Kamke differential equations. Mathematica 12.3 and Maple 2021

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February 2, 2024 Compiled on February 2, 2024 at 7:23pm

Contents

1 Introduction and summary of results

This report gives the result of solving the 1,940 differential equations from Kamke book in Mathematica 12.3 and Maple 2021 on windows 10, 64 bit OS. PC with 64 GB RAM, using Intel I7-8086K at 4GHz.

The command `AboluteTiming[]` was used in Mathematica to obtain the CPU time. In Maple the following commands were used for this purpose

```
t0 := time[real]():
timeOut := 5*60;
result_of_solve := timelimit(timeOut,dsolve(ode[i]));
cpu_time := time[real]()-t0:
```

Both Maple and Mathematica had a CPU time limit of 5 minutes to complete each problem else the problem is considered not solved and marked as timed out.

When Mathematica returned `DifferentialRoot` as a solution to an ODE this was counted as not solved. Similarly, when Maple returned `DESol` this was also counted as not solved.

Table 1 below summarizes the performance of each CAS system

system	% solved	mean CPU (sec)	result mean leaf size	total CPU (minutes)	total leaf size
Mathematica	88.04	2.66	2582.73	75.73	4411304
Maple	91.86	0.55	199.3	16.29	355148

Table 1: Summary of final results

Table 2 summarizes the Kamke equations used

book chapter	kamke equation numbers	This report numbers
Chapter 1, linear first order	1.1—1.576	1—576
Additional non-linear first order	N/A	577—1000
Chapter 2, linear second order	2.1—2.448	1001—1448
Chapter 3, linear third order	3.1—3.85	1449—1533
Chapter 4, linear fourth order	4.1—4.44	1534—1577
Chapter 5, linear fifth and higher order	5.1—5.13	1578—1590
Chapter 6, non-linear second order	6.1—6.246	1591—1836
Chapter 7, non-linear third and higher order	7.1—7.19	1837—1855
Chapter 8, system of ode, first order	8.1—8.57	1856—1912
Chapter 9, system of ode, higher order	9.1—9.28	1913–1940

Table 2: Kamke equation numbering

The following summarizes which equations are solved by each system

Not solved by Mathematica 47, 48, 49, 50, 55, 56, 74, 79, 82, 87, 110, 121, 188, 202, 203, 205, 206, 219, 234, 237, 250, 253, 265, 269, 331, 340, 367, 370, 395, 460, 461, 480, 482, 489, 503, 506, 507, 510, 531, 572, 575, 576, 835, 837, 862, 885, 894, 1015, 1019, 1026, 1028, 1030, 1031, 1032, 1038, 1072, 1073, 1074, 1075, 1076, 1077, 1081, 1082, 1083, 1099, 1126, 1157, 1205, 1212, 1216, 1236, 1278, 1306, 1323, 1362, 1408, 1419, 1439, 1440, 1441, 1443, 1444, 1457, 1458, 1459, 1460, 1461, 1462, 1463, 1473, 1474, 1476, 1484, 1489, 1500, 1515, 1531, 1540, 1541, 1542, 1543, 1544, 1547, 1552, 1569, 1572, 1576, 1581, 1586, 1593, 1595, 1596, 1598, 1599, 1601, 1603, 1605, 1606, 1608, 1609, 1611, 1612, 1615, 1616, 1617, 1618, 1619, 1623, 1624, 1625, 1626, 1627, 1628, 1634, 1636, 1637, 1639, 1642, 1643, 1644, 1645, 1648, 1649, 1658, 1659, 1660, 1662, 1663, 1664, 1665, 1666, 1667, 1672, 1673, 1675, 1677, 1678, 1680, 1684, 1685, 1686, 1690, 1692, 1693, 1695, 1696, 1702, 1704, 1708, 1710, 1713, 1719, 1729, 1732, 1734, 1735, 1737, 1738, 1739, 1742, 1751, 1757, 1761, 1762, 1777, 1779, 1780, 1788, 1789, 1797, 1801, 1802, 1806, 1807, 1811, 1815, 1816, 1818, 1819, 1820, 1821, 1825, 1827, 1831, 1832, 1836, 1838, 1839, 1840, 1841, 1850, 1851, 1854, 1855, 1890, 1905, 1915, 1918, 1919, 1920, 1921, 1922, 1927, 1928, 1929, 1932, 1933, 1934, 1935, 1936, 1937, 1940

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Solved by both Maple and Mathematica 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 51, 52, 53, 54, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 75, 76, 77, 78, 80, 81, 83, 84, 85, 86, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 204, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 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2 Problems table lookup

Final conclusion table for each equation is given by table 3 below. Clicking on the problem opens a new page that shows the result and links to download each problem as well.

Table 3: Breakdown of results for each Kamke differential equation

#	Mathematica			Maple			note on solution
	solved	cpu	leaf	solved	cpu	leaf	
Kamke 1	✓	0.466	1117	✓	0.056	1089	Linear first order, To Do
Kamke 2	✓	0.062	34	✓	0.021	25	Linear first order, integrating factor $y'(x) + ay(x) = f(x)$
Kamke 3	✓	0.073	40	✓	0.035	38	Linear first order, integrating factor $y'(x) + ay(x) = f(x)$
Kamke 4	✓	0.042	30	✓	0.007	18	Linear first order, integrating factor $y'(x) + g(x)y(x) = f(x)$
Kamke 5	✓	0.446	39	✓	0.242	21	Linear first order, integrating factor $y'(x) + g(x)y(x) = f(x)$
Kamke 6	✓	0.031	18	✓	0.037	15	Linear first order, integrating factor $y'(x) + g(x)y(x) = f(x)$
Kamke 7	✓	0.098	23	✓	0.011	13	Linear first order, integrating factor $y'(x) + g(x)y(x) = f(x)$
Kamke 8	✓	0.035	17	✓	0.022	13	Linear first order, integrating factor $y'(x) + g(x)y(x) = f(x)$
Kamke 9	✓	0.031	19	✓	0.027	14	Linear first order, integrating factor $y'(x) + g(x)y(x) = f(x)$

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#	Mathematica			Maple			note on solution
	solved	cpu	leaf	solved	cpu	leaf	
Kamke 10	✓	0.026	18	✓	0.022	15	Linear first order, integrating factor $y'(x) + g(x)y(x) = f(x)$
Kamke 11	✓	0.033	66	✓	0.025	24	Linear first order, integrating factor $y'(x) + g(x)y(x) = f(x)$
Kamke 12	✓	0.091	34	✓	0.056	8	Non-linear first order, Riccati, separable $y'(x) + y^2(x) = 1$
Kamke 13	✓	0.1	79	✓	0.206	79	Non-linear first order, Riccati, transform to second order Airy ODE using $y = -\frac{u'(x)}{uR(x)}$
Kamke 14	✓	0.127	254	✓	0.105	187	Non-linear first order, Riccati, transform to second order Airy ODE using $y = -\frac{u'(x)}{uR(x)}$
Kamke 15	✓	0.092	25	✓	0.181	33	Non-linear first order, Riccati, transform to separable first order
Kamke 16	✓	0.093	186	✓	0.117	49	Non-linear first order, Riccati, transform to first order separable using $y = y_p + \frac{1}{u}$
Kamke 17	✓	0.083	34	✓	0.126	24	Non-linear first order, Riccati, transform to second order standard ODE using $y = -\frac{u'(x)}{uR(x)}$

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#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 18	✓	0.104	50	✓	0.07	39	Non-linear first order, Riccati, transform to first order ODE solved using integrating factor using transformtion $y = y_p + \frac{1}{u}$
Kamke 19	✓	0.095	14	✓	0.045	16	Non-linear first order, Riccati, transform to first order separable
Kamke 20	✓	0.1	49	✓	0.077	34	Non-linear first order, Riccati, transform to Bernoulli first order non-linear first order then solve Bernoulli
Kamke 21	✓	0.375	7	✓	0.159	25	Non-linear first order, Riccati, transform to first order ODE solved using integrating factor using transformtion $y = y_p + \frac{1}{u}$
Kamke 22	✓	0.594	113	✓	0.438	128	Non-linear first order, Riccati, transform to first order ODE solved using integrating factor using transformtion $y = y_p + \frac{1}{u}$
Kamke 23	✓	0.087	43	✓	0.039	23	Non-linear first order, Riccati, Separable
Kamke 24	✓	0.148	277	✓	0.069	214	Non-linear first order, Riccati, transform to second order Emden-Fowler ODE using $y = -\frac{u'(x)}{uR(x)}$ solution in terms of Bessel functions
Kamke 25	✓	0.408	1835	✓	0.325	348	Non-linear first order, Riccati. To do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 26	✓	0.264	68	✓	0.283	45	Non-Linear first order, Riccati, transform to second order standard ODE using $y = -\frac{u'(x)}{uR(x)}$
Kamke 27	✓	0.273	120	✓	0.184	72	Non-linear first order, Riccati, transform to Bernoulli first order non-linear first order then solve Bernoulli
Kamke 28	✓	0.163	96	✓	0.096	51	Non-linear first order, Riccati, transform to Bernoulli first order non-linear first order then solve Bernoulli
Kamke 29	✓	0.116	39	✓	0.013	19	Non-linear first order, Bernoulli
Kamke 30	✓	0.201	230	✓	0.082	54	Non-Linear first order, Riccati, transform to second order Bessel like ODE using $y = -\frac{u'(x)}{uR(x)}$, solution uses Bessel functions
Kamke 31	✓	0.218	21	✓	0.056	23	Non-Linear first order, Riccati, separable
Kamke 32	✓	0.365	34	✓	0.262	28	Non-Linear first order, Riccati, has particular solution, solution using $y = y_p + \frac{1}{u}$ leads to first order solved using integrating factor
Kamke 33	✓	0.483	160	✓	0.457	58	Non-Linear first order, Riccati. Complicated algebra, will do later
Kamke 34	✓	0.116	54	✓	0.027	28	Non-Linear first order, Bernoulli. Standard method.

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 35	✓	0.138	61	✓	0.053	35	Non-Linear first order, Riccati. Transform to second order ODE using $y(x) = -\frac{u'(x)}{u(x)R(x)}$
Kamke 36	✓	0.405	195	✓	0.089	62	Non-Linear first order of Abel first kind with None constant invariant. Transform to a reverse Riccati then Solve the resulting second order Airy ODE, and transform solution back. Lots of algebra involved. Hardest ODE so far
Kamke 37	✓	1.058	78	✓	0.095	50	To Do
Kamke 38	✓	0.203	99	✓	0.03	34	Non-Linear first order. smart transformation makes it proper Abel first kind
Kamke 39	✓	0.142	54	✓	0.016	30	To Do
Kamke 40	✓	0.462	185	✓	0.066	48	To Do
Kamke 41	✓	0.279	103	✓	0.31	103	To Do
Kamke 42	✓	1.21	485	✓	0.027	40	To Do
Kamke 43	✓	7.115	490	✓	1.662	373	To Do
Kamke 44	✓	0.089	72	✓	0.015	53	Non-Linear first order Bernoulli. Solved using standard method of solving Bernoulli.
Kamke 45	✓	0.683	133	✓	0.165	123	To Do
Kamke 46	✓	0.313	228	✓	0.119	956	To Do
Kamke 47	✗	0	0	✗	0	0	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 48	✗	0	0	✗	0	0	To Do
Kamke 49	✗	0	0	✗	0	0	To Do
Kamke 50	✗	0	0	✗	0	0	To Do
Kamke 51	✓	2.214	355	✓	0.334	237	To Do
Kamke 52	✓	0.307	117	✓	0.418	61	To Do
Kamke 53	✓	0.679	96	✓	0.181	281	To Do
Kamke 54	✓	0.476	74	✓	0.204	38	To Do
Kamke 55	✗	0	0	✗	0	0	To Do
Kamke 56	✗	0	0	✗	0	0	To Do
Kamke 57	✓	0.075	26	✓	0.12	31	To Do
Kamke 58	✓	0.381	118	✓	0.077	68	To Do
Kamke 59	✓	0.326	96	✓	0.058	26	To Do
Kamke 60	✓	0.178	173	✓	0.019	29	Non-Linear first order, separable.
Kamke 61	✓	0.243	75	✓	0.015	50	To Do
Kamke 62	✓	3.205	44	✓	0.384	34	Non-Linear first order, special transformation makes it exact differential.
Kamke 63	✓	0.188	48	✓	5.726	35	To Do
Kamke 64	✓	0.381	269	✓	0.117	124	To Do
Kamke 65	✓	1.144	312	✓	0.059	47	To Do
Kamke 66	✓	0.213	67	✓	0.258	40	To Do
Kamke 67	✓	0.245	14	✓	0.022	51	To Do
Kamke 68	✓	1.076	373	✓	0.073	77	To Do
Kamke 69	✓	8.367	1163	✓	0.182	111	To Do
Kamke 70	✓	12.877	81	✓	0.177	113	To Do

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#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 71	✓	3.749	2237	✓	0.129	113	To Do
Kamke 72	✓	0.205	89	✓	0.019	64	To Do
Kamke 73	✓	1.717	733	✓	0.501	91	To Do
Kamke 74	✗	0	0	✗	0	0	To Do
Kamke 75	✓	0.215	20	✓	0.16	20	Non-Linear first order, Separable
Kamke 76	✓	0.27	116	✓	0.052	41	Non-Linear first order, Separable, integral requires the tangent half-angle substitution (Weierstrass substitution)
Kamke 77	✓	0.397	124	✓	0.083	54	Non-Linear first order, transform to Separable, becomes same as problem 76 above. Transform back after soluion.
Kamke 78	✓	0.942	1317	✓	0.112	89	Non-Linear first order, transform to Separable, integral requires the tangent half-angle substitution (Weierstrass substitution). Kamke calls this d'Alembertsche differential equation
Kamke 79	✗	0	0	✗	0	0	To Do
Kamke 80	✓	0.074	72	✓	1.2	41	To Do
Kamke 81	✓	1.878	220	✓	1.29	78	To Do
Kamke 82	✗	0	0	✗	0	0	To Do
Kamke 83	✓	0.43	69	✓	0.356	44	To Do
Kamke 84	✓	0.236	248	✓	0.046	37	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 85	✓	0.436	238	✓	0.427	153	To Do
Kamke 86	✓	0.532	184	✓	0.526	52	To Do
Kamke 87	✗	0	0	✗	0	0	To Do
Kamke 88	✓	0.551	2831	✓	0.243	256	Non-Linear first order, Riccati, Solved using $y = -\frac{u'}{uR(x)}$ substitution. Convert to second order Bessel ODE
Kamke 89	✓	0.014	42	✓	0.02	56	Linear first order, separable. Integration tricky. requires tangent half-angle substitution
Kamke 90	✓	0.024	24	✓	0.021	17	Linear first order, separable. integrating factor
Kamke 91	✓	0.025	15	✓	0.008	11	To Do
Kamke 92	✓	0.024	15	✓	0.006	12	Linear first order, separable. integrating factor
Kamke 93	✓	0.052	16	✓	0.027	12	To Do
Kamke 94	✓	0.042	25	✓	0.017	23	Linear first order, separable. integrating factor
Kamke 95	✓	0.082	32	✓	0.071	27	Non-Linear first order, Riccati, conversion to second order linear Lienard ODE using $y = \frac{u'}{uR}$. Solution in terms of Bessel functions
Kamke 96	✓	0.073	33	✓	0.035	11	Non-Linear first order, Riccati, but it is separable, so easy to solve by direct integration

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 97	✓	0.12	46	✓	0.042	25	Non-Linear first order, Riccati, smart substitution transfer it to separable first order, so easy to solve by direct integration
Kamke 98	✓	0.204	442	✓	0.062	38	To Do
Kamke 99	✓	0.195	244	✓	0.111	171	To Do
Kamke 100	✓	0.092	157	✓	0.079	59	Non-Linear first order, Riccati, conversion to second order linear Lienard ODE using $y = \frac{u'}{uR}$. Solution in terms of Bessel functions
Kamke 101	✓	0.09	18	✓	0.015	16	Non-Linear first order, Bernoulli, standard method of solving Bernoulli
Kamke 102	✓	0.1	36	✓	0.049	22	Non-Linear first order, Riccati, but transformed using smart substitution $y = xv$ to separable first order which is easily solved
Kamke 103	✓	0.176	90	✓	0.039	29	Non-Linear first order, Riccati, conversion to second order linear Sturm-Lioville ODE using $y = \frac{u'}{uR}$, then smart substitution $t = \frac{x^2}{2}$ is used to solve Sturm-Lioville by converting it to constant coefficients second order ODE
Kamke 104	✓	0.129	43	✓	0.062	63	Non-Linear first order, Riccati, conversion using smart transformation to separable first order

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#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 105	✓	0.244	473	✓	0.245	844	To Do
Kamke 106	✓	0.231	40	✓	0.069	41	To Do
Kamke 107	✓	0.378	1415	✓	0.271	174	To Do
Kamke 108	✓	0.083	15	✓	0.02	13	Non-Linear first order, Bernoulli, standard method of solving Bernoulli, leads to first order separable
Kamke 109	✓	0.081	17	✓	0.014	15	Non-Linear first order, Bernoulli, standard method of solving Bernoulli, leads to first order separable
Kamke 110	✗	0	0	✗	0	0	Non-Linear first order, Riccati, has known particular solution. Using $y = y_p + \frac{1}{u}$ convert it to first order separable ODE
Kamke 111	✓	0.508	55	✓	0.128	54	To Do
Kamke 112	✓	0.125	13	✓	0.05	27	Non-Linear first order, smart transformation $y(x) = xv(x)$ makes it separable
Kamke 113	✓	0.124	16	✓	0.036	33	Non-Linear first order, very similar to 112. Smart transformation $y(x) = xv(x)$ makes it separable
Kamke 114	✓	0.121	12	✓	3.354	28	Non-Linear first order, very similar to 113. Smart transformation $y(x) = xv(x)$ makes it separable

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 115	✓	0.305	221	✓	0.221	49	Non-Linear first order, Smart transformation $y(x) = xv(x)$ makes it separable
Kamke 116	✓	0.632	121	✓	0.23	86	To Do
Kamke 117	✓	0.189	21	✓	0.116	20	To Do
Kamke 118	✓	0.086	13	✓	0.089	8	To Do
Kamke 119	✓	0.108	17	✓	0.088	14	To Do
Kamke 120	✓	0.118	20	✓	0.173	17	To Do
Kamke 121	✗	0	0	✗	0	0	To Do
Kamke 122	✓	0.314	21	✓	0.403	16	To Do
Kamke 123	✓	0.134	19	✓	0.079	44	To Do
Kamke 124	✓	0.111	16	✓	0.04	12	To Do
Kamke 125	✓	0.198	16	✓	0.086	14	To Do
Kamke 126	✓	0.253	115	✓	0.03	29	To Do
Kamke 127	✓	0.317	186	✓	0.127	39	To Do
Kamke 128	✓	3.409	41	✓	0.279	33	To Do
Kamke 129	✓	0.208	44	✓	0.036	33	To Do
Kamke 130	✓	0.019	21	✓	0.007	15	To Do
Kamke 131	✓	0.232	21	✓	0.193	31	To Do
Kamke 132	✓	0.129	115	✓	0.042	153	To Do
Kamke 133	✓	0.018	27	✓	0.015	16	To Do
Kamke 134	✓	0.07	27	✓	0.01	17	To Do
Kamke 135	✓	0.02	14	✓	0.006	11	To Do
Kamke 136	✓	0.096	28	✓	0.016	18	To Do
Kamke 137	✓	0.099	16	✓	0.014	14	To Do

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#	Mathematica			Maple			note on solution
	solved	cpu	leaf	solved	cpu	leaf	
Kamke 138	✓	0.124	13	✓	0.034	11	To Do
Kamke 139	✓	0.256	821	✓	0.135	219	To Do
Kamke 140	✓	0.13	17	✓	0.112	20	To Do
Kamke 141	✓	0.169	67	✓	0.063	51	To Do
Kamke 142	✓	0.218	122	✓	0.091	52	To Do
Kamke 143	✓	0.112	51	✓	0.053	41	To Do
Kamke 144	✓	0.321	1787	✓	0.113	219	To Do
Kamke 145	✓	0.704	267	✓	0.103	117	To Do
Kamke 146	✓	0.991	78	✓	0.144	84	To Do
Kamke 147	✓	0.956	343	✓	0.206	178	To Do
Kamke 148	✓	0.023	30	✓	0.01	16	To Do
Kamke 149	✓	0.024	27	✓	0.011	20	To Do
Kamke 150	✓	0.023	30	✓	0.006	23	To Do
Kamke 151	✓	0.637	203	✓	0.047	85	To Do
Kamke 152	✓	0.416	40	✓	0.733	159	To Do
Kamke 153	✓	0.024	21	✓	0.017	20	To Do
Kamke 154	✓	0.025	26	✓	0.008	19	To Do
Kamke 155	✓	0.156	46	✓	0.097	14	To Do
Kamke 156	✓	0.098	21	✓	0.019	20	To Do
Kamke 157	✓	0.241	158	✓	0.252	231	To Do
Kamke 158	✓	0.163	31	✓	0.017	22	To Do
Kamke 159	✓	0.106	22	✓	0.145	13	To Do
Kamke 160	✓	0.139	27	✓	0.03	21	To Do
Kamke 161	✓	0.031	53	✓	0.018	27	To Do
Kamke 162	✓	0.534	133	✓	0.196	58	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 163	✓	0.124	43	✓	0.072	27	To Do
Kamke 164	✓	0.152	131	✓	0.191	100	To Do
Kamke 165	✓	0.137	22	✓	0.02	17	To Do
Kamke 166	✓	0.171	71	✓	0.148	97	To Do
Kamke 167	✓	0.102	35	✓	0.035	20	To Do
Kamke 168	✓	0.212	234	✓	0.163	140	To Do
Kamke 169	✓	2.324	149	✓	0.142	153	To Do
Kamke 170	✓	0.094	43	✓	0.016	23	To Do
Kamke 171	✓	0.096	17	✓	0.013	15	To Do
Kamke 172	✓	0.095	35	✓	0.3	26	To Do
Kamke 173	✓	0.107	29	✓	0.123	27	To Do
Kamke 174	✓	0.02	17	✓	0.006	13	To Do
Kamke 175	✓	0.033	24	✓	0.018	20	To Do
Kamke 176	✓	0.212	82	✓	0.097	30	To Do
Kamke 177	✓	0.166	22	✓	0.023	17	To Do
Kamke 178	✓	0.18	49	✓	0.104	61	To Do
Kamke 179	✓	0.662	2833	✓	0.145	112	To Do
Kamke 180	✓	0.412	132	✓	0.078	58	To Do
Kamke 181	✓	0.103	347	✓	0.075	28	To Do
Kamke 182	✓	0.24	96	✓	0.119	18	To Do
Kamke 183	✓	0.029	22	✓	0.015	18	To Do
Kamke 184	✓	1.291	704	✓	0.422	493	To Do
Kamke 185	✓	0.515	123	✓	0.037	63	To Do
Kamke 186	✓	0.323	19	✓	0.046	17	To Do
Kamke 187	✓	0.25	328	✓	0.075	60	To Do

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#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 188	✗	0	0	✓	0.027	32	To Do
Kamke 189	✓	0.488	91	✓	0.339	60	To Do
Kamke 190	✓	0.149	173	✓	0.006	29	To Do
Kamke 191	✓	0.141	39	✓	0.018	16	To Do
Kamke 192	✓	0.764	168	✓	0.018	36	To Do
Kamke 193	✓	0.031	16	✓	0.007	14	To Do
Kamke 194	✓	0.214	98	✓	0.025	23	To Do
Kamke 195	✓	0.184	27	✓	0.118	28	To Do
Kamke 196	✓	0.234	53	✓	0.157	29	To Do
Kamke 197	✓	0.134	98	✓	0.158	237	To Do
Kamke 198	✓	0.034	15	✓	0.037	13	To Do
Kamke 199	✓	0.232	15	✓	0.181	102	To Do
Kamke 200	✓	0.143	77	✓	0.096	53	To Do
Kamke 201	✓	0.164	39	✓	0.052	23	To Do
Kamke 202	✗	0	0	✗	0	0	To Do
Kamke 203	✗	0	0	✗	0	0	To Do
Kamke 204	✓	0.134	70	✓	0.325	92	To Do
Kamke 205	✗	0	0	✗	0	0	To Do
Kamke 206	✗	0	0	✗	0	0	To Do
Kamke 207	✓	0.101	47	✓	0.027	37	To Do
Kamke 208	✓	0.238	118	✓	0.088	106	To Do
Kamke 209	✓	0.134	84	✓	0.012	21	To Do
Kamke 210	✓	0.098	47	✓	0.026	33	To Do
Kamke 211	✓	0.261	41	✓	0.053	31	To Do
Kamke 212	✓	0.398	95	✓	0.141	30	To Do

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#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 213	✓	0.146	71	✓	0.823	66	To Do
Kamke 214	✓	0.179	78	✓	0.18	48	To Do
Kamke 215	✓	0.169	80	✓	0.204	51	To Do
Kamke 216	✓	0.148	82	✓	0.204	51	To Do
Kamke 217	✓	0.028	29	✓	0.036	23	To Do
Kamke 218	✓	0.152	257	✓	0.169	57	To Do
Kamke 219	✗	0	0	✗	0	0	To Do
Kamke 220	✓	0.127	57	✓	0.028	43	To Do
Kamke 221	✓	0.033	35	✓	0.117	21	To Do
Kamke 222	✓	0.131	65	✓	0.091	32	To Do
Kamke 223	✓	0.043	55	✓	0.184	51	To Do
Kamke 224	✓	0.034	29	✓	0.121	35	To Do
Kamke 225	✓	0.073	33	✓	0.108	20	To Do
Kamke 226	✓	0.035	35	✓	0.102	21	To Do
Kamke 227	✓	0.028	107	✓	0.178	33	To Do
Kamke 228	✓	0.463	3357	✓	0.416	271	To Do
Kamke 229	✓	0.036	121	✓	0.171	32	To Do
Kamke 230	✓	0.312	98	✓	0.053	100	To Do
Kamke 231	✓	3.808	252	✓	0.254	178	To Do
Kamke 232	✓	0.147	56	✓	0.019	39	To Do
Kamke 233	✓	0.221	38	✓	0.03	30	To Do
Kamke 234	✗	0	0	✗	0	0	To Do
Kamke 235	✓	0.21	40	✓	0.056	30	To Do
Kamke 236	✓	0.238	114	✓	0.065	141	To Do
Kamke 237	✗	0	0	✗	0	0	To Do

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#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 238	✓	0.399	192	✓	0.079	93	To Do
Kamke 239	✓	0.166	54	✓	0.171	59	To Do
Kamke 240	✓	0.132	41	✓	0.029	34	To Do
Kamke 241	✓	0.124	41	✓	0.017	33	To Do
Kamke 242	✓	0.113	60	✓	0.019	39	To Do
Kamke 243	✓	14.992	487	✓	0.132	391	To Do
Kamke 244	✓	14.38	484	✓	0.109	391	To Do
Kamke 245	✓	0.554	1453	✓	0.898	31	To Do
Kamke 246	✓	0.2	80	✓	0.079	63	To Do
Kamke 247	✓	13.318	693	✓	0.214	517	To Do
Kamke 248	✓	0.254	110	✓	0.02	75	To Do
Kamke 249	✓	5.659	115	✓	0.255	202	To Do
Kamke 250	✗	0	0	✗	0	0	To Do
Kamke 251	✓	0.149	60	✓	0.016	51	To Do
Kamke 252	✓	10.007	819	✓	0.662	1338	To Do
Kamke 253	✗	0	0	✗	0	0	To Do
Kamke 254	✓	0.149	99	✓	0.027	59	To Do
Kamke 255	✓	6.019	30	✓	0.214	74	To Do
Kamke 256	✓	0.033	21	✓	0.154	31	To Do
Kamke 257	✓	0.538	39	✓	0.119	98	To Do
Kamke 258	✓	0.142	43	✓	0.028	33	To Do
Kamke 259	✓	0.282	50	✓	0.033	51	To Do
Kamke 260	✓	0.145	80	✓	0.029	59	To Do
Kamke 261	✓	0.763	32	✓	0.171	18	To Do
Kamke 262	✓	0.205	101	✓	0.25	65	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 263	✓	0.11	181	✓	0.162	173	To Do
Kamke 264	✓	0.445	680	✓	0.433	37	To Do
Kamke 265	✗	0	0	✗	0	0	To Do
Kamke 266	✓	2.499	69	✓	2.078	65	To Do
Kamke 267	✓	0.315	36	✓	0.041	32	To Do
Kamke 268	✓	0.199	146	✓	0.09	118	To Do
Kamke 269	✗	0	0	✗	0	0	To Do
Kamke 270	✓	0.152	327	✓	0.027	319	To Do
Kamke 271	✓	0.301	370	✓	0.191	352	To Do
Kamke 272	✓	0.165	42	✓	0.155	43	To Do
Kamke 273	✓	0.194	297	✓	0.03	401	To Do
Kamke 274	✓	0.201	411	✓	0.039	657	To Do
Kamke 275	✓	0.15	18	✓	0.072	30	To Do
Kamke 276	✓	0.156	61	✓	0.049	47	To Do
Kamke 277	✓	0.118	53	✓	0.312	41	To Do
Kamke 278	✓	0.246	39	✓	0.061	28	To Do
Kamke 279	✓	0.643	107	✓	0.161	116	To Do
Kamke 280	✓	0.151	21	✓	0.067	24	To Do
Kamke 281	✓	0.224	75	✓	0.053	55	To Do
Kamke 282	✓	0.257	2129	✓	0.337	71	To Do
Kamke 283	✓	0.39	477	✓	0.079	407	To Do
Kamke 284	✓	0.125	59	✓	0.12	21	To Do
Kamke 285	✓	0.186	402	✓	0.095	432	To Do
Kamke 286	✓	0.292	3501	✓	1.959	1337	To Do
Kamke 287	✓	3.115	77	✓	0.074	56	To Do

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#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 288	✓	0.276	534	✓	0.04	579	To Do
Kamke 289	✓	0.209	115	✓	0.039	115	To Do
Kamke 290	✓	0.518	831	✓	0.148	1388	To Do
Kamke 291	✓	1.276	39	✓	0.161	50	To Do
Kamke 292	✓	51.552	1716	✓	0.043	115	To Do
Kamke 293	✓	0.208	661	✓	0.295	35	To Do
Kamke 294	✓	0.287	71	✓	0.093	112	To Do
Kamke 295	✓	0.276	31	✓	0.269	29	To Do
Kamke 296	✓	0.537	102	✓	0.599	135	To Do
Kamke 297	✓	0.19	216	✓	0.293	29	To Do
Kamke 298	✓	0.121	72	✓	0.024	73	To Do
Kamke 299	✓	0.14	371	✓	0.233	276	To Do
Kamke 300	✓	0.1	99	✓	0.025	83	To Do
Kamke 301	✓	0.162	64	✓	0.221	25	To Do
Kamke 302	✓	0.122	70	✓	0.134	133	To Do
Kamke 303	✓	0.166	25	✓	0.24	34	To Do
Kamke 304	✓	0.483	44	✓	0.256	44	To Do
Kamke 305	✓	0.207	1277	✓	0.021	21	To Do
Kamke 306	✓	0.155	201	✓	0.263	231	To Do
Kamke 307	✓	0.27	149	✓	0.052	125	To Do
Kamke 308	✓	0.016	55	✓	0.018	37	To Do
Kamke 309	✓	0.118	151	✓	0.043	113	To Do
Kamke 310	✓	0.191	159	✓	0.151	125	To Do
Kamke 311	✓	0.251	2201	✓	0.117	50	To Do
Kamke 312	✓	0.763	204	✓	1.648	240	To Do

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#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 313	✓	0.391	537	✓	0.202	748	To Do
Kamke 314	✓	0.171	188	✓	0.07	158	To Do
Kamke 315	✓	0.341	368	✓	0.074	370	To Do
Kamke 316	✓	0.211	48	✓	0.071	53	To Do
Kamke 317	✓	0.365	23	✓	0.168	29	To Do
Kamke 318	✓	0.269	4284	✓	0.021	28	To Do
Kamke 319	✓	0.177	302	✓	0.033	35	To Do
Kamke 320	✓	0.132	76	✓	0.108	78	To Do
Kamke 321	✓	0.526	47	✓	0.231	42	To Do
Kamke 322	✓	0.317	2077	✓	0.029	29	To Do
Kamke 323	✓	0.277	463	✓	0.116	630	To Do
Kamke 324	✓	0.134	723	✓	0.128	815	To Do
Kamke 325	✓	0.226	139	✓	0.691	124	To Do
Kamke 326	✓	3.456	13289	✓	0.537	160	To Do
Kamke 327	✓	0.351	669	✓	0.158	583	To Do
Kamke 328	✓	0.314	42	✓	0.224	33	To Do
Kamke 329	✓	0.833	102	✓	0.466	73	To Do
Kamke 330	✓	0.128	52	✓	0.036	22	To Do
Kamke 331	✗	0	0	✓	0.241	78	To Do
Kamke 332	✓	0.346	34	✓	0.017	33	To Do
Kamke 333	✓	0.493	72	✓	0.104	32	To Do
Kamke 334	✓	0.13	39	✓	0.026	19	To Do
Kamke 335	✓	0.199	75	✓	0.01	50	To Do
Kamke 336	✓	0.317	53	✓	0.037	41	To Do
Kamke 337	✓	0.258	161	✓	0.108	28	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 338	✓	96.477	17681	✓	0.688	129	To Do
Kamke 339	✓	0.416	27	✓	0.222	27	To Do
Kamke 340	✗	0	0	✗	0	0	To Do
Kamke 341	✓	0.275	33	✓	0.069	33	To Do
Kamke 342	✓	0.624	163	✓	0.047	17	To Do
Kamke 343	✓	0.176	35	✓	0.114	27	To Do
Kamke 344	✓	0.203	23	✓	0.063	19	To Do
Kamke 345	✓	0.23	35	✓	0.097	36	To Do
Kamke 346	✓	0.456	24	✓	0.281	19	To Do
Kamke 347	✓	0.339	32	✓	0.158	12	To Do
Kamke 348	✓	0.213	17	✓	0.099	15	To Do
Kamke 349	✓	0.255	15	✓	0.044	17	To Do
Kamke 350	✓	0.654	53	✓	0.872	226	To Do
Kamke 351	✓	0.556	61	✓	0.434	55	To Do
Kamke 352	✓	0.607	43	✓	0.43	33	To Do
Kamke 353	✓	0.089	14	✓	0.089	12	To Do
Kamke 354	✓	0.192	145	✓	0.073	108	To Do
Kamke 355	✓	0.191	17	✓	0.096	15	To Do
Kamke 356	✓	0.275	21	✓	0.112	19	To Do
Kamke 357	✓	0.605	35	✓	0.606	13	To Do
Kamke 358	✓	0.163	29	✓	0.096	11	To Do
Kamke 359	✓	0.355	45	✓	0.074	28	To Do
Kamke 360	✓	4.649	369	✓	0.375	48	To Do
Kamke 361	✓	0.961	31	✓	0.198	22	To Do
Kamke 362	✓	0.384	23	✓	0.241	23	To Do

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#	Mathematica			Maple			note on solution
	solved	cpu	leaf	solved	cpu	leaf	
Kamke 363	✓	0.403	33	✓	0.081	35	To Do
Kamke 364	✓	0.483	31	✓	0.199	23	To Do
Kamke 365	✓	0.393	156	✓	0.355	42	To Do
Kamke 366	✓	0.315	91	✓	0.137	45	To Do
Kamke 367	✗	0	0	✗	0	0	To Do
Kamke 368	✓	1.475	795	✗	0	0	To Do
Kamke 369	✓	0.088	107	✓	0.114	68	To Do
Kamke 370	✗	0	0	✗	0	0	To Do
Kamke 371	✓	0.057	37	✓	0.126	20	To Do
Kamke 372	✓	0.004	27	✓	0.05	232	To Do
Kamke 373	✓	0.326	185	✓	0.238	49	To Do
Kamke 374	✓	0.087	73	✓	0.036	85	To Do
Kamke 375	✓	0.034	71	✓	0.032	49	To Do
Kamke 376	✓	0.262	110	✓	0.768	279	To Do
Kamke 377	✓	0.004	19	✓	0.021	24	To Do
Kamke 378	✓	0.004	18	✓	0.025	20	To Do
Kamke 379	✓	0.004	18	✓	0.022	22	To Do
Kamke 380	✓	0.405	1757	✓	0.04	619	To Do
Kamke 381	✓	0.424	1757	✓	0.035	579	To Do
Kamke 382	✓	0.185	201	✓	0.037	146	To Do
Kamke 383	✓	5.636	1118	✗	0	0	To Do
Kamke 384	✓	0.005	24	✓	0.03	50	To Do
Kamke 385	✓	0.735	6217	✓	0.263	169	To Do
Kamke 386	✓	0.194	119	✓	0.556	27	To Do
Kamke 387	✓	2.393	190	✓	0.673	115	To Do

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#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 388	✓	0.715	61	✓	0.084	223	To Do
Kamke 389	✓	0.081	57	✓	0.529	71	To Do
Kamke 390	✓	1.871	154	✓	0.418	281	To Do
Kamke 391	✓	0.016	29	✓	0.01	22	To Do
Kamke 392	✓	0.224	27	✓	0.502	50	To Do
Kamke 393	✓	0.104	31	✓	0.175	77	To Do
Kamke 394	✓	0.374	89	✓	5.127	109	To Do
Kamke 395	✗	0	0	✗	0	0	To Do
Kamke 396	✓	0.07	29	✓	0.017	20	To Do
Kamke 397	✓	0.751	143	✓	0.343	128	To Do
Kamke 398	✓	1.756	258	✓	2.125	138	To Do
Kamke 399	✓	0.004	20	✓	0.026	22	To Do
Kamke 400	✓	0.482	135	✓	0.186	74	To Do
Kamke 401	✓	0.33	1093	✓	0.044	580	To Do
Kamke 402	✓	6.552	1211	✓	0.154	101	To Do
Kamke 403	✓	0.253	116	✓	0.815	247	To Do
Kamke 404	✓	2.58	795	✓	0.26	389	To Do
Kamke 405	✓	1.312	61	✓	0.19	375	To Do
Kamke 406	✓	0.866	57	✓	0.094	262	To Do
Kamke 407	✓	0.036	51	✓	0.036	39	To Do
Kamke 408	✓	0.288	97	✓	0.059	73	To Do
Kamke 409	✓	2.373	50	✓	0.119	63	To Do
Kamke 410	✓	30.857	90	✓	0.125	64	To Do
Kamke 411	✓	0.264	99	✓	0.059	65	To Do
Kamke 412	✓	0.45	3229	✓	0.052	146	To Do

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#	Mathematica			Maple			note on solution
	solved	cpu	leaf	solved	cpu	leaf	
Kamke 413	✓	0.13	673	✓	0.184	269	To Do
Kamke 414	✓	0.152	107	✓	0.19	269	To Do
Kamke 415	✓	0.343	25	✓	0.237	95	To Do
Kamke 416	✓	2.465	383	✓	0.075	136	To Do
Kamke 417	✓	0.004	16	✓	0.04	35	To Do
Kamke 418	✓	0.993	220	✓	0.051	42	To Do
Kamke 419	✓	1.145	9073	✓	0.046	109	To Do
Kamke 420	✓	0.308	777	✓	0.053	689	To Do
Kamke 421	✓	0.051	27	✓	0.046	32	To Do
Kamke 422	✓	0.085	81	✓	0.043	30	To Do
Kamke 423	✓	0.095	59	✓	0.049	44	To Do
Kamke 424	✓	0.892	223	✓	0.115	193	To Do
Kamke 425	✓	0.005	21	✓	0.041	45	To Do
Kamke 426	✓	0.005	28	✓	0.043	51	To Do
Kamke 427	✓	0.005	24	✓	0.045	60	To Do
Kamke 428	✓	0.006	22	✓	0.075	66	To Do
Kamke 429	✓	0.006	30	✓	0.072	72	To Do
Kamke 430	✓	254.175	507	✓	2.898	1602	To Do
Kamke 431	✓	0.059	81	✓	0.208	62	To Do
Kamke 432	✓	1.278	70	✓	10.385	242	To Do
Kamke 433	✓	1.208	22	✓	0.216	34	To Do
Kamke 434	✓	0.053	27	✓	0.007	7	To Do
Kamke 435	✓	0.084	61	✓	0.221	22	To Do
Kamke 436	✓	0.071	26	✓	2.895	61	To Do
Kamke 437	✓	0.366	47	✓	0.05	36	To Do

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#	Mathematica			Maple			note on solution
	solved	cpu	leaf	solved	cpu	leaf	
Kamke 438	✓	0.028	21	✓	0.013	17	To Do
Kamke 439	✓	0.051	49	✓	0.062	33	To Do
Kamke 440	✓	0.027	19	✓	0.012	15	To Do
Kamke 441	✓	0.101	65	✓	1.013	137	To Do
Kamke 442	✓	0.034	28	✓	0.026	21	To Do
Kamke 443	✓	2.977	10121	✓	1.482	221	To Do
Kamke 444	✓	0.43	75	✓	0.837	120	To Do
Kamke 445	✓	0.071	49	✓	0.018	35	To Do
Kamke 446	✓	0.045	45	✓	0.054	57	To Do
Kamke 447	✓	0.011	89	✓	0.035	33	To Do
Kamke 448	✓	0.133	349	✗	0	0	To Do
Kamke 449	✓	0.035	27	✓	0.017	23	To Do
Kamke 450	✓	0.369	26	✓	0.727	51	To Do
Kamke 451	✓	0.057	51	✓	0.065	78	To Do
Kamke 452	✓	0.018	23	✗	0	0	To Do
Kamke 453	✓	1.062	327	✓	2.323	229	To Do
Kamke 454	✓	0.423	241	✓	0.154	106	To Do
Kamke 455	✓	0.959	123	✓	0.445	66	To Do
Kamke 456	✓	0.15	421	✓	0.395	33	To Do
Kamke 457	✓	0.453	118	✓	0.957	45	To Do
Kamke 458	✓	0.023	120	✓	0.061	90	To Do
Kamke 459	✓	3.251	271	✓	0.625	65	To Do
Kamke 460	✗	0	0	✗	0	0	To Do
Kamke 461	✗	0	0	✗	0	0	To Do
Kamke 462	✓	0.032	43	✓	0.044	27	To Do

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#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 463	✓	0.052	47	✓	0.112	50	To Do
Kamke 464	✓	0.107	52	✓	0.706	70	To Do
Kamke 465	✓	0.058	107	✓	0.085	210	To Do
Kamke 466	✓	3.607	433	✓	0.668	71	To Do
Kamke 467	✓	0.295	226	✓	0.084	148	To Do
Kamke 468	✓	8.599	753	✓	0.094	181	To Do
Kamke 469	✓	0.423	157	✓	0.14	264	To Do
Kamke 470	✓	0.464	143	✓	0.473	87	To Do
Kamke 471	✓	0.017	47	✓	0.026	33	To Do
Kamke 472	✓	0.592	269	✓	0.487	121	To Do
Kamke 473	✓	0.348	165	✓	0.63	71	To Do
Kamke 474	✓	0.193	135	✓	0.999	152	To Do
Kamke 475	✓	0.119	57	✓	0.74	67	To Do
Kamke 476	✓	0.459	143	✓	0.494	87	To Do
Kamke 477	✓	0.245	146	✓	0.49	622	To Do
Kamke 478	✓	0.349	223	✓	0.118	88	To Do
Kamke 479	✓	8.242	576	✓	0.375	929	To Do
Kamke 480	✗	0	0	✗	0	0	To Do
Kamke 481	✓	0.031	49	✓	0.032	35	To Do
Kamke 482	✗	0	0	✗	0	0	To Do
Kamke 483	✓	0.23	71	✓	0.081	103	To Do
Kamke 484	✓	0.196	81	✓	0.08	115	To Do
Kamke 485	✓	0.059	29	✗	0	0	To Do
Kamke 486	✓	0.065	117	✓	0.246	54	To Do
Kamke 487	✓	0.507	157	✓	0.464	100	To Do

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#	Mathematica			Maple			note on solution
	solved	cpu	leaf	solved	cpu	leaf	
Kamke 488	✓	0.346	85	✓	0.5	111	To Do
Kamke 489	✗	0	0	✓	2.316	551	To Do
Kamke 490	✓	0.499	70	✓	0.479	145	To Do
Kamke 491	✓	0.874	79	✓	0.664	195	To Do
Kamke 492	✓	0.098	97	✓	0.56	122	To Do
Kamke 493	✓	8.486	615	✓	1.067	111	To Do
Kamke 494	✓	0.133	49	✓	0.193	161	To Do
Kamke 495	✓	0.239	83	✓	0.668	61	To Do
Kamke 496	✓	26.125	17831	✓	0.257	130	To Do
Kamke 497	✓	0.172	76	✓	0.528	203	To Do
Kamke 498	✓	0.133	155	✓	0.388	99	To Do
Kamke 499	✓	0.404	212	✓	0.254	189	To Do
Kamke 500	✓	1.058	100	✓	0.978	220	To Do
Kamke 501	✓	22.487	975	✓	4.77	215	To Do
Kamke 502	✓	1.273	100	✓	0.354	195	To Do
Kamke 503	✗	0	0	✗	0	0	To Do
Kamke 504	✓	0.075	36	✓	0.822	247	To Do
Kamke 505	✓	0.11	73	✓	0.037	52	To Do
Kamke 506	✗	0	0	✗	0	0	To Do
Kamke 507	✗	0	0	✗	0	0	To Do
Kamke 508	✓	2.625	88	✓	2.451	60	To Do
Kamke 509	✓	0.333	34	✓	1.554	212	To Do
Kamke 510	✗	0	0	✗	0	0	To Do
Kamke 511	✓	1.799	229	✓	5.067	199	To Do
Kamke 512	✓	7.257	713	✓	6.647	135	To Do

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#	Mathematica			Maple			note on solution
	solved	cpu	leaf	solved	cpu	leaf	
Kamke 513	✓	0.083	81	✓	1.872	1134	To Do
Kamke 514	✓	10.673	605	✓	0.266	87	To Do
Kamke 515	✓	2.193	1922	✓	1.44	117	To Do
Kamke 516	✓	0.573	253	✓	0.979	139	To Do
Kamke 517	✓	0.606	283	✓	0.972	78	To Do
Kamke 518	✓	0.591	236	✓	0.462	126	To Do
Kamke 519	✓	0.702	353	✓	0.537	197	To Do
Kamke 520	✓	0.025	1115	✓	0.336	249	To Do
Kamke 521	✓	0.004	14	✓	0.036	33	To Do
Kamke 522	✓	0.009	20	✓	0.2	44	To Do
Kamke 523	✓	145.417	392	✓	0.223	231	To Do
Kamke 524	✓	0.02	422	✓	0.207	243	To Do
Kamke 525	✓	0.089	135	✓	0.237	122	To Do
Kamke 526	✓	0.077	45	✓	0.016	32	To Do
Kamke 527	✓	0.017	20	✓	0.929	43	To Do
Kamke 528	✓	0.989	398	✓	0.124	86	To Do
Kamke 529	✓	43.474	1758	✓	0.195	1251	To Do
Kamke 530	✓	8.896	648	✓	0.25	424	To Do
Kamke 531	✗	0	0	✗	0	0	To Do
Kamke 532	✓	0.029	1124	✓	0.478	874	To Do
Kamke 533	✓	0.005	16	✓	0.197	76	To Do
Kamke 534	✓	0.063	114	✓	0.059	84	To Do
Kamke 535	✓	0.05	49	✓	0.052	51	To Do
Kamke 536	✓	0.016	64	✓	0.04	52	To Do
Kamke 537	✓	0.036	16	✓	4.172	250	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 538	✓	9.984	113	✓	1.191	1625	To Do
Kamke 539	✓	0.043	45	✓	0.056	32	To Do
Kamke 540	✓	0.038	69	✓	0.076	109	To Do
Kamke 541	✓	0.031	39	✓	0.533	103	To Do
Kamke 542	✓	0.034	20	✓	0.522	107	To Do
Kamke 543	✓	0.034	55	✗	0	0	To Do
Kamke 544	✓	0.083	22	✓	0.822	4201	To Do
Kamke 545	✓	0.926	323	✓	0.214	144	To Do
Kamke 546	✓	0.042	113	✓	0.099	171	To Do
Kamke 547	✓	3.173	490	✓	0.254	118	To Do
Kamke 548	✓	1.095	479	✓	0.413	250	To Do
Kamke 549	✓	0.252	216	✓	0.758	553	To Do
Kamke 550	✓	0.832	488	✓	0.273	60	To Do
Kamke 551	✓	0.185	86	✓	0.622	55	To Do
Kamke 552	✓	0.053	41	✓	0.087	43	To Do
Kamke 553	✓	0.271	56	✓	0.063	36	To Do
Kamke 554	✓	0.171	54	✓	0.39	32	To Do
Kamke 555	✓	0.007	20	✓	0.033	15	To Do
Kamke 556	✓	5.329	67	✓	0.213	581	To Do
Kamke 557	✓	0.049	39	✓	0.26	74	To Do
Kamke 558	✓	1.131	327	✓	0.341	223	To Do
Kamke 559	✓	0.4	212	✓	0.248	215	To Do
Kamke 560	✓	17.17	110	✓	0.833	1120	To Do
Kamke 561	✓	2.054	2138	✓	2.26	50	To Do
Kamke 562	✓	0.157	84	✓	0.185	3306	To Do

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#	Mathematica			Maple			note on solution
	solved	cpu	leaf	solved	cpu	leaf	
Kamke 563	✓	0.232	59	✓	0.225	66	To Do
Kamke 564	✓	0.005	17	✓	0.029	32	To Do
Kamke 565	✓	0.03	25	✓	0.257	17	To Do
Kamke 566	✓	0.045	38	✓	0.041	16	To Do
Kamke 567	✓	0.09	49	✓	0.055	18	To Do
Kamke 568	✓	0.105	34	✓	0.067	32	To Do
Kamke 569	✓	0.111	59	✓	0.355	147	To Do
Kamke 570	✓	1.935	58	✓	0.065	30	To Do
Kamke 571	✓	0.163	124	✓	0.517	169	To Do
Kamke 572	✗	0	0	✗	0	0	To Do
Kamke 573	✓	0.029	42	✓	0.125	24	To Do
Kamke 574	✓	0.038	102	✓	0.141	41	To Do
Kamke 575	✗	0	0	✗	0	0	To Do
Kamke 576	✗	0	0	✗	0	0	To Do
Kamke 577	✓	0.309	243	✓	0.039	28	To Do
Kamke 578	✓	0.257	100	✓	0.049	22	To Do
Kamke 579	✓	0.322	514	✓	0.052	35	To Do
Kamke 580	✓	0.33	203	✓	0.07	31	To Do
Kamke 581	✓	0.304	144	✓	0.101	32	To Do
Kamke 582	✓	0.31	142	✓	0.237	30	To Do
Kamke 583	✓	0.278	126	✓	0.148	31	To Do
Kamke 584	✓	0.331	115	✓	0.107	35	To Do
Kamke 585	✓	0.275	205	✓	0.451	120	To Do
Kamke 586	✓	0.728	975	✓	0.251	39	To Do
Kamke 587	✓	0.299	123	✓	0.119	29	To Do

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Table 3 – continued from previous page

#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 588	✓	0.235	109	✓	0.121	53	To Do
Kamke 589	✓	0.3	245	✓	0.155	38	To Do
Kamke 590	✓	0.286	94	✓	0.132	28	To Do
Kamke 591	✓	0.593	253	✓	0.226	108	To Do
Kamke 592	✓	0.712	241	✓	0.168	33	To Do
Kamke 593	✓	0.607	221	✓	0.274	35	To Do
Kamke 594	✓	0.48	236	✓	0.129	67	To Do
Kamke 595	✓	0.457	204	✓	0.165	72	To Do
Kamke 596	✓	0.35	156	✓	0.092	26	To Do
Kamke 597	✓	0.432	130	✓	0.421	37	To Do
Kamke 598	✓	0.189	37	✓	0.02	29	To Do
Kamke 599	✓	0.191	95	✓	0.095	57	To Do
Kamke 600	✓	0.323	246	✓	0.137	38	To Do
Kamke 601	✓	0.297	182	✓	0.124	61	To Do
Kamke 602	✓	0.596	167	✓	0.121	33	To Do
Kamke 603	✓	0.41	117	✓	0.138	27	To Do
Kamke 604	✓	0.456	143	✓	0.158	30	To Do
Kamke 605	✓	0.557	145	✓	0.121	29	To Do
Kamke 606	✓	0.69	361	✓	0.615	34	To Do
Kamke 607	✓	0.267	121	✓	0.096	22	To Do
Kamke 608	✓	0.596	274	✓	0.157	40	To Do
Kamke 609	✓	0.318	117	✓	0.177	22	To Do
Kamke 610	✓	0.106	25	✓	0.011	20	To Do
Kamke 611	✓	0.333	191	✓	0.083	28	To Do
Kamke 612	✓	0.452	199	✓	0.125	27	To Do

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#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 613	✓	0.35	226	✓	0.105	23	To Do
Kamke 614	✓	0.463	177	✓	0.393	60	To Do
Kamke 615	✓	0.311	77	✓	0.125	26	To Do
Kamke 616	✓	0.583	177	✓	0.095	26	To Do
Kamke 617	✓	1.237	615	✓	0.243	47	To Do
Kamke 618	✓	0.235	25	✓	0.513	34	To Do
Kamke 619	✓	0.837	330	✓	0.373	81	To Do
Kamke 620	✓	0.937	205	✓	0.227	37	To Do
Kamke 621	✓	0.074	445	✓	0.244	59	To Do
Kamke 622	✓	0.368	140	✓	0.214	77	To Do
Kamke 623	✓	0.307	77	✓	0.255	49	To Do
Kamke 624	✓	32.167	9837	✓	33.316	46	To Do
Kamke 625	✓	0.348	56	✓	0.299	53	To Do
Kamke 626	✓	0.245	88	✓	0.437	115	To Do
Kamke 627	✓	0.955	25	✓	0.253	35	To Do
Kamke 628	✓	0.197	38	✓	0.31	23	To Do
Kamke 629	✓	0.989	47	✓	0.251	62	To Do
Kamke 630	✓	0.502	101	✓	0.386	98	To Do
Kamke 631	✓	0.237	38	✓	0.249	23	To Do
Kamke 632	✓	0.243	65	✓	0.331	54	To Do
Kamke 633	✓	0.267	85	✓	1.121	52	To Do
Kamke 634	✓	0.246	33	✓	0.338	26	To Do
Kamke 635	✓	0.226	33	✓	0.277	22	To Do
Kamke 636	✓	0.143	24	✓	0.212	19	To Do
Kamke 637	✓	11.405	59	✓	0.197	84	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 638	✓	0.146	41	✓	0.196	35	To Do
Kamke 639	✓	0.193	53	✓	0.247	50	To Do
Kamke 640	✓	0.31	53	✓	0.367	47	To Do
Kamke 641	✓	0.251	35	✓	0.339	26	To Do
Kamke 642	✓	0.191	105	✓	0.275	286	To Do
Kamke 643	✓	0.23	31	✓	0.24	22	To Do
Kamke 644	✓	0.41	34	✓	0.476	27	To Do
Kamke 645	✓	0.096	20	✓	0.156	14	To Do
Kamke 646	✓	0.33	35	✓	0.379	23	To Do
Kamke 647	✓	0.418	115	✓	0.302	460	To Do
Kamke 648	✓	0.589	128	✓	0.843	41	To Do
Kamke 649	✓	0.306	37	✓	0.296	27	To Do
Kamke 650	✓	0.577	109	✓	0.312	28	To Do
Kamke 651	✓	0.112	16	✓	0.118	13	To Do
Kamke 652	✓	1.348	101	✓	0.177	27	To Do
Kamke 653	✓	0.843	94	✓	0.262	24	To Do
Kamke 654	✓	0.371	37	✓	0.372	23	To Do
Kamke 655	✓	14.457	82	✓	0.76	66	To Do
Kamke 656	✓	0.141	20	✓	0.132	15	To Do
Kamke 657	✓	0.298	37	✓	0.271	26	To Do
Kamke 658	✓	0.531	41	✓	0.422	28	To Do
Kamke 659	✓	0.989	164	✓	0.351	41	To Do
Kamke 660	✓	0.594	109	✓	0.322	29	To Do
Kamke 661	✓	0.955	164	✓	0.349	39	To Do
Kamke 662	✓	0.316	37	✓	0.301	26	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 663	✓	1.71	101	✓	0.169	27	To Do
Kamke 664	✓	1.024	94	✓	0.243	25	To Do
Kamke 665	✓	0.533	41	✓	0.694	28	To Do
Kamke 666	✓	0.168	29	✓	0.249	24	To Do
Kamke 667	✓	1.159	90	✓	0.303	82	To Do
Kamke 668	✓	0.756	78	✓	0.86	58	To Do
Kamke 669	✓	0.834	264	✓	0.195	72	To Do
Kamke 670	✓	0.591	62	✓	0.365	70	To Do
Kamke 671	✓	0.409	192	✓	0.273	237	To Do
Kamke 672	✓	2.205	4512	✓	0.195	36	To Do
Kamke 673	✓	0.363	23	✓	0.422	17	To Do
Kamke 674	✓	1.012	91	✓	0.44	27	To Do
Kamke 675	✓	0.395	48	✓	0.073	37	To Do
Kamke 676	✓	0.533	144	✓	0.643	43	To Do
Kamke 677	✓	0.232	80	✓	0.085	48	To Do
Kamke 678	✓	0.437	101	✓	0.475	37	To Do
Kamke 679	✓	0.195	59	✓	0.061	37	To Do
Kamke 680	✓	1.234	89	✓	0.436	28	To Do
Kamke 681	✓	0.269	84	✓	0.095	45	To Do
Kamke 682	✓	0.346	39	✓	0.356	28	To Do
Kamke 683	✓	1.225	84	✓	0.168	114	To Do
Kamke 684	✓	0.137	20	✓	4.142	30	To Do
Kamke 685	✓	0.194	87	✓	0.097	48	To Do
Kamke 686	✓	11.212	68	✓	0.198	85	To Do
Kamke 687	✓	0.197	130	✓	0.119	39	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 688	✓	0.43	82	✓	0.119	42	To Do
Kamke 689	✓	0.395	60	✓	0.069	25	To Do
Kamke 690	✓	0.613	105	✓	0.527	40	To Do
Kamke 691	✓	0.345	21	✓	0.626	17	To Do
Kamke 692	✓	0.131	20	✓	3.915	30	To Do
Kamke 693	✓	0.424	146	✓	0.11	40	To Do
Kamke 694	✓	0.49	66	✓	0.527	30	To Do
Kamke 695	✓	0.253	34	✓	0.066	39	To Do
Kamke 696	✓	1.115	51	✓	0.077	32	To Do
Kamke 697	✓	0.365	114	✓	0.125	40	To Do
Kamke 698	✓	0.377	108	✓	0.094	34	To Do
Kamke 699	✓	0.403	101	✓	0.485	36	To Do
Kamke 700	✓	0.171	76	✓	0.128	62	To Do
Kamke 701	✓	2.112	88	✓	8.82	71	To Do
Kamke 702	✓	2.86	37	✓	0.097	35	To Do
Kamke 703	✓	0.609	101	✓	0.234	44	To Do
Kamke 704	✓	9.054	66	✓	0.072	38	To Do
Kamke 705	✓	0.168	30	✓	0.214	24	To Do
Kamke 706	✓	40.533	610	✓	0.648	65	To Do
Kamke 707	✓	5.565	1391	✓	0.543	105	To Do
Kamke 708	✓	0.408	89	✗	0	0	To Do
Kamke 709	✓	3.549	217	✓	0.279	39	To Do
Kamke 710	✓	1.32	38	✓	3.191	31	To Do
Kamke 711	✓	0.263	28	✓	0.266	31	To Do
Kamke 712	✓	0.515	105	✓	0.493	38	To Do

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#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 713	✓	0.143	649	✓	0.385	86	To Do
Kamke 714	✓	1.585	162	✓	0.276	96	To Do
Kamke 715	✓	0.609	104	✓	0.449	39	To Do
Kamke 716	✓	3.305	133	✓	0.294	37	To Do
Kamke 717	✓	0.748	106	✓	0.513	33	To Do
Kamke 718	✓	0.383	127	✓	0.069	44	To Do
Kamke 719	✓	0.501	49	✓	0.147	34	To Do
Kamke 720	✓	3.743	314	✓	0.2	48	To Do
Kamke 721	✓	0.134	27	✓	0.089	19	To Do
Kamke 722	✓	32.239	490	✓	0.493	70	To Do
Kamke 723	✓	0.254	663	✓	0.122	856	To Do
Kamke 724	✓	20.114	422	✓	0.065	18	To Do
Kamke 725	✓	0.361	19	✓	0.942	25	To Do
Kamke 726	✓	0.135	625	✓	0.296	83	To Do
Kamke 727	✓	0.57	29	✓	0.282	25	To Do
Kamke 728	✓	0.364	72	✓	0.388	50	To Do
Kamke 729	✓	0.317	327	✓	0.121	404	To Do
Kamke 730	✓	0.339	83	✓	1.445	41	To Do
Kamke 731	✓	0.542	47	✓	0.255	42	To Do
Kamke 732	✓	0.885	116	✓	0.551	43	To Do
Kamke 733	✓	13.337	73	✗	0	0	To Do
Kamke 734	✓	0.282	37	✓	0.481	39	To Do
Kamke 735	✓	1.609	573	✓	0.119	78	To Do
Kamke 736	✓	0.236	31	✓	0.256	43	To Do
Kamke 737	✓	0.041	36	✓	0.313	29	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 738	✓	0.53	1347	✓	1.059	1054	To Do
Kamke 739	✓	0.448	39	✓	0.25	35	To Do
Kamke 740	✓	0.125	74	✓	0.096	72	To Do
Kamke 741	✓	2.06	175	✓	1.13	246	To Do
Kamke 742	✓	3.777	3913	✓	1.543	239	To Do
Kamke 743	✓	0.108	406	✓	0.521	296	To Do
Kamke 744	✓	0.175	510	✓	0.18	621	To Do
Kamke 745	✓	1.495	546	✓	0.085	78	To Do
Kamke 746	✓	0.095	274	✓	0.469	232	To Do
Kamke 747	✓	3.219	88	✓	0.31	75	To Do
Kamke 748	✓	0.348	285	✓	0.105	404	To Do
Kamke 749	✓	0.191	126	✓	0.123	192	To Do
Kamke 750	✓	0.346	72	✓	0.335	49	To Do
Kamke 751	✓	0.191	30	✓	0.162	26	To Do
Kamke 752	✓	0.243	849	✓	1.611	723	To Do
Kamke 753	✓	0.187	41	✓	0.258	38	To Do
Kamke 754	✓	0.14	47	✓	0.022	26	To Do
Kamke 755	✓	0.364	2633	✓	0.134	44	To Do
Kamke 756	✓	0.199	95	✓	0.036	37	To Do
Kamke 757	✓	0.043	36	✓	0.1	26	To Do
Kamke 758	✓	0.913	459	✓	0.278	41	To Do
Kamke 759	✓	0.104	498	✓	0.589	305	To Do
Kamke 760	✓	1.044	112	✓	2.026	137	To Do
Kamke 761	✓	0.049	33	✓	0.09	18	To Do
Kamke 762	✓	0.225	26	✓	0.176	22	To Do

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#	Mathematica			Maple			note on solution
	solved	cpu	leaf	solved	cpu	leaf	
Kamke 763	✓	0.178	22	✓	0.122	14	To Do
Kamke 764	✓	0.201	50	✓	0.218	36	To Do
Kamke 765	✓	0.421	138	✓	0.198	106	To Do
Kamke 766	✓	0.383	129	✓	0.186	89	To Do
Kamke 767	✓	0.042	38	✓	0.1	26	To Do
Kamke 768	✓	1.794	66	✓	0.129	26	To Do
Kamke 769	✓	0.101	360	✓	0.537	251	To Do
Kamke 770	✓	0.247	705	✓	0.141	1105	To Do
Kamke 771	✓	0.056	46	✓	0.255	84	To Do
Kamke 772	✓	0.22	21	✓	0.217	18	To Do
Kamke 773	✓	0.221	61	✓	0.239	48	To Do
Kamke 774	✓	0.045	45	✓	0.165	51	To Do
Kamke 775	✓	0.185	943	✓	0.082	44	To Do
Kamke 776	✓	0.43	133	✓	0.245	96	To Do
Kamke 777	✓	0.318	39	✓	0.263	51	To Do
Kamke 778	✓	0.18	95	✓	0.031	37	To Do
Kamke 779	✓	0.183	57	✓	0.066	50	To Do
Kamke 780	✓	0.2	15	✓	0.615	27	To Do
Kamke 781	✓	0.487	82	✓	0.481	61	To Do
Kamke 782	✓	4.743	115	✓	2.313	96	To Do
Kamke 783	✓	4.529	88	✓	0.2	75	To Do
Kamke 784	✓	21.956	27	✓	10.085	24	To Do
Kamke 785	✓	9.236	29	✓	50.054	24	To Do
Kamke 786	✓	4.459	61	✓	0.089	33	To Do
Kamke 787	✓	29.737	488	✓	0.899	191	To Do

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#	Mathematica			Maple			note on solution
	solved	cpu	leaf	solved	cpu	leaf	
Kamke 788	✓	27.788	348	✓	0.31	108	To Do
Kamke 789	✓	76.965	120	✗	0	0	To Do
Kamke 790	✓	92.886	127	✗	0	0	To Do
Kamke 791	✓	8.216	110	✓	6.811	306	To Do
Kamke 792	✓	3.101	157	✓	0.437	112	To Do
Kamke 793	✓	14.854	399	✓	2.147	32	To Do
Kamke 794	✓	0.23	67	✓	0.59	32	To Do
Kamke 795	✓	0.505	111	✓	0.029	37	To Do
Kamke 796	✓	11.607	102	✓	1.647	143	To Do
Kamke 797	✓	2.137	349	✓	0.696	168	To Do
Kamke 798	✓	0.624	27	✓	0.208	30	To Do
Kamke 799	✓	1.296	126	✓	0.309	147	To Do
Kamke 800	✓	0.49	128	✓	0.024	41	To Do
Kamke 801	✓	0.416	126	✓	0.07	63	To Do
Kamke 802	✓	0.149	101	✓	0.272	27	To Do
Kamke 803	✓	0.488	637	✓	0.442	65	To Do
Kamke 804	✓	0.677	43	✓	0.986	38	To Do
Kamke 805	✓	0.197	37	✓	0.761	42	To Do
Kamke 806	✓	0.48	22	✓	0.587	22	To Do
Kamke 807	✓	0.322	59	✓	0.522	43	To Do
Kamke 808	✓	2.348	149	✓	0.299	45	To Do
Kamke 809	✓	0.393	128	✓	0.022	41	To Do
Kamke 810	✓	0.135	40	✓	0.065	16	To Do
Kamke 811	✓	2.043	33	✓	1.769	32	To Do
Kamke 812	✓	0.44	78	✓	0.389	30	To Do

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#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 813	✓	0.66	93	✓	0.707	40	To Do
Kamke 814	✓	0.152	72	✓	0.039	38	To Do
Kamke 815	✓	12.858	99	✓	0.975	168	To Do
Kamke 816	✓	0.288	74	✓	0.611	190	To Do
Kamke 817	✓	0.678	63	✓	0.824	27	To Do
Kamke 818	✓	0.266	34	✓	0.317	34	To Do
Kamke 819	✓	0.354	65	✓	0.429	30	To Do
Kamke 820	✓	0.573	63	✓	0.737	27	To Do
Kamke 821	✓	0.242	2093	✓	0.177	27	To Do
Kamke 822	✓	0.364	32	✓	0.146	25	To Do
Kamke 823	✓	0.486	39	✓	0.234	38	To Do
Kamke 824	✓	0.281	68	✓	0.392	61	To Do
Kamke 825	✓	0.588	148	✓	0.126	48	To Do
Kamke 826	✓	0.58	70	✓	0.426	51	To Do
Kamke 827	✓	0.306	221	✓	0.341	49	To Do
Kamke 828	✓	0.687	56	✓	0.318	54	To Do
Kamke 829	✓	0.532	74	✓	0.431	34	To Do
Kamke 830	✓	0.514	37	✓	0.23	38	To Do
Kamke 831	✓	3.378	145	✓	0.386	35	To Do
Kamke 832	✓	2.375	2497	✓	0.189	31	To Do
Kamke 833	✓	0.305	221	✓	0.301	49	To Do
Kamke 834	✓	0.687	90	✓	0.736	60	To Do
Kamke 835	✗	0	0	✗	0	0	To Do
Kamke 836	✓	14.782	379	✓	0.301	73	To Do
Kamke 837	✗	0	0	✗	0	0	To Do

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#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 838	✓	0.197	31	✓	0.118	25	To Do
Kamke 839	✓	0.346	28	✓	0.076	19	To Do
Kamke 840	✓	0.341	30	✓	0.069	19	To Do
Kamke 841	✓	1.31	236	✓	0.295	97	To Do
Kamke 842	✓	0.266	186	✓	0.033	43	To Do
Kamke 843	✓	0.24	198	✓	0.03	43	To Do
Kamke 844	✓	15.811	386	✓	0.304	97	To Do
Kamke 845	✓	4.348	266	✓	0.234	44	To Do
Kamke 846	✓	0.927	365	✓	0.306	40	To Do
Kamke 847	✓	1.442	103	✓	0.384	34	To Do
Kamke 848	✓	0.268	157	✓	0.545	27	To Do
Kamke 849	✓	1.277	102	✓	0.388	33	To Do
Kamke 850	✓	0.406	1485	✓	1.058	32	To Do
Kamke 851	✓	0.439	145	✓	0.061	42	To Do
Kamke 852	✓	0.417	145	✓	0.069	42	To Do
Kamke 853	✓	0.198	76	✓	0.04	63	To Do
Kamke 854	✓	0.168	24	✓	0.272	51	To Do
Kamke 855	✓	0.16	24	✓	0.244	51	To Do
Kamke 856	✓	0.634	103	✓	0.318	65	To Do
Kamke 857	✓	1.042	107	✓	0.362	32	To Do
Kamke 858	✓	0.442	145	✓	0.056	42	To Do
Kamke 859	✓	0.895	105	✓	0.265	63	To Do
Kamke 860	✓	0.404	33	✓	1.744	29	To Do
Kamke 861	✓	1.56	158	✓	0.158	26	To Do
Kamke 862	✗	0	0	✓	0.207	27	To Do

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#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 863	✓	0.244	30	✓	14.23	38	To Do
Kamke 864	✓	0.391	137	✓	0.097	162	To Do
Kamke 865	✓	0.4	87	✓	0.2	23	To Do
Kamke 866	✓	0.889	117	✓	0.405	37	To Do
Kamke 867	✓	0.227	77	✓	0.059	30	To Do
Kamke 868	✓	0.197	79	✓	0.056	28	To Do
Kamke 869	✓	0.053	42	✓	0.334	37	To Do
Kamke 870	✓	1.749	35	✓	0.708	30	To Do
Kamke 871	✓	0.341	22	✓	0.092	26	To Do
Kamke 872	✓	0.066	215	✓	0.063	49	To Do
Kamke 873	✓	0.948	53	✓	0.361	50	To Do
Kamke 874	✓	0.27	101	✓	0.057	40	To Do
Kamke 875	✓	0.301	497	✓	0.238	73	To Do
Kamke 876	✓	0.204	135	✓	0.056	41	To Do
Kamke 877	✓	0.207	49	✓	0.04	73	To Do
Kamke 878	✓	0.476	130	✓	39.088	75	To Do
Kamke 879	✓	0.384	239	✓	0.275	55	To Do
Kamke 880	✓	0.525	131	✓	0.176	41	To Do
Kamke 881	✓	0.196	75	✓	0.046	77	To Do
Kamke 882	✓	0.29	119	✓	0.065	41	To Do
Kamke 883	✓	1.373	164	✓	0.68	352	To Do
Kamke 884	✓	0.872	71	✓	0.451	107	To Do
Kamke 885	✗	0	0	✗	0	0	To Do
Kamke 886	✓	0.234	82	✓	0.028	42	To Do
Kamke 887	✓	0.283	106	✓	0.051	72	To Do

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#	Mathematica			Maple			note on solution
	solved	cpu	leaf	solved	cpu	leaf	
Kamke 888	✓	0.196	78	✓	0.059	79	To Do
Kamke 889	✓	1.83	68	✓	0.911	49	To Do
Kamke 890	✓	0.213	103	✓	0.655	34	To Do
Kamke 891	✓	0.21	135	✓	0.065	56	To Do
Kamke 892	✓	2.491	1283	✓	0.635	40	To Do
Kamke 893	✓	0.212	80	✓	0.029	41	To Do
Kamke 894	✗	0	0	✗	0	0	To Do
Kamke 895	✓	0.315	81	✓	0.062	79	To Do
Kamke 896	✓	0.35	106	✓	0.511	63	To Do
Kamke 897	✓	0.256	79	✓	0.086	87	To Do
Kamke 898	✓	0.236	106	✓	0.043	87	To Do
Kamke 899	✓	0.266	106	✓	0.035	47	To Do
Kamke 900	✓	0.237	381	✓	0.074	48	To Do
Kamke 901	✓	0.7	33	✓	0.547	30	To Do
Kamke 902	✓	0.245	295	✓	0.224	183	To Do
Kamke 903	✓	0.14	19	✓	0.168	48	To Do
Kamke 904	✓	0.123	23	✓	0.177	64	To Do
Kamke 905	✓	0.263	85	✓	0.044	46	To Do
Kamke 906	✓	0.161	326	✓	0.298	37	To Do
Kamke 907	✓	0.286	22	✓	0.168	20	To Do
Kamke 908	✓	1.143	1269	✓	0.343	1742	To Do
Kamke 909	✓	0.186	64	✓	0.559	84	To Do
Kamke 910	✓	0.237	98	✓	0.029	42	To Do
Kamke 911	✓	0.932	106	✓	0.796	30	To Do
Kamke 912	✓	1.37	201	✗	0	0	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 913	✓	0.908	716	✓	0.086	43	To Do
Kamke 914	✓	1.301	401	✓	3.685	71	To Do
Kamke 915	✓	0.985	724	✓	0.083	43	To Do
Kamke 916	✓	0.251	43	✓	0.318	73	To Do
Kamke 917	✓	0.25	28	✓	0.218	38	To Do
Kamke 918	✓	0.591	720	✓	1.016	41	To Do
Kamke 919	✓	0.356	251	✓	0.167	61	To Do
Kamke 920	✓	0.468	301	✗	0	0	To Do
Kamke 921	✓	0.296	92	✓	0.196	30	To Do
Kamke 922	✓	1.428	882	✓	0.18	47	To Do
Kamke 923	✓	1.629	432	✓	0.413	36	To Do
Kamke 924	✓	0.313	80	✓	0.128	46	To Do
Kamke 925	✓	2.255	228	✓	0.312	38	To Do
Kamke 926	✓	0.234	128	✓	0.059	67	To Do
Kamke 927	✓	0.737	112	✓	0.114	68	To Do
Kamke 928	✓	1.269	23	✓	0.294	20	To Do
Kamke 929	✓	0.94	683	✓	0.038	42	To Do
Kamke 930	✓	1.598	39	✓	0.434	36	To Do
Kamke 931	✓	0.212	80	✓	0.038	73	To Do
Kamke 932	✓	5.822	4323	✓	0.133	54	To Do
Kamke 933	✓	0.279	99	✓	0.061	39	To Do
Kamke 934	✓	0.324	102	✓	0.068	39	To Do
Kamke 935	✓	62.194	248	✓	0.212	55	To Do
Kamke 936	✓	0.353	99	✓	0.068	39	To Do
Kamke 937	✓	0.33	124	✓	0.092	79	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 938	✓	0.277	108	✓	0.029	39	To Do
Kamke 939	✓	0.594	136	✓	0.085	70	To Do
Kamke 940	✓	0.284	80	✓	0.069	63	To Do
Kamke 941	✓	0.509	53	✓	0.055	35	To Do
Kamke 942	✓	4.933	349	✓	0.71	43	To Do
Kamke 943	✓	0.594	53	✓	0.056	40	To Do
Kamke 944	✓	1.92	233	✓	0.08	47	To Do
Kamke 945	✓	1.459	213	✓	0.059	41	To Do
Kamke 946	✓	0.748	150	✓	0.15	85	To Do
Kamke 947	✓	0.422	30	✓	0.273	44	To Do
Kamke 948	✓	0.751	39	✓	0.323	68	To Do
Kamke 949	✓	0.235	76	✓	0.048	81	To Do
Kamke 950	✓	0.56	141	✓	0.085	42	To Do
Kamke 951	✓	0.46	140	✓	0.07	41	To Do
Kamke 952	✓	0.419	341	✓	0.263	62	To Do
Kamke 953	✓	0.285	36	✓	0.41	145	To Do
Kamke 954	✓	0.386	115	✓	0.09	53	To Do
Kamke 955	✓	0.365	112	✓	0.109	101	To Do
Kamke 956	✓	1.338	28	✓	0.181	79	To Do
Kamke 957	✓	1.324	28	✓	0.112	79	To Do
Kamke 958	✓	0.481	82	✓	0.071	40	To Do
Kamke 959	✓	0.257	20	✓	0.154	15	To Do
Kamke 960	✓	0.198	14	✓	0.152	11	To Do
Kamke 961	✓	5.859	813	✓	0.437	45	To Do
Kamke 962	✓	5.323	1191	✓	1.338	79	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 963	✓	0.546	108	✓	0.196	39	To Do
Kamke 964	✓	4.921	264	✓	2.188	80	To Do
Kamke 965	✓	0.321	29	✓	0.155	26	To Do
Kamke 966	✓	0.818	292	✓	0.625	50	To Do
Kamke 967	✓	0.585	151	✓	0.092	91	To Do
Kamke 968	✓	0.403	30	✓	0.179	22	To Do
Kamke 969	✓	0.28	19	✓	0.175	15	To Do
Kamke 970	✓	0.807	66	✓	0.671	181	To Do
Kamke 971	✓	0.329	157	✓	0.309	86	To Do
Kamke 972	✓	0.039	32	✓	0.223	27	To Do
Kamke 973	✓	0.463	146	✓	0.414	134	To Do
Kamke 974	✓	0.103	39	✓	0.039	57	To Do
Kamke 975	✓	0.112	47	✓	0.036	59	To Do
Kamke 976	✓	0.212	101	✓	0.251	57	To Do
Kamke 977	✓	0.447	139	✓	0.228	122	To Do
Kamke 978	✓	0.231	60	✓	0.2	71	To Do
Kamke 979	✓	0.158	37	✓	0.043	57	To Do
Kamke 980	✓	0.148	43	✓	0.015	35	To Do
Kamke 981	✓	0.168	49	✓	0.023	41	To Do
Kamke 982	✓	0.466	132	✓	0.315	145	To Do
Kamke 983	✓	0.881	238	✓	0.566	188	To Do
Kamke 984	✓	14.012	428	✓	0.32	40	To Do
Kamke 985	✓	0.376	103	✓	0.042	43	To Do
Kamke 986	✓	0.13	44	✓	0.048	36	To Do
Kamke 987	✓	0.171	41	✓	0.055	22	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 988	✓	0.232	107	✓	0.042	29	To Do
Kamke 989	✓	0.263	56	✓	0.049	29	To Do
Kamke 990	✓	0.231	58	✓	0.469	44	To Do
Kamke 991	✓	0.206	104	✓	0.037	29	To Do
Kamke 992	✓	0.142	43	✓	0.042	25	To Do
Kamke 993	✓	1.83	73	✓	0.03	35	To Do
Kamke 994	✓	0.245	198	✓	0.036	43	To Do
Kamke 995	✓	0.24	17	✓	0.144	14	To Do
Kamke 996	✓	0.177	17	✓	0.079	15	To Do
Kamke 997	✓	0.131	18	✓	0.068	16	To Do
Kamke 998	✓	0.601	27	✓	0.267	27	To Do
Kamke 999	✓	0.335	24	✓	0.06	36	To Do
Kamke 1000	✓	1.199	351	✓	0.135	19	To Do
Kamke 1001	✓	0.004	12	✓	0.004	9	Linear second order, homogeneous, constant coefficient. First problem. Direct integration
Kamke 1002	✓	0.005	16	✓	0.005	13	Linear second order, homogeneous, constant coefficient. Direct method
Kamke 1003	✓	0.108	45	✓	0.07	26	Linear second order, Non-homogeneous, constant coefficient. variation of parameters
Kamke 1004	✓	0.116	47	✓	0.063	27	Linear second order, Non-homogeneous, constant coefficient. variation of parameters

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1005	✓	0.549	1163	✓	0.128	82	Linear second order, Non-homogeneous, constant coefficient. variation of parameters
Kamke 1006	✓	0.004	20	✓	0.009	15	Linear second order, homogeneous, constant coefficient
Kamke 1007	✓	0.099	135	✓	0.018	26	Linear second order, Non-homogeneous, constant coefficient. variation of parameters
Kamke 1008	✓	0.043	48	✓	0.121	41	To Do
Kamke 1009	✓	0.006	28	✓	0.02	21	To Do
Kamke 1010	✓	0.007	46	✓	0.132	31	Linear second order, homogeneous, variable coefficient. Airy ODE with plus sign, series solution
Kamke 1011	✓	0.006	33	✓	0.034	17	Linear second order, homogeneous, variable coefficient. power series solution
Kamke 1012	✓	0.008	47	✓	0.164	29	To Do
Kamke 1013	✓	0.014	43	✓	0.039	22	To Do
Kamke 1014	✓	0.023	170	✓	0.231	63	To Do
Kamke 1015	✗	0	0	✗	0	0	To Do
Kamke 1016	✓	0.128	312	✓	0.346	91	To Do
Kamke 1017	✓	0.024	46	✓	0.056	17	To Do
Kamke 1018	✓	0.021	55	✓	0.131	39	To Do
Kamke 1019	✗	0	0	✗	0	0	To Do
Kamke 1020	✓	0.578	180	✓	0.29	58	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1021	✓	0.028	44	✓	0.295	39	To Do
Kamke 1022	✓	0.02	28	✓	0.302	21	To Do
Kamke 1023	✓	0.012	44	✓	0.306	29	To Do
Kamke 1024	✓	0.158	84	✓	0.167	30	To Do
Kamke 1025	✓	1.059	615	✓	0.257	102	To Do
Kamke 1026	✗	0	0	✗	0	0	To Do
Kamke 1027	✓	0.992	235	✓	0.459	69	To Do
Kamke 1028	✗	0	0	✗	0	0	To Do
Kamke 1029	✓	0.023	58	✓	0.136	22	To Do
Kamke 1030	✗	0	0	✗	0	0	To Do
Kamke 1031	✗	0	0	✗	0	0	To Do
Kamke 1032	✗	0	0	✓	0.132	48	To Do
Kamke 1033	✓	0.013	37	✓	0.019	27	Linear second order, homogeneous, variable coefficient. smart substitution turns it to second order with constant coefficient
Kamke 1034	✓	0.01	20	✓	0.014	15	Linear second order, homogeneous, variable coefficient. smart substitution turns it to second order with constant coefficient
Kamke 1035	✓	0.006	58	✓	0.01	41	To Do
Kamke 1036	✓	0.156	209	✓	0.145	134	To Do
Kamke 1037	✓	0.022	101	✓	0.157	64	To Do
Kamke 1038	✗	0	0	✗	0	0	To Do
Kamke 1039	✓	0.01	47	✓	0.014	25	To Do

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#	Mathematica			Maple			note on solution
	solved	cpu	leaf	solved	cpu	leaf	
Kamke 1040	✓	0.049	53	✓	0.066	34	To Do
Kamke 1041	✓	0.011	55	✓	0.141	41	To Do
Kamke 1042	✓	0.009	61	✓	0.147	41	To Do
Kamke 1043	✓	0.116	69	✓	0.293	39	Linear second order, homogeneous, variable coefficient. power series solution
Kamke 1044	✓	0.007	39	✓	0.152	35	To Do
Kamke 1045	✓	0.047	39	✓	0.016	21	To Do
Kamke 1046	✓	0.008	31	✓	0.151	31	To Do
Kamke 1047	✓	0.014	27	✓	0.029	16	Linear second order, homogeneous, variable coefficient. power series solution
Kamke 1048	✓	0.01	45	✓	0.129	37	To Do
Kamke 1049	✓	0.06	109	✓	0.182	66	To Do
Kamke 1050	✓	0.011	23	✓	0.026	14	To Do
Kamke 1051	✓	0.023	44	✓	0.036	27	To Do
Kamke 1052	✓	0.016	78	✓	0.164	58	To Do
Kamke 1053	✓	0.026	57	✓	0.054	35	To Do
Kamke 1054	✓	0.045	172	✓	0.122	98	To Do
Kamke 1055	✓	0.14	421	✓	0.289	262	To Do
Kamke 1056	✓	0.052	41	✓	0.101	52	To Do
Kamke 1057	✓	0.056	56	✓	0.264	50	To Do
Kamke 1058	✓	0.064	56	✓	0.261	29	To Do
Kamke 1059	✓	0.088	39	✓	0.085	56	To Do
Kamke 1060	✓	0.031	83	✓	0.293	81	To Do
Kamke 1061	✓	0.067	70	✓	0.104	28	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1062	✓	0.021	35	✓	0.023	19	To Do
Kamke 1063	✓	0.049	28	✓	0.31	34	To Do
Kamke 1064	✓	0.519	1400	✓	0.445	134	To Do
Kamke 1065	✓	0.158	114	✓	0.271	60	To Do
Kamke 1066	✓	0.026	18	✓	0.151	15	To Do
Kamke 1067	✓	0.028	21	✓	0.053	17	To Do
Kamke 1068	✓	0.13	20	✓	0.288	45	To Do
Kamke 1069	✓	0.031	19	✓	0.151	15	To Do
Kamke 1070	✓	0.285	143	✓	0.231	60	To Do
Kamke 1071	✓	0.074	44	✓	0.077	24	To Do
Kamke 1072	✗	0	0	✗	0	0	To Do
Kamke 1073	✗	0	0	✗	0	0	To Do
Kamke 1074	✗	0	0	✓	0.037	21	To Do
Kamke 1075	✗	0	0	✗	0	0	To Do
Kamke 1076	✗	0	0	✗	0	0	To Do
Kamke 1077	✗	0	0	✗	0	0	To Do
Kamke 1078	✓	0.043	76	✓	0.037	33	To Do
Kamke 1079	✓	0.229	315	✓	0.027	37	To Do
Kamke 1080	✓	0.067	49	✓	0.577	74	To Do
Kamke 1081	✗	0	0	✗	0	0	To Do
Kamke 1082	✗	0	0	✓	0.201	74	To Do
Kamke 1083	✗	0	0	✓	0.122	31	To Do
Kamke 1084	✓	0.163	36	✓	0.105	20	To Do
Kamke 1085	✓	0.158	32	✓	0.094	24	To Do
Kamke 1086	✓	0.005	42	✓	0.023	29	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1087	✓	0.008	36	✓	0.131	33	To Do
Kamke 1088	✓	0.076	180	✓	0.184	31	To Do
Kamke 1089	✓	0.044	99	✓	0.153	58	To Do
Kamke 1090	✓	0.029	50	✓	0.047	40	To Do
Kamke 1091	✓	0.02	41	✓	0.066	35	To Do
Kamke 1092	✓	0.078	72	✓	0.055	29	To Do
Kamke 1093	✓	0.016	13	✓	0.006	10	To Do
Kamke 1094	✓	0.019	41	✓	0.01	29	To Do
Kamke 1095	✓	0.008	30	✓	0.042	23	To Do
Kamke 1096	✓	0.012	61	✓	0.148	39	To Do
Kamke 1097	✓	0.021	46	✓	0.01	31	To Do
Kamke 1098	✓	0.009	41	✓	0.01	27	To Do
Kamke 1099	✗	0	0	✓	0.148	25	To Do
Kamke 1100	✓	0.016	44	✓	0.037	23	Linear second order, non-homogeneous, variable coefficient. Singularity, Frobenius series solution and also using smart transformation. Variation of parameters.
Kamke 1101	✓	0.022	52	✓	0.039	29	Linear second order, homogeneous, variable coefficient. Singularity, Frobenius series solution and also using smart transformation

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1102	✓	0.007	42	✓	0.118	33	Linear second order, homogeneous, variable coefficient. Use smart transformation to convert to Emden-Fowler then use Power series solution
Kamke 1103	✓	0.023	64	✓	0.01	33	To Do
Kamke 1104	✓	0.035	104	✓	0.014	41	To Do
Kamke 1105	✓	0.015	64	✓	0.05	39	To Do
Kamke 1106	✓	0.04	441	✓	0.237	71	To Do
Kamke 1107	✓	0.023	40	✓	0.204	30	To Do
Kamke 1108	✓	0.026	37	✓	0.183	26	To Do
Kamke 1109	✓	0.133	45	✓	0.034	33	To Do
Kamke 1110	✓	0.035	36	✓	0.059	23	To Do
Kamke 1111	✓	0.02	20	✓	0.023	13	Linear second order, homogeneous, variable coefficient. Solved using Laplace transform instead of series method
Kamke 1112	✓	0.022	30	✓	0.033	22	To Do
Kamke 1113	✓	0.014	24	✓	0.178	17	To Do
Kamke 1114	✓	0.042	39	✓	0.056	34	To Do
Kamke 1115	✓	0.052	76	✓	1.483	47	To Do
Kamke 1116	✓	0.049	43	✓	0.204	31	To Do
Kamke 1117	✓	0.072	107	✓	0.204	82	To Do
Kamke 1118	✓	0.066	51	✓	0.207	39	To Do
Kamke 1119	✓	0.127	77	✓	0.051	20	To Do
Kamke 1120	✓	0.043	168	✓	0.284	109	To Do

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#	Mathematica			Maple			note on solution
	solved	cpu	leaf	solved	cpu	leaf	
Kamke 1121	✓	0.228	41	✓	0.033	23	To Do
Kamke 1122	✓	0.234	57	✓	0.25	28	To Do
Kamke 1123	✓	0.011	91	✓	0.073	45	To Do
Kamke 1124	✓	0.068	65	✓	0.194	29	To Do
Kamke 1125	✓	0.112	84	✓	0.059	36	To Do
Kamke 1126	✗	0	0	✓	0.034	19	To Do
Kamke 1127	✓	0.029	36	✓	0.024	21	To Do
Kamke 1128	✓	0.021	40	✓	0.235	32	To Do
Kamke 1129	✓	0.062	42	✓	0.032	30	To Do
Kamke 1130	✓	0.012	46	✓	0.016	31	To Do
Kamke 1131	✓	0.01	58	✓	0.176	33	To Do
Kamke 1132	✓	0.01	48	✓	0.198	29	To Do
Kamke 1133	✓	0.055	52	✓	0.192	37	To Do
Kamke 1134	✓	0.081	78	✓	0.045	21	To Do
Kamke 1135	✓	0.008	27	✓	0.012	17	To Do
Kamke 1136	✓	0.02	30	✓	0.039	16	To Do
Kamke 1137	✓	0.08	74	✓	0.053	25	To Do
Kamke 1138	✓	0.022	38	✓	0.177	26	To Do
Kamke 1139	✓	0.013	74	✓	0.187	37	To Do
Kamke 1140	✓	0.038	190	✓	0.023	66	To Do
Kamke 1141	✓	0.127	79	✓	0.056	55	To Do
Kamke 1142	✓	0.04	108	✓	0.224	53	To Do
Kamke 1143	✓	0.029	93	✓	0.231	57	To Do
Kamke 1144	✓	0.026	88	✓	0.23	60	To Do
Kamke 1145	✓	0.256	386	✓	0.238	248	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1146	✓	0.006	18	✓	0.008	15	To Do
Kamke 1147	✓	0.005	18	✓	0.009	15	To Do
Kamke 1148	✓	0.011	77	✓	0.012	35	To Do
Kamke 1149	✓	0.051	212	✓	0.02	45	To Do
Kamke 1150	✓	0.008	53	✓	0.089	27	To Do
Kamke 1151	✓	0.017	129	✓	0.114	43	To Do
Kamke 1152	✓	0.015	114	✓	0.246	53	To Do
Kamke 1153	✓	0.029	56	✓	0.036	31	To Do
Kamke 1154	✓	0.017	88	✓	0.243	57	To Do
Kamke 1155	✓	0.051	225	✓	0.17	67	To Do
Kamke 1156	✓	0.092	32	✓	0.247	71	To Do
Kamke 1157	✗	0	0	✗	0	0	To Do
Kamke 1158	✓	0.18	43	✓	0.289	178	To Do
Kamke 1159	✓	0.007	24	✓	0.015	19	To Do
Kamke 1160	✓	0.012	30	✓	0.017	23	To Do
Kamke 1161	✓	0.038	78	✓	0.013	31	To Do
Kamke 1162	✓	0.052	18	✓	0.013	15	To Do
Kamke 1163	✓	0.128	72	✓	0.046	49	To Do
Kamke 1164	✓	0.02	30	✓	0.033	23	To Do
Kamke 1165	✓	0.122	26	✓	0.018	19	To Do
Kamke 1166	✓	0.011	23	✓	0.013	21	To Do
Kamke 1167	✓	0.059	326	✓	0.177	63	To Do
Kamke 1168	✓	0.022	15	✓	0.007	11	To Do
Kamke 1169	✓	0.061	236	✓	0.189	49	To Do
Kamke 1170	✓	0.017	58	✓	0.142	43	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1171	✓	0.04	142	✓	0.221	49	To Do
Kamke 1172	✓	0.067	158	✓	0.154	47	To Do
Kamke 1173	✓	0.131	74	✓	0.213	37	To Do
Kamke 1174	✓	0.008	33	✓	0.026	25	To Do
Kamke 1175	✓	0.228	38	✓	0.087	29	To Do
Kamke 1176	✓	0.017	33	✓	0.03	15	To Do
Kamke 1177	✓	0.83	141	✓	0.123	34	To Do
Kamke 1178	✓	0.037	74	✓	0.033	23	To Do
Kamke 1179	✓	0.018	38	✓	0.033	19	To Do
Kamke 1180	✓	0.066	75	✓	0.065	49	To Do
Kamke 1181	✓	0.047	37	✓	0.021	25	To Do
Kamke 1182	✓	0.011	24	✓	0.013	20	To Do
Kamke 1183	✓	0.01	27	✓	0.013	22	To Do
Kamke 1184	✓	0.008	38	✓	0.026	25	To Do
Kamke 1185	✓	0.03	67	✓	0.024	33	To Do
Kamke 1186	✓	0.016	42	✓	0.036	36	To Do
Kamke 1187	✓	0.01	99	✓	0.011	53	To Do
Kamke 1188	✓	0.169	266	✓	0.273	114	To Do
Kamke 1189	✓	0.058	445	✓	0.164	79	To Do
Kamke 1190	✓	0.023	122	✓	0.192	38	To Do
Kamke 1191	✓	0.008	110	✓	0.015	23	To Do
Kamke 1192	✓	0.089	40	✓	0.22	51	To Do
Kamke 1193	✓	0.213	44	✓	0.033	38	To Do
Kamke 1194	✓	0.1	65	✓	0.048	48	To Do
Kamke 1195	✓	0.029	80	✓	0.23	93	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1196	✓	0.029	37	✓	0.034	31	To Do
Kamke 1197	✓	0.015	78	✓	0.132	43	To Do
Kamke 1198	✓	0.047	41	✓	0.034	37	To Do
Kamke 1199	✓	0.015	41	✓	0.017	35	To Do
Kamke 1200	✓	0.016	62	✓	0.017	27	To Do
Kamke 1201	✓	0.12	44	✓	0.019	34	To Do
Kamke 1202	✓	0.012	22	✓	0.031	14	To Do
Kamke 1203	✓	0.016	124	✓	0.02	28	To Do
Kamke 1204	✓	0.016	132	✓	0.043	35	To Do
Kamke 1205	✗	0	0	✗	0	0	To Do
Kamke 1206	✓	0.088	120	✓	0.081	76	To Do
Kamke 1207	✓	0.09	294	✓	0.333	110	To Do
Kamke 1208	✓	0.047	59	✓	0.056	35	To Do
Kamke 1209	✓	0.018	67	✓	0.073	41	To Do
Kamke 1210	✓	0.223	252	✓	0.281	81	To Do
Kamke 1211	✓	0.054	68	✓	0.065	36	To Do
Kamke 1212	✗	0	0	✗	0	0	To Do
Kamke 1213	✓	0.088	54	✓	0.234	53	To Do
Kamke 1214	✓	0.227	260	✓	0.26	71	To Do
Kamke 1215	✓	0.123	664	✓	0.318	148	To Do
Kamke 1216	✗	0	0	✗	0	0	To Do
Kamke 1217	✓	0.121	30	✓	0.045	24	To Do
Kamke 1218	✓	0.125	38	✓	0.047	30	To Do
Kamke 1219	✓	0.143	218	✓	0.231	69	To Do
Kamke 1220	✓	0.048	98	✓	0.019	40	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1221	✓	0.029	42	✓	0.026	35	To Do
Kamke 1222	✓	0.016	30	✓	0.02	23	To Do
Kamke 1223	✓	0.016	25	✓	0.018	19	To Do
Kamke 1224	✓	0.015	30	✓	0.016	23	To Do
Kamke 1225	✓	0.022	29	✓	0.039	23	To Do
Kamke 1226	✓	0.012	30	✓	0.167	25	To Do
Kamke 1227	✓	0.027	21	✓	0.013	16	To Do
Kamke 1228	✓	0.014	82	✓	0.253	53	To Do
Kamke 1229	✓	0.032	48	✓	0.02	31	To Do
Kamke 1230	✓	0.02	82	✓	0.214	36	To Do
Kamke 1231	✓	0.067	58	✓	0.19	52	To Do
Kamke 1232	✓	8.04	6628	✓	0.28	409	To Do
Kamke 1233	✓	0.542	6628	✓	0.255	409	To Do
Kamke 1234	✓	0.079	48	✗	0	0	To Do
Kamke 1235	✓	0.041	97	✓	0.036	45	To Do
Kamke 1236	✗	0	0	✗	0	0	To Do
Kamke 1237	✓	0.025	30	✓	0.017	20	To Do
Kamke 1238	✓	0.031	36	✓	0.026	26	To Do
Kamke 1239	✓	0.011	46	✓	0.168	35	To Do
Kamke 1240	✓	0.014	18	✓	0.15	15	To Do
Kamke 1241	✓	0.013	30	✓	0.16	24	To Do
Kamke 1242	✓	0.226	68	✓	0.074	41	To Do
Kamke 1243	✓	0.037	45	✓	0.038	21	To Do
Kamke 1244	✓	0.024	42	✓	0.161	27	To Do
Kamke 1245	✓	0.02	42	✓	0.166	27	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1246	✓	0.015	42	✓	0.224	28	To Do
Kamke 1247	✓	0.184	128	✓	0.039	27	To Do
Kamke 1248	✓	0.295	238	✓	0.293	134	To Do
Kamke 1249	✓	0.141	193	✓	0.18	134	To Do
Kamke 1250	✓	0.042	41	✓	0.022	41	To Do
Kamke 1251	✓	0.038	25	✓	0.024	20	To Do
Kamke 1252	✓	0.13	151	✓	0.145	124	To Do
Kamke 1253	✓	0.022	34	✓	0.007	16	To Do
Kamke 1254	✓	0.151	69	✓	0.074	43	To Do
Kamke 1255	✓	0.715	360	✓	0.017	42	To Do
Kamke 1256	✓	0.018	26	✓	0.258	51	To Do
Kamke 1257	✓	0.043	33	✓	0.219	27	To Do
Kamke 1258	✓	0.134	146	✓	0.155	110	To Do
Kamke 1259	✓	0.117	120	✓	0.16	92	To Do
Kamke 1260	✓	0.246	65	✓	0.712	77	To Do
Kamke 1261	✓	0.476	148	✓	0.302	105	To Do
Kamke 1262	✓	0.294	88	✓	0.273	53	To Do
Kamke 1263	✓	0.429	276	✓	0.138	52	To Do
Kamke 1264	✓	0.057	23	✓	0.041	19	To Do
Kamke 1265	✓	0.036	64	✓	1.132	93	To Do
Kamke 1266	✓	0.023	22	✓	0.01	19	To Do
Kamke 1267	✓	0.414	166	✓	0.134	41	To Do
Kamke 1268	✓	0.112	50	✓	0.248	39	To Do
Kamke 1269	✓	0.074	60	✓	0.221	40	To Do
Kamke 1270	✓	2.046	58	✓	0.243	46	To Do

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#	Mathematica			Maple			note on solution
	solved	cpu	leaf	solved	cpu	leaf	
Kamke 1271	✓	0.01	27	✓	0.007	14	To Do
Kamke 1272	✓	0.011	32	✓	0.038	23	To Do
Kamke 1273	✓	0.016	20	✓	0.151	17	To Do
Kamke 1274	✓	0.043	38	✓	0.01	19	To Do
Kamke 1275	✓	0.028	120	✓	0.262	53	To Do
Kamke 1276	✓	0.033	55	✓	0.181	31	To Do
Kamke 1277	✓	0.024	51	✓	0.168	27	To Do
Kamke 1278	✗	0	0	✗	0	0	To Do
Kamke 1279	✓	0.116	74	✓	0.169	32	To Do
Kamke 1280	✓	0.048	52	✓	0.148	40	To Do
Kamke 1281	✓	0.016	28	✓	0.066	15	To Do
Kamke 1282	✓	0.018	39	✓	0.034	21	To Do
Kamke 1283	✓	0.069	90	✓	0.141	48	To Do
Kamke 1284	✓	0.032	47	✓	0.019	41	To Do
Kamke 1285	✓	1.232	269	✓	0.11	52	To Do
Kamke 1286	✓	0.107	101	✓	0.02	32	To Do
Kamke 1287	✓	0.015	83	✓	0.033	27	To Do
Kamke 1288	✓	0.028	47	✓	0.023	21	To Do
Kamke 1289	✓	0.125	53	✓	0.111	33	To Do
Kamke 1290	✓	0.125	103	✓	0.033	29	To Do
Kamke 1291	✓	0.07	92	✓	0.123	50	To Do
Kamke 1292	✓	0.037	42	✓	0.049	31	To Do
Kamke 1293	✓	0.289	44	✓	0.108	33	To Do
Kamke 1294	✓	0.065	44	✓	0.108	33	To Do
Kamke 1295	✓	0.195	310	✓	0.279	106	To Do

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#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 1296	✓	0.372	356	✓	0.446	150	To Do
Kamke 1297	✓	0.028	52	✓	0.044	63	To Do
Kamke 1298	✓	0.067	162	✓	0.138	124	To Do
Kamke 1299	✓	0.028	19	✓	0.013	27	To Do
Kamke 1300	✓	0.017	41	✓	0.031	31	To Do
Kamke 1301	✓	0.026	31	✓	0.02	19	To Do
Kamke 1302	✓	0.065	243	✓	0.083	98	To Do
Kamke 1303	✓	5.127	498	✓	0.215	501	To Do
Kamke 1304	✓	0.057	50	✓	0.039	38	To Do
Kamke 1305	✓	0.08	47	✓	0.09	44	To Do
Kamke 1306	✗	0	0	✓	0.223	69	To Do
Kamke 1307	✓	0.117	54	✓	0.055	36	To Do
Kamke 1308	✓	0.014	41	✓	0.017	40	To Do
Kamke 1309	✓	0.1	84	✓	0.148	85	To Do
Kamke 1310	✓	0.009	31	✓	0.013	20	To Do
Kamke 1311	✓	0.11	63	✓	0.201	52	To Do
Kamke 1312	✓	0.019	32	✓	0.017	19	To Do
Kamke 1313	✓	0.175	87	✓	0.135	35	To Do
Kamke 1314	✓	0.163	87	✓	0.105	33	To Do
Kamke 1315	✓	0.026	44	✓	0.019	45	To Do
Kamke 1316	✓	0.075	38	✓	0.074	18	To Do
Kamke 1317	✓	0.085	38	✓	0.086	13	To Do
Kamke 1318	✓	0.23	172	✓	0.182	122	To Do
Kamke 1319	✓	0.062	60	✓	0.131	31	To Do
Kamke 1320	✓	0.074	21	✓	0.039	17	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1321	✓	0.021	18	✓	0.023	15	To Do
Kamke 1322	✓	0.052	44	✓	0.022	44	To Do
Kamke 1323	✗	0	0	✓	0.014	17	To Do
Kamke 1324	✓	0.025	25	✓	0.023	18	To Do
Kamke 1325	✓	0.211	52	✓	0.139	86	To Do
Kamke 1326	✓	0.02	29	✓	0.027	22	To Do
Kamke 1327	✓	0.146	104	✓	0.811	81	To Do
Kamke 1328	✓	0.018	36	✓	0.025	27	To Do
Kamke 1329	✓	0.723	67	✓	0.328	64	To Do
Kamke 1330	✓	4.171	1176	✓	0.917	1147	To Do
Kamke 1331	✓	0.033	55	✓	0.021	19	To Do
Kamke 1332	✓	0.021	26	✓	0.014	17	To Do
Kamke 1333	✓	0.094	70	✓	0.122	45	To Do
Kamke 1334	✓	0.17	114	✓	0.124	89	To Do
Kamke 1335	✓	0.259	893	✓	0.102	57	To Do
Kamke 1336	✓	0.043	70	✓	0.039	44	To Do
Kamke 1337	✓	0.062	62	✓	0.038	27	To Do
Kamke 1338	✓	0.045	40	✓	0.023	27	To Do
Kamke 1339	✓	0.211	66	✓	0.167	76	To Do
Kamke 1340	✓	0.029	32	✓	0.022	20	To Do
Kamke 1341	✓	61.979	2924	✓	0.2	201	To Do
Kamke 1342	✓	0.084	52	✓	0.027	31	To Do
Kamke 1343	✓	0.189	73	✓	0.132	58	To Do
Kamke 1344	✓	0.51	173	✓	0.089	23	To Do
Kamke 1345	✓	0.059	52	✓	0.05	25	To Do

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#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 1346	✓	0.093	37	✓	0.046	25	To Do
Kamke 1347	✓	0.089	31	✓	0.071	19	To Do
Kamke 1348	✓	0.38	34	✓	0.253	73	To Do
Kamke 1349	✓	0.105	76	✓	0.118	85	To Do
Kamke 1350	✓	0.008	25	✓	0.009	21	To Do
Kamke 1351	✓	0.019	50	✓	0.026	24	To Do
Kamke 1352	✓	0.012	89	✓	0.046	43	To Do
Kamke 1353	✓	0.839	119	✓	0.249	66	To Do
Kamke 1354	✓	0.244	108	✓	0.298	33	To Do
Kamke 1355	✓	0.289	51	✓	0.13	30	To Do
Kamke 1356	✓	0.246	90	✓	0.116	29	To Do
Kamke 1357	✓	0.578	288	✓	0.145	97	To Do
Kamke 1358	✓	0.049	89	✓	0.044	20	To Do
Kamke 1359	✓	0.088	86	✓	0.148	57	To Do
Kamke 1360	✓	0.079	68	✓	0.124	47	To Do
Kamke 1361	✓	0.48	38	✓	0.036	33	To Do
Kamke 1362	✗	0	0	✓	0.231	109	To Do
Kamke 1363	✓	0.601	236	✓	0.171	161	To Do
Kamke 1364	✓	0.123	42	✓	0.115	25	To Do
Kamke 1365	✓	0.081	104	✓	0.062	59	To Do
Kamke 1366	✓	0.019	31	✓	0.011	17	To Do
Kamke 1367	✓	0.236	229	✓	0.23	88	To Do
Kamke 1368	✓	0.021	106	✓	0.115	71	To Do
Kamke 1369	✓	0.094	106	✓	0.053	55	To Do
Kamke 1370	✓	0.021	53	✓	0.013	19	To Do

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#	Mathematica			Maple			note on solution
	solved	cpu	leaf	solved	cpu	leaf	
Kamke 1371	✓	0.023	48	✓	0.106	37	To Do
Kamke 1372	✓	0.305	202	✓	0.286	110	To Do
Kamke 1373	✓	0.235	113	✓	0.253	84	To Do
Kamke 1374	✓	0.033	32	✓	0.099	23	To Do
Kamke 1375	✓	0.038	54	✓	0.109	29	To Do
Kamke 1376	✓	0.034	69	✓	0.06	73	To Do
Kamke 1377	✓	0.187	163	✓	0.128	83	To Do
Kamke 1378	✓	0.039	65	✓	0.039	48	To Do
Kamke 1379	✓	0.057	99	✓	0.059	60	To Do
Kamke 1380	✓	0.203	132	✓	0.089	67	To Do
Kamke 1381	✓	0.252	589	✓	0.192	175	To Do
Kamke 1382	✓	0.468	154	✓	0.13	104	To Do
Kamke 1383	✓	0.119	50	✓	0.056	39	To Do
Kamke 1384	✓	0.022	110	✓	0.26	73	To Do
Kamke 1385	✓	0.014	78	✓	0.064	55	To Do
Kamke 1386	✓	0.065	108	✓	0.054	58	To Do
Kamke 1387	✓	0.029	50	✓	0.026	28	To Do
Kamke 1388	✓	0.263	235	✓	0.112	76	To Do
Kamke 1389	✓	0.33	217	✓	0.124	68	To Do
Kamke 1390	✓	0.025	41	✓	0.026	25	To Do
Kamke 1391	✓	0.041	27	✓	0.031	20	To Do
Kamke 1392	✓	64.808	1763961	✓	0.233	561	To Do
Kamke 1393	✓	15.271	413606	✓	0.162	299	To Do
Kamke 1394	✓	0.039	115	✓	0.108	79	To Do
Kamke 1395	✓	0.072	59	✓	0.075	39	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1396	✓	0.963	211	✓	0.218	178	To Do
Kamke 1397	✓	0.052	38	✓	0.111	27	To Do
Kamke 1398	✓	0.151	72	✓	0.217	69	To Do
Kamke 1399	✓	0.036	72	✓	0.046	34	To Do
Kamke 1400	✓	0.099	60	✓	0.054	35	To Do
Kamke 1401	✓	0.01	93	✓	0.068	45	To Do
Kamke 1402	✓	0.955	86	✓	0.319	58	To Do
Kamke 1403	✓	18.488	316	✓	0.892	298	To Do
Kamke 1404	✓	0.02	33	✓	0.053	19	To Do
Kamke 1405	✓	0.054	77	✓	0.069	42	To Do
Kamke 1406	✓	1.682	258	✓	0.163	44	To Do
Kamke 1407	✓	88.764	2002	✓	1.664	2607	To Do
Kamke 1408	✗	0	0	✗	0	0	To Do
Kamke 1409	✓	0.019	43	✓	0.018	39	To Do
Kamke 1410	✓	0.093	481	✓	0.319	253	To Do
Kamke 1411	✓	0.312	42	✓	0.023	27	To Do
Kamke 1412	✓	0.013	29	✓	0.011	23	To Do
Kamke 1413	✓	0.048	16	✓	0.099	12	To Do
Kamke 1414	✓	0.873	231	✓	0.28	97	To Do
Kamke 1415	✓	0.758	273	✓	0.154	36	To Do
Kamke 1416	✓	0.181	46	✓	0.19	26	To Do
Kamke 1417	✓	0.142	52	✓	0.153	31	To Do
Kamke 1418	✓	0.13	15	✓	3.614	59	To Do
Kamke 1419	✗	0	0	✓	0.227	12	To Do
Kamke 1420	✓	0.412	134	✓	0.369	123	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1421	✓	0.162	81	✓	0.127	27	To Do
Kamke 1422	✓	0.081	58	✓	0.242	50	To Do
Kamke 1423	✓	0.062	70	✓	0.325	132	To Do
Kamke 1424	✓	0.213	90	✓	0.322	120	To Do
Kamke 1425	✓	0.899	236	✓	0.484	91	To Do
Kamke 1426	✓	5.044	4128	✓	0.624	549	To Do
Kamke 1427	✓	0.861	129	✓	1.349	203	To Do
Kamke 1428	✓	0.408	104	✓	0.341	183	To Do
Kamke 1429	✓	0.042	51	✓	0.048	25	To Do
Kamke 1430	✓	0.415	22	✓	0.344	85	To Do
Kamke 1431	✓	0.163	80	✓	0.22	30	To Do
Kamke 1432	✓	0.07	37	✓	0.046	22	To Do
Kamke 1433	✓	0.161	46	✓	0.109	28	To Do
Kamke 1434	✓	71.913	1596424	✓	0.656	517	To Do
Kamke 1435	✓	0.151	70	✓	0.159	38	To Do
Kamke 1436	✓	0.586	42	✓	0.299	113	To Do
Kamke 1437	✓	0.317	42	✓	0.272	29	To Do
Kamke 1438	✓	1.33	615	✓	0.23	102	To Do
Kamke 1439	✗	0	0	✗	0	0	To Do
Kamke 1440	✗	0	0	✗	0	0	To Do
Kamke 1441	✗	0	0	✗	0	0	To Do
Kamke 1442	✓	0.078	46	✓	0.075	30	To Do
Kamke 1443	✗	0	0	✗	0	0	To Do
Kamke 1444	✗	0	0	✓	0.021	37	To Do
Kamke 1445	✓	0.273	24	✓	0.221	20	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1446	✓	0.049	33	✓	0.058	22	To Do
Kamke 1447	✓	0.045	29	✓	0.056	20	To Do
Kamke 1448	✓	0.27	149	✓	0.118	77	To Do
Kamke 1449	✓	0.041	53	✓	0.022	47	To Do
Kamke 1450	✓	7.124	3595	✓	0.255	1616	To Do
Kamke 1451	✓	0.015	168	✓	0.155	114	To Do
Kamke 1452	✓	0.007	54	✓	0.01	35	To Do
Kamke 1453	✓	1.575	128	✓	0.15	122	To Do
Kamke 1454	✓	0.01	79	✓	0.058	55	To Do
Kamke 1455	✓	0.029	127	✓	0.148	71	To Do
Kamke 1456	✓	0.03	183	✓	0.131	73	To Do
Kamke 1457	✗	0	0	✗	0	0	To Do
Kamke 1458	✗	0	0	✗	0	0	To Do
Kamke 1459	✗	0	0	✗	0	0	To Do
Kamke 1460	✗	0	0	✗	0	0	To Do
Kamke 1461	✗	0	0	✗	0	0	To Do
Kamke 1462	✗	0	0	✗	0	0	To Do
Kamke 1463	✗	0	0	✗	0	0	To Do
Kamke 1464	✓	0.007	34	✓	0.012	27	To Do
Kamke 1465	✓	0.108	95	✓	0.112	113	To Do
Kamke 1466	✓	0.01	46	✓	0.026	27	To Do
Kamke 1467	✓	0.005	84	✓	0.03	590	To Do
Kamke 1468	✓	0.075	57	✓	0.117	59	To Do
Kamke 1469	✓	0.014	72	✓	0.036	37	To Do
Kamke 1470	✓	3.909	64	✓	0.094	36	To Do

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#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 1471	✓	0.112	84	✓	0.157	36	To Do
Kamke 1472	✓	0.136	88	✓	0.159	33	To Do
Kamke 1473	✗	0	0	✗	0	0	To Do
Kamke 1474	✗	0	0	✗	0	0	To Do
Kamke 1475	✓	0.071	38	✓	0.025	23	To Do
Kamke 1476	✗	0	0	✗	0	0	To Do
Kamke 1477	✓	0.182	48	✓	0.027	41	To Do
Kamke 1478	✓	0.045	104	✓	0.102	48	To Do
Kamke 1479	✓	0.151	153	✓	0.201	92	To Do
Kamke 1480	✓	0.275	93	✓	0.217	35	To Do
Kamke 1481	✓	0.549	432	✓	0.067	44	To Do
Kamke 1482	✓	12.027	3629	✓	0.298	1616	To Do
Kamke 1483	✓	0.145	112	✓	0.233	37	To Do
Kamke 1484	✗	0	0	✗	0	0	To Do
Kamke 1485	✓	0.24	64	✓	0.3	51	To Do
Kamke 1486	✓	0.331	65	✓	0.208	51	To Do
Kamke 1487	✓	0.974	87	✓	0.141	38	To Do
Kamke 1488	✓	0.618	102	✓	0.5	135	To Do
Kamke 1489	✗	0	0	✗	0	0	To Do
Kamke 1490	✓	0.052	33	✓	0.074	18	To Do
Kamke 1491	✓	0.035	102	✓	0.099	88	To Do
Kamke 1492	✓	0.392	43	✓	0.141	39	To Do
Kamke 1493	✓	1.602	2585	✓	0.326	1033	To Do
Kamke 1494	✓	0.021	43	✓	0.029	32	To Do
Kamke 1495	✓	0.007	24	✓	0.013	16	To Do

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#	Mathematica			Maple			note on solution
	solved	cpu	leaf	solved	cpu	leaf	
Kamke 1496	✓	0.258	63	✓	0.03	57	To Do
Kamke 1497	✓	0.538	135	✓	0.227	77	To Do
Kamke 1498	✓	13.6	584	✓	0.222	53	To Do
Kamke 1499	✓	0.316	97	✓	0.218	25	To Do
Kamke 1500	✗	0	0	✓	0.189	55	To Do
Kamke 1501	✓	0.201	86	✓	0.194	37	To Do
Kamke 1502	✓	0.105	98	✓	0.409	104	To Do
Kamke 1503	✓	0.646	258	✓	0.033	67	To Do
Kamke 1504	✓	0.139	43	✓	0.175	18	To Do
Kamke 1505	✓	60.413	115	✓	0.202	79	To Do
Kamke 1506	✓	0.437	150	✓	0.187	43	To Do
Kamke 1507	✓	5.839	70099	✓	0.747	1210	To Do
Kamke 1508	✓	0.894	143	✓	0.138	81	To Do
Kamke 1509	✓	0.02	34	✓	0.063	29	To Do
Kamke 1510	✓	0.05	102	✗	0	0	To Do
Kamke 1511	✓	0.057	51	✓	0.033	49	To Do
Kamke 1512	✓	0.046	29	✓	0.013	18	To Do
Kamke 1513	✓	0.091	25	✓	0.168	18	To Do
Kamke 1514	✓	0.688	102	✓	0.478	135	To Do
Kamke 1515	✗	0	0	✗	0	0	To Do
Kamke 1516	✓	260.122	15142	✓	0.405	188	To Do
Kamke 1517	✓	0.288	30686	✓	0.454	866	To Do
Kamke 1518	✓	0.272	104	✓	0.372	60	To Do
Kamke 1519	✓	0.024	65	✓	0.131	19	To Do
Kamke 1520	✓	4.923	534	✓	0.424	288	To Do

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#	Mathematica			Maple			note on solution
	solved	cpu	leaf	solved	cpu	leaf	
Kamke 1521	✓	0.056	35	✓	0.349	28	To Do
Kamke 1522	✓	0.015	44	✓	0.06	34	To Do
Kamke 1523	✓	0.321	74	✓	0.351	23	To Do
Kamke 1524	✓	0.167	96	✓	0.439	98	To Do
Kamke 1525	✓	0.38	102	✓	0.633	291	To Do
Kamke 1526	✓	130.195	27	✓	0.21	19	To Do
Kamke 1527	✓	130.128	165	✓	0.611	437	To Do
Kamke 1528	✓	0.997	72	✓	0.227	71	To Do
Kamke 1529	✓	0.094	47	✓	0.106	25	To Do
Kamke 1530	✓	0.088	35	✓	0.257	113	To Do
Kamke 1531	✗	0	0	✗	0	0	To Do
Kamke 1532	✓	0.016	103	✓	0.101	58	To Do
Kamke 1533	✓	0.016	113	✓	0.106	58	To Do
Kamke 1534	✓	0.003	24	✓	0.018	21	To Do
Kamke 1535	✓	0.406	223	✓	0.043	36	To Do
Kamke 1536	✓	0.005	76	✓	0.02	50	To Do
Kamke 1537	✓	1.047	1722	✓	0.16	67	To Do
Kamke 1538	✓	0.181	66	✓	0.725	49	To Do
Kamke 1539	✓	0.007	44	✓	0.033	35	To Do
Kamke 1540	✗	0	0	✗	0	0	To Do
Kamke 1541	✗	0	0	✗	0	0	To Do
Kamke 1542	✗	0	0	✗	0	0	To Do
Kamke 1543	✗	0	0	✗	0	0	To Do
Kamke 1544	✗	0	0	✓	0.017	41	To Do
Kamke 1545	✓	0.68	40	✓	0.124	27	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1546	✓	0.543	300	✓	0.063	73	To Do
Kamke 1547	✗	0	0	✓	0.02	87	To Do
Kamke 1548	✓	0.081	50	✓	0.086	32	To Do
Kamke 1549	✓	0.032	34	✓	0.034	26	To Do
Kamke 1550	✓	3.307	270	✓	2.871	157	To Do
Kamke 1551	✓	0.367	110	✓	0.231	62	To Do
Kamke 1552	✗	0	0	✓	0.08	89	To Do
Kamke 1553	✓	0.009	29	✓	0.011	17	To Do
Kamke 1554	✓	0.01	29	✓	0.013	18	To Do
Kamke 1555	✓	0.053	156	✓	0.168	61	To Do
Kamke 1556	✓	0.011	30	✓	0.015	19	To Do
Kamke 1557	✓	0.057	146	✓	0.112	61	To Do
Kamke 1558	✓	0.124	319	✓	0.167	67	To Do
Kamke 1559	✓	0.225	100	✓	0.161	33	To Do
Kamke 1560	✓	0.008	29	✓	0.013	18	To Do
Kamke 1561	✓	3.217	400	✓	0.305	69	To Do
Kamke 1562	✓	0.921	140	✓	0.359	77	To Do
Kamke 1563	✓	1.641	232	✓	0.251	87	To Do
Kamke 1564	✓	1.13	230	✓	0.24	88	To Do
Kamke 1565	✓	0.42	242	✓	0.353	71	To Do
Kamke 1566	✓	0.496	238	✓	0.309	35	To Do
Kamke 1567	✓	0.008	30	✓	0.015	19	To Do
Kamke 1568	✓	0.01	122	✓	0.036	89	To Do
Kamke 1569	✗	0	0	✓	0.423	63	To Do
Kamke 1570	✓	0.111	470	✓	0.107	49	To Do

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#	Mathematica			Maple			note on solution
	solved	cpu	leaf	solved	cpu	leaf	
Kamke 1571	✓	0.07	390	✓	0.312	143	To Do
Kamke 1572	✗	0	0	✓	0.396	35	To Do
Kamke 1573	✓	0.173	77	✓	0.056	41	To Do
Kamke 1574	✓	0.2	270	✓	0.812	252	To Do
Kamke 1575	✓	8.531	138	✓	0.622	638	To Do
Kamke 1576	✗	0	0	✓	0.022	67	To Do
Kamke 1577	✓	0.077	46	✓	0.016	21	To Do
Kamke 1578	✓	48.837	141	✓	0.482	89	To Do
Kamke 1579	✓	0.938	80	✓	0.467	69	To Do
Kamke 1580	✓	2.443	234	✓	1.247	79	To Do
Kamke 1581	✗	0	0	✗	0	0	To Do
Kamke 1582	✓	0.123	787	✗	0	0	To Do
Kamke 1583	✓	0.121	92	✓	0.067	40	To Do
Kamke 1584	✓	2.476	216	✓	0.246	118	To Do
Kamke 1585	✓	0.181	214	✓	0.042	679	To Do
Kamke 1586	✗	0	0	✗	0	0	To Do
Kamke 1587	✓	0.324	492	✓	0.467	154	To Do
Kamke 1588	✓	12.139	114	✓	0.147	90	To Do
Kamke 1589	✓	0.04	670	✓	8.053	4018	To Do
Kamke 1590	✓	271.105	331	✓	1.732	553	To Do
Kamke 1591	✓	0.049	26	✓	0.857	12	To Do
Kamke 1592	✓	0.098	14	✓	0.852	10	To Do
Kamke 1593	✗	0	0	✗	0	0	To Do
Kamke 1594	✓	0.506	373	✓	0.941	59	To Do
Kamke 1595	✗	0	0	✗	0	0	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1596	✗	0	0	✗	0	0	To Do
Kamke 1597	✓	2.521	242	✓	1.019	21	To Do
Kamke 1598	✗	0	0	✗	0	0	To Do
Kamke 1599	✗	0	0	✗	0	0	To Do
Kamke 1600	✓	2.373	1017	✓	0.916	89	To Do
Kamke 1601	✗	0	0	✓	4.318	151	To Do
Kamke 1602	✓	0.148	47	✓	0.243	73	To Do
Kamke 1603	✗	0	0	✓	43.954	8413	To Do
Kamke 1604	✓	0.043	34	✓	0.269	23	To Do
Kamke 1605	✗	0	0	✓	1.266	104	To Do
Kamke 1606	✗	0	0	✗	0	0	To Do
Kamke 1607	✓	0.086	79	✓	0.165	49	To Do
Kamke 1608	✗	0	0	✗	0	0	To Do
Kamke 1609	✗	0	0	✗	0	0	To Do
Kamke 1610	✓	4.061	754	✓	0.255	92	To Do
Kamke 1611	✗	0	0	✓	1.618	57	To Do
Kamke 1612	✗	0	0	✓	2.113	57	To Do
Kamke 1613	✓	1.341	35	✓	1.03	27	To Do
Kamke 1614	✓	0.965	32	✓	1.122	33	To Do
Kamke 1615	✗	0	0	✓	4.202	91	To Do
Kamke 1616	✗	0	0	✓	1.225	63	To Do
Kamke 1617	✗	0	0	✗	0	0	To Do
Kamke 1618	✗	0	0	✓	1.568	56	To Do
Kamke 1619	✗	0	0	✗	0	0	To Do
Kamke 1620	✓	3.447	492	✓	1.297	291	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1621	✓	9.747	990	✓	2.558	108	To Do
Kamke 1622	✓	24.361	88	✓	1.829	817	To Do
Kamke 1623	✗	0	0	✗	0	0	To Do
Kamke 1624	✗	0	0	✓	1.931	131	To Do
Kamke 1625	✗	0	0	✗	0	0	To Do
Kamke 1626	✗	0	0	✓	0.283	48	To Do
Kamke 1627	✗	0	0	✓	0.889	58	To Do
Kamke 1628	✗	0	0	✗	0	0	To Do
Kamke 1629	✓	0.069	75	✓	0.054	38	To Do
Kamke 1630	✓	7.716	3227	✓	1.75	783	To Do
Kamke 1631	✓	0.055	75	✓	0.095	38	To Do
Kamke 1632	✓	0.066	46	✓	1.243	23	To Do
Kamke 1633	✓	34.088	92	✓	1.438	97	To Do
Kamke 1634	✗	0	0	✗	0	0	To Do
Kamke 1635	✓	0.591	104	✓	1.332	79	To Do
Kamke 1636	✗	0	0	✗	0	0	To Do
Kamke 1637	✗	0	0	✓	1.709	58	To Do
Kamke 1638	✓	4.773	146	✓	0.263	115	To Do
Kamke 1639	✗	0	0	✗	0	0	To Do
Kamke 1640	✓	0.525	96	✓	1.342	70	To Do
Kamke 1641	✓	0.058	61	✓	0.046	29	To Do
Kamke 1642	✗	0	0	✗	0	0	To Do
Kamke 1643	✗	0	0	✗	0	0	To Do
Kamke 1644	✗	0	0	✓	0.787	56	To Do
Kamke 1645	✗	0	0	✗	0	0	To Do

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#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 1646	✓	10.842	262	✓	1.322	94	To Do
Kamke 1647	✓	0.508	91	✓	0.69	60	To Do
Kamke 1648	✗	0	0	✓	1.552	205	To Do
Kamke 1649	✗	0	0	✗	0	0	To Do
Kamke 1650	✓	0.119	30	✓	2.766	16	To Do
Kamke 1651	✓	0.369	414	✓	2.411	31	To Do
Kamke 1652	✓	0.504	76	✓	2.596	36	To Do
Kamke 1653	✓	0.173	75	✓	2.365	41	To Do
Kamke 1654	✓	0.549	308	✓	2.41	38	To Do
Kamke 1655	✓	1.078	350	✓	2.516	84	To Do
Kamke 1656	✓	43.666	9706	✓	3.269	771	To Do
Kamke 1657	✓	0.437	192	✓	2.586	35	To Do
Kamke 1658	✗	0	0	✓	0.232	115	To Do
Kamke 1659	✗	0	0	✓	0.165	60	To Do
Kamke 1660	✗	0	0	✓	0.821	125	To Do
Kamke 1661	✓	0.084	92	✓	1.227	51	To Do
Kamke 1662	✗	0	0	✓	0.464	56	To Do
Kamke 1663	✗	0	0	✓	1.092	125	To Do
Kamke 1664	✗	0	0	✓	3.128	155	To Do
Kamke 1665	✗	0	0	✓	0.552	84	To Do
Kamke 1666	✗	0	0	✓	1.038	93	To Do
Kamke 1667	✗	0	0	✓	1.448	121	To Do
Kamke 1668	✓	0.059	60	✓	1.286	24	To Do
Kamke 1669	✓	0.501	160	✓	1.308	32	To Do
Kamke 1670	✓	7.643	51	✓	1.733	35	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1671	✓	0.117	59	✓	1.225	35	To Do
Kamke 1672	✗	0	0	✓	1.155	65	To Do
Kamke 1673	✗	0	0	✓	0.797	60	To Do
Kamke 1674	✓	0.046	106	✓	0.146	25	To Do
Kamke 1675	✗	0	0	✗	0	0	To Do
Kamke 1676	✓	0.364	134	✓	1.323	72	To Do
Kamke 1677	✗	0	0	✓	2.769	101	To Do
Kamke 1678	✗	0	0	✓	2.408	60	To Do
Kamke 1679	✓	0.201	33	✓	1.277	27	To Do
Kamke 1680	✗	0	0	✓	1.809	103	To Do
Kamke 1681	✓	2.762	41	✓	1.154	31	To Do
Kamke 1682	✓	22.24	41	✓	1.964	94	To Do
Kamke 1683	✓	0.089	26	✓	1.171	23	To Do
Kamke 1684	✗	0	0	✓	2.791	100	To Do
Kamke 1685	✗	0	0	✗	0	0	To Do
Kamke 1686	✗	0	0	✓	1.433	128	To Do
Kamke 1687	✓	0.079	262	✓	1.247	21	To Do
Kamke 1688	✓	0.594	189	✓	1.247	32	To Do
Kamke 1689	✓	0.309	104	✓	1.296	37	To Do
Kamke 1690	✗	0	0	✓	2.916	99	To Do
Kamke 1691	✓	61.035	251	✓	0.948	254	To Do
Kamke 1692	✗	0	0	✓	4.227	156	To Do
Kamke 1693	✗	0	0	✓	0.326	68	To Do
Kamke 1694	✓	0.135	115	✓	1.28	54	To Do
Kamke 1695	✗	0	0	✓	1.84	103	To Do

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Table 3 – continued from previous page

#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1696	✗	0	0	✓	1.707	100	To Do
Kamke 1697	✓	0.211	94	✓	1.198	39	To Do
Kamke 1698	✓	0.037	72	✗	0	0	To Do
Kamke 1699	✓	0.146	40	✓	1.378	33	To Do
Kamke 1700	✓	0.2	44	✓	1.553	86	To Do
Kamke 1701	✓	0.231	80	✓	1.475	42	To Do
Kamke 1702	✗	0	0	✗	0	0	To Do
Kamke 1703	✓	0.411	77	✓	0.217	21	To Do
Kamke 1704	✗	0	0	✗	0	0	To Do
Kamke 1705	✓	0.319	252	✗	0	0	To Do
Kamke 1706	✓	0.585	308	✗	0	0	To Do
Kamke 1707	✓	0.076	31	✓	1.363	39	To Do
Kamke 1708	✗	0	0	✓	2.422	73	To Do
Kamke 1709	✓	56.284	543	✓	3.061	84	To Do
Kamke 1710	✗	0	0	✓	4.236	91	To Do
Kamke 1711	✓	98.969	916	✓	0.709	81	To Do
Kamke 1712	✓	0.101	75	✓	0.266	61	To Do
Kamke 1713	✗	0	0	✓	0.352	54	To Do
Kamke 1714	✓	0.197	25	✓	1.282	68	To Do
Kamke 1715	✓	0.18	26	✓	1.24	25	To Do
Kamke 1716	✓	0.717	172	✓	1.478	68	To Do
Kamke 1717	✓	58.061	277	✓	1.49	107	To Do
Kamke 1718	✓	2.311	744	✓	0.394	133	To Do
Kamke 1719	✗	0	0	✓	0.628	70	To Do
Kamke 1720	✓	88.096	105	✓	1.628	173	To Do

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Table 3 – continued from previous page

#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1721	✓	21.35	41	✗	0	0	To Do
Kamke 1722	✓	2.341	697	✓	2.931	98	To Do
Kamke 1723	✓	0.851	130	✓	1.301	16	To Do
Kamke 1724	✓	0.501	38	✓	2.094	21	To Do
Kamke 1725	✓	2.205	75	✓	1.856	105	To Do
Kamke 1726	✓	0.376	82	✓	0.232	39	To Do
Kamke 1727	✓	0.449	166	✓	1.708	823	To Do
Kamke 1728	✓	0.005	31	✓	1.189	24	To Do
Kamke 1729	✗	0	0	✗	0	0	To Do
Kamke 1730	✓	0.965	135	✓	1.29	53	To Do
Kamke 1731	✓	1.301	351	✓	1.265	61	To Do
Kamke 1732	✗	0	0	✗	0	0	To Do
Kamke 1733	✓	2.275	437	✓	1.249	71	To Do
Kamke 1734	✗	0	0	✗	0	0	To Do
Kamke 1735	✗	0	0	✗	0	0	To Do
Kamke 1736	✓	8.559	129	✓	1.409	49	To Do
Kamke 1737	✗	0	0	✗	0	0	To Do
Kamke 1738	✗	0	0	✗	0	0	To Do
Kamke 1739	✗	0	0	✗	0	0	To Do
Kamke 1740	✓	0.119	16	✓	1.301	13	To Do
Kamke 1741	✓	0.14	17	✓	1.244	34	To Do
Kamke 1742	✗	0	0	✓	0.256	60	To Do
Kamke 1743	✓	23.354	2761	✓	1.312	71	To Do
Kamke 1744	✓	0.717	155	✓	1.608	823	To Do
Kamke 1745	✓	0.779	251	✓	1.778	117	To Do

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Table 3 – continued from previous page

#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1746	✓	0.139	118	✓	1.656	207	To Do
Kamke 1747	✓	0.119	20	✓	1.225	17	To Do
Kamke 1748	✓	0.256	43	✓	1.247	67	To Do
Kamke 1749	✓	0.525	153	✓	2.003	57	To Do
Kamke 1750	✓	4.561	2281	✓	1.772	87	To Do
Kamke 1751	✗	0	0	✗	0	0	To Do
Kamke 1752	✓	0.192	26	✓	1.435	33	To Do
Kamke 1753	✓	0.56	43	✓	1.294	147	To Do
Kamke 1754	✓	0.152	17	✓	1.221	15	To Do
Kamke 1755	✓	6.09	716	✓	1.46	418	To Do
Kamke 1756	✓	0.718	211	✓	2.506	75	To Do
Kamke 1757	✗	0	0	✗	0	0	To Do
Kamke 1758	✓	0.376	36	✓	1.394	42	To Do
Kamke 1759	✓	0.161	18	✓	1.181	31	To Do
Kamke 1760	✓	0.093	108	✓	0.115	114	To Do
Kamke 1761	✗	0	0	✗	0	0	To Do
Kamke 1762	✗	0	0	✓	2.309	108	To Do
Kamke 1763	✓	0.255	40	✓	1.236	148	To Do
Kamke 1764	✓	0.071	52	✓	1.406	18	To Do
Kamke 1765	✓	0.274	34	✓	1.218	27	To Do
Kamke 1766	✓	0.179	21	✓	1.242	64	To Do
Kamke 1767	✓	0.343	55	✓	2.704	50	To Do
Kamke 1768	✓	0.05	53	✓	1.215	43	To Do
Kamke 1769	✓	0.168	18	✓	1.314	21	To Do
Kamke 1770	✓	0.957	28	✓	1.257	26	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1771	✓	0.122	21	✓	1.365	22	To Do
Kamke 1772	✓	0.692	37	✓	1.298	42	To Do
Kamke 1773	✓	0.442	44	✓	1.185	30	To Do
Kamke 1774	✓	1.355	92	✓	1.5	136	To Do
Kamke 1775	✓	0.185	29	✓	1.5	31	To Do
Kamke 1776	✓	7.598	1743	✓	1.55	49	To Do
Kamke 1777	✗	0	0	✓	0.704	79	To Do
Kamke 1778	✓	0.266	65	✓	2.039	245	To Do
Kamke 1779	✗	0	0	✓	2.007	117	To Do
Kamke 1780	✗	0	0	✓	2.125	156	To Do
Kamke 1781	✓	0.238	46	✓	1.253	11	To Do
Kamke 1782	✓	0.206	93	✓	1.271	33	To Do
Kamke 1783	✓	1.389	26	✓	1.331	23	To Do
Kamke 1784	✓	0.326	74	✓	1.961	82	To Do
Kamke 1785	✓	0.444	95	✓	1.649	83	To Do
Kamke 1786	✓	0.068	53	✓	0.247	42	To Do
Kamke 1787	✓	1.004	170	✓	0.34	80	To Do
Kamke 1788	✗	0	0	✗	0	0	To Do
Kamke 1789	✗	0	0	✗	0	0	To Do
Kamke 1790	✓	0.708	186	✓	0.333	119	To Do
Kamke 1791	✓	0.779	168	✓	0.367	90	To Do
Kamke 1792	✓	1.144	226	✓	0.531	194	To Do
Kamke 1793	✓	0.141	83	✓	1.296	40	To Do
Kamke 1794	✓	0.158	69	✓	1.322	46	To Do
Kamke 1795	✓	0.351	116	✓	3.092	529	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1796	✓	0.31	363	✓	1.62	51	To Do
Kamke 1797	✗	0	0	✗	0	0	To Do
Kamke 1798	✓	36.677	248	✓	1.401	166	To Do
Kamke 1799	✓	2.148	88	✓	1.566	46	To Do
Kamke 1800	✓	0.651	84	✓	1.413	60	To Do
Kamke 1801	✗	0	0	✗	0	0	To Do
Kamke 1802	✗	0	0	✗	0	0	To Do
Kamke 1803	✓	23.624	10387	✓	3.684	115620	To Do
Kamke 1804	✓	3.379	415	✓	1.208	31	To Do
Kamke 1805	✓	0.462	438	✓	1.066	34	To Do
Kamke 1806	✗	0	0	✓	6.389	733	To Do
Kamke 1807	✗	0	0	✗	0	0	To Do
Kamke 1808	✓	1.246	124	✓	0.204	72	To Do
Kamke 1809	✓	26.494	260	✓	0.65	336	To Do
Kamke 1810	✓	0.088	1677	✓	0.167	91	To Do
Kamke 1811	✗	0	0	✗	0	0	To Do
Kamke 1812	✓	0.343	29	✓	0.181	19	To Do
Kamke 1813	✓	29.028	176	✓	0.463	138	To Do
Kamke 1814	✓	0.413	120	✓	0.209	87	To Do
Kamke 1815	✗	0	0	✓	0.951	71	To Do
Kamke 1816	✗	0	0	✓	1.562	46	To Do
Kamke 1817	✓	20.836	41	✓	0.349	40	To Do
Kamke 1818	✗	0	0	✓	0.474	66	To Do
Kamke 1819	✗	0	0	✓	0.117	42	To Do
Kamke 1820	✗	0	0	✓	1.169	88	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1821	✗	0	0	✓	3.185	54	To Do
Kamke 1822	✓	1.112	371	✓	1.948	293	To Do
Kamke 1823	✓	0.401	281	✓	0.55	289	To Do
Kamke 1824	✓	0.957	347	✓	1.288	96	To Do
Kamke 1825	✗	0	0	✓	1.306	49	To Do
Kamke 1826	✓	1.144	201	✓	0.799	173	To Do
Kamke 1827	✗	0	0	✓	3.5	81	To Do
Kamke 1828	✓	0.01	32	✓	1.3	59	To Do
Kamke 1829	✓	0.006	24	✓	0.782	36	To Do
Kamke 1830	✓	0.028	24	✓	0.987	308	To Do
Kamke 1831	✗	0	0	✓	1.721	163	To Do
Kamke 1832	✗	0	0	✓	1.201	117	To Do
Kamke 1833	✓	121.475	81	✓	6.829	162	To Do
Kamke 1834	✓	22.674	19	✓	0.652	92	To Do
Kamke 1835	✓	0.084	143	✗	0	0	To Do
Kamke 1836	✗	0	0	✓	1.172	116	To Do
Kamke 1837	✓	10.217	145	✓	0.547	95	To Do
Kamke 1838	✗	0	0	✓	0.816	73	To Do
Kamke 1839	✗	0	0	✓	1.057	116	To Do
Kamke 1840	✗	0	0	✓	1.15	129	To Do
Kamke 1841	✗	0	0	✓	0.73	60	To Do
Kamke 1842	✓	0.208	286	✓	0.821	190	To Do
Kamke 1843	✓	2.926	409	✓	0.518	77	To Do
Kamke 1844	✓	0.115	20	✓	0.833	17	To Do
Kamke 1845	✓	0.113	22	✓	0.652	22	To Do

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#	Mathematica			Maple			note on solution
	solved	cpu	leaf	solved	cpu	leaf	
Kamke 1846	✓	0.036	51	✓	0.018	28	To Do
Kamke 1847	✓	0.247	95	✓	0.424	49	To Do
Kamke 1848	✓	0.493	187	✓	1.487	789	To Do
Kamke 1849	✓	0.645	426	✓	0.388	197	To Do
Kamke 1850	✗	0	0	✓	1.645	164	To Do
Kamke 1851	✗	0	0	✗	0	0	To Do
Kamke 1852	✓	0.13	28	✓	0.416	28	To Do
Kamke 1853	✓	0.142	43	✓	1.053	110	To Do
Kamke 1854	✗	0	0	✗	0	0	To Do
Kamke 1855	✗	0	0	✗	0	0	To Do
Kamke 1856	✓	0.018	22	✓	0.055	19	To Do
Kamke 1857	✓	0.01	39	✓	0.067	35	To Do
Kamke 1858	✓	0.009	182	✓	0.073	64	To Do
Kamke 1859	✓	0.005	51	✓	0.054	37	To Do
Kamke 1860	✓	0.035	696	✓	0.102	177	To Do
Kamke 1861	✓	0.011	183	✓	0.113	152	To Do
Kamke 1862	✓	0.013	52	✓	0.05	39	To Do
Kamke 1863	✓	0.007	84	✓	0.054	35	To Do
Kamke 1864	✓	0.01	59	✓	0.051	44	To Do
Kamke 1865	✓	0.837	2062	✓	0.144	224	To Do
Kamke 1866	✓	0.042	132	✓	0.047	39	To Do
Kamke 1867	✓	0.1	124	✓	0.047	42	To Do
Kamke 1868	✓	0.09	162	✓	0.095	64	To Do
Kamke 1869	✓	0.108	118	✓	0.082	51	To Do
Kamke 1870	✓	0.156	122	✓	0.152	47	To Do

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#	Mathematica			Maple			note on solution
	solved	cpu	leaf	solved	cpu	leaf	
Kamke 1871	✓	0.352	180	✓	0.132	62	To Do
Kamke 1872	✓	0.13	162	✓	0.102	65	To Do
Kamke 1873	✓	0.105	322	✓	0.079	52	To Do
Kamke 1874	✓	0.011	115	✓	0.556	57	To Do
Kamke 1875	✓	1.869	3181	✓	3.296	2602	To Do
Kamke 1876	✓	0.023	39	✓	0.207	18	To Do
Kamke 1877	✓	0.005	31	✓	0.046	31	To Do
Kamke 1878	✓	0.013	39	✓	0.091	39	To Do
Kamke 1879	✓	0.023	58	✓	0.088	54	To Do
Kamke 1880	✓	0.021	29	✓	0.1	23	To Do
Kamke 1881	✓	0.013	44	✓	0.057	48	To Do
Kamke 1882	✓	1.737	928	✓	0.235	99	To Do
Kamke 1883	✓	1.059	602	✓	0.135	80	To Do
Kamke 1884	✓	0.447	224	✓	0.185	69	To Do
Kamke 1885	✓	0.02	66	✓	0.175	47	To Do
Kamke 1886	✓	0.016	115	✓	0.086	49	To Do
Kamke 1887	✓	0.368	5748	✓	0.155	360	To Do
Kamke 1888	✓	13.551	17774	✓	0.256	457	To Do
Kamke 1889	✓	0.233	554	✓	0.065	60	To Do
Kamke 1890	✗	0	0	✗	0	0	To Do
Kamke 1891	✓	1.06	742	✓	0.084	64	To Do
Kamke 1892	✓	0.28	4815	✓	0.167	463	To Do
Kamke 1893	✓	0.485	5546	✓	0.954	1579	To Do
Kamke 1894	✓	0.527	3386	✓	0.916	1056	To Do
Kamke 1895	✓	0.248	7517	✓	0.227	1008	To Do

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#	Mathematica			Maple			note on solution
	solved	cpu	leaf	solved	cpu	leaf	
Kamke 1896	✓	0.571	1132	✓	0.084	67	To Do
Kamke 1897	✓	0.241	280	✓	0.329	90	To Do
Kamke 1898	✓	0.032	420	✓	0.092	71	To Do
Kamke 1899	✓	0.01	112	✓	0.113	52	To Do
Kamke 1900	✓	0.009	94	✓	0.116	50	To Do
Kamke 1901	✓	0.009	105	✓	0.092	43	To Do
Kamke 1902	✓	0.02	226	✓	0.099	51	To Do
Kamke 1903	✓	0.088	1304	✓	0.17	299	To Do
Kamke 1904	✓	0.051	1445	✓	0.11	257	To Do
Kamke 1905	✗	0	0	✗	0	0	To Do
Kamke 1906	✓	0.045	278	✓	0.098	120	To Do
Kamke 1907	✓	0.011	179	✓	0.094	66	To Do
Kamke 1908	✓	0.04	551	✓	0.388	1285	To Do
Kamke 1909	✓	0.057	1630	✓	16.364	33085	To Do
Kamke 1910	✓	0.009	39	✓	0.133	37	To Do
Kamke 1911	✓	0.031	1148	✓	0.162	309	To Do
Kamke 1912	✓	0.011	798	✓	1.156	2788	To Do
Kamke 1913	✓	0.034	64	✓	0.185	57	To Do
Kamke 1914	✓	0.325	204	✓	0.582	92	To Do
Kamke 1915	✗	0	0	✓	4.182	147	To Do
Kamke 1916	✓	0.399	557	✓	0.655	180	To Do
Kamke 1917	✓	216.129	3406	✓	1.252	108	To Do
Kamke 1918	✗	0	0	✓	2.908	184	To Do
Kamke 1919	✗	0	0	✓	4.266	200	To Do
Kamke 1920	✗	0	0	✓	3.939	202	To Do

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#	Mathematica			Maple			note on solution
	solved	cpu	leaf	solved	cpu	leaf	
Kamke 1921	✗	0	0	✗	0	0	To Do
Kamke 1922	✗	0	0	✗	0	0	To Do
Kamke 1923	✓	0.011	53	✓	0.055	35	To Do
Kamke 1924	✓	0.072	191	✓	0.391	180	To Do
Kamke 1925	✓	0.019	31	✓	0.354	194	To Do
Kamke 1926	✓	0.006	28	✓	0.273	96	To Do
Kamke 1927	✗	0	0	✗	0	0	To Do
Kamke 1928	✗	0	0	✗	0	0	To Do
Kamke 1929	✗	0	0	✓	4.415	116	To Do
Kamke 1930	✓	0.034	308	✓	0.092	45	To Do
Kamke 1931	✓	4.138	10101	✓	1.4	1117	To Do
Kamke 1932	✗	0	0	✓	1.242	383	To Do
Kamke 1933	✗	0	0	✓	1.618	4258	To Do
Kamke 1934	✗	0	0	✓	1.512	377	To Do
Kamke 1935	✗	0	0	✓	2.276	741	To Do
Kamke 1936	✗	0	0	✓	1.076	704	To Do
Kamke 1937	✗	0	0	✓	1.039	242	To Do
Kamke 1938	✓	0.008	137	✓	0.211	101	To Do
Kamke 1939	✓	0.291	2168	✓	1.798	899	To Do
Kamke 1940	✗	0	0	✗	0	0	To Do

2.1 ODE No. 1

$$y'(x) - \frac{1}{\sqrt{\mathrm{a0} + \mathrm{a1}x + \mathrm{a2}x^2 + \mathrm{a3}x^3 + \mathrm{a4}x^4}} = 0$$

✓ **Mathematica** : cpu = 0.465968 (sec), leaf count = 1117

$$\left\{\left\{y(x) \to c_1 - \frac{2F\left(\sin^{-1}\left(\sqrt{\frac{(x-\mathrm{Root}[\mathrm{a4}\#1^4+\mathrm{a3}\#1^3+\mathrm{a2}\#1^2+\mathrm{a1}\#1+\mathrm{a0}\&,1])(\mathrm{Root}[\mathrm{a4}\#1^4+\mathrm{a3}\#1^3+\mathrm{a2}\#1^2+\mathrm{a1}\#1+\mathrm{a0}\&,2]-\mathrm{Root}}{(x-\mathrm{Root}[\mathrm{a4}\#1^4+\mathrm{a3}\#1^3+\mathrm{a2}\#1^2+\mathrm{a1}\#1+\mathrm{a0}\&,2])(\mathrm{Root}[\mathrm{a4}\#1^4+\mathrm{a3}\#1^3+\mathrm{a2}\#1^2+\mathrm{a1}\#1+\mathrm{a0}\&,1]-\mathrm{Root}}}\right.\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.056 (sec), leaf count = 1089

Expression too large to display

Hand solution

$$y' - \frac{1}{\sqrt{a_0 + a_1 x + a_2 x^2 + a_3 x^3 + a_4 x^4}} = 0 \tag{1}$$

To Do.

2.2 ODE No. 2

$$ay(x) + c\left(-e^{bx}\right) + y'(x) = 0$$

✓ **Mathematica** : cpu = 0.0621456 (sec), leaf count = 34

$$\left\{\left\{y(x) \to \frac{ce^{x(a+b)-ax}}{a+b} + c_1 e^{-ax}\right\}\right\}$$

✓ **Maple** : cpu = 0.021 (sec), leaf count = 25

$$\left\{y(x) = \left(\frac{c\,\mathrm{e}^{(a+b)x}}{a+b} + c_1\right)\mathrm{e}^{-ax}\right\}$$

Hand solution

$$\frac{dy}{dx} + ay(x) = ce^{bx} \tag{1}$$

Integrating factor $\mu = e^{\int a dx} = e^{ax}$. Hence (1) becomes

$$
\begin{aligned}
\frac{d}{dx}(\mu y(x)) &= \mu c e^{bx} \\
\mu y(x) &= \int \mu c e^{bx} dx + C
\end{aligned}
$$

Replacing μ by e^{ax}

$$
\begin{aligned}
y(x) = c e^{-ax} \int e^{(a+b)x} dx + C e^{-ax} \\
= c e^{-ax} \frac{e^{(a+b)x}}{a+b} + C e^{-ax} \\
= \frac{c e^{(a+b)x-ax}}{a+b} + C e^{-ax}
\end{aligned}
$$

Can be reduced to

$$
y(x) = c\frac{e^{bx}}{a+b} + C e^{-ax}
$$

2.3 ODE No. 3

$$
ay(x) - b\sin(cx) + y'(x) = 0
$$

✓ **Mathematica** : cpu = 0.0729384 (sec), leaf count = 40

$$
\left\{\left\{y(x) \to \frac{b(a\sin(cx) - c\cos(cx))}{a^2+c^2} + c_1 e^{-ax}\right\}\right\}
$$

✓ **Maple** : cpu = 0.035 (sec), leaf count = 38

$$
\left\{y(x) = c_1 \mathrm{e}^{-ax} - \frac{(-a\sin(cx) + c\cos(cx))\, b}{a^2+c^2}\right\}
$$

Hand solution

$$
\frac{dy}{dx} + ay(x) = b\sin(cx) \tag{1}
$$

Integrating factor $\mu = e^{\int a dx} = e^{ax}$. Hence (1) becomes

$$
\begin{aligned}
\frac{d}{dx}(\mu y(x)) &= \mu b \sin(cx) \\
\mu y(x) &= b\int \mu \sin(cx)\, dx + C
\end{aligned}
$$

Replacing μ by e^{ax}

$$y(x) = be^{-ax} \int e^{ax} \sin(cx)\, dx + Ce^{-ax} \tag{2}$$

Using $\sin(cx) = \frac{e^{icx} - e^{-icx}}{2i}$ then

$$\begin{aligned}
\int e^{ax} \sin(cx)\, dx &= \int \frac{e^{(ic+a)x} - e^{(-ic+a)x}}{2i} dx \\
&= \frac{1}{2i} \left(\frac{e^{(ic+a)x}}{ic+a} - \frac{e^{(-ic+a)x}}{-ic+a} \right) \\
&= \frac{1}{2i} e^{ax} \left(\frac{e^{icx}}{ic+a} - \frac{e^{-icx}}{-ic+a} \right) \\
&= \frac{1}{2i} e^{ax} \left(\frac{e^{icx}(-ic+a) - e^{-icx}(ic+a)}{(ic+a)(-ic+a)} \right) \\
&= \frac{1}{2i} e^{ax} \left(\frac{-ice^{icx} + ae^{icx} - ice^{-icx} - ae^{-icx}}{(c^2+a^2)} \right) \\
&= \frac{1}{2i} e^{ax} \left(\frac{-ic\left(e^{icx} + e^{-icx}\right) + a\left(e^{icx} - e^{-icx}\right)}{(c^2+a^2)} \right) \\
&= \frac{e^{ax}}{(c^2+a^2)} \left(\frac{-ic\left(e^{icx} + e^{-icx}\right)}{2i} + \frac{a\left(e^{icx} - e^{-icx}\right)}{2i} \right) \\
&= \frac{e^{ax}}{(c^2+a^2)} (-c\cos cx + a \sin cx)
\end{aligned}$$

Therefore (2) becomes

$$\begin{aligned}
y(x) &= be^{-ax} \left[\frac{e^{ax}}{(c^2+a^2)} (-c\cos cx + a\sin cx) \right] + Ce^{-ax} \\
&= \frac{b}{(c^2+a^2)} (-c\cos cx + a\sin cx) + Ce^{-ax}
\end{aligned}$$

2.4 ODE No. 4

$$-e^{-x^2}x + y'(x) + 2xy(x) = 0$$

✓ **Mathematica** : cpu = 0.0419564 (sec), leaf count = 30

$$\left\{\left\{y(x) \to \frac{1}{2}e^{-x^2}x^2 + c_1 e^{-x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.007 (sec), leaf count = 18

$$\left\{y(x) = \left(\frac{x^2}{2} + c_1\right) \mathrm{e}^{-x^2}\right\}$$

Hand solution

$$\frac{dy}{dx} + 2xy(x) = e^{-x^2}x \tag{1}$$

Integrating factor $\mu = e^{\int 2x dx} = e^{x^2}$. Hence (1) becomes

$$\begin{aligned}\frac{d}{dx}\left(e^{x^2}y(x)\right) &= e^{x^2}e^{-x^2}x\\ \frac{d}{dx}\left(e^{x^2}y(x)\right) &= x\end{aligned}$$

Integrating both sides

$$\begin{aligned}e^{x^2}y(x) &= \frac{x^2}{2} + C\\ y(x) &= e^{-x^2}\left(\frac{x^2}{2} + C\right)\end{aligned}$$

2.5 ODE No. 5

$$y'(x) + y(x)\cos(x) - e^{2x} = 0$$

✓ **Mathematica** : cpu = 0.446427 (sec), leaf count = 39

$$\left\{\left\{y(x) \to e^{-\sin(x)}\int_1^x e^{2K[1]+\sin(K[1])}dK[1] + c_1e^{-\sin(x)}\right\}\right\}$$

✓ **Maple** : cpu = 0.242 (sec), leaf count = 21

$$\{y(x) = \left(c_1 + \int \mathrm{e}^{2x+\sin(x)}dx\right)\mathrm{e}^{-\sin(x)}\}$$

Hand solution

$$\frac{dy}{dx} + y(x)\cos(x) = e^{2x} \tag{1}$$

Integrating factor $\mu = e^{\int \cos(x)dx} = e^{\sin(x)}$. Hence (1) becomes

$$\frac{d}{dx}\left(e^{\sin(x)}y(x)\right) = e^{\sin(x)}e^{2x}$$

Integrating both sides

$$
\begin{aligned}
e^{\sin(x)}y(x) &= \int e^{\sin(x)}e^{2x} + C \\
y(x) &= e^{-\sin(x)} \int e^{2x+\sin(x)} + Ce^{-\sin(x)}
\end{aligned}
$$

2.6 ODE No. 6

$$
y'(x) + y(x)\cos(x) - \frac{1}{2}\sin(2x) = 0
$$

✓ **Mathematica** : cpu = 0.0313337 (sec), leaf count = 18

$$
\left\{\left\{y(x) \to \sin(x) + c_1 e^{-\sin(x)} - 1\right\}\right\}
$$

✓ **Maple** : cpu = 0.037 (sec), leaf count = 15

$$
\left\{y(x) = c_1 \mathrm{e}^{-\sin(x)} + \sin(x) - 1\right\}
$$

Hand solution

$$
\frac{dy}{dx} + y(x)\cos(x) = \frac{1}{2}\sin(2x) \tag{1}
$$

Integrating factor $\mu = e^{\int \cos dx} = e^{\sin(x)}$. Therefore (1) becomes2

$$
\frac{d}{dx}\left(e^{\sin(x)}y(x)\right) = \frac{1}{2}e^{\sin(x)}\sin(2x)
$$

Integrating

$$
\begin{aligned}
e^{\sin(x)}y(x) &= \frac{1}{2}\int e^{\sin(x)}\sin(2x) + C \\
y(x) &= \frac{e^{-\sin(x)}}{2}\int e^{\sin(x)}\sin(2x) + e^{-\sin(x)}C
\end{aligned}
$$

But $e^{\sin(x)}\sin(2x)$ can be integrated by parts which gives $e^{\sin(x)}(-2 + 2\sin(x))$. Hence the above becomes

$$
\begin{aligned}
y(x) &= \frac{e^{-\sin(x)}}{2}\left(e^{\sin(x)}(-2 + 2\sin(x))\right) + e^{-\sin(x)}C \\
&= -1 + \sin(x) + e^{-\sin(x)}C
\end{aligned}
$$

2.7 ODE No. 7

$$y'(x) + y(x)\cos(x) - e^{-\sin(x)} = 0$$

✓ **Mathematica** : cpu = 0.0982518 (sec), leaf count = 23

$$\left\{\left\{y(x) \to xe^{-\sin(x)} + c_1 e^{-\sin(x)}\right\}\right\}$$

✓ **Maple** : cpu = 0.011 (sec), leaf count = 13

$$\{y(x) = (c_1 + x)\,\mathrm{e}^{-\sin(x)}\}$$

Hand solution

$$\frac{dy}{dx} + y(x)\cos(x) = e^{-\sin(x)} \tag{1}$$

Integrating factor $\mu = e^{\int \cos dx} = e^{\sin x}$. Hence (1) becomes

$$\frac{d}{dx}(\mu y(x)) = \mu e^{-\sin(x)}$$

Replacing μ by $e^{\sin x}$ and integrating both sides

$$\begin{aligned}
e^{\sin x} y(x) &= \int e^{\sin x} e^{-\sin(x)} dx + C \\
e^{\sin x} y(x) &= \int dx + C \\
e^{\sin x} y(x) &= x + C \\
y(x) &= xe^{-\sin x} + Ce^{-\sin(x)}
\end{aligned}$$

2.8 ODE No. 8

$$y'(x) + y(x)\tan(x) - \sin(2x) = 0$$

✓ **Mathematica** : cpu = 0.0353108 (sec), leaf count = 17

$$\{\{y(x) \to -2\cos^2(x) + c_1\cos(x)\}\}$$

✓ **Maple** : cpu = 0.022 (sec), leaf count = 13

$$\{y(x) = (c_1 - 2\cos(x))\cos(x)\}$$

Hand solution

$$\frac{dy}{dx} + y(x)\tan(x) = \sin(2x) \tag{1}$$

Integrating factor $\mu = e^{\int \tan dx} = e^{-\ln(\cos(x))} = \frac{1}{\cos(x)}$. Hence (1) becomes

$$\frac{d}{dx}\left(y(x)\frac{1}{\cos(x)}\right) = \frac{1}{\cos(x)}\sin(2x)$$

Integrating both sides

$$\begin{aligned} y(x)\frac{1}{\cos(x)} &= \int \frac{1}{\cos(x)}\sin(2x)\,dx + C \\ y(x) &= \cos(x)\int \frac{\sin(2x)}{\cos(x)}dx + C\cos(x) \end{aligned}$$

But $\sin(2x) = 2\sin(x)\cos(x)$ hence

$$\begin{aligned} y(x) &= \cos(x)\int \frac{2\sin(x)\cos(x)}{\cos(x)}dx + C\cos(x) \\ &= 2\cos(x)\int \sin(x)\,dx + C\cos(x) \\ &= -2\cos^2(x) + C\cos(x) \end{aligned}$$

2.9 ODE No. 9

$$y'(x) - y(x)(a + \sin(\log(x)) + \cos(\log(x))) = 0$$

✓ **Mathematica** : cpu = 0.0308109 (sec), leaf count = 19

$$\left\{\left\{y(x) \to c_1 e^{ax + x\sin(\log(x))}\right\}\right\}$$

✓ **Maple** : cpu = 0.027 (sec), leaf count = 14

$$\{y(x) = c_1 \mathrm{e}^{(a+\sin(\ln(x)))x}\}$$

Hand solution

$$\frac{dy}{dx} - y(x)\left[a + \sin(\log(x)) + \cos(\log(x))\right] = 0 \tag{1}$$

Integrating factor $\mu = e^{-\int a - \sin(\log(x)) - \cos(\log(x)) dx} = e^{-ax}e^{-\int \sin(\log(x)) + \cos(\log(x)) dx}$. To integrate $\int \sin(\log(x)) + \cos(\log(x))\, dx$, let $r = \log(x)$, $\frac{dr}{dx} = \frac{1}{x}$, then $dx = x dr$, But $x = e^r$, hence the integral becomes

$$\begin{aligned}
\int \sin(\log(x)) + \cos(\log(x))\, dx &= \int [\sin(r) + \cos(r)]\, e^r dr \\
&= \int e^r \sin(r)\, dr + \int e^r \cos(r)\, dr
\end{aligned} \tag{2}$$

Integrating by parts $\int e^r \cos(r)\, dr$, $\int u dv = uv - \int v du$, Let $u = e^r \to du = e^r$ and $dv = \cos(r) \to v = \sin(r)$, hence (2) becomes

$$\begin{aligned}
\int e^r \sin(r)\, dr + \int e^r \cos(r)\, dr &= \int e^r \sin(r)\, dr + e^r \sin(r) - \int \sin(r)\, e^r dr \\
&= e^r \sin(r)
\end{aligned}$$

Therefore, substituting back $r = \log(x)$ gives

$$\begin{aligned}
\int \sin(\log(x)) + \cos(\log(x))\, dx &= e^{\log(x)} \sin(\log(x)) \\
&= x \sin(\log(x))
\end{aligned}$$

Hence the integration factor is

$$\begin{aligned}
\mu &= e^{-ax}e^{-\int \sin(\log(x)) + \cos(\log(x)) dx} \\
&= e^{-ax}e^{-x\sin(\log(x))}
\end{aligned}$$

Therefore (1) becomes

$$\frac{d}{dx}(\mu y(x)) = 0$$

Integrating

$$\begin{aligned}
y(x)\, e^{-ax}e^{-x\sin(\log(x))} &= C \\
y(x) &= Ce^{ax}e^{x\sin(\log(x))} \\
&= Ce^{ax + x\sin(\log(x))} \\
&= Ce^{x(a + \sin(\log(x)))}
\end{aligned}$$

2.10 ODE No. 10

$$y(x)f'(x) - f(x)f'(x) + y'(x) = 0$$

✓ **Mathematica** : cpu = 0.02596 (sec), leaf count = 18

$$\left\{\left\{y(x) \to f(x) + c_1 e^{-f(x)} - 1\right\}\right\}$$

✓ **Maple** : cpu = 0.022 (sec), leaf count = 15

$$\left\{y(x) = c_1 \mathrm{e}^{-f(x)} + f(x) - 1\right\}$$

$$\boxed{\textbf{Hand solution}}$$

$$\frac{dy}{dx} + y(x)\frac{df}{dx} = f(x)\frac{df}{dx} \tag{1}$$

Integrating factor $\mu = e^{\int \frac{df}{dx}dx} = e^f$. Therefore (1) becomes

$$\frac{d}{dx}\left(e^f y(x)\right) = e^f f(x)\frac{df}{dx}$$

Integrating

$$\begin{aligned} e^f y(x) &= \int e^f f(x)\frac{df}{dx}dx + C \\ y(x) &= e^{-f}\int e^f f df + e^{-f}C \end{aligned}$$

But $\int e^f f df$ is the same as $\int e^x x dx$ which by integration by parts gives $e^x(x-1)$ or in terms of f, gives $e^f(f-1)$. Hence the above becomes

$$\begin{aligned} y(x) &= e^{-f}\left(e^f(f-1)\right) + e^{-f}C \\ &= f - 1 + e^{-f}C \end{aligned}$$

2.11 ODE No. 11

$$f(x)y(x) - g(x) + y'(x) = 0$$

✓ **Mathematica** : cpu = 0.0328135 (sec), leaf count = 66

$$\left\{\left\{y(x) \to \exp\left(\int_1^x -f(K[1])dK[1]\right)\int_1^x \exp\left(-\int_1^{K[2]} -f(K[1])dK[1]\right)g(K[2])dK[2] + c_1 \exp\left(\int_1^x -f(K[1]\right.\right.\right.$$

✓ **Maple** : cpu = 0.025 (sec), leaf count = 24

$$\left\{y(x) = \left(c_1 + \int \mathrm{e}^{\int f(x)dx} g(x)\,dx\right)\mathrm{e}^{\int -f(x)dx}\right\}$$

Hand solution

$$\frac{dy}{dx} + y(x)\,f(x) = g(x) \tag{1}$$

Integrating factor $\mu = e^{\int f(x)dx}$. Therefore (1) becomes

$$\frac{d}{dx}\left(e^{\int f(x)dx}y(x)\right) = e^{\int f(x)dx}g(x)$$

Integrating

$$\begin{aligned}
e^{\int f(x)dx}y(x) &= \int e^{\int f(x)dx}g(x)\,dx + C \\
y(x) &= e^{-\int f(x)dx}\int e^{\int f(x)dx}g(x)\,dx + e^{-\int f(x)dx}C \\
&= \left(\int e^{\int f(x)dx}g(x)\,dx + C\right)e^{-\int f(x)dx}
\end{aligned}$$

2.12 ODE No. 12

$$y'(x) + y(x)^2 - 1 = 0$$

✓ **Mathematica** : cpu = 0.0910503 (sec), leaf count = 34

$$\left\{\left\{y(x) \to \frac{e^{2x} - e^{2c_1}}{e^{2x} + e^{2c_1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.056 (sec), leaf count = 8

$$\{y(x) = \tanh(c_1 + x)\}$$

Hand solution

$$\begin{aligned}
\frac{dy}{dx} + y^2(x) - 1 &= 0 \\
\frac{dy}{dx} &= 1 - y^2(x) \qquad (1)
\end{aligned}$$

This is separable. Hence

$$\begin{aligned}
\frac{dy}{dx}\frac{1}{1 - y^2(x)} &= 1 \\
\frac{dy}{1 - y^2(x)} &= dx
\end{aligned}$$

Integrating

$$\int \frac{dy}{1-y^2(x)} = x + C$$

Using $\int \frac{1}{a+by^2}dy = \frac{\sqrt{-\frac{a}{b}}\tanh^{-1}\left(\frac{y}{\sqrt{\frac{-a}{b}}}\right)}{a}$ and since $a=1, b=-1$, then $\int \frac{dy}{1-y^2(x)} = \tanh^{-1}(y)$ and the above becomes

$$\tanh^{-1}(y) = x + C$$

Therefore

$$y = \tanh(x+C) \tag{2}$$

In terms of exponential, since $\tanh(u) = \frac{e^u - e^{-u}}{e^u + e^{-u}}$ then (2) can also be written as

$$y = \frac{e^{x+C} - e^{-(x+C)}}{e^{x+C} + e^{-(x+C)}} = \frac{e^x e^C - e^{-x}e^{-C}}{e^x e^C + e^{-x}e^{-C}}$$

Multiplying numerator and denominator by $e^{-C}e^x$

$$y = \frac{e^{2x} - e^{-2C}}{e^{2x} + e^{-2C}}$$

To get same answer as Mathematica, since C is constant, let $C_1 = -C$, then

$$y = \frac{e^{2x} - e^{2C_1}}{e^{2x} + e^{2C_1}}$$

2.13 ODE No. 13

$$-ax - b + y'(x) + y(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.0996128 (sec), leaf count = 79

$$\left\{\left\{y(x) \to -\frac{\sqrt[3]{a}\text{Bi}'\left(\frac{b+ax}{a^{2/3}}\right) + \sqrt[3]{a}c_1\text{Ai}'\left(\frac{b+ax}{a^{2/3}}\right)}{-\text{Bi}\left(\frac{b+ax}{a^{2/3}}\right) - c_1\text{Ai}\left(\frac{b+ax}{a^{2/3}}\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.206 (sec), leaf count = 79

$$\left\{y(x) = -\frac{i(-ia)^{\frac{1}{3}}\left(c_1 \operatorname{AiryAi}\left(1, -\frac{ax+b}{(-ia)^{\frac{2}{3}}}\right) + \operatorname{AiryBi}\left(1, -\frac{ax+b}{(-ia)^{\frac{2}{3}}}\right)\right)}{c_1 \operatorname{AiryAi}\left(-\frac{ax+b}{(-ia)^{\frac{2}{3}}}\right) + \operatorname{AiryBi}\left(-\frac{ax+b}{(-ia)^{\frac{2}{3}}}\right)}\right\}$$

Hand solution

$$
\begin{aligned}
y'(x) + y^2(x) - ax - b = 0 \\
y'(x) = b + ax - y^2(x) \qquad (1)
\end{aligned}
$$

This is Riccati first order non-linear ODE of the form

$$
y'(x) = P(x) + Q(x)\, y + R(x)\, y^2(x) \tag{2}
$$

where in this case $Q(x) = 0, R(x) = -1, P(x) = b + ax$. We can solve this in two ways. If we know one particular solution $y_p(x)$ for (1) then we use the substitution $y = y_p + \frac{1}{u}$ and convert (1) to new associated linear ODE of the form $u' + (Q(x) + 2R(x))\, y_p + R(x) = 0$. If we do not know a particular solution, then we use the standard substitution $y = \frac{-u'}{uR(x)} = \frac{u'}{u}$ since $R(x) = -1$ and this is what we will do here.

Since $u' = yu$ then

$$
\begin{aligned}
u'' &= yu' + y'u \\
&= y(yu) + \left(b + ax - y^2\right) u \\
&= y^2 u + (b + ax)\, u - y^2 u \\
&= (b + ax)\, u
\end{aligned}
$$

So we have new second order ODE

$$
u'' - (b + ax)\, u = 0 \tag{3}
$$

which we solve for u. This ODE is of the form $u'' - q(x)\, u = 0$ which has solutions in terms of Airy function of first $Ai(x)$ and second kind $Bi(x)$, where

$$
\begin{aligned}
Ai(x) &= \frac{1}{\pi} \int_0^\infty \cos\left(\frac{t^3}{3} + xt\right) dt \\
Bi(x) &= \frac{1}{\pi} \int_0^\infty \exp\left(-\frac{t^3}{3} + xt\right) + \sin\left(\frac{t^3}{3} + xt\right) dt
\end{aligned}
$$

Therefore the solution to (3) is

$$
u(x) = c_1 Ai\left(\frac{b + ax}{a^{\frac{2}{3}}}\right) + c_2 Bi\left(\frac{b + ax}{a^{\frac{2}{3}}}\right)
$$

We need to find $u'(x)$ now. Using $Ai'(x)\,, Bi'(x)$ for derivative of Airy functions of first and second kind, then

$$u'(x) = c_1 Ai'\left(\frac{b+ax}{a^{\frac{2}{3}}}\right) a^{\frac{1}{3}} + c_2 Bi'\left(\frac{b+ax}{a^{\frac{2}{3}}}\right) a^{\frac{1}{3}}$$

Therefore since $u' = yu$ then

$$\begin{aligned} y &= \frac{u'}{u} \\ &= \frac{c_1 A'i\left(\frac{b+ax}{a^{\frac{2}{3}}}\right) a^{\frac{1}{3}} + c_2 Bi'\left(\frac{b+ax}{a^{\frac{2}{3}}}\right) a^{\frac{1}{3}}}{c_1 Ai\left(\frac{b+ax}{a^{\frac{2}{3}}}\right) + c_2 Bi\left(\frac{b+ax}{a^{\frac{2}{3}}}\right)} \end{aligned}$$

Let $C_1 = \frac{c_1}{c_2}$ then the above can be written as

$$y = \frac{C_1 A'i\left(\frac{b+ax}{a^{\frac{2}{3}}}\right) a^{\frac{1}{3}} + Bi'\left(\frac{b+ax}{a^{\frac{2}{3}}}\right) a^{\frac{1}{3}}}{C_1 Ai\left(\frac{b+ax}{a^{\frac{2}{3}}}\right) + Bi\left(\frac{b+ax}{a^{\frac{2}{3}}}\right)}$$

Reference: Airy function

2.14 ODE No. 14

$$ax^m + y'(x) + y(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.126584 (sec), leaf count = 254

$$\left\{\left\{y(x) \to -\frac{i\sqrt{-a}x^{\frac{m+2}{2}}\left(c_1 J_{\frac{m+1}{m+2}}\left(\frac{2i\sqrt{-a}x^{\frac{m}{2}+1}}{m+2}\right) - 2J_{\frac{1}{m+2}-1}\left(\frac{2i\sqrt{-a}x^{\frac{m+2}{2}}}{m+2}\right) - c_1 J_{-\frac{m+3}{m+2}}\left(\frac{2i\sqrt{-a}x^{\frac{m+2}{2}}}{m+2}\right)\right) - c_1 J_{-\frac{1}{m+2}}}{2x\left(J_{\frac{1}{m+2}}\left(\frac{2i\sqrt{-a}x^{\frac{m+2}{2}}}{m+2}\right) + c_1 J_{-\frac{1}{m+2}}\left(\frac{2i\sqrt{-a}x^{\frac{m+2}{2}}}{m+2}\right)\right)}\right.\right.$$

✓ **Maple** : cpu = 0.105 (sec), leaf count = 187

$$\left\{y(x) = \frac{-c_1\sqrt{a}\,x^{\frac{m}{2}+1}\,\mathrm{BesselJ}\left(\frac{m+3}{m+2}, \frac{2\sqrt{a}\,x^{\frac{m}{2}+1}}{m+2}\right) - \sqrt{a}\,x^{\frac{m}{2}+1}\,\mathrm{BesselY}\left(\frac{m+3}{m+2}, \frac{2\sqrt{a}\,x^{\frac{m}{2}+1}}{m+2}\right) + c_1\,\mathrm{BesselJ}\left(\frac{1}{m+2}, \frac{2\sqrt{a}}{m}\right.}{\left(c_1\,\mathrm{BesselJ}\left(\frac{1}{m+2}, \frac{2\sqrt{a}\,x^{\frac{m}{2}+1}}{m+2}\right) + \mathrm{BesselY}\left(\frac{1}{m+2}, \frac{2\sqrt{a}\,x^{\frac{m}{2}+1}}{m+2}\right)\right)x}\right.$$

Hand solution

$$
\begin{aligned}
y'(x) + y^2(x) + ax^m &= 0 \\
y'(x) &= -ax^m - y^2(x) \qquad (1)
\end{aligned}
$$

This is Riccati first order non-linear ODE of the form

$$
y'(x) = P(x) + Q(x)\,y + R(x)\,y^2(x) \tag{2}
$$

where in this case $Q(x) = 0, R(x) = -1, P(x) = -ax^m$. We can solve this in two ways. If we know one particular solution $y_p(x)$ for (1) then we use the substitution $y = y_p + \frac{1}{u}$ and convert (1) to new associated linear ODE of the form $u' + (Q(x) + 2R(x))\,y_p + R(x) = 0$. If we do not know a particular solution, then we use the standard substitution $y = \frac{-u'}{uR(x)} = \frac{u'}{u}$ since $R(x) = -1$ and this is what we will do here.

Since $u' = yu$ then

$$
\begin{aligned}
u'' &= yu' + y'u \\
&= y(yu) + \left(-ax^m - y^2\right) u \\
&= y^2u - ax^m u - y^2 u \\
&= -ax^m u
\end{aligned}
$$

So we have new second order ODE

$$
u'' + ax^m u = 0 \tag{3}
$$

which we solve for u. This is Airy ODE but with a positive sign. Of the form $u'' + q(x)\,u = 0$.

Recall that the solution to $u'' - axu = 0$ is

$$
u = c_1 Ai\left(a^{\frac{1}{3}} x\right) + c_2 Bi\left(a^{\frac{1}{3}} x\right)
$$

When x has power on it (there are restriction on what values the power can take), the solution is written in terms of Bessel functions. The solution to $u'' - ax^m u = 0$ is

$$
u = c_1\sqrt{x} BesselI\left(\frac{1}{m+2}, \frac{2\sqrt{a}x^{\frac{m+1}{2}}}{m+2}\right) + c_2\sqrt{x} BesselK\left(\frac{1}{m+2}, \frac{2\sqrt{a}x^{\frac{m+1}{2}}}{m+2}\right)
$$

When the sign is positive, the solution to $u'' + ax^m u = 0$ is

$$
u(x) = c_1\sqrt{x} BesselJ\left(\frac{1}{m+2}, \frac{2\sqrt{a}x^{\frac{m+1}{2}}}{m+2}\right) + c_2\sqrt{x} BesselY\left(\frac{1}{m+2}, \frac{2\sqrt{a}x^{\frac{m+1}{2}}}{m+2}\right) \tag{4}
$$

We need to find $u'(x)$ now. From (4)

$$\frac{d}{dx}\left[c_1\sqrt{x}BesselJ\left(\frac{1}{m+2}, \frac{2\sqrt{a}x^{\frac{m+1}{2}}}{m+2}\right)\right] = c_1\frac{BesselJ\left(\frac{1}{m+2}, \frac{2\sqrt{a}x^{\frac{m+1}{2}}}{m+2}\right) - \sqrt{a}x^{\frac{m+1}{2}}BesselJ\left(\frac{m+3}{m+2}, \frac{2\sqrt{a}x^{\frac{m+1}{2}}}{m+2}\right)}{\sqrt{x}}$$

And

$$\frac{d}{dx}\left[c_2\sqrt{x}BesselY\left(\frac{1}{m+2}, \frac{2\sqrt{a}x^{\frac{m+1}{2}}}{m+2}\right)\right] = c_2\frac{BesselY\left(\frac{1}{m+2}, \frac{2\sqrt{a}x^{\frac{m+1}{2}}}{m+2}\right) - \sqrt{a}x^{\frac{m+1}{2}}BesselY\left(\frac{m+3}{m+2}, \frac{2\sqrt{a}x^{\frac{m+1}{2}}}{m+2}\right)}{\sqrt{x}}$$

Therefore

$$\begin{aligned} u'(x) = {} & c_1\frac{BesselJ\left(\frac{1}{m+2}, \frac{2\sqrt{a}x^{\frac{m+1}{2}}}{m+2}\right) - \sqrt{a}x^{\frac{m+1}{2}}BesselJ\left(\frac{m+3}{m+2}, \frac{2\sqrt{a}x^{\frac{m+1}{2}}}{m+2}\right)}{\sqrt{x}} \\ & + c_2\frac{BesselY\left(\frac{1}{m+2}, \frac{2\sqrt{a}x^{\frac{m+1}{2}}}{m+2}\right) - \sqrt{a}x^{\frac{m+1}{2}}BesselY\left(\frac{m+3}{m+2}, \frac{2\sqrt{a}x^{\frac{m+1}{2}}}{m+2}\right)}{\sqrt{x}} \end{aligned}$$

Since $u' = yu$ then

$$\begin{aligned} y &= \frac{u'}{u} \\ &= \frac{c_1\frac{BesselJ\left(\frac{1}{m+2}, \frac{2\sqrt{a}x^{\frac{m+1}{2}}}{m+2}\right) - \sqrt{a}x^{\frac{m+1}{2}}BesselJ\left(\frac{m+3}{m+2}, \frac{2\sqrt{a}x^{\frac{m+1}{2}}}{m+2}\right)}{\sqrt{x}} + c_2\frac{BesselY\left(\frac{1}{m+2}, \frac{2\sqrt{a}x^{\frac{m+1}{2}}}{m+2}\right) - \sqrt{a}x^{\frac{m+1}{2}}BesselY\left(\frac{m+3}{m+2}, \frac{2\sqrt{a}x^{\frac{m+1}{2}}}{m+2}\right)}{\sqrt{x}}}{c_1\sqrt{x}BesselJ\left(\frac{1}{m+2}, \frac{2\sqrt{a}x^{\frac{m+1}{2}}}{m+2}\right) + c_2\sqrt{x}BesselY\left(\frac{1}{m+2}, \frac{2\sqrt{a}x^{\frac{m+1}{2}}}{m+2}\right)} \\ &= \frac{c_1\left[BesselJ\left(\frac{1}{m+2}, \frac{2\sqrt{a}x^{\frac{m+1}{2}}}{m+2}\right) - \sqrt{a}x^{\frac{m+1}{2}}BesselJ\left(\frac{m+3}{m+2}, \frac{2\sqrt{a}x^{\frac{m+1}{2}}}{m+2}\right)\right] + c_2\left[BesselY\left(\frac{1}{m+2}, \frac{2\sqrt{a}x^{\frac{m+1}{2}}}{m+2}\right) - \sqrt{a}x^{\frac{m+1}{2}}BesselY\left(\frac{m+3}{m+2}, \frac{2\sqrt{a}x^{\frac{m+1}{2}}}{m+2}\right)\right]}{\sqrt{x}\left[c_1\sqrt{x}BesselJ\left(\frac{1}{m+2}, \frac{2\sqrt{a}x^{\frac{m+1}{2}}}{m+2}\right) + c_2\sqrt{x}BesselY\left(\frac{1}{m+2}, \frac{2\sqrt{a}x^{\frac{m+1}{2}}}{m+2}\right)\right]} \\ &= \frac{c_1\left[BesselJ\left(\frac{1}{m+2}, \frac{2\sqrt{a}x^{\frac{m+1}{2}}}{m+2}\right) - \sqrt{a}x^{\frac{m+1}{2}}BesselJ\left(\frac{m+3}{m+2}, \frac{2\sqrt{a}x^{\frac{m+1}{2}}}{m+2}\right)\right] + c_2\left[BesselY\left(\frac{1}{m+2}, \frac{2\sqrt{a}x^{\frac{m+1}{2}}}{m+2}\right) - \sqrt{a}x^{\frac{m+1}{2}}BesselY\left(\frac{m+3}{m+2}, \frac{2\sqrt{a}x^{\frac{m+1}{2}}}{m+2}\right)\right]}{c_1xBesselJ\left(\frac{1}{m+2}, \frac{2\sqrt{a}x^{\frac{m+1}{2}}}{m+2}\right) + c_2xBesselY\left(\frac{1}{m+2}, \frac{2\sqrt{a}x^{\frac{m+1}{2}}}{m+2}\right)} \end{aligned}$$

Let $C_1 = \frac{c_1}{c_2}$ then the above can be written as

$$y = \frac{1}{x}\frac{C_1\left[BesselJ\left(\frac{1}{m+2}, \frac{2\sqrt{a}x^{\frac{m+1}{2}}}{m+2}\right) - \sqrt{a}x^{\frac{m+1}{2}}BesselJ\left(\frac{m+3}{m+2}, \frac{2\sqrt{a}x^{\frac{m+1}{2}}}{m+2}\right)\right] + BesselY\left(\frac{1}{m+2}, \frac{2\sqrt{a}x^{\frac{m+1}{2}}}{m+2}\right) - \sqrt{a}x^{\frac{m+1}{2}}BesselY\left(\frac{m+3}{m+2}, \frac{2\sqrt{a}x^{\frac{m+1}{2}}}{m+2}\right)}{C_1BesselJ\left(\frac{1}{m+2}, \frac{2\sqrt{a}x^{\frac{m+1}{2}}}{m+2}\right) + BesselY\left(\frac{1}{m+2}, \frac{2\sqrt{a}x^{\frac{m+1}{2}}}{m+2}\right)}$$

2.15 ODE No. 15

$$x^4 - 2x^2 y(x) + y'(x) + y(x)^2 - 2x - 1 = 0$$

✓ **Mathematica** : cpu = 0.0922518 (sec), leaf count = 25

$$\left\{\left\{y(x) \to x^2 + \frac{1}{-\frac{1}{2} + c_1\left(-e^{2x}\right)} + 1\right\}\right\}$$

✓ **Maple** : cpu = 0.181 (sec), leaf count = 33

$$\left\{y(x) = \frac{c_1\left(x^2+1\right)e^{2x} - x^2 + 1}{c_1 e^{2x} - 1}\right\}$$

Hand solution

$$\begin{aligned} x^4 - 2x^2 y(x) + y'(x) + y^2(x) - 2x - 1 &= 0 \\ y'(x) &= -x^4 + 2x + 1 + 2x^2 y(x) - y^2(x) \end{aligned} \tag{1}$$

This is Riccati first order non-linear ODE of the form

$$y'(x) = P(x) + Q(x)\,y + R(x)\,y^2(x) \tag{2}$$

where in this case $Q(x) = 2x^2, R(x) = -1, P(x) = -x^4 + 2x + 1$.

Let $u = y - x^2$ or $y = u + x^2$ then

$$\begin{aligned} u' &= y' - 2x \\ &= \left(-x^4 + 2x + 1 + 2x^2 y - y^2\right) - 2x \\ &= \left(-x^4 + 2x + 1 + 2x^2\left(u + x^2\right) - \left(u + x^2\right)^2\right) - 2x \\ &= \left(-x^4 + 2x + 1 + 2x^2 u + 2x^4 - \left(u^2 + x^4 + 2ux^2\right)\right) - 2x \\ &= -x^4 + 2x + 1 + 2x^2 u + 2x^4 - u^2 - x^4 - 2ux^2 - 2x \\ &= 1 - u^2 \end{aligned}$$

Hence

$$u' = 1 - u^2$$

This is separable

$$\begin{aligned} \frac{du}{dx} &= 1 - u^2 \\ \frac{du}{1-u^2} &= dx \end{aligned}$$

Integrating both sides

$$
\begin{aligned}
\tanh^{-1}(u) &= x + C\\
u(x) &= \tanh(x + C)\\
&= \frac{e^{x+C} - e^{-x-C}}{e^{x+C} + e^{-x-C}}\\
&= \frac{e^{x}e^{C} - e^{-x}e^{-C}}{e^{x}e^{C} + e^{-x}e^{-C}}
\end{aligned}
$$

Multiplying numerator and denominator by $e^{-C}e^{x}$

$$
u(x) = \frac{e^{2x} - e^{-2C}}{e^{2x} + e^{-2C}}
$$

Let $e^{-2C} = C_1$

$$
u(x) = \frac{e^{2x} - C_1}{e^{2x} + C_1}
$$

Since $u = y - x^2$ then

$$
\begin{aligned}
y &= u + x^2\\
&= \frac{e^{2x} - C_1}{e^{2x} + C_1} + x^2\\
&= \frac{e^{2x} - C_1 + x^2 e^{2x} + x^2 C_1}{e^{2x} + C_1}
\end{aligned}
$$

To obtain same solution as Maple, we divide by C_1

$$
y = \frac{\frac{1}{C_1}e^{2x} - 1 + \frac{1}{C_1}x^2 e^{2x} + x^2}{\frac{1}{C_1}e^{2x} + 1}
$$

Let $\frac{1}{C_1} = -C$ then

$$
\begin{aligned}
y &= \frac{-Ce^{2x} - 1 - Cx^2 e^{2x} + x^2}{-Ce^{2x} + 1}\\
&= \frac{Ce^{2x} + 1 + Cx^2 e^{2x} - x^2}{Ce^{2x} - 1}
\end{aligned}
$$

Which now agrees with the Maple solution form. Mathematica solution also verified to be correct.

2.16 ODE No. 16

$$f(x)(xy(x)-1)+y'(x)+y(x)^2=0$$

✓ **Mathematica** : cpu = 0.0926893 (sec), leaf count = 186

$$\left\{\left\{y(x)\to \frac{\exp\left(\int_1^x \frac{f(K[1])K[1]^2+2}{K[1]}dK[1]\right)\int_1^x \exp\left(-\int_1^{K[2]} \frac{f(K[1])K[1]^2+2}{K[1]}dK[1]\right)dK[2]+c_1\exp\left(\int_1^x \frac{f(K[1])K[1]^2+2}{K[1]} d\right.}{x\left(\exp\left(\int_1^x \frac{f(K[1])K[1]^2+2}{K[1]}dK[1]\right)\int_1^x \exp\left(-\int_1^{K[2]} \frac{f(K[1])K[1]^2+2}{K[1]}dK[1]\right)dK[2]+c_1\exp\left(\int_1^x \frac{f(K[1])K[1]^2}{K[1]}\right.\right.}\right.\right.$$

✓ **Maple** : cpu = 0.117 (sec), leaf count = 49

$$\left\{y(x)=\frac{\mathrm{e}^{\int \frac{-x^2 f(x)-2}{x}dx}}{-c_1+\int \mathrm{e}^{\int \frac{-x^2 f(x)-2}{x}dx}dx}+\frac{1}{x}\right\}$$

Hand solution

$$\begin{aligned} y'+y^2+(xy-1)f&=0\\ y'(x)&=(-xy+1)f-y^2 \end{aligned}\tag{1}$$

This is Riccati first order non-linear ODE of the form. We can see a particular solution is $y_p=\frac{1}{x}$, therefore, we use the substitution

$$\begin{aligned} y(x)&=y_p(x)+\frac{1}{u(x)}\\ &=\frac{1}{x}+\frac{1}{u} \end{aligned}$$

Hence

$$\begin{aligned} y'(x)&=y_p'(x)-\frac{u'(x)}{u^2(x)}\\ &=\frac{-1}{x^2}-\frac{u'(x)}{u^2(x)} \end{aligned}\tag{2}$$

Equating (1) and (2) gives

$$\begin{aligned}
(-xy+1)\,f-y^2 &= \frac{-1}{x^2}-\frac{u'}{u^2}\\
\left(-x\left(\frac{1}{x}+\frac{1}{u}\right)+1\right)f-\left(\frac{1}{x}+\frac{1}{u}\right)^2 &= \frac{-1}{x^2}-\frac{u'}{u^2}\\
\left(\left(-1-\frac{x}{u}\right)+1\right)f-\left(\frac{1}{x^2}+\frac{1}{u^2}+\frac{2}{xu}\right) &= \frac{-1}{x^2}-\frac{u'}{u^2}\\
-\frac{x}{u}f-\left(\frac{1}{x^2}+\frac{1}{u^2}+\frac{2}{xu}\right) &= \frac{-1}{x^2}-\frac{u'}{u^2}\\
-\frac{x}{u}f-\frac{1}{x^2}-\frac{1}{u^2}-\frac{2}{xu} &= \frac{-1}{x^2}-\frac{u'}{u^2}\\
-xuf-1-\frac{2u}{x} &= -u'\\
u' &= xuf+1+\frac{2u}{x}
\end{aligned}$$

Hence

$$u'-\left(xf+\frac{2}{x}\right)u=1$$

Integrating factor is $\mu=e^{\int\left(xf+\frac{2}{x}\right)dx}$, hence the solution is

$$d(\mu u)=\mu$$

Integrating both sides

$$\begin{aligned}
\mu u &= \int \mu dx + C\\
u &= e^{-\int\left(xf+\frac{2}{x}\right)dx}\int e^{\int\left(xf+\frac{2}{x}\right)dx}dx + Ce^{-\int\left(xf+\frac{2}{x}\right)dx}\\
&= e^{-\int\left(xf+\frac{2}{x}\right)dx}\left(\int e^{\int\left(xf+\frac{2}{x}\right)dx}dx + C\right)
\end{aligned}$$

Hence

$$\begin{aligned}
y &= y_p+\frac{1}{u}\\
&= \frac{1}{x}+\frac{1}{e^{-\int\left(xf+\frac{2}{x}\right)dx}\left(\int e^{\int\left(xf+\frac{2}{x}\right)dx}dx+C\right)}
\end{aligned}$$

Hence

$$y(x)=\frac{1}{x}+e^{\int\left(xf+\frac{2}{x}\right)dx}\left(\int e^{\int\left(xf+\frac{2}{x}\right)dx}dx+C\right)^{-1}$$

2.17 ODE No. 17

$$y'(x) - y(x)^2 - 3y(x) + 4 = 0$$

✓ **Mathematica** : cpu = 0.0826272 (sec), leaf count = 34

$$\left\{\left\{y(x) \to \frac{-1 - 4e^{5x+5c_1}}{-1 + e^{5x+5c_1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.126 (sec), leaf count = 24

$$\left\{y(x) = \frac{-4c_1 e^{5x} - 1}{c_1 e^{5x} - 1}\right\}$$

Hand solution

$$\begin{aligned} y' - y^2 - 3y + 4 &= 0 \\ y' &= 3y - 4 + y^2 \end{aligned} \tag{1}$$

This is Riccati first order non-linear ODE of the form. The general form is

$$y' = P(x) + Q(x)\,y + R(x)\,y^2$$

Where $P(x) = -4, Q(x) = 3, R(x) = 1$. Using the substitution $y = -\frac{u'}{uR(x)} = \frac{-u'}{u}$ then

$$\begin{aligned} u' &= -yu \\ u'' &= -yu' - y'u \\ &= -y(-yu) - \left(3y - 4 + y^2\right)u \\ &= y^2u - 3\left(-\frac{u'}{u}\right)u + 4u - y^2u \\ &= 3u' + 4u \end{aligned}$$

Hence

$$u'' - 3u' - 4u = 0$$

This is standard second order ODE. The characteristic equation is $\lambda^2 - 3\lambda - 4 = 0$, with roots $\frac{-b\pm\sqrt{b^2-4ac}}{2a} = \frac{3\pm\sqrt{9+16}}{2} = \frac{3\pm5}{2} = \{4, -1\}$, hence

$$u(x) = c_1e^{4x} + c_2e^{-x}$$

And

$$u'(x) = c_1 4e^{4x} - c_2e^{-x}$$

Since $y = \frac{-u'}{u}$ then

$$\begin{aligned} y(x) &= \frac{-c_1 4e^{4x} + c_2 e^{-x}}{c_1 e^{4x} + c_2 e^{-x}} \\ &= \frac{-\frac{c_1}{c_2} 4e^{4x} + e^{-x}}{\frac{c_1}{c_2} e^{4x} + e^{-x}} \end{aligned}$$

Let $\frac{c_1}{c_2} = C_1$ then

$$y(x) = \frac{-4C_1 e^{4x} + e^{-x}}{C_1 e^{4x} + e^{-x}}$$

Dividing by e^{-x}

$$y(x) = \frac{-4C_1 e^{5x} + 1}{C_1 e^{5x} + 1}$$

This is the same result given by CAS. To see it better, let $C_2 = -C_1$ then the above becomes

$$\begin{aligned} y(x) &= \frac{4C_2 e^{5x} + 1}{-C_2 e^{5x} + 1} \\ &= -\frac{4C_2 e^{5x} + 1}{C_2 e^{5x} - 1} \end{aligned}$$

2.18 ODE No. 18

$$y'(x) - y(x)^2 - xy(x) - x + 1 = 0$$

✓ **Mathematica** : cpu = 0.104324 (sec), leaf count = 50

$$\left\{\left\{y(x) \to -1 + \frac{e^{\frac{x^2}{2} - 2x}}{-\frac{\sqrt{\frac{\pi}{2}}\operatorname{erfi}\left(\frac{x-2}{\sqrt{2}}\right)}{e^2} + c_1}\right\}\right\}$$

✓ **Maple** : cpu = 0.07 (sec), leaf count = 39

$$\left\{y(x) = \frac{\mathrm{e}^{\frac{(x-4)x}{2}}}{c_1 + \frac{i\sqrt{\pi}\,\mathrm{e}^{-2}\sqrt{2}\,\operatorname{erf}\left(\frac{i\sqrt{2}\,(x-2)}{2}\right)}{2}} - 1\right\}$$

Hand solution

$$\begin{aligned} y' - y^2 - xy - x + 1 &= 0 \\ y' &= x - 1 + xy + y^2 \qquad (1) \end{aligned}$$

This is Riccati first order non-linear ODE of the form. The general form is

$$y' = P(x) + Q(x)\,y + R(x)\,y^2$$

Where $P(x) = x - 1, Q(x) = x, R(x) = 1$. We see that $y_p = -1$ is a particular solution, therefore we use the substitution $y = y_p + \frac{1}{u}$, hence $y' = -\frac{u'}{u^2}$ and equating this to (1) we obtain

$$\begin{aligned} -\frac{u'}{u^2} &= x - 1 + xy + y^2 \\ &= x - 1 + x\left(-1 + \frac{1}{u}\right) + \left(-1 + \frac{1}{u}\right)^2 \\ &= x - 1 - x + \frac{x}{u} + \left(1 + \frac{1}{u^2} - \frac{2}{u}\right) \\ &= \frac{x}{u} + \frac{1}{u^2} - \frac{2}{u} \end{aligned}$$

Hence

$$\begin{aligned} u' &= -u^2\left(\frac{x}{u} + \frac{1}{u^2} - \frac{2}{u}\right) \\ &= -xu - 1 + 2u \\ u' + xu - 2u &= -1 \\ u' + u(x - 2) &= -1 \end{aligned}$$

Integration factor is $e^{\int (x-2)dx} = e^{\frac{x^2}{2} - 2x} = e^{\frac{1}{2}x(x-4)}$, therefore

$$d\left(e^{\frac{1}{2}x(x-4)}u\right) = -e^{\frac{1}{2}x(x-4)}$$

Integrating both sides

$$e^{\frac{1}{2}x(x-4)}u = -\int e^{\frac{1}{2}x(x-4)} + C$$

But

$$\int e^{\frac{1}{2}x(x-4)} = \frac{1}{e^2}\sqrt{\frac{\pi}{2}}\operatorname{erfi}\left(\frac{x-2}{\sqrt{2}}\right)$$

Hence

$$u(x) = e^{\frac{-1}{2}x(x-4)}\left(\frac{-1}{e^2}\sqrt{\frac{\pi}{2}}\operatorname{erfi}\left(\frac{x-2}{\sqrt{2}}\right) + C\right)$$

Since $y = y_p + \frac{1}{u}$ then

$$y = -1 + \frac{1}{e^{\frac{-1}{2}x(x-4)}\left(\frac{-1}{e^2}\sqrt{\frac{\pi}{2}}\operatorname{erfi}\left(\frac{x-2}{\sqrt{2}}\right) + C\right)}$$

Or

$$y = \frac{e^{\frac{1}{2}x(x-4)}}{C - \frac{1}{e^2}\sqrt{\frac{\pi}{2}}\operatorname{erfi}\left(\frac{x-2}{\sqrt{2}}\right)} - 1$$

2.19 ODE No. 19

$$y'(x) - (y(x) + x)^2 = 0$$

✓ **Mathematica** : cpu = 0.0950924 (sec), leaf count = 14

$$\{\{y(x) \to -x + \tan(x + c_1)\}\}$$

✓ **Maple** : cpu = 0.045 (sec), leaf count = 16

$$\{y(x) = -x - \tan(c_1 - x)\}$$

Hand solution

$$\begin{aligned} y' - (y + x)^2 &= 0 \\ y' &= (y + x)^2 \end{aligned} \tag{1}$$

This is Riccati first order non-linear ODE of the form. Let $u = y + x$, then $u' = y' + 1$ and (1) becomes

$$\begin{aligned} u' - 1 &= u^2 \\ u' &= 1 + u^2 \end{aligned}$$

This is separable

$$\begin{aligned} \frac{du}{dx} \frac{1}{1 + u^2} &= 1 \\ \int \frac{du}{1 + u^2} &= \int dx \\ \tan^{-1} u &= x + C \\ u &= \tan(x + C) \end{aligned}$$

Since $u = y + x$ then

$$y = \tan(x + C) - x$$

2.20 ODE No. 20

$$\left(x^2+1\right) y(x)+y'(x)-y(x)^2-2x=0$$

✓ **Mathematica** : cpu = 0.0997771 (sec), leaf count = 49

$$\left\{\left\{y(x)\to \frac{e^{\frac{x^3}{3}+x}}{-\int_1^x e^{\frac{K[1]^3}{3}+K[1]}dK[1]+c_1}+x^2+1\right\}\right\}$$

✓ **Maple** : cpu = 0.077 (sec), leaf count = 34

$$\left\{y(x)=x^2+\frac{e^{\frac{1}{3}x^3+x}}{c_1-\left(\int e^{\frac{1}{3}x^3+x}dx\right)}+1\right\}$$

Hand solution

$$\begin{aligned}\left(x^2+1\right) y+y'-y^2-2x&=0\\ y'&=-\left(x^2+1\right) y+y^2+2x \end{aligned}\tag{1}$$

This is Riccati first order non-linear ODE of the form of the general form $y'=P(x)+Q(x)\,y+R(x)\,y^2$ where $P(x)=2x, Q(x)=-\left(x^2+1\right), R(x)=1$. We can convert this to Bernoulli first order ODE in $u(x)$, which is little easier to solve by using $u=y-x^2-1$. The difference between Bernoulli and Riccati is that the term $P(x)=0$ in Bernoulli. If $P(x)\neq 0$ and $R(x)\neq 0$ then it is called Riccati.

Using $u=y-x^2-1$ gives

$$\begin{aligned}u'&=y'-2x\\ u'&=\left[-\left(x^2+1\right) y+y^2+2x\right]-2x\\ &=-\left(x^2+1\right)\left(u+x^2+1\right)+\left(u+x^2+1\right)^2\\ &=\left(u+x^2+1\right)\left[\left(u+x^2+1\right)-\left(x^2+1\right)\right]\\ &=\left(u+x^2+1\right)u\\ &=u^2+u\left(1+x^2\right)\end{aligned}$$

We see now this is Bernoulli since $P(x)=0$. To solve Bernoulli we always start by dividing by u^2 giving

$$\frac{u'}{u^2}=1+\frac{1}{u}\left(1+x^2\right)$$

Next we let $v=\frac{1}{u}$, hence $v'=-\frac{u'}{u^2}$therefore the above becomes

$$\begin{aligned}-v'&=1+v\left(1+x^2\right)\\ v'+v\left(1+x^2\right)&=-1\end{aligned}$$

Integrating factor is $e^{\int(1+x^2)dx} = e^{\left(x+\frac{x^3}{2}\right)}$, therefore

$$d\left(e^{\left(x+\frac{x^3}{2}\right)}v\right) = -e^{\left(x+\frac{x^3}{2}\right)}$$

Integrating

$$\begin{aligned}
e^{\left(x+\frac{x^3}{2}\right)}v &= -\int e^{\left(x+\frac{x^3}{2}\right)}dx + C \\
v(x) &= e^{-\left(x+\frac{x^3}{2}\right)}\left(C - \int e^{\left(x+\frac{x^3}{2}\right)}dx\right)
\end{aligned}$$

Therefore

$$u = \frac{1}{v} = \frac{e^{\left(x+\frac{x^3}{2}\right)}}{\left(C - \int e^{\left(x+\frac{x^3}{2}\right)}dx\right)}$$

And since $u = y - x^2 - 1$ then

$$\begin{aligned}
y(x) &= u + 1 + x^2 \\
&= \frac{e^{\left(x+\frac{x^3}{2}\right)}}{\left(C - \int e^{\left(x+\frac{x^3}{2}\right)}dx\right)} + 1 + x^2
\end{aligned}$$

2.21 ODE No. 21

$$y'(x) - y(x)^2 + y(x)\sin(x) - \cos(x) = 0$$

✓ **Mathematica** : cpu = 0.374642 (sec), leaf count = 7

$$\{\{y(x) \to \sin(x)\}\}$$

✓ **Maple** : cpu = 0.159 (sec), leaf count = 25

$$\left\{y(x) = -\frac{\mathrm{e}^{-\cos(x)}}{c_1 + \int \mathrm{e}^{-\cos(x)}dx} + \sin(x)\right\}$$

Hand solution

$$\begin{aligned}
y' - y^2 + y\sin(x) - \cos(x) &= 0 \\
y' &= y^2 - y\sin(x) + \cos(x) \qquad (1)
\end{aligned}$$

This is Riccati first order non-linear ODE of the form of the general form $y' = P(x) + Q(x)\,y + R(x)\,y^2$ where $P(x) = \cos(x)\,, Q(x) = -\sin(x)\,, R(x) = 1$. It is best to first try to spot a particular solution y_p and use the transformation $y = y_p + \frac{1}{u}$ otherwise we use $y = -\frac{u'}{yR(x)}$ transformation. For this problem

$$y_p = \sin(x)$$

Therefore

$$\begin{aligned} y &= \sin x + \frac{1}{u} \\ y' &= \cos x - \frac{u'}{u^2} \end{aligned}$$

Equating this to (1) gives

$$\begin{aligned} y^2 - y\sin(x) + \cos(x) &= \cos x - \frac{u'}{u^2} \\ \left(\sin x + \frac{1}{u}\right)^2 - \left(\sin x + \frac{1}{u}\right)\sin x + \cos x &= \cos x - \frac{u'}{u^2} \\ \sin^2 x + \frac{1}{u^2} + \frac{2}{u}\sin x - \sin^2 x - \frac{1}{u}\sin x &= -\frac{u'}{u^2} \\ \frac{1}{u^2} + \frac{1}{u}\sin x &= -\frac{u'}{u^2} \\ 1 + u\sin x &= -u' \\ u' + u\sin x &= -1 \end{aligned}$$

Integrating factor is $e^{\int \sin x} = e^{-\cos x}$, hence

$$d\left(e^{-\cos x}u\right) = -e^{-\cos x}$$

Integrating both sides

$$\begin{aligned} e^{-\cos x}u &= -\int e^{-\cos x}dx + C \\ u &= e^{\cos x}\left(C - \int e^{-\cos x}dx\right) \end{aligned}$$

Since $y = \sin x + \frac{1}{u}$ then

$$y = \sin x + \frac{e^{-\cos x}}{C - \int e^{-\cos x}dx}$$

Or letting $C_1 = -C$ to make match Maple form, we obtain

$$y = -\frac{e^{-\cos x}}{C_1 + \int e^{-\cos x} dx} + \sin x$$

2.22 ODE No. 22

$$y'(x) - y(x)^2 - y(x)\sin(2x) - \cos(2x) = 0$$

✓ **Mathematica** : cpu = 0.59381 (sec), leaf count = 113

$$\left\{\left\{y(x) \to -\frac{-\sin(x)\int_1^{\cos(x)} \frac{e^{-K[1]^2}}{K[1]^2\sqrt{K[1]^2-1}} dK[1] - \frac{e^{-\cos^2(x)}\tan(x)}{\sqrt{\cos^2(x)-1}} - c_1\sin(x)}{\cos(x)\int_1^{\cos(x)} \frac{e^{-K[1]^2}}{K[1]^2\sqrt{K[1]^2-1}} dK[1] + c_1\cos(x)}\right\}\right\}$$

✓ **Maple** : cpu = 0.438 (sec), leaf count = 128

$$\left\{y(x) = \frac{2\left(c_1 \operatorname{HeunC}\left(1, \frac{1}{2}, -\frac{1}{2}, -1, \frac{7}{8}, \frac{\cos(2x)}{2} + \frac{1}{2}\right) + c_1(\cos(2x) + 1)\operatorname{HeunCPrime}\left(1, \frac{1}{2}, -\frac{1}{2}, -1, \frac{7}{8}, \frac{\cos(2x)}{2} + \frac{1}{2}\right)\right.}{\sqrt{2\cos(2x) + 2}\left(c_1\sqrt{2\cos(2x) + 2}\operatorname{HeunC}\left(1, \frac{1}{2}, -\frac{1}{2}, -1, \frac{7}{8}, \frac{\cos(2x)}{2} + \frac{1}{2}\right) + \operatorname{Heu}\right.}\right.$$

Hand solution

$$y' - y^2 - y\sin(2x) - \cos(2x) = 0$$
$$y' = y^2 + y\sin(2x) + \cos(2x) \tag{1}$$

This is Riccati first order non-linear ODE of the form of the general form $y' = P(x) + Q(x)\,y + R(x)\,y^2$ where $P(x) = \cos(2x), Q(x) = \sin(2x), R(x) = 1$. It is best to first try to spot a particular solution y_p and use the transformation $y = y_p + \frac{1}{u}$ otherwise we use $y = -\frac{u'}{yR(x)}$ transformation. For this problem

$$y_p = \tan(x)$$

To verify, since $y_p' = \frac{1}{\cos^2 x}$ then plugging this particular in (1) gives

$$\frac{1}{\cos^2 x} - \tan^2(x) - \tan(x)\sin(2x) - \cos(2x) = 0$$

But $\cos(2x) = \cos^2 x - \sin^2 x$ and $\sin(2x) = 2\sin x\cos x$ and $\tan(x) = \frac{\sin x}{\cos x}$ therefore the above becomes

$$
\begin{aligned}
\frac{1}{\cos^2 x} - \frac{\sin^2 x}{\cos^2 x} - \frac{\sin x}{\cos x}(2\sin x\cos x) - \left(\cos^2 x - \sin^2 x\right) &= 0\\
\frac{1}{\cos^2 x} - \frac{\sin^2 x}{\cos^2 x} - 2\sin^2 x - \cos^2 x + \sin^2 x &= 0\\
\frac{1}{\cos^2 x} - \frac{\sin^2 x}{\cos^2 x} - \sin^2 x - \cos^2 x &= 0\\
\frac{1}{\cos^2 x} - \frac{\sin^2 x}{\cos^2 x} - 1 &= 0\\
\frac{1-\sin^2 x}{\cos^2 x} - 1 &= 0\\
\frac{\cos^2 x}{\cos^2 x} - 1 &= 0\\
1 - 1 &= 0\\
0 &= 0
\end{aligned}
$$

Therefore we, we can use $y = y_p + \frac{1}{u}$

$$
\begin{aligned}
y &= \tan x + \frac{1}{u}\\
y' &= \frac{1}{\cos^2 x} - \frac{u'}{u^2}
\end{aligned}
$$

Equating this to (1) gives

$$
\begin{aligned}
-\frac{u'}{u^2} &= y^2 + y\sin(2x) + \cos(2x)\\
-\frac{u'}{u^2} &= -\frac{1}{\cos^2 x} + \left(\tan x + \frac{1}{u}\right)^2 + \left(\tan x + \frac{1}{u}\right)\sin(2x) + \cos(2x)
\end{aligned}
$$

Using $\sin(2x) = 2\sin x\cos x$ and $\cos 2x = \cos^2 x - \sin^2 x$ then above becomes

$$
\begin{aligned}
-\frac{u'}{u^2} &= -\frac{1}{\cos^2 x} + \left(\tan^2 x + \frac{1}{u^2} + \frac{2}{u}\tan x\right) + \left(\frac{\sin x}{\cos x} + \frac{1}{u}\right) 2\sin x\cos x + \left(\cos^2 x - \sin^2 x\right)\\
u' &= \frac{u^2}{\cos^2 x} - \left(u^2\frac{\sin^2 x}{\cos^2 x} + 1 + 2u\frac{\sin x}{\cos x}\right) - \left(u^2\frac{\sin x}{\cos x} + u\right) 2\sin x\cos x - u^2\cos^2 x + u^2\sin^2 x\\
&= \frac{u^2}{\cos^2 x} - u^2\frac{\sin^2 x}{\cos^2 x} - 1 - 2u\frac{\sin x}{\cos x} - 2u^2\frac{\sin x}{\cos x}\sin x\cos x - 2u\sin x\cos x - u^2\cos^2 x + u^2\sin^2 x\\
&= \frac{u^2}{\cos^2 x} - u^2\frac{\sin^2 x}{\cos^2 x} - 1 - 2u\frac{\sin x}{\cos x} - 2u^2\sin^2 x - 2u\sin x\cos x - u^2\cos^2 x + u^2\sin^2 x\\
&= \frac{u^2}{\cos^2 x} - u^2\frac{\sin^2 x}{\cos^2 x} - 1 - 2u\frac{\sin x}{\cos x} - u^2\sin^2 x - 2u\sin x\cos x - u^2\cos^2 x\\
&= u^2\left(\frac{1}{\cos^2 x} - \frac{\sin^2 x}{\cos^2 x} - \left(\sin^2 x + \cos^2 x\right)\right) - 1 + u\left(-2\frac{\sin x}{\cos x} - 2\sin x\cos x\right)\\
&= u^2\left(\frac{1-\sin^2 x}{\cos^2 x} - 1\right) - 1 + u\left(-2\frac{\sin x}{\cos x} - 2\sin x\cos x\right)\\
&= u^2\left(\frac{\cos^2 x}{\cos^2 x} - 1\right) - 1 + u\left(-2\frac{\sin x}{\cos x} - 2\sin x\cos x\right)\\
&= -1 + 2u\left(-\frac{\sin x}{\cos x} - \sin x\cos x\right)
\end{aligned}
$$

Hence

$$
u' + 2u(\tan x + \sin x\cos x) = -1
$$

Integrating factor is $e^{2\int \tan x + \sin x\cos x dx}$. But

$$
\int \tan x dx = -\ln(\cos x)
$$

And

$$
\int \sin x\cos x dx = \frac{-1}{2}\cos^2 x
$$

Hence $\mu = e^{-2\ln\cos x}e^{-\cos^2 x} = \frac{1}{\cos^2 x}e^{-\cos^2 x}$, therefore

$$
d\left(\frac{1}{\cos^2 x}e^{-\cos^2 x}u\right) = \frac{-1}{\cos^2 x}e^{-\cos^2 x}
$$

Integrating both sides

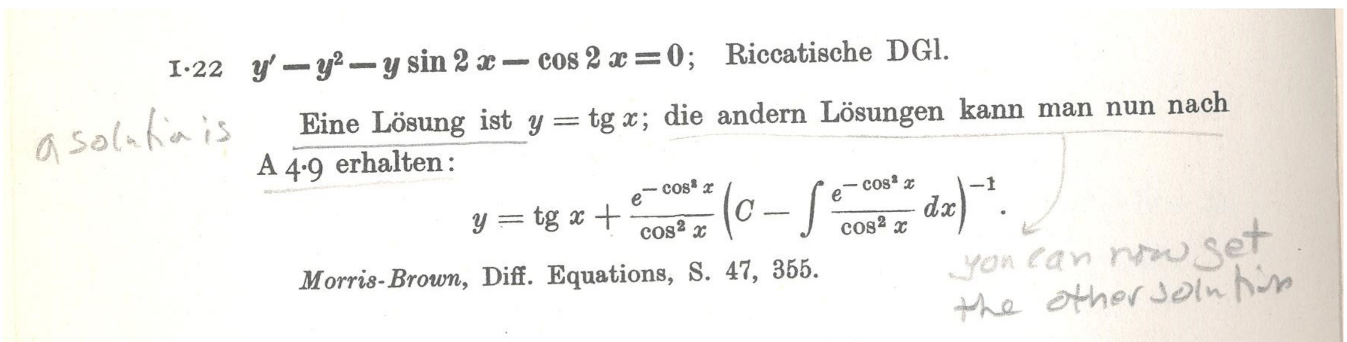
$$
\begin{aligned}
\frac{1}{\cos^2 x}e^{-\cos^2 x}u &= -\int \frac{e^{-\cos^2 x}}{\cos^2 x}dx + C\\
u &= \cos^2 x e^{\cos^2 x}\left(C - \int \frac{e^{-\cos^2 x}}{\cos^2 x}dx\right)
\end{aligned}
$$

Since $y = \tan x + \frac{1}{u}$ then

$$
\begin{aligned}
y &= \tan x + \frac{1}{\cos^2 x e^{\cos^2 x}\left(C - \int \frac{e^{-\cos^2 x}}{\cos^2 x} dx\right)} \\
&= \tan x + \frac{e^{-\cos^2 x}}{\cos^2 x}\left(C - \int \frac{e^{-\cos^2 x}}{\cos^2 x} dx\right)^{-1}
\end{aligned}
$$

I do not know how Maple came up with the solution involving HeunC functions since $\int \frac{e^{-\cos^2 x}}{\cos^2 x} dx$ has no closed form solution. I should ask CAS experts about this.

Below is screen shot from Kamke book of the solution it gives, which matches the above result



I·22 $y' - y^2 - y \sin 2x - \cos 2x = 0$; Riccatische DGl.

a solution is Eine Lösung ist $y = \operatorname{tg} x$; die andern Lösungen kann man nun nach A 4·9 erhalten:

$$y = \operatorname{tg} x + \frac{e^{-\cos^2 x}}{\cos^2 x}\left(C - \int \frac{e^{-\cos^2 x}}{\cos^2 x} dx\right)^{-1}.$$

Morris-Brown, Diff. Equations, S. 47, 355.

you can now set the other solution

2.23 ODE No. 23

$$a y(x)^2 - b + y'(x) = 0$$

✓ **Mathematica** : cpu = 0.0867575 (sec), leaf count = 43

$$\left\{\left\{y(x) \to \frac{\sqrt{b}\tanh\left(\sqrt{a}\sqrt{b}x + \sqrt{a}\sqrt{b}c_1\right)}{\sqrt{a}}\right\}\right\}$$

✓ **Maple** : cpu = 0.039 (sec), leaf count = 23

$$\left\{y(x) = \frac{\sqrt{ab}\tanh\left(\sqrt{ab}\,(c_1 + x)\right)}{a}\right\}$$

Hand solution

$$
\begin{aligned}
y' + ay^2 - b &= 0 \\
\frac{dy}{dx} &= b - ay^2
\end{aligned}
$$

Separable,

$$
\begin{aligned}
\frac{dy}{b - ay^2} &= dx \\
\int \frac{dy}{b - ay^2} &= \int dx
\end{aligned}
$$

But

$$
\int \frac{dy}{b - ay^2} = \frac{1}{\sqrt{ab}} \tanh^{-1}\left(\sqrt{\frac{a}{b}} y\right)
$$

Hence

$$
\begin{aligned}
\frac{1}{\sqrt{ab}} \tanh^{-1}\left(\sqrt{\frac{a}{b}} y\right) &= x + C \\
\tanh^{-1}\left(\sqrt{\frac{a}{b}} y\right) &= \sqrt{ab}(x + C) \\
\sqrt{\frac{a}{b}} y &= \tanh\left(\sqrt{ab}(x + C)\right) \\
y &= \sqrt{\frac{b}{a}} \tanh\left(\sqrt{ab}(x + C)\right)
\end{aligned}
$$

2.24 ODE No. 24

$$
ay(x)^2 - bx^\nu + y'(x) = 0
$$

✓ **Mathematica** : cpu = 0.147869 (sec), leaf count = 277

$$
\left\{\left\{y(x) \to -\frac{\sqrt{-a}\sqrt{b} x^{\frac{\nu+2}{2}} \left(c_1 J_{\frac{\nu+1}{\nu+2}}\left(\frac{2\sqrt{-a}\sqrt{b} x^{\frac{\nu}{2}+1}}{\nu+2}\right) - 2J_{\frac{1}{\nu+2}-1}\left(\frac{2\sqrt{-a}\sqrt{b} x^{\frac{\nu+2}{2}}}{\nu+2}\right) - c_1 J_{-\frac{\nu+3}{\nu+2}}\left(\frac{2\sqrt{-a}\sqrt{b} x^{\frac{\nu+2}{2}}}{\nu+2}\right)\right) - c_1 J_{-}}{2ax\left(J_{\frac{1}{\nu+2}}\left(\frac{2\sqrt{-a}\sqrt{b} x^{\frac{\nu+2}{2}}}{\nu+2}\right) + c_1 J_{-\frac{1}{\nu+2}}\left(\frac{2\sqrt{-a}\sqrt{b} x^{\frac{\nu+2}{2}}}{\nu+2}\right)\right)}\right.\right.
$$

✓ **Maple** : cpu = 0.069 (sec), leaf count = 214

$$
\left\{y(x) = \frac{-c_1\sqrt{-ab}\, x^{\frac{\nu}{2}+1} \operatorname{BesselJ}\left(\frac{\nu+3}{\nu+2}, \frac{2\sqrt{-ab}\, x^{\frac{\nu}{2}+1}}{\nu+2}\right) + c_1 \operatorname{BesselJ}\left(\frac{1}{\nu+2}, \frac{2\sqrt{-ab}\, x^{\frac{\nu}{2}+1}}{\nu+2}\right) - \sqrt{-ab}\, x^{\frac{\nu}{2}+1} \operatorname{BesselY}\left(\frac{\nu+3}{\nu+2},\right.}{\left(c_1 \operatorname{BesselJ}\left(\frac{1}{\nu+2}, \frac{2\sqrt{-ab}\, x^{\frac{\nu}{2}+1}}{\nu+2}\right) + \operatorname{BesselY}\left(\frac{1}{\nu+2}, \frac{2\sqrt{-ab}\, x^{\frac{\nu}{2}+1}}{\nu+2}\right)\right) a}\right.
$$

Hand solution

$$
\begin{aligned}
y' + ay^2 - bx^v &= 0 \\
y' &= bx^v - ay^2 \\
&= P(x) + Q(x)\,y + R(x)\,y^2
\end{aligned} \tag{1}
$$

This is Riccati first order non-linear ODE with $P(x) = bx^v, Q(x) = 0, R(x) = -a$. Using the standard substitution

$$
y = -\frac{u'}{uR(x)} = \frac{u'}{au}
$$

Hence

$$
y' = \frac{u''}{au} - \frac{(u')^2}{au^2}
$$

Therefore (1) becomes

$$
\begin{aligned}
\frac{u''}{au} - \frac{(u')^2}{au^2} &= bx^v - ay^2 \\
&= bx^v - a\left(\frac{u'}{au}\right)^2 \\
&= bx^v - \frac{(u')^2}{au^2}
\end{aligned}
$$

Hence

$$
\begin{aligned}
\frac{u''}{au} &= bx^v \\
u'' - abx^v u &= 0
\end{aligned}
$$

This is an Emden-Fowler equation, of the general form $u'' = Ax^n u^m$, where here $m = 1$ and $n = v$ and $A = ab$.

For any n, the solution uses Bessel functions and modified Bessel functions of first and second kind. From Handbook of exact solutions for ODE, page 237, equation 2.1.2.7 we see the solution is given as

$$u = \begin{cases} C_1\sqrt{x}J_{\frac{1}{2q}}\left(\frac{\sqrt{-ab}}{q}x^q\right) + C_2\sqrt{x}Y_{\frac{1}{2q}}\left(\frac{\sqrt{-ab}}{q}x^q\right) & ab<0 \\ C_1\sqrt{x}I_{\frac{1}{2q}}\left(\frac{\sqrt{ab}}{q}x^q\right) + C_2\sqrt{x}K_{\frac{1}{2q}}\left(\frac{\sqrt{ab}}{q}x^q\right) & ab>0 \end{cases}$$

Where $q = \frac{n+1}{2}$. J is Bessel function of first kind and Y is Bessel function of second kind. I is modified Besself function of first kind and K is modified Besself function of second kind. To find y we now use $y = \frac{u'}{au}$. Derivative of Bessel functions is given by

$$\begin{aligned} J_m'(x) &= \frac{1}{2}(J_{m-1}(x) - J_{m+1}(x)) \\ Y_m'(x) &= \frac{1}{2}(Y_{m-1}(x) - Y_{m+1}(x)) \\ I_m'(x) &= \frac{1}{2}(I_{m-1}(x) + I_{m+1}(x)) \\ K_m'(x) &= -\frac{1}{2}(K_{m-1}(x) + K_{m+1}(x)) \end{aligned}$$

Using these, then

$$u' = \begin{cases} C_1\left[\frac{1}{2\sqrt{x}}J_{\frac{1}{2q}}\left(\frac{\sqrt{-ab}}{q}x^q\right) + \sqrt{x}J'_{\frac{1}{2q}}\left(\frac{\sqrt{-ab}}{q}x^q\right)\right] + C_2\left[\frac{1}{2\sqrt{x}}Y_{\frac{1}{2q}}\left(\frac{\sqrt{-ab}}{q}x^q\right) + \sqrt{x}Y'_{\frac{1}{2q}}\left(\frac{\sqrt{-ab}}{q}x^q\right)\right] & ab<0 \\ C_1\left[\frac{1}{2\sqrt{x}}I_{\frac{1}{2q}}\left(\frac{\sqrt{ab}}{q}x^q\right) + \sqrt{x}I'_{\frac{1}{2q}}\left(\frac{\sqrt{ab}}{q}x^q\right)\right] + C_2\left[\frac{1}{2\sqrt{x}}K_{\frac{1}{2q}}\left(\frac{\sqrt{ab}}{q}x^q\right) + \sqrt{x}K'_{\frac{1}{2q}}\left(\frac{\sqrt{ab}}{q}x^q\right)\right] & ab>0 \end{cases}$$

Hence for $ab<0$

$$\begin{aligned} y &= \frac{u'}{au} \\ &= \frac{C_1\left[\frac{1}{2\sqrt{x}}J_{\frac{1}{2q}}\left(\frac{\sqrt{-ab}}{q}x^q\right) + \sqrt{x}J'_{\frac{1}{2q}}\left(\frac{\sqrt{-ab}}{q}x^q\right)\right] + C_2\left[\frac{1}{2\sqrt{x}}Y_{\frac{1}{2q}}\left(\frac{\sqrt{-ab}}{q}x^q\right) + \sqrt{x}Y'_{\frac{1}{2q}}\left(\frac{\sqrt{-ab}}{q}x^q\right)\right]}{aC_1\sqrt{x}J_{\frac{1}{2q}}\left(\frac{\sqrt{-ab}}{q}x^q\right) + aC_2\sqrt{x}Y_{\frac{1}{2q}}\left(\frac{\sqrt{-ab}}{q}x^q\right)} \\ &= \frac{\sqrt{x}C_1\left[\frac{1}{2x}J_{\frac{1}{2q}}\left(\frac{\sqrt{-ab}}{q}x^q\right) + J'_{\frac{1}{2q}}\left(\frac{\sqrt{-ab}}{q}x^q\right)\right] + \sqrt{x}C_2\left[\frac{1}{2x}Y_{\frac{1}{2q}}\left(\frac{\sqrt{-ab}}{q}x^q\right) + Y'_{\frac{1}{2q}}\left(\frac{\sqrt{-ab}}{q}x^q\right)\right]}{aC_1\sqrt{x}J_{\frac{1}{2q}}\left(\frac{\sqrt{-ab}}{q}x^q\right) + aC_2\sqrt{x}Y_{\frac{1}{2q}}\left(\frac{\sqrt{-ab}}{q}x^q\right)} \\ &= \frac{C_1\left[\frac{1}{2x}J_{\frac{1}{2q}}\left(\frac{\sqrt{-ab}}{q}x^q\right) + J'_{\frac{1}{2q}}\left(\frac{\sqrt{-ab}}{q}x^q\right)\right] + C_2\left[\frac{1}{2x}Y_{\frac{1}{2q}}\left(\frac{\sqrt{-ab}}{q}x^q\right) + Y'_{\frac{1}{2q}}\left(\frac{\sqrt{-ab}}{q}x^q\right)\right]}{aC_1J_{\frac{1}{2q}}\left(\frac{\sqrt{-ab}}{q}x^q\right) + aC_2Y_{\frac{1}{2q}}\left(\frac{\sqrt{-ab}}{q}x^q\right)} \end{aligned}$$

Using derivatives the above becomes

$$
\begin{aligned}
y = {} & \frac{C_1\left[\frac{1}{2x}J_{\frac{1}{2q}}\left(\frac{\sqrt{-ab}}{q}x^q\right)+\frac{1}{2}\left(J_{\frac{1}{2q}-1}\left(\frac{\sqrt{-ab}}{q}x^q\right)-J_{\frac{1}{2q}+1}\left(\frac{\sqrt{-ab}}{q}x^q\right)\right)\right]}{aC_1J_{\frac{1}{2q}}\left(\frac{\sqrt{-ab}}{q}x^q\right)+aC_2Y_{\frac{1}{2q}}\left(\frac{\sqrt{-ab}}{q}x^q\right)} \\
& + \frac{C_2\left[\frac{1}{2x}Y_{\frac{1}{2q}}\left(\frac{\sqrt{-ab}}{q}x^q\right)+\frac{1}{2}\left(Y_{\frac{1}{2q}-1}\left(\frac{\sqrt{-ab}}{q}x^q\right)-Y_{\frac{1}{2q}+1}\left(\frac{\sqrt{-ab}}{q}x^q\right)\right)\right]}{aC_1J_{\frac{1}{2q}}\left(\frac{\sqrt{-ab}}{q}x^q\right)+aC_2Y_{\frac{1}{2q}}\left(\frac{\sqrt{-ab}}{q}x^q\right)}
\end{aligned}
$$

Similar result can be found for $ab > 0$

2.25 ODE No. 25

$$ay(x)^2 - bx^{2\nu} - cx^{\nu-1} + y'(x) = 0$$

✓ **Mathematica** : cpu = 0.408475 (sec), leaf count = 1835

$$
\left\{\left\{y(x) \to \frac{-2^{\frac{\nu}{2(\nu+1)}-1} e^{-\frac{\sqrt{a}\sqrt{b}x^{\nu+1}}{\sqrt{\nu^2+2\nu+1}}} \nu \left(x^{\nu+1}\right)^{\frac{\nu}{2(\nu+1)}} L^{\frac{\nu}{\nu+1}-1}_{-\frac{\frac{\sqrt{a}\sqrt{b}\nu c}{\sqrt{(\nu+1)^2}}+\frac{\sqrt{a}\sqrt{b}c}{\sqrt{(\nu+1)^2}}+b\nu}{2(\nu b+b)}}\left(\frac{2\sqrt{a}\sqrt{b}x^{\nu+1}}{\sqrt{\nu^2+2\nu+1}}\right) x^{-\frac{\nu}{2}-1} - \frac{2^{\frac{\nu}{2(\nu+1)}}\sqrt{a}\sqrt{b}e^{-\frac{\sqrt{a}\sqrt{b}x^{\nu}}{\sqrt{\nu^2+2\nu}}}}{}}{}\right.\right.
$$

✓ **Maple** : cpu = 0.325 (sec), leaf count = 348

$$
\left\{y(x) = -\frac{2c_1(\nu+1)\,b^{\frac{3}{2}}\,\mathrm{WhittakerW}\left(-\frac{\sqrt{a}\,c+(-2\nu-2)\sqrt{b}}{(2\nu+2)\sqrt{b}}, \frac{1}{2\nu+2}, \frac{2\sqrt{a}\,\sqrt{b}\,x^{\nu+1}}{\nu+1}\right)+\left(\sqrt{a}\,bc+(-\nu-2)\,b^{\frac{3}{2}}\right)\mathrm{Whittaker}}{2\left(c_1\,\mathrm{WhittakerW}\right.}\right.
$$

Hand solution

$$
\begin{aligned}
y' + ay^2 - bx^{2v} - cx^{v-1} &= 0 \\
y' &= bx^v + cx^{v-1} - ay^2 \qquad (1)\\
&= P(x) + Q(x)\,y + R(x)\,y^2
\end{aligned}
$$

This is Riccati first order non-linear ODE with $P(x) = bx^v + cx^{v-1}, Q(x) = 0, R(x) = -a$. Need to do this later.

2.26 ODE No. 26

$$y'(x) - (Ay(x) - a)(By(x) - b) = 0$$

✓ **Mathematica** : cpu = 0.263709 (sec), leaf count = 68

$$\left\{\left\{y(x) \to \frac{ae^{Abx+Abc_1} - be^{aBx+aBc_1}}{Ae^{Abx+Abc_1} - Be^{aBx+aBc_1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.283 (sec), leaf count = 45

$$\left\{y(x) = \frac{a\,\mathrm{e}^{(c_1+x)(Ab-aB)} - b}{A\,\mathrm{e}^{(c_1+x)(Ab-aB)} - B}\right\}$$

Hand solution

$$\begin{aligned} y' - (Ay - a)(By - b) &= 0 \\ y' &= (Ay - a)(By - b) \\ &= ab - y(Ab + Ba) + ABy^2 \end{aligned} \tag{1}$$

This is Riccati first order non-linear ODE with $P(x) = ab, Q(x) = -(Ab + Ba), R(x) = AB$. Let $y = -\frac{u'}{uR(x)} = -\frac{u'}{ABu}$, hence

$$y' = \frac{-u''}{ABu} - \frac{(u')^2}{ABu^2}$$

Comparing to (1) results in

$$\begin{aligned} \frac{-u''}{ABu} - \frac{(u')^2}{ABu^2} &= ab - y(Ab + Ba) + ABy^2 \\ &= ab - \left(-\frac{u'}{ABu}\right)(Ab + Ba) + AB\left(-\frac{u'}{ABu}\right)^2 \\ &= ab + \frac{u'}{ABu}(Ab + Ba) + AB\frac{(u')^2}{(ABu)^2} \\ &= ab + \frac{u'}{ABu}(Ab + Ba) + \frac{(u')^2}{ABu^2} \end{aligned}$$

Hence

$$
\begin{aligned}
\frac{-u''}{ABu} &= ab + \frac{u'}{ABu}(Ab + Ba) \\
-u'' &= ABabu + u'(Ab + Ba) \\
u'' + u'(Ab + Ba) + u(ABab) &= 0
\end{aligned}
$$

This is second order ODE with constant coefficient. Solution is

$$
u = c_1 e^{-aBx} + c_2 e^{-Abx}
$$

Therefore

$$
u' = -aBc_1 e^{-aBx} - c_2 Abe^{-Abx}
$$

And therefore the solution is

$$
\begin{aligned}
y &= -\frac{u'}{ABu} = -\frac{1}{AB}\frac{-aBc_1 e^{-aBx} - c_2 Abe^{-Abx}}{c_1 e^{-aBx} + c_2 e^{-Abx}} \\
&= \frac{aBc_1 e^{-aBx} + c_2 Abe^{-Abx}}{AB\left(c_1 e^{-aBx} + c_2 e^{-Abx}\right)}
\end{aligned}
$$

Dividing by c_2 and letting $c = \frac{c_1}{c_2}$

$$
y = \frac{aBce^{-aBx} + Abe^{-Abx}}{AB\left(ce^{-aBx} + e^{-Abx}\right)}
$$

Verification

```
eq:=diff(y(x),x)-(A*y(x)-a)*(B*y(x)-b) = 0;
sol:=(a*B*_C1*exp(-a*B*x)+A*b*exp(-A*b*x))/(A*B*(_C1*exp(-a*B*x)+exp(-A*b*x)));
odetest(y(x)=sol,eq);
0
```

2.27 ODE No. 27

$$a y(x)(y(x)-x)+y'(x)-1=0$$

✓ **Mathematica** : cpu = 0.272532 (sec), leaf count = 120

$$\left\{\left\{y(x)\to \frac{axe^{\frac{ax^2}{2}}+c_1\left(\sqrt{\frac{\pi}{2}}\sqrt{a}xe^{\frac{ax^2}{2}}\operatorname{erf}\left(\frac{\sqrt{a}x}{\sqrt{2}}\right)+1\right)}{a\left(e^{\frac{ax^2}{2}}+\frac{\sqrt{\frac{\pi}{2}}c_1e^{\frac{ax^2}{2}}\operatorname{erf}\left(\frac{\sqrt{a}x}{\sqrt{2}}\right)}{\sqrt{a}}\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.184 (sec), leaf count = 72

$$\left\{y(x)=\frac{2\sqrt{a}\,\mathrm{e}^{-\frac{a\,x^2}{2}}+\left(2c_1a^{\frac{3}{2}}+\sqrt{\pi}\,\sqrt{2}\,a\operatorname{erf}\left(\frac{\sqrt{2}\,\sqrt{a}\,x}{2}\right)\right)x}{2c_1a^{\frac{3}{2}}+\sqrt{\pi}\,\sqrt{2}\,a\operatorname{erf}\left(\frac{\sqrt{2}\,\sqrt{a}\,x}{2}\right)}\right\}$$

Hand solution

$$\begin{aligned}
y'+ay(y-x)-1=0&\\
y'&=1-\left(ay^2-ayx\right)\\
&=1+ayx-ay^2 \qquad (1)
\end{aligned}$$

This is Riccati first order non-linear ODE $y'=P(x)+A(x)\,y+R(x)\,y^2$ with $P(x)=1,Q(x)=-ax,R(x)=-a$. We can convert Riccati to Bernoulli which is easier to solve using the substitution $u=y-x$

$$\begin{aligned}
u'&=y'-1\\
&=\left(1+ayx-ay^2\right)-1\\
&=\left(1+a(u+x)\,x-a(u+x)^2\right)-1\\
&=1+aux+ax^2-a\left(u^2+x^2+2ux\right)-1\\
&=1+aux+ax^2-au^2-ax^2-2aux-1\\
&=-aux-au^2\\
u'&=-aux-au^2
\end{aligned}$$

This is of the form $u'=P(x)+Q(x)\,u+R(x)\,u^2$ and since $P(x)=0$ then it is Bernoulli differential equation. (when $P(x)\neq 0$ and $R(x)\neq 0$ it is Riccati). To solve Bernoulli we always start by dividing by u^2

$$\frac{u'}{u^2}=-\frac{ax}{u}-a$$

Then we let $\zeta = \frac{1}{u}$, hence $\zeta' = -\frac{u'}{u^2}$, therefore the above becomes

$$\begin{aligned} -\zeta' &= -ax\zeta - a \\ \zeta' - ax\zeta &= a \end{aligned}$$

Integrating factor is $e^{-\int ax dx} = e^{-a\frac{x^2}{2}}$, hence $d\left(e^{-a\frac{x^2}{2}}\zeta\right) = ae^{-a\frac{x^2}{2}}$. Integrating both sides gives

$$e^{-a\frac{x^2}{2}}\zeta = a\int e^{-a\frac{x^2}{2}}dx + C$$

But

$$\int e^{-a\frac{x^2}{2}}dx = \sqrt{\frac{\pi}{2a}}\operatorname{erf}\left(\sqrt{\frac{a}{2}}x\right)$$

Therefore

$$\begin{aligned} e^{-a\frac{x^2}{2}}\zeta &= a\sqrt{\frac{\pi}{2a}}\operatorname{erf}\left(\sqrt{\frac{a}{2}}x\right) + C \\ \zeta &= e^{a\frac{x^2}{2}}\left(a\sqrt{\frac{\pi}{2a}}\operatorname{erf}\left(\sqrt{\frac{a}{2}}x\right) + C\right) \end{aligned}$$

Hence

$$\begin{aligned} u &= \frac{1}{\zeta} \\ &= e^{-a\frac{x^2}{2}}\left(a\sqrt{\frac{\pi}{2a}}\operatorname{erf}\left(\sqrt{\frac{a}{2}}x\right) + C\right)^{-1} \end{aligned}$$

Since $u = y - x$ then

$$\begin{aligned} y &= u + x \\ &= e^{-a\frac{x^2}{2}}\left(a\sqrt{\frac{\pi}{2a}}\operatorname{erf}\left(\sqrt{\frac{a}{2}}x\right) + C\right)^{-1} + x \\ &= \frac{e^{-a\frac{x^2}{2}}}{\sqrt{\frac{a\pi}{2}}\operatorname{erf}\left(\sqrt{\frac{a}{2}}x\right) + C} + x \end{aligned}$$

Verification

```
eq:=diff(y(x),x)+a*y(x)*(y(x)-x)-1 = 0;
sol:=exp(-a*x^2/2)/(sqrt(a*Pi/2)*erf(sqrt(a/2)*x)+_C1)+x;
odetest(y(x)=sol,eq);
0
```

2.28 ODE No. 28

$$x^3(-y(x))+y'(x)+xy(x)^2-2x=0$$

✓ **Mathematica** : cpu = 0.162688 (sec), leaf count = 96

$$\left\{\left\{y(x)\to\frac{\frac{1}{2}\sqrt{\pi}e^{\frac{x^4}{4}}x^3\text{erf}\left(\frac{x^2}{2}\right)+c_1e^{\frac{x^4}{4}}x^3+x}{x\left(\frac{1}{2}\sqrt{\pi}e^{\frac{x^4}{4}}\text{erf}\left(\frac{x^2}{2}\right)+c_1e^{\frac{x^4}{4}}\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.096 (sec), leaf count = 51

$$\left\{y(x)=\frac{c_1\sqrt{\pi}\,x^2\operatorname{erf}\left(\frac{x^2}{2}\right)+2c_1\mathrm{e}^{-\frac{x^4}{4}}+\sqrt{\pi}\,x^2}{\sqrt{\pi}\left(c_1\operatorname{erf}\left(\frac{x^2}{2}\right)+1\right)}\right\}$$

Hand solution

$$\begin{aligned}
y'-yx^3+xy^2-2x&=0\\
y'&=2x+yx^3-xy^2\\
&=P(x)+Q(x)\,y+R(x)\,y^2 \qquad (1)
\end{aligned}$$

This is Riccati first order non-linear ODE with $P(x)=2x, Q(x)=x^3, R(x)=-x$. We can convert Riccati to Bernoulli which is easier to solve using the substitution $u=x^2-y$ or $y=x^2-u$

$$\begin{aligned}
u'&=2x-y'\\
&=2x-\left(2x+yx^3-xy^2\right)\\
&=2x-\left(2x+\left(x^2-u\right)x^3-x\left(x^2-u\right)^2\right)\\
&=2x-\left(2x+\left(x^5-ux^3\right)-x\left(x^4+u^2-2x^2u\right)\right)\\
u'&=2x-\left(2x+\left(x^5-ux^3\right)-\left(x^5+xu^2-2x^3u\right)\right)\\
&=2x-2x-\left(x^5-ux^3\right)+\left(x^5+xu^2-2x^3u\right)\\
&=-x^5+ux^3+x^5+xu^2-2x^3u\\
&=-ux^3+xu^2
\end{aligned}$$

This is of the form $u'=P(x)+Q(x)\,u+R(x)\,u^2$ and since $P(x)=0$ then it is Bernoulli differential equation. (when $P(x)\neq 0$ and $R(x)\neq 0$ it is Riccati). To solve Bernoulli we always start by dividing by u^2

$$\frac{u'}{u^2}=-\frac{1}{u}x^3+x$$

Then we let $\zeta = -\frac{1}{u}$, hence $\zeta' = \frac{u'}{u^2}$, therefore the above becomes

$$\zeta' = x^3\zeta + x$$
$$\zeta' - x^3\zeta = x$$

Integrating factor is $e^{-\int x^3 dx} = e^{-\frac{x^4}{4}}$, hence

$$d\left(e^{-\frac{x^4}{4}}\zeta\right) = xe^{-\frac{x^4}{4}}$$

Integrating both sides gives

$$e^{-\frac{x^4}{4}}\zeta = \int xe^{-\frac{x^4}{4}}\,dx + C$$

$\int xe^{-\frac{x^4}{4}}\,dx = \frac{\sqrt{\pi}}{2}\operatorname{erf}\left(\frac{x^2}{2}\right)$, hence from above

$$e^{-\frac{x^4}{4}}\zeta = \frac{\sqrt{\pi}}{2}\operatorname{erf}\left(\frac{x^2}{2}\right) + C$$
$$\zeta = e^{\frac{x^4}{4}}\left(\frac{\sqrt{\pi}}{2}\operatorname{erf}\left(\frac{x^2}{2}\right) + C\right)$$

Since $\zeta = -\frac{1}{u}$ then

$$u = -e^{-\frac{x^4}{4}}\left(\frac{\sqrt{\pi}}{2}\operatorname{erf}\left(\frac{x^2}{2}\right) + C\right)^{-1}$$

And since $y = x^2 - u$ then

$$\begin{aligned} y &= x^2 + e^{-\frac{x^4}{4}}\left(\frac{\sqrt{\pi}}{2}\operatorname{erf}\left(\frac{x^2}{2}\right) + C\right)^{-1} \\ &= x^2 + \frac{e^{-\frac{x^4}{4}}}{\frac{\sqrt{\pi}}{2}\operatorname{erf}\left(\frac{x^2}{2}\right) + C} \end{aligned}$$

Verification

```
eq:=diff(y(x),x)+x*y(x)^2-x^3*y(x)-2*x = 0;
sol:=x^2+ exp(-x^4/4)/(_C1+ sqrt(Pi)/2*erf(x^2/2));
odetest(y(x)=sol,eq);
0
```

2.29 ODE No. 29

$$y'(x) - xy(x)^2 - 3xy(x) = 0$$

✓ **Mathematica** : cpu = 0.115562 (sec), leaf count = 39

$$\left\{\left\{y(x) \to -\frac{3e^{\frac{3x^2}{2}+3c_1}}{-1+e^{\frac{3x^2}{2}+3c_1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.013 (sec), leaf count = 19

$$\left\{y(x) = \frac{3}{3c_1 \mathrm{e}^{-\frac{3x^2}{2}} - 1}\right\}$$

Hand solution

$$\begin{aligned} y' - xy^2 - 3xy &= 0 \\ y' &= 3xy + xy^2 \\ &= P(x) + Q(x)\,y + R(x)\,y^2 \end{aligned} \tag{1}$$

This is Bernoulli first order non-linear ODE since $P(x) = 0$. To solve Bernoulli we always start by dividing by y^2

$$\frac{y'}{y^2} = \frac{3x}{y} + x$$

Then we let $u = \frac{1}{y}$, hence $u' = \frac{-y'}{y^2}$, therefore the above becomes

$$\begin{aligned} -u' &= 3xu + x \\ u' + 3ux &= -x \end{aligned}$$

Integrating factor is $e^{\int 3x dx} = e^{\frac{3x^2}{2}}$, hence

$$d\left(e^{\frac{3x^2}{2}} u\right) = -xe^{\frac{3x^2}{2}}$$

Integrating both sides gives

$$\begin{aligned} e^{\frac{3x^2}{2}} u &= \int -xe^{\frac{3x^2}{2}} dx + C \\ &= -\frac{1}{3} e^{\frac{3x^2}{2}} + C \end{aligned}$$

Hence from above

$$u = e^{\frac{-3x^2}{2}} \left(-\frac{1}{3} e^{\frac{3x^2}{2}} + C\right)$$

And since $y=\frac{1}{u}$ then

$$y=\frac{e^{\frac{3x^2}{2}}}{C-\frac{1}{3}e^{\frac{3x^2}{2}}}$$

Verification

```
eq:=diff(y(x),x)-x*y(x)^2-3*x*y(x) = 0;
sol:=exp(3*x^2/2)/(_C1- 1/3*exp(3*x^2/2));
odetest(y(x)=sol,eq);
0
```

2.30 ODE No. 30

$$x^{-a-1}y(x)^2-x^a+y'(x)=0$$

✓ **Mathematica** : cpu = 0.200589 (sec), leaf count = 230

$$\left\{\left\{y(x)\to\frac{x^{a+1}\left(-\frac{1}{2}(-1)^{-a}ax^{-\frac{a}{2}-1}\Gamma(1-a)I_{-a}(2\sqrt{x})+\frac{1}{2}(-1)^{-a}x^{-\frac{a}{2}-\frac{1}{2}}\Gamma(1-a)\left(I_{-a-1}(2\sqrt{x})+I_{1-a}(2\sqrt{x})\right)-\right.}{(-1)^{-a}x^{-a/2}\Gamma(1-a)I_{-a}\left(2\sqrt{x}\right)+c_1x^-}\right.\right.$$

✓ **Maple** : cpu = 0.082 (sec), leaf count = 54

$$\left\{y(x)=\frac{\left(-c_1\operatorname{BesselK}\left(a+1,2\sqrt{x}\right)+\operatorname{BesselI}\left(a+1,2\sqrt{x}\right)\right)x^{a+1}}{\left(c_1\operatorname{BesselK}\left(a,2\sqrt{x}\right)+\operatorname{BesselI}\left(a,2\sqrt{x}\right)\right)\sqrt{x}}\right\}$$

Hand solution

$$\begin{aligned}y'+x^{-a-1}y^2-x^a=0&\\ y'&=x^a-x^{-a-1}y^2\\ &=P(x)+Q(x)\,y+R(x)\,y^2\end{aligned}\tag{1}$$

This is Ricatti first order non-linear ODE. Using standard transformation

$$y=-\frac{u'}{uR\,(x)}=x^{a+1}\frac{u'}{u}$$

Hence

$$y'=(a+1)\,x^a\frac{u'}{u}+x^{a+1}\frac{u''}{u}-x^{a+1}\frac{(u')^2}{u^2}$$

Comparing to (1) gives

$$
\begin{aligned}
x^{a}-x^{-a-1}y^{2} &= (a+1)\,x^{a}\frac{u'}{u}+x^{a+1}\frac{u''}{u}-x^{a+1}\frac{(u')^{2}}{u^{2}}\\
x^{a}-x^{-a-1}\left(x^{a+1}\frac{u'}{u}\right)^{2} &= (a+1)\,x^{a}\frac{u'}{u}+x^{a+1}\frac{u''}{u}-x^{a+1}\frac{(u')^{2}}{u^{2}}\\
1-\frac{x^{-a-1}}{x^{a}}x^{2a+2}\frac{(u')^{2}}{u^{2}} &= (a+1)\,\frac{u'}{u}+x\frac{u''}{u}-x\frac{(u')^{2}}{u^{2}}\\
1-x\frac{(u')^{2}}{u^{2}} &= (a+1)\,\frac{u'}{u}+x\frac{u''}{u}-x\frac{(u')^{2}}{u^{2}}\\
1 &= (a+1)\,\frac{u'}{u}+x\frac{u''}{u}\\
xu''+(1+a)\,u'-u=0 & \qquad\qquad (2)
\end{aligned}
$$

In standard form $u''+\frac{1}{x}(1+a)\,u'-\frac{1}{x}u=0$ or $u''+p(x)\,(1+a)\,u'+q(x)\,u=0$. We see that $p(x)$ is not analytic at $x=0$ (the expansion point). So we can't use power series solution, and will use Forbenius series. Power series, which is $u=\sum_{n=0}^{\infty}c_nx^n$ is used when the expansion point is not singular point. (i.e. $p(x)$ and $q(x)$ are analytic there). Forbenius series $u=x^r\sum_{n=0}^{\infty}c_nx^n$ is used when there is a removable singular point (called also regular singular point), as in this case. Starting with

$$
u=x^{r}\sum_{n=0}^{\infty}c_nx^{n}=\sum_{n=0}^{\infty}c_nx^{n+r}
$$

Hence

$$
\begin{aligned}
u' &= \sum_{n=0}^{\infty}(n+r)\,c_nx^{n+r-1}\\
u'' &= \sum_{n=0}^{\infty}(n+r)\,(n+r-1)\,c_nx^{n+r-2}
\end{aligned}
$$

Substituting in (2) gives

$$
\begin{aligned}
x\sum_{n=0}^{\infty}(n+r)\,(n+r-1)\,c_nx^{n+r-2}+(1+a)\sum_{n=0}^{\infty}(n+r)\,c_nx^{n+r-1}-\sum_{n=0}^{\infty}c_nx^{n+r}&=0\\
\sum_{n=0}^{\infty}(n+r)\,(n+r-1)\,c_nx^{n+r-1}+(1+a)\sum_{n=0}^{\infty}(n+r)\,c_nx^{n+r-1}-\sum_{n=0}^{\infty}c_nx^{n+r}&=0
\end{aligned}
$$

Dividing out x^r

$$
\sum_{n=0}^{\infty}(n+r)\,(n+r-1)\,c_nx^{n-1}+(1+a)\sum_{n=0}^{\infty}(n+r)\,c_nx^{n-1}-\sum_{n=0}^{\infty}c_nx^{n}=0
$$

Each term should have x^{n-1} in it. So we adjust the last term

$$\sum_{n=0}^{\infty}(n+r)(n+r-1)c_n x^{n-1}+(1+a)\sum_{n=0}^{\infty}(n+r)c_n x^{n-1}-\sum_{n=1}^{\infty}c_{n-1}x^{n-1}=0$$

Expanding the second term

$$\sum_{n=0}^{\infty}(n+r)(n+r-1)c_n x^{n-1}+\sum_{n=0}^{\infty}(n+r)c_n x^{n-1}+\sum_{n=0}^{\infty}a(n+r)c_n x^{n-1}-\sum_{n=1}^{\infty}c_{n-1}x^{n-1}=0$$

Hence for $n=0$

$$\begin{aligned}(n+r)(n+r-1)c_n x^{n-1}+(n+r)c_n x^{n-1}+a(n+r)c_n x^{n-1}&=0\\ r(r-1)c_0+rc_0+arc_0&=0\end{aligned}$$

Since $c_0\neq 0$ then

$$r(r-1)+r+ar=0$$

Hence $r=-a$ or $r=0$. Now for $n\geq 1$

$$\begin{aligned}(n+r)(n+r-1)c_n x^{n-1}+\ (n+r)c_n x^{n-1}+\ a(n+r)c_n x^{n-1}-\ c_{n-1}x^{n-1}&=0\\ (n+r)(n+r-1)c_n\ +\ (n+r)c_n\ +\ a(n+r)c_n\ -\ c_{n-1}\ &=0\\ ((n+r)(n+r-1)\ +\ (n+r)\ +\ a(n+r))c_n\ &=c_{n-1}\\ c_n\ &=\frac{c_{n-1}}{(n+r)(n+r-1)\ +\ (n+r)}\end{aligned}$$

For $r=0$, we obtain

$$c_n=\frac{c_{n-1}}{n(n-1)\ +\ n\ +\ an}\tag{3}$$

For $r=-a$

$$c_n=\frac{c_{n-1}}{(n-a)(n-a-1)\ +\ (n-a)\ +\ a(n-a)}\tag{4}$$

There are two solutions. Looking at (3) for now, for $n=1$

$$c_1=\frac{c_0}{1\ +\ a}$$

For $n=2$

$$c_2=\frac{c_1}{4\ +2a}=\frac{c_0}{1\ +\ a}\frac{1}{2(2\ +a)}$$

For $n=3$

$$c_3=\frac{c_2}{3(2)\ +\ 3\ +3a}=\frac{c_2}{3(3\ +a)}=\frac{c_0}{1\ +\ a}\frac{1}{2(2\ +a)}\frac{1}{3(3\ +a)}$$

And so on. Since the solution is assumed to be $x^r \sum_{n=0}^{\infty} c_n x^n$ and we are looking at case $r = 0$ then

$$
\begin{aligned}
u_{r=0}(x) &= \sum_{n=1}^{\infty} c_n x^n \\
&= c_0 + c_1 x + c_2 x^2 + \cdots \\
&= c_0 x^0 + \frac{c_0}{1\ +\ a} x + \frac{c_0}{1\ +\ a} \frac{1}{2\,(2\ +a)} x^2 + \frac{c_0}{1\ +\ a} \frac{1}{2\,(2\ +a)} \frac{1}{3\,(3\ +a)} x^3 + \cdots \\
&= c_0 \left(x^0 + \frac{1}{1\ +\ a} x + \frac{1}{(1\ +\ a)} \frac{1}{2\,(2\ +a)} x^2 + \frac{1}{(1\ +\ a)} \frac{1}{2\,(2\ +a)} \frac{1}{3\,(3\ +a)} x^3 + \cdots \right)
\end{aligned} \tag{5}
$$

Since

$$
\Gamma(n) = (n-1)!
$$

and

$$
a(1+a)\,(2+a)\cdots(n+a) = \frac{\Gamma(a+n+1)}{\Gamma\,(a)}
$$

Then

$$
(1+a)\,(2+a)\cdots(n+a) = \frac{\Gamma(a+n+1)}{a\Gamma\,(a)}
$$

And (5) can now be written as

$$
y_{r=0}(x) = c_0 \sum_{n=1}^{\infty} \frac{1}{n!} \frac{a\Gamma(a)}{\Gamma\,(a+n+1)} x^n \tag{6}
$$

But modified Bessel function of first kind is

$$
\operatorname{BesselI}\,(a, z) = \sum_{n=0}^{\infty} \frac{1}{n!} \frac{1}{\Gamma\,(a+n+1)} \left(\frac{z}{2}\right)^{2n+a}
$$

So if we let $z = 2\sqrt{x}$ we obtain

$$
\begin{aligned}
\operatorname{BesselI}\left(a, 2\sqrt{x}\right) &= \sum_{n=0}^{\infty} \frac{1}{n!} \frac{1}{\Gamma\,(a+n+1)} \left(\frac{2\sqrt{x}}{2}\right)^{2n+a} \\
&= \sum_{n=0}^{\infty} \frac{1}{n!} \frac{1}{\Gamma\,(a+n+1)} \left(\sqrt{x}\right)^{2n} \left(\sqrt{x}\right)^{a} \\
&= \sum_{n=0}^{\infty} \frac{1}{n!} \frac{1}{\Gamma\,(a+n+1)} x^n \left(\sqrt{x}\right)^{a}
\end{aligned}
$$

Hence

$$
\frac{1}{\sqrt{x^a}} \operatorname{BesselI}\left(a, 2\sqrt{x}\right) = \sum_{n=0}^{\infty} \frac{1}{n!} \frac{1}{\Gamma\,(a+n+1)} x^n \tag{7}
$$

If we now compare (6) and (7), we see that if we set c_0, which is arbitrary, to be $c_0 = \frac{1}{a\Gamma(a)}$, then we obtain

$$
\begin{aligned}
u_{r=0}(x) &= \frac{1}{a\Gamma(a)} \sum_{n=0}^{\infty} \frac{1}{n!} \frac{a\Gamma(a)}{\Gamma(a+n+1)} x^n \\
&= \sum_{n=0}^{\infty} \frac{1}{n!} \frac{1}{\Gamma(a+n+1)} x^n
\end{aligned}
$$

But this is (7). Hence we found the first solution, which is

$$
u_{r=0}(x) = \frac{1}{\sqrt{x^a}} \operatorname{BesselI}\left(a, 2\sqrt{x}\right) \tag{8}
$$

The above was for $r = 0$. Now we find the second solution for $r = -a$. From (4)

$$
c_n = \frac{c_{n-1}}{(n-a)(n-a-1) + (n-a) + a(n-a)}
$$

For $n = 1$

$$
c_1 = \frac{c_0}{-a(1-a) + (1-a) + a(1-a)} = \frac{c_0}{(1-a)}
$$

For $n = 2$

$$
c_2 = \frac{c_1}{(2-a)(1-a) + (2-a) + a(2-a)} = \frac{c_1}{4-2a} = \frac{c_0}{(1-a)} \frac{1}{2(2-a)}
$$

For $n = 3$

$$
c_3 = \frac{c_2}{(3-a)(2-a) + (3-a) + a(3-a)} = \frac{c_2}{3(3-a)} = \frac{c_0}{(1-a)} \frac{1}{2(2-a)} \frac{1}{3(3-a)}
$$

And so on. Since the solution is assumed to be $x^r \sum_{n=0}^{\infty} c_n x^n$ then

$$
\begin{aligned}
u_{r=-a} &= x^{-a} \sum_{n=0}^{\infty} c_n x^n \\
&= \sum_{n=0}^{\infty} c_n x^{n-a} \\
&= c_0 x^{-a} \sum_{n=0}^{\infty} \frac{1}{n!} \left(\frac{1}{(1-a)} \frac{1}{(2-a)} \frac{1}{(3-a)} \cdots \frac{1}{(n-a)} \right) x^{n-a}
\end{aligned}
$$

But as we found above, we obtain that $(1-a)(2-a)\cdots(n-a) = \frac{\Gamma(-a+n+1)}{-a\Gamma(-a)}$, therefore

$$u_{r=-a} = c_0 \sum_{n=0}^{\infty} \frac{1}{n!} \frac{-a\Gamma(-a)}{\Gamma(-a+n+1)} x^{n-a}$$

Modified Bessel function of second kind is $\operatorname{BesselK}(a,z) = \frac{\pi}{2}\frac{1}{\sin(a\pi)}(\operatorname{BesselI}(-a,z) - \operatorname{BesselI}(a,z))$. The above should result in $\frac{1}{\sqrt{x^a}} \operatorname{BesselK}(a, 2\sqrt{x})$ for $z = 2\sqrt{x}$ by setting c_0 to appropriate arbitrary value. I need to work out this final manipulation later. Hence we find $u_{r=-a}(x) = \frac{1}{\sqrt{x^a}} \operatorname{BesselK}(a, 2\sqrt{x})$. Therefore, the solution is

$$u = C_1 \frac{1}{\sqrt{x^a}} \operatorname{BesselI}(a, 2\sqrt{x}) + C_2 \frac{1}{\sqrt{x^a}} \operatorname{BesselK}(a, 2\sqrt{x})$$

But

$$\begin{aligned}
\frac{d}{dx} \frac{1}{\sqrt{x^a}} \operatorname{BesselI}(a, 2\sqrt{x}) &= \frac{1}{\sqrt{x^{1+a}}} \operatorname{BesselI}(1+a, 2\sqrt{x}) \\
\frac{d}{dx} \frac{1}{\sqrt{x^a}} \operatorname{BesselI}(a, 2\sqrt{x}) &= -\frac{1}{\sqrt{x^{1+a}}} \operatorname{BesselK}(1+a, 2\sqrt{x})
\end{aligned}$$

Hence

$$u' = C_1 \frac{1}{\sqrt{x^{1+a}}} \operatorname{BesselI}(1+a, 2\sqrt{x}) - C_2 \frac{1}{\sqrt{x^{1+a}}} \operatorname{BesselK}(1+a, 2\sqrt{x})$$

And from $y = x^{a+1}\frac{u'}{u}$

$$y = x^{1+a} \frac{C_1 \frac{1}{\sqrt{x^{1+a}}} \operatorname{BesselI}(1+a, 2\sqrt{x}) - C_2 \frac{1}{\sqrt{x^{1+a}}} \operatorname{BesselK}(1+a, 2\sqrt{x})}{C_1 \frac{1}{\sqrt{x^a}} \operatorname{BesselI}(a, 2\sqrt{x}) + C_2 \frac{1}{\sqrt{x^a}} \operatorname{BesselK}(a, 2\sqrt{x})}$$

Let $C = \frac{C_2}{C_1}$ hence

$$y = x^{1+a} \frac{\frac{1}{\sqrt{x^{1+a}}} \operatorname{BesselI}(1+a, 2\sqrt{x}) - C \frac{1}{\sqrt{x^{1+a}}} \operatorname{BesselK}(1+a, 2\sqrt{x})}{\frac{1}{\sqrt{x^a}} \operatorname{BesselI}(a, 2\sqrt{x}) + C \frac{1}{\sqrt{x^a}} \operatorname{BesselK}(a, 2\sqrt{x})}$$

Or

$$\begin{aligned}
y &= x^{1+a} \frac{x^{-\frac{1}{2}} \operatorname{BesselI}(1+a, 2\sqrt{x}) - C x^{-\frac{1}{2}} \operatorname{BesselK}(1+a, 2\sqrt{x})}{\operatorname{BesselI}(a, 2\sqrt{x}) + C \operatorname{BesselK}(a, 2\sqrt{x})} \\
&= \frac{x^{\frac{1}{2}+a} \operatorname{BesselI}(1+a, 2\sqrt{x}) - C x^{\frac{1}{2}+a} \operatorname{BesselK}(1+a, 2\sqrt{x})}{\operatorname{BesselI}(a, 2\sqrt{x}) + C \operatorname{BesselK}(a, 2\sqrt{x})}
\end{aligned}$$

Verification

```
eq:=diff(y(x),x)+x^(-a-1)*y(x)^2-x^a = 0;
num:=x^(1/2+a)*BesselI(1+a,2*sqrt(x))-_C1*x^(1/2+a)*BesselK(1+a,2*sqrt(x));
den:=BesselI(a,2*sqrt(x))+_C1*BesselK(a,2*sqrt(x));
my_sol:=num/den;
odetest(y(x)=my_sol,eq);
0
```

2.31 ODE No. 31

$$y'(x) - ax^n\left(y(x)^2 + 1\right) = 0$$

✓ **Mathematica** : cpu = 0.218208 (sec), leaf count = 21

$$\left\{\left\{y(x) \to \tan\left(\frac{ax^{n+1}}{n+1} + c_1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.056 (sec), leaf count = 23

$$\left\{y(x) = \tan\left(\frac{\left(c_1(n+1) + x^{n+1}\right)a}{n+1}\right)\right\}$$

Hand solution

$$\begin{aligned} y' - ax^n\left(y^2 + 1\right) &= 0 \\ y' &= ax^n + ax^n y^2 \\ &= P(x) + Q(x)\,y + R(x)\,y^2 \end{aligned} \tag{1}$$

This is Ricatti first order non-linear ODE. $P(x) = ax^n, Q(x) = 0, R(x) = ax^n$. But this is separable also. Hence

$$\begin{aligned} \frac{y'}{(y^2+1)} &= ax^n \\ \frac{dy}{(y^2+1)} &= ax^n dx \end{aligned}$$

Integrating

$$\arctan\left(y(x)\right) = a\frac{x^{n+1}}{n+1} + C$$

Or

$$y(x) = \tan\left(a\frac{x^{n+1}}{n+1} + C\right)$$

Verification

```
restart;
eq:=diff(y(x),x)-a*x^n*(y(x)^2+1) = 0;
sol:=tan(a*x^(n+1)/(n+1)+_C1);
odetest(y(x)=sol,eq);
0
```

2.32 ODE No. 32

$$y'(x) + y(x)^2 \sin(x) - 2\tan(x)\sec(x) = 0$$

✓ **Mathematica** : cpu = 0.364816 (sec), leaf count = 34

$$\left\{\left\{y(x) \to \frac{\csc(x)(-2\sin(x)\cos(x) + c_1\tan(x)\sec(x))}{\cos^2(x) + c_1\sec(x)}\right\}\right\}$$

✓ **Maple** : cpu = 0.262 (sec), leaf count = 28

$$\left\{y(x) = \frac{-2c_1\left(\cos^3(x)\right) - 2}{\left(c_1\left(\cos^3(x)\right) - 2\right)\cos(x)}\right\}$$

Hand solution

$$\begin{aligned}
y' + y^2\sin(x) - 2\frac{\sin x}{\cos^2 x} &= 0\\
y' &= 2\frac{\sin x}{\cos^2 x} - y^2\sin(x)\\
&= P(x) + Q(x)\,y + R(x)\,y^2 \qquad (1)
\end{aligned}$$

This is Ricatti first order non-linear ODE. $P(x) = 2\frac{\sin x}{\cos^2 x}, Q(x) = 0, R(x) = -\sin(x)$. A particular solution is $y_p = \frac{1}{\cos x}$, therefore the solution is

$$\begin{aligned}
y &= y_p + \frac{1}{u}\\
y &= \frac{1}{\cos x} + \frac{1}{u}
\end{aligned}$$

Hence

$$y' = \frac{\sin x}{\cos^2 x} - \frac{u'}{u^2}$$

Equating this to RHS of (1) gives

$$\begin{aligned}
\frac{\sin x}{\cos^2 x} - \frac{u'}{u^2} &= 2\frac{\sin x}{\cos^2 x} - y^2\sin(x)\\
&= 2\frac{\sin x}{\cos^2 x} - \left(\frac{1}{\cos x} + \frac{1}{u}\right)^2\sin(x)\\
&= 2\frac{\sin x}{\cos^2 x} - \left(\frac{1}{\cos^2 x} + \frac{1}{u^2} + \frac{2}{u\cos x}\right)\sin(x)
\end{aligned}$$

Hence

$$\begin{aligned}
-\frac{u'}{u^2} &= -\frac{\sin x}{\cos^2 x} + 2\frac{\sin x}{\cos^2 x} - \frac{\sin(x)}{\cos^2 x} - \frac{\sin(x)}{u^2} - \frac{2\sin(x)}{u\cos x}\\
&= -\frac{\sin(x)}{u^2} - \frac{2\sin(x)}{u\cos x}
\end{aligned}$$

Or

$$
\begin{aligned}
u' &= \sin(x) + \frac{2u\sin(x)}{\cos x} \\
u' - 2u\tan(x) &= \sin(x)
\end{aligned}
$$

Integrating factor is $e^{-2\int \tan x dx} = e^{2\ln(\cos x)} = \cos^2(x)$. Hence the above becomes

$$
d\left(u\cos^2 x\right) = \cos^2(x)\sin(x)
$$

Integrating both sides

$$
\begin{aligned}
u\cos^2 x &= \int \cos^2(x)\sin(x)\,dx + C \\
&= \frac{-1}{3}\cos^3(x) + C
\end{aligned}
$$

Hence

$$
u = \frac{-1}{3}\cos(x) + \frac{C}{\cos^2 x}
$$

Therefore

$$
\begin{aligned}
y &= y_p + \frac{1}{u} \\
&= \frac{1}{\cos x} + \frac{1}{\frac{-1}{3}\cos(x) + \frac{C}{\cos^2 x}} \\
&= \frac{1}{\cos x} + \frac{3\cos^2 x}{3C - \cos^3(x)}
\end{aligned}
$$

Let $3C = C_1$

$$
y = \frac{1}{\cos x} + \frac{3\cos^2 x}{C_2 - \cos^3(x)}
$$

Verification

```
restart;
ode:=diff(y(x),x)+y(x)^2*sin(x)-2*sin(x)/cos(x)^2 = 0;
my_sol:=1/cos(x)+ 3*cos(x)^2/(_C1-cos(x)^3);
odetest(y(x)=my_sol,ode);
0
```

2.33 ODE No. 33

$$-\frac{y(x)^2 f'(x)}{g(x)}+\frac{g'(x)}{f(x)}+y'(x)=0$$

✓ **Mathematica** : cpu = 0.48339 (sec), leaf count = 160

$$\text{Solve}\left[\int_1^{y(x)}\left(\frac{1}{(g(x)+f(x)K[2])^2}-\int_1^x\left(\frac{2\big(f(K[1])K[2]^2f'(K[1])-g(K[1])g'(K[1])\big)}{g(K[1])(g(K[1])+f(K[1])K[2])^3}-\frac{2K[2]f'(K[1]}{g(K[1])(g(K[1])+f(K[1]}\right.\right.\right.$$

✓ **Maple** : cpu = 0.457 (sec), leaf count = 58

$$\left\{y(x)=\frac{-c_1 f(x)\,g(x)-f(x)\,g(x)\left(\int\frac{\frac{d}{dx}f(x)}{f(x)^2g(x)}dx\right)-1}{\left(c_1+\int\frac{\frac{d}{dx}f(x)}{f(x)^2g(x)}dx\right)f(x)^2}\right\}$$

Hand solution

$$-\frac{f'}{g}y^2+\frac{g'}{f}+y'=0$$

$$\begin{aligned} y'&=-\frac{g'}{f}+\frac{f'}{g}y^2\\ &=P(x)+Q(x)\,y+R(x)\,y^2 \end{aligned}\tag{1}$$

This is Ricatti first order non-linear ODE. $P(x)=-\frac{g'}{f},Q(x)=0,R(x)=\frac{f'}{g}$.

To do.

2.34 ODE No. 34

$$f(x)y(x)^2+g(x)y(x)+y'(x)=0$$

✓ **Mathematica** : cpu = 0.116418 (sec), leaf count = 54

$$\left\{\left\{y(x)\to\frac{\exp\left(\int_1^x-g(K[1])dK[1]\right)}{-\int_1^x-\exp\left(\int_1^{K[2]}-g(K[1])dK[1]\right)f(K[2])dK[2]+c_1}\right\}\right\}$$

✓ **Maple** : cpu = 0.027 (sec), leaf count = 28

$$\left\{y(x)=\frac{e^{\int-g(x)dx}}{c_1+\int e^{\int-g(x)dx}f(x)\,dx}\right\}$$

Hand solution

$$
\begin{aligned}
y^2 f+g y+y' &= 0 \\
y' &= -g y-y^2 f \\
&= P(x)+Q(x) y+R(x) y^2
\end{aligned}
\tag{1}
$$

This is Bernoulli first order non-linear ODE. $P(x)=0, Q(x)=-g, R(x)=f$. First step is to divide by y^2

$$
\frac{y'}{y^2}=-g \frac{1}{y}-f \tag{2}
$$

Let $u=\frac{1}{y}$, then $u'=\frac{-y'}{y^2}$ and (2) becomes

$$
\begin{aligned}
-u' &= -g u-f \\
u'-g u &= f
\end{aligned}
$$

Integrating factor is $e^{-\int g d x}$ hence

$$
\begin{aligned}
d\left(e^{-\int g d x} u\right) &= f e^{-\int g d x} \\
e^{-\int g d x} u &= \int f e^{-\int g d x} d x+C \\
u &= e^{\int g d x}\left(\int f e^{-\int g d x} d x+C\right)
\end{aligned}
$$

Hence

$$
\begin{aligned}
y &= \frac{1}{e^{\int g d x}\left(\int f e^{-\int g d x}+C\right)} \\
&= \frac{e^{-\int g d x}}{\int f e^{-\int g d x} d x+C}
\end{aligned}
$$

Let $\beta=e^{-\int g d x}$ then

$$
y=\frac{\beta}{\int f \beta d x+C}
$$

Verification

```
restart;
eq:=diff(y(x),x)+f(x)*y(x)^2+g(x)*y(x) = 0;
beta:=exp(-Int(g(x),x)):
my_sol:=beta/(Int(f(x)*beta,x)+_C1);
odetest(y(x)=my_sol,eq);
0
```

2.35 ODE No. 35

$$f(x)\left(2ay(x)+b+y(x)^2\right)+y'(x)=0$$

✓ **Mathematica** : cpu = 0.137875 (sec), leaf count = 61

$$\left\{\left\{y(x)\to -a+\sqrt{b-a^2}\tan\left(\sqrt{b-a^2}\int_1^x -f(K[1])dK[1]+c_1\sqrt{b-a^2}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.053 (sec), leaf count = 35

$$\left\{y(x)=-a+\sqrt{a^2-b}\tanh\left(\sqrt{a^2-b}\left(c_1+\int f(x)\,dx\right)\right)\right\}$$

Hand solution

$$\begin{aligned}
y'(x)+f(x)\left(2ay(x)+b+y^2(x)\right)&=0\\
y'(x)&=-2af(x)\,y(x)-bf(x)-f(x)\,y^2(x)\\
&=P(x)+Q(x)\,y+R(x)\,y^2 \qquad (1)
\end{aligned}$$

This is Riccati first order non-linear ODE. $P(x)=-bf(x)\,,Q(x)=-2af(x)\,,R(x)=-f(x)$. Let

$$y(x)=-\frac{u'(x)}{u(x)\,R(x)}=\frac{u'(x)}{u(x)\,f(x)}$$

Hence

$$y'(x)=\frac{u''(x)}{u(x)\,f(x)}-\frac{(u'(x))^2}{u^2(x)\,f(x)}-\frac{u'(x)\,f'(x)}{u(x)\,f^2(x)}$$

Equating this to RHS of (1) gives

$$\begin{aligned}
\frac{u''(x)}{u(x)\,f(x)}-\frac{(u'(x))^2}{u^2(x)\,f(x)}-\frac{u'(x)\,f'(x)}{u(x)\,f^2(x)}&=-2af(x)\,y(x)-bf(x)-f(x)\,y^2(x)\\
&=-2af(x)\left[\frac{u'(x)}{u(x)\,f(x)}\right]-bf(x)-f(x)\left[\frac{u'(x)}{u(x)\,f(x)}\right]^2\\
&=-2a\frac{u'(x)}{u(x)}-bf(x)-\frac{u'(x)^2}{u^2(x)\,f(x)}
\end{aligned}$$

Simplifying

$$
\begin{aligned}
u''(x) - \frac{(u'(x))^2}{u(x)} - \frac{u'(x)\, f'(x)}{f(x)} &= -2au'(x)\, f(x) - u(x)\, bf^2(x) - \frac{u'(x)^2}{u(x)} \\
u''(x) - \frac{u'(x)\, f'(x)}{f(x)} &= -2au'(x)\, f(x) - u(x)\, bf^2(x)
\end{aligned}
$$

$$
u''(x) + u'(x)\left(-\frac{f'(x)}{f(x)} + 2af(x)\right) + u(x)\, bf^2(x) = 0
$$

Second order ODE with variable coefficients. Since coefficients are variables and not constants, a power series method is the standard way to continue. When I tried solving this now pretending the coefficients are constants in time, using the standard auxiliary equation method, the solution did verify OK. I need to look more into this. For now, this is solved using standard method for solving second order ODE with constant coefficients.

$$
u(x) = C_1 \exp\left(\frac{\int f(x)\sqrt{-b}dx\left(\sqrt{\frac{b-a^2}{b}}b + a\sqrt{-b}\right)}{b}\right) + C_2 \exp\left(\frac{\int f(x)\sqrt{-b}dx\left(-\sqrt{\frac{b-a^2}{b}}b + a\sqrt{-b}\right)}{b}\right)
$$

Hence

$$
\begin{aligned}
u'(x) = {}& \frac{C_1\, f(x)\sqrt{-b}}{b}\left(\sqrt{\frac{-a^2+b}{b}}b + \sqrt{-b}a\right) e^{\frac{\int f(x)\sqrt{-b}\,\mathrm{d}x}{b}\left(\sqrt{\frac{-a^2+b}{b}}b+\sqrt{-b}a\right)} \\
& + \frac{C_2\, f(x)\sqrt{-b}}{b}\left(-\sqrt{\frac{-a^2+b}{b}}b + \sqrt{-b}a\right) e^{\frac{\int f(x)\sqrt{-b}\,\mathrm{d}x}{b}\left(-\sqrt{\frac{-a^2+b}{b}}b+\sqrt{-b}a\right)}
\end{aligned}
$$

Therefore

$$
\begin{aligned}
y &= \frac{u'(x)}{u(x)\, f(x)} \\
&= \frac{\frac{C_1\, f(x)\sqrt{-b}}{b}\left(\sqrt{\frac{-a^2+b}{b}}b + \sqrt{-b}a\right) e^{\frac{\int f(x)\sqrt{-b}\,\mathrm{d}x}{b}\left(\sqrt{\frac{-a^2+b}{b}}b+\sqrt{-b}a\right)} + \frac{C_2\, f(x)\sqrt{-b}}{b}\left(-\sqrt{\frac{-a^2+b}{b}}b + \sqrt{-b}a\right) e^{\frac{\int f(x)\sqrt{-b}\,\mathrm{d}x}{b}\left(-\sqrt{\frac{-a^2+b}{b}}b+\sqrt{-b}a\right)}}{f(x)\left[C_1 \exp\left(\frac{\int f(x)\sqrt{-b}dx\left(\sqrt{\frac{b-a^2}{b}}b+a\sqrt{-b}\right)}{b}\right) + C_2 \exp\left(\frac{\int f(x)\sqrt{-b}dx\left(-\sqrt{\frac{b-a^2}{b}}b+a\sqrt{-b}\right)}{b}\right)\right]}
\end{aligned}
$$

Verification

```
restart;
book:=diff(y(x),x)+f(x)*(2*a*y(x)+b+y(x)^2)=0;
eqU:=diff(u(x),x$2)+diff(u(x),x)*(- diff(f(x),x)/f(x)+2*a*f(x))+u(x)*f(x)^2*b=0;
solU:=dsolve(eqU,u(x));
```

```
my_sol:=diff(rhs(solU),x)/(rhs(solU)*f(x));
odetest(y(x)=my_sol,book);
0
```

2.36 ODE No. 36

$$axy(x)^2 + y'(x) + y(x)^3 = 0$$

✓ **Mathematica** : cpu = 0.405404 (sec), leaf count = 195

$$\text{Solve}\left[\frac{\text{Ai}'\left(\frac{\sqrt[3]{-\frac{1}{2}}\sqrt[3]{a}}{y(x)} - \frac{1}{2}\sqrt[3]{-\frac{1}{2}}a^{4/3}x^2\right) - \left(-\frac{1}{2}\right)^{2/3} a^{2/3}x\text{Ai}\left(\frac{\sqrt[3]{-\frac{1}{2}}\sqrt[3]{a}}{y(x)} - \frac{1}{2}\sqrt[3]{-\frac{1}{2}}a^{4/3}x^2\right)}{\text{Bi}'\left(\frac{\sqrt[3]{-\frac{1}{2}}\sqrt[3]{a}}{y(x)} - \frac{1}{2}\sqrt[3]{-\frac{1}{2}}a^{4/3}x^2\right) - \left(-\frac{1}{2}\right)^{2/3} a^{2/3}x\text{Bi}\left(\frac{\sqrt[3]{-\frac{1}{2}}\sqrt[3]{a}}{y(x)} - \frac{1}{2}\sqrt[3]{-\frac{1}{2}}a^{4/3}x^2\right)} + c_1 = 0, y(x)\right]$$

✓ **Maple** : cpu = 0.089 (sec), leaf count = 62

$$\left\{y(x) = \frac{2a}{a^2x^2 + 2\left(-2a^2\right)^{\frac{1}{3}} \text{RootOf}\left(c_1\left(-2a^2\right)^{\frac{1}{3}} x \,\text{AiryBi}\left(\_Z\right) + 2c_1 \,\text{AiryBi}\left(1, \_Z\right) + \left(-2a^2\right)^{\frac{1}{3}} x \,\text{AiryAi}\left(\_Z\right) + 2\right.}\right.$$

Hand solution

$$y'(x) = -axy^2 - y^3 \tag{1}$$

This is Abel first order non-linear. The general form is of Abel first kind is

$$y'(x) = f_0(x) + f_1(x)\,y(x) + f_2(x)\,y^2(x) + f_3(x)\,y^3(x)$$

In this case, $f_0(x) = 0, f_1(x) = 0, f_2(x) = -ax, f_3(x) = -1$. Note $\left(\frac{f_3}{f_2}\right)' = \left(\frac{1}{ax}\right)' = -\frac{1}{a}$. While Abel second kind has the form

$$(y + g(x))\,y'(x) = f_0(x) + f_1(x)\,y(x) + f_2(x)\,y^2(x)$$

For $g(x) \neq 0$.

Looking at (1) again, using the transformation suggested in Kamke $u = \frac{1}{y} - \frac{1}{2}ax^2$ or $y = \frac{1}{u+\frac{1}{2}ax^2}$ Then

$$y' = \frac{-u' - ax}{\left(u + \frac{1}{2}ax^2\right)^2}$$

Equating the above to the RHS of (1) gives

$$
\begin{aligned}
\frac{-u' - ax}{\left(u + \frac{1}{2}ax^2\right)^2} &= -ax\left(\frac{1}{u + \frac{1}{2}ax^2}\right)^2 - \left(\frac{1}{u + \frac{1}{2}ax^2}\right)^3 \\
-u' - ax &= -ax - \frac{1}{u + \frac{1}{2}ax^2} \\
\frac{du}{dx} &= \frac{1}{u + \frac{1}{2}ax^2}
\end{aligned}
$$

Writing as

$$
\frac{dx}{du} = u + \frac{1}{2}ax^2 \tag{2}
$$

This can now be viewed as reverse Riccati in x. Using the standard transformation

$$
x = -\frac{z'}{z\left(\frac{1}{2}a\right)} = -\frac{2z'}{az} \tag{3}
$$

Hence

$$
\frac{dx}{du} = -\frac{2}{a}\left(\frac{z''}{z} - \frac{(z')^2}{z^2}\right)
$$

Equating this to RHS of (2) gives a second order Airy ODE where the dependent variable is z and the independent variable is u

$$
\begin{aligned}
-\frac{2}{a}\left(\frac{z''}{z} - \frac{(z')^2}{z^2}\right) &= u + \frac{1}{2}a\left(-\frac{2z'}{az}\right)^2 \\
-\frac{2}{a}\frac{z''}{z} + \frac{2}{a}\frac{(z')^2}{z^2} &= u + \frac{1}{2}a\frac{4(z')^2}{a^2z^2} \\
-\frac{2}{a}\frac{z''}{z} + \frac{2}{a}\frac{(z')^2}{z^2} &= u + \frac{2}{a}\frac{(z')^2}{z^2} \\
-\frac{2}{a}\frac{z''}{z} &= u \\
z''(u) + \frac{a}{2}uz(u) &= 0
\end{aligned}
$$

This is Airy ODE whose solution is found using power series method. The solution is

$$
z(u) = C_1 \operatorname{AiryAI}\left(-\frac{1}{2}2^{\frac{2}{3}}a^{\frac{1}{3}}u\right) + C_2 \operatorname{AiryBI}\left(-\frac{1}{2}2^{\frac{2}{3}}a^{\frac{1}{3}}u\right) \tag{4}
$$

We now go back to (3) and find x

$$
x = -\frac{2z'}{az}
$$

Since

$$
\begin{aligned}
\frac{d}{du}\operatorname{AiryAI}\left(-\frac{1}{2}2^{\frac{2}{3}}a^{\frac{1}{3}}u\right) &= -\frac{1}{2}2^{\frac{2}{3}}a^{\frac{1}{3}}\operatorname{AiryAI}\left(1, -\frac{1}{2}2^{\frac{2}{3}}a^{\frac{1}{3}}u\right) \\
\frac{d}{du}\operatorname{AiryBI}\left(-\frac{1}{2}2^{\frac{2}{3}}a^{\frac{1}{3}}u\right) &= -\frac{1}{2}2^{\frac{2}{3}}a^{\frac{1}{3}}\operatorname{AiryBI}\left(1, -\frac{1}{2}2^{\frac{2}{3}}a^{\frac{1}{3}}u\right)
\end{aligned}
$$

Then

$$x = -\frac{2}{a}\frac{-C_1\frac{1}{2}2^{\frac{2}{3}}a^{\frac{1}{3}}\operatorname{AiryAI}\left(1,-\frac{1}{2}2^{\frac{2}{3}}a^{\frac{1}{3}}u\right)-C_2\frac{1}{2}2^{\frac{2}{3}}a^{\frac{1}{3}}\operatorname{AiryBI}\left(1,-\frac{1}{2}2^{\frac{2}{3}}a^{\frac{1}{3}}u\right)}{C_1\operatorname{AiryAI}\left(-\frac{1}{2}2^{\frac{2}{3}}a^{\frac{1}{3}}u\right)+C_2\operatorname{AiryBI}\left(-\frac{1}{2}2^{\frac{2}{3}}a^{\frac{1}{3}}u\right)}$$

Therefore $\frac{dx}{du}$ is now found from above. Once we find $\frac{dx}{du}$ then $\frac{du}{dx}$ is also found. Using $\frac{du}{dx} = \frac{1}{u+\frac{1}{2}ax^2}$ now $u(x)$ is found. Once $u(x)$ is found then $y(x)$ is found from the original transformation $y = \frac{1}{u+\frac{1}{2}ax^2}$. This is all now just algebra.

2.37 ODE No. 37

$$-ae^x y(x)^2 + y'(x) - y(x)^3 = 0$$

✓ **Mathematica** : cpu = 1.05781 (sec), leaf count = 78

$$\text{Solve}\left[-iae^x = \frac{2e^{\frac{1}{2}\left(-iae^x-\frac{i}{y(x)}\right)^2}}{\sqrt{2\pi}\text{erfi}\left(\frac{-iae^x-\frac{i}{y(x)}}{\sqrt{2}}\right)+2c_1}, y(x)\right]$$

✓ **Maple** : cpu = 0.095 (sec), leaf count = 50

$$\left\{c_1 + \frac{e^{-x}e^{-\frac{\left(a\,e^x+\frac{1}{y(x)}\right)^2}{2}}}{a} + \frac{\sqrt{2}\,\sqrt{\pi}\ \text{erf}\left(\frac{\left(a\,e^x+\frac{1}{y(x)}\right)\sqrt{2}}{2}\right)}{2} = 0\right\}$$

2.38 ODE No. 38

$$-ay(x)^3 - \frac{b}{x^{3/2}} + y'(x) = 0$$

✓ **Mathematica** : cpu = 0.203189 (sec), leaf count = 99

$$\text{Solve}\left[-2\text{RootSum}\left[-2\#1^3+\#1\sqrt[3]{-\frac{1}{ab^2}}-2\&, \frac{\log\left(y(x)\sqrt[3]{\frac{ax^{3/2}}{b}}-\#1\right)}{\sqrt[3]{-\frac{1}{ab^2}}-6\#1^2}\&\right] = \frac{ax\log(x)}{\left(\frac{ax^{3/2}}{b}\right)^{2/3}}+c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.03 (sec), leaf count = 34

$$\left\{y(x) = \frac{\text{RootOf}\left(c_1 + 2\left(\int^{\_Z}\frac{1}{2\_a^3+\_a+2b}d\_a\right)-\ln(x)\right)}{\sqrt{x}}\right\}$$

Hand solution

$$y'(x) = ay^3 + bx^{-\frac{3}{2}} \tag{1}$$

This can be transformed to Abel first order non-linear ode as follows. Let $y(x) = x^{-\frac{1}{2}}\eta(\xi)$ where $\xi = \ln x$ hence

$$\begin{aligned}
\frac{dy}{dx} &= -\frac{1}{2}x^{-\frac{3}{2}}\eta(\xi) + x^{-\frac{1}{2}}\frac{d\eta}{d\xi}\frac{d\xi}{dx} \\
&= -\frac{1}{2}x^{-\frac{3}{2}}\eta(\xi) + x^{-\frac{1}{2}}\frac{d\eta}{d\xi}\frac{1}{x} \\
&= -\frac{1}{2}x^{-\frac{3}{2}}\eta(\xi) + x^{-\frac{3}{2}}\frac{d\eta}{d\xi}
\end{aligned}$$

Substituting in (1) gives

$$\begin{aligned}
-\frac{1}{2}x^{-\frac{3}{2}}\eta(\xi) + x^{-\frac{3}{2}}\frac{d\eta}{d\xi} &= a\left(x^{-\frac{1}{2}}\eta(\xi)\right)^3 + bx^{-\frac{3}{2}} \\
-\frac{1}{2}x^{-\frac{3}{2}}\eta(\xi) + x^{-\frac{3}{2}}\frac{d\eta}{d\xi} &= ax^{-\frac{3}{2}}\eta^3(\xi) + bx^{-\frac{3}{2}} \\
-\frac{1}{2}\eta + \eta' &= a\eta^3 + b \\
\eta' &= b + \frac{1}{2}\eta + a\eta^3
\end{aligned}$$

This is Abel first kind. In general form it is

$$\eta' = f_0 + f_1\eta + f_2\eta^2 + f_3\eta^3$$

Where in this case $f_0 = b, f_1 = \frac{1}{2}, f_2 = 0, f_3 = a$. Using Maple, the solution to the above is (I need to learn how to solve Able by hand more) is implicit, given as

$$\eta = \xi - \int^{\eta(\xi)} \frac{1}{b + \frac{1}{2}z + az^3} dz + C$$

Where C is constant of integration. Hence, since $y(x) = x^{-\frac{1}{2}}\eta(\xi)$, then $\eta(\xi) = \sqrt{x}y$ and the above becomes

$$\begin{aligned}
\sqrt{x}y &= \ln x - \int^{\sqrt{x}y} \frac{1}{b + \frac{1}{2}z + az^3} dz + C \\
y(x) &= \left(\ln x - \int^{\sqrt{x}y} \frac{1}{b + \frac{1}{2}z + az^3} dz + C\right)\frac{1}{\sqrt{x}}
\end{aligned}$$

DId not verify. Need to look more into this later.

2.39 ODE No. 39

$$-\mathrm{a0}-\mathrm{a1}y(x)-\mathrm{a2}y(x)^2-\mathrm{a3}y(x)^3+y'(x)=0$$

✓ **Mathematica** : cpu = 0.142328 (sec), leaf count = 54

$$\mathrm{Solve}\left[\mathrm{RootSum}\left[\#1^3\mathrm{a3}+\#1^2\mathrm{a2}+\#1\mathrm{a1}+\mathrm{a0}\&,\frac{\log(y(x)-\#1)}{3\#1^2\mathrm{a3}+2\#1\mathrm{a2}+\mathrm{a1}}\&\right]=x+c_1,y(x)\right]$$

✓ **Maple** : cpu = 0.016 (sec), leaf count = 30

$$\left\{c_1+x-\left(\int^{y(x)}\frac{1}{\_a^3 a3+\_a^2 a2+\_a a1+a0}d\_a\right)=0\right\}$$

2.40 ODE No. 40

$$3ay(x)^3+6axy(x)^2+y'(x)=0$$

✓ **Mathematica** : cpu = 0.461629 (sec), leaf count = 185

$$\mathrm{Solve}\left[\frac{\sqrt[3]{-3}\sqrt[3]{a}x\mathrm{Ai}\left((-3)^{2/3}a^{2/3}x^2-\frac{(-1)^{2/3}}{\sqrt[3]{3}\sqrt[3]{a}y(x)}\right)+\mathrm{Ai}'\left((-3)^{2/3}a^{2/3}x^2-\frac{(-1)^{2/3}}{\sqrt[3]{3}\sqrt[3]{a}y(x)}\right)}{\sqrt[3]{-3}\sqrt[3]{a}x\mathrm{Bi}\left((-3)^{2/3}a^{2/3}x^2-\frac{(-1)^{2/3}}{\sqrt[3]{3}\sqrt[3]{a}y(x)}\right)+\mathrm{Bi}'\left((-3)^{2/3}a^{2/3}x^2-\frac{(-1)^{2/3}}{\sqrt[3]{3}\sqrt[3]{a}y(x)}\right)}+c_1=0,y(x)\right]$$

✓ **Maple** : cpu = 0.066 (sec), leaf count = 48

$$\left\{y(x)=\frac{1}{3a\,x^2+(-3a)^{\frac{1}{3}}\,\mathrm{RootOf}\left(c_1\,(-3a)^{\frac{1}{3}}\,x\,\mathrm{AiryBi}\,(\_Z)+c_1\,\mathrm{AiryBi}\,(1,\_Z)+(-3a)^{\frac{1}{3}}\,x\,\mathrm{AiryAi}\,(\_Z)+\mathrm{AiryA}\right.}\right.$$

2.41 ODE No. 41

$$axy(x)^3+by(x)^2+y'(x)=0$$

✓ **Mathematica** : cpu = 0.279243 (sec), leaf count = 103

$$\text{Solve}\left[-\frac{b^2\left(\frac{2\tan^{-1}\left(\frac{-2axy(x)-b}{b\sqrt{-\frac{4a}{b^2}-1}}\right)}{\sqrt{-\frac{4a}{b^2}-1}}-\log\left(\frac{a(-x)y(x)(-axy(x)-b)-a}{a^2x^2y(x)^2}\right)\right)}{2a}=-\frac{b^2\log(x)}{a}+c_1,y(x)\right]$$

✓ **Maple** : cpu = 0.31 (sec), leaf count = 103

$$\left\{y(x)=\frac{e^{\mathrm{RootOf}\left(2c_1b^2+2\_Zb^2-b^2\ln\left(\left(a\,e^{2\_Z}+b\,e^{\_Z}-1\right)x^2\right)+8c_1a+8\_Za-4a\ln\left(\left(a\,e^{2\_Z}+b\,e^{\_Z}-1\right)x^2\right)+2\sqrt{b^2+4a}\,b\,\mathrm{arctanh}\left(\frac{2a\,e^{\_Z}+b}{\sqrt{b^2+4a}}\right)\right.}}{x}\right.$$

2.42 ODE No. 42

$$y'(x)-x(x+2)y(x)^3-(x+3)y(x)^2=0$$

✓ **Mathematica** : cpu = 1.21032 (sec), leaf count = 485

$$\text{Solve}\left[c_1=-\frac{\frac{i\sqrt{\frac{2}{\pi}}\sqrt{\frac{1}{2y(x)}+\frac{1}{4}(x+1)^2-\frac{1}{4}}\left(\frac{\sinh\left(\sqrt{\frac{1}{2y(x)}+\frac{1}{4}(x+1)^2-\frac{1}{4}}\right)}{\sqrt{\frac{1}{2y(x)}+\frac{1}{4}(x+1)^2-\frac{1}{4}}}-\cosh\left(\sqrt{\frac{1}{2y(x)}+\frac{1}{4}(x+1)^2-\frac{1}{4}}\right)\right)}{\sqrt{-i\sqrt{\frac{1}{2y(x)}+\frac{1}{4}(x+1)^2-\frac{1}{4}}}}-\frac{i\sqrt{\frac{2}{\pi}}\left(\frac{x+1}{2}+\frac{1}{2}\right)\sinh\left(\sqrt{\frac{1}{2y(x)}+\frac{1}{4}\right.\right.}{\sqrt{-i\sqrt{\frac{1}{2y(x)}+\frac{1}{4}(x+1)^2}}}}{\frac{i\sqrt{\frac{2}{\pi}}\sqrt{\frac{1}{2y(x)}+\frac{1}{4}(x+1)^2-\frac{1}{4}}\left(i\sinh\left(\sqrt{\frac{1}{2y(x)}+\frac{1}{4}(x+1)^2-\frac{1}{4}}\right)-\frac{i\cosh\left(\sqrt{\frac{1}{2y(x)}+\frac{1}{4}(x+1)^2-\frac{1}{4}}\right)}{\sqrt{\frac{1}{2y(x)}+\frac{1}{4}(x+1)^2-\frac{1}{4}}}\right)}{\sqrt{-i\sqrt{\frac{1}{2y(x)}+\frac{1}{4}(x+1)^2-\frac{1}{4}}}}-\frac{\sqrt{\frac{2}{\pi}}\left(\frac{x+1}{2}+\frac{1}{2}\right)\cosh\left(\sqrt{\frac{1}{2y(x)}+\right.\right.}{\sqrt{-i\sqrt{\frac{1}{2y(x)}+\frac{1}{4}(x+1)}}}}\right.$$

✓ **Maple** : cpu = 0.027 (sec), leaf count = 40

$$\left\{c_1+\mathrm{arctanh}\left(\frac{x\sqrt{y(x)}}{\sqrt{(x+2)\,xy(x)+2}}\right)+\frac{\sqrt{(x+2)\,xy(x)+2}}{2\sqrt{y(x)}}=0\right\}$$

2.43 ODE No. 43

$$y(x)^3\left(4a^2x+3ax^2+b\right)+y'(x)+3xy(x)^2=0$$

✓ **Mathematica** : cpu = 7.115 (sec), leaf count = 490

$$\text{Solve}\left[c_1=-\frac{i\sqrt{-\frac{4a^3-3b}{4a^3}-\frac{3}{2a^2y(x)}+\frac{(-2a-3x)^2}{4a^2}}J_{\frac{1}{2}\sqrt{\frac{4a^3-3b}{a^3}}+1}\left(-i\sqrt{\frac{(-2a-3x)^2}{4a^2}-\frac{4a^3-3b}{4a^3}-\frac{3}{2a^2y(x)}}\right)+\left(\frac{1}{2}\sqrt{\frac{4a^3-3b}{a^3}}+\right.}{i\sqrt{-\frac{4a^3-3b}{4a^3}-\frac{3}{2a^2y(x)}+\frac{(-2a-3x)^2}{4a^2}}Y_{\frac{1}{2}\sqrt{\frac{4a^3-3b}{a^3}}+1}\left(-i\sqrt{\frac{(-2a-3x)^2}{4a^2}-\frac{4a^3-3b}{4a^3}-\frac{3}{2a^2y(x)}}\right)+\left(\frac{1}{2}\sqrt{\frac{4a^3-3b}{a^3}}+\right.}\right.$$

✓ **Maple** : cpu = 1.662 (sec), leaf count = 373

$$\left\{c_1+\frac{-\sqrt{3}\sqrt{\frac{4a^2xy(x)+3a\,x^2y(x)+by(x)-2a}{a^3y(x)}}\,a\,\text{BesselK}\left(\frac{\sqrt{\frac{4a^3-3b}{a^3}}}{2}+1,-\frac{\sqrt{3}\sqrt{\frac{4a^2xy(x)+3a\,x^2y(x)+by(x)-2a}{a^3y(x)}}}{2}\right)-\left(\sqrt{\frac{4a^3-3b}{a^3}}\,a\right.}{\sqrt{3}\sqrt{\frac{4a^2xy(x)+3a\,x^2y(x)+by(x)-2a}{a^3y(x)}}\,a\,\text{BesselI}\left(\frac{\sqrt{\frac{4a^3-3b}{a^3}}}{2}+1,-\frac{\sqrt{3}\sqrt{\frac{4a^2xy(x)+3a\,x^2y(x)+by(x)-2a}{a^3y(x)}}}{2}\right)-\left(\sqrt{\frac{4a^3-3b}{a^3}}\,a\,-\right.}\right.$$

2.44 ODE No. 44

$$2ax^3y(x)^3+y'(x)+2xy(x)=0$$

✓ **Mathematica** : cpu = 0.08882 (sec), leaf count = 72

$$\left\{\left\{y(x)\to-\frac{\sqrt{2}}{\sqrt{-2ax^2-a+2c_1e^{2x^2}}}\right\},\left\{y(x)\to\frac{\sqrt{2}}{\sqrt{-2ax^2-a+2c_1e^{2x^2}}}\right\}\right\}$$

✓ **Maple** : cpu = 0.015 (sec), leaf count = 53

$$\left\{y(x)=-\frac{2}{\sqrt{-4a\,x^2+4c_1\mathrm{e}^{2x^2}-2a}},y(x)=\frac{2}{\sqrt{-4a\,x^2+4c_1\mathrm{e}^{2x^2}-2a}}\right\}$$

Hand solution

$$y'=-2xy-2ax^3y^3 \tag{1}$$

This is of the form $y'=f_0+f_1y+f_2y^2+f_3y^3$ where $f_0=0, f_2=0$. Hence this is Bernoulli first order non-linear ODE. We start by diving by y^3

$$\frac{y'}{y^3}=-2x\frac{1}{y^2}-2ax^3$$

Let $u = \frac{1}{y^2}$, hence $u' = -2\frac{y'}{y^3}$ and the above becomes

$$
\begin{aligned}
-\frac{1}{2}u' &= -2xu - 2ax^3 \\
u' - 4xu &= 4ax^3
\end{aligned}
$$

Integrating factor is $e^{-4\int x dx} = e^{-2x^2}$ hence

$$
\frac{d}{dx}\left(e^{-2x^2}u\right) = 4ax^3e^{-2x^2}
$$

Integrating

$$
\begin{aligned}
e^{-2x^2}u &= 4a\int x^3e^{-2x^2}dx + C \\
&= 4a\left(\frac{-1}{8}\left(2x^2+1\right)e^{-2x^2}\right) + C
\end{aligned}
$$

Therefore

$$
u = -\frac{1}{2}a\left(2x^2+1\right) + Ce^{2x^2}
$$

Hence

$$
y^2 = \frac{1}{u} = \frac{1}{-\frac{1}{2}a\left(2x^2+1\right) + Ce^{2x^2}}
$$

Or

$$
y = \pm\frac{\sqrt{2}}{\sqrt{-a\left(2x^2+1\right) + Ce^{2x^2}}}
$$

Verification

```
ode:=2*a*x^3*y(x)^3+diff(y(x),x)+2*x*y(x)=0;
my_sol:=sqrt(2)/sqrt(-a*(2*x^2+1)+_C1*exp(2*x^2));
odetest(y(x)=my_sol,ode);
0
my_sol:=-sqrt(2)/sqrt(-a*(2*x^2+1)+_C1*exp(2*x^2));
odetest(y(x)=my_sol,ode);
0
```

2.45 ODE No. 45

$$
2y(x)^3\left(a^2x^3 - b^2x\right) + 3by(x)^2 + y'(x) = 0
$$

✓ **Mathematica** : cpu = 0.682554 (sec), leaf count = 133

$$
\text{Solve}\left[c_1 = \sqrt[4]{\left(\frac{b}{ax} - \frac{1}{ax^2y(x)}\right)^2 - 1}\left(-\frac{\left(\frac{b}{ax} - \frac{1}{ax^2y(x)}\right)\,{}_2F_1\left(\frac{1}{2},\frac{3}{4};\frac{3}{2};\left(\frac{b}{ax} - \frac{1}{ax^2y(x)}\right)^2\right)}{2\sqrt[4]{1 - \left(\frac{b}{ax} - \frac{1}{ax^2y(x)}\right)^2}} - \frac{ax}{b}\right), y(x)\right]
$$

✓ **Maple** : cpu = 0.165 (sec), leaf count = 123

$$\left\{c_1 - \left(\int^{\frac{a\,x^2 y(x)}{bxy(x)-1}} \frac{(\_a^2-1)^{\frac{1}{4}}}{\sqrt{\_a}} d\_a\right) + \frac{\left(\left(\frac{ax}{b}+\frac{1}{\frac{b^2 y(x)}{a}-\frac{b}{ax}}\right)^2-1\right)^{\frac{1}{4}}}{\left(\frac{b^2 y(x)}{a}-\frac{b}{ax}\right)\sqrt{\frac{ax}{b}+\frac{1}{\frac{b^2 y(x)}{a}-\frac{b}{ax}}}} = 0\right\}$$

2.46 ODE No. 46

$$-x^{-a}y(x) + ax^{-a-1} - x^{-2a} - x^a y(x)^3 + y'(x) + 3y(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.313116 (sec), leaf count = 228

$$\left\{\left\{y(x) \to x^{-a} - \frac{e^{-\frac{2x^{1-a}}{1-a}}}{\sqrt{-\frac{2^{\frac{2(a+1)}{a-1}+1} x^{a+1}\left(\frac{x^{1-a}}{1-a}\right)^{\frac{a+1}{a-1}}\Gamma\left(\frac{a+1}{1-a},-\frac{4x^{1-a}}{a-1}\right)}{a-1}+c_1}}\right\}, \left\{y(x) \to x^{-a} + \frac{e^{-\frac{2x^{1-a}}{1-a}}}{\sqrt{-\frac{2^{\frac{2(a+1)}{a-1}+1} x^{a+1}\left(\frac{x^{1-a}}{1-a}\right)^{\frac{a+1}{a-1}}}{a-1}}}\right.$$

✓ **Maple** : cpu = 0.119 (sec), leaf count = 956

$$\left\{y(x) = x^{-a} - \frac{}{\sqrt{-\frac{2\left(-\frac{(a-1)\left(-\frac{4a^2x^{-a+1}}{-a+1}+\frac{8a\,x^{-a+1}}{-a+1}+2a-\frac{4x^{-a+1}}{-a+1}-2\right)(-a+1)2^{\frac{2a}{-a+1}-3+\frac{2}{-a+1}+\frac{2}{a-1}}x^{-\frac{a^2}{-a+1}+a+\frac{1}{-a+1}-1}\left(\frac{1}{-a+1}\right)^{-\frac{a+1}{a-1}}}{(a+1)(a-3)}\right.}{}}}\right.$$

2.47 ODE No. 47

$$-a(x^n - x)\,y(x)^3 + y'(x) - y(x)^2 = 0$$

✗ **Mathematica** : cpu = 29.1809 (sec), leaf count = 0 , could not solve

```
DSolve[-y[x]^2 - a*(-x + x^n)*y[x]^3 + Derivative[1][y][x] == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(y(x),x)-a*(x^n-x)*y(x)^3-y(x)^2 = 0,y(x))
```

2.48 ODE No. 48

$$-\left(y(x)^3\left(ax^n+bx\right)\right)-cy(x)^2+y'(x)=0$$

✗ **Mathematica** : cpu = 31.186 (sec), leaf count = 0 , could not solve

```
DSolve[-(c*y[x]^2) - (b*x + a*x^n)*y[x]^3 + Derivative[1][y][x] == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(y(x),x)-(a*x^n+b*x)*y(x)^3-c*y(x)^2 = 0,y(x))
```

2.49 ODE No. 49

$$ay(x)^3\phi'(x)+\frac{(2a+1)y(x)\phi''(x)}{\phi'(x)}+6a\phi(x)y(x)^2+2a+y'(x)+2=0$$

✗ **Mathematica** : cpu = 26.192 (sec), leaf count = 0 , could not solve

```
DSolve[2 + 2*a + 6*a*phi[x]*y[x]^2 + a*y[x]^3*Derivative[1][phi][x] + Derivative[1][y][x] +
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(y(x),x)+a*diff(phi(x),x)*y(x)^3+6*a*phi(x)*y(x)^2+(2*a+1)*y(x)*diff(diff(phi(x),
```

2.50 ODE No. 50

$$-\mathrm{f0}(x)-\mathrm{f1}(x)y(x)-\mathrm{f2}(x)y(x)^2-\mathrm{f3}(x)y(x)^3+y'(x)=0$$

✗ **Mathematica** : cpu = 68.3933 (sec), leaf count = 0 , could not solve

```
DSolve[-f0[x] - f1[x]*y[x] - f2[x]*y[x]^2 - f3[x]*y[x]^3 + Derivative[1][y][x] == 0, y[x], x
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(y(x),x)-f3(x)*y(x)^3-f2(x)*y(x)^2-f1(x)*y(x)-f0(x) = 0,y(x))
```

2.51 ODE No. 51

$$-h(x)(y(x)-f(x))(y(x)-g(x))\left(y(x)-\frac{af(x)+bg(x)}{a+b}\right)-\frac{f'(x)(y(x)-g(x))}{f(x)-g(x)}-\frac{(y(x)-f(x))g'(x)}{g(x)-f(x)}+y'(x)=0$$

✓ **Mathematica** : cpu = 2.21423 (sec), leaf count = 355

$$\text{Solve}\left[-\frac{1}{3}(a-b)^{2/3}(2a+b)^{2/3}(a+2b)^{2/3}\text{RootSum}\left[\#1^3(a-b)^{2/3}(2a+b)^{2/3}(a+2b)^{2/3}-3\#1a^2-3\#1ab-3\#\right.\right.$$

✓ **Maple** : cpu = 0.334 (sec), leaf count = 237

$$\left\{ y(x) = \frac{2(a+2b)\left(a+\frac{b}{2}\right)(f(x)-g(x))(a-b)\,\mathrm{RootOf}\left(c_1 - 27\left(\int^{-Z} \frac{}{(\_a\,a^2+\_aab-2\_a\,b^2+3a^2+3ab+3b^2)(2\_a\,a^2-\_a\cdots}\right.\right.}{}\right.$$

2.52 ODE No. 52

$$-ay(x)^n - bx^{\frac{n}{1-n}} + y'(x) = 0$$

✓ **Mathematica** : cpu = 0.307046 (sec), leaf count = 117

$$\text{Solve}\left[\int_1^{\left(\frac{ax^{-\frac{n}{1-n}}}{b}\right)^{\frac{1}{n}} y(x)} \frac{1}{K[1]^n - \left(\frac{(-1)^n b^{1-n}(n-1)^{-n}}{a}\right)^{\frac{1}{n}} K[1]+1} dK[1] = \int_1^x bK[2]^{\frac{n}{1-n}} \left(\frac{aK[2]^{-\frac{n}{1-n}}}{b}\right)^{\frac{1}{n}} dK[2] + c\cdots\right.$$

✓ **Maple** : cpu = 0.418 (sec), leaf count = 61

$$\left\{ -c_1 - (n-1)\left(\int_{\_b}^{y(x)} \frac{x^{\frac{n}{n-1}}}{(n-1)\,bx + ((n-1)\,ax\_a^n + \_a)\,x^{\frac{n}{n-1}}} d\_a\right) + \ln(x) = 0 \right\}$$

2.53 ODE No. 53

$$f(x)^{1-n} g'(x) y(x)^n \left(-(ag(x)+b)^{-n}\right) - \frac{y(x)f'(x)}{f(x)} - f(x)g'(x) + y'(x) = 0$$

✓ **Mathematica** : cpu = 0.679161 (sec), leaf count = 96

$$\text{Solve}\left[\int_1^{\left(f(x)^{-n}(b+ag(x))^{-n}\right)^{\frac{1}{n}} y(x)} \frac{1}{K[1]^n - (a^n)^{\frac{1}{n}} K[1]+1} dK[1] = \frac{f(x)(ag(x)+b)\log(ag(x)+b)\left(f(x)^{-n}(ag(x)+\cdots\right.}{a}\right.$$

✓ **Maple** : cpu = 0.181 (sec), leaf count = 281

$$\left\{ y(x) = \frac{(ag(x)+b)\,\mathrm{RootOf}\left(c_1 - \left(\int^{-Z} \frac{n^{-n}\left(\left(\frac{d}{dx}g(x)\right)f(x)\right)^{-2n+\cdots}}{\_a\,n^{-n}\left(\left(\frac{d}{dx}g(x)\right)f(x)\right)^{-2n+1}\left((ag(x)+b)^{-n}f(x)^{-n+1}\left(\frac{d}{dx}g(x)\right)\right)^{-n-1}\left(an(ag(x)+b)^{-\cdots}\right.}\right.\right.}{}\right.$$

2.54 ODE No. 54

$$-a^n f(x)^{1-n} g'(x) y(x)^n - \frac{y(x) f'(x)}{f(x)} - f(x) g'(x) + y'(x) = 0$$

✓ **Mathematica** : cpu = 0.476437 (sec), leaf count = 74

$$\text{Solve}\left[y(x) \left(a^n f(x)^{-n}\right)^{\frac{1}{n}} \, {}_2F_1\left(1, \frac{1}{n}; 1+\frac{1}{n}; -\left(\left(a^n f(x)^{-n}\right)^{\frac{1}{n}} y(x)\right)^n\right) = f(x) g(x) \left(a^n f(x)^{-n}\right)^{\frac{1}{n}} + c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.204 (sec), leaf count = 38

$$\left\{-a g(x) + c_1 + \frac{a y(x) \, \Phi\left(-\left(\frac{a y(x)}{f(x)}\right)^n, 1, \frac{1}{n}\right)}{n f(x)} = 0\right\}$$

2.55 ODE No. 55

$$-f(x) y(x)^n - g(x) y(x) - h(x) + y'(x) = 0$$

✗ **Mathematica** : cpu = 3.80204 (sec), leaf count = 0 , could not solve

```
DSolve[-h[x] - g[x]*y[x] - f[x]*y[x]^n + Derivative[1][y][x] == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(y(x),x)-f(x)*y(x)^n-g(x)*y(x)-h(x) = 0,y(x))
```

2.56 ODE No. 56

$$-f(x) y(x)^a - g(x) y(x)^b + y'(x) = 0$$

✗ **Mathematica** : cpu = 1.54805 (sec), leaf count = 0 , could not solve

```
DSolve[-(f[x]*y[x]^a) - g[x]*y[x]^b + Derivative[1][y][x] == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(y(x),x)-f(x)*y(x)^a-g(x)*y(x)^b = 0,y(x))
```

2.57 ODE No. 57

$$y'(x) - \sqrt{|y(x)|} = 0$$

✓ **Mathematica** : cpu = 0.074623 (sec), leaf count = 26

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[\int_1^{\#1} \frac{1}{\sqrt{|K[1]|}} dK[1]\&\right][x + c_1]\right\}\right\}$$

✓ **Maple** : cpu = 0.12 (sec), leaf count = 31

$$\left\{c_1 + x - \left(\left\{\begin{array}{cc} -2\sqrt{-y(x)} & y(x) \leq 0 \\ 2\sqrt{y(x)} & 0 < y(x) \end{array}\right.\right) = 0\right\}$$

2.58 ODE No. 58

$$a\left(-\sqrt{y(x)}\right) - bx + y'(x) = 0$$

✓ **Mathematica** : cpu = 0.381228 (sec), leaf count = 118

$$\text{Solve}\left[\frac{a^2\left(-\log\left(a^2\left(\sqrt{\frac{a^2 y(x)}{b^2 x^2}} + 1\right) - \frac{2a^2 y(x)}{bx^2}\right) - \frac{2a\tanh^{-1}\left(\frac{a\left(1 - \frac{4b\sqrt{\frac{a^2 y(x)}{b^2 x^2}}}{a^2}\right)}{\sqrt{a^2+8b}}\right)}{\sqrt{a^2+8b}}\right)}{2b} = \frac{a^2\log(x)}{b} + c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.077 (sec), leaf count = 68

$$\left\{\frac{a\,\text{arctanh}\left(\frac{2bx + a\sqrt{y(x)}}{\sqrt{(a^2+8b)y(x)}}\right)\sqrt{y(x)}}{\sqrt{(a^2+8b)\,y(x)}} + c_1 - \frac{\ln\left(b\,x^2 + ax\sqrt{y(x)} - 2y(x)\right)}{2} = 0\right\}$$

2.59 ODE No. 59

$$a\left(-\sqrt{y(x)^2+1}\right)-b+y'(x)=0$$

✓ **Mathematica** : cpu = 0.326393 (sec), leaf count = 96

$$\left\{\left\{y(x)\to \text{InverseFunction}\left[\frac{\frac{b\tan^{-1}\left(\frac{\#1b}{\sqrt{\#1^2+1}\sqrt{a^2-b^2}}\right)}{\sqrt{a^2-b^2}}-\frac{b\tan^{-1}\left(\frac{\#1a}{\sqrt{a^2-b^2}}\right)}{\sqrt{a^2-b^2}}+\sinh^{-1}(\#1)}{a}\&\right][x+c_1]\right\}\right\}$$

✓ **Maple** : cpu = 0.058 (sec), leaf count = 26

$$\left\{c_1+x-\left(\int^{y(x)}\frac{1}{\sqrt{\_a^2+1}\,a+b}d\_a\right)=0\right\}$$

2.60 ODE No. 60

$$y'(x)-\frac{\sqrt{y(x)^2-1}}{\sqrt{x^2-1}}=0$$

✓ **Mathematica** : cpu = 0.177511 (sec), leaf count = 173

$$\left\{\left\{y(x)\to -\frac{1}{2}e^{-c_1}\sqrt{2x^2+2e^{4c_1}x^2-2\sqrt{(x-1)(x+1)}x+2e^{4c_1}\sqrt{(x-1)(x+1)}x-1+2e^{2c_1}-e^{4c_1}}\right\},\left\{y(x)-\right.\right.$$

✓ **Maple** : cpu = 0.019 (sec), leaf count = 29

$$\left\{c_1+\ln\left(x+\sqrt{x^2-1}\right)-\ln\left(y(x)+\sqrt{y(x)^2-1}\right)=0\right\}$$

Hand solution

$$y'=\pm\frac{\sqrt{y^2-1}}{\sqrt{x^2-1}} \tag{1}$$

Separable. For the positive case

$$\frac{dy}{dx}\frac{1}{\sqrt{y^2-1}}=\frac{1}{\sqrt{x^2-1}}$$

$$\frac{dy}{(y^2-1)^{\frac{1}{2}}}=\frac{dx}{(x^2-1)^{\frac{1}{2}}}$$

Integrating

$$\int \frac{dy}{(y^2-1)^{\frac{1}{2}}} = \int \frac{dx}{(x^2-1)^{\frac{1}{2}}} + C$$

But $\int \frac{dy}{(y^2-1)^{\frac{1}{2}}} = \tanh^{-1} \frac{y}{(y^2-1)^{\frac{1}{2}}} = \ln\left(y+\sqrt{y^2-1}\right)$, hence

$$\ln\left(y+\sqrt{y^2-1}\right) = \ln\left(x+\sqrt{x^2-1}\right) + C$$

For the negative case

$$\begin{aligned}\frac{dy}{dx}\frac{1}{\sqrt{y^2-1}} &= -\frac{1}{\sqrt{x^2-1}}\\ \frac{dy}{(y^2-1)^{\frac{1}{2}}} &= -\frac{dx}{(x^2-1)^{\frac{1}{2}}}\end{aligned}$$

Integrating

$$\int \frac{dy}{(y^2-1)^{\frac{1}{2}}} = -\int \frac{dx}{(x^2-1)^{\frac{1}{2}}} + C$$

But $\int \frac{dy}{(y^2-1)^{\frac{1}{2}}} = \tanh^{-1} \frac{y}{(y^2-1)^{\frac{1}{2}}} = \ln\left(y+\sqrt{y^2-1}\right)$, hence

$$\ln\left(y+\sqrt{y^2-1}\right) = -\ln\left(x+\sqrt{x^2-1}\right) + C$$

Therefore

$$\ln\left(y+\sqrt{y^2-1}\right) = \pm\ln\left(x+\sqrt{x^2-1}\right) + C$$

2.61 ODE No. 61

$$y'(x) - \frac{\sqrt{x^2-1}}{\sqrt{y(x)^2-1}} = 0$$

✓ **Mathematica** : cpu = 0.243064 (sec), leaf count = 75

$$\left\{\left\{y(x)\to \text{InverseFunction}\left[\frac{1}{2}\#1\sqrt{\#1^2-1}-\frac{1}{2}\log\left(\sqrt{\#1^2-1}+\#1\right)\&\right]\left[\frac{1}{2}\sqrt{x^2-1}x-\frac{1}{2}\log\left(\sqrt{x^2-1}+x\right)\right.\right.\right.$$

✓ **Maple** : cpu = 0.015 (sec), leaf count = 50

$$\left\{c_1+\sqrt{x^2-1}\,x-\ln\left(x+\sqrt{x^2-1}\right)+\ln\left(y(x)+\sqrt{y(x)^2-1}\right)-\sqrt{y(x)^2-1}\,y(x)=0\right\}$$

2.62 ODE No. 62

$$y'(x) - \frac{y(x) - x^2\sqrt{x^2 - y(x)^2}}{xy(x)\sqrt{x^2 - y(x)^2} + x} = 0$$

✓ **Mathematica** : cpu = 3.20455 (sec), leaf count = 44

$$\text{Solve}\left[-\tan^{-1}\left(\frac{\sqrt{x^2 - y(x)^2}}{y(x)}\right) + \frac{x^2}{2} + \frac{y(x)^2}{2} = c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.384 (sec), leaf count = 34

$$\left\{\frac{x^2}{2} + \frac{y(x)^2}{2} - c_1 + \arctan\left(\frac{y(x)}{\sqrt{x^2 - y(x)^2}}\right) = 0\right\}$$

Hand solution

$$y' = \frac{y - x^2\sqrt{x^2 - y^2}}{xy\sqrt{x^2 - y^2} + x} \tag{1}$$

Let $y = ux$ then $y' = u + xu'$ therefore

$$\begin{aligned}
u + xu' &= \frac{y - x^2\sqrt{x^2 - y^2}}{xy\sqrt{x^2 - y^2} + x} \\
&= \frac{ux - x^2\sqrt{x^2 - (ux)^2}}{x(ux)\sqrt{x^2 - (ux)^2} + x} \\
&= \frac{ux - x^3\sqrt{1 - u^2}}{x^3u\sqrt{1 - u^2} + x} \\
&= \frac{u - x^2\sqrt{1 - u^2}}{x^2u\sqrt{1 - u^2} + 1}
\end{aligned}$$

Hence

$$\begin{aligned}
u\left(x^2u\sqrt{1 - u^2} + 1\right) + xu'\left(x^2u\sqrt{1 - u^2} + 1\right) &= u - x^2\sqrt{1 - u^2} \\
x^2u^2\sqrt{1 - u^2} + u + u'\left(x^3u\sqrt{1 - u^2} + x\right) &= u - x^2\sqrt{1 - u^2} \\
x^2u^2\sqrt{1 - u^2} + u'\left(x^3u\sqrt{1 - u^2} + x\right) &= -x^2\sqrt{1 - u^2} \\
xu^2\sqrt{1 - u^2} + u'\left(x^2u\sqrt{1 - u^2} + 1\right) &= -x\sqrt{1 - u^2} \\
xu^2 + u'\left(x^2u + \frac{1}{\sqrt{1 - u^2}}\right) &= -x \\
x(1 + u^2) + u'\left(x^2u + \frac{1}{\sqrt{1 - u^2}}\right) &= 0
\end{aligned}$$

Hence

$$x\left(1+u^{2}\right) dx+\left(x^{2} u+\frac{1}{\sqrt{1-u^{2}}}\right) du=0 \tag{2}$$

Let $M=x\left(1+u^{2}\right), N=\left(x^{2} u+\frac{1}{\sqrt{1-u^{2}}}\right)$.

$$\begin{aligned}
\frac{\partial M}{\partial u} &= 2xu \\
\frac{\partial N}{\partial x} &= 2xu
\end{aligned}$$

Therefore (2) is exact. Let

$$x\left(1+u^{2}\right) dx+\left(x^{2} u+\frac{1}{\sqrt{1-u^{2}}}\right) du=dU$$

Since $dU=\frac{\partial U}{\partial x} dx+\frac{\partial U}{\partial u} du$. Comparing with the above, we see that

$$\frac{\partial U}{\partial x}=x\left(1+u^{2}\right) \tag{3}$$

$$\frac{\partial U}{\partial u}=x^{2} u+\frac{1}{\sqrt{1-u^{2}}} \tag{4}$$

From (3)

$$\begin{aligned}
U &= \int x\left(1+u^{2}\right) dx \\
&= \frac{x^{2}}{2}\left(1+u^{2}\right)+f(u) \qquad (5)
\end{aligned}$$

From (4)

$$\begin{aligned}
\frac{d}{\partial u}\left(\frac{x^{2}}{2}\left(1+u^{2}\right)+f(u)\right) &= x^{2} u+\frac{1}{\sqrt{1-u^{2}}} \\
x^{2} u+f^{\prime}(u) &= x^{2} u+\frac{1}{\sqrt{1-u^{2}}} \\
f^{\prime}(u) &= \frac{1}{\sqrt{1-u^{2}}}
\end{aligned}$$

Therefore

$$f(u)=\arcsin (u)$$

From (5) we find

$$U(x, u)=\frac{x^{2}}{2}\left(1+u^{2}\right)+\arcsin (u)$$

Since $dU=0$ then

$$\begin{aligned}
\frac{x^{2}}{2}\left(1+u^{2}\right)+\arcsin (u) &= C \\
\frac{x^{2}}{2}\left(1+u^{2}\right)+\arcsin (u)-C &= 0
\end{aligned}$$

Since $y = ux$ then the above can be written as

$$\frac{x^2}{2}\left(1+\left(\frac{y}{x}\right)^2\right)+\arcsin\left(\frac{y}{x}\right)-C=0$$
$$\frac{x^2}{2}\left(\frac{x^2+y^2}{x^2}\right)+\arcsin\left(\frac{y}{x}\right)-C=0$$
$$\frac{1}{2}(x^2+y^2)+\arcsin\left(\frac{y}{x}\right)-C=0$$
$$\arcsin\left(\frac{y}{x}\right)=C-\frac{1}{2}(x^2+y^2)$$

Hence

$$\frac{y}{x}=\sin\left(C-\frac{1}{2}(x^2+y^2)\right)$$
$$y(x)=x\sin\left(C-\frac{1}{2}(x^2+y^2)\right)$$

2.63 ODE No. 63

$$y'(x)-\frac{y(x)^2+1}{(x+1)^{3/2}\left|y(x)+\sqrt{y(x)+1}\right|}=0$$

✓ **Mathematica** : cpu = 0.188141 (sec), leaf count = 48

$$\left\{\left\{y(x)\to \text{InverseFunction}\left[\int_1^{\#1}\frac{\left|K[1]+\sqrt{K[1]+1}\right|}{K[1]^2+1}dK[1]\&\right]\left[-\frac{2}{\sqrt{x+1}}+c_1\right]\right\}\right\}$$

✓ **Maple** : cpu = 5.726 (sec), leaf count = 35

$$\left\{c_1-\left(\int^{y(x)}\frac{|\_a+\sqrt{\_a+1}|}{\_a^2+1}d\_a\right)-\frac{2}{\sqrt{x+1}}=0\right\}$$

2.64 ODE No. 64

$$y'(x)-\sqrt{\frac{ay(x)^2+by(x)+c}{ax^2+bx+c}}=0$$

✓ **Mathematica** : cpu = 0.380561 (sec), leaf count = 269

$$\left\{\left\{y(x)\to \frac{e^{-\sqrt{a}c_1}\left(-8a^{3/2}c\sqrt{ax^2+bx+c}+8a^{3/2}ce^{2\sqrt{a}c_1}\sqrt{ax^2+bx+c}+8a^2cx+8a^2cxe^{2\sqrt{a}c_1}+2b^3e^{\sqrt{a}c_1}-b^3\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.117 (sec), leaf count = 124

$$\left\{c_1 - \frac{\sqrt{\frac{ay(x)^2+by(x)+c}{a\,x^2+bx+c}}\,\sqrt{a\,x^2+bx+c}\,\ln\left(\frac{2ax+b+2\sqrt{a\,x^2+bx+c}\,\sqrt{a}}{2\sqrt{a}}\right)}{\sqrt{ay\left(x\right)^2+by\left(x\right)+c}\,\sqrt{a}} + \frac{\ln\left(\frac{2ay(x)+b}{2\sqrt{a}}+\sqrt{ay\left(x\right)^2+by\left(x\right)+c}\right)}{\sqrt{a}} = 0\right.$$

2.65 ODE No. 65

$$y'(x) - \sqrt{\frac{y(x)^3+1}{x^3+1}} = 0$$

✓ **Mathematica** : cpu = 1.14392 (sec), leaf count = 312

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[\frac{i(\#1+1)\sqrt{1+\frac{6i}{\left(\sqrt{3}-3i\right)(\#1+1)}}\sqrt{\frac{2}{3}-\frac{4i}{\left(\sqrt{3}+3i\right)(\#1+1)}}F\left(i\sinh^{-1}\left(\frac{\sqrt{-\frac{6i}{3i+\sqrt{3}}}}{\sqrt{\#1+1}}\right)|\frac{3i+\sqrt{3}}{3i-\sqrt{3}}\right.}{\sqrt{-\frac{i}{\sqrt{3}+3i}}\sqrt{\#1^2-\#1+1}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.059 (sec), leaf count = 47

$$\left\{c_1 + \int^{y(x)} \frac{1}{\sqrt{\_a^3+1}}d\_a + \int^{x} -\frac{\sqrt{\frac{y(x)^3+1}{\_a^3+1}}}{\sqrt{y\left(x\right)^3+1}}d\_a = 0\right\}$$

2.66 ODE No. 66

$$y'(x) - \frac{\sqrt{|(1-y(x))y(x)(1-ay(x))|}}{\sqrt{|(1-x)x(1-ax)|}} = 0$$

✓ **Mathematica** : cpu = 0.212899 (sec), leaf count = 67

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[\int_1^{\#1} \frac{1}{\sqrt{|(1-K[1])K[1](1-aK[1])|}}dK[1]\&\right]\left[\int_1^{x} \frac{1}{\sqrt{|(1-K[2])K[2](1-aK[2])|}}d\right.\right.\right.$$

✓ **Maple** : cpu = 0.258 (sec), leaf count = 40

$$\left\{c_1 - \left(\int^{y(x)} \frac{1}{\sqrt{|\left(\_a-1\right)\left(\_aa-1\right)\_a|}}d\_a\right) + \int \frac{1}{\sqrt{|\left(x-1\right)\left(ax-1\right)x|}}dx = 0\right\}$$

2.67 ODE No. 67

$$y'(x)-\frac{\sqrt{1-y(x)^4}}{\sqrt{1-x^4}}=0$$

✓ **Mathematica** : cpu = 0.245416 (sec), leaf count = 14

$$\left\{\left\{y(x)\to \operatorname{sn}\left(c_1+F\left(\sin^{-1}(x)\middle|-1\right)\middle|-1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.022 (sec), leaf count = 51

$$\left\{c_1+\frac{\sqrt{-x^2+1}\sqrt{x^2+1}\,\text{EllipticF}\left(x,i\right)}{\sqrt{-x^4+1}}-\left(\int^{y(x)}\frac{1}{\sqrt{-\_a^4+1}}d\_a\right)=0\right\}$$

2.68 ODE No. 68

$$y'(x)-\sqrt{\frac{ay(x)^4+by(x)^2+1}{ax^4+bx^2+1}}=0$$

✓ **Mathematica** : cpu = 1.07621 (sec), leaf count = 373

$$\left\{\left\{y(x)\to \text{InverseFunction}\left[-\frac{i\sqrt{\frac{2\#1^2a+\sqrt{b^2-4a}+b}{\sqrt{b^2-4a}+b}}\sqrt{\frac{2\#1^2a}{b-\sqrt{b^2-4a}}+1}F\left(i\sinh^{-1}\left(\sqrt{2}\sqrt{\frac{a}{b+\sqrt{b^2-4a}}}\#1\right)|\frac{b+\sqrt{b^2-4a}}{b-\sqrt{b^2-4a}}\right)}{\sqrt{2}\sqrt{\frac{a}{\sqrt{b^2-4a}+b}}\sqrt{\#1^4a+\#1^2b+1}}\&\right.\right.\right.$$

✓ **Maple** : cpu = 0.073 (sec), leaf count = 77

$$\left\{c_1+\int^{y(x)}\frac{1}{\sqrt{\_a^4a+\_a^2b+1}}d\_a+\int^{x}-\frac{\sqrt{\frac{ay(x)^4+by(x)^2+1}{\_a^4a+\_a^2b+1}}}{\sqrt{ay\left(x\right)^4+by\left(x\right)^2+1}}d\_a=0\right\}$$

2.69 ODE No. 69

$$y'(x)-\sqrt{\left(\mathrm{a0}+\mathrm{a1}x+\mathrm{a2}x^2+\mathrm{a3}x^3+\mathrm{a4}x^4\right)\left(\mathrm{b0}+\mathrm{b1}y(x)+\mathrm{b2}y(x)^2+\mathrm{b3}y(x)^3+\mathrm{b4}y(x)^4\right)}=0$$

✓ **Mathematica** : cpu = 8.3668 (sec), leaf count = 1163

$$\text{Solve}\left[-\frac{2F\left(\sin^{-1}\left(\sqrt{\frac{(\text{Root}[\text{b4}\#1^4+\text{b3}\#1^3+\text{b2}\#1^2+\text{b1}\#1+\text{b0}\&,2]-\text{Root}[\text{b4}\#1^4+\text{b3}\#1^3+\text{b2}\#1^2+\text{b1}\#1+\text{b0}\&,4])(y(x)-\text{Root}[\text{b4}\#1}{(\text{Root}[\text{b4}\#1^4+\text{b3}\#1^3+\text{b2}\#1^2+\text{b1}\#1+\text{b0}\&,1]-\text{Root}[\text{b4}\#1^4+\text{b3}\#1^3+\text{b2}\#1^2+\text{b1}\#1+\text{b0}\&,4])(y(x)-\text{Root}[\text{b4}\#1}}\right.\right.\right.}{}\right.$$

✓ **Maple** : cpu = 0.182 (sec), leaf count = 111

$$\left\{c_1+\int^{y(x)}\frac{1}{\sqrt{\_a^4b4+\_a^3b3+\_a^2b2+\_ab1+b0}}d\_a+\int^x-\frac{\sqrt{\left(b4\,y(x)^4+b3\,y(x)^3+b2\,y(x)^2+b1\,y(x)\right.}}{\sqrt{b4\,y(x)^4+b3\,y(x)^3}}\right.$$

2.70 ODE No. 70

$$y'(x)-\sqrt{\frac{\mathrm{a0}+\mathrm{a1}x+\mathrm{a2}x^2+\mathrm{a3}x^3+\mathrm{a4}x^4}{\mathrm{b0}+\mathrm{b1}y(x)+\mathrm{b2}y(x)^2+\mathrm{b3}y(x)^3+\mathrm{b4}y(x)^4}}=0$$

✓ **Mathematica** : cpu = 12.877 (sec), leaf count = 81

$$\left\{\left\{y(x)\to\text{InverseFunction}\left[\int_1^{\#1}\sqrt{\mathrm{b4}K[1]^4+\mathrm{b3}K[1]^3+\mathrm{b2}K[1]^2+\mathrm{b1}K[1]+\mathrm{b0}}dK[1]\&\right]\left[\int_1^x\sqrt{\mathrm{a4}K[2]^4+\mathrm{a3}K\right.\right.\right.$$

✓ **Maple** : cpu = 0.177 (sec), leaf count = 113

$$\left\{c_1+\int^{y(x)}\sqrt{\_a^4b4+\_a^3b3+\_a^2b2+\_ab1+b0}d\_a+\int^x-\sqrt{\frac{\_a^4a4+\_a^3a3+\_a^2a2+\_aa1+a0}{b4\,y(x)^4+b3\,y(x)^3+b2\,y(x)^2+b1\,y(x)+}}\right.$$

2.71 ODE No. 71

$$y'(x)-\sqrt{\frac{\mathrm{b0}+\mathrm{b1}y(x)+\mathrm{b2}y(x)^2+\mathrm{b3}y(x)^3+\mathrm{b4}y(x)^4}{\mathrm{a0}+\mathrm{a1}x+\mathrm{a2}x^2+\mathrm{a3}x^3+\mathrm{a4}x^4}}=0$$

✓ **Mathematica** : cpu = 3.74941 (sec), leaf count = 2237

$$\text{Solve}\left[-\frac{2F\left(\sin^{-1}\left(\sqrt{\frac{(\text{Root}[\mathrm{b4}\#1^4+\mathrm{b3}\#1^3+\mathrm{b2}\#1^2+\mathrm{b1}\#1+\mathrm{b0}\&,2]-\text{Root}[\mathrm{b4}\#1^4+\mathrm{b3}\#1^3+\mathrm{b2}\#1^2+\mathrm{b1}\#1+\mathrm{b0}\&,4])(y(x)-\text{Root}[\mathrm{b4}\#1}{(\text{Root}[\mathrm{b4}\#1^4+\mathrm{b3}\#1^3+\mathrm{b2}\#1^2+\mathrm{b1}\#1+\mathrm{b0}\&,1]-\text{Root}[\mathrm{b4}\#1^4+\mathrm{b3}\#1^3+\mathrm{b2}\#1^2+\mathrm{b1}\#1+\mathrm{b0}\&,4])(y(x)-\text{Root}[\mathrm{b4}\#1}}\right.\right.\right.}{}\right.$$

✓ **Maple** : cpu = 0.129 (sec), leaf count = 113

$$\left\{c_1+\int^{y(x)}\frac{1}{\sqrt{\_a^4b4+\_a^3b3+\_a^2b2+\_ab1+b0}}d\_a+\int^x-\frac{\sqrt{\frac{b4\,y(x)^4+b3\,y(x)^3+b2\,y(x)^2+b1\,y(x)+b0}{\_a^4a4+\_a^3a3+\_a^2a2+\_aa1+a0}}}{\sqrt{b4\,y(x)^4+b3\,y(x)^3+b2\,y(x)^2+b1\,y(x)-}}\right.$$

2.72 ODE No. 72

$$y'(x) - \mathrm{R1}\left(x, \sqrt{\mathrm{a0} + \mathrm{a1}x + \mathrm{a2}x^2 + \mathrm{a3}x^3 + \mathrm{a4}x^4}\right)\mathrm{R2}\left(y(x), \sqrt{\mathrm{b0} + \mathrm{b1}y(x) + \mathrm{b2}y(x)^2 + \mathrm{b3}y(x)^3 + \mathrm{b4}y(x)^4}\right) = 0$$

✓ **Mathematica** : cpu = 0.20499 (sec), leaf count = 89

$$\left\{\left\{y(x) \to \mathrm{InverseFunction}\left[\int_1^{\#1} \frac{1}{\mathrm{R2}\left(K[1], \sqrt{\mathrm{b4}K[1]^4 + \mathrm{b3}K[1]^3 + \mathrm{b2}K[1]^2 + \mathrm{b1}K[1] + \mathrm{b0}}\right)} dK[1]\&\right]\left[\int_1^x \mathrm{R1}\right.\right.\right.$$

✓ **Maple** : cpu = 0.019 (sec), leaf count = 64

$$\left\{c_1 - \left(\int^{y(x)} \frac{1}{R2\left(\_a, \sqrt{\_a^4 b4 + \_a^3 b3 + \_a^2 b2 + \_a b1 + b0}\right)} d\_a\right) + \int R1\left(x, \sqrt{a4\,x^4 + a3\,x^3 + a2\,x^2 +\right.\right.$$

2.73 ODE No. 73

$$y'(x) - \left(\frac{\mathrm{a0} + \mathrm{a1}x + \mathrm{a2}x^2 + \mathrm{a3}x^3}{\mathrm{a0} + \mathrm{a1}y(x) + \mathrm{a2}y(x)^2 + \mathrm{a3}y(x)^3}\right)^{2/3} = 0$$

✓ **Mathematica** : cpu = 1.71741 (sec), leaf count = 733

$$\mathrm{Solve}\left[\frac{3(\mathrm{a0} + y(x)(\mathrm{a1} + y(x)(\mathrm{a2} + \mathrm{a3}y(x))))^{2/3}\left(y(x) - \mathrm{Root}\left[\#1^3\mathrm{a3} + \#1^2\mathrm{a2} + \#1\mathrm{a1} + \mathrm{a0}\&, 1\right]\right) F_1\left(\frac{5}{3}; -\frac{2}{3}, -\frac{2}{3};\right.}{5\left(\frac{y(x) - \mathrm{Root}\left[\#1^3\mathrm{a3} + \#1^2\mathrm{a2} + \#1\mathrm{a1} + \mathrm{a0}\&, 2\right]}{\mathrm{Root}\left[\#1^3\mathrm{a3} + \#1^2\mathrm{a2} + \#1\mathrm{a1} + \mathrm{a0}\&, 1\right] - \mathrm{Root}\left[\#1^3\mathrm{a3} + \#1^2\mathrm{a2} + \#1\mathrm{a1} +\right.}\right.}\right.$$

✓ **Maple** : cpu = 0.501 (sec), leaf count = 91

$$\left\{c_1 + \int^{y(x)} \left(\_a^3 a3 + \_a^2 a2 + \_a a1 + a0\right)^{\frac{2}{3}} d\_a + \int^x -\left(\frac{\_a^3 a3 + \_a^2 a2 + \_a a1 + a0}{a3 y(x)^3 + a2 y(x)^2 + a1 y(x) + a0}\right)^{\frac{2}{3}} \left(a3 y(x)^3 +\right.\right.$$

2.74 ODE No. 74

$$y'(x) - f(x)(y(x) - g(x))\sqrt{(y(x) - a)(y(x) - b)} = 0$$

✗ **Mathematica** : cpu = 2.36593 (sec), leaf count = 0 , could not solve

```
DSolve[-(f[x]*Sqrt[(-a + y[x])*(-b + y[x])]*(-g[x] + y[x])) + Derivative[1][y][x] == 0, y[x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(y(x),x)-f(x)*(y(x)-g(x))*((y(x)-a)*(y(x)-b))^(1/2) = 0,y(x))
```

2.75 ODE No. 75

$$y'(x) - e^{x-y(x)} + e^x = 0$$

✓ **Mathematica** : cpu = 0.214679 (sec), leaf count = 20

$$\left\{\left\{y(x) \to \log\left(1 - e^{-e^x + c_1}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.16 (sec), leaf count = 20

$$\left\{y(x) = -c_1 - e^x + \ln\left(e^{c_1 + e^x} - 1\right)\right\}$$

Hand solution

$$\begin{aligned} y' &= e^{x-y} - e^x \\ y' &= e^x\left(e^{-y} - 1\right) \\ \frac{1}{e^{-y} - 1} dy &= e^x dx \end{aligned} \tag{1}$$

Integrating both sides. $\int \frac{1}{e^{-y}-1} dy$. Let $e^{-y} = u$, then $\frac{du}{dy} = -e^{-y} = -u$. Hence $dy = -\frac{du}{u}$, therefore the integral becomes

$$\int \frac{1}{u-1}\left(-\frac{du}{u}\right) = -\int \frac{1}{u(u-1)} du$$

But $\frac{1}{u(u-1)} = -\left(\frac{1}{u} - \frac{1}{u-1}\right)$, hence

$$\begin{aligned} -\int \frac{1}{u(u-1)} du &= \int \left(\frac{1}{u} - \frac{1}{u-1}\right) du \\ &= \ln u - \ln(u-1) \\ &= \ln e^{-y} - \ln\left(e^{-y} - 1\right) \\ &= -\left(\ln\left(e^{-y} - 1\right) - \ln e^{-y}\right) \end{aligned}$$

But $\ln x - \ln y = \ln\left(\frac{x}{y}\right)$ and the above becomes

$$\begin{aligned} \int \frac{1}{e^{-y} - 1} dy &= -\left[\ln\left(\frac{e^{-y} - 1}{e^{-y}}\right)\right] \\ &= -\ln\left(1 - e^y\right) \end{aligned}$$

Back to (1), when we integrate both sides, and since $\int e^x dx = e^x + C$

$$\begin{aligned} -\ln\left(1 - e^y\right) &= e^x + C \\ \ln\left(1 - e^y\right) &= -e^x + C_1 \end{aligned}$$

Hence

$$
\begin{aligned}
1-e^{y} &= \exp\left(-e^{x}+C_{1}\right)\\
e^{y} &= 1-\exp\left(-e^{x}+C_{1}\right)
\end{aligned}
$$

Taking logs

$$
y=\ln\left(1-\exp\left(-e^{x}+C_{1}\right)\right)
$$

Let $e^{C_1}=C_2$ then

$$
y=\ln\left(1-C_{2}e^{-e^{x}}\right)
$$

Verification

```
ode:=diff(y(x),x)=exp(x-y(x))-exp(x);
my_sol:=log(1-_C1*exp(-exp(x)));
odetest(y(x)=my_sol,ode);
0
```

2.76 ODE No. 76

$$
-a\cos(y(x))+b+y'(x)=0
$$

✓ **Mathematica** : cpu = 0.269774 (sec), leaf count = 116

$$
\left\{\left\{y(x)\to 2\tan^{-1}\left(\frac{a\tanh\left(\frac{1}{2}\left(x\sqrt{(a-b)(a+b)}-c_1\sqrt{(a-b)(a+b)}\right)\right)}{\sqrt{(a-b)(a+b)}}-\frac{b\tanh\left(\frac{1}{2}\left(x\sqrt{(a-b)(a+b)}-c_1\sqrt{\vphantom{b}}\right.\right.}{\sqrt{(a-b)(a+b)}}\right.\right.\right.
$$

✓ **Maple** : cpu = 0.052 (sec), leaf count = 41

$$
\left\{y(x)=2\arctan\left(\frac{\sqrt{(a-b)\,(a+b)}\,\tanh\left(\frac{\sqrt{(a-b)(a+b)}\,(c_1+x)}{2}\right)}{a+b}\right)\right\}
$$

Hand solution

$$
y'=a\cos y+b
$$

This is separable.

$$
\begin{aligned}
\frac{dy}{a\cos y+b} &= dx\\
\int\frac{dy}{a\cos y+b} &= x+C \qquad (1)
\end{aligned}
$$

Using standard Tangent half-angle substitution, let $t=\tan\frac{y}{2},\cos y=\frac{1-t^2}{1+t^2},dy=\frac{2}{1+t^2}dt$, then the integral becomes

$$\begin{aligned}
\int\frac{dy}{a\cos y+b} &= \int\frac{2}{1+t^2}\frac{1}{\left(a\frac{1-t^2}{1+t^2}+b\right)}dt\\
&= 2\int\frac{1+t^2}{(1+t^2)\left(a\left(1-t^2\right)+b\left(1+t^2\right)\right)}dt\\
&= 2\int\frac{dt}{a-at^2+b+bt^2}\\
&= 2\int\frac{dt}{(a+b)+t^2(b-a)}\\
&= 2\int\frac{dt}{(a+b)\left(1+\frac{t^2(b-a)}{(a+b)}\right)}\\
&= \frac{2}{a+b}\int\frac{dt}{\left(1+\frac{t^2(b-a)}{(a+b)}\right)}
\end{aligned}$$

Let $z^2=\frac{t^2(b-a)}{(a+b)}$, or $z=\frac{t\sqrt{b-a}}{\sqrt{a+b}}$, then $\frac{dz}{dt}=\frac{\sqrt{b-a}}{\sqrt{a+b}}$ and the above integral becomes

$$\begin{aligned}
\frac{2}{a+b}\int\frac{dt}{\left(1+\frac{t^2(b-a)}{(a+b)}\right)} &= \frac{2}{a+b}\int\frac{\sqrt{a+b}}{\sqrt{b-a}}\frac{dz}{(1+z^2)}\\
&= \frac{2}{a+b}\frac{\sqrt{a+b}}{\sqrt{b-a}}\int\frac{dz}{(1+z^2)}\\
&= \frac{2}{\sqrt{a+b}}\frac{1}{\sqrt{b-a}}\int\frac{dz}{(1+z^2)}\\
&= \frac{2}{\sqrt{(a+b)(b-a)}}\int\frac{dz}{(1+z^2)}\\
&= \frac{2}{\sqrt{b^2-a^2}}\int\frac{dz}{(1+z^2)}
\end{aligned}$$

Now, $\int\frac{dz}{(1+z^2)}=\arctan(z)$, hence

$$\begin{aligned}
\frac{2}{\sqrt{b^2-a^2}}\int\frac{dz}{(1+z^2)} &= \frac{2}{\sqrt{b^2-a^2}}\arctan(z)\\
&= \frac{2}{\sqrt{b^2-a^2}}\arctan\left(\frac{t\sqrt{b-a}}{\sqrt{a+b}}\right)
\end{aligned}$$

But $t=\tan\frac{y}{2}$ therefore

$$\frac{2}{\sqrt{b^2-a^2}}\arctan\left(\frac{t\sqrt{b-a}}{\sqrt{a+b}}\right)=\frac{2}{\sqrt{b^2-a^2}}\arctan\left(\frac{\tan\left(\frac{y}{2}\right)\sqrt{b-a}}{\sqrt{a+b}}\right)$$

Going back to (1)

$$\begin{aligned}
\int\frac{dy}{a\cos y+b}&=x+C\\
\frac{2}{\sqrt{b^2-a^2}}\arctan\left(\frac{\tan\left(\frac{y}{2}\right)\sqrt{b-a}}{\sqrt{a+b}}\right)&=x+C\\
\arctan\left(\frac{\tan\left(\frac{y}{2}\right)\sqrt{b-a}}{\sqrt{a+b}}\right)&=\frac{1}{2}\sqrt{b^2-a^2}(x+C)\\
\frac{\tan\left(\frac{y}{2}\right)\sqrt{b-a}}{\sqrt{a+b}}&=\tan\left(\frac{1}{2}\sqrt{b^2-a^2}(x+C)\right)\\
\tan\left(\frac{y}{2}\right)&=\frac{\sqrt{a+b}}{\sqrt{b-a}}\tan\left(\frac{1}{2}\sqrt{b^2-a^2}(x+C)\right)\\
\frac{y}{2}&=\arctan\left(\frac{(a+b)}{\sqrt{(a+b)(b-a)}}\tan\left(\frac{1}{2}\sqrt{b^2-a^2}(x+C)\right)\right)\\
&=\arctan\left(\frac{(a+b)}{\sqrt{b^2-a^2}}\tan\left(\frac{1}{2}\sqrt{b^2-a^2}(x+C)\right)\right)\\
y&=2\arctan\left(\frac{a+b}{\sqrt{b^2-a^2}}\tan\left(\frac{1}{2}\sqrt{b^2-a^2}(x+C)\right)\right)
\end{aligned}$$

Verification

```
ode:=diff(y(x),x)=a*cos(y(x))+b;
my_sol:=2*arctan( (a+b)/sqrt(b^2-a^2) * tan(1/2*sqrt(b^2-a^2)*(x+_C1)));
odetest(y(x)=my_sol,ode);
0
```

2.77 ODE No. 77

$$y'(x)-\cos(ay(x)+bx)=0$$

✓ **Mathematica** : cpu = 0.39693 (sec), leaf count = 124

$$\left\{\left\{y(x)\to\frac{-bx-2\tan^{-1}\left(\frac{a\tanh\left(\frac{1}{2}\left(-x\sqrt{a^2-b^2}+c_1\sqrt{a^2-b^2}\right)\right)}{\sqrt{a^2-b^2}}+\frac{b\tanh\left(\frac{1}{2}\left(-x\sqrt{a^2-b^2}+c_1\sqrt{a^2-b^2}\right)\right)}{\sqrt{a^2-b^2}}\right)}{a}\right\}\right\}$$

✓ **Maple** : cpu = 0.083 (sec), leaf count = 54

$$\left\{y(x) = \frac{-bx + 2\arctan\left(\frac{\sqrt{(a-b)(a+b)}\,\tanh\left(\frac{\sqrt{(a-b)(a+b)}\,(-c_1+x)}{2}\right)}{a-b}\right)}{a}\right\}$$

Hand solution

$$y' = \cos(ay + bx)$$

This is separable after transformation of $u = ay + bx$, hence $u' = ay' + b$ or $y' = \frac{1}{a}(u' - b)$. Therefore the above becomes

$$\begin{aligned}\frac{1}{a}\left(u' - b\right) &= \cos(u)\\ u' &= a\cos u + b\\ \frac{du}{a\cos u + b} &= dx\end{aligned}$$

This is the same as Kamke 76 (the problem before this), which we solved using half angle tan transformation, and the answer is

$$u = 2\arctan\left(\frac{a+b}{\sqrt{b^2-a^2}}\tan\left(\frac{1}{2}\sqrt{b^2-a^2}(x+C)\right)\right)$$

Since $u = ay + bx$ then $y = \frac{u-bx}{a}$, hence

$$y = \frac{1}{a}\left(2\arctan\left(\frac{a+b}{\sqrt{b^2-a^2}}\tan\left(\frac{1}{2}\sqrt{b^2-a^2}(x+C)\right)\right) - bx\right)$$

Verification

```
ode:=diff(y(x),x)=cos(a*y(x)+b*x);
my_sol:=(1/a)*(2*arctan( (a+b)/sqrt(b^2-a^2) * tan(1/2*sqrt(b^2-a^2)*(x+_C1)))-b*x);
odetest(y(x)=my_sol,ode);
0
```

2.78 ODE No. 78

$$a\sin(\alpha y(x)+\beta x)+b+y'(x)=0$$

✓ **Mathematica** : cpu = 0.942125 (sec), leaf count = 1317

$$\left\{\left\{y(x)\to \frac{2\tan^{-1}\left(\frac{\frac{a^2\sqrt{-((a\alpha+b\alpha-\beta)(a\alpha-b\alpha+\beta))}\tan\left(\frac{1}{2}\left(\frac{a^2x\alpha^2}{\sqrt{-((a\alpha+b\alpha-\beta)(a\alpha-b\alpha+\beta))}}-\frac{b^2x\alpha^2}{\sqrt{-((a\alpha+b\alpha-\beta)(a\alpha-b\alpha+\beta))}}-\frac{a^2c_1\alpha^2}{\sqrt{-((a\alpha+b\alpha-\beta)(a\alpha-b\alpha}\right.\right.}{}}{}\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.112 (sec), leaf count = 89

$$\left\{y(x)=\frac{-\beta x+2\arctan\left(\frac{-a\alpha-\sqrt{-2\alpha b\beta+(-a^2+b^2)\alpha^2+\beta^2}\tan\left(\frac{\sqrt{-2\alpha b\beta+\left(-a^2+b^2\right)\alpha^2+\beta^2}\,(-c_1+x)}{2}\right)}{b\alpha-\beta}\right)}{\alpha}\right\}$$

Hand solution

$$y'=-a\sin\left(\alpha y+\beta x\right)-b$$

This is separable after transformation of $u=\alpha y+\beta x$, hence $u'=\alpha y'+\beta$ or $y'=\frac{1}{\alpha}(u'-\beta)$. Therefore the above becomes

$$\frac{1}{\alpha}\left(u'-\beta\right)=-a\sin\left(u\right)-b$$

$$u'=-\alpha(a\sin\left(u\right)+b)+\beta$$

$$\frac{du}{\beta-\alpha\left(a\sin\left(u\right)+b\right)}=dx \tag{1}$$

Using half angle tan transformation where $\tan\left(\frac{u}{2}\right)=t, \sin(u)=\frac{2t}{t^2+1}, du=\frac{2}{1+t^2}dt$ then

$$
\begin{aligned}
\int \frac{du}{\beta-\alpha(a\sin(u)+b)} &= \int \frac{2}{1+t^2}\frac{dt}{\beta-\alpha\left(a\frac{2t}{t^2+1}+b\right)}\\
&= 2\int \frac{dt}{\beta(t^2+1)-\alpha(a2t+b(t^2+1))}\\
&= 2\int \frac{dt}{t\beta^2+\beta-(\alpha a2t+t^2\alpha b+\alpha b)}\\
&= 2\int \frac{dt}{(\beta-\alpha b)\left(\frac{t\beta^2-\alpha a2t-t^2\alpha b}{(\beta-\alpha b)}+1\right)}\\
&= \frac{2}{(\beta-\alpha b)}\int \frac{dt}{\frac{t\beta^2-\alpha a2t-t^2\alpha b}{(\beta-\alpha b)}+1}\\
&= \frac{2}{(\beta-\alpha b)}\frac{-(\alpha b-\beta)}{\sqrt{\alpha^2a^2-(\alpha^2b^2+\beta^2-2\alpha b\beta)}}\tanh^{-1}\left(\frac{\left(t+\frac{a\alpha}{b\alpha-\beta}\right)(b\alpha-\beta)}{\sqrt{\alpha^2a^2-(\alpha^2b^2+\beta^2-2\alpha b\beta)}}\right)\\
&= \frac{2}{\sqrt{\alpha^2a^2-(\alpha^2b^2+\beta^2-2\alpha b\beta)}}\tanh^{-1}\left(\frac{t(b\alpha-\beta)+a\alpha}{\sqrt{\alpha^2a^2-(\alpha^2b^2+\beta^2-2\alpha b\beta)}}\right)
\end{aligned}
$$

But $t=\tan\left(\frac{u}{2}\right)$ therefore

$$
\int \frac{du}{\beta-\alpha(a\sin(u)+b)} = \frac{2}{\sqrt{\alpha^2a^2-(\alpha^2b^2+\beta^2-2\alpha b\beta)}}\tanh^{-1}\left(\frac{\tan\left(\frac{u}{2}\right)(b\alpha-\beta)+a\alpha}{\sqrt{\alpha^2a^2-(\alpha^2b^2+\beta^2-2\alpha b\beta)}}\right)
$$

But $u=\alpha y+\beta x$, and the above becomes

$$
\int \frac{du}{\beta-\alpha(a\sin(u)+b)} = \frac{2\tanh^{-1}\left(\frac{\tan\left(\frac{\alpha y+\beta x}{2}\right)(b\alpha-\beta)+a\alpha}{\sqrt{\alpha^2a^2-(\alpha^2b^2+\beta^2-2\alpha b\beta)}}\right)}{\sqrt{\alpha^2a^2-(\alpha^2b^2+\beta^2-2\alpha b\beta)}}
$$

Back to (1), therefore after integrating both sides

$$
\frac{2\tanh^{-1}\left(\frac{\tan\left(\frac{\alpha y+\beta x}{2}\right)(b\alpha-\beta)+a\alpha}{\sqrt{\alpha^2a^2-(\alpha^2b^2+\beta^2-2\alpha b\beta)}}\right)}{\sqrt{\alpha^2a^2-(\alpha^2b^2+\beta^2-2\alpha b\beta)}} = x+C
$$

Let

$$
A=\sqrt{\alpha^2a^2-(\alpha^2b^2+\beta^2-2\alpha b\beta)}
$$

Then

$$\tanh^{-1}\left(\frac{\tan\left(\frac{\alpha y+\beta x}{2}\right)(b\alpha-\beta)+a\alpha}{A}\right)=\frac{1}{2}A(x+C)$$

$$\frac{\tan\left(\frac{\alpha y+\beta x}{2}\right)(b\alpha-\beta)+a\alpha}{A}=\tanh\left(\frac{1}{2}A(x+C)\right)$$

$$\tan\left(\frac{\alpha y+\beta x}{2}\right)(b\alpha-\beta)+a\alpha=A\tanh\left(\frac{1}{2}A(x+C)\right)$$

$$\tan\left(\frac{\alpha y+\beta x}{2}\right)=\frac{A}{(b\alpha-\beta)}\tanh\left(\frac{1}{2}A(x+C)\right)-\frac{a\alpha}{(b\alpha-\beta)}$$

$$\frac{\alpha y+\beta x}{2}=\arctan\left(\frac{A}{(b\alpha-\beta)}\tanh\left(\frac{1}{2}A(x+C)\right)-\frac{a\alpha}{(b\alpha-\beta)}\right)$$

$$y=\frac{2}{\alpha}\arctan\left(\frac{A}{(b\alpha-\beta)}\tanh\left(\frac{1}{2}A(x+C)\right)-\frac{a\alpha}{(b\alpha-\beta)}\right)-\frac{\beta x}{\alpha}$$

Verification

```
ode:=diff(y(x),x)=-a*sin(alpha*y(x)+beta*x)-b;
A0:=sqrt(alpha^2*a^2-(alpha^2*b^2+beta^2-2*alpha*b*beta));
B0:=(alpha*b-beta);
my_sol:=2/alpha*arctan(A0/B0*tanh((1/2)*A0*(x+_C1))-a*alpha/(B0))-beta*x/alpha;
odetest(y(x)=my_sol,ode);
0
```

2.79 ODE No. 79

$$f(x)\cos(ay(x))+g(x)\sin(ay(x))+h(x)+y'(x)=0$$

✗ **Mathematica** : cpu = 24.9646 (sec), leaf count = 0 , could not solve

```
DSolve[Cos[a*y[x]]*f[x] + h[x] + g[x]*Sin[a*y[x]] + Derivative[1][y][x] == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(y(x),x)+f(x)*cos(a*y(x))+g(x)*sin(a*y(x))+h(x) = 0,y(x))
```

2.80 ODE No. 80

$$(1 - f'(x))\cos(y(x)) - f'(x) + f(x)\sin(y(x)) + y'(x) - 1 = 0$$

✓ **Mathematica** : cpu = 0.0737126 (sec), leaf count = 72

$$\left\{\left\{y(x) \to 2\tan^{-1}\left(f(x) + \frac{1}{\exp\left(\int_1^x -f(K[1])dK[1]\right)\int_1^x -\exp\left(-\int_1^{K[2]} -f(K[1])dK[1]\right)dK[2] + c_1\exp\left(\int_1^x -f\right.}\right.\right.\right.$$

✓ **Maple** : cpu = 1.2 (sec), leaf count = 41

$$\left\{y(x) = 2\arctan\left(\frac{c_1 f(x) + f(x)\left(\int e^{\int f(x)dx}dx\right) - e^{\int f(x)dx}}{c_1 + \int e^{\int f(x)dx}dx}\right)\right\}$$

2.81 ODE No. 81

$$y'(x) + 2\tan(x)\tan(y(x)) - 1 = 0$$

✓ **Mathematica** : cpu = 1.87795 (sec), leaf count = 220

$$\text{Solve}\left[c_1 = \frac{\frac{1}{2}\left(\frac{1}{\frac{i\tan(x)}{\tan^2(x)+1} - \frac{i\tan^2(x)\tan(y(x))}{\tan^2(x)+1}} + i\cot(x)\right)\sqrt[4]{1 - \left(\frac{1}{\frac{i\tan(x)}{\tan^2(x)+1} - \frac{i\tan^2(x)\tan(y(x))}{\tan^2(x)+1}} + i\cot(x)\right)^2}\,{}_2F_1\left(\frac{1}{2}, \frac{5}{4}; \frac{3}{2}; \left(i\right.\right.}{\sqrt[4]{-1 + \left(\frac{1}{\frac{i\tan(x)}{\tan^2(x)+1} - \frac{i\tan^2(x)\tan(y(x))}{\tan^2(x)+1}} + i\cot(x)\right)^2}}\right.$$

✓ **Maple** : cpu = 1.29 (sec), leaf count = 78

$$\left\{c_1 + \frac{(\tan(x) + \tan(y(x)))\,\mathrm{hypergeom}\left(\left[\frac{1}{2}, \frac{5}{4}\right], \left[\frac{3}{2}\right], -\frac{(\tan(x)+\tan(y(x)))^2}{(\tan(x)\tan(y(x))-1)^2}\right)}{2\tan(x)\tan(y(x)) - 2} + \frac{\tan(x)}{\left(\frac{(\tan^2(y(x))+1)(\tan^2(x)+1)}{(\tan(x)\tan(y(x))-1)^2}\right)^{\frac{1}{4}}} = 0\right\}$$

2.82 ODE No. 82

$$-a\left(\tan^2(y(x))+1\right)+y'(x)+\tan(x)\tan(y(x))=0$$

✗ **Mathematica** : cpu = 47.4088 (sec), leaf count = 0 , could not solve

```
DSolve[Tan[x]*Tan[y[x]] - a*(1 + Tan[y[x]]^2) + Derivative[1][y][x] == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(y(x),x)-a*(tan(y(x))^2+1)+tan(x)*tan(y(x)) = 0,y(x))
```

2.83 ODE No. 83

$$y'(x)-\tan(xy(x))=0$$

✓ **Mathematica** : cpu = 0.429712 (sec), leaf count = 69

$$\text{Solve}\left[\frac{1}{2}\sqrt{\frac{\pi}{2}}e^{\frac{x^2}{2}}\left(\text{erfi}\left(\frac{y(x)-ix}{\sqrt{2}}\right)+\text{erfi}\left(\frac{y(x)+ix}{\sqrt{2}}\right)\right)=c_1e^{\frac{x^2}{2}},y(x)\right]$$

✓ **Maple** : cpu = 0.356 (sec), leaf count = 44

$$\left\{y(x)=-i\,\text{RootOf}\left(c_1\sqrt{2}-\sqrt{\pi}\,\text{erf}\left(\frac{\sqrt{2}\left(\_Z+x\right)}{2}\right)-\sqrt{\pi}\,\text{erf}\left(\frac{\left(\_Z-x\right)\sqrt{2}}{2}\right)\right)\right\}$$

2.84 ODE No. 84

$$y'(x)-f(ax+by(x))=0$$

✓ **Mathematica** : cpu = 0.236357 (sec), leaf count = 248

$$\text{Solve}\left[\int_1^{y(x)}-\frac{f(ax+bK[2])\int_1^x\left(\frac{b^2f'(aK[1]+bK[2])}{a+bf(aK[1]+bK[2])}-\frac{b^3f(aK[1]+bK[2])f'(aK[1]+bK[2])}{(a+bf(aK[1]+bK[2]))^2}\right)dK[1]b+b+a\int_1^x\left(\frac{b^2f'(aK[1]}{a+bf(aK[1]}\right.}{a+bf(ax+bK[2])}\right.$$

✓ **Maple** : cpu = 0.046 (sec), leaf count = 37

$$\left\{y(x)=\frac{-ax+b\,\text{RootOf}\left(b\left(\int^{-\_Z}\frac{1}{bf(\_ab)+a}d\_a\right)+c_1-x\right)}{b}\right\}$$

2.85 ODE No. 85

$$y'(x)-x^{a-1}y(x)^{1-b}f\left(\frac{x^a}{a}+\frac{y(x)^b}{b}\right)=0$$

✓ **Mathematica** : cpu = 0.435531 (sec), leaf count = 238

$$\text{Solve}\left[\int_1^{y(x)}\left(-\frac{K[2]^{b-1}}{f\left(\frac{x^a}{a}+\frac{K[2]^b}{b}\right)+1}-\int_1^x\left(\frac{K[1]^{a-1}K[2]^{b-1}f'\left(\frac{K[1]^a}{a}+\frac{K[2]^b}{b}\right)}{f\left(\frac{K[1]^a}{a}+\frac{K[2]^b}{b}\right)+1}-\frac{f\left(\frac{K[1]^a}{a}+\frac{K[2]^b}{b}\right)K[1]^{a-1}K[2]^{b}}{\left(f\left(\frac{K[1]^a}{a}+\frac{K[2]^b}{b}\right.\right.}\right.\right.\right.$$

✓ **Maple** : cpu = 0.427 (sec), leaf count = 153

$$\left\{y(x)=\left(-\frac{-a\,\text{RootOf}\left(c_1ab+a^2\left(\int^{-Z}\frac{1}{\_a\left(a^{\frac{1}{a}}\right)^a\left((\_a-b)^{\frac{1}{b}}\right)^{-b}f\left(\frac{a\left((\_a-b)^{\frac{1}{b}}\right)^b+b\left(a^{\frac{1}{a}}\right)^a}{ab}\right)-b\left(a^{\frac{1}{a}}\right)^a\left((\_a-b)^{\frac{1}{b}}\right)^{-b}f\left(\frac{a\left((\right.}{}\right.}\right.\right.\right.}{a}\right.\right.$$

2.86 ODE No. 86

$$y'(x)-\frac{y(x)-xf\left(ay(x)^2+x^2\right)}{ay(x)f\left(ay(x)^2+x^2\right)+x}=0$$

✓ **Mathematica** : cpu = 0.532138 (sec), leaf count = 184

$$\text{Solve}\left[\int_1^{y(x)}\left(\frac{-f\left(x^2+aK[2]^2\right)K[2]a^2-xa}{x^2+aK[2]^2}-\int_1^x\left(\frac{a-2a^2K[1]K[2]f'\left(K[1]^2+aK[2]^2\right)}{K[1]^2+aK[2]^2}-\frac{2aK[2]\left(aK[2]-a\right.}{\left(K[1]^2\right.}\right.\right.\right.$$

✓ **Maple** : cpu = 0.526 (sec), leaf count = 52

$$\left\{-c_1-\frac{\left(\int^{y(x)^2+\frac{x^2}{a}}\frac{f(\_a a)}{\_a}d\_a\right)}{2}+\frac{\arctan\left(\frac{\sqrt{a}\,x}{\sqrt{a^2y(x)^2}}\right)}{\sqrt{a}}=0\right\}$$

2.87 ODE No. 87

$$y'(x) - \frac{cx^a y(x)^b + ay(x)f(x^c y(x))}{bxf(x^c y(x)) - x^a y(x)^b} = 0$$

✗ **Mathematica** : cpu = 11.023 (sec), leaf count = 0 , could not solve

```
DSolve[-((a*f[x^c*y[x]]*y[x] + c*x^a*y[x]^b)/(b*x*f[x^c*y[x]] - x^a*y[x]^b)) + Derivative[1]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(y(x),x)-(y(x)*a*f(x^c*y(x))+c*x^a*y(x)^b)/(x*b*f(x^c*y(x))-x^a*y(x)^b) = 0,y(x))
```

2.88 ODE No. 88

$$-ce^{-2ax} - 4ay(x) - b + 2y'(x) - 3y(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.551086 (sec), leaf count = 2831

$$\left\{\left\{y(x) \to -\frac{2\left(-2^{-\frac{a\sqrt{4a^2-3b}-2a^2}{a^2}+\frac{\sqrt{4a^4-3a^2b}}{a^2}+1}3^{\frac{a\sqrt{4a^2-3b}-2a^2}{4a^2}-\frac{\sqrt{4a^4-3a^2b}}{4a^2}}a^{-\frac{a\sqrt{4a^2-3b}-2a^2}{2a^2}+\frac{\sqrt{4a^4-3a^2b}}{2a^2}+1}b^{\frac{a\sqrt{4a^2-3b}-2a^2}{4a^2}-\cdots}\right.}{\cdots}\right.\right.$$

✓ **Maple** : cpu = 0.243 (sec), leaf count = 256

$$\left\{y(x) = \frac{-\sqrt{3}\left(c_1 \operatorname{BesselY}\left(-\frac{-2a+\sqrt{4a^2-3b}}{2a}, \frac{\sqrt{3}\sqrt{c}\,e^{-ax}}{2a}\right) + \operatorname{BesselJ}\left(-\frac{-2a+\sqrt{4a^2-3b}}{2a}, \frac{\sqrt{3}\sqrt{c}\,e^{-ax}}{2a}\right)\right)\sqrt{c}\,e^{-ax} - \left(2a + \cdots\right.}{3c_1 \operatorname{BesselY}\left(-\frac{\sqrt{4a^2-3b}}{2a}, \frac{\sqrt{3}\sqrt{c}\,e^{-ax}}{2a}\right) + 3\operatorname{Besse}\cdots}\right.$$

Hand solution

$$y' = \frac{1}{2}b + \frac{1}{2}ce^{-2ax} + 2ay + \frac{3}{2}y^2$$

This is of the form $y' = f_0 + f_1 y + f_2 y^2$ with $f_0 = \frac{1}{2}b + \frac{1}{2}ce^{-2ax}, f_1 = 2a, f_3 = \frac{3}{2}$. Hence it is Riccati non-linear first order. Transforming to second order ODE using

$$\begin{aligned} y &= -\frac{u'}{uf_2} \\ &= \frac{-2}{3}\frac{u'}{u} \end{aligned}$$

Hence $y' = \frac{-2}{3}\left(\frac{u''}{u} - \frac{(u')^2}{u^2}\right)$ and equating this to RHS of the ODE gives

$$
\frac{-2}{3}\left(\frac{u''}{u}-\frac{(u')^2}{u^2}\right)=\frac{1}{2}b+\frac{1}{2}ce^{-2ax}+2a\left(\frac{-2}{3}\frac{u'}{u}\right)+\frac{3}{2}\left(\frac{-2}{3}\frac{u'}{u}\right)^2
$$

$$
\frac{-2}{3}\frac{u''}{u}+\frac{2}{3}\frac{(u')^2}{u^2}=\frac{1}{2}b+\frac{1}{2}ce^{-2ax}-\frac{4}{3}a\frac{u'}{u}+\frac{2}{3}\frac{(u')^2}{u^2}
$$

$$
\frac{-2}{3}\frac{u''}{u}=\frac{1}{2}b+\frac{1}{2}ce^{-2ax}-\frac{4}{3}a\frac{u'}{u}
$$

$$
\frac{u''}{u}=-\frac{3}{4}b-\frac{3}{4}ce^{-2ax}+2a\frac{u'}{u}
$$

$$
u''=-\left(\frac{3}{4}b+\frac{3}{4}ce^{-2ax}\right)u+2au'
$$

$$
u''-2au'+\frac{3}{4}\left(b+ce^{-2ax}\right)u=0
$$

This is second order linear ODE with varying coefficient. Solved using power series method giving solutions using special functions (Bessel functions). Let $A=\frac{\sqrt{4a^2-3b}}{a}, B=\frac{\sqrt{3c}e^{-ax}}{a}$ then

$$
u(x)=C_1e^{ax}\operatorname{BesselJ}\left(-\frac{1}{2}\frac{\sqrt{4a^2-3b}}{a},\frac{1}{2}\frac{\sqrt{3c}e^{-ax}}{a}\right)+C_2e^{ax}\operatorname{BesselY}\left(-\frac{1}{2}\frac{\sqrt{4a^2-3b}}{a},\frac{1}{2}\frac{\sqrt{3c}e^{-ax}}{a}\right)
$$

But

$$
u'(x)=C_1\,a\exp(ax)\operatorname{BesselJ}\left(-1/2\,\frac{\sqrt{4\,a^2-3\,b}}{a},1/2\,\frac{\sqrt{3}\sqrt{c}\exp(-ax)}{a}\right)
$$

$$
-1/2\,C_1\exp(ax)\left(-\operatorname{BesselJ}\left(-1/2\,\frac{\sqrt{4\,a^2-3\,b}}{a}+1,1/2\,\frac{\sqrt{3}\sqrt{c}\exp(-ax)}{a}\right)-1/3\,\frac{\sqrt{3}\sqrt{4\,a^2-3\,b}}{\sqrt{c}\exp(-ax)}\operatorname{BesselJ}\left(-1/2\,\frac{\sqrt{4\,a^2-3\,b}}{a},1/2\,\sqrt{3}\right.\right.
$$

$$
+C_2\,a\exp(ax)\operatorname{BesselY}\left(-1/2\,\frac{\sqrt{4\,a^2-3\,b}}{a},1/2\,\frac{\sqrt{3}\sqrt{c}\exp(-ax)}{a}\right)
$$

$$
-1/2\,C_1\,\exp(ax)\left(-\operatorname{BesselY}\left(-1/2\,\frac{\sqrt{4\,a^2-3\,b}}{a}+1,1/2\,\frac{\sqrt{3}\sqrt{c}\exp(-ax)}{a}\right)-1/3\,\frac{\sqrt{3}\sqrt{4\,a^2-3\,b}}{\sqrt{c}\exp(-ax)}\operatorname{BesselY}\left(-1/2\,\frac{\sqrt{4\,a^2-3\,b}}{a},1/2\right.\right.
$$

Hence from $y=\frac{-2}{3}\frac{u'}{u}$ the solution is now found.

Verification

```
ode:=2*diff(y(x),x)-3*y(x)^2-4*a*y(x)=b+c*exp(-2*a*x);
uode:=diff(u(x),x$2)-2*a*diff(u(x),x)+3/4*(b+c*(exp(-2*a*x)))*u(x)=0;
uSol:=dsolve(uode,u(x));
my_sol:=(-2/3)*diff(rhs(uSol),x)/rhs(uSol);
odetest(y(x)=my_sol,ode);
0
```

2.89 ODE No. 89

$$xy'(x) - \sqrt{a^2 - x^2} = 0$$

✓ **Mathematica** : cpu = 0.0136913 (sec), leaf count = 42

$$\left\{\left\{y(x) \to \sqrt{a^2 - x^2} - a \tanh^{-1}\left(\frac{\sqrt{a^2 - x^2}}{a}\right) + c_1\right\}\right\}$$

✓ **Maple** : cpu = 0.02 (sec), leaf count = 56

$$\left\{y(x) = -\frac{a^2 \ln\left(\frac{2a^2 + 2\sqrt{a^2}\sqrt{a^2 - x^2}}{x}\right)}{\sqrt{a^2}} + c_1 + \sqrt{a^2 - x^2}\right\}$$

Hand solution

$$xy' = \pm\sqrt{a^2 - x^2}$$

This is separable. $y' = \frac{\pm\sqrt{a^2 - x^2}}{x}$ or $dy = \frac{\pm\sqrt{a^2 - x^2}}{x}dx$. Hence

$$y = \pm \int \frac{\sqrt{a^2 - x^2}}{x} dx + C$$

Let $x = a \sin u$, then $dx = a \cos(u)\, du$ and the integral becomes

$$\begin{aligned}
\int \frac{\sqrt{a^2 - x^2}}{x} dx &= \int \frac{\sqrt{a^2 - a^2 \sin^2 u}}{a \sin u} a \cos(u)\, du \\
&= \int \frac{a\sqrt{1 - \sin^2 u}}{a \sin u} a \cos(u)\, du \\
&= a \int \frac{\cos u}{\sin u} \cos(u)\, du \\
&= a \int \frac{\cos^2 u}{\sin u} du \\
&= a \int \frac{1 - \sin^2 u}{\sin u} du \\
&= a\left(\int \frac{1}{\sin u} du - \int \sin u du\right) \\
&= a\left(\int \frac{1}{\sin u} du + \cos u\right) \qquad (1)
\end{aligned}$$

For $\int \frac{1}{\sin u} du$, using half tan angle, let $t = \tan\left(\frac{u}{2}\right), du = \frac{2}{1+t^2} dt, \sin u = \frac{2t}{1+t^2}$, therefore

$$
\begin{aligned}
\int \frac{1}{\sin u} du &= \int \frac{1+t^2}{2t} \frac{2}{1+t^2} dt \\
&= \int \frac{1}{t} dt \\
&= \ln(t)
\end{aligned}
$$

Hence $\int \frac{1}{\sin u} du = \ln\left(\tan\left(\frac{u}{2}\right)\right)$ and from (1)

$$
\begin{aligned}
\int \frac{\sqrt{a^2-x^2}}{x} dx &= a\left(\int \frac{1}{\sin u} du + \cos u\right) \\
&= a\left(\ln\left(\tan\left(\frac{u}{2}\right)\right) + \cos u\right)
\end{aligned}
$$

But $x = a \sin u$, hence $u = \arcsin\left(\frac{x}{a}\right)$ and the integral becomes

$$
\int \frac{\sqrt{a^2-x^2}}{x} dx = a\left[\ln\left(\tan\left(\frac{\arcsin\left(\frac{x}{a}\right)}{2}\right)\right) + \cos\left(\arcsin\left(\frac{x}{a}\right)\right)\right]
$$

Hence the solution is

$$
y = \pm a\left[\ln\left(\tan\left(\frac{\arcsin\left(\frac{x}{a}\right)}{2}\right)\right) + \cos\left(\arcsin\left(\frac{x}{a}\right)\right)\right] + C
$$

Maple do not verify the above, but I do not see what is wrong with the solution. Will investigate more later.

2.90 ODE No. 90

$$
xy'(x) + y(x) - x\sin(x) = 0
$$

✓ **Mathematica** : cpu = 0.0244245 (sec), leaf count = 24

$$
\left\{\left\{y(x) \to \frac{\sin(x) - x\cos(x)}{x} + \frac{c_1}{x}\right\}\right\}
$$

✓ **Maple** : cpu = 0.021 (sec), leaf count = 17

$$
\left\{y(x) = \frac{-x\cos(x) + c_1 + \sin(x)}{x}\right\}
$$

Hand solution

$$xy' + y = x \sin x$$

Linear first order, exact, separable. $y' + \frac{y}{x} = \sin x$, integrating factor $\mu = e^{\int \frac{1}{x} dx} = x$, hence

$$\begin{aligned} d(\mu y) &= \mu \sin x \\ xy &= \int x \sin x dx + C \end{aligned}$$

Using integration by parts. $\int u dv = uv - \int v du$. Let $u = x, dv = \sin x$, hence $du = 1, v = -\cos x$, therefore

$$\begin{aligned} \int x \sin x dx &= -x \cos x + \int \cos x \\ &= -x \cos x + \sin x \end{aligned}$$

Hence

$$\begin{aligned} xy &= -x \cos x + \sin x + C \\ y &= \frac{\sin x}{x} - \cos x + \frac{C}{x} \end{aligned}$$

Verification

```
restart;
ode:=x*diff(y(x),x)+y(x)=x*sin(x);
my_sol:=sin(x)/x-cos(x)+_C1/x;
odetest(y(x)=my_sol,ode);
0
```

2.91 ODE No. 91

$$xy'(x) - y(x) - \frac{x}{\log(x)} = 0$$

✓ **Mathematica** : cpu = 0.0249662 (sec), leaf count = 15

$$\{\{y(x) \to x \log(\log(x)) + c_1 x\}\}$$

✓ **Maple** : cpu = 0.008 (sec), leaf count = 11

$$\{y(x) = (c_1 + \ln(\ln(x)))\, x\}$$

2.92 ODE No. 92

$$x^2(-\sin(x)) + xy'(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 0.0237564 (sec), leaf count = 15

$$\{\{y(x) \to -x\cos(x) + c_1 x\}\}$$

✓ **Maple** : cpu = 0.006 (sec), leaf count = 12

$$\{y(x) = (c_1 - \cos(x))\, x\}$$

Hand solution

$$xy' - y = x^2 \sin x$$

Linear first order, exact, separable. $y' - \frac{y}{x} = x \sin x$, integrating factor $\mu = e^{\int -\frac{1}{x} dx} = e^{-\ln x} = \frac{1}{x}$, hence

$$\begin{aligned} d(\mu y) &= \mu \sin x \\ \frac{1}{x} y &= \int \sin x dx + C \\ y &= x(C - \cos x) \end{aligned}$$

Verification

```
restart;
ode:=x*diff(y(x),x)-y(x)=x^2*sin(x);
my_sol:=x*(_C1-cos(x));
odetest(y(x)=my_sol,ode);
0
```

2.93 ODE No. 93

$$xy'(x) - y(x) - \frac{x\cos(\log(\log(x)))}{\log(x)} = 0$$

✓ **Mathematica** : cpu = 0.0516383 (sec), leaf count = 16

$$\{\{y(x) \to x\sin(\log(\log(x))) + c_1 x\}\}$$

✓ **Maple** : cpu = 0.027 (sec), leaf count = 12

$$\{y(x) = (c_1 + \sin(\ln(\ln(x))))\, x\}$$

2.94 ODE No. 94

$$ay(x) + bx^n + xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.042067 (sec), leaf count = 25

$$\left\{\left\{y(x) \to -\frac{bx^n}{a+n} + c_1 x^{-a}\right\}\right\}$$

✓ **Maple** : cpu = 0.017 (sec), leaf count = 23

$$\left\{y(x) = c_1 x^{-a} - \frac{b\,x^n}{a+n}\right\}$$

Hand solution

$$xy' + ay + bx^n = 0$$

Linear first order, exact, separable. $y' + \frac{ay}{x} = -bx^{n-1}$, integrating factor $\mu = e^{\int \frac{a}{x} dx} = e^{a \ln x} = x^a$, hence

$$\begin{aligned} d(\mu y) &= -\mu b x^{n-1} \\ x^a y &= -\int b x^{a+n-1} + C \end{aligned}$$

If $a = -n$ then

$$\begin{aligned} x^a y &= -\int b x^{-1} + C \\ y &= -x^{-a} b \ln(x) + x^{-a} C \\ &= x^{-a}(C - b \ln x) \end{aligned}$$

If $a \neq -n$ then

$$\begin{aligned} x^a y &= -\frac{b x^{a+n}}{a+n} + C \\ y &= -b\frac{x^n}{a+n} + C x^{-a} \end{aligned}$$

Verification

```
restart;
ode:=x*diff(y(x),x)+a*y(x)+b*x^n=0;
s1:=x^(-a)*(_C1-b*ln(x));
s2:=-b*(x^n/(a+n))+_C1*x^(-a);
odetest(y(x)=s2,ode);
0
```

2.95 ODE No. 95

$$x^2 + xy'(x) + y(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.0818114 (sec), leaf count = 32

$$\left\{\left\{y(x) \to \frac{x(-Y_1(x) - c_1 J_1(x))}{Y_0(x) + c_1 J_0(x)}\right\}\right\}$$

✓ **Maple** : cpu = 0.071 (sec), leaf count = 27

$$\left\{y(x) = -\frac{(c_1 \operatorname{BesselY}(1,x) + \operatorname{BesselJ}(1,x))\, x}{c_1 \operatorname{BesselY}(0,x) + \operatorname{BesselJ}(0,x)}\right\}$$

Hand solution

$$xy' + y^2 + x^2 = 0$$

This is Riccati first order non-linear. Writing it in standard form and for $x \neq 0$

$$\begin{aligned} y' &= -x - \frac{1}{x}y^2 \\ &= f_0 + f_1 y + f_2 y^2 \end{aligned} \tag{1}$$

Where $f_0 = -x, f_1 = 0, f_2 = -\frac{1}{x}$. Using standard substitution $y = \frac{-u'}{uf_2}$ changes the ODE to second order linear ODE

$$y = \frac{xu'}{u} \tag{2}$$

Hence

$$y' = \frac{u'}{u} + x\frac{u''}{u} - \frac{x(u')^2}{u^2}$$

Equating this to RHS of (1) gives

$$
\begin{aligned}
\frac{u'}{u}+x\frac{u''}{u}-\frac{x(u')^2}{u^2} &= -x-\frac{1}{x}\left(\frac{xu'}{u}\right)^2\\
\frac{u'}{u}+x\frac{u''}{u} &= -x\\
u''+\frac{1}{x}u'+u &= 0
\end{aligned}
$$

This is Lienard ODE. Since it is not constant coefficient ODE, the solution will be in Bessel functions, using Power series method. The solution is

$$
u = C_1 \operatorname{BesselJ}(0,x) + C_2 \operatorname{BesselY}(0,x)
$$

But $\frac{d}{dx}\operatorname{BesselJ}(0,x) = -\operatorname{BesselJ}(1,x)$ and $\frac{d}{dx}\operatorname{BesselY}(0,x) = -\operatorname{BesselY}(1,x)$, hence

$$
u'(x) = -C_1 \operatorname{BesselJ}(1,x) - C_2 \operatorname{BesselY}(1,x)
$$

And from (2) the solution is

$$
\begin{aligned}
y &= \frac{xu'}{u}\\
&= x\frac{[-C_1 \operatorname{BesselJ}(1,x) - C_2 \operatorname{BesselY}(1,x)]}{C_1 \operatorname{BesselJ}(0,x) + C_2 \operatorname{BesselY}(0,x)}\\
&= -x\frac{C_1 \operatorname{BesselJ}(1,x) + C_2 \operatorname{BesselY}(1,x)}{C_1 \operatorname{BesselJ}(0,x) + C_2 \operatorname{BesselY}(0,x)}
\end{aligned}
$$

Let $C = \frac{C_1}{C_2}$ then

$$
y = -x\frac{C \operatorname{BesselJ}(1,x) + \operatorname{BesselY}(1,x)}{C \operatorname{BesselJ}(0,x) + \operatorname{BesselY}(0,x)}
$$

Verification

```
restart;
ode:=x*diff(y(x),x)+y(x)^2+x^2=0;
my_sol:=-x*(_C1*BesselJ(1, x)+BesselY(1,x))/(_C1*BesselJ(0, x)+BesselY(0,x));
odetest(y(x)=my_sol,ode);
0
```

2.96 ODE No. 96

$$xy'(x) - y(x)^2 + 1 = 0$$

✓ **Mathematica** : cpu = 0.0727398 (sec), leaf count = 33

$$\left\{\left\{y(x) \to \frac{1 - e^{2c_1}x^2}{1 + e^{2c_1}x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.035 (sec), leaf count = 11

$$\{y(x) = -\tanh(c_1 + \ln(x))\}$$

Hand solution

$$xy' - y^2 + 1 = 0$$

This is Riccati first order non-linear. But it is separable. Hence

$$y' = \frac{y^2 - 1}{x} \tag{1}$$

Hence

$$\begin{aligned} \frac{dy}{dx} &= \frac{y^2 - 1}{x} \\ \frac{dy}{y^2 - 1} &= \frac{dx}{x} \end{aligned}$$

Integrating

$$\begin{aligned} -\tanh^{-1}(y) &= \ln x + C \\ y &= -\tanh(\ln x + C) \end{aligned}$$

Verification

```
restart;
ode:=x*diff(y(x),x)-y(x)^2+1=0;
my_sol:=-tanh(ln(x)+_C1);
odetest(y(x)=my_sol,ode);
0
```

2.97 ODE No. 97

$$a y(x)^2 + b x^2 + x y'(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 0.119685 (sec), leaf count = 46

$$\left\{\left\{y(x) \to -\frac{\sqrt{b} x \tan\left(\sqrt{a}\sqrt{b} x - \sqrt{a}\sqrt{b} c_1\right)}{\sqrt{a}}\right\}\right\}$$

✓ **Maple** : cpu = 0.042 (sec), leaf count = 25

$$\left\{y(x) = -\frac{\sqrt{ab}\, x \tan\left(\sqrt{ab}\,(c_1 + x)\right)}{a}\right\}$$

Hand solution

$$a y^2 + b x^2 + x y' - y = 0$$

This is Riccati first order non-linear. Let $y = ux$, hence the above becomes

$$\begin{aligned} a u^2 x^2 + b x^2 + x\left(u' x + u\right) - ux &= 0 \\ a u^2 x + b x + u' x &= 0 \\ a u^2 + b + u' &= 0 \\ u' &= -a u^2 - b \end{aligned}$$

Which is separable, Hence

$$\frac{du}{au^2 + b} = -dx$$

Integrating

$$\begin{aligned} \frac{1}{\sqrt{ab}} \arctan\left(\frac{au}{\sqrt{ab}}\right) &= -x + C \\ \frac{au}{\sqrt{ab}} &= \tan\left(\sqrt{ab}(-x + C)\right) \\ u &= \frac{\sqrt{ab}}{a} \tan\left(\sqrt{ab}(-x + C)\right) \end{aligned}$$

Therefore

$$
\begin{aligned}
y &= ux \\
&= x\frac{\sqrt{ab}}{a}\tan\left(\sqrt{ab}(-x+C)\right)
\end{aligned}
$$

Verification

```
restart;
ode:=a*y(x)^2+b*x^2+x*diff(y(x),x)-y(x)=0;
my_sol:=x*sqrt(a*b)/a*tan(sqrt(a*b)*(-x+_C1));
odetest(y(x)=my_sol,ode);
0
```

2.98 ODE No. 98

$$
ay(x)^2 + cx^{2b} - by(x) + xy'(x) = 0
$$

✓ **Mathematica** : cpu = 0.204037 (sec), leaf count = 442

$$
\left\{\left\{y(x)\to -\frac{\sqrt{-a}\sqrt{-c}x^b\left(-\frac{2\sqrt{\frac{2}{\pi}}\cos\left(\frac{\sqrt{-a}\sqrt{-c}x^b}{b}\right)}{\sqrt{\frac{\sqrt{-a}\sqrt{-c}x^b}{b}}}+\frac{\sqrt{\frac{2}{\pi}}c_1\sin\left(\frac{\sqrt{-a}\sqrt{-c}x^b}{b}\right)}{\sqrt{\frac{\sqrt{-a}\sqrt{-c}x^b}{b}}}-\frac{\sqrt{\frac{2}{\pi}}c_1\left(-\sin\left(\frac{\sqrt{-a}\sqrt{-c}x^b}{b}\right)-\frac{\sqrt{-a}b\sqrt{-c}x^{-b}\cos\left(\cdots\right.}{ac}\cdots\right.}{\sqrt{\frac{\sqrt{-a}\sqrt{-c}x^b}{b}}}\cdots\right.}{2a\left(\frac{\sqrt{\frac{2}{\pi}}\sin\left(\frac{\sqrt{-a}\sqrt{-c}x^b}{b}\right)}{\sqrt{\frac{\sqrt{-a}\sqrt{-c}x^b}{b}}}+\frac{\sqrt{\frac{2}{\pi}}c_1\cos\left(\frac{\sqrt{-a}\sqrt{-c}x^b}{b}\right)}{\sqrt{\frac{\sqrt{-a}\sqrt{-c}x^b}{b}}}\right)}\right.\right.
$$

✓ **Maple** : cpu = 0.062 (sec), leaf count = 38

$$
\left\{y(x) = -\frac{\sqrt{c}\,x^b\tan\left(\frac{c_1 b+\sqrt{a}\,\sqrt{c}\,x^b}{b}\right)}{\sqrt{a}}\right\}
$$

2.99 ODE No. 99

$$ay(x)^2 - by(x) - cx^\beta + xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.194934 (sec), leaf count = 244

$$\left\{\left\{y(x) \to -\frac{\sqrt{-a}\sqrt{c}x^{\beta/2}\left(-2J_{\frac{b}{\beta}-1}\left(\frac{2\sqrt{-a}\sqrt{c}x^{\beta/2}}{\beta}\right) + c_1 J_{1-\frac{b}{\beta}}\left(\frac{2\sqrt{-a}\sqrt{c}x^{\beta/2}}{\beta}\right) - c_1 J_{-\frac{b+\beta}{\beta}}\left(\frac{2\sqrt{-a}\sqrt{c}x^{\beta/2}}{\beta}\right)\right) - bc_1 J_{-\frac{b}{\beta}}\left(\right.}{2a\left(J_{\frac{b}{\beta}}\left(\frac{2\sqrt{-a}\sqrt{c}x^{\beta/2}}{\beta}\right) + c_1 J_{-\frac{b}{\beta}}\left(\frac{2\sqrt{-a}\sqrt{c}x^{\beta/2}}{\beta}\right)\right)}\right.\right.$$

✓ **Maple** : cpu = 0.111 (sec), leaf count = 171

$$\left\{y(x) = \frac{\left(c_1 \operatorname{BesselY}\left(\frac{b}{\beta}, \frac{2\sqrt{-ac}\,x^{\frac{\beta}{2}}}{\beta}\right) + \operatorname{BesselJ}\left(\frac{b}{\beta}, \frac{2\sqrt{-ac}\,x^{\frac{\beta}{2}}}{\beta}\right)\right) b - \left(c_1 \operatorname{BesselY}\left(\frac{b+\beta}{\beta}, \frac{2\sqrt{-ac}\,x^{\frac{\beta}{2}}}{\beta}\right) + \operatorname{BesselJ}\left(\right.\right.}{\left(c_1 \operatorname{BesselY}\left(\frac{b}{\beta}, \frac{2\sqrt{-ac}\,x^{\frac{\beta}{2}}}{\beta}\right) + \operatorname{BesselJ}\left(\frac{b}{\beta}, \frac{2\sqrt{-ac}\,x^{\frac{\beta}{2}}}{\beta}\right)\right) a}\right.$$

2.100 ODE No. 100

$$a + xy'(x) + xy(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.0920759 (sec), leaf count = 157

$$\left\{\left\{y(x) \to -\frac{c_1 J_1\left(2i\sqrt{-a}\sqrt{x}\right) + i\sqrt{-a}\sqrt{x}\left(-2J_0\left(2i\sqrt{-a}\sqrt{x}\right) + c_1 J_0\left(2i\sqrt{-a}\sqrt{x}\right) - c_1 J_2\left(2i\sqrt{-a}\sqrt{x}\right)\right)}{2x\left(J_1\left(2i\sqrt{-a}\sqrt{x}\right) - c_1 J_1\left(2i\sqrt{-a}\sqrt{x}\right)\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.079 (sec), leaf count = 59

$$\left\{y(x) = \frac{\left(c_1 \operatorname{BesselJ}\left(0, 2\sqrt{a}\sqrt{x}\right) + \operatorname{BesselY}\left(0, 2\sqrt{a}\sqrt{x}\right)\right)\sqrt{a}}{\left(c_1 \operatorname{BesselJ}\left(1, 2\sqrt{a}\sqrt{x}\right) + \operatorname{BesselY}\left(1, 2\sqrt{a}\sqrt{x}\right)\right)\sqrt{x}}\right\}$$

Hand solution

$$xy' + xy^2 + a = 0$$
$$y' = -\frac{a}{x} - y^2$$

This is Riccati first order non-linear. Let $y = -\frac{u'}{uR} = \frac{u'}{u}$, hence $y' = \frac{u''}{u} - \frac{(u')^2}{u^2}$. Equating this to RHS of the above gives

$$
\begin{aligned}
\frac{u''}{u} - \frac{(u')^2}{u^2} &= -\frac{a}{x} - \left(\frac{u'}{u}\right)^2 \\
\frac{u''}{u} &= -\frac{a}{x} \\
u'' + \frac{a}{x}u &= 0
\end{aligned}
$$

This is linear second order, an Emden Fowler ODE, with removal singularity. Solved using power series method. The solution is

$$
u = C_1\sqrt{x}\,\text{BesselJ}\left(1, 2\sqrt{ax}\right) + C_2\sqrt{x}\,\text{BesselY}\left(1, 2\sqrt{ax}\right)
$$

But

$$
\frac{d}{dx}\text{BesselJ}\left(1, 2\sqrt{ax}\right) = \frac{\sqrt{a}}{\sqrt{x}}\left(\text{BesselJ}\left(0, 2\sqrt{ax}\right) - \frac{1}{2}\frac{1}{\sqrt{ax}}\text{BesselJ}\left(1, 2\sqrt{ax}\right)\right)
$$

And

$$
\frac{d}{dx}\text{BesselY}\left(1, 2\sqrt{ax}\right) = \frac{\sqrt{a}}{\sqrt{x}}\left(\text{BesselY}\left(0, 2\sqrt{ax}\right) - \frac{1}{2}\frac{1}{\sqrt{ax}}\text{BesselY}\left(1, 2\sqrt{ax}\right)\right)
$$

Therefore,

$$
\begin{aligned}
u' = C_1\left(\frac{1}{2\sqrt{x}}\text{BesselJ}\left(1, 2\sqrt{a}\sqrt{x}\right) + \sqrt{x}\frac{\sqrt{a}}{\sqrt{x}}\left(\text{BesselJ}\left(0, 2\sqrt{a}\sqrt{x}\right) - \frac{1}{2}\frac{1}{\sqrt{ax}}\text{BesselJ}\left(1, 2\sqrt{a}\sqrt{x}\right)\right)\right) \\
+ C_2\left(\frac{1}{2\sqrt{x}}\text{BesselY}\left(1, 2\sqrt{a}\sqrt{x}\right) + \sqrt{x}\frac{\sqrt{a}}{\sqrt{x}}\left(\text{BesselY}\left(0, 2\sqrt{ax}\right) - \frac{1}{2}\frac{1}{\sqrt{ax}}\text{BesselY}\left(1, 2\sqrt{a}\sqrt{x}\right)\right)\right)
\end{aligned}
$$

Which is simplified to

$$
u' = C_1\sqrt{a}\,\text{BesselJ}\left(0, 2\sqrt{a}\sqrt{x}\right) + C_2\sqrt{a}\,\text{BesselY}\left(0, 2\sqrt{a}\sqrt{x}\right)
$$

Therefore, from $y = \frac{u'}{u}$, the solution is

$$
y = \frac{C_1\sqrt{a}\,\text{BesselJ}\left(0, 2\sqrt{a}\sqrt{x}\right) + C_2\sqrt{a}\,\text{BesselY}\left(0, 2\sqrt{a}\sqrt{x}\right)}{C_1\sqrt{x}\,\text{BesselJ}\left(1, 2\sqrt{a}\sqrt{x}\right) + C_2\sqrt{x}\,\text{BesselY}\left(1, 2\sqrt{a}\sqrt{x}\right)}
$$

Let $C = \frac{C_1}{C_2}$, hence

$$
y = \frac{C\sqrt{a}\,\text{BesselJ}\left(0, 2\sqrt{a}\sqrt{x}\right) + \sqrt{a}\,\text{BesselY}\left(0, 2\sqrt{a}\sqrt{x}\right)}{C\sqrt{x}\,\text{BesselJ}\left(1, 2\sqrt{a}\sqrt{x}\right) + \sqrt{x}\,\text{BesselY}\left(1, 2\sqrt{a}\sqrt{x}\right)}
$$

Verification

```
restart;
ode:=x*diff(y(x),x)+x*y(x)^2+a=0;
num:=_C1*sqrt(a)*BesselJ(0,2*sqrt(a)*sqrt(x))+sqrt(a)*BesselY(0,2*sqrt(a)*sqrt(x));
den:=_C1*sqrt(x)*BesselJ(1,2*sqrt(a)*sqrt(x))+sqrt(x)*BesselY(1,2*sqrt(a)*sqrt(x));
my_solution:=num/den;
odetest(y(x)=my_solution,ode);
0
```

2.101 ODE No. 101

$$xy'(x) + xy(x)^2 - y(x) = 0$$

✓ **Mathematica** : cpu = 0.0902297 (sec), leaf count = 18

$$\left\{\left\{y(x) \to \frac{2x}{x^2 + 2c_1}\right\}\right\}$$

✓ **Maple** : cpu = 0.015 (sec), leaf count = 16

$$\left\{y(x) = \frac{2x}{x^2 + 2c_1}\right\}$$

Hand solution

$$\begin{aligned} xy' + xy^2 - y &= 0 \\ y' &= \frac{1}{x}y - y^2 \end{aligned} \tag{1}$$

This is of the form $y' = f_0 + f_1 y + f_2 y^2$ with $f_0 = 0, f_1 = \frac{1}{x}, f_2 = -1$. Since $f_0 = 0$ this is Bernoulli differential equation. We always start by dividing by y^2

$$\frac{y'}{y^2} = \frac{1}{x}\frac{1}{y} - 1$$

Then $u = \frac{1}{y}$ or $y = \frac{1}{u}$, therefore $y' = -\frac{u'}{u^2}$. Equating this to RHS of (1) gives

$$\begin{aligned} -\frac{u'}{u^2}u^2 &= \frac{1}{x}u - 1 \\ -u' &= \frac{u}{x} - 1 \\ u' + \frac{u}{x} &= 1 \end{aligned}$$

Integrating factor is $e^{\int \frac{1}{x} dx} = x$ and the above becomes

$$d(xu) = x$$

Integrating

$$
\begin{aligned}
xu &= \frac{x^2}{2} + C \\
u &= \frac{x}{2} + \frac{C}{x} \\
&= \frac{x^2 + 2C}{2x}
\end{aligned}
$$

Hence

$$
\begin{aligned}
y &= \frac{1}{u} \\
&= \frac{2x}{x^2 + 2C}
\end{aligned}
$$

Verification

```
restart;
ode:=x*diff(y(x),x)+x*y(x)^2-y=0;
my_solution:=2*x/(x^2+2*_C1);
odetest(y(x)=my_solution,ode);
0
```

2.102 ODE No. 102

$$
-ax^3 + xy'(x) + xy(x)^2 - y(x) = 0
$$

✓ **Mathematica** : cpu = 0.0997935 (sec), leaf count = 36

$$
\left\{\left\{y(x) \to \sqrt{a}x \tanh\left(\frac{1}{2}(\sqrt{a}x^2 + 2\sqrt{a}c_1)\right)\right\}\right\}
$$

✓ **Maple** : cpu = 0.049 (sec), leaf count = 22

$$
\left\{y(x) = \sqrt{a}\, x \tanh\left(\frac{(x^2 + 2c_1)\sqrt{a}}{2}\right)\right\}
$$

Hand solution

$$
xy' + xy^2 - y - ax^3 = 0
$$

This is Riccati non-linear first order. But using the transformation $y = xv$ it is transformed to easily solved ODE

$$
y' = v + xv'
$$

Therefore the ODE becomes

$$
\begin{aligned}
x\left(v+xv'\right)+x(xv)^2-xv-ax^3&=0\\
xv+x^2v'+x^3v^2-xv-ax^3&=0\\
x^2v'+x^3v^2-ax^3&=0\\
v'+xv^2-ax&=0\\
\frac{dv}{dx}&=x\left(a-v^2\right)\\
\frac{dv}{a-v^2}&=xdx
\end{aligned}
$$

Integrating

$$
\begin{aligned}
\frac{1}{\sqrt{a}}\tanh^{-1}\left(\frac{v}{\sqrt{a}}\right)&=\frac{x^2}{2}+C\\
\tanh^{-1}\left(\frac{v}{\sqrt{a}}\right)&=\sqrt{a}\left(\frac{x^2}{2}+C\right)\\
\frac{v}{\sqrt{a}}&=\tanh\left(\sqrt{a}\left(\frac{x^2}{2}+C\right)\right)\\
v&=\sqrt{a}\tanh\left(\sqrt{a}\left(\frac{x^2}{2}+C\right)\right)
\end{aligned}
$$

Therefore

$$
\begin{aligned}
y&=xv\\
&=x\sqrt{a}\tanh\left(\sqrt{a}\left(\frac{x^2}{2}+C\right)\right)
\end{aligned}
$$

Verification

```
restart;
ode:=x*diff(y(x),x)+x*y(x)^2-y(x)-a*x^3=0;
my_solution:=x*sqrt(a)*tanh(sqrt(a)*(x^2/2+_C1));
odetest(y(x)=my_solution,ode);
0
```

2.103 ODE No. 103

$$-x^3 - (2x^2+1)\, y(x) + xy'(x) + xy(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.175563 (sec), leaf count = 90

$$\left\{\left\{y(x) \to \frac{x\left(e^{\sqrt{2}x^2} + \sqrt{2}e^{\sqrt{2}x^2} + e^{2\sqrt{2}c_1} - \sqrt{2}e^{2\sqrt{2}c_1}\right)}{e^{\sqrt{2}x^2} + e^{2\sqrt{2}c_1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.039 (sec), leaf count = 29

$$\left\{y(x) = \frac{\left(2\tanh\left(\frac{(x^2+2c_1)\sqrt{2}}{2}\right) + \sqrt{2}\right)\sqrt{2}\, x}{2}\right\}$$

Hand solution

$$xy' - xy^2 - (2x^2+1)\, y - x^3 = 0$$

This is Riccati non-linear first order. Converting it to standard form

$$\begin{aligned} y' &= x^2 + \frac{(2x^2+1)}{x} y + y^2 \\ &= f_0 + f_1 y + f_2 y^2 \end{aligned} \tag{1}$$

Using standard transformation $y = -\frac{u'}{uf_2} = -\frac{u'}{u}$, therefore

$$y' = -\frac{u''}{u} + \frac{(u')^2}{u^2}$$

Equating the above to RHS of (1) gives

$$\begin{aligned} -\frac{u''}{u} + \frac{(u')^2}{u^2} &= x^2 - \frac{(2x^2+1)}{x}\frac{u'}{u} + \left(-\frac{u'}{u}\right)^2 \\ -\frac{u''}{u} &= x^2 - \frac{(2x^2+1)}{x}\frac{u'}{u} \\ -u'' &= ux^2 - \frac{(2x^2+1)}{x}u' \end{aligned}$$

$$-u'' + \frac{(2x^2+1)}{x}u' - ux^2 = 0$$

$$xu'' - (2x^2+1)\, u' + ux^3 = 0 \tag{2}$$

This is second order linear ODE (Sturm-Liouville). Using the transformation $t = \frac{x^2}{2}$, then $\frac{dt}{dx} = x$ and

$$\frac{du}{dx} = \frac{du}{dt}\frac{dt}{dx} = x\frac{du}{dt} = \sqrt{2t}\frac{du}{dt}$$

And

$$\begin{aligned}
\frac{d^2u}{dx^2} &= \frac{d}{dx}\left(\frac{du}{dx}\right) \\
&= \frac{d}{dx}\left(x\frac{du}{dt}\right) \\
&= \frac{du}{dt} + x\frac{d^2u}{dt^2}\frac{dt}{dx} \\
&= \frac{du}{dt} + x\frac{d^2u}{dt^2}x \\
&= \frac{du}{dt} + x^2\frac{d^2u}{dt^2} \\
&= \frac{du}{dt} + 2t\frac{d^2u}{dt^2}
\end{aligned}$$

Hence (2) can be written as

$$\begin{aligned}
\sqrt{2t}\left(\frac{du}{dt} + 2t\frac{d^2u}{dt^2}\right) - (2(2t)+1)\sqrt{2t}\frac{du}{dt} + u(2t)^{\frac{3}{2}} &= 0 \\
\sqrt{2t}\frac{du}{dt} + \sqrt{2t}2t\frac{d^2u}{dt^2} - (4t+1)\sqrt{2t}\frac{du}{dt} + u\left(\sqrt{2t}\right)^3 &= 0 \\
\frac{du}{dt} + 2t\frac{d^2u}{dt^2} - (4t+1)\frac{du}{dt} + 2tu &= 0 \\
\frac{du}{dt} + 2t\frac{d^2u}{dt^2} - 4t\frac{du}{dt} - \frac{du}{dt} + 2tu &= 0 \\
2t\frac{d^2u}{dt^2} - 4t\frac{du}{dt} + 2tu &= 0 \\
2t\left(\frac{d^2u}{dt^2} - 2\frac{du}{dt} + u\right) &= 0
\end{aligned}$$

Hence

$$\frac{d^2u}{dt^2} - 2\frac{du}{dt} + u = 0$$

This is linear second order with constant coefficients. The indicial equation is $\lambda^2 - 2\lambda + 1 = 0$ with roots $\lambda = \frac{-b\pm\sqrt{b^2-4ac}}{2a} = \frac{2\pm\sqrt{4-4}}{2} = 1$ double root. Hence

$$u(t) = Ae^t + tBe^t$$

Since $t = \frac{x^2}{2}$ then

$$u(x) = Ae^{\frac{x^2}{2}} + \frac{x^2}{2}Be^{\frac{x^2}{2}}$$

But $y = -\frac{u'}{u}$ therefore

$$\begin{aligned}
u' &= Axe^{\frac{x^2}{2}} + \left(xBe^{\frac{x^2}{2}} + \frac{x^2}{2}xBe^{\frac{x^2}{2}}\right) \\
&= Axe^{\frac{x^2}{2}} + xBe^{\frac{x^2}{2}} + \frac{x^3}{2}Be^{\frac{x^2}{2}}
\end{aligned}$$

Hence

$$y=-\frac{Axe^{\frac{x^2}{2}}+xBe^{\frac{x^2}{2}}+\frac{x^3}{2}Be^{\frac{x^2}{2}}}{Ae^{\frac{x^2}{2}}+\frac{x^2}{2}Be^{\frac{x^2}{2}}}=-\frac{Axe^{\frac{x^2}{2}}+B\left(xe^{\frac{x^2}{2}}+\frac{x^3}{2}e^{\frac{x^2}{2}}\right)}{Ae^{\frac{x^2}{2}}+\frac{x^2}{2}Be^{\frac{x^2}{2}}}$$

Let $C=\frac{A}{B}$

$$\begin{aligned}y&=-\frac{xe^{\frac{x^2}{2}}\left(C+1+\frac{x^2}{2}\right)}{e^{\frac{x^2}{2}}\left(C+\frac{x^2}{2}\right)}\\&=-\frac{x\left(C+1+\frac{x^2}{2}\right)}{C+\frac{x^2}{2}}\\&=-\frac{x\left(2C+2+x^2\right)}{2C+x^2}\\&=-\frac{x\left(C_1+2+x^2\right)}{C_1+x^2}\end{aligned}$$

Verification

```
restart;
ode:=x*diff(y(x),x)-x*y(x)^2-(2*x^2+1)*y(x)-x^3;
my_solution:=-(x*(_C1+2+x^2))/(_C1+x^2);
odetest(y(x)=my_solution,ode);
0
```

2.104 ODE No. 104

$$axy(x)^2+bx+xy'(x)+2y(x)=0$$

✓ **Mathematica** : cpu = 0.129029 (sec), leaf count = 43

$$\left\{\left\{y(x)\to-\frac{1}{ax}-\sqrt{\frac{b}{a}}\tan\left(ax\sqrt{\frac{b}{a}}-c_1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.062 (sec), leaf count = 63

$$\left\{y(x)=-\frac{\frac{e^{-2i\sqrt{a}\sqrt{b}\,x}}{c_1-\frac{ie^{-2i\sqrt{a}\sqrt{b}\,x}}{2\sqrt{a}\sqrt{b}}}-\frac{i\sqrt{a}\sqrt{b}\,x-1}{x}}{a}\right\}$$

Hand solution

$xy' + axy^2 + 2y + bx = 0$This is Riccati non-linear first order. Converting it to standard form

$$
\begin{aligned}
y' &= -b - \frac{2}{x}y - ay^2 \qquad (1)\\
&= f_0 + f_1 y + f_2 y^2
\end{aligned}
$$

Using transformation suggested by Kamke $y = u(x) - \frac{1}{ax}$ then $y' = u' + \frac{1}{ax^2}$. Equating this to RHS of (1) gives

$$
\begin{aligned}
u' + \frac{1}{ax^2} &= -b - \frac{2}{x}\left(u - \frac{1}{ax}\right) - a\left(u - \frac{1}{ax}\right)^2\\
&= -b - \frac{2}{x}u + \frac{2}{ax^2} - a\left(u^2 + \frac{1}{a^2x^2} - \frac{2u}{ax}\right)\\
&= -b - \frac{2}{x}u + \frac{2}{ax^2} - au^2 - \frac{1}{ax^2} + \frac{2u}{x}
\end{aligned}
$$

Hence

$$
\begin{aligned}
u' &= -b - au^2\\
\frac{du}{dx} &= -b - au^2
\end{aligned}
$$

This is separable

$$
\frac{du}{b + au^2} = -dx
$$

Integrating

$$
\begin{aligned}
\int \frac{du}{b + au^2} &= -x + C\\
\frac{1}{\sqrt{ba}} \arctan\left(\frac{au}{\sqrt{ba}}\right) &= -x + C\\
\arctan\left(\frac{au}{\sqrt{ba}}\right) &= -\sqrt{ba}\,x + C\\
u &= \frac{\sqrt{ba}}{a} \tan\left(-\sqrt{ba}\,x + C\right)
\end{aligned}
$$

Hence

$$
\begin{aligned}
y &= u - \frac{1}{ax}\\
&= \frac{\sqrt{ba}}{a} \tan\left(-\sqrt{ba}\,x + C\right) - \frac{1}{ax}
\end{aligned}
$$

Verification

```
restart;
ode:=x*diff(y(x),x)+a*x*y(x)^2+2*y(x)+b*x = 0;
my_solution:=sqrt(b*a)/a*tan(-sqrt(b*a)*x+_C1)-1/(a*x);
odetest(y(x)=my_solution,ode);
0
```

2.105 ODE No. 105

$$axy(x)^2 + by(x) + cx + d + xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.243652 (sec), leaf count = 473

$$\left\{\left\{y(x) \to \frac{c_1\left(i\sqrt{a}e^{-i\sqrt{a}\sqrt{c}x}\left(b(-\sqrt{c}) - i\sqrt{a}d\right)U\left(1 - \frac{-\sqrt{c}b-i\sqrt{a}d}{2\sqrt{c}}, b+1, 2i\sqrt{a}\sqrt{c}x\right) - i\sqrt{a}\sqrt{c}e^{-i\sqrt{a}\sqrt{c}x}U\left(-\frac{-\sqrt{c}b-}{2\sqrt{}}\right.\right.}{a\left(c_1e^{-i\sqrt{a}\sqrt{c}x}U\left(-\frac{-\sqrt{c}b-i\sqrt{a}d}{2\sqrt{c}}, b, 2i\sqrt{}\right.\right.}\right.\right.$$

✓ **Maple** : cpu = 0.245 (sec), leaf count = 844

$$\left\{y(x) = -\frac{4\left(\left(\left(ad+\sqrt{-ac}\,b\right)a\,c^3\,\text{KummerM}\left(\frac{ab\,c^2+2\sqrt{-ac}\,acd+(-ac)^{\frac{3}{2}}d}{2a\,c^2}, \frac{((b+1)c+\sqrt{-ac}\,d)ac+(-ac)^{\frac{3}{2}}d}{a\,c^2}, 2\sqrt{-}\right.\right.\right.}{4\left(\left(bc-\sqrt{-ac}\,d\right)a^2c^2\,\text{KummerM}\left(\frac{ab\,c^2+2\sqrt{-ac}\,acd+(-ac)^{\frac{3}{2}}d}{2a\,c^2}, \frac{((b+1)c+\sqrt{-ac}\,d)ac+(-ac)^{\frac{3}{2}}d}{a\,c^2}, 2\sqrt{-ac}\,x\right) + (\right.}\right.$$

2.106 ODE No. 106

$$\frac{1}{2}(a-b)y(x) + x^a y(x)^2 + x^b + xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.231483 (sec), leaf count = 40

$$\left\{\left\{y(x) \to -x^{\frac{b-a}{2}}\tan\left(\frac{2x^{\frac{a+b}{2}}}{a+b} - c_1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.069 (sec), leaf count = 41

$$\left\{y(x) = -x^{-\frac{a}{2}+\frac{b}{2}}\tan\left(\frac{c_1(a+b)+2x^{\frac{a}{2}+\frac{b}{2}}}{a+b}\right)\right\}$$

2.107 ODE No. 107

$$ax^{\alpha}y(x)^2+by(x)-cx^{\beta}+xy'(x)=0$$

✓ **Mathematica** : cpu = 0.377808 (sec), leaf count = 1415

$$\left\{\left\{y(x)\to \frac{x^{1-\alpha}\left((-1)^{\frac{\alpha-b}{\alpha+\beta}} a^{\frac{\alpha-b}{\alpha+\beta}+\frac{1}{2}\left(\frac{b}{\alpha+\beta}-\frac{\alpha}{\alpha+\beta}\right)}(\alpha+\beta)^{\frac{\alpha}{\alpha+\beta}-\frac{b}{\alpha+\beta}+1}\left(\alpha^2+2\beta\alpha+\beta^2\right)^{-\frac{\alpha-b}{\alpha+\beta}}\left(\frac{\alpha-b}{\alpha+\beta}+\frac{1}{2}\left(\frac{b}{\alpha+\beta}-\frac{\alpha}{\alpha+\beta}\right)\right)\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.271 (sec), leaf count = 174

$$\left\{y(x)=-\frac{\left(c_1\,\mathrm{BesselY}\left(\frac{b+\beta}{\alpha+\beta},\frac{2\sqrt{-ac}\,x^{\frac{\alpha}{2}+\frac{\beta}{2}}}{\alpha+\beta}\right)+\mathrm{BesselJ}\left(\frac{b+\beta}{\alpha+\beta},\frac{2\sqrt{-ac}\,x^{\frac{\alpha}{2}+\frac{\beta}{2}}}{\alpha+\beta}\right)\right)\sqrt{-ac}\,x^{-\alpha+1}x^{\frac{\alpha}{2}+\frac{\beta}{2}}}{\left(c_1\,\mathrm{BesselY}\left(\frac{-\alpha+b}{\alpha+\beta},\frac{2\sqrt{-ac}\,x^{\frac{\alpha}{2}+\frac{\beta}{2}}}{\alpha+\beta}\right)+\mathrm{BesselJ}\left(\frac{-\alpha+b}{\alpha+\beta},\frac{2\sqrt{-ac}\,x^{\frac{\alpha}{2}+\frac{\beta}{2}}}{\alpha+\beta}\right)\right)ax}\right\}$$

2.108 ODE No. 108

$$xy'(x)+y(x)+y(x)^2(-\log(x))=0$$

✓ **Mathematica** : cpu = 0.0826525 (sec), leaf count = 15

$$\left\{\left\{y(x)\to\frac{1}{\log(x)+c_1x+1}\right\}\right\}$$

✓ **Maple** : cpu = 0.02 (sec), leaf count = 13

$$\left\{y(x)=\frac{1}{c_1x+\ln(x)+1}\right\}$$

Hand solution

$xy'+axy^2+2y+bx=0$This is Riccati non-linear first order. Converting it to standard form

$$xy'-y^2\ln x+y=0 \tag{1}$$

$$\begin{aligned}y'&=-\frac{1}{x}y+y^2\frac{\ln x}{x}\\&=f_0+f_1y+f_2y^2\end{aligned}$$

This is Bernoulli non-linear first order ODE since $f_0 = 0$. Dividing by y^2 gives

$$\frac{y'}{y^2} = -\frac{1}{x}\frac{1}{y} + \frac{\ln x}{x}$$

Let $u = \frac{1}{y}$, hence $u' = -\frac{y'}{y^2}$, and the above becomes

$$\begin{aligned} -u' &= -\frac{1}{x}u + \frac{\ln x}{x} \\ u' - \frac{1}{x}u &= -\frac{\ln x}{x} \end{aligned}$$

Integrating factor is $\mu = e^{\int -\frac{1}{x}dx} = e^{-\ln x} = \frac{1}{x}$, hence

$$d(\mu u) = -\mu \frac{\ln x}{x}$$

Integrating

$$\begin{aligned} \frac{1}{x}u &= -\int \frac{1}{x^2} \ln x dx + C \\ &= -\left(-\frac{\ln x}{x} - \frac{1}{x}\right) + C \end{aligned}$$

Therefore

$$u = \ln x + 1 + Cx$$

Since $u = \frac{1}{y}$ then

$$y = \frac{1}{\ln x + 1 + Cx}$$

Verification

```
restart;
ode:=x*diff(y(x),x)-y(x)^2*ln(x)+y(x)=0;
my_solution:=1/(ln(x)+1+_C1*x);
odetest(y(x)=my_solution,ode);
0
```

2.109 ODE No. 109

$$xy'(x) - y(x)(2y(x)\log(x) - 1) = 0$$

✓ **Mathematica** : cpu = 0.0814038 (sec), leaf count = 17

$$\left\{\left\{y(x) \to \frac{1}{2\log(x) + c_1 x + 2}\right\}\right\}$$

✓ **Maple** : cpu = 0.014 (sec), leaf count = 15

$$\left\{y(x) = \frac{1}{c_1 x + 2\ln(x) + 2}\right\}$$

Hand solution

$xy' + axy^2 + 2y + bx = 0$This is Riccati non-linear first order. Converting it to standard form

$$\begin{aligned} xy' - y(2y\ln x - 1) &= 0 \\ xy' &= y(2y\ln x - 1) \\ y' &= -\frac{1}{x}y + y^2\frac{2}{x}\ln x \quad (1) \\ y' &= f_0 + f_1 y + f_2 y^2 \end{aligned}$$

This is Bernoulli non-linear first order ODE since $f_0 = 0$. Dividing by y^2 gives

$$\frac{y'}{y^2} = -\frac{1}{x}\frac{1}{y} + \frac{2}{x}\ln x$$

Putting $u = \frac{1}{y}$, hence $u' = -\frac{y'}{y^2}$, and the above becomes

$$\begin{aligned} -u' &= -\frac{1}{x}u + 2\frac{\ln x}{x} \\ -u' + \frac{1}{x}u &= 2\frac{\ln x}{x} \\ u' - \frac{1}{x}u &= -2\frac{\ln x}{x} \end{aligned}$$

Integrating factor is $\mu = e^{\int -\frac{1}{x}dx} = e^{-\ln x} = \frac{1}{x}$, hence

$$\begin{aligned} d(\mu u) &= -2\mu\frac{\ln x}{x} \\ d\left(\frac{1}{x}u\right) &= -2\frac{\ln x}{x^2} \end{aligned}$$

Integrating

$$\begin{aligned} \frac{1}{x}u &= -2\int \frac{1}{x^2}\ln x dx + C \\ &= -2\left(-\frac{\ln x}{x} - \frac{1}{x}\right) + C \end{aligned}$$

Therefore

$$\begin{aligned} u &= -2x\left(-\frac{\ln x}{x} - \frac{1}{x}\right) + Cx \\ &= 2(\ln x + 1) + Cx \end{aligned}$$

Since $u = \frac{1}{y}$ then

$$y = \frac{1}{2(\ln x + 1) + Cx}$$

Verification

```
restart;
ode:=x*diff(y(x),x)-y(x)*(2*y(x)*ln(x)-1)=0;
my_solution:=1/(2*(ln(x)+1)+_C1*x);
odetest(y(x)=my_solution,ode);
0
```

2.110 ODE No. 110

$$f(x)\left(y(x)^2 - x^2\right) + xy'(x) = 0$$

✗ **Mathematica** : cpu = 13.4693 (sec), leaf count = 0 , could not solve

```
DSolve[f[x]*(-x^2 + y[x]^2) + x*Derivative[1][y][x] == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(x*diff(y(x),x)+f(x)*(y(x)^2-x^2) = 0,y(x))
```

Hand solution

$xy' + axy^2 + 2y + bx = 0$This is Riccati non-linear first order. Converting it to standard form

$$\begin{aligned} xy' + f(x)\left(y^2 - x^2\right) - y = 0 \\ xy' &= -f\left(y^2 - x^2\right) + y \\ y' &= -\frac{f}{x}y^2 + fx + \frac{1}{x}y \end{aligned} \tag{1}$$

This is Riccati non-linear first order oder. There are two particular solutions $y_p = \pm x$. Using $y_p = x$, then using the transformation $y = y_p + \frac{1}{u}$, gives $y' = 1 - \frac{u'}{u^2}$ and (1) becomes

$$\begin{aligned} 1 - \frac{u'}{u^2} &= -\frac{f}{x}\left(x + \frac{1}{u}\right)^2 + fx + \frac{1}{x}\left(x + \frac{1}{u}\right) \\ &= -\frac{f}{x}\left(x^2 + \frac{1}{u^2} + 2\frac{x}{u}\right) + fx + \left(1 + \frac{1}{ux}\right) \\ &= -fx - \frac{f}{x}\frac{1}{u^2} - 2\frac{f}{u} + fx + 1 + \frac{1}{ux} \\ &= -\frac{f}{x}\frac{1}{u^2} - 2\frac{f}{u} + 1 + \frac{1}{ux} \end{aligned}$$

Hence

$$
\begin{aligned}
u^2 - u' &= -\frac{f}{x} - 2fu + u^2 + \frac{u}{x} \\
-u' &= -\frac{f}{x} - 2fu + \frac{u}{x} \\
-u' - \frac{u}{x} + 2fu &= \frac{-f}{x} \\
u' + \frac{u}{x} - 2fu &= \frac{-f}{x} \\
u' + u\left(\frac{1}{x} - 2f\right) &= \frac{-f}{x}
\end{aligned}
$$

Integrating factor is $\mu = e^{\int \frac{1}{x} - 2f} = e^{\ln x} e^{-2\int f dx} = xe^{-2\int f dx}$, hence

$$
\begin{aligned}
d(\mu u) &= -\mu \frac{f}{x} \\
d\left(xe^{-2\int f dx} u\right) &= -\left(xe^{-2\int f dx}\right) \frac{f}{x} \\
d\left(xe^{-2\int f dx} u\right) &= -f\left(e^{-2\int f dx}\right)
\end{aligned}
$$

Integrating

$$
\begin{aligned}
xe^{-2\int f dx} u &= -\int f\left(e^{-2\int f dx}\right) + C \\
u &= -\frac{1}{x} e^{2\int f dx} \int f\left(e^{-2\int f dx}\right) + C\frac{1}{x} e^{2\int f dx}
\end{aligned}
$$

Since $u = \frac{1}{y}$ then

$$
\begin{aligned}
y &= \frac{1}{-\frac{1}{x} e^{2\int f dx} \int f\left(e^{-2\int f dx}\right) + C\frac{1}{x} e^{2\int f dx}} \\
&= \frac{xe^{-2\int f dx}}{-\int fe^{-2\int f dx} dx + C}
\end{aligned}
$$

Verification (Maple does not verify it, need to look more into this)

```
ode:=x*diff(y(x),x)+f(x)*(y(x)^2-x^2) =0;
dsolve(ode,y(x));
fint:=Int(f(x),x);
my_solution:=x*exp(-2*fint)/(-Int(f*exp(-2*fint),x)+_C1);
odetest(y(x)=my_solution,ode);
not zero
```

2.111 ODE No. 111

$$xy'(x) + y(x)^3 + 3xy(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.508279 (sec), leaf count = 55

$$\text{Solve}\left[-3x = \frac{2e^{\frac{1}{2}\left(\frac{1}{y(x)}-3x\right)^2}}{\sqrt{2\pi}\text{erfi}\left(\frac{\frac{1}{y(x)}-3x}{\sqrt{2}}\right)+2c_1}, y(x)\right]$$

✓ **Maple** : cpu = 0.128 (sec), leaf count = 54

$$\left\{c_1 + \frac{\sqrt{2}\sqrt{\pi}\,\operatorname{erf}\left(\frac{(3ixy(x)-i)\sqrt{2}}{2y(x)}\right)}{2} - \frac{ie^{\frac{(3xy(x)-1)^2}{2y(x)^2}}}{3x} = 0\right\}$$

2.112 ODE No. 112

$$-\sqrt{x^2 + y(x)^2} + xy'(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 0.124761 (sec), leaf count = 13

$$\{\{y(x) \to x\sinh(\log(x) + c_1)\}\}$$

✓ **Maple** : cpu = 0.05 (sec), leaf count = 27

$$\left\{-c_1 + \frac{y(x)}{x^2} + \frac{\sqrt{x^2 + y(x)^2}}{x^2} = 0\right\}$$

Hand solution

$$xy' = \sqrt{x^2 + y^2} + y$$

Let $y = xv$, then $y' = v + xv'$ and the above becomes

$$\begin{aligned}
x\left(v + xv'\right) &= \sqrt{x^2 + (xv)^2} + xv \\
x\left(v + xv'\right) &= x\sqrt{1 + v^2} + xv \\
\left(v + xv'\right) &= \sqrt{1 + v^2} + v \\
xv' &= \sqrt{1 + v^2}
\end{aligned}$$

Separable.

$$\frac{dv}{\sqrt{1+v^2}} = \frac{1}{x}dx$$

Integrating

$$\begin{aligned} \operatorname{arcsinh}(v) &= \ln x + C \\ v &= \sinh(\ln x + C) \end{aligned}$$

Since $y = xv$ then

$$y = x\sinh(\ln x + C)$$

Verification

```
ode:=x*diff(y(x),x)=sqrt(x^2+y(x)^2)+y(x);
y0:=x*sinh(ln(x)+_C1);
odetest(y(x)=y0,ode) assuming x>= 0;
0
```

2.113 ODE No. 113

$$a\sqrt{x^2 + y(x)^2} + xy'(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 0.124043 (sec), leaf count = 16

$$\{\{y(x) \to x\sinh(-a\log(x) + c_1)\}\}$$

✓ **Maple** : cpu = 0.036 (sec), leaf count = 33

$$\left\{-c_1 + \frac{x^a y(x)}{x} + \frac{\sqrt{x^2 + y(x)^2}\, x^a}{x} = 0\right\}$$

Hand solution

$$xy' = -a\sqrt{x^2 + y^2} + y$$

Let $y = xv$, then $y' = v + xv'$ and the above becomes

$$
\begin{aligned}
x(v+xv') &= -a\sqrt{x^2+(xv)^2}+xv \\
x(v+xv') &= -ax\sqrt{1+v^2}+xv \\
(v+xv') &= -a\sqrt{1+v^2}+v \\
xv' &= -a\sqrt{1+v^2}
\end{aligned}
$$

Separable.

$$
\frac{dv}{\sqrt{1+v^2}} = \frac{-a}{x}dx
$$

Integrating

$$
\begin{aligned}
\operatorname{arcsinh}(v) &= -a\ln x + C \\
v &= \sinh(C - a\ln x)
\end{aligned}
$$

Since $y = xv$ then

$$
y = x\sinh(C - a\ln x)
$$

Verification

```
ode:=x*diff(y(x),x)=-a*sqrt(x^2+y(x)^2)+y(x);
y0:=x*sinh(_C1-a*ln(x));
odetest(y(x)=y0,ode) assuming x >=0;
0
```

2.114 ODE No. 114

$$
-x\sqrt{x^2+y(x)^2}+xy'(x)-y(x)=0
$$

✓ **Mathematica** : cpu = 0.120998 (sec), leaf count = 12

$$
\{\{y(x)\to x\sinh(x+c_1)\}\}
$$

✓ **Maple** : cpu = 3.354 (sec), leaf count = 28

$$
\left\{-c_1 - x - \ln(x) + \ln\left(y(x)+\sqrt{x^2+y(x)^2}\right) = 0\right\}
$$

Hand solution

$$xy' = x\sqrt{x^2+y^2} + y$$

Let $y = xv$, then $y' = v + xv'$ and the above becomes

$$\begin{aligned}
x(v+xv') &= x\sqrt{x^2+(xv)^2} + xv \\
(v+xv') &= x\sqrt{1+v^2} + v \\
xv' &= x\sqrt{1+v^2} \\
v' &= \sqrt{1+v^2}
\end{aligned}$$

Separable.

$$\frac{dv}{\sqrt{1+v^2}} = dx$$

Integrating

$$\begin{aligned}
\operatorname{arcsinh}(v) &= x + C \\
v &= \sinh(x+C)
\end{aligned}$$

Since $y = xv$ then

$$y = x\sinh(x+C)$$

Verification

```
ode:=x*diff(y(x),x)=x*sqrt(x^2+y(x)^2)+y(x);
y0:=x*sinh(x+_C1);
odetest(y(x)=y0,ode) assuming x>0;
0
```

2.115 ODE No. 115

$$-x(y(x)-x)\sqrt{x^2+y(x)^2}+xy'(x)-y(x)=0$$

✓ **Mathematica** : cpu = 0.30524 (sec), leaf count = 221

$$\left\{\left\{y(x)\to\frac{x-2\sqrt{x^2\tanh^2\left(\frac{1}{2}\left(-\sqrt{2}x^2-2\sqrt{2}c_1\right)\right)-x^2\tanh^4\left(\frac{1}{2}\left(-\sqrt{2}x^2-2\sqrt{2}c_1\right)\right)}}{-1+2\tanh^2\left(\frac{1}{2}\left(-\sqrt{2}x^2-2\sqrt{2}c_1\right)\right)}\right\},\left\{y(x)\to\frac{x+2\sqrt{x^2\tan}}{}\right.\right.$$

✓ **Maple** : cpu = 0.221 (sec), leaf count = 49

$$\left\{\frac{\sqrt{2}\,x^2}{2}-c_1-\ln(x)+\ln\left(\frac{2\left(x+y(x)+\sqrt{2x^2+2y(x)^2}\right)x}{-x+y(x)}\right)=0\right\}$$

Hand solution

$$xy'=x(y-x)\sqrt{y^2-x^2}+y$$

Let $y=xu$, then $y'=u+xu'$ and the above becomes

$$\begin{aligned}x(u+xu')&=x(xu-x)\sqrt{(xu)^2-x^2}+xu\\(u+xu')&=(xu-x)\sqrt{(xu)^2-x^2}+u\\xu'&=(xu-x)\,x\sqrt{u^2-1}\\u'&=x(u-1)\sqrt{u^2-1}\end{aligned}$$

Separable.

$$\begin{aligned}\frac{du}{(u-1)\sqrt{u^2-1}}&=xdx\\\frac{-u-1}{\sqrt{u^2-1}}&=\frac{x^2}{2}+C\end{aligned}$$

But $y=xu$, hence

$$\frac{-\frac{y}{x}-1}{\sqrt{\left(\frac{y}{x}\right)^2-1}}=\frac{x^2}{2}+C$$

Let $\frac{y}{x} = z$

$$\begin{aligned}
\frac{-z-1}{\sqrt{z^2-1}} &= \frac{x^2}{2} + C \\
-z-1 &= \sqrt{z^2-1}\left(\frac{x^2}{2} + C\right) \\
(-z-1)^2 &= \left(z^2-1\right)\left(\frac{x^2}{2} + C\right)^2 \\
z^2 + 1 + 2z &= z^2\left(\frac{x^2}{2} + C\right)^2 - \left(\frac{x^2}{2} + C\right)^2
\end{aligned}$$

$$z^2\left(1 - \left(\frac{x^2}{2} + C\right)^2\right) + 2z + 1 + \left(\frac{x^2}{2} + C\right)^2 = 0$$

Solving for z (quadratic formula, some conditions apply), one of the solutions is

$$z = \frac{4Cx^2 + 4C^2 + x^4 + 4}{4Cx^2 + 4C^2 + x^4 - 4}$$

Hence

$$y = x\frac{4Cx^2 + 4C^2 + x^4 + 4}{4Cx^2 + 4C^2 + x^4 - 4}$$

Need to work on verification. Kamke gives the final solution as

$$y = x\frac{-2Cx^2 + C^2 + x^4 + 4}{-2Cx^2 + C^2 + x^4 - 4}$$

I am not sure where my error now is. Need to look at this again.

2.116 ODE No. 116

$$-x\sqrt{\left(y(x)^2 - 4x^2\right)\left(y(x)^2 - x^2\right)} + xy'(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 0.631941 (sec), leaf count = 121

$$\text{Solve}\left[\frac{\sqrt{\frac{\frac{y(x)}{x}+2}{\frac{y(x)}{x}-1}}\sqrt{\frac{\frac{y(x)}{x}+1}{\frac{2y(x)}{x}+4}}F\left(\sin^{-1}\left(\sqrt{\frac{2}{3}}\sqrt{\frac{\frac{y(x)}{x}-2}{\frac{y(x)}{x}-1}}\right)|\frac{9}{8}\right)}{\sqrt{\frac{\frac{y(x)}{x}+1}{\frac{y(x)}{x}-1}}} = \frac{x^2}{2} + c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.23 (sec), leaf count = 86

$$\left\{c_1+\int^{y(x)}-\frac{\_b}{\sqrt{4\_b^4-5\_b^2\_f^2+\_f^4}}d\_f+\int_{\_b}^{x}\frac{\sqrt{4\_a^4-5\_a^2y(x)^2+y(x)^4}\_a+y(x)}{\sqrt{4\_a^4-5\_a^2y(x)^2+y(x)^4}}d\_a=0\right\}$$

2.117 ODE No. 117

$$xy'(x)+x\left(-e^{\frac{y(x)}{x}}\right)-y(x)-x=0$$

✓ **Mathematica** : cpu = 0.188868 (sec), leaf count = 21

$$\left\{\left\{y(x)\to -x\log\left(-1+\frac{e^{-c_1}}{x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.116 (sec), leaf count = 20

$$\left\{y(x)=\left(c_1+\ln\left(-\frac{x}{x\,\mathrm{e}^{c_1}-1}\right)\right)x\right\}$$

2.118 ODE No. 118

$$xy'(x)-y(x)\log(y(x))=0$$

✓ **Mathematica** : cpu = 0.086483 (sec), leaf count = 13

$$\left\{\left\{y(x)\to e^{e^{c_1x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.089 (sec), leaf count = 8

$$\{y(x)=\mathrm{e}^{c_1x}\}$$

2.119 ODE No. 119

$$xy'(x)-y(x)(\log(xy(x))-1)=0$$

✓ **Mathematica** : cpu = 0.108007 (sec), leaf count = 17

$$\left\{\left\{y(x)\to\frac{e^{e^{c_1x}}}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.088 (sec), leaf count = 14

$$\left\{y(x)=\frac{\mathrm{e}^{\frac{x}{c_1}}}{x}\right\}$$

2.120 ODE No. 120

$$xy'(x) - y(x)\left(x\log\left(\frac{x^2}{y(x)}\right) + 2\right) = 0$$

✓ **Mathematica** : cpu = 0.117749 (sec), leaf count = 20

$$\left\{\left\{y(x) \to x^2 e^{-2c_1 e^{-x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.173 (sec), leaf count = 17

$$\left\{y(x) = x^2 e^{-c_1 e^{-x}}\right\}$$

2.121 ODE No. 121

$$xy'(x) - \sin(x - y(x)) = 0$$

✗ **Mathematica** : cpu = 2.16794 (sec), leaf count = 0 , could not solve

```
DSolve[-Sin[x - y[x]] + x*Derivative[1][y][x] == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(x*diff(y(x),x)-sin(x-y(x)) = 0,y(x))
```

2.122 ODE No. 122

$$\cos(y(x))\left(\sin(y(x)) - 3x^2\cos(y(x))\right) + xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.313522 (sec), leaf count = 21

$$\left\{\left\{y(x) \to \tan^{-1}\left(\frac{2x^3 + c_1}{2x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.403 (sec), leaf count = 16

$$\left\{y(x) = \arctan\left(\frac{x^3 + 2c_1}{x}\right)\right\}$$

2.123 ODE No. 123

$$xy'(x) - y(x) - x\sin\left(\frac{y(x)}{x}\right) = 0$$

✓ **Mathematica** : cpu = 0.134421 (sec), leaf count = 19

$$\left\{\left\{y(x) \to 2x\cot^{-1}\left(\frac{e^{-c_1}}{x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.079 (sec), leaf count = 44

$$\left\{y(x) = x\arctan\left(\frac{2c_1x}{c_1^2x^2+1}, \frac{-c_1^2x^2+1}{c_1^2x^2+1}\right)\right\}$$

2.124 ODE No. 124

$$xy'(x) - y(x) + x\cos\left(\frac{y(x)}{x}\right) + x = 0$$

✓ **Mathematica** : cpu = 0.11128 (sec), leaf count = 16

$$\{\{y(x) \to 2x\tan^{-1}(-\log(x) + c_1)\}\}$$

✓ **Maple** : cpu = 0.04 (sec), leaf count = 12

$$\{y(x) = -2x\arctan(c_1 + \ln(x))\}$$

2.125 ODE No. 125

$$xy'(x) - y(x) + x\tan\left(\frac{y(x)}{x}\right) = 0$$

✓ **Mathematica** : cpu = 0.198305 (sec), leaf count = 16

$$\left\{\left\{y(x) \to x\sin^{-1}\left(\frac{e^{c_1}}{x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.086 (sec), leaf count = 14

$$\left\{y(x) = x\arcsin\left(\frac{1}{c_1x}\right)\right\}$$

2.126 ODE No. 126

$$xy'(x) - y(x)f(xy(x)) = 0$$

✓ **Mathematica** : cpu = 0.253086 (sec), leaf count = 115

$$\text{Solve}\left[\int_1^{y(x)} \left(\frac{1}{(-f(xK[2])-1)K[2]} - \int_1^x \left(\frac{f'(K[1]K[2])}{f(K[1]K[2])+1} - \frac{f(K[1]K[2])f'(K[1]K[2])}{(f(K[1]K[2])+1)^2}\right) dK[1]\right) dK[2] + \int_1^x\right.$$

✓ **Maple** : cpu = 0.03 (sec), leaf count = 29

$$\left\{ y(x) = \frac{\text{RootOf}\left(c_1 + \int^{\_Z} \frac{1}{(f(\_a)+1)\_a} d\_a - \ln(x)\right)}{x} \right\}$$

2.127 ODE No. 127

$$xy'(x) - y(x)f\left(x^a y(x)^b\right) = 0$$

✓ **Mathematica** : cpu = 0.317384 (sec), leaf count = 186

$$\text{Solve}\left[\int_1^{y(x)} \left(-\frac{b}{(a+bf(x^a K[2]^b))K[2]} - \int_1^x \left(\frac{b^2 K[1]^{a-1}K[2]^{b-1}f'(K[1]^a K[2]^b)}{a+bf(K[1]^a K[2]^b)} - \frac{b^3 f(K[1]^a K[2]^b)K[1]^{a-1}K}{(a+bf(K[1]^a}\right.\right.\right.$$

✓ **Maple** : cpu = 0.127 (sec), leaf count = 39

$$\left\{ -c_1 + \int_{\_b}^{y(x)} \frac{1}{(bf(\_a^b x^a)+a)\_a} d\_a - \frac{\ln(x)}{b} = 0 \right\}$$

2.128 ODE No. 128

$$-f(x)g(x^a y(x)) + ay(x) + xy'(x) = 0$$

✓ **Mathematica** : cpu = 3.40912 (sec), leaf count = 41

$$\text{Solve}\left[\int_1^{x^a y(x)} \frac{1}{g(K[1])} dK[1] = \int_1^x f(K[2])K[2]^{a-1} dK[2] + c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.279 (sec), leaf count = 33

$$\left\{ y(x) = x^{-a}\,\text{RootOf}\left(c_1 + \int^{\_Z} \frac{1}{g(\_a)} d\_a - \left(\int x^{a-1} f(x)\,dx\right)\right) \right\}$$

2.129 ODE No. 129

$$(x+1)y'(x)+y(x)(y(x)-x)=0$$

✓ **Mathematica** : cpu = 0.207714 (sec), leaf count = 44

$$\left\{\left\{y(x)\to -\frac{e^{x+1}}{-x\text{Ei}(x+1)-\text{Ei}(x+1)+e^{x+1}-ec_1x-ec_1}\right\}\right\}$$

✓ **Maple** : cpu = 0.036 (sec), leaf count = 33

$$\left\{y(x)=\frac{e^x}{c_1\,(x+1)-e^{-1}\,(x+1)\,\text{expIntegral}\,(1,-x-1)-e^x}\right\}$$

2.130 ODE No. 130

$$-2x^3+2xy'(x)-y(x)=0$$

✓ **Mathematica** : cpu = 0.0189719 (sec), leaf count = 21

$$\left\{\left\{y(x)\to \frac{2x^3}{5}+c_1\sqrt{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.007 (sec), leaf count = 15

$$\left\{y(x)=\frac{2x^3}{5}+c_1\sqrt{x}\right\}$$

2.131 ODE No. 131

$$(2x+1)y'(x)-4e^{-y(x)}+2=0$$

✓ **Mathematica** : cpu = 0.23194 (sec), leaf count = 21

$$\left\{\left\{y(x)\to \log\left(2-\frac{e^{c_1}}{2x+1}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.193 (sec), leaf count = 31

$$\left\{y(x)=-2c_1-\ln\left(\frac{2x+1}{(4x+2)\,e^{2c_1}-1}\right)\right\}$$

2.132 ODE No. 132

$$3xy'(x) - y(x) - 3xy(x)^4 \log(x) = 0$$

✓ **Mathematica** : cpu = 0.128854 (sec), leaf count = 115

$$\left\{\left\{y(x) \to \frac{(-2)^{2/3}\sqrt[3]{x}}{\sqrt[3]{3x^2 - 6x^2\log(x) + 4c_1}}\right\}, \left\{y(x) \to \frac{2^{2/3}\sqrt[3]{x}}{\sqrt[3]{3x^2 - 6x^2\log(x) + 4c_1}}\right\}, \left\{y(x) \to -\frac{\sqrt[3]{-1}2^{2/3}\sqrt[3]{x}}{\sqrt[3]{3x^2 - 6x^2\log(x) +}}\right.\right.$$

✓ **Maple** : cpu = 0.042 (sec), leaf count = 153

$$\left\{y(x) = \frac{\left(-4\left(6x^2\ln(x) - 3x^2 - 4c_1\right)^2 x\right)^{\frac{1}{3}}}{6x^2\ln(x) - 3x^2 - 4c_1}, y(x) = \frac{\left(-4\left(6x^2\ln(x) - 3x^2 - 4c_1\right)^2 x\right)^{\frac{1}{3}}\left(i\sqrt{3} - 1\right)}{12x^2\ln(x) - 6x^2 - 8c_1}, y(x) = -\frac{(-4}{}\right.$$

2.133 ODE No. 133

$$x^2y'(x) + y(x) - x = 0$$

✓ **Mathematica** : cpu = 0.017806 (sec), leaf count = 27

$$\left\{\left\{y(x) \to -e^{\frac{1}{x}}\text{Ei}\left(-\frac{1}{x}\right) + c_1e^{\frac{1}{x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.015 (sec), leaf count = 16

$$\left\{y(x) = \left(c_1 + \text{expIntegral}\left(1, \frac{1}{x}\right)\right)\mathrm{e}^{\frac{1}{x}}\right\}$$

2.134 ODE No. 134

$$x^2y'(x) + e^{x-\frac{1}{x}}x^2 - y(x) = 0$$

✓ **Mathematica** : cpu = 0.069632 (sec), leaf count = 27

$$\left\{\left\{y(x) \to -e^{x-\frac{1}{x}} + c_1e^{-1/x}\right\}\right\}$$

✓ **Maple** : cpu = 0.01 (sec), leaf count = 17

$$\left\{y(x) = (c_1 - \mathrm{e}^{x})\,\mathrm{e}^{-\frac{1}{x}}\right\}$$

2.135 ODE No. 135

$$x^2y'(x) - (x-1)y(x) = 0$$

✓ **Mathematica** : cpu = 0.0196931 (sec), leaf count = 14

$$\left\{\left\{y(x) \to c_1 e^{\frac{1}{x}} x\right\}\right\}$$

✓ **Maple** : cpu = 0.006 (sec), leaf count = 11

$$\left\{y(x) = c_1 x \,\mathrm{e}^{\frac{1}{x}}\right\}$$

2.136 ODE No. 136

$$x^2y'(x) + x^2 + xy(x) + y(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.0964434 (sec), leaf count = 28

$$\left\{\left\{y(x) \to \frac{-x + x\log(x) - c_1 x}{-\log(x) + c_1}\right\}\right\}$$

✓ **Maple** : cpu = 0.016 (sec), leaf count = 18

$$\left\{y(x) = -\frac{(c_1 + \ln(x) - 1)\,x}{c_1 + \ln(x)}\right\}$$

2.137 ODE No. 137

$$x^2y'(x) - xy(x) - y(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.0992509 (sec), leaf count = 16

$$\left\{\left\{y(x) \to \frac{x}{-\log(x) + c_1}\right\}\right\}$$

✓ **Maple** : cpu = 0.014 (sec), leaf count = 14

$$\left\{y(x) = \frac{x}{c_1 - \ln(x)}\right\}$$

2.138 ODE No. 138

$$x^2y'(x) - x^2 - xy(x) - y(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.124071 (sec), leaf count = 13

$$\{\{y(x) \to x \tan(\log(x) + c_1)\}\}$$

✓ **Maple** : cpu = 0.034 (sec), leaf count = 11

$$\{y(x) = x \tan(c_1 + \ln(x))\}$$

2.139 ODE No. 139

$$ax^k - (b-1)b + x^2(y'(x) + y(x)^2) = 0$$

✓ **Mathematica** : cpu = 0.256101 (sec), leaf count = 821

$$\left\{\left\{y(x) \to -\frac{a^{\frac{b}{k}+\frac{1}{2}\left(\frac{1}{k}-\frac{2b}{k}\right)}\left(\frac{b}{k}+\frac{1}{2}\left(\frac{1}{k}-\frac{2b}{k}\right)\right)x^{k-1}\left(x^k\right)^{\frac{b}{k}+\frac{1}{2}\left(\frac{1}{k}-\frac{2b}{k}\right)-1} J_{\frac{2b-1}{k}}\left(\frac{2\sqrt{a}\sqrt{x^k}}{k}\right)\Gamma\left(\frac{2b}{k}-\frac{1}{k}+1\right)k^{1-\frac{1}{k}} + \frac{1}{2}a^{\frac{b}{k}+\frac{1}{2}(}\cdots}{\cdots}\right.\right.$$

✓ **Maple** : cpu = 0.135 (sec), leaf count = 219

$$\left\{y(x) = \frac{-2c_1\sqrt{a}\,x^{\frac{k}{2}}\operatorname{BesselY}\left(\frac{k+\sqrt{(2b-1)^2}}{k}, \frac{2\sqrt{a}\,x^{\frac{k}{2}}}{k}\right) - 2\sqrt{a}\,x^{\frac{k}{2}}\operatorname{BesselJ}\left(\frac{k+\sqrt{(2b-1)^2}}{k}, \frac{2\sqrt{a}\,x^{\frac{k}{2}}}{k}\right) + 2\left(c_1\operatorname{BesselY}\left(\cdots\right.\right.}{2\left(c_1\operatorname{BesselY}\left(\frac{\sqrt{(2b-1)^2}}{k}, \frac{2\sqrt{a}\,x^{\frac{k}{2}}}{k}\right) + \operatorname{BesselJ}\left(\cdots\right.\right.}\right.$$

2.140 ODE No. 140

$$x^2(y'(x) + y(x)^2) + 4xy(x) + 2 = 0$$

✓ **Mathematica** : cpu = 0.129566 (sec), leaf count = 17

$$\left\{\left\{y(x) \to -\frac{2}{x} + \frac{1}{x + c_1}\right\}\right\}$$

✓ **Maple** : cpu = 0.112 (sec), leaf count = 20

$$\left\{y(x) = \frac{-2c_1 + x}{(c_1 - x)\,x}\right\}$$

2.141 ODE No. 141

$$axy(x) + b + x^2\left(y'(x) + y(x)^2\right) = 0$$

✓ **Mathematica** : cpu = 0.169393 (sec), leaf count = 67

$$\left\{\left\{y(x) \to -\frac{a}{2x} - \frac{-1 + \sqrt{a^2 - 2a - 4b + 1}\left(-1 + \frac{2c_1}{x^{\sqrt{a^2-2a-4b+1}} + c_1}\right)}{2x}\right\}\right\}$$

✓ **Maple** : cpu = 0.063 (sec), leaf count = 51

$$\left\{y(x) = \frac{-a - \sqrt{a^2 - 2a - 4b + 1}\,\tanh\left(\frac{\sqrt{a^2-2a-4b+1}\,(c_1 - \ln(x))}{2}\right) + 1}{2x}\right\}$$

2.142 ODE No. 142

$$-ax^2y(x) + ax + x^2\left(y'(x) - y(x)^2\right) + 2 = 0$$

✓ **Mathematica** : cpu = 0.218494 (sec), leaf count = 122

$$\left\{\left\{y(x) \to -\frac{\frac{e^{ax}(a^2x^2-2ax+2)}{a^2x} - \frac{e^{ax}(a^2x^2-2ax+2)}{a^3x^2} + \frac{e^{ax}(2a^2x-2a)}{a^3x} - \frac{c_1}{x^2}}{\frac{e^{ax}(a^2x^2-2ax+2)}{a^3x} + \frac{c_1}{x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.091 (sec), leaf count = 52

$$\left\{y(x) = \frac{c_1 - (ax-1)\left(a^2x^2+2\right)e^{ax}}{\left(c_1 + \left(a^2x^2 - 2ax + 2\right)e^{ax}\right)x}\right\}$$

2.143 ODE No. 143

$$x^2\left(ay(x)^2 + y'(x)\right) - b = 0$$

✓ **Mathematica** : cpu = 0.111509 (sec), leaf count = 51

$$\left\{\left\{y(x) \to -\frac{-1 + \sqrt{4ab+1}\left(-1 + \frac{2c_1}{x^{\sqrt{4ab+1}} + c_1}\right)}{2ax}\right\}\right\}$$

✓ **Maple** : cpu = 0.053 (sec), leaf count = 41

$$\left\{y(x) = \frac{-\sqrt{4ab+1}\,\tanh\left(\frac{\sqrt{4ab+1}\,(c_1 - \ln(x))}{2}\right) + 1}{2ax}\right\}$$

2.144 ODE No. 144

$$x^2\left(ay(x)^2+y'(x)\right)+bx^\alpha+c=0$$

✓ **Mathematica** : cpu = 0.321428 (sec), leaf count = 1787

$$\left\{\left\{y(x)\to\frac{a^{\frac{i\sqrt{4ac-1}\alpha+\alpha}{2\alpha^2}-\frac{\sqrt{\alpha^2-4a\alpha^2c}}{2\alpha^2}}\alpha^{-\frac{i\sqrt{4ac-1}\alpha+\alpha}{\alpha^2}+\frac{\sqrt{\alpha^2-4a\alpha^2c}}{\alpha^2}+1}b^{\frac{i\sqrt{4ac-1}\alpha+\alpha}{2\alpha^2}-\frac{\sqrt{\alpha^2-4a\alpha^2c}}{2\alpha^2}}\left(\frac{i\sqrt{4ac-1}\alpha+\alpha}{2\alpha^2}-\frac{\sqrt{\alpha^2-4a\alpha^2c}}{2\alpha^2}\right)(x\right.\right.$$

✓ **Maple** : cpu = 0.113 (sec), leaf count = 219

$$\left\{y(x)=\frac{-2\sqrt{ab}\left(c_1\operatorname{BesselY}\left(\frac{\alpha+\sqrt{-4ac+1}}{\alpha},\frac{2\sqrt{ab}\,x^{\frac{\alpha}{2}}}{\alpha}\right)+\operatorname{BesselJ}\left(\frac{\alpha+\sqrt{-4ac+1}}{\alpha},\frac{2\sqrt{ab}\,x^{\frac{\alpha}{2}}}{\alpha}\right)\right)x^{\frac{\alpha}{2}}+\left(\sqrt{-4ac+1}+1\right)\left(c\right.}{2\left(c_1\operatorname{BesselY}\left(\frac{\sqrt{-4ac+1}}{\alpha},\frac{2\sqrt{ab}\,x^{\frac{\alpha}{2}}}{\alpha}\right)+\operatorname{BesselJ}\left(\frac{\sqrt{-4ac+1}}{\alpha},\right.\right.}\right.$$

2.145 ODE No. 145

$$-ax^2y(x)^2+ay(x)^3+x^2y'(x)=0$$

✓ **Mathematica** : cpu = 0.704306 (sec), leaf count = 267

$$\operatorname{Solve}\left[\frac{\left(-\frac{1}{2^{2/3}a^{2/3}y(x)}-\frac{\sqrt[3]{a}x}{2^{2/3}}\right)\operatorname{Ai}\left(\left(-\frac{\sqrt[3]{a}x}{2^{2/3}}-\frac{1}{2^{2/3}a^{2/3}y(x)}\right)^2+\frac{1}{\sqrt[3]{2}\sqrt[3]{a}x}\right)+\operatorname{Ai}'\left(\left(-\frac{\sqrt[3]{a}x}{2^{2/3}}-\frac{1}{2^{2/3}a^{2/3}y(x)}\right)^2+\frac{1}{\sqrt[3]{2}\sqrt[3]{a}x}\right)}{\left(-\frac{1}{2^{2/3}a^{2/3}y(x)}-\frac{\sqrt[3]{a}x}{2^{2/3}}\right)\operatorname{Bi}\left(\left(-\frac{\sqrt[3]{a}x}{2^{2/3}}-\frac{1}{2^{2/3}a^{2/3}y(x)}\right)^2+\frac{1}{\sqrt[3]{2}\sqrt[3]{a}x}\right)+\operatorname{Bi}'\left(\left(-\frac{\sqrt[3]{a}x}{2^{2/3}}-\frac{1}{2^{2/3}a^{2/3}y(x)}\right)^2+\frac{1}{\sqrt[3]{2}\sqrt[3]{a}x}\right)}\right.$$

✓ **Maple** : cpu = 0.103 (sec), leaf count = 117

$$\left\{y(x)=-\frac{1}{ax+(-2a)^{\frac{2}{3}}\operatorname{RootOf}\left(c_1\_Z\operatorname{AiryBi}\left(\frac{(-2a)^{\frac{1}{3}}\_Z^2x-1}{(-2a)^{\frac{1}{3}}x}\right)+c_1\operatorname{AiryBi}\left(1,\frac{(-2a)^{\frac{1}{3}}\_Z^2x-1}{(-2a)^{\frac{1}{3}}x}\right)+\_Z\operatorname{AiryAi}\left(\right.\right.}\right.$$

2.146 ODE No. 146

$$a y(x)^2+x^2 y'(x)+x y(x)^3=0$$

✓ **Mathematica** : cpu = 0.991355 (sec), leaf count = 78

$$\text{Solve}\left[-\frac{ia}{x}=\frac{2e^{\frac{1}{2}\left(-\frac{ia}{x}-\frac{i}{y(x)}\right)^2}}{\sqrt{2\pi}\text{erfi}\left(\frac{-\frac{ia}{x}-\frac{i}{y(x)}}{\sqrt{2}}\right)+2c_1},y(x)\right]$$

✓ **Maple** : cpu = 0.144 (sec), leaf count = 84

$$\left\{c_1+\frac{\left(\sqrt{\pi}\,\sqrt{2}\,a\,\mathrm{erf}\left(\frac{\sqrt{2}\,(ay(x)+x)}{2xy(x)}\right)\mathrm{e}^{\frac{(ay(x)+x)^2}{2x^2y(x)^2}}+2x\right)\mathrm{e}^{-\frac{(x+(a+x)y(x))(x+(a-x)y(x))}{2x^2y(x)^2}}}{2}=0\right\}$$

2.147 ODE No. 147

$$a x^2 y(x)^3+b y(x)^2+x^2 y'(x)=0$$

✓ **Mathematica** : cpu = 0.956268 (sec), leaf count = 343

$$\text{Solve}\left[\frac{\left(\frac{b^{2/3}}{2^{2/3}\sqrt[3]{a}x}+\frac{1}{2^{2/3}\sqrt[3]{a}\sqrt[3]{b}y(x)}\right)\text{Ai}\left(\left(\frac{b^{2/3}}{2^{2/3}\sqrt[3]{a}x}+\frac{1}{2^{2/3}\sqrt[3]{a}y(x)\sqrt[3]{b}}\right)^2-\frac{\sqrt[3]{a}x}{\sqrt[3]{2}b^{2/3}}\right)+\text{Ai}'\left(\left(\frac{b^{2/3}}{2^{2/3}\sqrt[3]{a}x}+\frac{1}{2^{2/3}\sqrt[3]{a}y(x)\sqrt[3]{b}}\right)^2-\right.}{\left(\frac{b^{2/3}}{2^{2/3}\sqrt[3]{a}x}+\frac{1}{2^{2/3}\sqrt[3]{a}\sqrt[3]{b}y(x)}\right)\text{Bi}\left(\left(\frac{b^{2/3}}{2^{2/3}\sqrt[3]{a}x}+\frac{1}{2^{2/3}\sqrt[3]{a}y(x)\sqrt[3]{b}}\right)^2-\frac{\sqrt[3]{a}x}{\sqrt[3]{2}b^{2/3}}\right)+\text{Bi}'\left(\left(\frac{b^{2/3}}{2^{2/3}\sqrt[3]{a}x}+\frac{1}{2^{2/3}\sqrt[3]{a}y(x)\sqrt[3]{b}}\right)^2-\right.}\right.$$

✓ **Maple** : cpu = 0.206 (sec), leaf count = 178

$$\left\{y(x)=-\frac{2^{\frac{1}{3}}abx}{2^{\frac{1}{3}}a\,b^2-2\left(a^2b^2\right)^{\frac{2}{3}}x\,\text{RootOf}\left(c_1\_Z\,\text{AiryBi}\left(-\frac{-2(a^2b^2)^{\frac{1}{3}}\_Z^2+2^{\frac{2}{3}}ax}{2(a^2b^2)^{\frac{1}{3}}}\right)+c_1\,\text{AiryBi}\left(1,-\frac{-2(a^2b^2)^{\frac{1}{3}}\_Z^2+2^{\frac{2}{3}}\right.\right.\right.}}\right.$$

2.148 ODE No. 148

$$(x^2+1)\,y'(x)+xy(x)-1=0$$

✓ **Mathematica** : cpu = 0.0232917 (sec), leaf count = 30

$$\left\{\left\{y(x)\to\frac{\sinh^{-1}(x)}{\sqrt{x^2+1}}+\frac{c_1}{\sqrt{x^2+1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.01 (sec), leaf count = 16

$$\left\{y(x)=\frac{c_1+\operatorname{arcsinh}(x)}{\sqrt{x^2+1}}\right\}$$

2.149 ODE No. 149

$$(x^2+1)\,y'(x)-x(x^2+1)+xy(x)=0$$

✓ **Mathematica** : cpu = 0.0242506 (sec), leaf count = 27

$$\left\{\left\{y(x)\to\frac{1}{3}(x^2+1)+\frac{c_1}{\sqrt{x^2+1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.011 (sec), leaf count = 20

$$\left\{y(x)=\frac{x^2}{3}+\frac{c_1}{\sqrt{x^2+1}}+\frac{1}{3}\right\}$$

2.150 ODE No. 150

$$(x^2+1)\,y'(x)-2x^2+2xy(x)=0$$

✓ **Mathematica** : cpu = 0.0234024 (sec), leaf count = 30

$$\left\{\left\{y(x)\to\frac{2x^3}{3(x^2+1)}+\frac{c_1}{x^2+1}\right\}\right\}$$

✓ **Maple** : cpu = 0.006 (sec), leaf count = 23

$$\left\{y(x)=\frac{2x^3+3c_1}{3x^2+3}\right\}$$

2.151 ODE No. 151

$$(x^2+1)\,y'(x)+(2xy(x)-1)\left(y(x)^2+1\right)=0$$

✓ **Mathematica** : cpu = 0.636967 (sec), leaf count = 203

$$\text{Solve}\left[c_1=\frac{\frac{1}{2}\left(\frac{1}{\frac{ix}{x^2+1}-\frac{ix^2y(x)}{x^2+1}}+\frac{i}{x}\right)\sqrt[4]{1-\left(\frac{1}{\frac{ix}{x^2+1}-\frac{ix^2y(x)}{x^2+1}}+\frac{i}{x}\right)^2}\,{}_2F_1\left(\frac{1}{2},\frac{5}{4};\frac{3}{2};\left(\frac{1}{\frac{ix}{x^2+1}-\frac{ix^2y(x)}{x^2+1}}+\frac{i}{x}\right)^2\right)+ix}{\sqrt[4]{-1+\left(\frac{1}{\frac{ix}{x^2+1}-\frac{ix^2y(x)}{x^2+1}}+\frac{i}{x}\right)^2}},y(x)\right]$$

✓ **Maple** : cpu = 0.047 (sec), leaf count = 85

$$\left\{c_1+\frac{x}{\left(\left(\frac{x^2}{\frac{x^4y(x)}{x^2+1}-\frac{x^3}{x^2+1}}+\frac{1}{x}\right)^2+1\right)^{\frac{1}{4}}}+\frac{(x+y(x))\,\text{hypergeom}\left(\left[\frac{1}{2},\frac{5}{4}\right],\left[\frac{3}{2}\right],-\frac{(x+y(x))^2}{(xy(x)-1)^2}\right)}{2xy\left(x\right)-2}=0\right\}$$

2.152 ODE No. 152

$$(x^2+1)\,y'(x)-x\left(x^2+1\right)\cos^2(y(x))+x\sin(y(x))\cos(y(x))=0$$

✓ **Mathematica** : cpu = 0.416217 (sec), leaf count = 40

$$\left\{\left\{y(x)\to\tan^{-1}\left(\frac{x^4+2x^2-6c_1\sqrt{x^2+1}+1}{3\left(x^2+1\right)}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.733 (sec), leaf count = 159

$$\left\{y(x)=\frac{\arctan\left(\frac{6\sqrt{x^2+1}\left(\sqrt{x^2+1}\,x^2+3c_1+\sqrt{x^2+1}\right)}{x^6+3x^4+9c_1^2+12x^2+(6c_1x^2+6c_1)\sqrt{x^2+1}+10},\frac{-x^6-3x^4-9c_1^2+6x^2+(-6c_1x^2-6c_1)\sqrt{x^2+1}+8}{x^6+3x^4+9c_1^2+12x^2+(6c_1x^2+6c_1)\sqrt{x^2+1}+10}\right)}{2}\right\}$$

2.153 ODE No. 153

$$a + (x^2 - 1) y'(x) - xy(x) = 0$$

✓ **Mathematica** : cpu = 0.0240529 (sec), leaf count = 21

$$\left\{\left\{y(x) \to ax + c_1\sqrt{x^2 - 1}\right\}\right\}$$

✓ **Maple** : cpu = 0.017 (sec), leaf count = 20

$$\left\{y(x) = ax + c_1\sqrt{x+1}\sqrt{x-1}\right\}$$

2.154 ODE No. 154

$$(x^2 - 1) y'(x) + 2xy(x) - \cos(x) = 0$$

✓ **Mathematica** : cpu = 0.0250227 (sec), leaf count = 26

$$\left\{\left\{y(x) \to \frac{\sin(x)}{x^2 - 1} + \frac{c_1}{x^2 - 1}\right\}\right\}$$

✓ **Maple** : cpu = 0.008 (sec), leaf count = 19

$$\left\{y(x) = \frac{c_1 + \sin(x)}{(x-1)(x+1)}\right\}$$

2.155 ODE No. 155

$$(x^2 - 1) y'(x) + y(x)^2 - 2xy(x) + 1 = 0$$

✓ **Mathematica** : cpu = 0.155791 (sec), leaf count = 46

$$\left\{\left\{y(x) \to -\frac{x(1 - x^2)}{x^2 - 1} + \frac{1}{\frac{1}{2}\log(1-x) - \frac{1}{2}\log(x+1) + c_1}\right\}\right\}$$

✓ **Maple** : cpu = 0.097 (sec), leaf count = 14

$$\left\{y(x) = x + \frac{1}{c_1 - \operatorname{arctanh}(x)}\right\}$$

2.156 ODE No. 156

$$(x^2-1)\,y'(x)-y(x)(y(x)-x)=0$$

✓ **Mathematica** : cpu = 0.097899 (sec), leaf count = 21

$$\left\{\left\{y(x)\to\frac{1}{x+c_1\sqrt{x^2-1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.019 (sec), leaf count = 20

$$\left\{y(x)=\frac{1}{c_1\sqrt{x-1}\,\sqrt{x+1}+x}\right\}$$

2.157 ODE No. 157

$$a\left(y(x)^2-2xy(x)+1\right)+(x^2-1)\,y'(x)=0$$

✓ **Mathematica** : cpu = 0.241046 (sec), leaf count = 158

$$\left\{\left\{y(x)\to\frac{(x^2-1)\left(c_1\left(ax(x^2-1)^{\frac{a}{2}-1}P_{a-1}(x)+(x^2-1)^{\frac{a}{2}-1}(aP_a(x)-axP_{a-1}(x))\right)+ax(x^2-1)^{\frac{a}{2}-1}Q_{a-1}(\right.}{a\left((x^2-1)^{a/2}Q_{a-1}(x)+c_1(x^2-1)^{a/2}P_{a-1}(x)\right)}\right.\right.$$

✓ **Maple** : cpu = 0.252 (sec), leaf count = 231

$$\left\{y(x)=\frac{-(x+1)\,a\left(-\frac{x}{2}-\frac{1}{2}\right)^{-2a+1}\mathrm{HeunC}\left(0,2a-1,0,0,a^2-a+\frac{1}{2},\frac{2}{x+1}\right)+8c_1\left(-\frac{a}{2}+\left(a-\frac{1}{2}\right)x+\frac{1}{2}\right)(x+1)\,\mathrm{I}}{4\,(x+1)\left(c_1\,\mathrm{HeunC}\left(0,\right.\right.}\right.$$

2.158 ODE No. 158

$$axy(x)^2+(x^2-1)\,y'(x)+xy(x)=0$$

✓ **Mathematica** : cpu = 0.162529 (sec), leaf count = 31

$$\left\{\left\{y(x)\to-\frac{e^{c_1}}{-\sqrt{x^2-1}+ae^{c_1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.017 (sec), leaf count = 22

$$\left\{y(x)=\frac{1}{c_1\sqrt{x-1}\,\sqrt{x+1}-a}\right\}$$

2.159 ODE No. 159

$$(x^2-1)\,y'(x)-2xy(x)\log(y(x))=0$$

✓ **Mathematica** : cpu = 0.106119 (sec), leaf count = 22

$$\left\{\left\{y(x)\to e^{e^{c_1}x^2-e^{c_1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.145 (sec), leaf count = 13

$$\{y(x)=\mathrm{e}^{c_1(x-1)(x+1)}\}$$

2.160 ODE No. 160

$$(x^2-4)\,y'(x)+(x+2)y(x)^2-4y(x)=0$$

✓ **Mathematica** : cpu = 0.139202 (sec), leaf count = 27

$$\left\{\left\{y(x)\to\frac{2-x}{(x+2)(-\log(x+2)+c_1)}\right\}\right\}$$

✓ **Maple** : cpu = 0.03 (sec), leaf count = 21

$$\left\{y(x)=\frac{x-2}{(c_1+\ln(x+2))(x+2)}\right\}$$

2.161 ODE No. 161

$$(x^2-5x+6)\,y'(x)+x^2+3xy(x)-8y(x)=0$$

✓ **Mathematica** : cpu = 0.0313999 (sec), leaf count = 53

$$\left\{\left\{y(x)\to\frac{\frac{x^4}{4}-\frac{2x^3}{3}}{(2-x)^2(3-x)}+\frac{c_1}{(2-x)^2(3-x)}\right\}\right\}$$

✓ **Maple** : cpu = 0.018 (sec), leaf count = 27

$$\left\{y(x)=\frac{-\frac{1}{4}x^4+\frac{2}{3}x^3+c_1}{(x-2)^2(x-3)}\right\}$$

2.162 ODE No. 162

$$k(-a+y(x)+x)(-b+y(x)+x)+(x-a)(x-b)y'(x)+y(x)^2=0$$

✓ **Mathematica** : cpu = 0.534002 (sec), leaf count = 133

$$\left\{\left\{y(x)\to -\frac{-ak-bk+2kx}{2(k+1)}+\frac{1}{2}\sqrt{\frac{-a^2k^2+2abk^2-b^2k^2}{(k+1)^2}}\tan\left(\frac{(k+1)\sqrt{\frac{-a^2k^2+2abk^2-b^2k^2}{(k+1)^2}}(\log(x-b)-\log(x}{2(a-b)}\right.\right.\right.$$

✓ **Maple** : cpu = 0.196 (sec), leaf count = 58

$$\left\{y(x)=\frac{\left(c_1(b-x)\,(b-x)^k+(a-x)\,(a-x)^k\right)k}{(k+1)\left(c_1\,(b-x)^k+(a-x)^k\right)}\right\}$$

2.163 ODE No. 163

$$2a^2x+2x^2y'(x)-2y(x)^2-xy(x)=0$$

✓ **Mathematica** : cpu = 0.124331 (sec), leaf count = 43

$$\left\{\left\{y(x)\to -\sqrt{-a^2}\sqrt{x}\tan\left(\frac{2\sqrt{-a^2}}{\sqrt{x}}-c_1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.072 (sec), leaf count = 27

$$\left\{y(x)=-ia\sqrt{x}\,\tan\left(\frac{-c_1\sqrt{x}+2ia}{\sqrt{x}}\right)\right\}$$

2.164 ODE No. 164

$$2a^2x+2x^2y'(x)-2y(x)^2-3xy(x)=0$$

✓ **Mathematica** : cpu = 0.152179 (sec), leaf count = 131

$$\left\{\left\{y(x)\to -\frac{x^2\left(-\frac{e^{\frac{2a}{\sqrt{x}}}}{4a\sqrt{x}}+\frac{e^{\frac{2a}{\sqrt{x}}}}{2x}+c_1\left(\frac{ae^{-\frac{2a}{\sqrt{x}}}}{x}+\frac{e^{-\frac{2a}{\sqrt{x}}}}{2\sqrt{x}}\right)\right)}{-\frac{\sqrt{x}e^{\frac{2a}{\sqrt{x}}}}{2a}+c_1\sqrt{x}e^{-\frac{2a}{\sqrt{x}}}}\right\}\right\}$$

✓ **Maple** : cpu = 0.191 (sec), leaf count = 100

$$\left\{y(x)=\frac{-\left(c_1-2\sqrt{-\frac{a^2}{x}}\right)x\cos\left(2\sqrt{-\frac{a^2}{x}}\right)-2\left(c_1\sqrt{-\frac{a^2}{x}}+\frac{1}{2}\right)x\sin\left(2\sqrt{-\frac{a^2}{x}}\right)}{2c_1\cos\left(2\sqrt{-\frac{a^2}{x}}\right)+2\sin\left(2\sqrt{-\frac{a^2}{x}}\right)}\right\}$$

2.165 ODE No. 165

$$x(2x-1)y'(x)+y(x)^2-(4x+1)y(x)+4x=0$$

✓ **Mathematica** : cpu = 0.137435 (sec), leaf count = 22

$$\left\{\left\{y(x)\to 1+\frac{(1-2x)x}{-x+c_1}\right\}\right\}$$

✓ **Maple** : cpu = 0.02 (sec), leaf count = 17

$$\left\{y(x)=\frac{2x^2+c_1}{c_1+x}\right\}$$

2.166 ODE No. 166

$$2(x-1)xy'(x)+(x-1)y(x)^2-x=0$$

✓ **Mathematica** : cpu = 0.170933 (sec), leaf count = 71

$$\left\{\left\{y(x)\to \frac{2x\left(-G_{2,2}^{2,0}\left(x\,\middle|\,\begin{array}{c}-\frac{1}{2},\frac{1}{2}\\-1,0\end{array}\right)+\frac{c_1(E(x)-K(x))}{\pi x}\right)}{G_{2,2}^{2,0}\left(x\,\middle|\,\begin{array}{c}\frac{1}{2},\frac{3}{2}\\0,0\end{array}\right)+\frac{2c_1E(x)}{\pi}}\right\}\right\}$$

✓ **Maple** : cpu = 0.148 (sec), leaf count = 97

$$\left\{y(x)=\frac{\left(c_1\,\mathrm{LegendreQ}\left(-\frac{1}{2},1,\frac{-x+2}{x}\right)-c_1\,\mathrm{LegendreQ}\left(\frac{1}{2},1,\frac{-x+2}{x}\right)+\mathrm{LegendreP}\left(-\frac{1}{2},1,\frac{-x+2}{x}\right)-\mathrm{LegendreP}\left(\frac{1}{2},\right.\right.}{2\left(c_1\,\mathrm{LegendreQ}\left(-\frac{1}{2},1,\frac{-x+2}{x}\right)+\mathrm{LegendreP}\left(-\frac{1}{2},1,\frac{-x+2}{x}\right)\right)(x-1)}\right.$$

2.167 ODE No. 167

$$3x^2y'(x)-x^2-3xy(x)-7y(x)^2=0$$

✓ **Mathematica** : cpu = 0.102134 (sec), leaf count = 35

$$\left\{\left\{y(x)\to \frac{x\tan\left(\frac{1}{3}\left(\sqrt{7}\log(x)+3\sqrt{7}c_1\right)\right)}{\sqrt{7}}\right\}\right\}$$

✓ **Maple** : cpu = 0.035 (sec), leaf count = 20

$$\left\{y(x)=\frac{\sqrt{7}\,x\tan\left(\frac{(c_1+\ln(x))\sqrt{7}}{3}\right)}{7}\right\}$$

2.168 ODE No. 168

$$3(x^2-4)\,y'(x)+y(x)^2-xy(x)-3=0$$

✓ **Mathematica** : cpu = 0.212471 (sec), leaf count = 234

$$\left\{\left\{y(x)\to\frac{3(x^2-4)\left(c_1\left(\frac{xP_{-\frac{1}{6}}^{\frac{1}{3}}\left(\frac{x}{2}\right)}{6(x^2-4)^{11/12}}+\frac{\sqrt[12]{x^2-4}\left(\frac{1}{2}P_{\frac{5}{6}}^{\frac{1}{3}}\left(\frac{x}{2}\right)-\frac{5}{12}xP_{-\frac{1}{6}}^{\frac{1}{3}}\left(\frac{x}{2}\right)\right)}{2\left(\frac{x^2}{4}-1\right)}\right)+\frac{xQ_{-\frac{1}{6}}^{\frac{1}{3}}\left(\frac{x}{2}\right)}{6(x^2-4)^{11/12}}+\frac{\sqrt[12]{x^2-4}\left(\frac{1}{2}Q_{\frac{5}{6}}^{\frac{1}{3}}\left(\frac{x}{2}\right)-\frac{5}{12}xQ^{\frac{1}{3}}_{-}\cdots\right.}{2\left(\frac{x^2}{4}-1\right)}\cdots}{\sqrt[12]{x^2-4}Q_{-\frac{1}{6}}^{\frac{1}{3}}\left(\frac{x}{2}\right)+c_1\sqrt[12]{x^2-4}P_{-\frac{1}{6}}^{\frac{1}{3}}\left(\frac{x}{2}\right)}\right.\right.$$

✓ **Maple** : cpu = 0.163 (sec), leaf count = 140

$$\left\{y(x)=-\frac{3(x+2)\left(c_1\operatorname{HeunC}\left(0,\frac{4}{3},-\frac{1}{3},0,\frac{25}{36},\frac{4}{x+2}\right)-\cdots\right.}{4c_1\left(x-\frac{5}{4}\right)(x+2)\operatorname{HeunC}\left(0,\frac{4}{3},-\frac{1}{3},0,\frac{25}{36},\frac{4}{x+2}\right)-\left(-\frac{x}{4}-\frac{1}{2}\right)^{\frac{4}{3}}(x+2)\operatorname{HeunC}\left(0,-\frac{4}{3},-\frac{1}{3},0,\frac{25}{36},\frac{4}{x+2}\right)\cdots}\right.$$

2.169 ODE No. 169

$$(ax+b)^2y'(x)+y(x)^3(ax+b)+cy(x)^2=0$$

✓ **Mathematica** : cpu = 2.32392 (sec), leaf count = 149

$$\text{Solve}\left[-\frac{c}{\sqrt{-a(ax+b)^2}}=\frac{2\exp\left(\frac{1}{2}\left(-\frac{c}{\sqrt{-a(ax+b)^2}}-\frac{\left(-a(ax+b)^2\right)^{3/2}}{ay(x)(ax+b)^3}\right)^2\right)}{\sqrt{2\pi}\operatorname{erfi}\left(\frac{-\frac{c}{\sqrt{-a(ax+b)^2}}-\frac{\left(-a(ax+b)^2\right)^{3/2}}{ay(x)(ax+b)^3}}{\sqrt{2}}\right)+2c_1},y(x)\right]$$

✓ **Maple** : cpu = 0.142 (sec), leaf count = 153

$$\left\{\frac{2c_1a^{\frac{5}{2}}+\left(\sqrt{2}\sqrt{\pi}\,ac\operatorname{erf}\left(\frac{\sqrt{2}\,(cy(x)+(ax+b)a)}{2(ax+b)\sqrt{a}\,y(x)}\right)e^{\frac{(cy(x)+(ax+b)a)^2}{2(ax+b)^2ay(x)^2}}+2(ax+b)\,a^{\frac{3}{2}}\right)e^{-\frac{((ax+b)a+(ax+b+c)y(x))((ax+b)a+(-ax-b+\cdots}{2(ax+b)^2ay(x)^2}}\cdots}{2a^{\frac{5}{2}}}\right.$$

2.170 ODE No. 170

$$-x^4 + x^3 y'(x) - y(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.0937589 (sec), leaf count = 43

$$\left\{\left\{y(x) \to -\frac{x^3 \left(\frac{1}{x^2} - \frac{\log(x)}{x^2} - \frac{c_1}{x^2}\right)}{\frac{\log(x)}{x} + \frac{c_1}{x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.016 (sec), leaf count = 23

$$\left\{y(x) = \frac{(-c_1 + \ln(x) - 1) x^2}{-c_1 + \ln(x)}\right\}$$

2.171 ODE No. 171

$$x^3 y'(x) - x^2 y(x) - y(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.0959222 (sec), leaf count = 17

$$\left\{\left\{y(x) \to \frac{x^2}{1 + c_1 x}\right\}\right\}$$

✓ **Maple** : cpu = 0.013 (sec), leaf count = 15

$$\left\{y(x) = \frac{x^2}{c_1 x + 1}\right\}$$

2.172 ODE No. 172

$$x^4(-y(x)^2) + x^3 y'(x) + x^2 y(x) + 20 = 0$$

✓ **Mathematica** : cpu = 0.0945504 (sec), leaf count = 35

$$\left\{\left\{y(x) \to -\frac{5x^4 - \frac{4c_1}{x^5}}{x\left(x^5 + \frac{c_1}{x^4}\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.3 (sec), leaf count = 26

$$\left\{y(x) = \frac{5x^9 + 4c_1}{(-x^9 + c_1) x^2}\right\}$$

2.173 ODE No. 173

$$x^6\left(-y(x)^2\right)+x^3y'(x)-(2x-3)x^2y(x)+3=0$$

✓ **Mathematica** : cpu = 0.106558 (sec), leaf count = 29

$$\left\{\left\{y(x)\to -\frac{3}{x^3}+\frac{1}{x^3\left(\frac{1}{4}+c_1e^{4x}\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.123 (sec), leaf count = 27

$$\left\{y(x)=\frac{-3c_1\mathrm{e}^{4x}-3}{\left(c_1\mathrm{e}^{4x}-3\right)x^3}\right\}$$

2.174 ODE No. 174

$$\left(x^2+1\right)xy'(x)+x^2y(x)=0$$

✓ **Mathematica** : cpu = 0.0201961 (sec), leaf count = 17

$$\left\{\left\{y(x)\to \frac{c_1}{\sqrt{x^2+1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.006 (sec), leaf count = 13

$$\left\{y(x)=\frac{c_1}{\sqrt{x^2+1}}\right\}$$

2.175 ODE No. 175

$$ax^3+\left(x^2-1\right)xy'(x)-\left(2x^2-1\right)y(x)=0$$

✓ **Mathematica** : cpu = 0.0326612 (sec), leaf count = 24

$$\left\{\left\{y(x)\to ax+c_1\sqrt{1-x^2}x\right\}\right\}$$

✓ **Maple** : cpu = 0.018 (sec), leaf count = 20

$$\left\{y(x)=\left(c_1\sqrt{x-1}\,\sqrt{x+1}+a\right)x\right\}$$

2.176 ODE No. 176

$$(x^2-1)\,xy'(x)+(x^2-1)\,y(x)^2-x^2=0$$

✓ **Mathematica** : cpu = 0.212384 (sec), leaf count = 82

$$\left\{\left\{y(x)\to\frac{x\left(-2xG_{2,2}^{2,0}\left(x^2\middle|\begin{array}{c}-\frac{1}{2},\frac{1}{2}\\-1,0\end{array}\right)+\frac{2c_1(E(x^2)-K(x^2))}{\pi x}\right)}{G_{2,2}^{2,0}\left(x^2\middle|\begin{array}{c}\frac{1}{2},\frac{3}{2}\\0,0\end{array}\right)+\frac{2c_1E(x^2)}{\pi}}\right\}\right\}$$

✓ **Maple** : cpu = 0.097 (sec), leaf count = 30

$$\left\{y(x)=\frac{c_1\,\mathrm{EllipticCE}\,(x)+\mathrm{EllipticE}\,(x)-\mathrm{EllipticK}\,(x)}{c_1\,\mathrm{EllipticCE}\,(x)-c_1\,\mathrm{EllipticCK}\,(x)+\mathrm{EllipticE}\,(x)}\right\}$$

2.177 ODE No. 177

$$(x-1)x^2y'(x)-(x-2)xy(x)-y(x)^2=0$$

✓ **Mathematica** : cpu = 0.166339 (sec), leaf count = 22

$$\left\{\left\{y(x)\to-\frac{x^2}{c_1x-1-c_1}\right\}\right\}$$

✓ **Maple** : cpu = 0.023 (sec), leaf count = 17

$$\left\{y(x)=\frac{x^2}{c_1\,(x-1)+1}\right\}$$

2.178 ODE No. 178

$$2(x^2-1)\,xy'(x)+2(x^2-1)\,y(x)^2-(3x^2-5)\,y(x)+x^2-3=0$$

✓ **Mathematica** : cpu = 0.179559 (sec), leaf count = 49

$$\left\{\left\{y(x)\to1+\frac{\sqrt{x}}{\sqrt{1-x^2}\left(2\sqrt{x}\,{}_2F_1\left(\frac{1}{4},\frac{1}{2};\frac{5}{4};x^2\right)+c_1\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.104 (sec), leaf count = 61

$$\left\{y(x)=-\frac{2\sqrt{x}}{\sqrt{x-1}\,\sqrt{x+1}\left(c_1-\frac{2\sqrt{-x}\,\sqrt{2}\,\sqrt{-x+1}\,\mathrm{EllipticF}\left(\sqrt{x+1},\frac{\sqrt{2}}{2}\right)}{\sqrt{x-1}\,\sqrt{x}}\right)}+1\right\}$$

2.179 ODE No. 179

$$3x(x^2-1)\,y'(x)-(x^2+1)\,y(x)+xy(x)^2-3x=0$$

✓ **Mathematica** : cpu = 0.661833 (sec), leaf count = 2833

$$\left\{\left\{y(x)\to\frac{3(x^2-1)\left(c_1\left(\frac{e^{\int_1^x \mathrm{Root}\left[125K[1]^8-164K[1]^6+70K[1]^4-20K[1]^2+\left(1296K[1]^{12}-5184K[1]^{10}+7776K[1]^8-5184K[1]^6+1296K[1]^4\right)\#1^4+(\right.}}{}\right.\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.145 (sec), leaf count = 112

$$\left\{y(x)=\frac{24x^{\frac{4}{3}}\,\mathrm{hypergeom}\left(\left[\frac{1}{2},\frac{5}{6}\right],\left[\frac{2}{3}\right],x^2\right)+35c_1\left(\frac{8x^2}{7}-\frac{16}{35}\right)\mathrm{hypergeom}\left(\left[\frac{5}{6},\frac{7}{6}\right],\left[\frac{4}{3}\right],x^2\right)+35c_1\left(x^4-x^2\right)\mathrm{hype}}{\left(8c_1x^{\frac{2}{3}}\,\mathrm{hypergeom}\left(\left[\frac{5}{6},\frac{7}{6}\right],\left[\frac{4}{3}\right],x^2\right)+8\,\mathrm{hypergeom}\right.}\right.$$

2.180 ODE No. 180

$$(xy'(x)-y(x))\left(ax^2+bx+c\right)+x^2-y(x)^2=0$$

✓ **Mathematica** : cpu = 0.411871 (sec), leaf count = 132

$$\left\{\left\{y(x)\to-\frac{x\left(-1+\exp\left(\frac{4\tan^{-1}\left(\frac{2ax}{\sqrt{4ac-b^2}}+\frac{b}{\sqrt{4ac-b^2}}\right)}{\sqrt{4ac-b^2}}+2c_1\right)\right)}{1+\exp\left(\frac{4\tan^{-1}\left(\frac{2ax}{\sqrt{4ac-b^2}}+\frac{b}{\sqrt{4ac-b^2}}\right)}{\sqrt{4ac-b^2}}+2c_1\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.078 (sec), leaf count = 58

$$\left\{y(x)=-x\tanh\left(\frac{c_1\sqrt{4ac-b^2}+2\arctan\left(\frac{2ax+b}{\sqrt{4ac-b^2}}\right)}{\sqrt{4ac-b^2}}\right)\right\}$$

2.181 ODE No. 181

$$a + x^4\left(y'(x) + y(x)^2\right) = 0$$

✓ **Mathematica** : cpu = 0.103347 (sec), leaf count = 347

$$\left\{\left\{y(x) \to -\frac{\frac{i\sqrt{\frac{2}{\pi}}c_1 \sinh\left(\frac{\sqrt{-a}}{x}\right)}{\sqrt{-\frac{i\sqrt{-a}}{x}}} + \frac{i\sqrt{-a}\left(-\frac{2\sqrt{\frac{2}{\pi}}\left(i\sinh\left(\frac{\sqrt{-a}}{x}\right)+\frac{i\sqrt{-a}x\cosh\left(\frac{\sqrt{-a}}{x}\right)}{a}\right)}{\sqrt{-\frac{i\sqrt{-a}}{x}}} - \frac{\sqrt{\frac{2}{\pi}}c_1\cosh\left(\frac{\sqrt{-a}}{x}\right)}{\sqrt{-\frac{i\sqrt{-a}}{x}}} + \frac{\sqrt{\frac{2}{\pi}}c_1\left(-\frac{\sqrt{-a}x\sinh\left(\frac{\sqrt{-a}}{x}\right)}{a} - \cdots\right.}{\sqrt{-\frac{i\sqrt{-a}}{x}}}\right.}{x}}{2x\left(\frac{\sqrt{\frac{2}{\pi}}\cosh\left(\frac{\sqrt{-a}}{x}\right)}{\sqrt{-\frac{i\sqrt{-a}}{x}}} - \frac{i\sqrt{\frac{2}{\pi}}c_1\sinh\left(\frac{\sqrt{-a}}{x}\right)}{\sqrt{-\frac{i\sqrt{-a}}{x}}}\right)}\right.\right.$$

✓ **Maple** : cpu = 0.075 (sec), leaf count = 28

$$\left\{y(x) = \frac{-\sqrt{a}\tan\left(\frac{(c_1x-1)\sqrt{a}}{x}\right) + x}{x^2}\right\}$$

2.182 ODE No. 182

$$\left(x^3 - 1\right)xy'(x) + x^2 - 2xy(x)^2 + y(x) = 0$$

✓ **Mathematica** : cpu = 0.240075 (sec), leaf count = 96

$$\left\{\left\{y(x) \to -\frac{\left(x^3-1\right)\left(\frac{x}{(1-x^3)^{2/3}} + \frac{x^4}{(1-x^3)^{5/3}} + \frac{2c_1x^2}{(1-x^3)^{5/3}}\right)}{2\left(\frac{x^2}{2(1-x^3)^{2/3}} + \frac{c_1}{(1-x^3)^{2/3}}\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.119 (sec), leaf count = 18

$$\left\{y(x) = \frac{(c_1 + x)\,x}{c_1x^2 + 1}\right\}$$

2.183 ODE No. 183

$$\left(2x^4 - x\right) y'(x) - 2\left(x^3 - 1\right) y(x) = 0$$

✓ **Mathematica** : cpu = 0.0287992 (sec), leaf count = 22

$$\left\{\left\{y(x) \to \frac{c_1 x^2}{\sqrt[3]{1 - 2x^3}}\right\}\right\}$$

✓ **Maple** : cpu = 0.015 (sec), leaf count = 18

$$\left\{y(x) = \frac{c_1 x^2}{\left(2x^3 - 1\right)^{\frac{1}{3}}}\right\}$$

2.184 ODE No. 184

$$\left(y'(x) + y(x)^2\right) \left(ax^2 + bx + c\right)^2 + A = 0$$

✓ **Mathematica** : cpu = 1.29124 (sec), leaf count = 704

$$\left\{\left\{y(x) \to -\frac{-\frac{2a\sqrt{ax^2+bx+c}\exp\left(-\frac{\sqrt{4ac-b^2}\sqrt{1-\frac{4A}{b^2-4ac}}\tan^{-1}\left(\frac{2ax+b}{\sqrt{4ac-b^2}}\right)}{\sqrt{b^2-4ac}}\right)}{\left(b^2-4ac\right)\left(\frac{(2ax+b)^2}{4ac-b^2}+1\right)} + \frac{(2ax+b)\exp\left(-\frac{\sqrt{4ac-b^2}\sqrt{1-\frac{4A}{b^2-4ac}}\tan^{-1}\left(\frac{2ax+b}{\sqrt{4ac-b^2}}\right)}{\sqrt{b^2-4ac}}\right)}{2\sqrt{b^2-4ac}\sqrt{1-\frac{4A}{b^2-4ac}}\sqrt{ax^2+bx+c}}}{-\frac{\sqrt{ax^2+bx+c}\exp\left(-\frac{\sqrt{4ac-b^2}\sqrt{1-\frac{4A}{b^2-4ac}}\tan^{-1}\left(\frac{2ax+b}{\sqrt{4ac-b^2}}\right)}{\sqrt{b^2-4ac}}\right)}{\sqrt{b^2-4ac}\sqrt{1-\frac{4A}{b^2-4ac}}}}$$

✓ **Maple** : cpu = 0.422 (sec), leaf count = 493

$$\left\{y(x) = \frac{2\left(c_1\left(i\sqrt{\frac{-4ac+b^2-4A}{a^2}}\sqrt{4ac-b^2}\,a - 2\sqrt{-4ac+b^2}\left(ax+\frac{b}{2}\right)\right)\left(\frac{-2ax-b+i\sqrt{4ac-b^2}}{2ax+b+i\sqrt{4ac-b^2}}\right)^{-\frac{\sqrt{\frac{-4ac+b^2-4A}{a^2}}\,a}{2\sqrt{-4ac+b^2}}} - \left(i\sqrt{\right.\right.}{\sqrt{-4ac+b^2}\left(2ax+b+i\sqrt{4ac-b^2}\right)\left(-2ax-b+i\sqrt{4ac-b^2}\right)\left(c_1\left(\frac{-2ax-b+}{2ax+b+}\right.\right.}\right.$$

2.185 ODE No. 185

$$x^7 y'(x) + 5x^3 y(x)^2 + 2\left(x^2+1\right) y(x)^3 = 0$$

✓ **Mathematica** : cpu = 0.514557 (sec), leaf count = 123

$$\text{Solve}\left[c_1 = \frac{\frac{1}{2}\sqrt[4]{1-\left(\frac{ix^2}{y(x)}+\frac{i}{x}\right)^2}\left(\frac{ix^2}{y(x)}+\frac{i}{x}\right)\,{}_2F_1\left(\frac{1}{2},\frac{5}{4};\frac{3}{2};\left(\frac{ix^2}{y(x)}+\frac{i}{x}\right)^2\right)+ix}{\sqrt[4]{-1+\left(\frac{ix^2}{y(x)}+\frac{i}{x}\right)^2}}, y(x)\right]$$

✓ **Maple** : cpu = 0.037 (sec), leaf count = 63

$$\left\{c_1 + \frac{x}{\left(\left(\frac{x^2}{y(x)}+\frac{1}{x}\right)^2+1\right)^{\frac{1}{4}}} + \frac{\left(x^3+y(x)\right)\text{hypergeom}\left(\left[\frac{1}{2},\frac{5}{4}\right],\left[\frac{3}{2}\right],-\frac{\left(x^3+y(x)\right)^2}{x^2 y(x)^2}\right)}{2xy\left(x\right)} = 0\right\}$$

2.186 ODE No. 186

$$-\left((n-1)x^{n-1}y(x)\right) + x^{2n-2} + x^n y'(x) + y(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.322511 (sec), leaf count = 19

$$\left\{\left\{y(x) \to x^{n-1}\tan(-\log(x)+c_1)\right\}\right\}$$

✓ **Maple** : cpu = 0.046 (sec), leaf count = 17

$$\left\{y(x) = x^{n-1}\tan\left(c_1 - \ln\left(x\right)\right)\right\}$$

2.187 ODE No. 187

$$-ay(x)^2 - bx^{2n-2} + x^n y'(x) = 0$$

✓ **Mathematica** : cpu = 0.25037 (sec), leaf count = 328

$$\left\{\left\{y(x) \to -\frac{x^n\left(\frac{1}{2}\sqrt{a}\sqrt{b}\left(\sqrt{\frac{(n-1)^2}{ab}-4}-\frac{n-1}{\sqrt{a}\sqrt{b}}\right)x^{\frac{1}{2}\sqrt{a}\sqrt{b}\left(\sqrt{\frac{(n-1)^2}{ab}-4}-\frac{n-1}{\sqrt{a}\sqrt{b}}\right)-1}+\frac{1}{2}\sqrt{a}\sqrt{b}c_1\left(-\frac{n-1}{\sqrt{a}\sqrt{b}}-\sqrt{\frac{(n-1)^2}{ab}\cdots}\right.\right.}{a\left(x^{\frac{1}{2}\sqrt{a}\sqrt{b}\left(\sqrt{\frac{(n-1)^2}{ab}-4}-\frac{n-1}{\sqrt{a}\sqrt{b}}\right)}+c_1x^{\frac{1}{2}\sqrt{a}\sqrt{b}\left(-\frac{n-1}{\sqrt{a}\sqrt{b}}-\sqrt{\frac{(n-1)^2}{ab}-4}\right)}\cdots\right.}\right.\right.$$

✓ **Maple** : cpu = 0.075 (sec), leaf count = 60

$$\left\{y(x) = \frac{\left(n - \sqrt{4ab - n^2 + 2n - 1}\tan\left(\frac{\sqrt{4ab-n^2+2n-1}\,(c_1 - \ln(x))}{2}\right) - 1\right)x^{n-1}}{2a}\right\}$$

2.188 ODE No. 188

$$-ay(x)^3 - bnx^3 + x^{2n+1}y'(x) = 0$$

✗ **Mathematica** : cpu = 14.0359 (sec), leaf count = 0 , could not solve

```
DSolve[-(b*n*x^3) - a*y[x]^3 + x^(1 + 2*n)*Derivative[1][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 0.027 (sec), leaf count = 32

$$\left\{y(x) = x^n \operatorname{RootOf}\left(c_1 + \int^{\_Z} \frac{1}{\_a^3 a - n\_a + b} d\_a - \ln(x)\right)\right\}$$

2.189 ODE No. 189

$$-ay(x)^n - bx^{(m+1)n} + x^{m(n-1)+n}y'(x) = 0$$

✓ **Mathematica** : cpu = 0.488293 (sec), leaf count = 91

$$\text{Solve}\left[\int_1^{\left(\frac{ax^{-((m+1)n)}}{b}\right)^{\frac{1}{n}}y(x)} \frac{1}{K[1]^n - \left(\frac{b^{1-n}(m+1)^n}{a}\right)^{\frac{1}{n}}K[1]+1}dK[1] = bx^{m+1}\log(x)\left(\frac{ax^{-((m+1)n)}}{b}\right)^{\frac{1}{n}} + c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.339 (sec), leaf count = 60

$$\left\{-c_1 + \int_{\_b}^{y(x)} -\frac{x^n x^{mn}}{ax\_a^n x^m + (bx\,x^m - (m+1)\_a)\,x^n x^{mn}}d\_a + \ln(x) = 0\right\}$$

2.190 ODE No. 190

$$\sqrt{x^2-1}y'(x) - \sqrt{y(x)^2-1} = 0$$

✓ **Mathematica** : cpu = 0.149295 (sec), leaf count = 173

$$\left\{\left\{y(x) \to -\frac{1}{2}e^{-c_1}\sqrt{2x^2 + 2e^{4c_1}x^2 - 2\sqrt{(x-1)(x+1)}x + 2e^{4c_1}\sqrt{(x-1)(x+1)}x - 1 + 2e^{2c_1} - e^{4c_1}}\right\}, \left\{y(x) \right.\right.$$

✓ **Maple** : cpu = 0.006 (sec), leaf count = 29

$$\left\{c_1 + \ln\left(x + \sqrt{x^2-1}\right) - \ln\left(y(x) + \sqrt{y(x)^2 - 1}\right) = 0\right\}$$

2.191 ODE No. 191

$$\sqrt{1-x^2}y'(x) - y(x)\sqrt{y(x)^2-1} = 0$$

✓ **Mathematica** : cpu = 0.14113 (sec), leaf count = 39

$$\left\{\left\{y(x)\to -\sqrt{1+\tan^2\left(\sin^{-1}(x)+c_1\right)}\right\},\left\{y(x)\to \sqrt{1+\tan^2\left(\sin^{-1}(x)+c_1\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.018 (sec), leaf count = 16

$$\left\{c_1+\arcsin(x)+\arctan\left(\frac{1}{\sqrt{y(x)^2-1}}\right)=0\right\}$$

2.192 ODE No. 192

$$\sqrt{a^2+x^2}y'(x) - \sqrt{a^2+x^2} + y(x) + x = 0$$

✓ **Mathematica** : cpu = 0.764372 (sec), leaf count = 168

$$\left\{\left\{y(x)\to \frac{\sqrt{1-\frac{x}{\sqrt{a^2+x^2}}}\int_1^x \frac{\sqrt{\frac{K[1]}{\sqrt{a^2+K[1]^2}}+1}\left(\sqrt{a^2+K[1]^2}-K[1]\right)}{\sqrt{a^2+K[1]^2}\sqrt{1-\frac{K[1]}{\sqrt{a^2+K[1]^2}}}}dK[1]}{\sqrt{\frac{x}{\sqrt{a^2+x^2}}+1}}+\frac{c_1\sqrt{1-\frac{x}{\sqrt{a^2+x^2}}}}{\sqrt{\frac{x}{\sqrt{a^2+x^2}}+1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.018 (sec), leaf count = 36

$$\left\{y(x)=\frac{a^2\ln\left(x+\sqrt{a^2+x^2}\right)+c_1}{x+\sqrt{a^2+x^2}}\right\}$$

2.193 ODE No. 193

$$-ax(\log(x)+1)+x\log(x)y'(x)+y(x)=0$$

✓ **Mathematica** : cpu = 0.0308073 (sec), leaf count = 16

$$\left\{\left\{y(x)\to ax+\frac{c_1}{\log(x)}\right\}\right\}$$

✓ **Maple** : cpu = 0.007 (sec), leaf count = 14

$$\left\{y(x)=ax+\frac{c_1}{\ln(x)}\right\}$$

2.194 ODE No. 194

$$x\log(x)y'(x)-y(x)\left(2\log^2(x)+1\right)-y(x)^2\log(x)-\log^3(x)=0$$

✓ **Mathematica** : cpu = 0.214417 (sec), leaf count = 98

$$\left\{\left\{y(x)\to-\frac{x\left(\frac{e^{\frac{\log^2(x)}{2}}\log(x)}{x}+\frac{e^{\frac{\log^2(x)}{2}}\log^3(x)}{2x}+\frac{c_1e^{\frac{\log^2(x)}{2}}\log(x)}{x}\right)}{\frac{1}{2}e^{\frac{\log^2(x)}{2}}\log^2(x)+c_1e^{\frac{\log^2(x)}{2}}}\right\}\right\}$$

✓ **Maple** : cpu = 0.025 (sec), leaf count = 23

$$\left\{y(x)=-\frac{\left(\ln(x)^2+c_1+2\right)\ln(x)}{\ln(x)^2+c_1}\right\}$$

2.195 ODE No. 195

$$\sin(x)y'(x)+y(x)^2\left(-\sin^2(x)\right)+y(x)(\cos(x)-3\sin(x))+4=0$$

✓ **Mathematica** : cpu = 0.183558 (sec), leaf count = 27

$$\left\{\left\{y(x)\to-4\csc(x)+\frac{\csc(x)}{\frac{1}{5}+c_1e^{5x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.118 (sec), leaf count = 28

$$\left\{y(x)=\frac{-4c_1e^{5x}-4}{(c_1e^{5x}-4)\sin(x)}\right\}$$

2.196 ODE No. 196

$$\cos(x)y'(x) + y(x) + (\sin(x) + 1)\cos(x) = 0$$

✓ **Mathematica** : cpu = 0.23401 (sec), leaf count = 53

$$\left\{\left\{y(x) \to e^{-2\tanh^{-1}\left(\tan\left(\frac{x}{2}\right)\right)}\left(\sin(x) + 4\log\left(\cos\left(\frac{x}{2}\right) - \sin\left(\frac{x}{2}\right)\right)\right) + c_1 e^{-2\tanh^{-1}\left(\tan\left(\frac{x}{2}\right)\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.157 (sec), leaf count = 29

$$\left\{y(x) = \frac{c_1 - 2\ln(\sec(x) + \tan(x)) + 2\ln(\cos(x)) + \sin(x)}{\sec(x) + \tan(x)}\right\}$$

2.197 ODE No. 197

$$\cos(x)y'(x) - y(x)^4 - y(x)\sin(x) = 0$$

✓ **Mathematica** : cpu = 0.134098 (sec), leaf count = 98

$$\left\{\left\{y(x) \to \frac{1}{\sqrt[3]{-\sin(x) + c_1\cos^3(x) - 2\sin(x)\cos^2(x)}}\right\}, \left\{y(x) \to -\frac{\sqrt[3]{-1}}{\sqrt[3]{-\sin(x) + c_1\cos^3(x) - 2\sin(x)\cos^2(x)}}\right\}$$

✓ **Maple** : cpu = 0.158 (sec), leaf count = 237

$$\left\{y(x) = \frac{\left(\left(c_1\left(\sin^4(x)\right) + 2\cos(x)\left(\sin^3(x)\right) - 2c_1\left(\sin^2(x)\right) - 3\cos(x)\sin(x) + c_1\right)^2\cos(x)\right)^{\frac{1}{3}}}{c_1\left(\sin^4(x)\right) + 2\cos(x)\left(\sin^3(x)\right) - 2c_1\left(\sin^2(x)\right) - 3\cos(x)\sin(x) + c_1}, y(x) = \frac{\left(\left(c_1\left(\sin\right.\right.\right.}{}$$

2.198 ODE No. 198

$$\sin(x)\cos(x)y'(x) - y(x) - \sin^3(x) = 0$$

✓ **Mathematica** : cpu = 0.0340805 (sec), leaf count = 15

$$\{\{y(x) \to -\sin(x) + c_1\tan(x)\}\}$$

✓ **Maple** : cpu = 0.037 (sec), leaf count = 13

$$\{y(x) = (c_1 - \cos(x))\tan(x)\}$$

2.199 ODE No. 199

$$\sin(2x)y'(x) + \sin(2y(x)) = 0$$

✓ **Mathematica** : cpu = 0.232108 (sec), leaf count = 15

$$\left\{\left\{y(x) \to \cot^{-1}\left(e^{-2c_1}\tan(x)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.181 (sec), leaf count = 102

$$\left\{y(x) = \frac{\arctan\left(\frac{2c_1(2\sin(2x)+\sin(4x))}{-c_1^2\cos(4x)+c_1^2+4\cos(2x)+\cos(4x)+3}, \frac{c_1^2\cos(4x)-c_1^2+4\cos(2x)+\cos(4x)+3}{c_1^2\cos(4x)-c_1^2-4\cos(2x)-\cos(4x)-3}\right)}{2}\right\}$$

2.200 ODE No. 200

$$Ax\left(a\sin^2(x)+c\right) + y'(x)\left(a\sin^2(x)+b\right) + ay(x)\sin(2x) = 0$$

✓ **Mathematica** : cpu = 0.143451 (sec), leaf count = 77

$$\left\{\left\{y(x) \to \frac{\frac{1}{2}aAx^2 - \frac{1}{2}aAx\sin(2x) - \frac{1}{4}aA\cos(2x) + Acx^2}{a\cos(2x)-a-2b} + \frac{c_1}{a\cos(2x)-a-2b}\right\}\right\}$$

✓ **Maple** : cpu = 0.096 (sec), leaf count = 53

$$\left\{y(x) = \frac{-2Aax\sin(2x) - Aa\cos(2x) + 2(a+2c)Ax^2 - 8c_1}{4a\cos(2x)-4a-8b}\right\}$$

2.201 ODE No. 201

$$-y(x)f'(x) + 2f(x)y'(x) + 2f(x)y(x)^2 - 2f(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.163848 (sec), leaf count = 39

$$\left\{\left\{y(x) \to i\sqrt{f(x)}\tan\left(i\int_1^x -\sqrt{f(K[1])}dK[1] + c_1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.052 (sec), leaf count = 23

$$\left\{y(x) = i\sqrt{f(x)}\tan\left(c_1 - i\left(\int\sqrt{f(x)}dx\right)\right)\right\}$$

2.202 ODE No. 202

$$f(x)y'(x) + g(x)\text{tg}(y(x)) + h(x) = 0$$

✗ **Mathematica** : cpu = 20.3047 (sec), leaf count = 0 , could not solve

```
DSolve[h[x] + g[x]*tg[y[x]] + f[x]*Derivative[1][y][x] == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(f(x)*diff(y(x),x)+g(x)*tg(y(x))+h(x) = 0,y(x))
```

2.203 ODE No. 203

$$x^3 + y(x)y'(x) + y(x) = 0$$

✗ **Mathematica** : cpu = 1.82444 (sec), leaf count = 0 , could not solve

```
DSolve[x^3 + y[x] + y[x]*Derivative[1][y][x] == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(y(x)*diff(y(x),x)+y(x)+x^3 = 0,y(x))
```

2.204 ODE No. 204

$$ay(x) + y(x)y'(x) + x = 0$$

✓ **Mathematica** : cpu = 0.13388 (sec), leaf count = 70

$$\text{Solve}\left[\frac{1}{2}\log\left(\frac{ay(x)}{x} + \frac{y(x)^2}{x^2} + 1\right) - \frac{a\tan^{-1}\left(\frac{a+\frac{2y(x)}{x}}{\sqrt{4-a^2}}\right)}{\sqrt{4-a^2}} = -\log(x) + c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.325 (sec), leaf count = 92

$$\left\{y(x) = x\,\text{RootOf}\left(\_Z^2 + \_Za - e^{\text{RootOf}\left(\left(a^2\left(\tanh^2\left(\frac{\sqrt{(a-2)(a+2)}\,(2c_1+\_Z+2\ln(x))}{2a}\right)\right)-a^2-4\left(\tanh^2\left(\frac{\sqrt{(a-2)(a+2)}\,(2c_1+\_Z+2\ln\right.\right.\right.\right.}}\right.\right.$$

2.205 ODE No. 205

$$\frac{1}{4}\left(a^2-1\right)x+ay(x)+bx^n+y(x)y'(x)=0$$

✗ **Mathematica** : cpu = 16.3552 (sec), leaf count = 0 , could not solve

```
DSolve[((-1 + a^2)*x)/4 + b*x^n + a*y[x] + y[x]*Derivative[1][y][x] == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(y(x)*diff(y(x),x)+a*y(x)+1/4*(a^2-1)*x+b*x^n = 0,y(x))
```

2.206 ODE No. 206

$$ay(x)-2a+be^x+y(x)y'(x)=0$$

✗ **Mathematica** : cpu = 26.7588 (sec), leaf count = 0 , could not solve

```
DSolve[-2*a + b*E^x + a*y[x] + y[x]*Derivative[1][y][x] == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(y(x)*diff(y(x),x)+a*y(x)+b*exp(x)-2*a = 0,y(x))
```

2.207 ODE No. 207

$$y(x)y'(x)+y(x)^2+4x(x+1)=0$$

✓ **Mathematica** : cpu = 0.100815 (sec), leaf count = 47

$$\left\{\left\{y(x)\to -\sqrt{-4x^2+c_1e^{-2x}}\right\},\left\{y(x)\to \sqrt{-4x^2+c_1e^{-2x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.027 (sec), leaf count = 37

$$\left\{y(x)=\sqrt{c_1\mathrm{e}^{-2x}-4x^2},y(x)=-\sqrt{c_1\mathrm{e}^{-2x}-4x^2}\right\}$$

2.208 ODE No. 208

$$ay(x)^2-b\cos(c+x)+y(x)y'(x)=0$$

✓ **Mathematica** : cpu = 0.238141 (sec), leaf count = 118

$$\left\{\left\{y(x)\to -\frac{\sqrt{4a^2c_1e^{-2ax}+4ab\cos(c+x)+c_1e^{-2ax}+2b\sin(c+x)}}{\sqrt{4a^2+1}}\right\},\left\{y(x)\to \frac{\sqrt{4a^2c_1e^{-2ax}+4ab\cos(c+x}}{\sqrt{4a^2}}\right.\right.$$

✓ **Maple** : cpu = 0.088 (sec), leaf count = 106

$$\left\{y(x) = \frac{\sqrt{16c_1\left(a^2+\frac{1}{4}\right)^2 \mathrm{e}^{-2ax} + 16\left(a^2+\frac{1}{4}\right)\left(a\cos\left(c+x\right)+\frac{\sin(c+x)}{2}\right)b}}{4a^2+1}, y(x) = -\frac{\sqrt{16c_1\left(a^2+\frac{1}{4}\right)^2 \mathrm{e}^{-2ax} + 16\right.}}{}\right.$$

2.209 ODE No. 209

$$y(x)y'(x) - \sqrt{ay(x)^2+b} = 0$$

✓ **Mathematica** : cpu = 0.133764 (sec), leaf count = 84

$$\left\{\left\{y(x) \to -\frac{\sqrt{a^2x^2+2a^2c_1x+a^2c_1{}^2-b}}{\sqrt{a}}\right\}, \left\{y(x) \to \frac{\sqrt{a^2x^2+2a^2c_1x+a^2c_1{}^2-b}}{\sqrt{a}}\right\}\right\}$$

✓ **Maple** : cpu = 0.012 (sec), leaf count = 21

$$\left\{c_1 + x - \frac{\sqrt{ay\left(x\right)^2+b}}{a} = 0\right\}$$

2.210 ODE No. 210

$$y(x)y'(x) + xy(x)^2 - 4x = 0$$

✓ **Mathematica** : cpu = 0.0976656 (sec), leaf count = 47

$$\left\{\left\{y(x) \to -\sqrt{4+e^{-x^2+2c_1}}\right\}, \left\{y(x) \to \sqrt{4+e^{-x^2+2c_1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.026 (sec), leaf count = 33

$$\left\{y(x) = \sqrt{c_1\mathrm{e}^{-x^2}+4}, y(x) = -\sqrt{c_1\mathrm{e}^{-x^2}+4}\right\}$$

2.211 ODE No. 211

$$y(x)y'(x) - xe^{\frac{x}{y(x)}} = 0$$

✓ **Mathematica** : cpu = 0.261051 (sec), leaf count = 41

$$\text{Solve}\left[\int_1^{\frac{y(x)}{x}} \frac{K[1]}{K[1]^2 - e^{\frac{1}{K[1]}}} dK[1] = -\log(x) + c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.053 (sec), leaf count = 31

$$\left\{y(x) = x \operatorname{RootOf}\left(c_1 - \left(\left(\int^{\_Z} \frac{\_a}{-\_a^2 + e^{\frac{1}{\_a}}} d\_a\right) + \ln(x)\right)\right)\right\}$$

2.212 ODE No. 212

$$g(x)f\left(x^2 + y(x)^2\right) + y(x)y'(x) + x = 0$$

✓ **Mathematica** : cpu = 0.39767 (sec), leaf count = 95

$$\text{Solve}\left[\int_1^{y(x)} \left(\frac{K[2]}{f\left(x^2 + K[2]^2\right)} - \int_1^x -\frac{2K[1]K[2]f'\left(K[1]^2 + K[2]^2\right)}{f\left(K[1]^2 + K[2]^2\right)^2} dK[1]\right) dK[2] + \int_1^x \left(g(K[1]) + \frac{K[1]}{f\left(K[1]^2 + y\right.}\right.$$

✓ **Maple** : cpu = 0.141 (sec), leaf count = 30

$$\left\{-c_1 + \int_{\_b}^{y(x)} \frac{\_a}{f\left(\_a^2 + x^2\right)} d\_a + \int g(x)\, dx = 0\right\}$$

2.213 ODE No. 213

$$(y(x) + 1)y'(x) - y(x) - x = 0$$

✓ **Mathematica** : cpu = 0.14623 (sec), leaf count = 71

$$\text{Solve}\left[\frac{1}{2}\log\left(\frac{x^2 - y(x)^2 + (x-3)y(x) - x - 1}{(x-1)^2}\right) + \log(1-x) = \frac{\tanh^{-1}\left(\frac{y(x)+2x-1}{\sqrt{5}(y(x)+1)}\right)}{\sqrt{5}} + c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.823 (sec), leaf count = 66

$$\left\{-c_1 - \frac{\sqrt{5}\operatorname{arctanh}\left(\frac{(x-2y(x)-3)\sqrt{5}}{5x-5}\right)}{5} - \frac{\ln\left(\frac{-x^2+y(x)^2+x+(-x+3)y(x)+1}{(x-1)^2}\right)}{2} - \ln(x-1) = 0\right\}$$

2.214 ODE No. 214

$$(y(x) + x - 1)y'(x) - y(x) + 2x + 3 = 0$$

✓ **Mathematica** : cpu = 0.179265 (sec), leaf count = 78

$$\text{Solve}\left[2\sqrt{2}\tan^{-1}\left(\frac{-y(x)+2x+3}{\sqrt{2}(y(x)+x-1)}\right) = 2\log\left(\frac{6x^2+3y(x)^2-10y(x)+8x+11}{(3x+2)^2}\right) + 4\log(3x+2) + 3c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.18 (sec), leaf count = 48

$$\left\{y(x) = \frac{(-3x-2)\sqrt{2}\tan\left(\text{RootOf}\left(2c_1\sqrt{2} - 2\_Z + \sqrt{2}\ln\left(2\left(\tan^2\left(\_Z\right)+1\right)(3x+2)^2\right)\right)\right)}{3} + \frac{5}{3}\right\}$$

2.215 ODE No. 215

$$(y(x) + 2x - 2)y'(x) - y(x) + x + 1 = 0$$

✓ **Mathematica** : cpu = 0.16912 (sec), leaf count = 80

$$\text{Solve}\left[6\sqrt{3}\tan^{-1}\left(\frac{4-3y(x)}{\sqrt{3}(y(x)+2x-2)}\right) = 3\log\left(\frac{3x^2+3y(x)^2+3(x-3)y(x)-6x+7}{(1-3x)^2}\right) + 6\log(3x-1) + 2c_1,\right.$$

✓ **Maple** : cpu = 0.204 (sec), leaf count = 51

$$\left\{y(x) = -\frac{x}{2} + \frac{\sqrt{3}(3x-1)\tan\left(\text{RootOf}\left(2c_1\sqrt{3} + 6\_Z + \sqrt{3}\ln\left(\frac{3\left(\tan^2(\_Z)+1\right)(3x-1)^2}{4}\right)\right)\right)}{6} + \frac{3}{2}\right\}$$

2.216 ODE No. 216

$$(y(x) - 2x + 1)y'(x) + y(x) + x = 0$$

✓ **Mathematica** : cpu = 0.147666 (sec), leaf count = 82

$$\text{Solve}\left[6\sqrt{3}\tan^{-1}\left(\frac{3y(x)+1}{\sqrt{3}(-y(x)+2x-1)}\right) = 3\log\left(\frac{3x^2+3y(x)^2-3(x-1)y(x)-3x+1}{(1-3x)^2}\right) + 6\log(3x-1) + 2c\right.$$

✓ **Maple** : cpu = 0.204 (sec), leaf count = 51

$$\left\{y(x) = \frac{x}{2} + \frac{(-3x+1)\sqrt{3}\tan\left(\text{RootOf}\left(2c_1\sqrt{3} + 6\_Z + \sqrt{3}\ln\left(\frac{3\left(\tan^2(\_Z)+1\right)(3x-1)^2}{4}\right)\right)\right)}{6} - \frac{1}{2}\right\}$$

2.217 ODE No. 217

$$\left(y(x)-x^2\right)y'(x)-x=0$$

✓ **Mathematica** : cpu = 0.028449 (sec), leaf count = 29

$$\left\{\left\{y(x)\to x^2+\frac{1}{2}\left(1+W\left(-e^{-2x^2-1+c_1}\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.036 (sec), leaf count = 23

$$\left\{y(x)=x^2+\frac{\mathrm{LambertW}\left(-4c_1\mathrm{e}^{-2x^2-1}\right)}{2}+\frac{1}{2}\right\}$$

2.218 ODE No. 218

$$\left(y(x)-x^2\right)y'(x)+4xy(x)=0$$

✓ **Mathematica** : cpu = 0.152185 (sec), leaf count = 257

$$\left\{\left\{y(x)\to x^2+\frac{1}{-\frac{1}{2x^2}-\frac{\frac{1}{2}-\frac{i}{2}}{\sqrt{2}x^2\sqrt{x^2\cosh\left(\frac{2c_1}{9}\right)+x^2\sinh\left(\frac{2c_1}{9}\right)-i}}}\right\},\left\{y(x)\to x^2+\frac{1}{-\frac{1}{2x^2}+\frac{\frac{1}{2}-\frac{i}{2}}{\sqrt{2}x^2\sqrt{x^2\cosh\left(\frac{2c_1}{9}\right)+x^2\sinh\left(\frac{2c_1}{9}\right.}}}\right.$$

✓ **Maple** : cpu = 0.169 (sec), leaf count = 57

$$\left\{y(x)=\frac{c_1^2}{2}-x^2-\frac{c_1\sqrt{-4x^2+c_1^2}}{2},y(x)=\frac{c_1^2}{2}-x^2+\frac{c_1\sqrt{-4x^2+c_1^2}}{2}\right\}$$

2.219 ODE No. 219

$$-\mathrm{f0}(x)-\mathrm{f1}(x)y(x)-\mathrm{f2}(x)y(x)^2+(g(x)+y(x))y'(x)=0$$

✗ **Mathematica** : cpu = 300.23 (sec), leaf count = 0 , timed out

`$Aborted`

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve((y(x)+g(x))*diff(y(x),x)-f2(x)*y(x)^2-f1(x)*y(x)-f0(x) = 0,y(x))
```

2.220 ODE No. 220

$$-x^3 + 2y(x)y'(x) - xy(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.127086 (sec), leaf count = 57

$$\left\{\left\{y(x) \to -\sqrt{-x^2 + c_1 e^{\frac{x^2}{2}} - 2}\right\}, \left\{y(x) \to \sqrt{-x^2 + c_1 e^{\frac{x^2}{2}} - 2}\right\}\right\}$$

✓ **Maple** : cpu = 0.028 (sec), leaf count = 43

$$\left\{y(x) = \sqrt{c_1 \mathrm{e}^{\frac{x^2}{2}} - x^2 - 2}, y(x) = -\sqrt{c_1 \mathrm{e}^{\frac{x^2}{2}} - x^2 - 2}\right\}$$

2.221 ODE No. 221

$$(2y(x) + x + 1)y'(x) - 2y(x) - x + 1 = 0$$

✓ **Mathematica** : cpu = 0.0325724 (sec), leaf count = 35

$$\left\{\left\{y(x) \to \frac{1}{2}(-x-1) + \frac{2}{3}\left(1 + W\left(-e^{\frac{9x}{4}-1+c_1}\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.117 (sec), leaf count = 21

$$\left\{y(x) = -\frac{x}{2} + \frac{2\,\mathrm{LambertW}\left(\frac{c_1 \mathrm{e}^{-\frac{1}{4}} \mathrm{e}^{\frac{9x}{4}}}{4}\right)}{3} + \frac{1}{6}\right\}$$

2.222 ODE No. 222

$$(2y(x) + x + 7)y'(x) - y(x) + 2x + 4 = 0$$

✓ **Mathematica** : cpu = 0.130989 (sec), leaf count = 65

$$\mathrm{Solve}\left[2\log\left(\frac{4(x^2 + y(x)^2 + 4y(x) + 6x + 13)}{5(x+3)^2}\right) + 2\tan^{-1}\left(\frac{y(x) - 2(x+2)}{2y(x) + x + 7}\right) + 4\log(x+3) + 5c_1 = 0, y(x)\right]$$

✓ **Maple** : cpu = 0.091 (sec), leaf count = 32

$$\left\{y(x) = (-x-3)\tan\left(\mathrm{RootOf}\left(2c_1 - \_Z + \ln\left(\frac{1}{\cos(\_Z)^2}\right) + 2\ln(x+3)\right)\right) - 2\right\}$$

2.223 ODE No. 223

$$(2y(x) - x)y'(x) - y(x) - 2x = 0$$

✓ **Mathematica** : cpu = 0.0426833 (sec), leaf count = 55

$$\left\{\left\{y(x) \to \frac{1}{2}\left(x - \sqrt{5x^2 - 4e^{c_1}}\right)\right\}, \left\{y(x) \to \frac{1}{2}\left(x + \sqrt{5x^2 - 4e^{c_1}}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.184 (sec), leaf count = 51

$$\left\{y(x) = \frac{c_1 x - \sqrt{5c_1^2 x^2 + 4}}{2c_1}, y(x) = \frac{c_1 x + \sqrt{5c_1^2 x^2 + 4}}{2c_1}\right\}$$

2.224 ODE No. 224

$$(2y(x) - 6x)y'(x) - y(x) + 3x + 2 = 0$$

✓ **Mathematica** : cpu = 0.0343946 (sec), leaf count = 29

$$\left\{\left\{y(x) \to 3x - \frac{2}{5}\left(1 + W\left(-e^{\frac{25x}{4} - 1 + c_1}\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.121 (sec), leaf count = 35

$$\left\{y(x) = 3x + \frac{\mathrm{e}^{-\frac{25c_1}{4} + \frac{25x}{4} - \mathrm{LambertW}\left(-\frac{\mathrm{e}^{-1}\mathrm{e}^{-\frac{25c_1}{4}}\mathrm{e}^{\frac{25x}{4}}}{2}\right) - 1}}{5} - \frac{2}{5}\right\}$$

2.225 ODE No. 225

$$(4y(x) + 2x + 3)y'(x) - 2y(x) - x - 1 = 0$$

✓ **Mathematica** : cpu = 0.0733567 (sec), leaf count = 33

$$\left\{\left\{y(x) \to \frac{1}{4}(-2x - 3) + \frac{1}{8}\left(1 + W\left(-e^{8x - 1 + c_1}\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.108 (sec), leaf count = 20

$$\left\{y(x) = -\frac{x}{2} + \frac{\mathrm{LambertW}\left(c_1 \mathrm{e}^5 \mathrm{e}^{8x}\right)}{8} - \frac{5}{8}\right\}$$

2.226 ODE No. 226

$$(4y(x) - 2x - 3)y'(x) + 2y(x) - x - 1 = 0$$

✓ **Mathematica** : cpu = 0.0351428 (sec), leaf count = 35

$$\left\{\left\{y(x) \to \frac{1}{4}(2x+3) + \frac{1}{8}\left(-1 - W\left(-e^{8x-1+c_1}\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.102 (sec), leaf count = 21

$$\left\{y(x) = \frac{x}{2} - \frac{\mathrm{LambertW}\left(-c_1 \mathrm{e}^5 \mathrm{e}^{8x}\right)}{8} + \frac{5}{8}\right\}$$

2.227 ODE No. 227

$$(4y(x) - 3x - 5)y'(x) - 3y(x) + 7x + 2 = 0$$

✓ **Mathematica** : cpu = 0.0278379 (sec), leaf count = 107

$$\left\{\left\{y(x) \to \frac{1}{4}(3x+5) - \frac{1}{2}i\sqrt{-2\left(-\frac{7x^2}{2} - 2x\right) - \frac{1}{4}(3x+5)^2 - 4c_1}\right\}, \left\{y(x) \to \frac{1}{4}(3x+5) + \frac{1}{2}i\sqrt{-2\left(-\frac{7x^2}{2} - \right.}\right.$$

✓ **Maple** : cpu = 0.178 (sec), leaf count = 33

$$\left\{y(x) = \frac{c_1(57x+95) - \sqrt{-6859\left(x - \frac{7}{19}\right)^2 c_1^2 + 4}}{76c_1}\right\}$$

2.228 ODE No. 228

$$(4y(x) + 11x - 11)y'(x) - 25y(x) - 8x + 62 = 0$$

✓ **Mathematica** : cpu = 0.462663 (sec), leaf count = 3357

$$\left\{\left\{y(x) \to \frac{}{4\left(-\frac{}{81(9x-1)\left(81\cosh\left(\frac{3c_1}{8}\right)x^2 + 81\sinh\left(\frac{3c_1}{8}\right)x^2 - 18\cosh\left(\frac{3c_1}{8}\right)x - 18\sinh\left(\frac{3c_1}{8}\right)x + \cosh\left(\frac{3c_1}{8}\right) + \sinh\left(\frac{3c_1}{8}\right) - 1\right)\sqrt[3]{-25828032}}\right.}\right.\right.$$

✓ **Maple** : cpu = 0.416 (sec), leaf count = 271

$$\left\{y(x) = \frac{(-76x+28)\left(-8748c_1(9x-1)^2+64+108\sqrt{43046721}\sqrt{c_1\left(c_1\left(x-\frac{1}{9}\right)^2-\frac{32}{177147}\right)\left(x-\frac{1}{9}\right)^2}\right)^{\frac{1}{3}}+4(x}{8\left(-8748c_1\left(9x-1\right)^2+64+108\sqrt{43046721}\sqrt{c_1\left(c_1\left(x-\frac{1}{9}\right)^2-\frac{32}{177147}\right)\left(x-\frac{1}{9}\right)^2}\right)^{\frac{1}{3}}+\left(i\right.}\right.$$

2.229 ODE No. 229

$$(12y(x)-5x-8)y'(x)-5y(x)+2x+3=0$$

✓ **Mathematica** : cpu = 0.0361257 (sec), leaf count = 121

$$\left\{\left\{y(x)\to\frac{1}{12}(5x+8)-\frac{i\sqrt{-24\left(-\frac{x^2}{12}-\frac{x}{4}\right)-\frac{1}{12}(5x+8)^2-12c_1}}{2\sqrt{3}}\right\},\left\{y(x)\to\frac{1}{12}(5x+8)+\frac{i\sqrt{-24\left(-\frac{x^2}{12}-\frac{x}{4}\right.}}{}\right.\right.$$

✓ **Maple** : cpu = 0.171 (sec), leaf count = 32

$$\left\{y(x)=\frac{c_1(5x+8)-\sqrt{(x+4)^2c_1^2+24}}{12c_1}\right\}$$

2.230 ODE No. 230

$$ay(x)y'(x)+by(x)^2+f(x)=0$$

✓ **Mathematica** : cpu = 0.312155 (sec), leaf count = 98

$$\left\{\left\{y(x)\to -e^{-\frac{bx}{a}}\sqrt{2\int_1^x-\frac{e^{\frac{2bK[1]}{a}}f(K[1])}{a}dK[1]+c_1}\right\},\left\{y(x)\to e^{-\frac{bx}{a}}\sqrt{2\int_1^x-\frac{e^{\frac{2bK[1]}{a}}f(K[1])}{a}dK[1]+c_1}\right\}\right\}$$

✓ **Maple** : cpu = 0.053 (sec), leaf count = 100

$$\left\{y(x)=\frac{\sqrt{\left(c_1a-2\left(\int e^{\frac{2bx}{a}}f(x)\,dx\right)\right)a\,e^{\frac{2bx}{a}}}\,e^{-\frac{2bx}{a}}}{a},y(x)=-\frac{\sqrt{\left(c_1a-2\left(\int e^{\frac{2bx}{a}}f(x)\,dx\right)\right)a\,e^{\frac{2bx}{a}}}\,e^{-\frac{2bx}{a}}}{a}\right\}$$

2.231 ODE No. 231

$$y'(x)(ay(x)+bx+c)+\alpha y(x)+\beta x+\gamma=0$$

✓ **Mathematica** : cpu = 3.80824 (sec), leaf count = 252

$$\text{Solve}\left[\frac{(\alpha-b)^2\left(-\log\left(\frac{(ay(x)+bx+c)^2\left(-\frac{(\alpha(bx+c)-a(\beta x+\gamma))\left(a(\alpha-b)y(x)+a(\beta x+\gamma)+b^2(-x)-bc\right)}{(ay(x)+bx+c)^2}+a\beta-\alpha b\right)}{(\alpha(bx+c)-a(\beta x+\gamma))^2}\right)-\frac{2\tan^{-1}\left(\frac{\frac{2a(\beta x+\gamma)-2\alpha}{ay(x)+bx}}{(\alpha-b)\sqrt{\frac{4(\alpha}{(\alpha}}}\right.}{\sqrt{\frac{4(a\beta-\alpha b)}{(\alpha-b)^2}}}\right.}{2(a\beta-\alpha b)}\right.$$

✓ **Maple** : cpu = 0.254 (sec), leaf count = 178

$$\left\{y(x)=\frac{\beta c-\gamma b+\frac{(-\alpha c+\gamma a+(a\beta-\alpha b)x)\left(\alpha+b+\sqrt{4a\beta-\alpha^2-2\alpha b-b^2}\tan\left(\mathrm{RootOf}\left(2\_Z\alpha-2\_Zb+2c_1\sqrt{4a\beta-\alpha^2-2\alpha b-b^2}+\sqrt{4a\beta-\alpha^2-}\right.\right.\right.}{2a}}{-a\beta+\alpha b}\right.$$

2.232 ODE No. 232

$$x^2+xy(x)y'(x)+y(x)^2=0$$

✓ **Mathematica** : cpu = 0.146583 (sec), leaf count = 56

$$\left\{\left\{y(x)\to-\frac{\sqrt{-x^4+2c_1}}{\sqrt{2}x}\right\},\left\{y(x)\to\frac{\sqrt{-x^4+2c_1}}{\sqrt{2}x}\right\}\right\}$$

✓ **Maple** : cpu = 0.019 (sec), leaf count = 39

$$\left\{y(x)=-\frac{\sqrt{-2x^4+4c_1}}{2x},y(x)=\frac{\sqrt{-2x^4+4c_1}}{2x}\right\}$$

2.233 ODE No. 233

$$ax^3\cos(x) + xy(x)y'(x) - y(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.220998 (sec), leaf count = 38

$$\left\{\left\{y(x)\to -x\sqrt{-2a\sin(x)+c_1}\right\},\left\{y(x)\to x\sqrt{-2a\sin(x)+c_1}\right\}\right\}$$

✓ **Maple** : cpu = 0.03 (sec), leaf count = 30

$$\left\{y(x)=\sqrt{-2a\sin(x)+c_1}\,x,y(x)=-\sqrt{-2a\sin(x)+c_1}\,x\right\}$$

2.234 ODE No. 234

$$x^3 - 2x^2 + xy(x)y'(x) + xy(x) - y(x)^2 = 0$$

✗ **Mathematica** : cpu = 28.5568 (sec), leaf count = 0 , could not solve

```
DSolve[-2*x^2 + x^3 + x*y[x] - y[x]^2 + x*y[x]*Derivative[1][y][x] == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(x*y(x)*diff(y(x),x)-y(x)^2+x*y(x)+x^3-2*x^2 = 0,y(x))
```

2.235 ODE No. 235

$$(a + xy(x))y'(x) + by(x) = 0$$

✓ **Mathematica** : cpu = 0.209539 (sec), leaf count = 40

$$\text{Solve}\left[x=-\frac{ae^{-\frac{y(x)}{b}}\text{Ei}\left(\frac{y(x)}{b}\right)}{b}+c_1e^{-\frac{y(x)}{b}},y(x)\right]$$

✓ **Maple** : cpu = 0.056 (sec), leaf count = 30

$$\left\{c_1+\frac{1}{-bx\,\mathrm{e}^{\frac{y(x)}{b}}+a\,\text{expIntegral}\left(1,-\frac{y(x)}{b}\right)}=0\right\}$$

2.236 ODE No. 236

$$x(y(x)+4)y'(x)-y(x)^2-2y(x)-2x=0$$

✓ **Mathematica** : cpu = 0.238047 (sec), leaf count = 114

$$\left\{\left\{y(x)\to -4+\frac{1}{x\left(\frac{1}{x^2+4x}-\frac{e^{-2\left(\frac{\log(x)}{4}+\frac{3}{4}\log(x+4)\right)}}{\sqrt{-\frac{4}{x+4}+c_1}}\right)}\right\},\left\{y(x)\to -4+\frac{1}{x\left(\frac{1}{x^2+4x}+\frac{e^{-2\left(\frac{\log(x)}{4}+\frac{3}{4}\log(x+4)\right)}}{\sqrt{-\frac{4}{x+4}+c_1}}\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.065 (sec), leaf count = 141

$$\left\{y(x)=\frac{-4x^{\frac{3}{2}}-(x+4)^{\frac{3}{2}}\sqrt{\frac{c_1(x+4)-4}{x+4}}\,x-16\sqrt{x}}{x^{\frac{3}{2}}+4\sqrt{x}-(x+4)^{\frac{3}{2}}\sqrt{\frac{c_1(x+4)-4}{x+4}}},y(x)=\frac{-4x^{\frac{3}{2}}+(x+4)^{\frac{3}{2}}\sqrt{\frac{c_1(x+4)-4}{x+4}}\,x-16\sqrt{x}}{x^{\frac{3}{2}}+4\sqrt{x}+(x+4)^{\frac{3}{2}}\sqrt{\frac{c_1(x+4)-4}{x+4}}}\right\}$$

2.237 ODE No. 237

$$x(a+y(x))y'(x)+by(x)+cx=0$$

✗ **Mathematica** : cpu = 6.10842 (sec), leaf count = 0 , could not solve

```
DSolve[c*x + b*y[x] + x*(a + y[x])*Derivative[1][y][x] == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(x*(y(x)+a)*diff(y(x),x)+b*y(x)+c*x = 0,y(x))
```

2.238 ODE No. 238

$$(a+x(y(x)+x))y'(x)-b-y(x)(y(x)+x)=0$$

✓ **Mathematica** : cpu = 0.398748 (sec), leaf count = 192

$$\left\{\left\{y(x)\to -\frac{a+x^2}{x}+\frac{1}{x\left(-\frac{a}{-a^2-ax^2-bx^2}-\frac{x}{(a^2+ax^2+bx^2)^{3/2}\sqrt{-\frac{1}{(a+b)\left(a^2+ax^2+bx^2\right)}+c_1}}\right)}\right\},\left\{y(x)\to -\frac{a+x^2}{x}+\right.$$

✓ **Maple** : cpu = 0.079 (sec), leaf count = 93

$$\left\{y(x)=\frac{-abx-c_1x+\sqrt{c_1\,(a+b)\,(a\,x^2+b\,x^2+a^2-c_1)}}{-a^2+c_1},y(x)=\frac{abx+c_1x+\sqrt{c_1\,(a+b)\,(a\,x^2+b\,x^2+a^2-c}}{a^2-c_1}\right.$$

2.239 ODE No. 239

$$
\left(xy(x)-x^2\right)y'(x)-2x^2-3xy(x)+y(x)^2=0
$$

✓ **Mathematica** : cpu = 0.165871 (sec), leaf count = 54

$$
\left\{\left\{y(x)\to x-\frac{\sqrt{2x^4+e^{2c_1}}}{x}\right\},\left\{y(x)\to x+\frac{\sqrt{2x^4+e^{2c_1}}}{x}\right\}\right\}
$$

✓ **Maple** : cpu = 0.171 (sec), leaf count = 59

$$
\left\{y(x)=\frac{c_1x^2-\sqrt{2x^4c_1^2+1}}{c_1x},y(x)=\frac{c_1x^2+\sqrt{2x^4c_1^2+1}}{c_1x}\right\}
$$

2.240 ODE No. 240

$$
ax+2xy(x)y'(x)-y(x)^2=0
$$

✓ **Mathematica** : cpu = 0.132447 (sec), leaf count = 41

$$
\left\{\left\{y(x)\to -\sqrt{-ax\log(x)+c_1x}\right\},\left\{y(x)\to \sqrt{-ax\log(x)+c_1x}\right\}\right\}
$$

✓ **Maple** : cpu = 0.029 (sec), leaf count = 34

$$
\left\{y(x)=\sqrt{-ax\ln(x)+c_1x},y(x)=-\sqrt{-(a\ln(x)-c_1)x}\right\}
$$

2.241 ODE No. 241

$$
ax^2+2xy(x)y'(x)-y(x)^2=0
$$

✓ **Mathematica** : cpu = 0.123503 (sec), leaf count = 41

$$
\left\{\left\{y(x)\to -\sqrt{-ax^2+c_1x}\right\},\left\{y(x)\to \sqrt{-ax^2+c_1x}\right\}\right\}
$$

✓ **Maple** : cpu = 0.017 (sec), leaf count = 33

$$
\left\{y(x)=\sqrt{-a\,x^2+c_1x},y(x)=-\sqrt{-a\,x^2+c_1x}\right\}
$$

2.242 ODE No. 242

$$2xy(x)y'(x) + 2y(x)^2 + 1 = 0$$

✓ **Mathematica** : cpu = 0.113008 (sec), leaf count = 60

$$\left\{\left\{y(x) \to -\frac{\sqrt{-x^2+e^{4c_1}}}{\sqrt{2}x}\right\}, \left\{y(x) \to \frac{\sqrt{-x^2+e^{4c_1}}}{\sqrt{2}x}\right\}\right\}$$

✓ **Maple** : cpu = 0.019 (sec), leaf count = 39

$$\left\{y(x) = -\frac{\sqrt{-2x^2+4c_1}}{2x}, y(x) = \frac{\sqrt{-2x^2+4c_1}}{2x}\right\}$$

2.243 ODE No. 243

$$x(2y(x) + x - 1)y'(x) - y(x)(y(x) + 2x + 1) = 0$$

✓ **Mathematica** : cpu = 14.9924 (sec), leaf count = 487

$$\left\{\left\{y(x) \to -\frac{\sqrt[3]{2}x}{\sqrt[3]{-27{c_1}^2x^2+\sqrt{108{c_1}^3x^3+(27{c_1}^2x-27{c_1}^2x^2)^2}+27{c_1}^2x}} + \frac{\sqrt[3]{-27{c_1}^2x^2+\sqrt{108{c_1}^3x^3+(27{c_1}^2x}}}{3\sqrt[3]{2}c_1}\right.\right.$$

✓ **Maple** : cpu = 0.132 (sec), leaf count = 391

$$\left\{ y(x) = \frac{-3c_1\left(\left(1+i\sqrt{3}\right)5^{\frac{2}{3}}x - \frac{80\left(\left(20x+\sqrt{5}\sqrt{\frac{80c_1(x-1)^2-x}{c_1}}-20\right)c_1^2x\right)^{\frac{1}{3}}(x-1)}{3}\right) + 3\left(\left(20x+\sqrt{5}\sqrt{\frac{80c_1(x-1)^2-x}{c_1}}-20\right.\right.}{80\left(\left(20x+\sqrt{5}\sqrt{\frac{80c_1(x-1)^2-x}{c_1}}-20\right)c_1^2x\right)^{\frac{1}{3}}c_1}\right.$$

2.244 ODE No. 244

$$x(2y(x)-x-1)y'(x)+(-y(x)+2x-1)y(x)=0$$

✓ **Mathematica** : cpu = 14.3797 (sec), leaf count = 484

$$\left\{\left\{y(x)\to -\frac{\sqrt[3]{2}x}{\sqrt[3]{27{c_1}^2x^2+\sqrt{\left(27{c_1}^2x^2+27{c_1}^2x\right)^2-108{c_1}^3x^3}+27{c_1}^2x}}-\frac{\sqrt[3]{27{c_1}^2x^2+\sqrt{\left(27{c_1}^2x^2+27{c_1}^2x\right)^2-}}}{3\sqrt[3]{2}c_1}\right.\right.$$

✓ **Maple** : cpu = 0.109 (sec), leaf count = 391

$$\left\{y(x)=\frac{-\frac{3c_1\left(\left(1+i\sqrt{3}\right)5^{\frac{2}{3}}x+\frac{80\left(-20\left(x-\frac{\sqrt{5}\sqrt{\frac{80c_1(x+1)^2-x}{c_1}}}{20}+1\right)c_1^2x\right)^{\frac{1}{3}}(x+1)}{3}\right)}{80}+\frac{3\left(i\sqrt{3}-1\right)\left(\left(-20x+\sqrt{5}\sqrt{\frac{80c_1(x+1)^2-x}{c_1}}-20\right)c_1^2x\right)^{\frac{2}{3}}}{80}}{\left(-20\left(x-\frac{\sqrt{5}\sqrt{\frac{80c_1(x+1)^2-x}{c_1}}}{20}+1\right)c_1^2x\right)^{\frac{1}{3}}c_1}\right.$$

2.245 ODE No. 245

$$\left(4x^3+2xy(x)\right)y'(x)+112x^2y(x)+y(x)^2=0$$

✓ **Mathematica** : cpu = 0.554292 (sec), leaf count = 1453

$$\left\{\left\{y(x)\to \text{Root}\left[-1521681143169024\#1x^{22}-697437190619136\#1^2x^{20}-145299414712320\#1^3x^{18}-18162426\right.\right.\right.$$

✓ **Maple** : cpu = 0.898 (sec), leaf count = 31

$$\left\{y(x)=\frac{c_1}{x^{28}\,\text{RootOf}\left(x^{30}\_Z^{360}-24x^{30}\_Z^{330}-c_1\right)^{330}}\right\}$$

2.246 ODE No. 246

$$x(3y(x)+2x)y'(x)+3(y(x)+x)^2=0$$

✓ **Mathematica** : cpu = 0.199788 (sec), leaf count = 80

$$\left\{\left\{y(x)\to\frac{1}{6}\left(-4x-\frac{\sqrt{2}\sqrt{-x^4+3e^{4c_1}}}{x}\right)\right\},\left\{y(x)\to\frac{1}{6}\left(-4x+\frac{\sqrt{2}\sqrt{-x^4+3e^{4c_1}}}{x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.079 (sec), leaf count = 63

$$\left\{y(x)=\frac{-4c_1x^2-\sqrt{-2x^4c_1^2+6}}{6c_1x},y(x)=\frac{-4c_1x^2+\sqrt{-2x^4c_1^2+6}}{6c_1x}\right\}$$

2.247 ODE No. 247

$$-7x^2+(3x+2)(y(x)-2x-1)y'(x)+xy(x)-y(x)^2-9x-3=0$$

✓ **Mathematica** : cpu = 13.318 (sec), leaf count = 693

$$\left\{\left\{y(x)\to\frac{\sqrt[3]{1458x^3+2916x^2+\sqrt{4\left(-81x^2-108x-36\right)^3+\left(1458x^3+2916x^2+1944x-324e^{2c_1}x+432-2\cdots\right.}}}{6\sqrt[3]{2}}\cdots\right.\right.$$

✓ **Maple** : cpu = 0.214 (sec), leaf count = 517

$$\left\{y(x)=-\frac{1}{3}+\frac{(3x+2)\left(7\left(-\frac{9(3x+2)^2c_1^2}{4\left(-27(3x+2)^3c_1^3+2c_1(3x+2)+2\sqrt{-27(3x+2)^4c_1^4+(3x+2)^2c_1^2}\right)^{\frac{1}{3}}}-\frac{3c_1(3x+2)}{2}-\frac{\left(-27(3x+2)^3c_1^3+\cdots\right.}{\cdots}\right.\right.}{6\left(-\frac{9(3x+2)^2c_1^2}{4\left(-27(3x+2)^3c_1^3+2c_1(3x+2)+2\sqrt{-27(3x+2)^4c_1^4+(3x+2)^2c_1^2}\right)^{\frac{1}{3}}}-\frac{3c_1(3x+2)}{2}-\frac{\left(-27(3x+2)^3c_1^3+2c_1\cdots\right.}{\cdots}\right.}\right.$$

2.248 ODE No. 248

$$\left(x^2+6xy(x)+3\right)y'(x)+3y(x)^2+2xy(x)+2x=0$$

✓ **Mathematica** : cpu = 0.254448 (sec), leaf count = 110

$$\left\{\left\{y(x)\to \frac{-x^2-3}{6x}-\frac{\sqrt{-2x^3+\frac{1}{6}\left(x^2+3\right)^2+6c_1x}}{\sqrt{6}x}\right\},\left\{y(x)\to \frac{-x^2-3}{6x}+\frac{\sqrt{-2x^3+\frac{1}{6}\left(x^2+3\right)^2+6c_1x}}{\sqrt{6}x}\right\}\right\}$$

✓ **Maple** : cpu = 0.02 (sec), leaf count = 75

$$\left\{y(x)=\frac{-x^2-3-\sqrt{x^4-12x^3+6x^2-12c_1x+9}}{6x},y(x)=\frac{-x^2-3+\sqrt{x^4-12x^3+6x^2-12c_1x+9}}{6x}\right\}$$

2.249 ODE No. 249

$$y'(x)\left(axy(x)+bx^n\right)+\alpha y(x)^3+\beta y(x)^2=0$$

✓ **Mathematica** : cpu = 5.65868 (sec), leaf count = 115

$$\text{Solve}\left[\frac{(a(-n)+a+\alpha y(x))y(x)^{\frac{a-an}{\beta}-1}(\alpha y(x)+\beta)^{\frac{a(n-1)}{\beta}}}{a^2(n-1)^2(a(n-1)+\beta)}+\frac{x^{1-n}\exp\left(-\frac{a(n-1)(\log(y(x))-\log(\alpha y(x)+\beta))}{\beta}\right)}{ab(1-n)(n-1)}=c_1,y(x)\right.$$

✓ **Maple** : cpu = 0.255 (sec), leaf count = 202

$$\left\{y(x)=\frac{}{\beta\,\text{RootOf}\left(c_1a^2bn^2-a^2\beta n\_Z^{\frac{(n-1)a}{\beta}}x^{-n+1}-2c_1a^2bn+c_1ab\beta n+a^2\beta\_Z^{\frac{(n-1)a}{\beta}}x^{-n+1}+a\alpha bn\_Z^{\frac{(n-1)a}{\beta}}\right.}\right.$$

2.250 ODE No. 250

$$y'(x)\left(ax+Ax^2+by(x)+Bxy(x)+c\right)+Axy(x)+\alpha x-By(x)^2+\beta y(x)+\gamma=0$$

✗ **Mathematica** : cpu = 300.652 (sec), leaf count = 0 , timed out

```
$Aborted
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve((B*x*y(x)+A*x^2+a*x+b*y(x)+c)*diff(y(x),x)-B*g(x)^2+A*x*y(x)+alpha*x+beta*y(x)+gamma
```

2.251 ODE No. 251

$$\left(x^2y(x)-1\right)y'(x)+xy(x)^2-1=0$$

✓ **Mathematica** : cpu = 0.148873 (sec), leaf count = 60

$$\left\{\left\{y(x)\to \frac{1}{x^2}-\frac{\sqrt{2x^3+c_1x^2+1}}{x^2}\right\},\left\{y(x)\to \frac{1}{x^2}+\frac{\sqrt{2x^3+c_1x^2+1}}{x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.016 (sec), leaf count = 51

$$\left\{y(x)=\frac{1-\sqrt{2x^3-2c_1x^2+1}}{x^2},y(x)=\frac{1+\sqrt{2x^3-2c_1x^2+1}}{x^2}\right\}$$

2.252 ODE No. 252

$$\left(x^2y(x)-1\right)y'(x)-xy(x)^2+1=0$$

✓ **Mathematica** : cpu = 10.0071 (sec), leaf count = 819

$$\left\{\left\{y(x)\to \frac{6xc_1-x}{6c_1-1}+\frac{\sqrt[3]{-1944c_1{}^2x^3+648c_1x^3-54x^3+1944c_1{}^2-648c_1+\sqrt{4\left(54x^2c_1-9x^2\right)^3+\left(-1944c_1{}^2\right.}}}{3\sqrt[3]{2}(6c_1-1)}\right.\right.$$

✓ **Maple** : cpu = 0.662 (sec), leaf count = 1338

$$\left\{y(x)=\frac{\left(c_1^2-80c_1\right)x^8+160c_1x^5-80c_1x^2+\left(\left(-c_1+80\right)x^7-160x^4+80x\right)4^{\frac{1}{3}}\left(c_1\left(-\frac{1}{4}+\sqrt{\frac{-5x^6+10x^3-5}{(c_1-80)x^6+160x^3-}}\right.\right.}{\left(\left(c_1^2-80c_1\right)x^8+160c_1x^5-80c_1x^2+\left(c_1\left(-1+4\sqrt{\frac{-5x^6+10x^3-5}{(c_1-80)x^6+160x^3-80}}\right)\left(c_1x^6-80x^6+160x^3-80\right)^2\right)\right.}\right.$$

2.253 ODE No. 253

$$\left(x^2y(x)-1\right)y'(x)+8xy(x)^2-8=0$$

✗ **Mathematica** : cpu = 12.4471 (sec), leaf count = 0 , could not solve

```
DSolve[-8 + 8*x*y[x]^2 + (-1 + x^2*y[x])*Derivative[1][y][x] == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve((x^2*y(x)-1)*diff(y(x),x)+8*x*y(x)^2-8 = 0,y(x))
```

2.254 ODE No. 254

$$x^2y(x)^3 + x(xy(x) - 2)y'(x) + xy(x)^2 - 2y(x) = 0$$

✓ **Mathematica** : cpu = 0.148685 (sec), leaf count = 99

$$\left\{\left\{y(x) \to -\frac{2x}{-x^2 + \frac{\sqrt{2}\sqrt{-\frac{x}{2} - 2x(-\log(x) + c_1)}}{\sqrt{-\frac{1}{x^3}}}}\right\}, \left\{y(x) \to \frac{2x}{x^2 + \frac{\sqrt{2}\sqrt{-\frac{x}{2} - 2x(-\log(x) + c_1)}}{\sqrt{-\frac{1}{x^3}}}}\right\}\right\}$$

✓ **Maple** : cpu = 0.027 (sec), leaf count = 59

$$\left\{y(x) = \frac{-1 + \sqrt{4c_1 - 4\ln(x) + 1}}{2(c_1 - \ln(x))x}, y(x) = \frac{1 + \sqrt{4c_1 - 4\ln(x) + 1}}{2(-c_1 + \ln(x))x}\right\}$$

2.255 ODE No. 255

$$x(xy(x) - 3)y'(x) + xy(x)^2 - y(x) = 0$$

✓ **Mathematica** : cpu = 6.01949 (sec), leaf count = 30

$$\left\{\left\{y(x) \to -\frac{3W\left(e^{-1+\frac{9c_1}{2^{2/3}}}x^{2/3}\right)}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.214 (sec), leaf count = 74

$$\left\{y(x) = -\frac{3\,\mathrm{LambertW}\left(\frac{2c_1\left(-\frac{x^2}{8}\right)^{\frac{1}{3}}}{3}\right)}{x}, y(x) = -\frac{3\,\mathrm{LambertW}\left(-\frac{c_1\left(-\frac{x^2}{8}\right)^{\frac{1}{3}}\left(1+i\sqrt{3}\right)}{3}\right)}{x}, y(x) = -\frac{3\,\mathrm{LambertW}\left(\right.}{}\right.$$

2.256 ODE No. 256

$$x^2(y(x)-1)y'(x)+(x-1)y(x)=0$$

✓ **Mathematica** : cpu = 0.0334352 (sec), leaf count = 21

$$\left\{\left\{y(x)\to -W\left(x\left(-e^{\frac{1}{x}-c_1}\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.154 (sec), leaf count = 31

$$\left\{y(x)=\mathrm{e}^{\frac{c_1x-x\,\mathrm{LambertW}\left(-x\,\mathrm{e}^{c_1+\frac{1}{x}}\right)+x\ln(x)+1}{x}}\right\}$$

2.257 ODE No. 257

$$x\left(x^4+xy(x)-1\right)y'(x)-y(x)\left(-x^4+xy(x)-1\right)=0$$

✓ **Mathematica** : cpu = 0.537836 (sec), leaf count = 39

$$\text{Solve}\left[2x^2+\frac{y(x)}{x}+\frac{x\left(-2\log\left(\frac{1}{1-xy(x)}\right)-2+c_1\right)}{y(x)}=0,y(x)\right]$$

✓ **Maple** : cpu = 0.119 (sec), leaf count = 98

$$\left\{y(x)=\frac{\left(-c_1+\mathrm{e}^{\mathrm{RootOf}\left(-2c_1x^4\mathrm{e}^{\_Z}-2\_Zx^4\mathrm{e}^{2\_Z}+2x^4\mathrm{e}^{2\_Z}+c_1^2-2c_1\mathrm{e}^{\_Z}+\mathrm{e}^{2\_Z}\right)}\right)\mathrm{e}^{-\mathrm{RootOf}\left(-2c_1x^4\mathrm{e}^{\_Z}-2\_Zx^4\mathrm{e}^{2\_Z}+2x^4\mathrm{e}^{2\_Z}+c_1^2-\right.}}{x}\right.$$

2.258 ODE No. 258

$$-2x^3+2x^2y(x)y'(x)-x^2+y(x)^2=0$$

✓ **Mathematica** : cpu = 0.141946 (sec), leaf count = 43

$$\left\{\left\{y(x)\to -\sqrt{x^2+c_1e^{\frac{1}{x}}}\right\},\left\{y(x)\to \sqrt{x^2+c_1e^{\frac{1}{x}}}\right\}\right\}$$

✓ **Maple** : cpu = 0.028 (sec), leaf count = 33

$$\left\{y(x)=\sqrt{c_1\mathrm{e}^{\frac{1}{x}}+x^2},y(x)=-\sqrt{c_1\mathrm{e}^{\frac{1}{x}}+x^2}\right\}$$

2.259 ODE No. 259

$$2x^2y(x)y'(x) - e^{x-\frac{1}{x}}x^2 - y(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.282333 (sec), leaf count = 50

$$\left\{\left\{y(x)\to -e^{-\frac{1}{2}/x}\sqrt{e^x+c_1}\right\},\left\{y(x)\to e^{-\frac{1}{2}/x}\sqrt{e^x+c_1}\right\}\right\}$$

✓ **Maple** : cpu = 0.033 (sec), leaf count = 51

$$\left\{y(x)=\sqrt{c_1\mathrm{e}^{-\frac{1}{x}}+\mathrm{e}^{\frac{x^2-1}{x}}},y(x)=-\sqrt{c_1\mathrm{e}^{-\frac{1}{x}}+\mathrm{e}^{\frac{x^2-1}{x}}}\right\}$$

2.260 ODE No. 260

$$\left(2x^2y(x)+x\right)y'(x) - x^2y(x)^3 + 2xy(x)^2 + y(x) = 0$$

✓ **Mathematica** : cpu = 0.145263 (sec), leaf count = 80

$$\left\{\left\{y(x)\to \frac{x}{-2x^2+\frac{\sqrt{4x+x(-2\log(x)+c_1)}}{\sqrt{\frac{1}{x^3}}}}\right\},\left\{y(x)\to -\frac{x}{2x^2+\frac{\sqrt{4x+x(-2\log(x)+c_1)}}{\sqrt{\frac{1}{x^3}}}}\right\}\right\}$$

✓ **Maple** : cpu = 0.029 (sec), leaf count = 59

$$\left\{y(x)=\frac{-2+\sqrt{2c_1-2\ln(x)+4}}{2\left(-c_1+\ln(x)\right)x},y(x)=\frac{2+\sqrt{2c_1-2\ln(x)+4}}{2\left(c_1-\ln(x)\right)x}\right\}$$

2.261 ODE No. 261

$$\left(2x^2y(x)-x\right)y'(x) - 2xy(x)^2 - y(x) = 0$$

✓ **Mathematica** : cpu = 0.763326 (sec), leaf count = 32

$$\left\{\left\{y(x)\to -\frac{1}{2xW\left(\frac{e^{-1+\frac{9c_1}{2^{2/3}}}}{x^2}\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.171 (sec), leaf count = 18

$$\left\{y(x)=-\frac{1}{2x\,\mathrm{LambertW}\left(-\frac{c_1}{2x^2}\right)}\right\}$$

2.262 ODE No. 262

$$2x^3 + (2x^2y(x) - x^3)\,y'(x) - 4xy(x)^2 + y(x)^3 = 0$$

✓ **Mathematica** : cpu = 0.204838 (sec), leaf count = 101

$$\left\{\left\{y(x)\to \frac{2x^3-\sqrt{e^{4c_1}x^2-3e^{2c_1}x^4}}{x^2+e^{2c_1}}\right\},\left\{y(x)\to \frac{2x^3+\sqrt{e^{4c_1}x^2-3e^{2c_1}x^4}}{x^2+e^{2c_1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.25 (sec), leaf count = 65

$$\left\{y(x)=\frac{\left(2c_1x^2-\sqrt{3c_1x^2+1}\right)x}{c_1x^2-1},y(x)=\frac{\left(2c_1x^2+\sqrt{3c_1x^2+1}\right)x}{c_1x^2-1}\right\}$$

2.263 ODE No. 263

$$2x^3 + 3x^2y(x)^2 + y(x)y'(x) + 7 = 0$$

✓ **Mathematica** : cpu = 0.109689 (sec), leaf count = 181

$$\left\{\left\{y(x)\to -\sqrt{\frac{7\ 2^{2/3}e^{-2x^3}x\Gamma\left(\frac{1}{3},-2x^3\right)}{3\sqrt[3]{-x^3}}-\frac{2^{2/3}e^{-2x^3}x\Gamma\left(\frac{4}{3},-2x^3\right)}{3\sqrt[3]{-x^3}}+c_1e^{-2x^3}}\right\},\left\{y(x)\to \sqrt{\frac{7\ 2^{2/3}e^{-2x^3}x\Gamma\left(\frac{1}{3},\right.}{3\sqrt[3]{-x^3}}}\right.\right.$$

✓ **Maple** : cpu = 0.162 (sec), leaf count = 173

$$\left\{y(x)=-\frac{2^{\frac{2}{3}}\sqrt{-240\left(\left(-\frac{3\Gamma\left(\frac{2}{3}\right)\Gamma\left(\frac{1}{3},-2x^3\right)}{2}+\pi\sqrt{3}\right)x\,\mathrm{e}^{-2x^3}+\frac{9\left(-\frac{3c_1\mathrm{e}^{-2x^3}}{2}+x\right)2^{\frac{1}{3}}\Gamma\left(\frac{2}{3}\right)\left(-x^3\right)^{\frac{1}{3}}}{40}\right)2^{\frac{1}{3}}\Gamma\left(\frac{2}{3}\right)\left(-x^3\right)^{\frac{1}{3}}}}{18\left(-x^3\right)^{\frac{1}{3}}\Gamma\left(\frac{2}{3}\right)},y(x)\right.$$

2.264 ODE No. 264

$$2x\left(x^3y(x)+1\right)y'(x)+y(x)\left(3x^3y(x)-1\right)=0$$

✓ **Mathematica** : cpu = 0.445037 (sec), leaf count = 680

$$\left\{\left\{y(x)\to \text{Root}\left[81\#1^7e^{\frac{21c_1}{2}}x^{12}+756\#1^6e^{\frac{21c_1}{2}}x^9+2646\#1^5e^{\frac{21c_1}{2}}x^6+4116\#1^4e^{\frac{21c_1}{2}}x^3+2401\#1^3e^{\frac{21c_1}{2}}-x^{3/2}\&\right.\right.\right.$$

✓ **Maple** : cpu = 0.433 (sec), leaf count = 37

$$\left\{y(x)=\frac{\text{RootOf}\left(c_1\_Z^{98}-14c_1\_Z^{77}+49c_1\_Z^{56}-9x^7\right)^{21}-7}{3x^3}\right\}$$

2.265 ODE No. 265

$$2(n+1)^2x^{n-1}\left(x^{n^2}y(x)^2-1\right)+\left(x^{n(n+1)}y(x)-1\right)y'(x)=0$$

✗ **Mathematica** : cpu = 287.249 (sec), leaf count = 0 , could not solve

```
DSolve[2*(1 + n)^2*x^(-1 + n)*(-1 + x^n^2*y[x]^2) + (-1 + x^(n*(1 + n))*y[x])*Derivative[1][
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve((x^(n*(n+1))*y(x)-1)*diff(y(x),x)+2*(n+1)^2*x^(n-1)*(x^(n^2)*y(x)^2-1) = 0,y(x))
```

2.266 ODE No. 266

$$\sqrt{x^2+1}(y(x)-x)y'(x)-a\sqrt{\left(y(x)^2+1\right)^3}=0$$

✓ **Mathematica** : cpu = 2.49879 (sec), leaf count = 69

$$\text{Solve}\left[\left\{\frac{2a\tan^{-1}\left(\frac{1-a\tan\left(\frac{K[1]}{2}\right)}{\sqrt{a^2-1}}\right)}{\sqrt{a^2-1}}+K[1]+\tan^{-1}(x)=c_1,y(x)=\frac{\tan(K[1])+x}{1-x\tan(K[1])}\right\},\{K[1],y(x)\}\right]$$

✓ **Maple** : cpu = 2.078 (sec), leaf count = 65

$$\left\{y(x)=\tan\left(\text{RootOf}\left(c_1+\int^{\_Z-\arctan(x)}\frac{-\cos(2\_a)+\sqrt{2}\sqrt{\frac{a^2}{\cos(2\_a)+1}}\sin(2\_a)+1}{2a^2+\cos(2\_a)-1}d\_a-\arctan(x)\right)\right)\right\}$$

2.267 ODE No. 267

$$y(x)\sin^2(x)y'(x)+y(x)^2\sin(x)\cos(x)-1=0$$

✓ **Mathematica** : cpu = 0.315005 (sec), leaf count = 36

$$\left\{\left\{y(x)\to -\sqrt{2x+c_1}\csc(x)\right\},\left\{y(x)\to \sqrt{2x+c_1}\csc(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.041 (sec), leaf count = 32

$$\left\{y(x)=\frac{\sqrt{c_1+2x}}{\sin(x)},y(x)=-\frac{\sqrt{c_1+2x}}{\sin(x)}\right\}$$

2.268 ODE No. 268

$$f(x)y(x)y'(x)+g(x)y(x)^2+h(x)=0$$

✓ **Mathematica** : cpu = 0.198925 (sec), leaf count = 146

$$\left\{\left\{y(x)\to -\exp\left(\int_1^x -\frac{g(K[1])}{f(K[1])}dK[1]\right)\sqrt{2\int_1^x -\frac{\exp\left(-2\int_1^{K[2]} -\frac{g(K[1])}{f(K[1])}dK[1]\right)h(K[2])}{f(K[2])}dK[2]+c_1}\right\},\left\{y(x)\right.\right.$$

✓ **Maple** : cpu = 0.09 (sec), leaf count = 118

$$\left\{y(x)=\sqrt{\left(c_1-2\left(\int\frac{e^{\int\frac{2g(x)}{f(x)}dx}h(x)}{f(x)}dx\right)\right)e^{2\left(\int\frac{g(x)}{f(x)}dx\right)}}\,e^{\int-\frac{2g(x)}{f(x)}dx},y(x)=-\sqrt{\left(c_1-2\left(\int\frac{e^{\int\frac{2g(x)}{f(x)}dx}h(x)}{f(x)}dx\right)\right.}\right.$$

2.269 ODE No. 269

$$-\mathrm{f0}(x)-\mathrm{f1}(x)y(x)-\mathrm{f2}(x)y(x)^2-\mathrm{f3}(x)y(x)^3+y'(x)(\mathrm{g0}(x)+\mathrm{g1}(x)y(x))=0$$

✗ **Mathematica** : cpu = 306.031 (sec), leaf count = 0 , timed out

```
$Aborted
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve((g1(x)*y(x)+g0(x))*diff(y(x),x)-f1(x)*y(x)-f2(x)*y(x)^2-f3(x)*y(x)^3-f0(x) = 0,y(x))
```

2.270 ODE No. 270

$$x^2 + (y(x)^2 - x)\, y'(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 0.15161 (sec), leaf count = 327

$$\left\{\left\{y(x) \to -\frac{3\sqrt[3]{2}x}{\sqrt[3]{27x^3 + \sqrt{-2916x^3 + (27x^3 + 81c_1)^2} + 81c_1}} - \frac{\sqrt[3]{27x^3 + \sqrt{-2916x^3 + (27x^3 + 81c_1)^2} + 81c_1}}{3\sqrt[3]{2}}\right\}\right.$$

✓ **Maple** : cpu = 0.027 (sec), leaf count = 319

$$\left\{y(x) = \frac{4x + \left(-4x^3 - 12c_1 + 4\sqrt{x^6 + (6c_1 - 4)\, x^3 + 9c_1^2}\right)^{\frac{2}{3}}}{2\left(-4x^3 - 12c_1 + 4\sqrt{x^6 + (6c_1 - 4)\, x^3 + 9c_1^2}\right)^{\frac{1}{3}}}, y(x) = -\frac{4x + \left(-4ix + i\left(-4x^3 - 12c_1 + 4\sqrt{x^6 +\right.\right.}{4\left(-4\right.}\right.$$

2.271 ODE No. 271

$$(x^2 + y(x)^2)\, y'(x) + 2x(y(x) + 2x) = 0$$

✓ **Mathematica** : cpu = 0.300769 (sec), leaf count = 370

$$\left\{\left\{y(x) \to \frac{\sqrt[3]{-4x^3 + \sqrt{20x^6 - 8e^{3c_1}x^3 + e^{6c_1}} + e^{3c_1}}}{\sqrt[3]{2}} - \frac{\sqrt[3]{2}x^2}{\sqrt[3]{-4x^3 + \sqrt{20x^6 - 8e^{3c_1}x^3 + e^{6c_1}} + e^{3c_1}}}\right\}, \left\{y(x) \to \frac{}{2^2}\right.\right.$$

✓ **Maple** : cpu = 0.191 (sec), leaf count = 352

$$\left\{y(x) = \frac{-\frac{2c_1x^2}{\left(-16c_1^{\frac{3}{2}}x^3+4+4\sqrt{20c_1^3x^6-8c_1^{\frac{3}{2}}x^3+1}\right)^{\frac{1}{3}}} + \frac{\left(-16c_1^{\frac{3}{2}}x^3+4+4\sqrt{20c_1^3x^6-8c_1^{\frac{3}{2}}x^3+1}\right)^{\frac{1}{3}}}{2}}{\sqrt{c_1}}, y(x) = -\frac{-4c_1x^2 + \left(4ic_1x^2 + i\right.}{}\right.$$

2.272 ODE No. 272

$$\left(x^2 + y(x)^2\right) y'(x) - y(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.164964 (sec), leaf count = 42

$$\text{Solve}\left[\log\left(\frac{y(x)}{x}\right) + \frac{2\tan^{-1}\left(\frac{\frac{2y(x)}{x}-1}{\sqrt{3}}\right)}{\sqrt{3}} = -\log(x) + c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.155 (sec), leaf count = 43

$$\left\{ y(x) = e^{-c_1 + \frac{2\sqrt{3}\ \text{RootOf}\left(3x\, e^{c_1} \tan(\_Z) - \sqrt{3}\, x\, e^{c_1} + 2\sqrt{3}\, e^{\frac{2\sqrt{3}\ \_Z}{3}}\right)}{3}} \right\}$$

2.273 ODE No. 273

$$\left(a + x^2 + y(x)^2\right) y'(x) + 2xy(x) = 0$$

✓ **Mathematica** : cpu = 0.193793 (sec), leaf count = 297

$$\left\{\left\{y(x) \to \frac{\sqrt[3]{\sqrt{2916\left(a+x^2\right)^3 + 6561{c_1}^2} + 81c_1}}{3\sqrt[3]{2}} - \frac{3\sqrt[3]{2}\left(a+x^2\right)}{\sqrt[3]{\sqrt{2916\left(a+x^2\right)^3 + 6561{c_1}^2} + 81c_1}}\right\}, \left\{y(x) \to \frac{}{2^{2/3}\sqrt[3]{\sqrt{}}}\right.\right.$$

✓ **Maple** : cpu = 0.03 (sec), leaf count = 401

$$\left\{ y(x) = \frac{-4x^2 - 4a + \left(-12c_1 + 4\sqrt{4x^6 + 12a\,x^4 + 12a^2x^2 + 4a^3 + 9c_1^2}\right)^{\frac{2}{3}}}{2\left(-12c_1 + 4\sqrt{4x^6 + 12a\,x^4 + 12a^2x^2 + 4a^3 + 9c_1^2}\right)^{\frac{1}{3}}}, y(x) = -\frac{-4x^2 - 4a + \left(4ix^2 + 4ia - \right.}{} \right.$$

2.274 ODE No. 274

$$(a+x^2+y(x)^2)\,y'(x)+b+x^2+2xy(x)=0$$

✓ **Mathematica** : cpu = 0.201124 (sec), leaf count = 411

$$\left\{\left\{y(x)\to\frac{\sqrt[3]{\sqrt{2916\,(a+x^2)^3+(-81bx-27x^3+81c_1)^2}-81bx-27x^3+81c_1}}{3\sqrt[3]{2}}-\frac{}{\sqrt[3]{\sqrt{2916\,(a+x^2)^3+(-81b}}}\right.\right.$$

✓ **Maple** : cpu = 0.039 (sec), leaf count = 657

$$\left\{y(x)=\frac{-4x^2-4a+\left(-4x^3-12bx-12c_1+4\sqrt{5x^6+6c_1x^3+(12a+6b)\,x^4+18c_1bx+4a^3+9c_1^2+(12a^2+9}\right.}{2\left(-4x^3-12bx-12c_1+4\sqrt{5x^6+6c_1x^3+(12a+6b)\,x^4+18c_1bx+4a^3+9c_1^2+(12a^2+9b^2)\,x^2}\right.}\right.$$

2.275 ODE No. 275

$$(x^2+y(x)^2+x)\,y'(x)-y(x)=0$$

✓ **Mathematica** : cpu = 0.149678 (sec), leaf count = 18

$$\text{Solve}\left[y(x)-\tan^{-1}\left(\frac{x}{y(x)}\right)=c_1,y(x)\right]$$

✓ **Maple** : cpu = 0.072 (sec), leaf count = 30

$$\left\{c_1+\frac{(ix+y(x))\,\mathrm{e}^{-2iy(x)}}{2x+2iy\,(x)}=0\right\}$$

2.276 ODE No. 276

$$(y(x)^2-x^2)\,y'(x)+2xy(x)=0$$

✓ **Mathematica** : cpu = 0.15576 (sec), leaf count = 61

$$\left\{\left\{y(x)\to\frac{1}{2}\left(e^{c_1}-\sqrt{-4x^2+e^{2c_1}}\right)\right\},\left\{y(x)\to\frac{1}{2}\left(\sqrt{-4x^2+e^{2c_1}}+e^{c_1}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.049 (sec), leaf count = 47

$$\left\{y(x)=\frac{1-\sqrt{-4c_1^2x^2+1}}{2c_1},y(x)=\frac{1+\sqrt{-4c_1^2x^2+1}}{2c_1}\right\}$$

2.277 ODE No. 277

$$\left(x^4+y(x)^2\right)y'(x)-4x^3y(x)=0$$

✓ **Mathematica** : cpu = 0.118486 (sec), leaf count = 53

$$\left\{\left\{y(x)\to\frac{1}{2}\left(c_1-\sqrt{4x^4+c_1{}^2}\right)\right\},\left\{y(x)\to\frac{1}{2}\left(\sqrt{4x^4+c_1{}^2}+c_1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.312 (sec), leaf count = 41

$$\left\{y(x)=\frac{c_1}{2}-\frac{\sqrt{4x^4+c_1^2}}{2},y(x)=\frac{c_1}{2}+\frac{\sqrt{4x^4+c_1^2}}{2}\right\}$$

2.278 ODE No. 278

$$y'(x)\left(y(x)^2+4\sin(x)\right)-\cos(x)=0$$

✓ **Mathematica** : cpu = 0.246344 (sec), leaf count = 39

$$\text{Solve}\left[-\frac{1}{32}e^{-4y(x)}\left(8y(x)^2+4y(x)+1\right)-e^{-4y(x)}\sin(x)=c_1,y(x)\right]$$

✓ **Maple** : cpu = 0.061 (sec), leaf count = 28

$$\left\{c_1+\frac{\left(-8y(x)^2-32\sin(x)-4y(x)-1\right)\mathrm{e}^{-4y(x)}}{32}=0\right\}$$

2.279 ODE No. 279

$$\left(y(x)^2+2y(x)+x\right)y'(x)+y(x)^2(y(x)+x)^2+y(x)(y(x)+1)=0$$

✓ **Mathematica** : cpu = 0.643367 (sec), leaf count = 107

$$\left\{\left\{y(x)\to\frac{-x^2-\sqrt{(x^2-c_1x-1)^2+4(x-c_1)}+c_1x+1}{2(x-c_1)}\right\},\left\{y(x)\to\frac{-x^2+\sqrt{(x^2-c_1x-1)^2+4(x-c_1)}+}{2(x-c_1)}\right.\right.$$

✓ **Maple** : cpu = 0.161 (sec), leaf count = 116

$$\left\{y(x)=\frac{-c_1x+2x^2+\sqrt{-4c_1x^3+4x^4+\left(c_1^2-8\right)x^2-8c_1+\left(4c_1+16\right)x+4}-2}{2c_1-4x},y(x)=\frac{c_1x-2x^2+\sqrt{-4c_1x}}{}\right.$$

2.280 ODE No. 280

$$(y(x)+x)^2y'(x)-a^2=0$$

✓ **Mathematica** : cpu = 0.150665 (sec), leaf count = 21

$$\text{Solve}\left[y(x)-a\tan^{-1}\left(\frac{y(x)+x}{a}\right)=c_1,y(x)\right]$$

✓ **Maple** : cpu = 0.067 (sec), leaf count = 24

$$\{y(x)=a\,\text{RootOf}\left(-\_Za+a\tan\left(\_Z\right)+c_1-x\right)-c_1\}$$

2.281 ODE No. 281

$$\left(-x^2+2xy(x)+y(x)^2\right)y'(x)+x^2+2xy(x)-y(x)^2=0$$

✓ **Mathematica** : cpu = 0.224416 (sec), leaf count = 75

$$\left\{\left\{y(x)\to\frac{1}{2}\left(e^{c_1}-\sqrt{-4x^2+4e^{c_1}x+e^{2c_1}}\right)\right\},\left\{y(x)\to\frac{1}{2}\left(\sqrt{-4x^2+4e^{c_1}x+e^{2c_1}}+e^{c_1}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.053 (sec), leaf count = 55

$$\left\{y(x)=\frac{1-\sqrt{-4c_1^2x^2+4c_1x+1}}{2c_1},y(x)=\frac{1+\sqrt{-4c_1^2x^2+4c_1x+1}}{2c_1}\right\}$$

2.282 ODE No. 282

$$(y(x)+3x-1)^2y'(x)-(2y(x)-1)(4y(x)+6x-3)=0$$

✓ **Mathematica** : cpu = 0.256761 (sec), leaf count = 2129

$$\left\{\left\{y(x)\to\frac{1}{6}(12x+4e^{c_1}+1)-\frac{1}{6}\sqrt{36x^2+96e^{c_1}x-12x-16e^{c_1}+16e^{2c_1}+3\,2^{2/3}\sqrt[3]{-7776e^{c_1}x^5+6480e^{c_1}x^4-}\right.\right.$$

✓ **Maple** : cpu = 0.337 (sec), leaf count = 71

$$\left\{-c_1+3\ln\left(\frac{-6y(x)+3}{6x-1}\right)-3\ln\left(\frac{18x-6y(x)}{6x-1}\right)-\ln\left(\frac{-6x-6y(x)+4}{6x-1}\right)-\ln\left(6x-1\right)=0\right\}$$

2.283 ODE No. 283

$$3\left(y(x)^2-x^2\right)y'(x)+2y(x)^3-6x(x+1)y(x)-3e^x=0$$

✓ **Mathematica** : cpu = 0.390417 (sec), leaf count = 477

$$\left\{\left\{y(x)\to-\frac{e^{-2x}\sqrt[3]{\sqrt{-2916e^{12x}x^6+\left(-27e^{7x}+27c_1e^{4x}\right)^2}-27e^{7x}+27c_1e^{4x}}}{3\sqrt[3]{2}}-\frac{3\sqrt[3]{2}e}{\sqrt[3]{\sqrt{-2916e^{12x}x^6+\left(-27e^{7x}+\right.}}}\right.\right.$$

✓ **Maple** : cpu = 0.079 (sec), leaf count = 407

$$\left\{y(x)=\frac{\left(4x^2\mathrm{e}^{4x}+\left(\left(-4c_1+4\,\mathrm{e}^{3x}+4\sqrt{-4x^6\mathrm{e}^{4x}+c_1^2-2c_1\mathrm{e}^{3x}+\mathrm{e}^{6x}}\right)\mathrm{e}^{4x}\right)^{\frac{2}{3}}\right)\mathrm{e}^{-2x}}{2\left(-4\left(c_1-\mathrm{e}^{3x}-\sqrt{-4x^6\mathrm{e}^{4x}+c_1^2-2c_1\mathrm{e}^{3x}+\mathrm{e}^{6x}}\right)\mathrm{e}^{4x}\right)^{\frac{1}{3}}},y(x)=\frac{\left(-4\left(1+i\sqrt{3}\right)x^2\mathrm{e}\right.}{}\right.$$

2.284 ODE No. 284

$$\left(x^2+4y(x)^2\right)y'(x)-xy(x)=0$$

✓ **Mathematica** : cpu = 0.124961 (sec), leaf count = 59

$$\left\{\left\{y(x)\to-\frac{x}{2\sqrt{W\left(\frac{1}{4}e^{-\frac{c_1}{2}}x^2\right)}}\right\},\left\{y(x)\to\frac{x}{2\sqrt{W\left(\frac{1}{4}e^{-\frac{c_1}{2}}x^2\right)}}\right\}\right\}$$

✓ **Maple** : cpu = 0.12 (sec), leaf count = 21

$$\left\{y(x)=\mathrm{e}^{-c_1+\frac{\mathrm{LambertW}\left(\frac{x^2\mathrm{e}^{2c_1}}{4}\right)}{2}}\right\}$$

2.285 ODE No. 285

$$\left(3x^2+2xy(x)+4y(x)^2\right)y'(x)+2x^2+6xy(x)+y(x)^2=0$$

✓ **Mathematica** : cpu = 0.185592 (sec), leaf count = 402

$$\left\{\left\{y(x)\to\frac{\sqrt[3]{54x^3+\sqrt{3881196x^6+\left(54x^3+432e^{3c_1}\right)^2}+432e^{3c_1}}}{12\sqrt[3]{2}}-\frac{33x^2}{2\;2^{2/3}\sqrt[3]{54x^3+\sqrt{3881196x^6+\left(54x^3+432\right.}}}\right.\right.$$

✓ **Maple** : cpu = 0.095 (sec), leaf count = 432

$$\left\{y(x) = \frac{-\frac{11c_1^2x^2}{4\left(c_1^3x^3+8+2\sqrt{333c_1^6x^6+4c_1^3x^3+16}\right)^{\frac{1}{3}}} - \frac{c_1x}{4} + \frac{\left(c_1^3x^3+8+2\sqrt{333c_1^6x^6+4c_1^3x^3+16}\right)^{\frac{1}{3}}}{4}}{c_1}, y(x) = -\frac{-11c_1^2x^2 + 2c_1\left(c_1^3x^3\right.}{}\right.$$

2.286 ODE No. 286

$$(2y(x) - 3x + 1)^2 y'(x) - (3y(x) - 2x - 4)^2 = 0$$

✓ **Mathematica** : cpu = 0.291813 (sec), leaf count = 3501

✓ **Maple** : cpu = 1.959 (sec), leaf count = 1337

$$\left\{y(x) = \frac{(5x+3)\,\mathrm{RootOf}\left(\left(115330078125c_1x^9 - 2283535546875c_1x^8 + 20095112812500c_1x^7 - 10315491243750\right.\right.}{5\,\mathrm{RootOf}\left(\left(115330078125c_1x^9 - 2283535546875c_1x^8 + 20095112812500c_1x^7 - 10315491243\right.\right.}\right.$$

2.287 ODE No. 287

$$(2y(x) - 4x + 1)^2 y'(x) - (y(x) - 2x)^2 = 0$$

✓ **Mathematica** : cpu = 3.1145 (sec), leaf count = 77

$$\mathrm{Solve}\left[\frac{y(x)}{2} + \frac{1}{196}\left(14y(x) - \left(8 - 9\sqrt{2}\right)\log\left(-7y(x) + 14x + \sqrt{2} - 4\right) - \left(8 + 9\sqrt{2}\right)\log\left(7y(x) - 14x + \sqrt{2} + 4\right)\right.\right.$$

✓ **Maple** : cpu = 0.074 (sec), leaf count = 56

$$\left\{-c_1 - \frac{x}{7} - \frac{9\sqrt{2}\,\operatorname{arctanh}\left(\frac{(-14x+7y(x)+4)\sqrt{2}}{2}\right)}{98} - \frac{2\ln\left(-16x + 8y(x) + 7(-2x + y(x))^2 + 2\right)}{49} + \frac{4y(x)}{7} = 0\right\}$$

2.288 ODE No. 288

$$\left(-3x^2y(x)+6y(x)^2+1\right)y'(x)-3xy(x)^2+x=0$$

✓ **Mathematica** : cpu = 0.276407 (sec), leaf count = 534

$$\left\{\left\{y(x)\to\frac{x^2}{4}-\frac{\sqrt[3]{-9x^6+108x^2+4\sqrt{3}\sqrt{-27x^8-54c_1x^6+207x^4+648c_1x^2+32+432c_1{}^2}+144c_1}}{4\ 3^{2/3}}+\frac{}{3\sqrt[3]{3}\sqrt[3]{}}\right.\right.$$

✓ **Maple** : cpu = 0.04 (sec), leaf count = 579

$$\left\{y(x)=\frac{-9x^4+6\left(27x^6-324x^2-432c_1+12\sqrt{-81x^8-162c_1x^6+621x^4+1944c_1x^2+1296c_1^2+96}\right)^{\frac{1}{3}}x^2+\left(\right.}{}\right.$$

2.289 ODE No. 289

$$a+(6y(x)-x)^2y'(x)-6y(x)^2+2xy(x)=0$$

✓ **Mathematica** : cpu = 0.208898 (sec), leaf count = 115

$$\left\{\left\{y(x)\to\frac{1}{6}\left(x+\sqrt[3]{-18ax-x^3+18c_1}\right)\right\},\left\{y(x)\to\frac{x}{6}-\frac{1}{12}\left(1-i\sqrt{3}\right)\sqrt[3]{-18ax-x^3+18c_1}\right\},\left\{y(x)\to\frac{x}{6}-\right.\right.$$

✓ **Maple** : cpu = 0.039 (sec), leaf count = 115

$$\left\{y(x)=\frac{x}{6}+\frac{\left(-x^3-18ax-18c_1\right)^{\frac{1}{3}}}{6},y(x)=\frac{x}{6}-\frac{\left(-x^3-18ax-18c_1\right)^{\frac{1}{3}}}{12}-\frac{i\sqrt{3}\left(-x^3-18ax-18c_1\right)^{\frac{1}{3}}}{12},y(x)=\right.$$

2.290 ODE No. 290

$$y'(x)\left(ay(x)^2+2bxy(x)+cx^2\right)+by(x)^2+2cxy(x)+dx^2=0$$

✓ **Mathematica** : cpu = 0.518176 (sec), leaf count = 831

$$\left\{\left\{y(x)\to-\frac{bx}{a}+\frac{\sqrt[3]{-54b^3x^3+81abcx^3-27a^2dx^3+27a^2e^{3c_1}+\sqrt{4\left(9acx^2-9b^2x^2\right)^3+\left(-54b^3x^3+81abcx^3-\right.}}}{3\sqrt[3]{2}a}\right.\right.$$

✓ **Maple** : cpu = 0.148 (sec), leaf count = 1388

$$\left\{ y(x) = -\frac{2(ac-b^2)c_1^2x^2}{\left(-4c_1^3a^2d\,x^3+12c_1^3abc\,x^3-8c_1^3b^3x^3+4a^2+4\sqrt{c_1^6a^2d^2x^6-6c_1^6abcd\,x^6+4c_1^6a\,c^3x^6+4c_1^6b^3d\,x^6-3c_1^6b^2c^2x^6-2c_1^3a^2d\,x^3+6c_1^3abc\,x^3-4c \cdots}\right.} \right.$$

2.291 ODE No. 291

$$y'(x)\left(b(\alpha x+\beta y(x))^2-\beta(ax+by(x))\right)-\alpha(ax+by(x))+a(\alpha x+\beta y(x))^2=0$$

✓ **Mathematica** : cpu = 1.27606 (sec), leaf count = 39

$$\text{Solve}\left[\frac{a\beta\left(\log(ax+by(x))+\frac{1}{\alpha x+\beta y(x)}\right)}{a\beta-\alpha b}=c_1,y(x)\right]$$

✓ **Maple** : cpu = 0.161 (sec), leaf count = 50

$$\left\{y(x)=\frac{-ax+\mathrm{e}^{\mathrm{RootOf}\left(c_1a\beta x-c_1\alpha bx-\_Za\beta x+\_Z\alpha bx-c_1\beta\,\mathrm{e}^{-\_Z}+\_Z\beta\,\mathrm{e}^{-\_Z}+b\right)}}{b}\right\}$$

2.292 ODE No. 292

$$y'(x)(ay(x)+bx+c)^2+(\alpha y(x)+\beta x+\gamma)^2=0$$

✓ **Mathematica** : cpu = 51.5524 (sec), leaf count = 1716

$$\text{Solve}\Big[(\alpha b-a\beta)\text{RootSum}\Big[-cy(x)^2\alpha^3-b\#1y(x)^2\alpha^3+a\beta\#1y(x)^2\alpha^2+a\gamma y(x)^2\alpha^2-2b\beta\#1^2y(x)\alpha^2-2\beta c\#1y(\cdots$$

✓ **Maple** : cpu = 0.043 (sec), leaf count = 115

$$\left\{y(x)=\frac{-\beta c+\gamma b+(-(\beta x+\gamma)\,a+(bx+c)\,\alpha)\,\mathrm{RootOf}\left(c_1+\int^{\_Z}\frac{(\_aa-b)^2}{\_a^3a^2-2\_a^2ab-\_a^2\alpha^2+2\_a\alpha\beta+\_a\,b^2-\beta^2}d\_a+\ln \cdots\right.}{a\beta-\alpha b}\right.$$

2.293 ODE No. 293

$$x(y(x)^2 - 3x)\, y'(x) + 2y(x)^3 - 5xy(x) = 0$$

✓ **Mathematica** : cpu = 0.207643 (sec), leaf count = 661

$$\left\{\left\{y(x) \to \text{Root}\left[-\#1^{15} - \frac{25\#1^2 e^{\frac{65c_1}{2}}}{x^{26}} + \frac{65e^{\frac{65c_1}{2}}}{x^{25}}\&, 1\right]\right\}, \left\{y(x) \to \text{Root}\left[-\#1^{15} - \frac{25\#1^2 e^{\frac{65c_1}{2}}}{x^{26}} + \frac{65e^{\frac{65c_1}{2}}}{x^{25}}\&, 2\right]\right.$$

✓ **Maple** : cpu = 0.295 (sec), leaf count = 35

$$\left\{-c_1 + \ln(x) - \frac{2\ln\left(\frac{5y(x)^2 - 13x}{x}\right)}{65} + \frac{6\ln\left(\frac{y(x)}{\sqrt{x}}\right)}{13} = 0\right\}$$

2.294 ODE No. 294

$$x(-a + x^2 + y(x)^2)\, y'(x) - y(x)\,(a + x^2 + y(x)^2) = 0$$

✓ **Mathematica** : cpu = 0.287296 (sec), leaf count = 71

$$\left\{\left\{y(x) \to \frac{1}{2}\left(c_1 x - \sqrt{-4a + 4x^2 + c_1{}^2 x^2}\right)\right\}, \left\{y(x) \to \frac{1}{2}\left(\sqrt{-4a + 4x^2 + c_1{}^2 x^2} + c_1 x\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.093 (sec), leaf count = 112

$$\left\{\frac{1}{\frac{1}{y(x)^2} - \frac{1}{-x^2+a}} = \frac{x^2}{2} - \frac{a}{2} - \frac{\sqrt{x^2 - a}\, x}{\sqrt{c_1 + \frac{4a}{x^2 - a}}}, \frac{1}{\frac{1}{y(x)^2} - \frac{1}{-x^2+a}} = \frac{x^2}{2} - \frac{a}{2} + \frac{\sqrt{x^2 - a}\, x}{\sqrt{c_1 + \frac{4a}{x^2 - a}}}\right\}$$

2.295 ODE No. 295

$$x(-x^2 + xy(x) + y(x)^2)\, y'(x) + x^2 y(x) - y(x)^3 + xy(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.275585 (sec), leaf count = 31

$$\text{Solve}\left[\frac{x}{y(x)} + \frac{y(x)}{x} + \log\left(\frac{y(x)}{x}\right) = -2\log(x) + c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.269 (sec), leaf count = 29

$$\{y(x) = x\, \mathrm{e}^{\text{RootOf}(2c_1 \mathrm{e}^{\_Z} + \_Z \mathrm{e}^{\_Z} + 2\,\mathrm{e}^{\_Z}\ln(x) + \mathrm{e}^{2\_Z} + 1)}\}$$

2.296 ODE No. 296

$$x^4 + x\left(x^2y(x) + x^2 + y(x)^2\right)y'(x) - 2x^2y(x)^2 - 2y(x)^3 = 0$$

✓ **Mathematica** : cpu = 0.536607 (sec), leaf count = 102

$$\left\{\left\{y(x) \to -e^{-c_1}x^2 - e^{-c_1}\sqrt{x^4 - e^{c_1}x^4 + e^{2c_1}x^2}\right\}, \left\{y(x) \to e^{-c_1}\sqrt{x^4 - e^{c_1}x^4 + e^{2c_1}x^2} - e^{-c_1}x^2\right\}\right\}$$

✓ **Maple** : cpu = 0.599 (sec), leaf count = 135

$$\left\{y(x) = -\frac{\left(-x^3 + c_1x + x^2 + \sqrt{-c_1x^4 + x^4 + c_1^2x^2}\right)x}{c_1x - x^2 + \sqrt{-c_1x^4 + x^4 + c_1^2x^2}}, y(x) = -\frac{\left(x^3 - c_1x - x^2 + \sqrt{-c_1x^4 + x^4 + c_1^2x^2}\right)x}{-c_1x + x^2 + \sqrt{-c_1x^4 + x^4 + c_1^2x^2}}\right\}$$

2.297 ODE No. 297

$$2x\left(5x^2 + y(x)^2\right)y'(x) - x^2y(x) + y(x)^3 = 0$$

✓ **Mathematica** : cpu = 0.19034 (sec), leaf count = 216

$$\left\{\left\{y(x) \to \text{Root}\left[-\#1^5 + \frac{\#1^2e^{3c_1}}{x^{3/2}} + 3e^{3c_1}\sqrt{x}\&, 1\right]\right\}, \left\{y(x) \to \text{Root}\left[-\#1^5 + \frac{\#1^2e^{3c_1}}{x^{3/2}} + 3e^{3c_1}\sqrt{x}\&, 2\right]\right\}, \left\{y(x\right.$$

✓ **Maple** : cpu = 0.293 (sec), leaf count = 29

$$\left\{y(x) = x\,\text{RootOf}\left(c_1x^9\_Z^{45} - \_Z^{18} - 6\_Z^9 - 9\right)^{\frac{9}{2}}\right\}$$

2.298 ODE No. 298

$$3xy(x)^2y'(x) + y(x)^3 - 2x = 0$$

✓ **Mathematica** : cpu = 0.120878 (sec), leaf count = 72

$$\left\{\left\{y(x) \to \frac{\sqrt[3]{x^2 + c_1}}{\sqrt[3]{x}}\right\}, \left\{y(x) \to -\frac{\sqrt[3]{-1}\sqrt[3]{x^2 + c_1}}{\sqrt[3]{x}}\right\}, \left\{y(x) \to \frac{(-1)^{2/3}\sqrt[3]{x^2 + c_1}}{\sqrt[3]{x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.024 (sec), leaf count = 73

$$\left\{y(x) = \frac{\left(\left(x^2 + c_1\right)x^2\right)^{\frac{1}{3}}}{x}, y(x) = -\frac{\left(\left(x^2 + c_1\right)x^2\right)^{\frac{1}{3}}\left(1 + i\sqrt{3}\right)}{2x}, y(x) = \frac{\left(\left(x^2 + c_1\right)x^2\right)^{\frac{1}{3}}\left(i\sqrt{3} - 1\right)}{2x}\right\}$$

2.299 ODE No. 299

$$\left(3xy(x)^2-x^2\right)y'(x)+y(x)^3-2xy(x)=0$$

✓ **Mathematica** : cpu = 0.140321 (sec), leaf count = 371

$$\left\{\left\{y(x)\to -\frac{\sqrt[3]{\frac{2}{3}}x^2}{\sqrt[3]{9c_1x^2+\sqrt{3}\sqrt{-4x^9+27c_1{}^2x^4}}}-\frac{\sqrt[3]{9c_1x^2+\sqrt{3}\sqrt{-4x^9+27c_1{}^2x^4}}}{\sqrt[3]{2}3^{2/3}x}\right\},\left\{y(x)\to \frac{(1+}{2^{2/3}\sqrt[3]{3}\sqrt[3]{9c_1x^2+}}\right.$$

✓ **Maple** : cpu = 0.233 (sec), leaf count = 276

$$\left\{y(x)=-\frac{12^{\frac{2}{3}}\left(12x^3+\left(-12ix^3+i\left(\left(108c_1+12\sqrt{-12x^5+81c_1^2}\right)x^2\right)^{\frac{2}{3}}\right)\sqrt{3}+\left(\left(108c_1+12\sqrt{-12x^5+81c_1^2}\right)\right.\right.}{144\left(\left(9c_1+\sqrt{-12x^5+81c_1^2}\right)x^2\right)^{\frac{1}{3}}x}\right.$$

2.300 ODE No. 300

$$6xy(x)^2y'(x)+2y(x)^3+x=0$$

✓ **Mathematica** : cpu = 0.100385 (sec), leaf count = 99

$$\left\{\left\{y(x)\to \frac{\sqrt[3]{-x^2+4c_1}}{2^{2/3}\sqrt[3]{x}}\right\},\left\{y(x)\to -\frac{\sqrt[3]{-1}\sqrt[3]{-x^2+4c_1}}{2^{2/3}\sqrt[3]{x}}\right\},\left\{y(x)\to \frac{(-1)^{2/3}\sqrt[3]{-x^2+4c_1}}{2^{2/3}\sqrt[3]{x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.025 (sec), leaf count = 83

$$\left\{y(x)=\frac{\left(-2\left(x^2-4c_1\right)x^2\right)^{\frac{1}{3}}}{2x},y(x)=-\frac{\left(-2\left(x^2-4c_1\right)x^2\right)^{\frac{1}{3}}\left(1+i\sqrt{3}\right)}{4x},y(x)=\frac{\left(-2\left(x^2-4c_1\right)x^2\right)^{\frac{1}{3}}\left(i\sqrt{3}-1\right)}{4x}\right\}$$

2.301 ODE No. 301

$$\left(x^2+6xy(x)^2\right)y'(x)-y(x)\left(3y(x)^2-x\right)=0$$

✓ **Mathematica** : cpu = 0.161957 (sec), leaf count = 64

$$\left\{\left\{y(x)\to -\frac{\sqrt{x}\sqrt{W\left(\frac{6e^{3c_1}}{x^3}\right)}}{\sqrt{6}}\right\},\left\{y(x)\to \frac{\sqrt{x}\sqrt{W\left(\frac{6e^{3c_1}}{x^3}\right)}}{\sqrt{6}}\right\}\right\}$$

✓ **Maple** : cpu = 0.221 (sec), leaf count = 25

$$\left\{y(x) = \frac{\mathrm{e}^{\frac{3c_1}{2} - \frac{\mathrm{LambertW}\left(\frac{6\,\mathrm{e}^{3c_1}}{x^3}\right)}{2}}}{x}\right\}$$

2.302 ODE No. 302

$$\left(x^2 y(x)^2 + x\right) y'(x) + y(x) = 0$$

✓ **Mathematica** : cpu = 0.122219 (sec), leaf count = 70

$$\left\{\left\{y(x) \to \frac{c_1 x - \sqrt{x}\sqrt{4 + c_1{}^2 x}}{2x}\right\}, \left\{y(x) \to \frac{c_1 x + \sqrt{x}\sqrt{4 + c_1{}^2 x}}{2x}\right\}\right\}$$

✓ **Maple** : cpu = 0.134 (sec), leaf count = 133

$$\left\{y(x) = -\frac{\sqrt{-2c_1\left(-2c_1 - x + \sqrt{(4c_1 + x)\,x}\right)x}}{2c_1 x}, y(x) = \frac{\sqrt{-2c_1\left(-2c_1 - x + \sqrt{(4c_1 + x)\,x}\right)x}}{2c_1 x}, y(x) = -\frac{\sqrt{2}\sqrt{}}{}\right.$$

2.303 ODE No. 303

$$y(x)\left(x^2 y(x)^2 + 1\right) + x(xy(x) - 1)^2 y'(x) = 0$$

✓ **Mathematica** : cpu = 0.166001 (sec), leaf count = 25

$$\mathrm{Solve}\left[xy(x) - \frac{1}{xy(x)} - 2\log(y(x)) = c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.24 (sec), leaf count = 34

$$\left\{y(x) = \frac{\mathrm{e}^{\mathrm{RootOf}\left(2c_1 \mathrm{e}^{\_Z} + 2\_Z\,\mathrm{e}^{\_Z} - 2\,\mathrm{e}^{\_Z}\ln(x) - \mathrm{e}^{2\_Z} + 1\right)}}{x}\right\}$$

2.304 ODE No. 304

$$5x^2y(x)^3 + \left(10x^3y(x)^2 + x^2y(x) + 2x\right)y'(x) + xy(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.482891 (sec), leaf count = 44

$$\text{Solve}\left[y(x)\sqrt{5x^2y(x)^2 + 2}e^{\frac{\tan^{-1}\left(\sqrt{\frac{5}{2}}xy(x)\right)}{\sqrt{10}}} = c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.256 (sec), leaf count = 44

$$\left\{y(x) = \frac{\sqrt{10}\tan\left(\text{RootOf}\left(2c_1\sqrt{10} + 2\_Z + \sqrt{10}\ln\left(\frac{4(\tan^2(\_Z)+1)(\tan^2(\_Z))}{5x^2}\right)\right)\right)}{5x}\right\}$$

2.305 ODE No. 305

$$x^2 + \left(y(x)^3 - 3x\right)y'(x) - 3y(x) = 0$$

✓ **Mathematica** : cpu = 0.206983 (sec), leaf count = 1277

$$\left\{\left\{y(x) \to -\frac{1}{2}\sqrt{\frac{16\sqrt[3]{2}\left(x^3 + 3c_1\right)}{\sqrt[3]{104976x^2 - \sqrt{11019960576x^4 - 4\left(144x^3 + 432c_1\right)^3}}} + \frac{\sqrt[3]{104976x^2 - \sqrt{11019960576x^4 - 4}}}{9\sqrt[3]{2}}}\right.\right.$$

✓ **Maple** : cpu = 0.021 (sec), leaf count = 21

$$\left\{\frac{y(x)^4}{4} + \frac{x^3}{3} - 3xy(x) + c_1 = 0\right\}$$

2.306 ODE No. 306

$$\left(y(x)^3 - x^3\right)y'(x) - x^2y(x) = 0$$

✓ **Mathematica** : cpu = 0.155274 (sec), leaf count = 201

$$\left\{\left\{y(x) \to \sqrt[3]{x^3 - \sqrt{x^6 - e^{6c_1}}}\right\}, \left\{y(x) \to -\sqrt[3]{-1}\sqrt[3]{x^3 - \sqrt{x^6 - e^{6c_1}}}\right\}, \left\{y(x) \to (-1)^{2/3}\sqrt[3]{x^3 - \sqrt{x^6 - e^{6c_1}}}\right\},\right.$$

✓ **Maple** : cpu = 0.263 (sec), leaf count = 231

$$\left\{y(x)=\frac{x}{\left(-c_1\left(c_1x^3-\sqrt{c_1^2x^6+1}\right)x^3\right)^{\frac{1}{3}}},y(x)=\frac{x}{\left(-c_1\left(c_1x^3+\sqrt{c_1^2x^6+1}\right)x^3\right)^{\frac{1}{3}}},y(x)=\frac{4}{\left(1+i\sqrt{3}\right)^2\left(-c_1\left(c_1\right.\right.}\right.$$

2.307 ODE No. 307

$$y(x)\left(a+x^2+y(x)^2\right)y'(x)+x\left(-a+x^2+y(x)^2\right)=0$$

✓ **Mathematica** : cpu = 0.270129 (sec), leaf count = 149

$$\left\{\left\{y(x)\to-\sqrt{-\sqrt{a^2+4ax^2+4c_1}-a-x^2}\right\},\left\{y(x)\to\sqrt{-\sqrt{a^2+4ax^2+4c_1}-a-x^2}\right\},\left\{y(x)\to-\sqrt{\sqrt{a^2\right.\right.$$

✓ **Maple** : cpu = 0.052 (sec), leaf count = 125

$$\left\{y(x)=\sqrt{-x^2-a-\sqrt{4a\,x^2+a^2-4c_1}},y(x)=\sqrt{-x^2-a+\sqrt{4a\,x^2+a^2-4c_1}},y(x)=-\sqrt{-x^2-a-\sqrt{4a\,x^2\right.$$

2.308 ODE No. 308

$$2y(x)^3y'(x)+xy(x)^2=0$$

✓ **Mathematica** : cpu = 0.016404 (sec), leaf count = 55

$$\left\{\{y(x)\to0\},\left\{y(x)\to-\frac{\sqrt{-x^2+4c_1}}{\sqrt{2}}\right\},\left\{y(x)\to\frac{\sqrt{-x^2+4c_1}}{\sqrt{2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.018 (sec), leaf count = 37

$$\left\{y(x)=0,y(x)=-\frac{\sqrt{-2x^2+4c_1}}{2},y(x)=\frac{\sqrt{-2x^2+4c_1}}{2}\right\}$$

2.309 ODE No. 309

$$-2x^3+\left(2y(x)^3+y(x)\right)y'(x)-x=0$$

✓ **Mathematica** : cpu = 0.117654 (sec), leaf count = 151

$$\left\{\left\{y(x)\to-\frac{\sqrt{-1-\sqrt{4x^4+4x^2+1+8c_1}}}{\sqrt{2}}\right\},\left\{y(x)\to\frac{\sqrt{-1-\sqrt{4x^4+4x^2+1+8c_1}}}{\sqrt{2}}\right\},\left\{y(x)\to-\frac{\sqrt{-1+\sqrt{}}}{}\right.\right.$$

✓ **Maple** : cpu = 0.043 (sec), leaf count = 113

$$\left\{y(x) = -\frac{\sqrt{-2-2\sqrt{4x^4+4x^2+8c_1+1}}}{2}, y(x) = \frac{\sqrt{-2-2\sqrt{4x^4+4x^2+8c_1+1}}}{2}, y(x) = -\frac{\sqrt{-2+2\sqrt{4x^4+4}}}{2}\right.$$

2.310 ODE No. 310

$$x^3 + \left(5x^2y(x) + 2y(x)^3\right)y'(x) + 5xy(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.191035 (sec), leaf count = 159

$$\left\{\left\{y(x) \to -\frac{\sqrt{-5x^2-\sqrt{23x^4+2e^{4c_1}}}}{\sqrt{2}}\right\}, \left\{y(x) \to \frac{\sqrt{-5x^2-\sqrt{23x^4+2e^{4c_1}}}}{\sqrt{2}}\right\}, \left\{y(x) \to -\frac{\sqrt{-5x^2+\sqrt{23x^4+}}}{\sqrt{2}}\right.\right.$$

✓ **Maple** : cpu = 0.151 (sec), leaf count = 125

$$\left\{y(x) = -\frac{\sqrt{-10c_1x^2-2\sqrt{23x^4c_1^2+2}}}{2\sqrt{c_1}}, y(x) = \frac{\sqrt{-10c_1x^2-2\sqrt{23x^4c_1^2+2}}}{2\sqrt{c_1}}, y(x) = -\frac{\sqrt{-10c_1x^2+2\sqrt{23x^4c_1^2}}}{2\sqrt{c_1}}\right.$$

2.311 ODE No. 311

$$4x^3 + 9x^2y(x) + \left(3x^3 + 6x^2y(x) - 3xy(x)^2 + 20y(x)^3\right)y'(x) + 6xy(x)^2 - y(x)^3 = 0$$

✓ **Mathematica** : cpu = 0.250914 (sec), leaf count = 2201

$$\left\{\left\{y(x) \to \frac{x}{20} + \frac{1}{2}\sqrt{-\frac{39x^2}{100} + \frac{\sqrt[3]{99x^6+351e^{c_1}x^2+\sqrt{3}\sqrt{-67037x^{12}+185406e^{c_1}x^8-83733e^{2c_1}x^4+32000e^{3c_1}}}}{5\sqrt[3]{2}3^{2/3}}}\right.\right.$$

✓ **Maple** : cpu = 0.117 (sec), leaf count = 50

$$\left\{y(x) = \frac{\mathrm{RootOf}\left(x^4c_1^4 + 3x^3c_1^3\_Z + 3c_1^2\_Z^2x^2 - c_1\_Z^3x + 5\_Z^4 - 1\right)}{c_1}\right\}$$

2.312 ODE No. 312

$$\left(y(x)y'(x)+x\right)\left(\frac{x^2}{a}+\frac{y(x)^2}{b}\right)+\frac{(a-b)\left(y(x)y'(x)-x\right)}{a+b}=0$$

✓ **Mathematica** : cpu = 0.763158 (sec), leaf count = 204

$$\left\{\left\{y(x)\to -\frac{\sqrt{b}\sqrt{a^2+2a^2W\left(\frac{c_1(a+b)e^{\frac{bx^2}{2a^2}-\frac{b}{2a}-\frac{x^2}{2b}-\frac{1}{2}}}{2a^3b^2}\right)+ab-ax^2-bx^2}}{\sqrt{a}\sqrt{a+b}}\right\},\left\{y(x)\to \frac{\sqrt{b}\sqrt{a^2+2a^2W\left(\frac{c_1(a+b)e}{}\right.}}{\sqrt{}}\right.$$

✓ **Maple** : cpu = 1.648 (sec), leaf count = 240

$$\left\{y(x)=\frac{\sqrt{\left(\left(-x^2+a\right)b+\mathrm{e}^{\frac{-2a^2b\,\mathrm{LambertW}\left(\frac{(a+b)\mathrm{e}^{-\frac{1}{2}}\mathrm{e}^{-\frac{x^2}{2b}}\mathrm{e}^{-\frac{b}{2a}}\mathrm{e}^{\frac{b\,x^2}{2a^2}}\mathrm{e}^{-\frac{c_1}{ab}}}{2a^2b}\right)+b^2x^2+\left(-x^2-b\right)a^2+\left(-b^2-2c_1\right)a}{2a^2b}}\right)a}}{a}, y(x)=-\sqrt{\left(\right.}\right.$$

2.313 ODE No. 313

$$y'(x)\left(3axy(x)^2+2ay(x)^3-bx^3+cx^2\right)-ay(x)^3+2bx^3+3bx^2y(x)+cy(x)^2=0$$

✓ **Mathematica** : cpu = 0.391069 (sec), leaf count = 537

$$\left\{\left\{y(x)\to \frac{\sqrt[3]{2}(3acx+3ac_1)}{3a\sqrt[3]{\sqrt{(27a^2bx^3+27a^2c_1x)^2+4(3acx+3ac_1)^3}+27a^2bx^3+27a^2c_1x}}-\frac{\sqrt[3]{\sqrt{(27a^2bx^3+27a^2c_1x)^2}}}{}\right.\right.$$

✓ **Maple** : cpu = 0.202 (sec), leaf count = 748

$$\left\{y(x)=\frac{(-12cx+12c_1)\,a+\left(\left(-108b\,x^3+108c_1x+12\sqrt{\frac{81a\,b^2x^6-162c_1ab\,x^4+12c^3x^3+81c_1^2a\,x^2-36c_1c^2x^2+36c_1^2cx-12c_1^3}{a}}\right)\right.\right.}{6\left(\left(-108b\,x^3+108c_1x+12\sqrt{\frac{81a\,b^2x^6-162c_1ab\,x^4+12c^3x^3+81c_1^2a\,x^2-36c_1c^2x^2+36c_1^2cx-12c_1^3}{a}}\right)a^2\right)^{\frac{1}{3}}a}\right.$$

2.314 ODE No. 314

$$xy(x)^3y'(x)+y(x)^4-x\sin(x)=0$$

✓ **Mathematica** : cpu = 0.17139 (sec), leaf count = 188

$$\left\{\left\{y(x)\to-\frac{\sqrt[4]{-4x^4\cos(x)+16x^3\sin(x)+48x^2\cos(x)-96x\sin(x)-96\cos(x)+c_1}}{x}\right\},\left\{y(x)\to-\frac{i\sqrt[4]{-4x^4\cos}}{}\right.\right.$$

✓ **Maple** : cpu = 0.07 (sec), leaf count = 158

$$\left\{y(x)=\frac{\left(c_1+\left(-4x^4+48x^2-96\right)\cos(x)+\left(16x^3-96x\right)\sin(x)\right)^{\frac{1}{4}}}{x},y(x)=\frac{i\left(c_1+\left(-4x^4+48x^2-96\right)\cos(x)\right.}{x}\right.$$

2.315 ODE No. 315

$$\left(2xy(x)^3-x^4\right)y'(x)+2x^3y(x)-y(x)^4=0$$

✓ **Mathematica** : cpu = 0.340547 (sec), leaf count = 368

$$\left\{\left\{y(x)\to\frac{\sqrt[3]{\frac{2}{3}}e^{c_1}x}{\sqrt[3]{-9x^3+\sqrt{3}\sqrt{27x^6-4e^{3c_1}x^3}}}+\frac{\sqrt[3]{-9x^3+\sqrt{3}\sqrt{27x^6-4e^{3c_1}x^3}}}{\sqrt[3]{2}3^{2/3}}\right\},\left\{y(x)\to-\frac{(1+i\sqrt{3}}{2^{2/3}\sqrt[3]{3}\sqrt[3]{-9x^3+\sqrt{}}}\right.\right.$$

✓ **Maple** : cpu = 0.074 (sec), leaf count = 370

$$\left\{y(x)=-\frac{12c_1x+\left(-12ic_1x+i\left(-12\left(9c_1x^2-\sqrt{3}\sqrt{\frac{27c_1^3x^4-4x}{c_1}}\right)c_1^2x\right)^{\frac{2}{3}}\right)\sqrt{3}+\left(-12\left(9c_1x^2-\sqrt{3}\sqrt{\frac{27c_1^3x^4-4x}{c_1}}\right.\right.}{12\left(-108\left(c_1x^2-\frac{\sqrt{3}\sqrt{\frac{27c_1^3x^4-4x}{c_1}}}{9}\right)c_1^2x\right)^{\frac{1}{3}}c_1}\right.$$

2.316 ODE No. 316

$$(2xy(x)^3 + y(x))\, y'(x) + 2y(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.211073 (sec), leaf count = 48

$$\left\{\{y(x)\to 0\},\text{Solve}\left[x = -\frac{1}{4}e^{-\frac{1}{2}y(x)^2}\text{Ei}\left(\frac{y(x)^2}{2}\right) + c_1 e^{-\frac{1}{2}y(x)^2}, y(x)\right]\right\}$$

✓ **Maple** : cpu = 0.071 (sec), leaf count = 53

$$\left\{y(x) = 0, y(x) = \sqrt{-2\,\text{RootOf}\left(4c_1\mathrm{e}^{\_Z} + \text{expIntegral}\left(1,\_Z\right)\mathrm{e}^{\_Z} - 4x\right)}, y(x) = -\sqrt{-2\,\text{RootOf}\left(4c_1\mathrm{e}^{\_Z} + \text{expIn}\right.}\right.$$

2.317 ODE No. 317

$$(x^2 + 2xy(x)^3 + xy(x))\, y'(x) + y(x)^2 - xy(x) = 0$$

✓ **Mathematica** : cpu = 0.36513 (sec), leaf count = 23

$$\text{Solve}\left[y(x)^2 - \frac{x}{y(x)} + \log(y(x)) + \log(x) = c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.168 (sec), leaf count = 29

$$\left\{y(x) = \mathrm{e}^{\text{RootOf}\left(c_1\mathrm{e}^{\_Z} - \_Z\mathrm{e}^{\_Z} - \mathrm{e}^{\_Z}\ln(x) + x - \mathrm{e}^{3\_Z}\right)}\right\}$$

2.318 ODE No. 318

$$(3xy(x)^3 - 4xy(x) + y(x))\, y'(x) + \left(y(x)^2 - 2\right) y(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.26889 (sec), leaf count = 4284

$$\left\{\{y(x)\to 0\},\left\{y(x)\to -\sqrt{\frac{4\sqrt[3]{2}x^2}{3\sqrt[3]{16x^6 + 24x^5 - 27c_1{}^2x^4 + 12x^4 + 2x^3 + 3\sqrt{3}\sqrt{-32c_1{}^2x^{10} - 48c_1{}^2x^9 + 27c_1{}^4x^8 -}}}}\right.\right.$$

✓ **Maple** : cpu = 0.021 (sec), leaf count = 28

$$\left\{x - \frac{c_1}{\sqrt{y(x)^2 - 2\,y(x)^2}} + \frac{1}{y(x)^2} = 0, y(x) = 0\right\}$$

2.319 ODE No. 319

$$(7xy(x)^3 + y(x) - 5x)\, y'(x) + y(x)^4 - 5y(x) = 0$$

✓ **Mathematica** : cpu = 0.177194 (sec), leaf count = 302

$$\{\{y(x) \to \text{Root}[10\#1^7 x + 2\#1^5 - 100\#1^4 x - 25\#1^2 + 250\#1 x - 10c_1\&, 1]\}, \{y(x) \to \text{Root}[10\#1^7 x + 2\#1^5 -$$

✓ **Maple** : cpu = 0.033 (sec), leaf count = 35

$$\left\{x + \frac{2y(x)^5 - 25y(x)^2 - 10c_1}{10\left(y(x)^3 - 5\right)^2 y(x)} = 0\right\}$$

2.320 ODE No. 320

$$(x^2 y(x)^3 + xy(x))\, y'(x) - 1 = 0$$

✓ **Mathematica** : cpu = 0.131532 (sec), leaf count = 76

$$\left\{\left\{y(x) \to -\frac{\sqrt{2xW\left(c_1 e^{\frac{1}{2x}-1}\right) + 2x - 1}}{\sqrt{x}}\right\}, \left\{y(x) \to \frac{\sqrt{2xW\left(c_1 e^{\frac{1}{2x}-1}\right) + 2x - 1}}{\sqrt{x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.108 (sec), leaf count = 78

$$\left\{y(x) = \frac{\sqrt{2x^2 \operatorname{LambertW}\left(\frac{c_1 e^{-\frac{2x-1}{2x}}}{2}\right) + 2x^2 - x}}{x}, y(x) = -\frac{\sqrt{2x^2 \operatorname{LambertW}\left(\frac{c_1 e^{-\frac{2x-1}{2x}}}{2}\right) + 2x^2 - x}}{x}\right\}$$

2.321 ODE No. 321

$$(2x^2 y(x)^3 + x^2 y(x)^2 - 2x)\, y'(x) - 2y(x) - 1 = 0$$

✓ **Mathematica** : cpu = 0.525617 (sec), leaf count = 47

$$\text{Solve}\left[\frac{1}{64}(-4y(x)^2 + 4y(x) - 2\log(8y(x) + 4) + 3) - \frac{1}{4x(2y(x) + 1)} = c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.231 (sec), leaf count = 42

$$\left\{y(x) = \frac{e^{\text{RootOf}(8c_1 x\, e^{\_Z} + 2\_Zx\, e^{\_Z} + 3x\, e^{\_Z} - 4x\, e^{2\_Z} + x\, e^{3\_Z} + 16)}}{2} - \frac{1}{2}\right\}$$

2.322 ODE No. 322

$$\left(10x^2y(x)^3-3y(x)^2-2\right)y'(x)+5xy(x)^4+x=0$$

✓ **Mathematica** : cpu = 0.317412 (sec), leaf count = 2077

$$\left\{\left\{y(x)\to -\frac{1}{2}\sqrt{\frac{4\sqrt[3]{2}\left(5x^4-10c_1x^2-2\right)}{5x^2\sqrt[3]{2268x^2-216c_1+\sqrt{\left(2160x^2+108\left(x^2-2c_1\right)\right)^2-4\left(60x^4-120c_1x^2-24\right)^3}}}+\frac{\sqrt[3]{2268x^2}}{}}\right.\right.$$

✓ **Maple** : cpu = 0.029 (sec), leaf count = 29

$$\left\{\frac{5x^2y(x)^4}{2}-y(x)^3+\frac{x^2}{2}+c_1-2y(x)=0\right\}$$

2.323 ODE No. 323

$$xy'(x)\left(axy(x)^3+c\right)+y(x)\left(bx^3y(x)+c\right)=0$$

✓ **Mathematica** : cpu = 0.277495 (sec), leaf count = 463

$$\left\{\left\{y(x)\to \frac{\sqrt[3]{54a^2cx^2+\sqrt{2916a^4c^2x^4+108a^3x^3\left(bx^3-2c_1x\right)^3}}}{3\sqrt[3]{2}ax}-\frac{\sqrt[3]{2}\left(bx^3-2c_1x\right)}{\sqrt[3]{54a^2cx^2+\sqrt{2916a^4c^2x^4+108a^3x^3\left(bx^3-\right.}}}\right.\right.$$

✓ **Maple** : cpu = 0.116 (sec), leaf count = 630

$$\left\{y(x)=\frac{3^{\frac{2}{3}}\left(\left(3x^4b-6c_1x^2\right)a+\left(3i\left(b\,x^2-2c_1\right)a\,x^2+i\left(\left(27c+3\sqrt{\frac{3b^3x^8-18c_1b^2x^6+36c_1^2b\,x^4-24c_1^3x^2+81c^2a}{a}}\right)a^2x^2\right)\right.\right.}{18\left(\left(9c+\sqrt{\frac{3b^3x^8-18c_1b^2x^6+36c_1^2b\,x^4-24c_1^3x^2+81c^2a}{a}}\right.\right.}\right.$$

2.324 ODE No. 324

$$\left(2x^3y(x)^3 - x\right)y'(x) + 2x^3y(x)^3 - y(x) = 0$$

✓ **Mathematica** : cpu = 0.134385 (sec), leaf count = 723

$$\left\{\left\{y(x) \to -\frac{2x^3 - c_1x^2}{6x^2} + \frac{\sqrt[3]{-8x^9 + 12c_1x^8 - 6c_1{}^2x^7 + c_1{}^3x^6 - 27x^4 + 3\sqrt{3}\sqrt{16x^{13} - 24c_1x^{12} + 12c_1{}^2x^{11} - 2c_1}}{6x^2}\right.\right.$$

✓ **Maple** : cpu = 0.128 (sec), leaf count = 815

$$\left\{y(x) = \frac{-c_1^2x^2 + 4c_1x^3 - 4x^4 + \left(-4x^2 + 2c_1x\right)\left(\left(c_1^3x^2 - 6c_1^2x^3 + 12c_1x^4 - 8x^5 + 3\sqrt{48x^5 - 72c_1x^4 + 36c_1^2x^3 -}\right.\right.}{}\right.$$

2.325 ODE No. 325

$$y(x)\left(y(x)^3 - 2x^3\right)y'(x) + x\left(2y(x)^3 - x^3\right) = 0$$

✓ **Mathematica** : cpu = 0.225761 (sec), leaf count = 139

$$\text{Solve}\left[\frac{1}{7}\text{RootSum}\left[\#1^4 + \#1^3 + 3\#1^2 + \#1 + 1\&, \frac{8\#1^3\log\left(\frac{y(x)}{x} - \#1\right) + 9\#1^2\log\left(\frac{y(x)}{x} - \#1\right) + 12\#1\log\left(\right.}{4\#1^3 + 3\#1^2 + 6\#1 + 1}\right.\right.$$

✓ **Maple** : cpu = 0.691 (sec), leaf count = 124

$$\left\{-c_1 + \frac{2\sqrt{3}\arctan\left(\frac{\sqrt{3}\left(x^3+4x^2y(x)+2xy(x)^2+2y(x)^3\right)}{3x^3}\right)}{7} - \frac{2\sqrt{3}\arctan\left(\frac{(x+2y(x))\sqrt{3}}{3x}\right)}{7} - \ln(x) + \frac{\ln\left(\frac{-x+y(x)}{x}\right)}{7} - \frac{2}{}\right.$$

2.326 ODE No. 326

$$y(x)y'(x)\left((ay(x)+bx)^3+bx^3\right)+x\left((ay(x)+bx)^3+ay(x)^3\right)=0$$

✓ **Mathematica** : cpu = 3.45581 (sec), leaf count = 13289

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✓ **Maple** : cpu = 0.537 (sec), leaf count = 160

$$\left\{y(x)=\frac{\left(c_1x-b\,\mathrm{RootOf}\left(c_1^4x^4-2c_1^3\_Z b\,x^3-2c_1\_Z^3bx+\_Z^4b^2+\left(a^2x^2c_1^2+b^2x^2c_1^2+c_1^2x^2-a^2\right)\_Z^2\right)\right)x}{a\,\mathrm{RootOf}\left(c_1^4x^4-2c_1^3\_Z b\,x^3-2c_1\_Z^3bx+\_Z^4b^2+\left(a^2x^2c_1^2+b^2x^2c_1^2+c_1^2x^2-a^2\right)\_Z^2\right)}\right\}$$

2.327 ODE No. 327

$$\left(2x^2y(x)^3+xy(x)^4+2y(x)+x\right)y'(x)+y(x)^5+y(x)=0$$

✓ **Mathematica** : cpu = 0.35088 (sec), leaf count = 669

$$\left\{\left\{y(x)\to\frac{\sqrt[3]{27x^2+9c_1{}^2x^2+3\sqrt{3}\sqrt{-4c_1{}^3x^6+27x^4-c_1{}^4x^4+18c_1{}^2x^4+4c_1{}^3x^2+2c_1{}^3}}}{3\sqrt[3]{2}x}-\frac{}{3x\sqrt[3]{27x^2+9c_1{}^2x^2-}}\right.\right.$$

✓ **Maple** : cpu = 0.158 (sec), leaf count = 583

$$\left\{y(x)=\frac{12c_1x^2+\left(-12ic_1x^2-i\left(108c_1^3x^2+36c_1x^2+12c_1\sqrt{3}\,\sqrt{27c_1^4x^2+18c_1^2x^2-x^2+c_1\left(4x^4-4\right)}\,x-8\right)^{\frac{2}{3}}+\right.}{12\left(108c_1^3x^2+36c_1x^2+12c_1\sqrt{3}\,\sqrt{27c_1^4x^2+1}\right.}\right.$$

2.328 ODE No. 328

$$ax^2y(x)^ny'(x)-2xy'(x)+y(x)=0$$

✓ **Mathematica** : cpu = 0.314464 (sec), leaf count = 42

$$\mathrm{Solve}\left[\frac{n(\log(x)-\log\left(-axy(x)^n+n+2\right))}{n+2}-\frac{2n\log(y(x))}{n+2}=c_1,y(x)\right]$$

✓ **Maple** : cpu = 0.224 (sec), leaf count = 33

$$\left\{x^{-n}\left(axy(x)^n-n-2\right)^n y(x)^{2n}-c_1=0\right\}$$

2.329 ODE No. 329

$$x^n y(x)^m \left(axy'(x) + by(x)\right) + \alpha xy'(x) + \beta y(x) = 0$$

✓ **Mathematica** : cpu = 0.832767 (sec), leaf count = 102

$$\text{Solve}\left[\frac{m((a\beta - \alpha b)\log\left(x^n y(x)^m (bm - an) - \alpha n + \beta m\right) + \beta \log(x)(bm - an))}{(bm - an)(\beta m - \alpha n)} + \frac{\alpha m \log(\beta m y(x) - \alpha n y(x))}{\beta m - \alpha n} =\right.$$

✓ **Maple** : cpu = 0.466 (sec), leaf count = 73

$$\{x^{-a\beta mn + b\beta m^2} \left(y(x)^m\right)^{-an\alpha + bm\alpha} \left(\alpha n - \beta m + (an - bm)\, x^n y(x)^m\right)^{(a\beta - \alpha b)m} - c_1 = 0\}$$

2.330 ODE No. 330

$$(f(y(x) + x) + 1)y'(x) + f(y(x) + x) = 0$$

✓ **Mathematica** : cpu = 0.127981 (sec), leaf count = 52

$$\text{Solve}\left[\int_1^{y(x)} \left(f(x + K[2]) - \int_1^x f'(K[1] + K[2])dK[1] + 1\right) dK[2] + \int_1^x f(K[1] + y(x))dK[1] = c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.036 (sec), leaf count = 22

$$\{y(x) = -x + \text{RootOf}\left(c_1 - x + \int^{\_Z} (f(\_a) + 1)\, d\_a\right)\}$$

2.331 ODE No. 331

$$y'(x)\left(\sum_{\nu=1}^{p} y(x)^\nu f(\nu)(x)\right) - \sum_{\nu=1}^{q} y(x)^\nu g(\nu)(x) = 0$$

✗ **Mathematica** : cpu = 55.8894 (sec), leaf count = 0 , could not solve

```
DSolve[-Sum[y[x]^nu*g[nu][x], {nu, 1, q}] + Sum[y[x]^nu*f[nu][x], {nu, 1, p}]*Derivative[1][
```

✓ **Maple** : cpu = 0.241 (sec), leaf count = 78

$$\left\{\frac{y(x)^{p+1}\,\Phi\left(-(-1)^{\mathrm{csgn}(iy(x)^q)}\, y(x)^q, 1, \frac{p+1}{q}\right) - y(x)\,\Phi\left(-(-1)^{\mathrm{csgn}(iy(x)^q)}\, y(x)^q, 1, \frac{1}{q}\right) + \left(c_1 + \int \frac{g_\nu(x)}{f_\nu(x)}dx\right) q}{q} = 0\right\}$$

2.332 ODE No. 332

$$x\left(\sqrt{xy(x)}-1\right)y'(x)-y(x)\left(\sqrt{xy(x)}+1\right)=0$$

✓ **Mathematica** : cpu = 0.345587 (sec), leaf count = 34

$$\text{Solve}\left[\log(y(x))-\frac{y(x)\log(x)-\frac{2y(x)}{\sqrt{xy(x)}}}{y(x)}=c_1,y(x)\right]$$

✓ **Maple** : cpu = 0.017 (sec), leaf count = 33

$$\left\{-\frac{1+\left(c_1-\ln(x)+\frac{\ln(xy(x))}{2}\right)\sqrt{xy(x)}}{\sqrt{xy(x)}}=0\right\}$$

2.333 ODE No. 333

$$-x^{3/2}y(x)^{5/2}+\left(2x^{5/2}y(x)^{3/2}+x^2y(x)-x\right)y'(x)+xy(x)^2-y(x)=0$$

✓ **Mathematica** : cpu = 0.492765 (sec), leaf count = 72

$$\text{Solve}\left[\frac{2\sqrt{xy(x)}\log(y(x))}{\sqrt{x}\sqrt{y(x)}}-\frac{\sqrt{xy(x)}\left(3x^{3/2}y(x)^{3/2}\log(x)+6xy(x)-2\right)}{3x^2y(x)^2}=c_1,y(x)\right]$$

✓ **Maple** : cpu = 0.104 (sec), leaf count = 32

$$\left\{-c_1-\frac{\ln(x)}{2}+\ln(y(x))-\frac{1}{\sqrt{x}\sqrt{y(x)}}+\frac{1}{3x^{\frac{3}{2}}y(x)^{\frac{3}{2}}}=0\right\}$$

2.334 ODE No. 334

$$\left(\sqrt{y(x)+x}+1\right)y'(x)+1=0$$

✓ **Mathematica** : cpu = 0.130494 (sec), leaf count = 39

$$\left\{\left\{y(x)\to-2\sqrt{x+1+c_1}+2+c_1\right\},\left\{y(x)\to2\sqrt{x+1+c_1}+2+c_1\right\}\right\}$$

✓ **Maple** : cpu = 0.026 (sec), leaf count = 19

$$\left\{-c_1-y(x)-2\sqrt{x+y(x)}=0\right\}$$

2.335 ODE No. 335

$$\sqrt{y(x)^2-1}y'(x)-\sqrt{x^2-1}=0$$

✓ **Mathematica** : cpu = 0.199083 (sec), leaf count = 75

$$\left\{\left\{y(x)\to \text{InverseFunction}\left[\frac{1}{2}\#1\sqrt{\#1^2-1}-\frac{1}{2}\log\left(\sqrt{\#1^2-1}+\#1\right)\&\right]\left[\frac{1}{2}\sqrt{x^2-1}x-\frac{1}{2}\log\left(\sqrt{x^2-1}+x\right)\right.\right.\right.$$

✓ **Maple** : cpu = 0.01 (sec), leaf count = 50

$$\left\{c_1+\sqrt{x^2-1}\,x-\ln\left(x+\sqrt{x^2-1}\right)+\ln\left(y(x)+\sqrt{y\left(x\right)^2-1}\right)-\sqrt{y\left(x\right)^2-1}\,y(x)=0\right\}$$

2.336 ODE No. 336

$$\left(ax+\sqrt{y(x)^2+1}\right)y'(x)+ay(x)+\sqrt{x^2+1}=0$$

✓ **Mathematica** : cpu = 0.317301 (sec), leaf count = 53

$$\text{Solve}\left[axy(x)+\frac{1}{2}\sqrt{x^2+1}x+\frac{1}{2}\left(y(x)\sqrt{y(x)^2+1}+\sinh^{-1}(y(x))\right)+\frac{1}{2}\sinh^{-1}(x)=c_1,y(x)\right]$$

✓ **Maple** : cpu = 0.037 (sec), leaf count = 41

$$\left\{axy(x)+c_1+\frac{\sqrt{x^2+1}\,x}{2}+\frac{\operatorname{arcsinh}\left(x\right)}{2}+\frac{\operatorname{arcsinh}\left(y(x)\right)}{2}+\frac{\sqrt{y\left(x\right)^2+1}\,y(x)}{2}=0\right\}$$

2.337 ODE No. 337

$$\left(\sqrt{x^2+y(x)^2}+x\right)y'(x)-y(x)=0$$

✓ **Mathematica** : cpu = 0.25801 (sec), leaf count = 161

$$\left\{\left\{y(x)\to -\sqrt{-2ix\cosh(c_1)-2ix\sinh(c_1)-\cosh(2c_1)-\sinh(2c_1)}\right\},\left\{y(x)\to \sqrt{-2ix\cosh(c_1)-2ix\sinh(c_1)-}\right.\right.$$

✓ **Maple** : cpu = 0.108 (sec), leaf count = 28

$$\left\{-c_1+\frac{x}{y\left(x\right)^2}+\frac{\sqrt{x^2+y\left(x\right)^2}}{y\left(x\right)^2}=0\right\}$$

2.338 ODE No. 338

$y'(x)\left(\sin(\alpha)\left(y(x)^2-x^2\right)-2x\cos(\alpha)y(x)+\sqrt{x^2+y(x)^2}y(x)\right)+\cos(\alpha)\left(y(x)^2-x^2\right)+2x\sin(\alpha)y(x)+x\sqrt{x^2+y}$

✓ **Mathematica** : cpu = 96.4769 (sec), leaf count = 17681

Too large to display

✓ **Maple** : cpu = 0.688 (sec), leaf count = 129

$$\left\{y(x)=x\,\mathrm{RootOf}\left(c_1+\int^{\_Z}\frac{-\_a^3\cos(2\alpha)-\_a^3-3\_a^2\sin(2\alpha)+3\_a\cos(2\alpha)-\_a+\sin(2\alpha)+\sqrt{2}\sqrt{(\_a}}{(\_a^2+1)(\_a^2\cos(2\alpha)+\_a^2+2\_a\sin(2}\right.\right.$$

2.339 ODE No. 339

$\left(x\sqrt{x^2+y(x)^2+1}-y(x)\left(x^2+y(x)^2\right)\right)y'(x)-\sqrt{x^2+y(x)^2+1}y(x)-x\left(x^2+y(x)^2\right)=0$

✓ **Mathematica** : cpu = 0.415714 (sec), leaf count = 27

$$\mathrm{Solve}\left[\sqrt{x^2+y(x)^2+1}+\tan^{-1}\left(\frac{x}{y(x)}\right)=c_1,y(x)\right]$$

✓ **Maple** : cpu = 0.222 (sec), leaf count = 27

$$\left\{-c_1+\arctan\left(\frac{y(x)}{x}\right)-\sqrt{x^2+y(x)^2+1}=0\right\}$$

2.340 ODE No. 340

$y'(x)\left(\frac{\mathrm{e1}(a+x)}{\left((a+x)^2+y(x)^2\right)^{3/2}}+\frac{\mathrm{e2}(x-a)}{\left((x-a)^2+y(x)^2\right)^{3/2}}\right)-y(x)\left(\frac{\mathrm{e1}}{\left((a+x)^2+y(x)^2\right)^{3/2}}+\frac{\mathrm{e2}}{\left((x-a)^2+y(x)^2\right)^{3/2}}\right)$

✗ **Mathematica** : cpu = 87.1637 (sec), leaf count = 0 , could not solve

```
DSolve[-(y[x]*(e2/((-a + x)^2 + y[x]^2)^(3/2) + e1/((a + x)^2 + y[x]^2)^(3/2))) + ((e2*(-
a + x))/((-a + x)^2 + y[x]^2)^(3/2) + (e1*(a + x))/((a + x)^2 + y[x]^2)^(3/2))*Derivative[1]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , exception

```
time expired
```

2.341 ODE No. 341

$$\left(xe^{y(x)}+e^{x}\right)y'(x)+e^{x}y(x)+e^{y(x)}=0$$

✓ **Mathematica** : cpu = 0.275273 (sec), leaf count = 33

$$\left\{\left\{y(x)\to c_1e^{-x}-W\left(xe^{-x+c_1e^{-x}}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.069 (sec), leaf count = 33

$$\{y(x)=\left(-\operatorname{LambertW}\left(x\,\mathrm{e}^{-x}\mathrm{e}^{-c_1\mathrm{e}^{-x}}\right)\mathrm{e}^{x}-c_1\right)\mathrm{e}^{-x}\}$$

2.342 ODE No. 342

$$x\left(2e^{-xy(x)}+3e^{xy(x)}\right)\left(xy'(x)+y(x)\right)+1=0$$

✓ **Mathematica** : cpu = 0.623731 (sec), leaf count = 163

$$\left\{\left\{y(x)\to-\frac{\cosh^{-1}\left(\frac{1}{24}\left(-5\sqrt{24+\log^2\left(\frac{c_1}{x}\right)}-\log\left(\frac{c_1}{x}\right)\right)\right)}{x}\right\},\left\{y(x)\to\frac{\cosh^{-1}\left(\frac{1}{24}\left(-5\sqrt{24+\log^2\left(\frac{c_1}{x}\right)}-\log\left(\right.\right.\right.}{x}\right.$$

✓ **Maple** : cpu = 0.047 (sec), leaf count = 17

$$\left\{y(x)=\frac{\ln\left(\frac{c_1}{5}-\frac{\ln(x)}{5}\right)}{x}\right\}$$

2.343 ODE No. 343

$$y'(x)(\log(y(x))+x)-1=0$$

✓ **Mathematica** : cpu = 0.176106 (sec), leaf count = 35

$$\mathrm{Solve}\left[x=e^{y(x)}\left(\mathrm{Ei}(-y(x))-e^{-y(x)}\log(y(x))\right)+c_1e^{y(x)},y(x)\right]$$

✓ **Maple** : cpu = 0.114 (sec), leaf count = 27

$$\{y(x)=\mathrm{e}^{\operatorname{RootOf}\left(c_1\mathrm{e}^{\mathrm{e}^{\_Z}}-\operatorname{expIntegral}(1,\mathrm{e}^{\_Z})\mathrm{e}^{\mathrm{e}^{\_Z}}-\_Z-x\right)}\}$$

2.344 ODE No. 344

$$y'(x)(\log(y(x)) + 2x - 1) - 2y(x) = 0$$

✓ **Mathematica** : cpu = 0.202776 (sec), leaf count = 23

$$\left\{\left\{y(x) \to -\frac{W\left(-2c_1 e^{-2x}\right)}{2c_1}\right\}\right\}$$

✓ **Maple** : cpu = 0.063 (sec), leaf count = 19

$$\{y(x) = \mathrm{e}^{-2x - \mathrm{LambertW}\left(-2c_1 \mathrm{e}^{-2x}\right)}\}$$

2.345 ODE No. 345

$$xy'(x)\left(2x^2 y(x) \log(y(x)) + 1\right) - 2y(x) = 0$$

✓ **Mathematica** : cpu = 0.230414 (sec), leaf count = 35

$$\text{Solve}\left[\frac{y(x)}{x^2} + 2\left(\frac{1}{2}y(x)^2 \log(y(x)) - \frac{y(x)^2}{4}\right) = c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.097 (sec), leaf count = 36

$$\{y(x) = \mathrm{e}^{\mathrm{RootOf}\left(2\_Z x^2 \mathrm{e}^{2\_Z} + 2c_1 x^2 - x^2 \mathrm{e}^{2\_Z} + 2\,\mathrm{e}^{\_Z}\right)}\}$$

2.346 ODE No. 346

$$xy'(x)(-ax + y(x) + y(x)\log(xy(x))) - y(x)(ax\log(xy(x)) + ax - y(x)) = 0$$

✓ **Mathematica** : cpu = 0.455704 (sec), leaf count = 24

$$\text{Solve}[ax\log(xy(x)) - y(x)\log(xy(x)) = c_1, y(x)]$$

✓ **Maple** : cpu = 0.281 (sec), leaf count = 19

$$\{-c_1 + (xy(x))^{-ax + y(x)} = 0\}$$

2.347 ODE No. 347

$$(\sin(x)+1)y'(x)\sin(y(x))+\cos(x)(\cos(y(x))-1)=0$$

✓ **Mathematica** : cpu = 0.338686 (sec), leaf count = 32

$$\left\{\{y(x)\to 0\},\left\{y(x)\to 2\sin^{-1}\left(\frac{1}{4}c_1\left(\sin\left(\frac{x}{2}\right)+\cos\left(\frac{x}{2}\right)\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.158 (sec), leaf count = 12

$$\{y(x)=\arccos\left(c_1\sin\left(x\right)+c_1+1\right)\}$$

2.348 ODE No. 348

$$y'(x)(x\cos(y(x))+\sin(x))+\sin(y(x))+y(x)\cos(x)=0$$

✓ **Mathematica** : cpu = 0.212954 (sec), leaf count = 17

$$\text{Solve}[x\sin(y(x))+y(x)\sin(x)=c_1,y(x)]$$

✓ **Maple** : cpu = 0.099 (sec), leaf count = 15

$$\{x\sin\left(y(x)\right)+\sin\left(x\right)y(x)+c_1=0\}$$

2.349 ODE No. 349

$$xy'(x)\cot\left(\frac{y(x)}{x}\right)+2x\sin\left(\frac{y(x)}{x}\right)-y(x)\cot\left(\frac{y(x)}{x}\right)=0$$

✓ **Mathematica** : cpu = 0.254555 (sec), leaf count = 15

$$\left\{\left\{y(x)\to x\csc^{-1}(2(\log(x)+c_1))\right\}\right\}$$

✓ **Maple** : cpu = 0.044 (sec), leaf count = 17

$$\left\{y(x)=x\arcsin\left(\frac{1}{2c_1+2\ln\left(x\right)}\right)\right\}$$

2.350 ODE No. 350

$$y'(x)\cos(y(x)) - \sin(y(x)) - \cos(x)\sin^2(y(x)) = 0$$

✓ **Mathematica** : cpu = 0.654024 (sec), leaf count = 53

$$\left\{\left\{y(x)\to \csc^{-1}\left(\frac{1}{2}\left(-\sin(x)-\cos(x)-2c_1e^{-x}\right)\right)\right\},\left\{y(x)\to -\csc^{-1}\left(\frac{1}{2}\left(\sin(x)+\cos(x)+2c_1e^{-x}\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.872 (sec), leaf count = 226

$$\left\{y(x)=\arctan\left(-\frac{2\,\mathrm{e}^{x}}{2c_1+(\cos(x)+\sin(x))\,\mathrm{e}^{x}},\frac{\sqrt{16}\sqrt{\left(c_1^2+c_1(\cos(x)+\sin(x))\,\mathrm{e}^{x}+\left(\frac{\cos(x)\sin(x)}{2}-\frac{3}{4}\right)\mathrm{e}^{2x}\right)\left(c\right.}}{4c_1^2+4c_1(\cos(x)+\sin(x))\,\mathrm{e}^{x}+(2}\right.\right.$$

2.351 ODE No. 351

$$y'(x)\cos(y(x)) - \sin^3(y(x)) + x\sin(y(x))\cos^2(y(x)) = 0$$

✓ **Mathematica** : cpu = 0.556262 (sec), leaf count = 61

$$\left\{\left\{y(x)\to -\cot^{-1}\left(\sqrt{e^{x^2}\left(-\sqrt{\pi}\mathrm{erf}(x)+4c_1\right)}\right)\right\},\left\{y(x)\to \cot^{-1}\left(\sqrt{e^{x^2}\left(-\sqrt{\pi}\mathrm{erf}(x)+4c_1\right)}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.434 (sec), leaf count = 55

$$\left\{y(x)=-\arcsin\left(\frac{1}{\sqrt{-2c_1\mathrm{e}^{x^2}-\sqrt{\pi}\,\mathrm{erf}(x)\,\mathrm{e}^{x^2}+1}}\right),y(x)=\arcsin\left(\frac{1}{\sqrt{-2c_1\mathrm{e}^{x^2}-\sqrt{\pi}\,\mathrm{erf}(x)\,\mathrm{e}^{x^2}+1}}\right)\right\}$$

2.352 ODE No. 352

$$y'(x)\cos(y(x))(\cos(y(x))-\sin(\alpha)\sin(x))+\cos(x)(\cos(x)-\sin(\alpha)\sin(y(x)))=0$$

✓ **Mathematica** : cpu = 0.607159 (sec), leaf count = 43

$$\mathrm{Solve}\left[4\sin(\alpha)\sin(x)\sin(y(x))-4\left(\frac{y(x)}{2}+\frac{1}{4}\sin(2y(x))\right)-2x-\sin(2x)=c_1,y(x)\right]$$

✓ **Maple** : cpu = 0.43 (sec), leaf count = 33

$$\left\{\frac{\cos(x)\sin(x)}{2}+c_1+\frac{x}{2}+\frac{(-2\sin(\alpha)\sin(x)+\cos(y(x)))\sin(y(x))}{2}+\frac{y(x)}{2}=0\right\}$$

2.353 ODE No. 353

$$xy'(x)\cos(y(x)) + \sin(y(x)) = 0$$

✓ **Mathematica** : cpu = 0.0885775 (sec), leaf count = 14

$$\left\{\left\{y(x) \to \sin^{-1}\left(\frac{e^{c_1}}{x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.089 (sec), leaf count = 12

$$\left\{y(x) = \arcsin\left(\frac{1}{c_1 x}\right)\right\}$$

2.354 ODE No. 354

$$y'(x)(x\sin(y(x)) - 1) + \cos(y(x)) = 0$$

✓ **Mathematica** : cpu = 0.191955 (sec), leaf count = 145

$$\left\{\left\{y(x) \to -\cos^{-1}\left(\frac{c_1 x - \sqrt{-x^2 + 1 + c_1{}^2}}{1 + c_1{}^2}\right)\right\}, \left\{y(x) \to \cos^{-1}\left(\frac{c_1 x - \sqrt{-x^2 + 1 + c_1{}^2}}{1 + c_1{}^2}\right)\right\}, \left\{y(x) \to -\cos^{-1}\right.$$

✓ **Maple** : cpu = 0.073 (sec), leaf count = 108

$$\left\{y(x) = \arctan\left(\frac{-c_1\sqrt{-x^2 + c_1^2 + 1} + x}{c_1^2 + 1}, \frac{c_1 x + \sqrt{-x^2 + c_1^2 + 1}}{c_1^2 + 1}\right), y(x) = \arctan\left(\frac{c_1\sqrt{-x^2 + c_1^2 + 1} + x}{c_1^2 + 1}, \frac{c_1 x}{}\right.\right.$$

2.355 ODE No. 355

$$y'(x)(x\cos(y(x)) + \cos(x)) + \sin(y(x)) - y(x)\sin(x) = 0$$

✓ **Mathematica** : cpu = 0.191022 (sec), leaf count = 17

$$\text{Solve}[x\sin(y(x)) + y(x)\cos(x) = c_1, y(x)]$$

✓ **Maple** : cpu = 0.096 (sec), leaf count = 15

$$\{x\sin(y(x)) + \cos(x)\,y(x) + c_1 = 0\}$$

2.356 ODE No. 356

$$y'(x)\left(x^2\cos(y(x))+2y(x)\sin(x)\right)+2x\sin(y(x))+y(x)^2\cos(x)=0$$

✓ **Mathematica** : cpu = 0.275337 (sec), leaf count = 21

$$\text{Solve}\left[x^2\sin(y(x))+y(x)^2\sin(x)=c_1,y(x)\right]$$

✓ **Maple** : cpu = 0.112 (sec), leaf count = 19

$$\{x^2\sin\left(y(x)\right)+\sin\left(x\right)y(x)^2+c_1=0\}$$

2.357 ODE No. 357

$$x\log(x)y'(x)\sin(y(x))+\cos(y(x))(1-x\cos(y(x)))=0$$

✓ **Mathematica** : cpu = 0.605152 (sec), leaf count = 35

$$\left\{\left\{y(x)\to-\sec^{-1}\left(\frac{x-c_1}{\log(x)}\right)\right\},\left\{y(x)\to\sec^{-1}\left(\frac{x-c_1}{\log(x)}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.606 (sec), leaf count = 13

$$\left\{y(x)=\arccos\left(\frac{\ln\left(x\right)}{c_1+x}\right)\right\}$$

2.358 ODE No. 358

$$\cos(x)y'(x)\sin(y(x))+\sin(x)\cos(y(x))=0$$

✓ **Mathematica** : cpu = 0.163464 (sec), leaf count = 29

$$\left\{\left\{y(x)\to-\cos^{-1}\left(\frac{1}{2}c_1\sec(x)\right)\right\},\left\{y(x)\to\cos^{-1}\left(\frac{1}{2}c_1\sec(x)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.096 (sec), leaf count = 11

$$\left\{y(x)=\arccos\left(\frac{c_1}{\cos\left(x\right)}\right)\right\}$$

2.359 ODE No. 359

$$3\sin(x)y'(x)\sin(y(x)) + 5y(x)\cos^4(x) = 0$$

✓ **Mathematica** : cpu = 0.354584 (sec), leaf count = 45

$$\left\{\left\{y(x) \to \text{SinIntegral}^{(-1)}\left(-\frac{5}{3}\left(\frac{5\cos(x)}{4} + \frac{1}{12}\cos(3x) + \log\left(\sin\left(\frac{x}{2}\right)\right) - \log\left(\cos\left(\frac{x}{2}\right)\right)\right) + c_1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.074 (sec), leaf count = 28

$$\left\{c_1 + \frac{3\,\text{sinIntegral}\,(y(x))}{5} + \frac{5\cos(x)}{4} + \frac{\cos(3x)}{12} + \ln(-\cot(x) + \csc(x)) = 0\right\}$$

2.360 ODE No. 360

$$y'(x)\cos(ay(x)) - b(1 - c\cos(ay(x)))\sqrt{c\cos(ay(x)) + \cos^2(ay(x)) - 1} = 0$$

✓ **Mathematica** : cpu = 4.64854 (sec), leaf count = 369

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[-\frac{i(\cos(\#1a)+1)\sqrt{\frac{2c\cos(\#1a)+\cos(2\#1a)-1}{(\cos(\#1a)+1)^2}}\sqrt{\frac{c\tan^2\left(\frac{\#1a}{2}\right)+\sqrt{c^2+4}+2}{\sqrt{c^2+4}+2}}\sqrt{1-\frac{c\tan^2\left(\frac{\#1a}{2}\right)}{\sqrt{c^2+4}-2}}\left(\cdots}{a\left(c^2-1\right)\sqrt{\frac{c}{4-2\sqrt{c^2+4}\cdots}}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.375 (sec), leaf count = 48

$$\left\{c_1 + x + \int^{y(x)} \frac{2\cos(\_aa)}{(c\cos(\_aa) - 1)\sqrt{4c\cos(\_aa) + 2\cos(2\_aa) - 2}\,b} d\_a = 0\right\}$$

2.361 ODE No. 361

$$y'(x)(-\sin(y(x)) + x\sin(xy(x)) + \cos(y(x)+x)) + y(x)\sin(xy(x)) + \cos(y(x)+x) + \cos(x) = 0$$

✓ **Mathematica** : cpu = 0.960836 (sec), leaf count = 31

$$\text{Solve}[\cos(y(x)) - \cos(xy(x)) + \sin(x)\cos(y(x)) + \cos(x)\sin(y(x)) + \sin(x) = c_1, y(x)]$$

✓ **Maple** : cpu = 0.198 (sec), leaf count = 22

$$\{c_1 - \cos(xy(x)) + \cos(y(x)) + \sin(x) + \sin(x + y(x)) = 0\}$$

2.362 ODE No. 362

$$y'(x)\left(x^2y(x)\sin(xy(x))-4x\right)-y(x)+xy(x)^2\sin(xy(x))=0$$

✓ **Mathematica** : cpu = 0.384123 (sec), leaf count = 23

$$\text{Solve}[-4\log(y(x))-\cos(xy(x))-\log(x)=c_1,y(x)]$$

✓ **Maple** : cpu = 0.241 (sec), leaf count = 23

$$\left\{y(x)=\frac{\text{RootOf}\left(c_1x^{\frac{3}{4}}\mathrm{e}^{-\frac{\cos(\_Z)}{4}}-\_Z\right)}{x}\right\}$$

2.363 ODE No. 363

$$(xy'(x)-y(x))\cos^2\left(\frac{y(x)}{x}\right)+x=0$$

✓ **Mathematica** : cpu = 0.402693 (sec), leaf count = 33

$$\text{Solve}\left[\frac{y(x)}{2x}+\frac{1}{4}\sin\left(\frac{2y(x)}{x}\right)=-\log(x)+c_1,y(x)\right]$$

✓ **Maple** : cpu = 0.081 (sec), leaf count = 35

$$\left\{-c_1-\ln(x)-\frac{x\cos\left(\frac{y(x)}{x}\right)\sin\left(\frac{y(x)}{x}\right)+y(x)}{2x}=0\right\}$$

2.364 ODE No. 364

$$xy'(x)\left(y(x)\sin\left(\frac{y(x)}{x}\right)-x\cos\left(\frac{y(x)}{x}\right)\right)-y(x)\left(y(x)\sin\left(\frac{y(x)}{x}\right)+x\cos\left(\frac{y(x)}{x}\right)\right)=0$$

✓ **Mathematica** : cpu = 0.483019 (sec), leaf count = 31

$$\text{Solve}\left[-\log\left(\frac{y(x)}{x}\right)-\log\left(\cos\left(\frac{y(x)}{x}\right)\right)=2\log(x)+c_1,y(x)\right]$$

✓ **Maple** : cpu = 0.199 (sec), leaf count = 23

$$\left\{y(x)=\frac{c_1}{x\cos\left(\text{RootOf}\left(-\_Zx^2\cos(\_Z)+c_1\right)\right)}\right\}$$

2.365 ODE No. 365

$$(y(x)f(x^2+y(x)^2)-x)\,y'(x)+xf(x^2+y(x)^2)+y(x)=0$$

✓ **Mathematica** : cpu = 0.392581 (sec), leaf count = 156

$$\text{Solve}\left[\int_1^{y(x)}\left(\frac{x-f(x^2+K[2]^2)\,K[2]}{x^2+K[2]^2}-\int_1^x\left(\frac{-2K[1]K[2]f'(K[1]^2+K[2]^2)-1}{K[1]^2+K[2]^2}-\frac{2(-f(K[1]^2+K[2]^2)\,K[1]}{(K[1]^2+K[2]^2)}\right.\right.\right.$$

✓ **Maple** : cpu = 0.355 (sec), leaf count = 42

$$\left\{y(x)=\frac{x}{\tan\left(\operatorname{RootOf}\left(2c_1-2\_Z-\left(\int^{\frac{(\tan^2(\_Z)+1)x^2}{\tan(\_Z)^2}}\frac{f(\_a)}{\_a}d\_a\right)\right)\right)}\right\}$$

2.366 ODE No. 366

$$f(ay(x)^2+x^2)\,(ay(x)y'(x)+x)-xy'(x)-y(x)=0$$

✓ **Mathematica** : cpu = 0.314976 (sec), leaf count = 91

$$\text{Solve}\left[\int_1^{y(x)}\left(x-af(x^2+aK[2]^2)\,K[2]-\int_1^x\left(1-2aK[1]K[2]f'(K[1]^2+aK[2]^2)\right)dK[1]\right)dK[2]+\int_1^x(y(x)-\right.$$

✓ **Maple** : cpu = 0.137 (sec), leaf count = 45

$$\left\{-\frac{axy(x)^2}{\sqrt{a^2y(x)^2}}+c_1-\left(\int^{-\frac{ay(x)^2}{2}-\frac{x^2}{2}}f(-2\_a)\,d\_a\right)=0\right\}$$

2.367 ODE No. 367

$$f(x^cy(x))\,(bxy'(x)-a)-x^ay(x)^b\,(cy(x)+xy'(x))=0$$

✗ **Mathematica** : cpu = 10.8087 (sec), leaf count = 0 , could not solve

```
DSolve[-(x^a*y[x]^b*(c*y[x] + x*Derivative[1][y][x])) + f[x^c*y[x]]*(-a + b*x*Derivative[1][
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(f(x^c*y(x))*(b*x*diff(y(x),x)-a)-x^a*y(x)^b*(x*diff(y(x),x)+c*y(x)) = 0,y(x))
```

2.368 ODE No. 368

$$ay(x) + bx^2 + y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 1.47476 (sec), leaf count = 795

$$\left\{ \text{Solve}\left[\int_1^x \left(\frac{2\sqrt{-bK[1]^2 - ay(x)}y(x)}{bK[1]^4 + ay(x)K[1]^2 + 4y(x)^2} + \frac{bK[1]^3 + ay(x)K[1]}{bK[1]^4 + ay(x)K[1]^2 + 4y(x)^2} \right) dK[1] + \int_1^{y(x)} \left(-\frac{\sqrt{-bx^2 -}}{bx^4 + aK[2]x} \right.\right.\right.$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , exception

```
time expired
```

2.369 ODE No. 369

$$-a^2 + y'(x)^2 + y(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.0877192 (sec), leaf count = 107

$$\left\{ \left\{ y(x) \to -\frac{a\tan(x - c_1)}{\sqrt{1 + \tan^2(x - c_1)}} \right\}, \left\{ y(x) \to \frac{a\tan(x - c_1)}{\sqrt{1 + \tan^2(x - c_1)}} \right\}, \left\{ y(x) \to -\frac{a\tan(x + c_1)}{\sqrt{1 + \tan^2(x + c_1)}} \right\}, \left\{ y(x) \to \right.\right.$$

✓ **Maple** : cpu = 0.114 (sec), leaf count = 68

$$\left\{ y(x) = a, y(x) = \sqrt{\frac{a^2}{\tan^2(c_1 - x) + 1}} \tan(c_1 - x), y(x) = -a, y(x) = -\sqrt{\frac{a^2}{\tan^2(c_1 - x) + 1}} \tan(c_1 - x) \right\}$$

2.370 ODE No. 370

$$-f(x)^2 + y'(x)^2 + y(x)^2 = 0$$

✗ **Mathematica** : cpu = 14.8204 (sec), leaf count = 0 , could not solve

```
DSolve[-f[x]^2 + y[x]^2 + Derivative[1][y][x]^2 == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(y(x),x)^2+y(x)^2-f(x)^2 = 0,y(x))
```

2.371 ODE No. 371

$$y'(x)^2 - y(x)^3 + y(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.0565052 (sec), leaf count = 37

$$\left\{\left\{y(x) \to 1 + \tan^2\left(\frac{-x + c_1}{2}\right)\right\}, \left\{y(x) \to 1 + \tan^2\left(\frac{x + c_1}{2}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.126 (sec), leaf count = 20

$$\left\{y(x) = 1, y(x) = \tan^2\left(-\frac{c_1}{2} + \frac{x}{2}\right) + 1\right\}$$

2.372 ODE No. 372

$$ay(x) + b + y'(x)^2 - 4y(x)^3 = 0$$

✓ **Mathematica** : cpu = 0.0038499 (sec), leaf count = 27

$$\{\{y(x) \to \wp(x - c_1; a, b)\}, \{y(x) \to \wp(x + c_1; a, b)\}\}$$

✓ **Maple** : cpu = 0.05 (sec), leaf count = 232

$$\left\{y(x) = -\frac{3a + \left(-3ia + i\left(27b + 3\sqrt{-3a^3 + 81b^2}\right)^{\frac{2}{3}}\right)\sqrt{3} + \left(27b + 3\sqrt{-3a^3 + 81b^2}\right)^{\frac{2}{3}}}{12\left(27b + 3\sqrt{-3a^3 + 81b^2}\right)^{\frac{1}{3}}}, y(x) = \frac{3a + \left(27b + 3\sqrt{-\right.}{6\left(27b + 3\sqrt{-\right.}\right.$$

2.373 ODE No. 373

$$a^2y(x)^2\left(\log^2(y(x)) - 1\right) + y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.325995 (sec), leaf count = 185

$$\left\{\left\{y(x) \to \exp\left(-\frac{1}{2}\sqrt{-e^{2iax-2c_1} - e^{2c_1-2iax} + 2}\right)\right\}, \left\{y(x) \to \exp\left(\frac{1}{2}\sqrt{-e^{2iax-2c_1} - e^{2c_1-2iax} + 2}\right)\right\}, \left\{y(x) -\right.\right.$$

✓ **Maple** : cpu = 0.238 (sec), leaf count = 49

$$\{y(x) = \mathrm{e}^{-\sin((-c_1+x)a)}, y(x) = \mathrm{e}^{\mathrm{RootOf}((\_Z^2-1)a^2\mathrm{e}^{2\_Z})}, y(x) = \mathrm{e}^{\sin(ax-c_1a)}\}$$

2.374 ODE No. 374

$$y'(x)^2 - 2y'(x) - y(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.0867985 (sec), leaf count = 73

$$\left\{\left\{y(x)\to \text{InverseFunction}\left[-\frac{\sqrt{\#1^2+1}}{\#1}-\frac{1}{\#1}+\sinh^{-1}(\#1)\&\right][-x+c_1]\right\},\left\{y(x)\to \text{InverseFunction}\left[-\frac{\sqrt{\#}}{}\right.\right.\right.$$

✓ **Maple** : cpu = 0.036 (sec), leaf count = 85

$$\left\{-c_1+x-\operatorname{arcsinh}(y(x))-\sqrt{y(x)^2+1}\,y(x)+\frac{\left(y(x)^2+1\right)^{\frac{3}{2}}}{y(x)}-\frac{1}{y(x)}=0,-c_1+x+\operatorname{arcsinh}(y(x))+\sqrt{y(x)^2}\right.$$

2.375 ODE No. 375

$$ay'(x) + bx + y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.0336034 (sec), leaf count = 71

$$\left\{\left\{y(x)\to \frac{1}{2}\left(-\frac{(a^2-4bx)^{3/2}}{6b}-ax\right)+c_1\right\},\left\{y(x)\to \frac{1}{2}\left(\frac{(a^2-4bx)^{3/2}}{6b}-ax\right)+c_1\right\}\right\}$$

✓ **Maple** : cpu = 0.032 (sec), leaf count = 49

$$\left\{y(x)=-\frac{ax}{2}+c_1-\frac{(a^2-4bx)^{\frac{3}{2}}}{12b},y(x)=-\frac{ax}{2}+c_1+\frac{(a^2-4bx)^{\frac{3}{2}}}{12b}\right\}$$

2.376 ODE No. 376

$$ay'(x) + by(x) + y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.262035 (sec), leaf count = 110

$$\left\{\left\{y(x)\to \text{InverseFunction}\left[-\frac{\sqrt{a^2-4\#1b}+a\log\left(a-\sqrt{a^2-4\#1b}\right)}{2b}\&\right]\left[\frac{x}{2}+c_1\right]\right\},\left\{y(x)\to \text{InverseFuncti}\right.\right.$$

✓ **Maple** : cpu = 0.768 (sec), leaf count = 279

$$\left\{ y(x) = -\frac{\left(2a + \mathrm{e}^{\frac{-2a\,\mathrm{LambertW}\left(\frac{2\,\mathrm{e}^{-1}\mathrm{e}^{\frac{c_1 b}{a}}\mathrm{e}^{-\frac{bx}{a}}}{\sqrt{-\frac{1}{b}}\,a}\right) - a\ln\left(-\frac{1}{4b}\right) - 2a + (2c_1 - 2x)b}{2a}}\right)\mathrm{e}^{\frac{-2a\,\mathrm{LambertW}\left(\frac{2\,\mathrm{e}^{-1}\mathrm{e}^{\frac{c_1 b}{a}}\mathrm{e}^{-\frac{bx}{a}}}{\sqrt{-\frac{1}{b}}\,a}\right) - a\ln\left(-\frac{1}{4b}\right) - 2a + (2c_1 - 2}{2a}}}{4b} \right.$$

2.377 ODE No. 377

$$y'(x)^2 + (x-2)y'(x) - y(x) + 1 = 0$$

✓ **Mathematica** : cpu = 0.0038089 (sec), leaf count = 19

$$\{\{y(x) \to c_1 x + 1 + c_1{}^2 - 2c_1\}\}$$

✓ **Maple** : cpu = 0.021 (sec), leaf count = 24

$$\left\{ y(x) = -\frac{1}{4}x^2 + x, y(x) = c_1^2 + c_1(x-2) + 1 \right\}$$

2.378 ODE No. 378

$$(a+x)y'(x) + y'(x)^2 - y(x) = 0$$

✓ **Mathematica** : cpu = 0.0038321 (sec), leaf count = 18

$$\{\{y(x) \to ac_1 + c_1 x + c_1{}^2\}\}$$

✓ **Maple** : cpu = 0.025 (sec), leaf count = 20

$$\left\{ y(x) = c_1(c_1 + a + x)\,, y(x) = -\frac{(a+x)^2}{4} \right\}$$

2.379 ODE No. 379

$$y'(x)^2 - (x+1)y'(x) + y(x) = 0$$

✓ **Mathematica** : cpu = 0.0037739 (sec), leaf count = 18

$$\{\{y(x) \to c_1 x - c_1{}^2 + c_1\}\}$$

✓ **Maple** : cpu = 0.022 (sec), leaf count = 22

$$\left\{ y(x) = c_1(-c_1 + x + 1), y(x) = \frac{(x+1)^2}{4} \right\}$$

2.380 ODE No. 380

$$y'(x)^2 + 2xy'(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 0.404607 (sec), leaf count = 1757

$$\left\{\left\{ y(x) \to -\frac{x^2}{4} - \frac{1}{4}\sqrt[3]{x^6 - 20\cosh(3c_1)x^3 - 20\sinh(3c_1)x^3 - 8\cosh(6c_1) - 8\sinh(6c_1) + 8\sqrt{-\cosh(3c_1)x^9 - \text{si}}}\right.\right.$$

✓ **Maple** : cpu = 0.04 (sec), leaf count = 619

$$\left\{ y(x) = \frac{\left(-i\sqrt{3}\,x^2 - x^2 - 2\left(-x^3 + 6c_1 + 2\sqrt{-3c_1x^3 + 9c_1^2}\right)^{\frac{1}{3}} x + i\left(-x^3 + 6c_1 + 2\sqrt{-3c_1x^3 + 9c_1^2}\right)^{\frac{2}{3}}\sqrt{3} - \left(-\right.\right.}{}\right.$$

2.381 ODE No. 381

$$y'(x)^2 - 2xy'(x) + y(x) = 0$$

✓ **Mathematica** : cpu = 0.423756 (sec), leaf count = 1757

$$\left\{\left\{ y(x) \to \frac{x^2}{4} + \frac{1}{4}\sqrt[3]{x^6 - 20\cosh(3c_1)x^3 - 20\sinh(3c_1)x^3 - 8\cosh(6c_1) - 8\sinh(6c_1) + 8\sqrt{-\cosh(3c_1)x^9 - \text{sin}}}\right.\right.$$

✓ **Maple** : cpu = 0.035 (sec), leaf count = 579

$$\left\{ y(x) = -\frac{\left(-i\sqrt{3}\,x^2 - x^2 + 2\left(x^3 - 6c_1 + 2\sqrt{-3c_1x^3 + 9c_1^2}\right)^{\frac{1}{3}} x + i\left(x^3 - 6c_1 + 2\sqrt{-3c_1x^3 + 9c_1^2}\right)^{\frac{2}{3}} \sqrt{3} - \left(x^3 \right.\right.}{}\right.$$

2.382 ODE No. 382

$$axy'(x) - bx^2 - c + y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.185046 (sec), leaf count = 201

$$\left\{\left\{y(x) \to \frac{1}{2}\left(\frac{1}{2}x\sqrt{a^2x^2 + 4bx^2 + 4c} + \frac{2c\log\left(\sqrt{a^2+4b}\sqrt{a^2x^2+4bx^2+4c} + a^2x + 4bx\right)}{\sqrt{a^2+4b}} - \frac{ax^2}{2}\right) + c_1\right\}, \left\{y(\right.\right.$$

✓ **Maple** : cpu = 0.037 (sec), leaf count = 146

$$\left\{ y(x) = -\frac{a\,x^2}{4} - \frac{c\ln\left(\sqrt{a^2+4b}\,x + \sqrt{(a^2+4b)\,x^2 + 4c}\right)}{\sqrt{a^2+4b}} + c_1 - \frac{\sqrt{(a^2+4b)\,x^2+4c}\,x}{4}, y(x) = -\frac{a\,x^2}{4} + \frac{c\ln\left(\sqrt{\right.}{}\right.$$

2.383 ODE No. 383

$$axy'(x) + by(x) + cx^2 + y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 5.63628 (sec), leaf count = 1118

$$\left\{\text{Solve}\left[\int_1^x \left(\frac{\sqrt{a^2K[1]^2 - 4cK[1]^2 - 4by(x)}y(x)}{cK[1]^4 + 2ay(x)K[1]^2 + by(x)K[1]^2 + 4y(x)^2} + \frac{cK[1]^3 + ay(x)K[1] + by(x)K[1]}{cK[1]^4 + 2ay(x)K[1]^2 + by(x)K[1]^2 + 4y(x)^2}\right) dK\right.\right.$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , exception

`time expired`

2.384 ODE No. 384

$$(ax+b)y'(x)-ay(x)+c+y'(x)^2=0$$

✓ **Mathematica** : cpu = 0.0049734 (sec), leaf count = 24

$$\left\{\left\{y(x)\to \frac{bc_1+c+c_1{}^2}{a}+c_1x\right\}\right\}$$

✓ **Maple** : cpu = 0.03 (sec), leaf count = 50

$$\left\{y(x)=\frac{c_1^2+c_1(ax+b)+c}{a}, y(x)=\frac{-a^2x^2-2abx-b^2+4c}{4a}\right\}$$

2.385 ODE No. 385

$$-2x^2y'(x)+y'(x)^2+2xy(x)=0$$

✓ **Mathematica** : cpu = 0.73493 (sec), leaf count = 6217

$$\left\{\left\{y(x)\to -x^3\left(\frac{1}{2}\sqrt{\frac{2\left(8e^{6c_1}x^{18}+e^{12c_1}x^{12}\right)}{9x^{24}\sqrt[3]{\frac{64\sqrt{e^{12c_1}x^{60}-3e^{18c_1}x^{54}+3e^{24c_1}x^{48}-e^{30c_1}x^{42}}}{x^{36}}+\frac{64e^{6c_1}}{x^6}+\frac{160e^{12c_1}}{x^{12}}-\frac{8e^{18c_1}}{x^{18}}}}+\frac{1}{18}\sqrt[3]{64\sqrt{e^{12c_1}x}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.263 (sec), leaf count = 169

$$\left\{y(x)=\frac{x^4-\operatorname{RootOf}\left(x^{16}-12\_Z^2x^{12}-16\_Z^3x^{10}+30\_Z^4x^8+96\_Z^5x^6+100\_Z^6x^4+48\_Z^7x^2+9\_Z^8-1\right.}{2x}\right.$$

2.386 ODE No. 386

$$ax^3y'(x)-2ax^2y(x)+y'(x)^2=0$$

✓ **Mathematica** : cpu = 0.193919 (sec), leaf count = 119

$$\left\{\left\{y(x)\to \frac{1}{2}(\cosh(2c_1)+\sinh(2c_1))\left(-\sqrt{2}\sqrt{a}x^2+2\cosh(2c_1)+2\sinh(2c_1)\right)\right\},\left\{y(x)\to \frac{\sqrt{a}x^2\cosh(2c_1)}{\sqrt{2}}+\sqrt{a}\right.\right.$$

✓ **Maple** : cpu = 0.556 (sec), leaf count = 27

$$\left\{y(x)=-\frac{a\,x^4}{8}, y(x)=c_1x^2+\frac{2c_1^2}{a}\right\}$$

2.387 ODE No. 387

$$y'(x)^2 + e^x(y'(x) - y(x)) = 0$$

✓ **Mathematica** : cpu = 2.39279 (sec), leaf count = 190

$$\left\{\text{Solve}\left[\log(y(x)) - \frac{-e^{x/2}\sqrt{4y(x)+e^x} - \frac{4\sqrt{\frac{e^x}{y(x)}+4}y(x)^{3/2}\sinh^{-1}\left(\frac{e^{x/2}}{2\sqrt{y(x)}}\right)}{\sqrt{4y(x)+e^x}} + e^x}{2y(x)} = c_1, y(x)\right], \text{Solve}\left[\log(y(x)) - \frac{e^{x/}}{}\right.\right.$$

✓ **Maple** : cpu = 0.673 (sec), leaf count = 115

$$\left\{-c_1 - 2\,\text{arctanh}\left(\sqrt{4\,e^x y(x) + e^{2x}}\,e^{-x}\right) + \ln(y(x)) - \frac{e^x}{2y(x)} - \frac{\sqrt{4\,e^x y(x) + e^{2x}}}{2y(x)} = 0, -c_1 + 2\,\text{arctanh}\left(\sqrt{4\,e^x y\right.\right.$$

2.388 ODE No. 388

$$y'(x)^2 - 2y(x)y'(x) - 2x = 0$$

✓ **Mathematica** : cpu = 0.715414 (sec), leaf count = 61

$$\text{Solve}\left[\left\{x = \frac{K[1]\sinh^{-1}(K[1])}{2\sqrt{K[1]^2+1}} + \frac{c_1 K[1]}{\sqrt{K[1]^2+1}}, y(x) = \frac{K[1]}{2} - \frac{x}{K[1]}\right\}, \{y(x), K[1]\}\right]$$

✓ **Maple** : cpu = 0.084 (sec), leaf count = 223

$$\left\{\frac{-2c_1 y(x) + 2c_1\sqrt{y(x)^2+2x} + \sqrt{2y(x)^2 + 2x - 2\sqrt{y(x)^2+2x}\,y(x) + 1}\,x + \left(\frac{y(x)}{2} - \frac{\sqrt{y(x)^2+2x}}{2}\right)\text{arcsinh}\left(-y\right.}{\sqrt{2y(x)^2 + 2x - 2\sqrt{y(x)^2+2x}\,y(x) + 1}}\right.$$

2.389 ODE No. 389

$$y'(x)^2-(4y(x)+1)y'(x)+y(x)(4y(x)+1)=0$$

✓ **Mathematica** : cpu = 0.0806726 (sec), leaf count = 57

$$\left\{\left\{y(x)\to -\frac{1}{4}e^{x-4c_1}\left(-e^x+2e^{2c_1}\right)\right\},\left\{y(x)\to \frac{1}{4}e^{x+2c_1}\left(-2+e^{x+2c_1}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.529 (sec), leaf count = 71

$$\left\{y(x)=-\frac{1}{4},y(x)=\frac{c_1-\sqrt{-c_1\mathrm{e}^{-2x}}\,\mathrm{e}^{2x}}{\sqrt{-c_1\mathrm{e}^{-2x}}\,c_1},y(x)=-\frac{c_1+\sqrt{-c_1\mathrm{e}^{-2x}}\,\mathrm{e}^{2x}}{\sqrt{-c_1\mathrm{e}^{-2x}}\,c_1}\right\}$$

2.390 ODE No. 390

$$ay(x)y'(x)-bx-c+y'(x)^2=0$$

✓ **Mathematica** : cpu = 1.87123 (sec), leaf count = 154

$$\text{Solve}\left[\left\{x=\left(\frac{\tan^{-1}\left(\frac{\sqrt{a}K[1]}{\sqrt{b-aK[1]^2}}\right)}{\sqrt{a}}-\frac{c\sqrt{b-aK[1]^2}}{bK[1]}\right)\exp\left(b\left(\frac{\log(K[1])}{b}-\frac{\log\left(b-aK[1]^2\right)}{2b}\right)\right)+c_1\exp\left(b\left(\frac{\mathrm{lo}}{}\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.418 (sec), leaf count = 281

$$\left\{y(x)=\frac{2\left((bx+c)\,a-\frac{\left(b+\mathrm{e}^{2\,\mathrm{RootOf}\left(a\,b^2x-abx\,\mathrm{e}^{2\_Z}+c_1\sqrt{a}\,b^2+c_1\sqrt{a}\,b\,\mathrm{e}^{2\_Z}-\_Z\,b^2-\_Zb\,\mathrm{e}^{2\_Z}+abc-ac\,\mathrm{e}^{2\_Z}\right)}\right)^2\mathrm{e}^{-2\,\mathrm{RootOf}\left(a\,b^2x-abx\,\mathrm{e}^{2\_Z}+\right.}}{4}\right.}{\left(b+\mathrm{e}^{2\,\mathrm{RootOf}\left(a\,b^2x-abx\,\mathrm{e}^{2\_Z}+c_1\sqrt{a}\,b^2+\right.}\right.}\right.$$

2.391 ODE No. 391

$$y'(x)(ay(x)+bx)+abxy(x)+y'(x)^2=0$$

✓ **Mathematica** : cpu = 0.015656 (sec), leaf count = 29

$$\left\{\left\{y(x)\to c_1e^{-ax}\right\},\left\{y(x)\to -\frac{bx^2}{2}+c_1\right\}\right\}$$

✓ **Maple** : cpu = 0.01 (sec), leaf count = 22

$$\left\{y(x)=c_1\mathrm{e}^{-ax},y(x)=-\frac{b\,x^2}{2}+c_1\right\}$$

2.392 ODE No. 392

$$y(x)^2 \log(ay(x)) - xy(x)y'(x) + y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.223711 (sec), leaf count = 27

$$\left\{\left\{y(x) \to \frac{e^{\frac{c_1 x}{2} - \frac{c_1{}^2}{4}}}{a}\right\}\right\}$$

✓ **Maple** : cpu = 0.502 (sec), leaf count = 50

$$\left\{y(x) = \frac{e^{\frac{x^2}{4}}}{a}, y(x) = \frac{e^{c_1 x} e^{-c_1^2}}{a}, y(x) = \frac{e^{-c_1^2} e^{-c_1 x}}{a}\right\}$$

2.393 ODE No. 393

$$y'(x)^2 + 2y(x)\cot(x)y'(x) - y(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.104328 (sec), leaf count = 31

$$\left\{\left\{y(x) \to c_1 \csc^2\left(\frac{x}{2}\right)\right\}, \left\{y(x) \to c_1 \sec^2\left(\frac{x}{2}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.175 (sec), leaf count = 77

$$\left\{y(x) = \frac{c_1\left(1 + \sqrt{\tan^2(x) + 1}\right)}{\sqrt{\frac{\tan^2(x)}{\tan^2(x)+1}}\tan(x)}, y(x) = \frac{c_1\left(\tan^2(x) + 1\right)\sqrt{\frac{\tan^2(x)}{\tan^2(x)+1}}}{\left(1 + \sqrt{\tan^2(x) + 1}\right)\tan(x)}\right\}$$

2.394 ODE No. 394

$$-\left(g(x) - f(x)^2\right)e^{-2\int_a^x f(\mathrm{xp})\,d\mathrm{xp}} + 2f(x)y(x)y'(x) + g(x)y(x)^2 + y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.373914 (sec), leaf count = 89

$$\left\{\left\{y(x) \to e^{-\int_a^x f(K[1])\,dK[1]}\left(\left\{\begin{array}{cc} \sin\left(c_1 + \int_a^x \sqrt{g(K[1]) - f(K[1])^2}\,dK[1]\right) & g(x) > f(x)^2 \\ \cosh\left(c_1 + \int_a^x \sqrt{f(K[1])^2 - g(K[1])}\,dK[1]\right) & g(x) < f(x)^2 \\ c_1 & \text{True} \end{array}\right.\right)\right\}\right\}$$

✓ **Maple** : cpu = 5.127 (sec), leaf count = 109

$$\left\{y(x)=\sqrt{\frac{e^{-2\left(\int_a^x f(xp)dxp\right)}}{\tan^2\left(c_1-\left(\int\sqrt{\left(-f(x)^2+g(x)\right)e^{\int_a^x -4f(xp)dxp}}\,e^{\int_a^x 2f(xp)dxp}dx\right)\right)+1}}\tan\left(c_1-\left(\int\sqrt{\left(-f(x)^2+\right.}\right.\right.\right.$$

2.395 ODE No. 395

$$2f(x)y(x)y'(x)+g(x)y(x)^2+h(x)+y'(x)^2=0$$

✗ **Mathematica** : cpu = 29.1152 (sec), leaf count = 0 , could not solve

```
DSolve[h[x] + g[x]*y[x]^2 + 2*f[x]*y[x]*Derivative[1][y][x] + Derivative[1][y][x]^2 == 0, y[
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(y(x),x)^2+2*f(x)*y(x)*diff(y(x),x)+g(x)*y(x)^2+h(x) = 0,y(x))
```

2.396 ODE No. 396

$$(y(x)-x)y(x)y'(x)+y'(x)^2-xy(x)^3=0$$

✓ **Mathematica** : cpu = 0.0703115 (sec), leaf count = 29

$$\left\{\left\{y(x)\to\frac{1}{x-c_1}\right\},\left\{y(x)\to c_1e^{\frac{x^2}{2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.017 (sec), leaf count = 20

$$\left\{y(x)=\frac{1}{c_1+x},y(x)=c_1e^{\frac{x^2}{2}}\right\}$$

2.397 ODE No. 397

$$-2x^3y(x)^2y'(x)-4x^2y(x)^3+y'(x)^2=0$$

✓ **Mathematica** : cpu = 0.751131 (sec), leaf count = 143

$$\left\{\text{Solve}\left[-\frac{x\sqrt{x^4y(x)+4}y(x)^{3/2}\sinh^{-1}\left(\frac{1}{2}x^2\sqrt{y(x)}\right)}{2\sqrt{x^2y(x)^3\left(x^4y(x)+4\right)}}-\frac{1}{4}\log(y(x))=c_1,y(x)\right],\text{Solve}\left[\frac{xy(x)^{3/2}\sqrt{x^4y(x)+4}\sin}{2\sqrt{x^2y(x)^3\left(x^4\right.}}\right.\right.$$

✓ **Maple** : cpu = 0.343 (sec), leaf count = 128

$$\left\{y(x)=\frac{-2\sqrt{2}\,x^2-2c_1}{2c_1x^4-c_1^3},y(x)=\frac{2\sqrt{2}\,x^2-2c_1}{2c_1x^4-c_1^3},y(x)=\frac{\left(c_1\sqrt{2}\,x^2-2\right)c_1^2}{2c_1^2x^4-4},y(x)=-\frac{4}{x^4},y(x)=-\frac{\left(c_1\sqrt{2}\,x^2+2\right)c_1^2}{2c_1^2x^4-4}\right.$$

2.398 ODE No. 398

$$y'(x)^2 - 3xy(x)^{2/3}y'(x) + 9y(x)^{5/3} = 0$$

✓ **Mathematica** : cpu = 1.75629 (sec), leaf count = 258

$$\left\{\text{Solve}\left[-\frac{\left(x^2-4\sqrt[3]{y(x)}\right)^{3/2}y(x)^2\log(y(x))}{6\left(\left(x^2-4\sqrt[3]{y(x)}\right)y(x)^{4/3}\right)^{3/2}}+\frac{\sqrt{\left(x^2-4\sqrt[3]{y(x)}\right)y(x)^{4/3}}\log\left(\sqrt{x^2-4\sqrt[3]{y(x)}}+x\right)}{\sqrt{x^2-4\sqrt[3]{y(x)}}y(x)^{2/3}}+\frac{1}{6}\log(y(\right.\right.$$

✓ **Maple** : cpu = 2.125 (sec), leaf count = 138

$$\left\{-c_1-\frac{\sqrt{-4\left(\frac{y(x)}{x^6}\right)^{\frac{5}{3}}+\left(\frac{y(x)}{x^6}\right)^{\frac{4}{3}}}\,\operatorname{arctanh}\left(\sqrt{-4\left(\frac{y(x)}{x^6}\right)^{\frac{1}{3}}+1}\right)}{\left(\frac{y(x)}{x^6}\right)^{\frac{2}{3}}\sqrt{-4\left(\frac{y(x)}{x^6}\right)^{\frac{1}{3}}+1}}+\ln(x)+\frac{\ln\left(\frac{y(x)}{x^6}\right)}{6}-\frac{\ln\left(4\left(\frac{y(x)}{x^6}\right)^{\frac{1}{3}}-1\right)}{6}+\frac{\ln}{}\right.$$

2.399 ODE No. 399

$$2y'(x)^2 + (x-1)y'(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 0.0037386 (sec), leaf count = 20

$$\left\{\left\{y(x)\to c_1x+2c_1{}^2-c_1\right\}\right\}$$

✓ **Maple** : cpu = 0.026 (sec), leaf count = 22

$$\left\{y(x)=c_1(2c_1+x-1)\,,y(x)=-\frac{(x-1)^2}{8}\right\}$$

2.400 ODE No. 400

$$-2x^2y'(x) + 2y'(x)^2 + 3xy(x) = 0$$

✓ **Mathematica** : cpu = 0.482087 (sec), leaf count = 135

$$\left\{\text{Solve}\left[\frac{1}{3}\log(y(x))-\frac{2\sqrt{x^4-6xy(x)}\tanh^{-1}\left(\frac{x^{3/2}}{\sqrt{x^3-6y(x)}}\right)}{3\sqrt{x}\sqrt{x^3-6y(x)}}=c_1,y(x)\right],\text{Solve}\left[\frac{2\sqrt{x^4-6xy(x)}\tanh^{-1}\left(\frac{x^{3/2}}{\sqrt{x^3-6y}}\right.}{3\sqrt{x}\sqrt{x^3-6y(x)}}\right.\right.$$

✓ **Maple** : cpu = 0.186 (sec), leaf count = 74

$$\left\{y(x)=\frac{x^3}{6},y(x)=\frac{-\sqrt{-6c_1x}\,x+3}{3c_1},y(x)=\frac{\sqrt{-6c_1x}\,x+3}{3c_1},y(x)=c_1-\frac{\sqrt{-6c_1x}\,x}{3},y(x)=c_1+\frac{\sqrt{-6c_1x}\,x}{3}\right\}$$

2.401 ODE No. 401

$$3y'(x)^2 - 2xy'(x) + y(x) = 0$$

✓ **Mathematica** : cpu = 0.330346 (sec), leaf count = 1093

$$\{\{y(x) \to \text{Root}\left[-16e^{6c_1}x^6 + 3\#1^4x^4 + 144e^{6c_1}\#1x^4 - 24\#1^5x^2 - 378e^{6c_1}\#1^2x^2 + 243e^{12c_1} + 48\#1^6 + 216e^{6c_1}\right.$$

✓ **Maple** : cpu = 0.044 (sec), leaf count = 580

$$\left\{ y(x) = -\frac{\left(-i\sqrt{3}\,x^2 - x^2 + 2\left(x^3 - 54c_1 + 6\sqrt{-3c_1x^3 + 81c_1^2}\right)^{\frac{1}{3}} x + i\sqrt{3}\left(x^3 - 54c_1 + 6\sqrt{-3c_1x^3 + 81c_1^2}\right)^{\frac{2}{3}} - \right.}{}\right.$$

2.402 ODE No. 402

$$x^2 + 4xy'(x) + 3y'(x)^2 - y(x) = 0$$

✓ **Mathematica** : cpu = 6.5522 (sec), leaf count = 1211

$$\left\{ \text{Solve}\left[\frac{1}{2}\left(\frac{\tanh^{-1}\left(\frac{1-3x}{2\sqrt{1-9y(x)}}\right)}{\sqrt{1-9y(x)}} + \log\left(-3x^2 + 2x - 12y(x) + 1\right) + \frac{9\tanh^{-1}\left(\frac{-2\sqrt{1-9y(x)}x + x + 9y(x)}{\sqrt{-9y(x) - 4\sqrt{1-9y(x)} + 5}\sqrt{x^2+3y(x)}}\right)}{\sqrt{1-9y(x)}\sqrt{-9y(x) - 4\sqrt{1-9y(x)} + }}\right.\right.\right.$$

✓ **Maple** : cpu = 0.154 (sec), leaf count = 101

$$\left\{ y(x) = -\frac{x^2}{3}, y(x) = \frac{-3c_1^2x^2 - 2c_1\sqrt{3}\,x + 3}{12c_1^2}, y(x) = \frac{-3c_1^2x^2 + 2c_1\sqrt{3}\,x + 3}{12c_1^2}, y(x) = \frac{c_1^2}{4} - \frac{c_1\sqrt{3}\,x}{6} - \frac{x^2}{4}, y(x) = \right.$$

2.403 ODE No. 403

$$ay'(x)^2 + by'(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 0.252719 (sec), leaf count = 116

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[\frac{\sqrt{4\#1a+b^2} + b\log\left(b - \sqrt{4\#1a+b^2}\right)}{2a}\&\right]\left[\frac{x}{2a} + c_1\right]\right\}, \left\{y(x) \to \text{InverseFunctio}\right.\right.$$

✓ **Maple** : cpu = 0.815 (sec), leaf count = 247

$$\left\{y(x) = \frac{\left(2b + \mathrm{e}^{-\frac{2b\,\mathrm{LambertW}\left(\frac{2\,\mathrm{e}^{-1}\mathrm{e}^{\frac{x}{b}}\mathrm{e}^{-\frac{c_1}{b}}}{\sqrt{\frac{1}{a}}\,b}\right) + b\ln\left(\frac{1}{4a}\right) + 2c_1 + 2b - 2x}{2b}}\right)\mathrm{e}^{-\frac{2b\,\mathrm{LambertW}\left(\frac{2\,\mathrm{e}^{-1}\mathrm{e}^{\frac{x}{b}}\mathrm{e}^{-\frac{c_1}{b}}}{\sqrt{\frac{1}{a}}\,b}\right) + b\ln\left(\frac{1}{4a}\right) + 2c_1 + 2b - 2x}{2b}}}{4a}, y(x) = \right.$$

2.404 ODE No. 404

$$ay'(x)^2 + bx^2y'(x) + cxy(x) = 0$$

✓ **Mathematica** : cpu = 2.57967 (sec), leaf count = 795

$$\left\{\text{Solve}\left[\int_1^x \left(\frac{(3b+2c)K[1]^2}{2\left(3bK[1]^3 + cK[1]^3 + 9ay(x)\right)} + \frac{3\sqrt{K[1]\left(b^2K[1]^3 - 4acy(x)\right)}}{2\left(3bK[1]^3 + cK[1]^3 + 9ay(x)\right)}\right)dK[1] + \int_1^{y(x)}\left(\frac{9\sqrt{x\left(b^2x\right.}}{2(3b+c)x^2\left(3b\right.}\right.\right.\right.$$

✓ **Maple** : cpu = 0.26 (sec), leaf count = 389

$$\left\{c_1 + \int_{\_b}^{x}\frac{-\_a^2b - \sqrt{\_a^4b^2 - 4\_aacy\left(x\right)}}{\_a^3b + 6ay\left(x\right) + \sqrt{\_a^4b^2 - 4\_aacy\left(x\right)}\,\_a}d\_a + \int^{y(x)}\left(-\frac{2a}{b\,x^3 + 6\_fa + \sqrt{b^2x^4 - 4\_facx}\,x} - \left(\int_{\_}\right.\right.\right.$$

2.405 ODE No. 405

$$ay'(x)^2 + y(x)y'(x) - x = 0$$

✓ **Mathematica** : cpu = 1.31218 (sec), leaf count = 61

$$\text{Solve}\left[\left\{x = \frac{aK[1]\sin^{-1}(K[1])}{\sqrt{1-K[1]^2}} + \frac{c_1 K[1]}{\sqrt{1-K[1]^2}}, y(x) = \frac{x}{K[1]} - aK[1]\right\}, \{y(x), K[1]\}\right]$$

✓ **Maple** : cpu = 0.19 (sec), leaf count = 375

$$\left\{\frac{c_1\left(y(x)-\sqrt{4ax+y(x)^2}\right)}{\sqrt{\frac{2a-y(x)+\sqrt{4ax+y(x)^2}}{a}}\sqrt{\frac{-2a-y(x)+\sqrt{4ax+y(x)^2}}{a}}} + x + \frac{\left(-y(x)+\sqrt{4ax+y(x)^2}\right)\ln\left(\frac{\sqrt{\frac{-4a^2+4ax+2y(x)^2-2\sqrt{4ax+y(x)^2}}{a^2}}}{2a}\right.}{\sqrt{-\frac{2\left(2a^2-2ax-y(x)^2+\sqrt{4ax+y(x)^2}\,y(x)\right.}{a^2}}}\right.$$

2.406 ODE No. 406

$$ay'(x)^2 - y(x)y'(x) - x = 0$$

✓ **Mathematica** : cpu = 0.865931 (sec), leaf count = 57

$$\text{Solve}\left[\left\{x = \frac{aK[1]\sinh^{-1}(K[1])}{\sqrt{K[1]^2+1}} + \frac{c_1 K[1]}{\sqrt{K[1]^2+1}}, y(x) = aK[1] - \frac{x}{K[1]}\right\}, \{y(x), K[1]\}\right]$$

✓ **Maple** : cpu = 0.094 (sec), leaf count = 262

$$\left\{\frac{-c_1 y(x) + c_1\sqrt{4ax+y(x)^2} + \sqrt{-\frac{2\left(-2a^2-2ax-y(x)^2+\sqrt{4ax+y(x)^2}\,y(x)\right)}{a^2}}\,x + \left(y(x)-\sqrt{4ax+y(x)^2}\right)\operatorname{arcsinh}\left(\right.}{\sqrt{\frac{2y(x)^2+4(a+x)a-2\sqrt{4ax+y(x)^2}\,y(x)}{a^2}}}\right.$$

2.407 ODE No. 407

$$xy'(x)^2 - y(x) = 0$$

✓ **Mathematica** : cpu = 0.0355723 (sec), leaf count = 51

$$\left\{\left\{y(x) \to \frac{1}{4}\left(4x - 4c_1\sqrt{x} + c_1{}^2\right)\right\}, \left\{y(x) \to \frac{1}{4}\left(4x + 4c_1\sqrt{x} + c_1{}^2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.036 (sec), leaf count = 39

$$\left\{y(x) = 0, y(x) = \frac{\left(-x + \sqrt{c_1 x}\right)^2}{x}, y(x) = \frac{\left(x + \sqrt{c_1 x}\right)^2}{x}\right\}$$

2.408 ODE No. 408

$$xy'(x)^2 - 2y(x) + x = 0$$

✓ **Mathematica** : cpu = 0.288166 (sec), leaf count = 97

$$\left\{\text{Solve}\left[-2\left(\frac{1}{1 - \sqrt{\frac{2y(x)}{x} - 1}} + \log\left(1 - \sqrt{\frac{2y(x)}{x} - 1}\right)\right) = \log(x) + c_1, y(x)\right], \text{Solve}\left[2\left(\frac{1}{\sqrt{\frac{2y(x)}{x} - 1} + 1} + \log\right.\right.\right.$$

✓ **Maple** : cpu = 0.059 (sec), leaf count = 73

$$\left\{y(x) = \left(\frac{\left(\text{LambertW}\left(\frac{\sqrt{c_1 x}}{c_1}\right) + 1\right)^2}{2\,\text{LambertW}\left(\frac{\sqrt{c_1 x}}{c_1}\right)^2} + \frac{1}{2}\right)x, y(x) = \left(\frac{\left(\text{LambertW}\left(-\frac{\sqrt{c_1 x}}{c_1}\right) + 1\right)^2}{2\,\text{LambertW}\left(-\frac{\sqrt{c_1 x}}{c_1}\right)^2} + \frac{1}{2}\right)x\right\}$$

2.409 ODE No. 409

$$xy'(x)^2 - 2y'(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 2.37288 (sec), leaf count = 50

$$\text{Solve}\left[\left\{x = \frac{2K[1] - 2\log(K[1])}{(K[1] - 1)^2} + \frac{c_1}{(K[1] - 1)^2}, y(x) = xK[1]^2 - 2K[1]\right\}, \{y(x), K[1]\}\right]$$

✓ **Maple** : cpu = 0.119 (sec), leaf count = 63

$$\left\{y(x) = x\,\mathrm{e}^{2\,\text{RootOf}\left(2x\,\mathrm{e}^{\_Z} - x\,\mathrm{e}^{2\_Z} + c_1 - 2\_Z - x + 2\,\mathrm{e}^{\_Z}\right)} - 2\,\mathrm{e}^{\text{RootOf}\left(2x\,\mathrm{e}^{\_Z} - x\,\mathrm{e}^{2\_Z} + c_1 - 2\_Z - x + 2\,\mathrm{e}^{\_Z}\right)}\right\}$$

2.410 ODE No. 410

$$xy'(x)^2 + 4y'(x) - 2y(x) = 0$$

✓ **Mathematica** : cpu = 30.8569 (sec), leaf count = 90

$$\text{Solve}\left[\left\{x = -\frac{2(2K[1] - y(K[1]))}{K[1]^2}, y(x) = 4\left(\frac{2}{K[1]} + \log(K[1])\right)\exp\left(-4\left(\frac{1}{2}\log(2-K[1]) - \frac{1}{2}\log(K[1])\right)\right) + c\right.\right.$$

✓ **Maple** : cpu = 0.125 (sec), leaf count = 64

$$\left\{y(x) = \frac{x\,e^{2\,\mathrm{RootOf}\left(4x\,e^{-\_Z} - x\,e^{2\_Z} + c_1 + 8\_Z - 4x - 4\,e^{-\_Z}\right)}}{2} + 2\,e^{\mathrm{RootOf}\left(4x\,e^{-\_Z} - x\,e^{2\_Z} + c_1 + 8\_Z - 4x - 4\,e^{-\_Z}\right)}\right\}$$

2.411 ODE No. 411

$$xy'(x)^2 + xy'(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 0.264361 (sec), leaf count = 99

$$\left\{\text{Solve}\left[\frac{1}{\sqrt{\frac{4y(x)}{x} + 1} - 1} - \log\left(1 - \sqrt{\frac{4y(x)}{x} + 1}\right) = \frac{\log(x)}{2} + c_1, y(x)\right], \text{Solve}\left[\frac{1}{\sqrt{\frac{4y(x)}{x} + 1} + 1} + \log\left(\sqrt{\frac{4y(x)}{x}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.059 (sec), leaf count = 65

$$\left\{y(x) = \frac{\left(2\,\mathrm{LambertW}\left(-\frac{1}{2\sqrt{\frac{c_1}{x}}}\right) + 1\right)x}{4\,\mathrm{LambertW}\left(-\frac{1}{2\sqrt{\frac{c_1}{x}}}\right)^2}, y(x) = \frac{\left(2\,\mathrm{LambertW}\left(\frac{1}{2\sqrt{\frac{c_1}{x}}}\right) + 1\right)x}{4\,\mathrm{LambertW}\left(\frac{1}{2\sqrt{\frac{c_1}{x}}}\right)^2}\right\}$$

2.412 ODE No. 412

$$a + xy'(x)^2 + y(x)y'(x) = 0$$

✓ **Mathematica** : cpu = 0.449911 (sec), leaf count = 3229

$$\left\{\left\{y(x) \to -\frac{1}{2}\sqrt{-\frac{16ax}{9} + \frac{\sqrt[3]{-131072a^6x^6 + 2560a^3e^{3c_1}x^3 + e^{6c_1} + \sqrt{-1073741824a^9e^{3c_1}x^9 + 3145728a^6e^{6c_1}x^6}}}{18\ 2^{2/3}ax}}\right.\right.$$

✓ **Maple** : cpu = 0.052 (sec), leaf count = 146

$$\left\{-\frac{c_1\left(\frac{-y(x)+\sqrt{-4ax+y(x)^2}}{x}\right)^{\frac{3}{2}}x^2}{\left(-y(x)+\sqrt{-4ax+y(x)^2}\right)^2}+\frac{4a\,x^2}{3\left(-y(x)+\sqrt{-4ax+y(x)^2}\right)^2}+x=0,\frac{c_1\left(\frac{-2y(x)-2\sqrt{-4ax+y(x)^2}}{x}\right)^{\frac{3}{2}}x^2}{\left(y(x)+\sqrt{-4ax+y(x)^2}\right)^2}+\right.$$

2.413 ODE No. 413

$$-x^2+xy'(x)^2+y(x)y'(x)=0$$

✓ **Mathematica** : cpu = 0.130333 (sec), leaf count = 673

$$\left\{\text{Solve}\left[\int\left(\frac{4\sqrt{4x^3+y(x)^2}x^2}{5y(x)\left(4x^3-15y(x)^2\right)}+\frac{16x^2}{5\left(4x^3-15y(x)^2\right)}-\frac{\sqrt{4x^3+y(x)^2}}{5y(x)x}+\frac{1}{5x}\right)dx+\int\left(\frac{8y(x)}{15y(x)^2-4x^3}-\int\right.\right.\right.$$

✓ **Maple** : cpu = 0.184 (sec), leaf count = 269

$$\left\{c_1+\int_{\_b}^{x}\frac{-y(x)-\sqrt{4\_a^3+y(x)^2}}{\left(4y(x)+\sqrt{4\_a^3+y(x)^2}\right)\_a}d\_a+\int^{y(x)}\frac{\left(-48\_f-12\sqrt{4x^3+\_f^2}\right)\left(\int_{\_b}^{x}\frac{\_a^2}{\left(4\_f+\sqrt{4\_a^3+\_f^2}\right)^2\sqrt{4\_a^3}}\right.}{4\_f+\sqrt{4x^3+\_f^2}}\right.$$

2.414 ODE No. 414

$$x^3+xy'(x)^2+y(x)y'(x)=0$$

✓ **Mathematica** : cpu = 0.151708 (sec), leaf count = 107

$$\left\{\left\{y(x)\to x^2\text{InverseFunction}\left[\int_1^{\#1}\frac{1}{5K[2]+\sqrt{K[2]^2-4}}dK[2]\&\right]\left[\int_1^x-\frac{1}{2K[3]}dK[3]+c_1\right]\right\},\left\{y(x)\to x^2\text{Inve}\right.\right.$$

✓ **Maple** : cpu = 0.19 (sec), leaf count = 269

$$\left\{c_1+\int_{\_b}^{x}\frac{-y(x)-\sqrt{-4\_a^4+y(x)^2}}{\left(5y(x)+\sqrt{-4\_a^4+y(x)^2}\right)\_a}d\_a+\int^{y(x)}\frac{\left(80\_f+16\sqrt{-4x^4+\_f^2}\right)\left(\int_{\_b}^{x}\frac{\_a^3}{\left(5\_f+\sqrt{-4\_a^4+\_f^2}\right)^2\sqrt{-}}\right.}{5\_f+\sqrt{-4x^4+\_f^2}}\right.$$

2.415 ODE No. 415

$$y(x)y'(x) + xy'(x)^2 - y(x)^4 = 0$$

✓ **Mathematica** : cpu = 0.343127 (sec), leaf count = 25

$$\left\{\left\{y(x) \to \frac{2e^{\frac{c_1}{2}}}{-4x + e^{c_1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.237 (sec), leaf count = 95

$$\left\{y(x) = -\frac{1}{2\sqrt{-x}}, y(x) = \frac{1}{2\sqrt{-x}}, y(x) = -\frac{\sqrt{-x\left(\tanh^2\left(\frac{c_1}{2} - \frac{\ln(x)}{2}\right)\right) + x}}{2x\tanh\left(\frac{c_1}{2} - \frac{\ln(x)}{2}\right)}, y(x) = \frac{\sqrt{-x\left(\tanh^2\left(\frac{c_1}{2} - \frac{\ln(x)}{2}\right)\right)}}{2x\tanh\left(\frac{c_1}{2} - \frac{\ln(x)}{2}\right)}\right.$$

2.416 ODE No. 416

$$xy'(x)^2 + (y(x) - 3x)y'(x) + y(x) = 0$$

✓ **Mathematica** : cpu = 2.46506 (sec), leaf count = 383

$$\left\{\text{Solve}\left[\frac{1}{8}\left(-\sqrt{\frac{\frac{y(x)}{x} - 9}{\frac{y(x)}{x} - 1}}\left(\frac{y(x)}{x} - 1\right) + \sqrt{\frac{y(x)}{x} - 9}\sqrt{\frac{y(x)}{x} - 1} - 3\log\left(\frac{y(x)}{x}\right) - \frac{10\sqrt{\frac{y(x)}{x} - 9}\sin^{-1}\left(\frac{\sqrt{9-\frac{y(x)}{x}}}{2\sqrt{2}}\right)}{\sqrt{9 - \frac{y(x)}{x}}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.075 (sec), leaf count = 136

$$\left\{x - \frac{c_1\left(5x - y(x) + \sqrt{9x^2 - 10xy(x) + y(x)^2}\right)}{\left(\frac{3x-y(x)+\sqrt{9x^2-10xy(x)+y(x)^2}}{x}\right)^{\frac{3}{2}} x} = 0, x + \frac{c_1\left(-5x + y(x) + \sqrt{9x^2 - 10xy(x) + y(x)^2}\right)}{\left(\frac{6x-2y(x)-2\sqrt{9x^2-10xy(x)+y(x)^2}}{x}\right)^{\frac{3}{2}} x} = 0, y\right.$$

2.417 ODE No. 417

$$a + xy'(x)^2 - y(x)y'(x) = 0$$

✓ **Mathematica** : cpu = 0.0042745 (sec), leaf count = 16

$$\left\{\left\{y(x) \to \frac{a}{c_1} + c_1 x\right\}\right\}$$

✓ **Maple** : cpu = 0.04 (sec), leaf count = 35

$$\left\{y(x) = \frac{xc_1^2 + a}{c_1}, y(x) = -2\sqrt{ax}, y(x) = 2\sqrt{ax}\right\}$$

2.418 ODE No. 418

$$ay(x) + xy'(x)^2 - y(x)y'(x) = 0$$

✓ **Mathematica** : cpu = 0.992978 (sec), leaf count = 220

$$\left\{\text{Solve}\left[-\frac{-\frac{4a^{3/2}\sqrt{4-\frac{y(x)}{ax}}\sin^{-1}\left(\frac{\sqrt{\frac{y(x)}{x}}}{2\sqrt{a}}\right)}{\sqrt{\frac{y(x)}{x}-4a}} + \sqrt{\frac{y(x)}{x}}\sqrt{\frac{y(x)}{x} - 4a} + \frac{y(x)}{x}}{4a} = \frac{\log(x)}{2} + c_1, y(x)\right], \text{Solve}\left[\frac{4a^{3/2}\sqrt{4-\frac{y(x)}{ax}}\sin^{-}}{\sqrt{\frac{y(x)}{x}-4}}\right.\right.$$

✓ **Maple** : cpu = 0.051 (sec), leaf count = 42

$$\left\{y(x) = 0, y(x) = -\frac{\left(\text{LambertW}\left(-\frac{ex}{c_1 a}\right) - 1\right)^2 ax}{\text{LambertW}\left(-\frac{ex}{c_1 a}\right)}\right\}$$

2.419 ODE No. 419

$$xy'(x)^2 + 2y(x)y'(x) - x = 0$$

✓ **Mathematica** : cpu = 1.14464 (sec), leaf count = 9073

✓ **Maple** : cpu = 0.046 (sec), leaf count = 109

$$\left\{x+\frac{c_1\left(y(x)-\sqrt{x^2+y(x)^2}\right)}{\left(\frac{2x^2+6y(x)^2-6\sqrt{x^2+y(x)^2}\,y(x)}{x^2}\right)^{\frac{2}{3}}x}=0, x+\frac{c_1\left(y(x)+\sqrt{x^2+y(x)^2}\right)}{\left(\frac{x^2+3y(x)^2+3\sqrt{x^2+y(x)^2}\,y(x)}{x^2}\right)^{\frac{2}{3}}x}=0\right\}$$

2.420 ODE No. 420

$$a+xy'(x)^2-2y(x)y'(x)=0$$

✓ **Mathematica** : cpu = 0.308459 (sec), leaf count = 777

$$\left\{\left\{y(x)\to\frac{1}{4}a^2e^{-\frac{3c_1}{2}}x^2+\frac{1}{4}e^{-\frac{3c_1}{2}}\sqrt[3]{a^6x^6-20a^3e^{3c_1}x^3+8\sqrt{-a^9e^{3c_1}x^9+3a^6e^{6c_1}x^6-3a^3e^{9c_1}x^3+e^{12c_1}}-8e^{6c_1}-\right.\right.$$

✓ **Maple** : cpu = 0.053 (sec), leaf count = 689

$$\left\{y(x)=\frac{3c_1a}{\frac{4x^2}{\left(-36c_1^2a+8x^3+12c_1\sqrt{(9c_1^2a-4x^3)a}\right)^{\frac{1}{3}}}+2x+\left(-36c_1^2a+8x^3+12c_1\sqrt{(9c_1^2a-4x^3)\,a}\right)^{\frac{1}{3}}}+\frac{\left(\frac{4x}{\left(-36c_1^2a+8x^3+12c\right.}\right.}{}\right.$$

2.421 ODE No. 421

$$xy'(x)^2-2y(x)y'(x)-x=0$$

✓ **Mathematica** : cpu = 0.050507 (sec), leaf count = 27

$$\{\{y(x)\to x\sinh(-\log(x)+c_1)\},\{y(x)\to x\sinh(\log(x)+c_1)\}\}$$

✓ **Maple** : cpu = 0.046 (sec), leaf count = 32

$$\left\{y(x)=ix, y(x)=-ix, y(x)=-\frac{-x^2+c_1^2}{2c_1}\right\}$$

2.422 ODE No. 422

$$xy'(x)^2 - 2y(x)y'(x) + 4x = 0$$

✓ **Mathematica** : cpu = 0.0849954 (sec), leaf count = 81

$$\left\{\left\{y(x) \to -\frac{2\left(x + x\tanh^2\left(\frac{1}{2}(-\log(x) + c_1)\right)\right)}{-1 + \tanh^2\left(\frac{1}{2}(-\log(x) + c_1)\right)}\right\}, \left\{y(x) \to -\frac{2\left(x + x\tanh^2\left(\frac{1}{2}(\log(x) + c_1)\right)\right)}{-1 + \tanh^2\left(\frac{1}{2}(\log(x) + c_1)\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.043 (sec), leaf count = 30

$$\left\{y(x) = -2x, y(x) = 2x, y(x) = \frac{x^2 + 4c_1^2}{2c_1}\right\}$$

2.423 ODE No. 423

$$xy'(x)^2 - 2y(x)y'(x) + 2y(x) + x = 0$$

✓ **Mathematica** : cpu = 0.0952307 (sec), leaf count = 59

$$\left\{\left\{y(x) \to \frac{1}{2}\left(-2e^{-c_1}x^2 + 2x - e^{c_1}\right)\right\}, \left\{y(x) \to \frac{1}{2}\left(-e^{c_1}x^2 + 2x - 2e^{-c_1}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.049 (sec), leaf count = 44

$$\left\{y(x) = \left(1 - \sqrt{2}\right)x, y(x) = \left(1 + \sqrt{2}\right)x, y(x) = \frac{x^2 + 2c_1x + 2c_1^2}{2c_1}\right\}$$

2.424 ODE No. 424

$$ay(x)y'(x) + bx + xy'(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.89173 (sec), leaf count = 223

$$\left\{\text{Solve}\left[\frac{-2a\tan^{-1}\left(\frac{ay(x)}{x\sqrt{4b - \frac{a^2y(x)^2}{x^2}}}\right) + (a+2)\left(2\tan^{-1}\left(\frac{(a+2)y(x)}{x\sqrt{4b - \frac{a^2y(x)^2}{x^2}}}\right) - i\log\left(\frac{(a+1)y(x)^2}{x^2} + b\right)\right)}{8(a+1)} = \frac{1}{2}i\log(x) \cdot\right.\right.$$

✓ **Maple** : cpu = 0.115 (sec), leaf count = 193

$$\left\{ \frac{-c_1\left(ay(x)-\sqrt{a^2y(x)^2-4b\,x^2}\right)\left(\frac{\left(-2b\,x^2+(a^2+a)y(x)^2-(a+1)\sqrt{a^2y(x)^2-4b\,x^2}\,y(x)\right)a}{2x^2}\right)^{\frac{-a-2}{2a+2}}+x^2}{x}=0, \frac{c_1\left(ay(x)+\right.}{} \right.$$

2.425 ODE No. 425

$$(x+1)y'(x)^2-(y(x)+x)y'(x)+y(x)=0$$

✓ **Mathematica** : cpu = 0.0049452 (sec), leaf count = 21

$$\left\{\left\{y(x)\to c_1x+\frac{c_1{}^2}{-1+c_1}\right\}\right\}$$

✓ **Maple** : cpu = 0.041 (sec), leaf count = 45

$$\left\{y(x)=\frac{c_1(c_1x-x+c_1)}{c_1-1},y(x)=x+2-2\sqrt{x+1},y(x)=x+2+2\sqrt{x+1}\right\}$$

2.426 ODE No. 426

$$(3x+1)y'(x)^2-3(y(x)+2)y'(x)+9=0$$

✓ **Mathematica** : cpu = 0.0047 (sec), leaf count = 28

$$\left\{\left\{y(x)\to c_1x+\frac{9+c_1{}^2-6c_1}{3c_1}\right\}\right\}$$

✓ **Maple** : cpu = 0.043 (sec), leaf count = 51

$$\left\{y(x)=\frac{(3x+1)\,c_1^2-6c_1+9}{3c_1},y(x)=-2-2\sqrt{3x+1},y(x)=-2+2\sqrt{3x+1}\right\}$$

2.427 ODE No. 427

$$(3x+5)y'(x)^2-(3y(x)+x)y'(x)+y(x)=0$$

✓ **Mathematica** : cpu = 0.0053878 (sec), leaf count = 24

$$\left\{\left\{y(x)\to c_1x+\frac{5c_1{}^2}{-1+3c_1}\right\}\right\}$$

✓ **Maple** : cpu = 0.045 (sec), leaf count = 60

$$\left\{y(x)=\frac{(3x+5)\,c_1^2-c_1x}{3c_1-1},y(x)=\frac{x}{3}+\frac{10}{9}-\frac{2\sqrt{15x+25}}{9},y(x)=\frac{x}{3}+\frac{10}{9}+\frac{2\sqrt{15x+25}}{9}\right\}$$

2.428 ODE No. 428

$$y'(x)(-ay(x)+bx+c)+axy'(x)^2-by(x)=0$$

✓ **Mathematica** : cpu = 0.0055729 (sec), leaf count = 22

$$\left\{\left\{y(x)\to\frac{cc_1}{b+ac_1}+c_1x\right\}\right\}$$

✓ **Maple** : cpu = 0.075 (sec), leaf count = 66

$$\left\{y(x)=\frac{-bx+c-2\sqrt{-bcx}}{a},y(x)=\frac{-bx+c+2\sqrt{-bcx}}{a},y(x)=\frac{c_1(c_1ax+bx+c)}{c_1a+b}\right\}$$

2.429 ODE No. 429

$$-y'(x)(ay(x)-a+bx-b)+axy'(x)^2+by(x)=0$$

✓ **Mathematica** : cpu = 0.0061346 (sec), leaf count = 30

$$\left\{\left\{y(x)\to\frac{ac_1+bc_1}{-b+ac_1}+c_1x\right\}\right\}$$

✓ **Maple** : cpu = 0.072 (sec), leaf count = 72

$$\left\{y(x)=\frac{bx+a+b-2\sqrt{(a+b)\,bx}}{a},y(x)=\frac{bx+a+b+2\sqrt{(a+b)\,bx}}{a},y(x)=\frac{c_1(c_1ax-bx+a+b)}{c_1a-b}\right\}$$

2.430 ODE No. 430

$$\mathrm{a0}x+y'(x)(\mathrm{a1}x+\mathrm{b1}y(x)+\mathrm{c1})+(\mathrm{a2}x+\mathrm{c2})y'(x)^2+\mathrm{b0}y(x)+\mathrm{c0}=0$$

✓ **Mathematica** : cpu = 254.175 (sec), leaf count = 507

$$\text{Solve}\left[\left\{x=(\mathrm{b1}K[1]+\mathrm{b0})\exp\left(\frac{(\mathrm{b1}(\mathrm{b0}-\mathrm{a1})+2\mathrm{a2b0})\tan^{-1}\left(\frac{2(\mathrm{a2}+\mathrm{b1})K[1]+\mathrm{a1}+\mathrm{b0}}{\sqrt{4\mathrm{a0}(\mathrm{a2}+\mathrm{b1})-\mathrm{a1}^2-2\mathrm{a1b0}-\mathrm{b0}^2}}\right)}{(\mathrm{a2}+\mathrm{b1})\sqrt{4\mathrm{a0}(\mathrm{a2}+\mathrm{b1})-\mathrm{a1}^2-2\mathrm{a1b0}-\mathrm{b0}^2}}-\frac{(2\mathrm{a2}+\mathrm{b1})\log(K\right.\right.\right.$$

✓ **Maple** : cpu = 2.898 (sec), leaf count = 1602

Expression too large to display

2.431 ODE No. 431

$$x^2y'(x)^2-y(x)^4+y(x)^2=0$$

✓ **Mathematica** : cpu = 0.058878 (sec), leaf count = 81

$$\left\{\left\{y(x)\to-\sqrt{1+\tan^2(-\log(x)+c_1)}\right\},\left\{y(x)\to\sqrt{1+\tan^2(-\log(x)+c_1)}\right\},\left\{y(x)\to-\sqrt{1+\tan^2(\log(x)+\right.\right.$$

✓ **Maple** : cpu = 0.208 (sec), leaf count = 62

$$\left\{y(x)=-1,y(x)=1,y(x)=\frac{\sqrt{\tan^2(c_1-\ln(x))+1}}{\tan(c_1-\ln(x))},y(x)=-\frac{\sqrt{\tan^2(c_1-\ln(x))+1}}{\tan(c_1-\ln(x))}\right\}$$

2.432 ODE No. 432

$$(a+xy'(x))^2-2ay(x)+x^2=0$$

✓ **Mathematica** : cpu = 1.27785 (sec), leaf count = 70

$$\text{Solve}\left[\left\{y(x)=\frac{2axK[1]+x^2K[1]^2+a^2+x^2}{2a},x=-\frac{a\sinh^{-1}(K[1])}{\sqrt{K[1]^2+1}}+\frac{c_1}{\sqrt{K[1]^2+1}}\right\},\{y(x),K[1]\}\right]$$

✓ **Maple** : cpu = 10.385 (sec), leaf count = 242

$$\left\{y(x) = \frac{-2\left(a \operatorname{arcsinh}\left(\operatorname{RootOf}\left(-\_Z^2x^2 + a^2 \operatorname{arcsinh}(\_Z)^2 - 2c_1 a \operatorname{arcsinh}(\_Z) + c_1^2 - x^2\right)\right) - c_1\right)\sqrt{\operatorname{RootOf}}}{}\right.$$

2.433 ODE No. 433

$$-4a - 4x^2 + (xy'(x) + y(x) + 2x)^2 - 4xy(x) = 0$$

✓ **Mathematica** : cpu = 1.20771 (sec), leaf count = 22

$$\left\{\left\{y(x) \to \frac{-a - 2c_1x + c_1{}^2}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.216 (sec), leaf count = 34

$$\left\{y(x) = \frac{-x^2 - a}{x}, y(x) = c_1 + \frac{c_1^2 - 4a}{4x}\right\}$$

2.434 ODE No. 434

$$x^2y'(x)^2 - x^2 - 2xy(x)y'(x) = 0$$

✓ **Mathematica** : cpu = 0.0526407 (sec), leaf count = 27

$$\{\{y(x) \to x \sinh(-\log(x) + c_1)\}, \{y(x) \to x \sinh(\log(x) + c_1)\}\}$$

✓ **Maple** : cpu = 0.007 (sec), leaf count = 7

$$\{y(x) = c_1 + x\}$$

2.435 ODE No. 435

$$x^2y'(x)^2 - 2xy(x)y'(x) + y(x)(y(x)+1) - x = 0$$

✓ **Mathematica** : cpu = 0.0839341 (sec), leaf count = 61

$$\left\{\left\{y(x) \to \frac{1}{4}\left(4x + {c_1}^2x - 4ic_1\sqrt{x} - 4\right)\right\}, \left\{y(x) \to \frac{1}{4}\left(4x + {c_1}^2x + 4ic_1\sqrt{x} - 4\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.221 (sec), leaf count = 22

$$\left\{y(x) = x, y(x) = -\frac{c_1^2x}{4} + c_1\sqrt{x} + x - 1\right\}$$

2.436 ODE No. 436

$$-x^4 + x^2y'(x)^2 + \left(1 - x^2\right)y(x)^2 - 2xy(x)y'(x) = 0$$

✓ **Mathematica** : cpu = 0.0711217 (sec), leaf count = 26

$$\{\{y(x) \to -x\sinh(x - c_1)\}, \{y(x) \to x\sinh(x + c_1)\}\}$$

✓ **Maple** : cpu = 2.895 (sec), leaf count = 61

$$\left\{y(x) = ix, y(x) = -ix, y(x) = -\frac{\left(-c_1^2 + e^{2x}\right)x\,e^{-x}}{2c_1}, y(x) = \frac{\left(c_1^2e^{2x} - 1\right)x\,e^{-x}}{2c_1}\right\}$$

2.437 ODE No. 437

$$-(a + 2xy(x))y'(x) + x^2y'(x)^2 + y(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.365575 (sec), leaf count = 47

$$\left\{\left\{y(x) \to \frac{x - 2\sqrt{a}c_1}{4{c_1}^2}\right\}, \left\{y(x) \to \frac{x + 2\sqrt{a}c_1}{4{c_1}^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.05 (sec), leaf count = 36

$$\left\{y(x) = -\frac{a}{4x}, y(x) = c_1x - \sqrt{c_1a}, y(x) = c_1x + \sqrt{c_1a}\right\}$$

2.438 ODE No. 438

$$x^2y'(x)^2 + 3xy(x)y'(x) + 2y(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.0282465 (sec), leaf count = 21

$$\left\{\left\{y(x) \to \frac{c_1}{x^2}\right\}, \left\{y(x) \to \frac{c_1}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.013 (sec), leaf count = 17

$$\left\{y(x) = \frac{c_1}{x^2}, y(x) = \frac{c_1}{x}\right\}$$

2.439 ODE No. 439

$$x^2y'(x)^2 + 3xy(x)y'(x) + 3y(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.0513211 (sec), leaf count = 49

$$\left\{\left\{y(x) \to c_1 x^{\frac{1}{2}\left(-3-i\sqrt{3}\right)}\right\}, \left\{y(x) \to c_1 x^{\frac{1}{2}i\left(\sqrt{3}+3i\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.062 (sec), leaf count = 33

$$\left\{y(x) = \frac{c_1 x^{-\frac{i\sqrt{3}}{2}}}{x^{\frac{3}{2}}}, y(x) = \frac{c_1 x^{\frac{i\sqrt{3}}{2}}}{x^{\frac{3}{2}}}\right\}$$

2.440 ODE No. 440

$$x^2y'(x)^2 + 4xy(x)y'(x) - 5y(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.0273368 (sec), leaf count = 19

$$\left\{\left\{y(x) \to \frac{c_1}{x^5}\right\}, \{y(x) \to c_1 x\}\right\}$$

✓ **Maple** : cpu = 0.012 (sec), leaf count = 15

$$\left\{y(x) = \frac{c_1}{x^5}, y(x) = c_1 x\right\}$$

2.441 ODE No. 441

$$x^2y'(x)^2 - 4x(y(x)+2)y'(x) + 4y(x)(y(x)+2) = 0$$

✓ **Mathematica** : cpu = 0.101443 (sec), leaf count = 65

$$\left\{\left\{y(x)\to -e^{-c_1}x\left(-x+2\sqrt{2}e^{\frac{c_1}{2}}\right)\right\},\left\{y(x)\to e^{\frac{c_1}{2}}x\left(-2\sqrt{2}+e^{\frac{c_1}{2}}x\right)\right\}\right\}$$

✓ **Maple** : cpu = 1.013 (sec), leaf count = 137

$$\left\{y(x)=-2, y(x)=\frac{x^2-2\sqrt{2}\sqrt{c_1x^2}}{c_1}, y(x)=\frac{x^2+2\sqrt{2}\sqrt{c_1x^2}}{c_1}, y(x)=\frac{(x^2-8c_1^2)(-2c_1\sqrt{2}+x)x}{(8c_1^2-4c_1\sqrt{2}x+x^2)c_1^2}, y(x)=\frac{(x^2-}{(8c_1^2}\right.$$

2.442 ODE No. 442

$$x^2y'(x)^2 + (1-x)\left(y(x)^2 - x^2y(x)\right) + \left(x^3 + x^2y(x) - 2xy(x)\right)y'(x) = 0$$

✓ **Mathematica** : cpu = 0.0342572 (sec), leaf count = 28

$$\{\{y(x)\to c_1e^{-x}x\},\{y(x)\to -x^2+c_1x\}\}$$

✓ **Maple** : cpu = 0.026 (sec), leaf count = 21

$$\{y(x)=(c_1-x)x, y(x)=c_1x\,\mathrm{e}^{-x}\}$$

2.443 ODE No. 443

$$x\left(xy'(x)-y(x)\right)^2 - y'(x) = 0$$

✓ **Mathematica** : cpu = 2.97667 (sec), leaf count = 10121

✓ **Maple** : cpu = 1.482 (sec), leaf count = 221

$$\left\{y(x)=-\frac{2}{9x^2}, y(x)=\frac{\left(\mathrm{RootOf}\left(-729c_1x^{12}+\_Z^8-12\_Z^7+60\_Z^6-160\_Z^5+240\_Z^4-192\_Z^3+64\_Z^2\right)\right.}{}\right.$$

2.444 ODE No. 444

$$x^2y'(x)^2 - (y(x) - 2x)y(x)y'(x) + y(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.429728 (sec), leaf count = 75

$$\left\{\left\{y(x) \to -\frac{\cosh(2c_1) - \sinh(2c_1)}{x\cosh(2c_1) + x\sinh(2c_1) - 1}\right\}, \left\{y(x) \to -\frac{\cosh(2c_1) - \sinh(2c_1)}{x\cosh(2c_1) + x\sinh(2c_1) + 1}\right\}\right\}$$

✓ **Maple** : cpu = 0.837 (sec), leaf count = 120

$$\left\{y(x) = \frac{\sqrt{2}\,c_1^3 - 2c_1^2x}{4x^2 - 2c_1^2}, y(x) = \frac{\left(c_1\sqrt{2} + 2x\right)c_1^2}{-4x^2 + 2c_1^2}, y(x) = 4x, y(x) = -\frac{2\left(-c_1\sqrt{2} + x\right)c_1^2}{x^2 - 2c_1^2}, y(x) = -\frac{2\left(c_1\sqrt{2} + x\right)c_1^2}{x^2 - 2c_1^2}\right\}$$

2.445 ODE No. 445

$$y'(x)\left(ax^2y(x)^3 + b\right) + aby(x)^3 + x^2y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.070667 (sec), leaf count = 49

$$\left\{\left\{y(x) \to -\frac{1}{\sqrt[3]{2ax - 2c_1}}\right\}, \left\{y(x) \to \frac{1}{\sqrt[3]{2ax - 2c_1}}\right\}, \left\{y(x) \to \frac{b}{x} + c_1\right\}\right\}$$

✓ **Maple** : cpu = 0.018 (sec), leaf count = 35

$$\left\{y(x) = \frac{1}{\sqrt{2ax + c_1}}, y(x) = -\frac{1}{\sqrt{2ax + c_1}}, y(x) = c_1 + \frac{b}{x}\right\}$$

2.446 ODE No. 446

$$\left(x^2 + 1\right)y'(x)^2 - 2xy(x)y'(x) + y(x)^2 - 1 = 0$$

✓ **Mathematica** : cpu = 0.0447207 (sec), leaf count = 45

$$\left\{\left\{y(x) \to c_1x - \sqrt{1 - c_1{}^2}\right\}, \left\{y(x) \to c_1x + \sqrt{1 - c_1{}^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.054 (sec), leaf count = 57

$$\left\{y(x) = \sqrt{x^2 + 1}, y(x) = -\sqrt{x^2 + 1}, y(x) = c_1x - \sqrt{-c_1^2 + 1}, y(x) = c_1x + \sqrt{-c_1^2 + 1}\right\}$$

2.447 ODE No. 447

$$\left(x^2-1\right)y'(x)^2-1=0$$

✓ **Mathematica** : cpu = 0.0109582 (sec), leaf count = 89

$$\left\{\left\{y(x)\to\frac{1}{2}\log\left(1-\frac{x}{\sqrt{x^2-1}}\right)-\frac{1}{2}\log\left(\frac{x}{\sqrt{x^2-1}}+1\right)+c_1\right\},\left\{y(x)\to-\frac{1}{2}\log\left(1-\frac{x}{\sqrt{x^2-1}}\right)+\frac{1}{2}\log\left(\frac{}{\sqrt{x}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.035 (sec), leaf count = 33

$$\left\{y(x)=c_1-\ln\left(x+\sqrt{x^2-1}\right),y(x)=c_1+\ln\left(x+\sqrt{x^2-1}\right)\right\}$$

2.448 ODE No. 448

$$\left(x^2-1\right)y'(x)^2-y(x)^2+1=0$$

✓ **Mathematica** : cpu = 0.132928 (sec), leaf count = 349

$$\left\{\left\{y(x)\to-\frac{1}{2}e^{-c_1}\sqrt{2x^2+2e^{4c_1}x^2-2\sqrt{(x-1)(x+1)}x+2e^{4c_1}\sqrt{(x-1)(x+1)}x-1+2e^{2c_1}-e^{4c_1}}\right\},\left\{y(x)-\right.\right.$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , exception

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2.449 ODE No. 449

$$\left(x^2-a^2\right)y'(x)^2+2xy(x)y'(x)+y(x)^2=0$$

✓ **Mathematica** : cpu = 0.0350793 (sec), leaf count = 27

$$\left\{\left\{y(x)\to\frac{c_1}{a-x}\right\},\left\{y(x)\to\frac{c_1}{a+x}\right\}\right\}$$

✓ **Maple** : cpu = 0.017 (sec), leaf count = 23

$$\left\{y(x)=\frac{c_1}{a-x},y(x)=\frac{c_1}{a+x}\right\}$$

2.450 ODE No. 450

$$\left(x^2-a^2\right)y'(x)^2-x^2-2xy(x)y'(x)=0$$

✓ **Mathematica** : cpu = 0.369148 (sec), leaf count = 26

$$\left\{\left\{y(x)\to\frac{a^2-x^2+c_1{}^2}{2c_1}\right\}\right\}$$

✓ **Maple** : cpu = 0.727 (sec), leaf count = 51

$$\left\{y(x)=\sqrt{a^2-x^2},y(x)=-\sqrt{a^2-x^2},y(x)=-c_1a^2+c_1x^2-\frac{1}{4c_1}\right\}$$

2.451 ODE No. 451

$$\left(a+x^2\right)y'(x)^2+b-2xy(x)y'(x)+y(x)^2=0$$

✓ **Mathematica** : cpu = 0.056729 (sec), leaf count = 51

$$\left\{\left\{y(x)\to c_1x-\sqrt{-b-ac_1{}^2}\right\},\left\{y(x)\to\sqrt{-b-ac_1{}^2}+c_1x\right\}\right\}$$

✓ **Maple** : cpu = 0.065 (sec), leaf count = 78

$$\left\{y(x)=\frac{\sqrt{-\left(x^2+a\right)ab}}{a},y(x)=-\frac{\sqrt{-\left(x^2+a\right)ab}}{a},y(x)=c_1x-\sqrt{-ac_1^2-b},y(x)=c_1x+\sqrt{-ac_1^2-b}\right\}$$

2.452 ODE No. 452

$$\left(2x^2+1\right)y'(x)^2+\left(x^2+2xy(x)+y(x)^2+2\right)y'(x)+2y(x)^2+1=0$$

✓ **Mathematica** : cpu = 0.0177797 (sec), leaf count = 23

$$\left\{\left\{y(x)\to\frac{-c_1x+1+c_1{}^2}{x+c_1}\right\}\right\}$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve((2*x^2+1)*diff(y(x),x)^2+(y(x)^2+2*x*y(x)+x^2+2)*diff(y(x),x)+2*y(x)^2+1 = 0,y(x))
```

2.453 ODE No. 453

$$\left(a^2-1\right)x^2y'(x)^2+a^2x^2+2xy(x)y'(x)-y(x)^2=0$$

✓ **Mathematica** : cpu = 1.062 (sec), leaf count = 327

$$\left\{\text{Solve}\left[\frac{2i\tan^{-1}\left(\frac{y(x)}{x\sqrt{a^2-\frac{y(x)^2}{x^2}-1}}\right)+a\tanh^{-1}\left(\frac{-a^2-\frac{iy(x)}{x}+1}{a\sqrt{a^2-\frac{y(x)^2}{x^2}-1}}\right)-a\tanh^{-1}\left(\frac{-a^2+\frac{iy(x)}{x}+1}{a\sqrt{a^2-\frac{y(x)^2}{x^2}-1}}\right)+a\log\left(\frac{y(x)^2}{x^2}+1\right)}{2a^2-2}\right.\right.$$

✓ **Maple** : cpu = 2.323 (sec), leaf count = 229

$$\left\{\frac{-2c_1a+2a\ln(x)+a\ln\left(\frac{x^2+y(x)^2}{x^2}\right)-2\sqrt{-a^2}\arctan\left(\frac{a^2y(x)}{\sqrt{-a^2}\sqrt{\frac{\left(-a^2+1\right)x^2+y(x)^2}{x^2}}\,x}\right)+2\ln\left(\frac{\sqrt{\frac{-a^2x^2+x^2+y(x)^2}{x^2}}\,x+y(x)}{x}\right.}{2a}\right.$$

2.454 ODE No. 454

$$ax^2y'(x)^2-(a-1)ax^2-2axy(x)y'(x)+y(x)^2=0$$

✓ **Mathematica** : cpu = 0.422821 (sec), leaf count = 241

$$\left\{\left\{y(x)\to-\frac{1}{2}\sqrt{a}e^{-c_1}x^{1-\sqrt{\frac{a-1}{a}}}\left(-x^{2\sqrt{\frac{a-1}{a}}}+e^{2c_1}\right)\right\},\left\{y(x)\to\frac{1}{2}\sqrt{a}e^{-c_1}x^{1-\sqrt{\frac{a-1}{a}}}\left(-x^{2\sqrt{\frac{a-1}{a}}}+e^{2c_1}\right)\right\},\left\{y(x)-\right.\right.$$

✓ **Maple** : cpu = 0.154 (sec), leaf count = 106

$$\left\{y(x)=x\,\text{RootOf}\left(c_1-\left(\int^{\_Z}\frac{\sqrt{(a-1)\left(\_a^2+a\right)a}}{(a-1)\left(\_a^2+a\right)}d\_a\right)-\ln(x)\right),y(x)=x\,\text{RootOf}\left(c_1+\int^{\_Z}\frac{\sqrt{(a-1)\left(\right.}}{(a-1)\left(\right.}\right.\right.$$

2.455 ODE No. 455

$$a + x^3 y'(x)^2 + x^2 y(x) y'(x) = 0$$

✓ **Mathematica** : cpu = 0.959435 (sec), leaf count = 123

$$\left\{\left\{y(x) \to -\frac{e^{-\frac{c_1}{2}}\left(x + 2ae^{c_1}\right)}{\sqrt{2}x}\right\}, \left\{y(x) \to \frac{e^{-\frac{c_1}{2}}\left(x + 2ae^{c_1}\right)}{\sqrt{2}x}\right\}, \left\{y(x) \to -\frac{e^{-\frac{c_1}{2}}\left(2ax + e^{c_1}\right)}{\sqrt{2}x}\right\}, \left\{y(x) \to \frac{e^{-\frac{c_1}{2}}\left(2a\right.}{\sqrt{}}\right.$$

✓ **Maple** : cpu = 0.445 (sec), leaf count = 66

$$\left\{y(x) = -\frac{2\sqrt{ax}}{x}, y(x) = \frac{2\sqrt{ax}}{x}, y(x) = \frac{4ax + c_1^2}{2c_1 x}, y(x) = \frac{c_1^2 x + 4a}{2c_1 x}\right\}$$

2.456 ODE No. 456

$$2\left(1 - x^2\right) y(x) y'(x) + x\left(x^2 - 1\right) y'(x)^2 + xy(x)^2 - x = 0$$

✓ **Mathematica** : cpu = 0.150413 (sec), leaf count = 421

$$\left\{\left\{y(x) \to \frac{-x - x\tanh^2\left(\frac{1}{4}\left(-\frac{i\sqrt{x-1}\sqrt{x+1}\sqrt{(x-1)(x+1)}\tan^{-1}\left(\sqrt{x^2-1}\right)}{1-x} - \frac{i\sqrt{x-1}\sqrt{(x-1)(x+1)}\tan^{-1}\left(\sqrt{x^2-1}\right)}{\sqrt{x+1}} + 2c_1\right)\right)}{-1 + \tanh^2\left(\frac{1}{4}\left(-\frac{i\sqrt{x-1}\sqrt{x+1}\sqrt{(x-1)(x+1)}\tan^{-1}\left(\sqrt{x^2-1}\right)}{1-x} - \frac{i\sqrt{x-1}\sqrt{(x-1)(x+1)}\tan^{-1}\left(\sqrt{x^2-1}\right)}{\sqrt{x+1}} + 2c_1\right)\right)}\right.\right.$$

✓ **Maple** : cpu = 0.395 (sec), leaf count = 33

$$\left\{y(x) = x, y(x) = -x, y(x) = c_1\sqrt{x^2 - 1} + \sqrt{-c_1^2 + 1}\right\}$$

2.457 ODE No. 457

$$x^4 y'(x)^2 - xy'(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 0.453479 (sec), leaf count = 118

$$\left\{\text{Solve}\left[-\frac{x\sqrt{4x^2y(x)+1}\tanh^{-1}\left(\sqrt{4x^2y(x)+1}\right)}{\sqrt{4x^4y(x)+x^2}} - \frac{1}{2}\log(y(x)) = c_1, y(x)\right], \text{Solve}\left[\frac{x\sqrt{4x^2y(x)+1}\tanh^{-1}\left(\right.}{\sqrt{4x^4y(x)+}}\right.\right.$$

✓ **Maple** : cpu = 0.957 (sec), leaf count = 45

$$\left\{y(x) = \frac{-ic_1 - x}{c_1^2 x}, y(x) = \frac{ic_1 - x}{c_1^2 x}, y(x) = -\frac{1}{4x^2}\right\}$$

2.458 ODE No. 458

$$x^2\left(x^2-a^2\right)y'(x)^2-1=0$$

✓ **Mathematica** : cpu = 0.0230423 (sec), leaf count = 120

$$\left\{\left\{y(x)\to -\frac{x\sqrt{x^2-a^2}\tan^{-1}\left(\frac{\sqrt{x^2-a^2}}{a}\right)}{a\sqrt{x^4-a^2x^2}}+c_1\right\},\left\{y(x)\to \frac{x\sqrt{x^2-a^2}\tan^{-1}\left(\frac{\sqrt{x^2-a^2}}{a}\right)}{a\sqrt{x^4-a^2x^2}}+c_1\right\}\right\}$$

✓ **Maple** : cpu = 0.061 (sec), leaf count = 90

$$\left\{y(x)=c_1-\frac{\ln\left(\frac{-2a^2+2\sqrt{-a^2}\sqrt{-a^2+x^2}}{x}\right)}{\sqrt{-a^2}},y(x)=c_1+\frac{\ln\left(\frac{-2a^2+2\sqrt{-a^2}\sqrt{-a^2+x^2}}{x}\right)}{\sqrt{-a^2}}\right\}$$

2.459 ODE No. 459

$$-\left(y'(x)-1\right)^2+e^{-2x}y'(x)^2+e^{-2y(x)}=0$$

✓ **Mathematica** : cpu = 3.25094 (sec), leaf count = 271

$$\left\{\left\{y(x)\to \log\left(-\frac{e^{-c_1}(e^x+1)\left(-e^x+e^{x+2c_1}-1-e^{2c_1}\right)}{\sqrt{8e^x+4e^{2x}+4}}\right)\right\},\left\{y(x)\to \log\left(\frac{e^{-c_1}(e^x+1)\left(-e^x+e^{x+2c_1}-1-\right.}{\sqrt{8e^x+4e^{2x}+4}}\right.\right.$$

✓ **Maple** : cpu = 0.625 (sec), leaf count = 65

$$\left\{y(x)=c_1+x+\ln\left(\left(-1-\sqrt{-\mathrm{e}^{-2c_1}\mathrm{e}^{2x}+\mathrm{e}^{2x}}\right)\mathrm{e}^{-x}\right),y(x)=c_1+x+\ln\left(\left(-1+\sqrt{-\mathrm{e}^{-2c_1}\mathrm{e}^{2x}+\mathrm{e}^{2x}}\right)\mathrm{e}^{-x}\right)\right\}$$

2.460 ODE No. 460

$$\cos^4(x)\left(y'(x)^2+y(x)^2\right)-a^2=0$$

✗ **Mathematica** : cpu = 53.665 (sec), leaf count = 0 , could not solve

```
DSolve[-a^2 + Cos[x]^4*(y[x]^2 + Derivative[1][y][x]^2) == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve((diff(y(x),x)^2+y(x)^2)*cos(x)^4-a^2 = 0,y(x))
```

2.461 ODE No. 461

$$a(x)y'(x)^2 + 2b(x)y(x)y'(x) + c(x)y(x)^2 + 2d(x)y'(x) + 2e(x)y(x) + f(x) = 0$$

✗ **Mathematica** : cpu = 300.052 (sec), leaf count = 0 , timed out

```
$Aborted
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(d0(x)*diff(y(x),x)^2+2*b0(x)*y(x)*diff(y(x),x)+c0(x)*y(x)^2+2*d0(x)*diff(y(x),x)+2*e0
```

2.462 ODE No. 462

$$y(x)y'(x)^2 - 1 = 0$$

✓ **Mathematica** : cpu = 0.0319725 (sec), leaf count = 43

$$\left\{\left\{y(x)\to \left(\frac{3}{2}\right)^{2/3}(-x+c_1)^{2/3}\right\},\left\{y(x)\to \left(\frac{3}{2}\right)^{2/3}(x+c_1)^{2/3}\right\}\right\}$$

✓ **Maple** : cpu = 0.044 (sec), leaf count = 27

$$\left\{-\frac{2y(x)^{\frac{3}{2}}}{3} - c_1 + x = 0, \frac{2y(x)^{\frac{3}{2}}}{3} - c_1 + x = 0\right\}$$

2.463 ODE No. 463

$$y(x)y'(x)^2 - e^{2x} = 0$$

✓ **Mathematica** : cpu = 0.0519976 (sec), leaf count = 47

$$\left\{\left\{y(x)\to \left(\frac{3}{2}\right)^{2/3}(-e^x+c_1)^{2/3}\right\},\left\{y(x)\to \left(\frac{3}{2}\right)^{2/3}(e^x+c_1)^{2/3}\right\}\right\}$$

✓ **Maple** : cpu = 0.112 (sec), leaf count = 50

$$\left\{\frac{2y(x)^{\frac{3}{2}}}{3} + c_1 - \frac{\sqrt{\mathrm{e}^{2x}y(x)}}{\sqrt{y(x)}} = 0, \frac{2y(x)^{\frac{3}{2}}}{3} + c_1 + \frac{\sqrt{\mathrm{e}^{2x}y(x)}}{\sqrt{y(x)}} = 0\right\}$$

2.464 ODE No. 464

$$y(x)y'(x)^2 + 2xy'(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 0.106651 (sec), leaf count = 52

$$\left\{\left\{y(x) \to -e^{\frac{c_1}{2}}\sqrt{-2x + e^{c_1}}\right\}, \left\{y(x) \to e^{\frac{c_1}{2}}\sqrt{-2x + e^{c_1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.706 (sec), leaf count = 70

$$\left\{y(x) = \sqrt{-2c_1x + c_1^2}, y(x) = \sqrt{2c_1x + c_1^2}, y(x) = ix, y(x) = -\sqrt{c_1\left(c_1 + 2x\right)}, y(x) = -\sqrt{-2c_1x + c_1^2}, y(x) = -$$

2.465 ODE No. 465

$$y(x)y'(x)^2 + 2xy'(x) - 9y(x) = 0$$

✓ **Mathematica** : cpu = 0.0584254 (sec), leaf count = 107

$$\left\{\text{Solve}\left[\int \frac{y(x)}{x\left(\frac{y(x)^2}{x^2} - \sqrt{\frac{9y(x)^2}{x^2} + 1} + 1\right)} d\frac{y(x)}{x} = -\log(x) + c_1, y(x)\right], \text{Solve}\left[\int \frac{y(x)}{x\left(\frac{y(x)^2}{x^2} + \sqrt{\frac{9y(x)^2}{x^2} + 1} + 1\right)} d\right.\right.$$

✓ **Maple** : cpu = 0.085 (sec), leaf count = 210

$$\left\{-\frac{c_1\left(x - \sqrt{x^2 + 9y\left(x\right)^2}\right)\left(\frac{-x + \sqrt{x^2 + 9y(x)^2}}{y(x)}\right)^{\frac{2}{7}} x}{\left(\frac{2x^2 + 2y(x)^2 - 2\sqrt{x^2 + 9y(x)^2}\, x}{y(x)^2}\right)^{\frac{1}{7}}\left(2x^2 + 2y\left(x\right)^2 - 2\sqrt{x^2 + 9y\left(x\right)^2}\, x\right)} + x = 0, \frac{c_1\left(x + \sqrt{x^2 + 9y\left(x\right)^2}\right)}{\left(x^2 + y\left(x\right)^2 + \sqrt{x^2 + 9y\left(x\right)^2}\, x\right.}\right.$$

2.466 ODE No. 466

$$y(x)y'(x)^2 - 2xy'(x) + y(x) = 0$$

✓ **Mathematica** : cpu = 3.6073 (sec), leaf count = 433

$$\left\{\text{Solve}\left[-\frac{i\sqrt{\frac{y(x)^2}{x^2} - 1}\tan^{-1}\left(\sqrt{\frac{y(x)^2}{x^2} - 1}\right)}{\sqrt{\frac{y(x)}{x} - 1}\sqrt{\frac{y(x)}{x} + 1}} - i\sqrt{\frac{\frac{y(x)}{x} - 1}{\frac{y(x)}{x} + 1}}\left(\frac{y(x)}{x} + 1\right) + i\sqrt{\frac{y(x)}{x} - 1}\sqrt{\frac{y(x)}{x} + 1} + \log\left(\frac{y(x)}{x}\right)\right.\right.$$

✓ **Maple** : cpu = 0.668 (sec), leaf count = 71

$$\left\{y(x)=x,y(x)=\sqrt{-2ic_1x+c_1^2},y(x)=\sqrt{2ic_1x+c_1^2},y(x)=-x,y(x)=-\sqrt{-2ic_1x+c_1^2},y(x)=-\sqrt{2ic_1x+c\right.$$

2.467 ODE No. 467

$$y(x)y'(x)^2-4xy'(x)+y(x)=0$$

✓ **Mathematica** : cpu = 0.29527 (sec), leaf count = 226

$$\left\{\left\{y(x)\to\sqrt{x^2+\frac{2^{2/3}c_1{}^3x}{\sqrt[3]{32x^6-40c_1{}^3x^3+\sqrt{-4096c_1{}^3x^9+768c_1{}^6x^6-48c_1{}^9x^3+c_1{}^{12}}-c_1{}^6}}+\frac{\sqrt[3]{32x^6-40c_1{}^3x^3+}}{}}\right.\right.$$

✓ **Maple** : cpu = 0.084 (sec), leaf count = 148

$$\left\{-\frac{c_1x}{\left(\frac{8x^2-4y(x)^2-4\sqrt{4x^2-y(x)^2}\,x}{y(x)^2}\right)^{\frac{1}{3}}\left(\frac{2x-\sqrt{4x^2-y(x)^2}}{y(x)}\right)^{\frac{1}{3}}y\left(x\right)}+x=0,-\frac{c_1x}{\left(\frac{2x^2-y(x)^2+\sqrt{4x^2-y(x)^2}\,x}{y(x)^2}\right)^{\frac{1}{3}}\left(\frac{2x+\sqrt{4x^2-y(x)^2}}{y(x)}\right.}\right.$$

2.468 ODE No. 468

$$-4a^2xy'(x)+a^2y(x)+y(x)y'(x)^2=0$$

✓ **Mathematica** : cpu = 8.59932 (sec), leaf count = 753

$$\left\{\text{Solve}\left[\frac{8\left(4a^2-\frac{y(x)^2}{x^2}\right)^{3/2}\sinh^{-1}\left(\frac{\sqrt{\frac{y(x)}{x}-2a}}{2\sqrt{a}}\right)+\sqrt{a}\sqrt{\frac{y(x)}{ax}+2}\left(4\sqrt{\frac{y(x)}{x}}-2a\left(\frac{y(x)^2}{x^2}-4a^2\right)\tanh^{-1}\left(\frac{\sqrt{4a^2-\frac{y(x)^2}{x^2}}}{2a}\right.\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.094 (sec), leaf count = 181

$$\left\{x-\frac{c_1x}{\left(\frac{\left(2a^2x^2+\sqrt{4a^2x^2-y(x)^2}\,ax-y(x)^2\right)a^2}{y(x)^2}\right)^{\frac{1}{3}}\left(\frac{\left(2ax+\sqrt{4a^2x^2-y(x)^2}\right)a}{y(x)}\right)^{\frac{1}{3}}ay\left(x\right)}=0,x-\frac{}{\left(-\frac{4\left(-2a^2x^2+\sqrt{4a^2x^2-y(x)^2}\right.}{y(x)^2}\right.}\right.$$

2.469 ODE No. 469

$$a x y'(x) + b y(x) + y(x) y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.422724 (sec), leaf count = 157

$$\left\{\text{Solve}\left[\frac{(a+2b)\log\left(-\sqrt{a^2-\frac{4by(x)^2}{x^2}}+a+2b\right)+a\log\left(\sqrt{a^2-\frac{4by(x)^2}{x^2}}+a\right)}{4(a+b)}=-\frac{\log(x)}{2}+c_1,y(x)\right],\text{Solve}\left[\frac{a}{-}\right.\right.$$

✓ **Maple** : cpu = 0.14 (sec), leaf count = 264

$$\left\{\frac{\left(c_1\left(ax+\sqrt{a^2x^2-4by\,(x)^2}\right)\left(-\frac{ax+\sqrt{a^2x^2-4by(x)^2}}{2y(x)}\right)^{-\frac{a}{a+b}}\left(\frac{\left(a\,x^2+2y(x)^2+\sqrt{a^2x^2-4by(x)^2}\,x\right)a}{2y(x)^2}\right)^{\frac{-a-2b}{2a+2b}}+y(x)^2\right)x}{y\,(x)^2}\right.$$

2.470 ODE No. 470

$$x^3 y'(x) - x^2 y(x) + y(x) y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.464024 (sec), leaf count = 143

$$\left\{\text{Solve}\left[\frac{1}{2}\log(y(x))-\frac{\sqrt{x^6+4x^2y(x)^2}\tanh^{-1}\left(\frac{x^2}{\sqrt{x^4+4y(x)^2}}\right)}{2x\sqrt{x^4+4y(x)^2}}=c_1,y(x)\right],\text{Solve}\left[\frac{\sqrt{x^6+4x^2y(x)^2}\tanh^{-1}\left(\frac{}{\sqrt{x^4}}\right.}{2x\sqrt{x^4+4y(x)^2}}\right.\right.$$

✓ **Maple** : cpu = 0.473 (sec), leaf count = 87

$$\left\{y(x)=-\frac{\sqrt{-4c_1x^2+c_1^2}}{4},y(x)=\frac{\sqrt{-4c_1x^2+c_1^2}}{4},y(x)=-\frac{ix^2}{2},y(x)=\frac{ix^2}{2},y(x)=-\frac{2\sqrt{c_1x^2+4}}{c_1},y(x)=\frac{2\sqrt{c_1}}{c}\right.$$

2.471 ODE No. 471

$$y(x)y'(x)^2 - (y(x) - x)y'(x) - x = 0$$

✓ **Mathematica** : cpu = 0.017416 (sec), leaf count = 47

$$\left\{\{y(x) \to x + c_1\}, \left\{y(x) \to -\sqrt{-x^2 + 2c_1}\right\}, \left\{y(x) \to \sqrt{-x^2 + 2c_1}\right\}\right\}$$

✓ **Maple** : cpu = 0.026 (sec), leaf count = 33

$$\left\{y(x) = \sqrt{-x^2 + c_1}, y(x) = -\sqrt{-x^2 + c_1}, y(x) = c_1 + x\right\}$$

2.472 ODE No. 472

$$(y(x) + x)y'(x)^2 + 2xy'(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 0.592004 (sec), leaf count = 269

$$\left\{\left\{y(x) \to -\frac{2\sqrt{-\sqrt{3}x\cosh(c_1) - \sqrt{3}x\sinh(c_1) + \cosh(2c_1) + \sinh(2c_1)}}{\sqrt{3}} - \frac{\cosh(c_1)}{\sqrt{3}} - \frac{\sinh(c_1)}{\sqrt{3}}\right\}, \left\{y(x) \to \frac{2\sqrt{}}{}\right.\right.$$

✓ **Maple** : cpu = 0.487 (sec), leaf count = 121

$$\left\{-c_1 - \operatorname{arctanh}\left(\frac{2x + y(x)}{2\sqrt{\frac{x^2+xy(x)+y(x)^2}{x^2}}\,x}\right) + \ln(x) + \ln\left(\frac{y(x)}{x}\right) = 0, -c_1 + \operatorname{arctanh}\left(\frac{2x + y(x)}{2\sqrt{\frac{x^2+xy(x)+y(x)^2}{x^2}}\,x}\right) + \ln(\right.$$

2.473 ODE No. 473

$$(y(x) - 2x)y'(x)^2 - 2(x - 1)y'(x) + y(x) - 2 = 0$$

✓ **Mathematica** : cpu = 0.34837 (sec), leaf count = 165

$$\left\{\left\{y(x) \to \frac{1}{2}\left(-\sqrt{-4e^{c_1}x + 4e^{c_1} - e^{2c_1}} + 4 - e^{c_1}\right)\right\}, \left\{y(x) \to \frac{1}{2}\left(\sqrt{-4e^{c_1}x + 4e^{c_1} - e^{2c_1}} + 4 - e^{c_1}\right)\right\}, \left\{y(x) \to\right.\right.$$

✓ **Maple** : cpu = 0.63 (sec), leaf count = 71

$$\left\{y(x) = c_1 + 2 - \sqrt{c_1(-c_1 + 2x - 2)}, y(x) = \frac{c_1}{2} + 2 - \frac{\sqrt{c_1(-c_1 + 4x - 4)}}{2}, y(x) = x + (x - 1)\sqrt{2} + 1, y(x) = \right.$$

2.474 ODE No. 474

$$2y(x)y'(x)^2 - (4x-5)y'(x) + 2y(x) = 0$$

✓ **Mathematica** : cpu = 0.193005 (sec), leaf count = 135

$$\left\{\left\{y(x) \to -i\sqrt{2}e^{\frac{c_1}{2}}\sqrt{4x-5+8e^{c_1}}\right\}, \left\{y(x) \to i\sqrt{2}e^{\frac{c_1}{2}}\sqrt{4x-5+8e^{c_1}}\right\}, \left\{y(x) \to -\frac{1}{4}ie^{\frac{c_1}{2}}\sqrt{8x-10+e^{c_1}}\right\}, \left\{y\right.\right.$$

✓ **Maple** : cpu = 0.999 (sec), leaf count = 152

$$\left\{-c_1 - \operatorname{arctanh}\left(\frac{1}{\sqrt{-\frac{16y(x)^2}{(4x-5)^2}+1}}\right) + \ln\left(\frac{y(x)}{4x-5}\right) + \ln\left(x-\frac{5}{4}\right) - \frac{\ln\left(\frac{4y(x)}{4x-5}-1\right)}{2} - \frac{\ln\left(\frac{4y(x)}{4x-5}+1\right)}{2} + \frac{\ln\left(\frac{16y(}{(4x-}\right.}{}\right.$$

2.475 ODE No. 475

$$4y(x)y'(x)^2 + 2xy'(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 0.118849 (sec), leaf count = 57

$$\left\{\left\{y(x) \to -\frac{1}{2}e^{2c_1}\sqrt{-2x+e^{4c_1}}\right\}, \left\{y(x) \to \frac{1}{2}e^{2c_1}\sqrt{-2x+e^{4c_1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.74 (sec), leaf count = 67

$$\left\{y(x) = \sqrt{-c_1x+c_1^2}, y(x) = \sqrt{c_1x+c_1^2}, y(x) = -\sqrt{c_1(c_1+x)}, y(x) = -\sqrt{-c_1x+c_1^2}, y(x) = -\frac{ix}{2}, y(x) = \frac{ix}{2}\right\}$$

2.476 ODE No. 476

$$4x^3y'(x) - 4x^2y(x) + 9y(x)y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.459249 (sec), leaf count = 143

$$\left\{\text{Solve}\left[\frac{1}{2}\log(y(x)) - \frac{\sqrt{x^6+9x^2y(x)^2}\tanh^{-1}\left(\frac{x^2}{\sqrt{x^4+9y(x)^2}}\right)}{2x\sqrt{x^4+9y(x)^2}} = c_1, y(x)\right], \text{Solve}\left[\frac{\sqrt{x^6+9x^2y(x)^2}\tanh^{-1}\left(\frac{}{\sqrt{x^4}}\right.}{2x\sqrt{x^4+9y(x)^2}}\right.\right.$$

✓ **Maple** : cpu = 0.494 (sec), leaf count = 87

$$\left\{y(x) = -\frac{\sqrt{-4c_1x^2+c_1^2}}{6}, y(x) = \frac{\sqrt{-4c_1x^2+c_1^2}}{6}, y(x) = -\frac{ix^2}{3}, y(x) = \frac{ix^2}{3}, y(x) = -\frac{2\sqrt{c_1x^2+9}}{c_1}, y(x) = \frac{2\sqrt{c_1}}{c}\right.$$

2.477 ODE No. 477

$$ay(x)y'(x)^2 + (2x - b)y'(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 0.245232 (sec), leaf count = 146

$$\left\{\left\{y(x) \to -\frac{e^{\frac{c_1}{2}}\sqrt{2b - 4x + e^{c_1}}}{2\sqrt{a}}\right\}, \left\{y(x) \to \frac{e^{\frac{c_1}{2}}\sqrt{2b - 4x + e^{c_1}}}{2\sqrt{a}}\right\}, \left\{y(x) \to -\sqrt{2}e^{\frac{c_1}{2}}\sqrt{2ae^{c_1} - b + 2x}\right\}, \left\{y(x) \right.\right.$$

✓ **Maple** : cpu = 0.49 (sec), leaf count = 622

$$\left\{c_1 + \int_{-b}^{x} \frac{-4\_a + 2b - 2\sqrt{4ay(x)^2 + (-2\_a + b)^2}}{4ay(x)^2 + (2\_a - b)\sqrt{4ay(x)^2 + (-2\_a + b)^2} + (-2\_a + b)^2} d\_a + \int^{y(x)} \left(\frac{}{-4\_f^2 a - b^2 + 4bx - 4} \right.\right.$$

2.478 ODE No. 478

$$\left(y'(x)^2 + 1\right)(ay(x) + b) - c = 0$$

✓ **Mathematica** : cpu = 0.34926 (sec), leaf count = 223

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[\frac{\frac{c\sqrt{-ac}\sqrt{\frac{\#1a+b}{c}}\sin^{-1}\left(\frac{a\sqrt{-\#1a-b+c}}{\sqrt{-a}\sqrt{-ac}}\right)}{\sqrt{-a}} - (\#1a + b)\sqrt{-\#1a - b + c}}{a\sqrt{\#1a + b}}\&\right][-x + c_1]\right\}, \left\{y(x)\right.\right.$$

✓ **Maple** : cpu = 0.118 (sec), leaf count = 88

$$\left\{-c_1 + x - \left(\int^{y(x)} \frac{\_aa + b}{\sqrt{-(\_aa + b)(\_aa + b - c)}} d\_a\right) = 0, -c_1 + x - \left(\int^{y(x)} -\frac{\_aa + b}{\sqrt{-(\_aa + b)(\_aa + b - c)}} d\_\right.\right.$$

2.479 ODE No. 479

$$\text{a0}x + y'(x)(\text{a1}x + \text{b1}y(x) + \text{c1}) + y'(x)^2(\text{a2}x + \text{b2}y(x) + \text{c2}) + \text{b0}y(x) + \text{c0} = 0$$

✓ **Mathematica** : cpu = 8.24177 (sec), leaf count = 576

$$\text{Solve}\left[\left\{x = -\frac{-(K[2](\text{b2}K[2] + \text{b1}) + \text{b0})\exp\left(\text{RootSum}\left[\#1^3\text{b2} + \#1^2\text{a2} + \#1^2\text{b1} + \#1\text{a1} + \#1\text{b0} + \text{a0}\&, \frac{\#1}{}\right.\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.375 (sec), leaf count = 929

$$\left\{ x - \left(c_1 + \int \frac{-a1\,x - b1\,y(x) - c1 + \sqrt{-4 a0\, a2\, x^2 - 4 a0\, b2\, x y(x) + a1^2 x^2 + 2 a1\, b1\, x y(x) - 4 a2\, b0\, x y(x) - 4 b0\, b2\, y(x)^2 + b1^2 y(x)^2 - 4 a0\, c2\, x + 2 a1\, c1\, x - 4 a2\, c0\, x - 4 b0\, c2}}{2 a2\, x + 2 b2\, y(x) + 2 c2}\right.\right.$$

2.480 ODE No. 480

$$\left(a y(x) - x^2\right) y'(x)^2 + 2 x y(x) y'(x)^2 - y(x)^2 = 0$$

✗ **Mathematica** : cpu = 28.1144 (sec), leaf count = 0 , could not solve

```
DSolve[-y[x]^2 + 2*x*y[x]*Derivative[1][y][x]^2 + (-x^2 + a*y[x])*Derivative[1][y][x]^2 == 0
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve((a*y(x)-x^2)*diff(y(x),x)^2+2*x*y(x)*diff(y(x),x)^2-y(x)^2 = 0,y(x))
```

2.481 ODE No. 481

$$\left(x^2 + y(x)^2\right) y'(x) + x y(x) y'(x)^2 + x y(x) = 0$$

✓ **Mathematica** : cpu = 0.0308551 (sec), leaf count = 49

$$\left\{\left\{y(x) \to \frac{c_1}{x}\right\}, \left\{y(x) \to -\sqrt{-x^2 + 2 c_1}\right\}, \left\{y(x) \to \sqrt{-x^2 + 2 c_1}\right\}\right\}$$

✓ **Maple** : cpu = 0.032 (sec), leaf count = 35

$$\left\{y(x) = \sqrt{-x^2 + c_1}, y(x) = \frac{c_1}{x}, y(x) = -\sqrt{-x^2 + c_1}\right\}$$

2.482 ODE No. 482

$$\left(a + x^{22} - y(x)^2\right) y'(x) + x y(x) y'(x)^2 - x y(x) = 0$$

✗ **Mathematica** : cpu = 58.335 (sec), leaf count = 0 , could not solve

```
DSolve[-(x*y[x]) + (a + x^22 - y[x]^2)*Derivative[1][y][x] + x*y[x]*Derivative[1][y][x]^2 ==
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(x*y(x)*diff(y(x),x)^2+(x^22-y(x)^2+a)*diff(y(x),x)-x*y(x) = 0,y(x))
```

2.483 ODE No. 483

$$\left(2xy(x)-x^2\right)y'(x)^2+2xy(x)y'(x)-y(x)^2+2xy(x)=0$$

✓ **Mathematica** : cpu = 0.229679 (sec), leaf count = 71

$$\left\{\left\{y(x)\to e^{\frac{c_1}{2}}-\sqrt{-x^2+2e^{\frac{c_1}{2}}x}\right\},\left\{y(x)\to\sqrt{-x^2+2e^{\frac{c_1}{2}}x}+e^{\frac{c_1}{2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.081 (sec), leaf count = 103

$$\left\{y(x)=0,y(x)=x\,\mathrm{RootOf}\left(2c_1+\int^{\_Z}\frac{-2\_a^2+\sqrt{2}\sqrt{(\_a-1)^2\_a}}{(\_a^2+1)\_a}d\_a-2\ln(x)\right),y(x)=x\,\mathrm{RootOf}\left(2c_1\right.\right.$$

2.484 ODE No. 484

$$\left(2xy(x)-x^2\right)y'(x)^2-6xy(x)y'(x)-y(x)^2+2xy(x)=0$$

✓ **Mathematica** : cpu = 0.196225 (sec), leaf count = 81

$$\left\{\left\{y(x)\to-\sqrt{3x^2-2e^{\frac{c_1}{2}}x}+2x-e^{\frac{c_1}{2}}\right\},\left\{y(x)\to\sqrt{3x^2-2e^{\frac{c_1}{2}}x}+2x-e^{\frac{c_1}{2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.08 (sec), leaf count = 115

$$\left\{y(x)=0,y(x)=x\,\mathrm{RootOf}\left(2c_1+\int^{\_Z}\frac{-2\_a^2+4\_a+\sqrt{2}\sqrt{(\_a+1)^2\_a}}{(\_a^2-4\_a+1)\_a}d\_a-2\ln(x)\right),y(x)=x\,\mathrm{RootO}\right.$$

2.485 ODE No. 485

$$-y'(x)\left(ay(x)^2+bx^2+c\right)+axy(x)y'(x)^2+bxy(x)=0$$

✓ **Mathematica** : cpu = 0.0586116 (sec), leaf count = 29

$$\left\{\left\{y(x)\to\sqrt{\frac{cc_1}{b-ac_1}+c_1x^2}\right\}\right\}$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , exception

```
time expired
```

2.486 ODE No. 486

$$-a^2 + y(x)^2 y'(x)^2 + y(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.065371 (sec), leaf count = 117

$$\left\{\left\{y(x) \to -\sqrt{a^2 - x^2 - 2c_1 x - c_1{}^2}\right\}, \left\{y(x) \to \sqrt{a^2 - x^2 - 2c_1 x - c_1{}^2}\right\}, \left\{y(x) \to -\sqrt{a^2 - x^2 + 2c_1 x - c_1{}^2}\right\},$$

✓ **Maple** : cpu = 0.246 (sec), leaf count = 54

$$\left\{y(x) = a, y(x) = \sqrt{a^2 - x^2 + 2c_1 x - c_1^2}, y(x) = -a, y(x) = -\sqrt{(-c_1 + a + x)(c_1 + a - x)}\right\}$$

2.487 ODE No. 487

$$-6x^3 y'(x) + 4x^2 y(x) + y(x)^2 y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.507485 (sec), leaf count = 157

$$\left\{\text{Solve}\left[\frac{3}{4}\log(y(x)) - \frac{\sqrt{9x^6 - 4x^2 y(x)^3}\tanh^{-1}\left(\frac{3x^2}{\sqrt{9x^4 - 4y(x)^3}}\right)}{2x\sqrt{9x^4 - 4y(x)^3}} = c_1, y(x)\right], \text{Solve}\left[\frac{\sqrt{9x^6 - 4x^2 y(x)^3}\tanh^{-1}\left(\right.}{2x\sqrt{9x^4 - 4y(x)^3}}\right.$$

✓ **Maple** : cpu = 0.464 (sec), leaf count = 100

$$\left\{y(x) = x^{\frac{4}{3}} \operatorname{RootOf}\left(c_1 + \int^{\_Z} -\frac{3\left(4\_a^3 + 3\sqrt{-4\_a^3 + 9} - 9\right)}{4\left(4\_a^3 - 9\right)\_a} d\_a - \ln(x)\right), y(x) = \frac{18^{\frac{1}{3}} x^{\frac{4}{3}}}{2}, y(x) = -\frac{18^{\frac{1}{3}}(1 -}{}\right.$$

2.488 ODE No. 488

$$4a^2 - 4ay(x)y'(x) - 4ax + y(x)^2 y'(x)^2 + y(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.345834 (sec), leaf count = 85

$$\left\{\left\{y(x) \to -\frac{\sqrt{16a^3 x - 4a^2 x^2 - 4ac_1 x - c_1{}^2}}{2a}\right\}, \left\{y(x) \to \frac{\sqrt{16a^3 x - 4a^2 x^2 - 4ac_1 x - c_1{}^2}}{2a}\right\}\right\}$$

✓ **Maple** : cpu = 0.5 (sec), leaf count = 111

$$\left\{y(x) = -2\sqrt{ax}, y(x) = 2\sqrt{ax}, y(x) = -\frac{\sqrt{-16a^4 + 32a^3 x + 8c_1 ax - c_1^2 + (-16x^2 + 8c_1)a^2}}{4a}, y(x) = \frac{\sqrt{-16a^4 +}}{}\right.$$

2.489 ODE No. 489

$$ay(x)^2 + bx + c + y(x)^2 y'(x)^2 + 2xy(x)y'(x) = 0$$

✗ **Mathematica** : cpu = 300.229 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 2.316 (sec), leaf count = 551

$$\left\{ y(x) = -\frac{\sqrt{16}\sqrt{\left(\left(\left(-\frac{bx}{4} - \frac{c}{4}\right)a^2 + \left(ax - \frac{1}{2}b + x\right)^2 (a+1)^2 a \operatorname{RootOf}\left(2c_1 a + 2\left(\int^{\_Z} \frac{\left(-4\_a\, a^2 + \sqrt{-(4\_a\, a^3 + 8\_a\, a}\right.}{4\_a(4\_a\, a}\right.\right.\right.\right.}}{}\right.$$

2.490 ODE No. 490

$$a - x^2 - 2xy(x)y'(x) + y(x)^2 y'(x)^2 + 2y(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.499205 (sec), leaf count = 70

$$\left\{\left\{y(x) \to -\frac{\sqrt{-a - 2x^2 + 8c_1 x - 4c_1{}^2}}{\sqrt{2}}\right\}, \left\{y(x) \to \frac{\sqrt{-a - 2x^2 + 8c_1 x - 4c_1{}^2}}{\sqrt{2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.479 (sec), leaf count = 145

$$\left\{ y(x) = \sqrt{-x^2 - c_1 - a - 2\sqrt{2c_1 + a}\, x}, y(x) = \sqrt{-x^2 - c_1 - a + 2\sqrt{2c_1 + a}\, x}, y(x) = -\sqrt{-x^2 - c_1 - a - 2\sqrt{2c\right.}}\right.$$

2.491 ODE No. 491

$$(a-1)b + ax^2 + 2axy(x)y'(x) + (1-a)y(x)^2 + y(x)^2 y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.873793 (sec), leaf count = 79

$$\left\{\left\{y(x) \to -\sqrt{-2ac_1 x + ac_1{}^2 + b - x^2 + 2c_1 x - c_1{}^2}\right\}, \left\{y(x) \to \sqrt{-2ac_1 x + ac_1{}^2 + b - x^2 + 2c_1 x - c_1{}^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.664 (sec), leaf count = 195

$$\left\{ y(x) = \sqrt{-a\, x^2 + b}, y(x) = \frac{\sqrt{\left(c_1 + (-x^2 + b)\, a - b - 2\sqrt{-(-c_1 + b)(a-1)\, a}\, x\right) a}}{a}, y(x) = \frac{\sqrt{\left(c_1 + (-x^2 + b\right.}}{}\right.$$

2.492 ODE No. 492

$$\left(y(x)^2 - a^2\right) y'(x)^2 + y(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.0981847 (sec), leaf count = 97

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[\sqrt{a^2 - \#1^2} - a \tanh^{-1}\left(\frac{\sqrt{a^2 - \#1^2}}{a}\right) \&\right][-x + c_1]\right\}, \left\{y(x) \to \text{InverseFunction}\left[\right.\right.$$

✓ **Maple** : cpu = 0.56 (sec), leaf count = 122

$$\left\{-\frac{a^2 \ln\left(\frac{2a^2+2\sqrt{a^2}\sqrt{a^2-y(x)^2}}{y(x)}\right)}{\sqrt{a^2}} - c_1 + x + \sqrt{a^2 - y(x)^2} = 0, \frac{a^2 \ln\left(\frac{2a^2+2\sqrt{a^2}\sqrt{a^2-y(x)^2}}{y(x)}\right)}{\sqrt{a^2}} - c_1 + x - \sqrt{a^2 - y(x\right.$$

2.493 ODE No. 493

$$\left(a^2 - 2ax + y(x)^2\right) y'(x)^2 + 2ay(x)y'(x) + y(x)^2 = 0$$

✓ **Mathematica** : cpu = 8.48613 (sec), leaf count = 615

$$\left\{\text{Solve}\left[\left\{y(x) = \frac{-\sqrt{-aK[1]^2\left(aK[1]^2 - 2xK[1]^2 - 2x\right)} - aK[1]}{K[1]^2 + 1}, x = \frac{aK[1]^2 + aK[1]^2 \log^2(K[1]) + a \log^2(K[1\right.\right.\right.$$

✓ **Maple** : cpu = 1.067 (sec), leaf count = 111

$$\left\{\left[x(\_T) = \frac{\sqrt{\_T^2+1}\, a^2 \operatorname{arctanh}\left(\frac{1}{\sqrt{\_T^2+1}}\right)^2 + 2c_1 a + \left(-2c_1\sqrt{\_T^2+1}\, a - 2a^2\right) \operatorname{arctanh}\left(\frac{1}{\sqrt{\_T^2+1}}\right) + (a^2 +}{2\sqrt{\_T^2+1}\, a}\right.\right.$$

2.494 ODE No. 494

$$\left(y(x)^2 - a^2x^2\right) y'(x)^2 + \left(1 - a^2\right) x^2 + 2xy(x)y'(x) = 0$$

✓ **Mathematica** : cpu = 0.132597 (sec), leaf count = 49

$$\left\{\left\{y(x) \to ac_1 - \sqrt{-x^2 + c_1{}^2}\right\}, \left\{y(x) \to ac_1 + \sqrt{-x^2 + c_1{}^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.193 (sec), leaf count = 161

$$\left\{y(x) = x \operatorname{RootOf}\left(c_1 + \int^{\_Z} \frac{-\_a^3 + \_a\, a^2 - \_a + \sqrt{\_a^2a^2 - a^4 + a^2}}{(\_a^2+1)(\_a^2 - a^2 + 1)} d\_a - \ln(x)\right), y(x) = x \operatorname{RootOf}\left(c_1 - \right.\right.$$

2.495 ODE No. 495

$$((1-a)x^2+y(x)^2)\,y'(x)^2+2axy(x)y'(x)+(1-a)y(x)^2+x^2=0$$

✓ **Mathematica** : cpu = 0.238946 (sec), leaf count = 83

$$\left\{\text{Solve}\left[\sqrt{a-1}\tan^{-1}\left(\frac{y(x)}{x}\right)-\frac{1}{2}\log\left(\frac{y(x)^2}{x^2}+1\right)=\log(x)+c_1,y(x)\right],\text{Solve}\left[\sqrt{a-1}\tan^{-1}\left(\frac{y(x)}{x}\right)+\frac{1}{2}\log\left(\right.\right.\right.$$

✓ **Maple** : cpu = 0.668 (sec), leaf count = 61

$$\left\{y(x)=x\tan\left(\text{RootOf}\left(2c_1-2\sqrt{a-1}\_Z-\ln\left(\frac{x^2}{\cos(\_Z)^2}\right)\right)\right),y(x)=x\tan\left(\text{RootOf}\left(2c_1+2\sqrt{a-1}\_Z-\right.\right.\right.$$

2.496 ODE No. 496

$$(y(x)-x)^2\left(y'(x)^2+1\right)-a^2\left(y'(x)+1\right)^2=0$$

✓ **Mathematica** : cpu = 26.125 (sec), leaf count = 17831

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✓ **Maple** : cpu = 0.257 (sec), leaf count = 130

$$\left\{y(x)=-\sqrt{2}\,a+x,y(x)=\sqrt{2}\,a+x,y(x)=x+\text{RootOf}\left(c_1-x+\int^{\_Z}-\frac{\_a^2-2a^2+\sqrt{-\_a^4+2\_a^2a^2}}{2\left(\_a^2-2a^2\right)}d\_a\right.\right.$$

2.497 ODE No. 497

$$-x^2-2xy(x)y'(x)+3y(x)^2y'(x)^2+4y(x)^2=0$$

✓ **Mathematica** : cpu = 0.171909 (sec), leaf count = 76

$$\left\{\left\{y(x)\to-\frac{\sqrt{-3x^2-4ie^{3c_1}x+e^{6c_1}}}{\sqrt{3}}\right\},\left\{y(x)\to\frac{\sqrt{-3x^2-4ie^{3c_1}x+e^{6c_1}}}{\sqrt{3}}\right\}\right\}$$

✓ **Maple** : cpu = 0.528 (sec), leaf count = 203

$$\left\{-c_1-\operatorname{arctanh}\left(\frac{\sqrt{\frac{x^2-3y(x)^2}{x^2}}}{2}\right)+\ln(x)+\frac{\ln\left(\frac{x^2+y(x)^2}{x^2}\right)}{2}+\frac{\sqrt{\frac{x^2-3y(x)^2}{x^2}}}{2}-\frac{\sqrt{3}\sqrt{\frac{\left(\sqrt{3}\,x+3y(x)\right)\left(\sqrt{3}\,x-3y(x)\right)}{x^2}}}{6}=0,-\right.$$

2.498 ODE No. 498

$$(3y(x)-2)y'(x)^2+4y(x)-4=0$$

✓ **Mathematica** : cpu = 0.133399 (sec), leaf count = 155

$$\left\{\left\{y(x)\to \text{InverseFunction}\left[-\sqrt{3(\#1-1)+1}\sqrt{1-\#1}-\frac{\sqrt{1-\#1}\sinh^{-1}\left(\sqrt{3}\sqrt{\#1-1}\right)}{\sqrt{3}\sqrt{\#1-1}}\&\right][-2x+c_1]\right\},\left\{y(\right.\right.$$

✓ **Maple** : cpu = 0.388 (sec), leaf count = 99

$$\left\{y(x)=1,y(x)=\frac{\sin\left(\text{RootOf}\left(48c_1^2-8c_1\sqrt{3}\_Z-96c_1x+\_Z^2+8\sqrt{3}\_Zx+48x^2-\left(\cos^2\left(\_Z\right)\right)\right)\right)}{6}+\frac{5}{6},y(x)\right.$$

2.499 ODE No. 499

$$a^2\left(-x^2\right)-2a^2xy(x)y'(x)+\left(1-a^2\right)y(x)^2y'(x)^2+y(x)^2=0$$

✓ **Mathematica** : cpu = 0.40395 (sec), leaf count = 212

$$\left\{\left\{y(x)\to -\frac{\sqrt{a^6\left(-x^2\right)+3a^4x^2-3a^2x^2+2a^2xe^{a^2c_1-c_1}-2xe^{a^2c_1-c_1}+e^{2a^2c_1-2c_1}+x^2}}{\sqrt{a^6-3a^4+3a^2-1}}\right\},\left\{y(x)\to \frac{\sqrt{a^6\left(-x^2\right)}}{}\right.\right.$$

✓ **Maple** : cpu = 0.254 (sec), leaf count = 189

$$\left\{y(x)=x\,\text{RootOf}\left(c_1+\int^{\_Z}\frac{\left(-\_a^2a^2+\_a^2-a^2+\sqrt{\_a^2a^2-\_a^2+a^2}\right)\_a}{\left(\_a^2a^2-\_a^2+a^2\right)\left(\_a^2+1\right)}d\_a-\ln\left(x\right)\right),y(x)=x\,\text{RootOf}\right.$$

2.500 ODE No. 500

$$(a-b)y(x)^2y'(x)^2-ab+ay(x)^2-bx^2-2bxy(x)y'(x)=0$$

✓ **Mathematica** : cpu = 1.05828 (sec), leaf count = 100

$$\left\{\left\{y(x)\to -\frac{\sqrt{-ab+ax^2-2ac_1x+ac_1{}^2+b^2-bx^2}}{\sqrt{b-a}}\right\},\left\{y(x)\to \frac{\sqrt{-ab+ax^2-2ac_1x+ac_1{}^2+b^2-bx^2}}{\sqrt{b-a}}\right\}\right\}$$

✓ **Maple** : cpu = 0.978 (sec), leaf count = 220

$$\left\{y(x)=\frac{\sqrt{\left(-c_1a+\left(-x^2+a+c_1\right)b-2\sqrt{-\left(-c_1+b\right)ab}\,x\right)b}}{b},y(x)=\frac{\sqrt{\left(-c_1a+\left(-x^2+a+c_1\right)b+2\sqrt{-\left(-c\right.}\right.}}{b}\right.$$

2.501 ODE No. 501

$$y'(x)^2\left(ay(x)^2+bx+c\right)-by(x)y'(x)+dy(x)^2=0$$

✓ **Mathematica** : cpu = 22.4866 (sec), leaf count = 975

$$\left\{\text{Solve}\left[\left\{y(x)=\frac{bK[1]-\sqrt{-K[1]^2\left(-b^2+4axK[1]^2b+4dxb+4acK[1]^2+4cd\right)}}{2\left(aK[1]^2+d\right)},x=\frac{-b^2c_1{}^2d^4-ab^2c_1{}^2K[1]^2c\right.\right.\right.$$

✓ **Maple** : cpu = 4.77 (sec), leaf count = 215

$$\left\{\left[x(\_T)=-\frac{\sqrt{\_T^2a+d}\,b^2\ln\left(\frac{d+\sqrt{\_T^2a+d}\sqrt{d}}{\_T}\right)^2-4c_1bd-2\ln(2)b^2\sqrt{d}+\left(-2b^2\sqrt{d}+\left(4c_1b\sqrt{d}+2\ln(2)b^2\right)\right.}{4\sqrt{\_T^2a+}}\right.\right.$$

2.502 ODE No. 502

$$(ay(x)-bx)^2\left(a^2y'(x)^2+b^2\right)-c^2\left(ay'(x)+b\right)^2=0$$

✓ **Mathematica** : cpu = 1.27299 (sec), leaf count = 100

$$\left\{\left\{y(x)\to\frac{bc_1}{a}-\frac{\sqrt{b^2\left(-x^2\right)+2b^2c_1x-b^2c_1{}^2+c^2}}{a}\right\},\left\{y(x)\to\frac{\sqrt{b^2\left(-x^2\right)+2b^2c_1x-b^2c_1{}^2+c^2}}{a}+\frac{bc_1}{a}\right\}\right\}$$

✓ **Maple** : cpu = 0.354 (sec), leaf count = 195

$$\left\{y(x)=\frac{a\,\text{RootOf}\left(c_1-x+\int^{\_Z}\frac{\left(-\_a^2a^2+2c^2+\sqrt{-(\_a^2a^2-2c^2)\_a^2a^2}\right)a}{2(\_a^2a^2-2c^2)b}d\_a\right)+bx}{a},y(x)=\frac{a\,\text{RootOf}\left(c_1-x+\int^{-}\right.}{}\right.$$

2.503 ODE No. 503

$$\text{a0}+y'(x)(\text{a1}x+\text{b1}y(x)+\text{c1})+y'(x)^2(\text{a2}x+\text{b2}y(x)+\text{c2})^2+\text{b0}y(x)+\text{c0}=0$$

✗ **Mathematica** : cpu = 300.047 (sec), leaf count = 0 , timed out

`$Aborted`

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve((b2*y(x)+a2*x+c2)^2*diff(y(x),x)^2+(a1*x+b1*y(x)+c1)*diff(y(x),x)+b0*y(x)+a0+c0=0,y(x
```

2.504 ODE No. 504

$$-\left(-a+x^3+y(x)^3\right)y'(x)+x^2y(x)+xy(x)^2y'(x)^2=0$$

✓ **Mathematica** : cpu = 0.0746197 (sec), leaf count = 36

$$\left\{y(x)\to\frac{\sqrt[3]{c_1}\sqrt[3]{a-x^3+c_1x^3}}{\sqrt[3]{-1+c_1}}\right\}$$

✓ **Maple** : cpu = 0.822 (sec), leaf count = 247

$$\left\{-c_1+\int_{\_b}^{y(x)}\frac{\_a^2}{\sqrt{x^6+\left(-2\_a^3-2a\right)x^3+\left(-\_a^3+a\right)^2}}d\_a-\frac{\ln(x)}{2}=0,-c_1+\int_{\_b}^{y(x)}\frac{\_a^2}{\sqrt{x^6+\left(-2\_a^3-2a\right)x^3+}}\right.$$

2.505 ODE No. 505

$$-x^3+xy(x)^2y'(x)^2-2y(x)^3y'(x)+2xy(x)^2=0$$

✓ **Mathematica** : cpu = 0.109843 (sec), leaf count = 73

$$\left\{\left\{y(x)\to-\sqrt{x^2+2c_1}\right\},\left\{y(x)\to\sqrt{x^2+2c_1}\right\},\left\{y(x)\to-\sqrt{x^2+c_1x^4}\right\},\left\{y(x)\to\sqrt{x^2+c_1x^4}\right\}\right\}$$

✓ **Maple** : cpu = 0.037 (sec), leaf count = 52

$$\left\{y(x)=\sqrt{x^2+c_1},y(x)=\sqrt{c_1x^2+1}\,x,y(x)=-\sqrt{x^2+c_1},y(x)=-\sqrt{c_1x^2+1}\,x\right\}$$

2.506 ODE No. 506

$$2x^2(y(x)-x)y(x)^2y'(x)+x^2\left(xy(x)^2-1\right)y'(x)^2-\left(\left(x^2y(x)-1\right)y(x)^2\right)=0$$

✗ **Mathematica** : cpu = 57.3959 (sec), leaf count = 0 , could not solve

```
DSolve[-(y[x]^2*(-1 + x^2*y[x])) + 2*x^2*y[x]^2*(-x + y[x])*Derivative[1][y][x] + x^2*(-
1 + x*y[x]^2)*Derivative[1][y][x]^2 == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(x^2*(x*y(x)^2-1)*diff(y(x),x)^2+2*x^2*y(x)^2*(-x+y(x))*diff(y(x),x)-y(x)^2*(x^2*y(x)-
1)=0,y(x))
```

2.507 ODE No. 507

$$\left(y(x)^4-a^2x^2\right)y'(x)^2+2a^2xy(x)y'(x)+y(x)^2\left(y(x)^2-a^2\right)=0$$

✗ **Mathematica** : cpu = 44.2337 (sec), leaf count = 0 , could not solve

```
DSolve[y[x]^2*(-a^2 + y[x]^2) + 2*a^2*x*y[x]*Derivative[1][y][x] + (-(a^2*x^2) + y[x]^4)*Der
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve((y(x)^4-a^2*x^2)*diff(y(x),x)^2+2*a^2*x*y(x)*diff(y(x),x)+y(x)^2*(y(x)^2-
a^2)=0,y(x))
```

2.508 ODE No. 508

$$\left(x^2y(x)^2-x^2+y(x)^4\right)y'(x)^2+2xy(x)y'(x)-y(x)^2=0$$

✓ **Mathematica** : cpu = 2.6248 (sec), leaf count = 88

$$\text{Solve}\left[\frac{\sqrt{x^2+y(x)^2}y(x)\left(\log\left(\frac{x}{\sqrt{x^2+y(x)^2}}+1\right)-\log\left(1-\frac{x}{\sqrt{x^2+y(x)^2}}\right)\right)}{2x^2\sqrt{\frac{y(x)^2(x^2+y(x)^2)}{x^4}}}+y(x)=c_1,y(x)\right]$$

✓ **Maple** : cpu = 2.451 (sec), leaf count = 60

$$\{y(x)=ix,y(x)=-ix,y(x)=c_1-\operatorname{arctanh}\left(\operatorname{RootOf}\left(c_1^2\_Z^2-2c_1\_Z^2\operatorname{arctanh}(\_Z)+\_Z^2x^2+\_Z^2\operatorname{arctanh}(\_\right.\right.$$

2.509 ODE No. 509

$$9\left(x^2-1\right)y(x)^4y'(x)^2-4x^2-6xy(x)^5y'(x)=0$$

✓ **Mathematica** : cpu = 0.332651 (sec), leaf count = 34

$$\left\{y(x)\to-\frac{\sqrt[3]{-\frac{1}{2}}\sqrt[3]{-4x^2+4+c_1{}^2}}{\sqrt[3]{c_1}}\right\}$$

✓ **Maple** : cpu = 1.554 (sec), leaf count = 212

$$\left\{y(x)=\left(-4x^2+4\right)^{\frac{1}{6}},y(x)=-\left(-4x^2+4\right)^{\frac{1}{6}},y(x)=-\frac{\left(1+i\sqrt{3}\right)\left(-4x^2+4\right)^{\frac{1}{6}}}{2},y(x)=\frac{\left(1+i\sqrt{3}\right)\left(-4x^2+4\right)^{\frac{1}{6}}}{2}\right.$$

2.510 ODE No. 510

$$-\left(x^4y(x)^2-1\right)y(x)^2+x^2\left(x^2y(x)^4-1\right)y'(x)^2+2x^3\left(y(x)^2-x^2\right)y(x)^3y'(x)=0$$

✗ **Mathematica** : cpu = 53.9006 (sec), leaf count = 0 , could not solve

```
DSolve[-(y[x]^2*(-1 + x^4*y[x]^2)) + 2*x^3*y[x]^3*(-x^2 + y[x]^2)*Derivative[1][y][x] + x^2*
1 + x^2*y[x]^4)*Derivative[1][y][x]^2 == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(x^2*(x^2*y(x)^4-1)*diff(y(x),x)^2+2*x^3*y(x)^3*(y(x)^2-x^2)*diff(y(x),x)-
y(x)^2*(x^4*y(x)^2-1)=0,y(x))
```

2.511 ODE No. 511

$$\left(a^2\sqrt{x^2+y(x)^2}-x^2\right)y'(x)^2+a^2\sqrt{x^2+y(x)^2}+2xy(x)y'(x)-y(x)^2=0$$

✓ **Mathematica** : cpu = 1.79877 (sec), leaf count = 229

$$\left\{\text{Solve}\left[\tan^{-1}\left(\frac{x}{y(x)}\right)-\frac{2\sqrt{a^2\left(x^2+y(x)^2\right)}\left(\sqrt{x^2+y(x)^2}-a^2\right)\tan^{-1}\left(\frac{\sqrt{\sqrt{x^2+y(x)^2}-a^2}}{a}\right)}{a\sqrt{x^2+y(x)^2}\sqrt{\sqrt{x^2+y(x)^2}-a^2}}=c_1,y(x)\right],\text{Solve}\left[\right.\right.$$

✓ **Maple** : cpu = 5.067 (sec), leaf count = 199

$$\left\{-c_1+\arctan\left(\frac{x}{y\left(x\right)}\right)-\frac{2\sqrt{\left(x^2+y\left(x\right)^2\right)\left(-a^2+\sqrt{x^2+y\left(x\right)^2}\right)}\,a^2\arctan\left(\frac{\sqrt{-a^2+\sqrt{x^2+y(x)^2}}}{a}\right)}{\sqrt{x^2+y\left(x\right)^2}\sqrt{-a^2+\sqrt{x^2+y\left(x\right)^2}}\,a}=0,-c_1+a\right.$$

2.512 ODE No. 512

$$\left(a\left(x^2+y(x)^2\right)^{3/2}-x^2\right)y'(x)^2+a\left(x^2+y(x)^2\right)^{3/2}+2xy(x)y'(x)-y(x)^2=0$$

✓ **Mathematica** : cpu = 7.25726 (sec), leaf count = 713

$$\left\{\text{Solve}\left[\tan^{-1}\left(\frac{x}{y(x)}\right)-\frac{i\sqrt{a\left(\left(x^2+y(x)^2\right)^{5/2}-a\left(x^2+y(x)^2\right)^3\right)}\left(\sqrt{2}\left(\log\left(\frac{a^{3/2}\left(3i\sqrt{2}a\sqrt{x^2+y(x)^2}+4\sqrt{a}\sqrt{\sqrt{x^2+y(}\right.}{4a\sqrt{x^2+y(x)^2}+}\right.\right.\right.}{}\right.\right.$$

✓ **Maple** : cpu = 6.647 (sec), leaf count = 135

$$\left\{y(x)=\frac{x}{\tan\left(\mathrm{RootOf}\left(c_1-\_Z+\int^{\frac{(\tan^2(\_Z)+1)x^2}{\tan(\_Z)^2}}-\frac{\sqrt{-(\sqrt{\_a}\,a-1)\_a^{\frac{5}{2}}a\,(\sqrt{\_a}\,a+1)}}{2(\_a\,a^2-1)\_a^2}d\_a\right)\right)},y(x)=\frac{}{\tan\left(\mathrm{RootOf}\left(c\right.\right.}\right.$$

2.513 ODE No. 513

$$y'(x)^2\sin(y(x))+2xy'(x)\cos^3(y(x))-\sin(y(x))\cos^4(y(x))=0$$

✓ **Mathematica** : cpu = 0.0825941 (sec), leaf count = 81

$$\left\{\left\{y(x)\to\tan^{-1}\left(2\left(-\frac{c_1{}^{3/2}}{\sqrt{x+c_1}}-\frac{\sqrt{c_1}x}{\sqrt{x+c_1}}\right)\right)\right\},\left\{y(x)\to\tan^{-1}\left(2\left(\frac{c_1{}^{3/2}}{\sqrt{x+c_1}}+\frac{\sqrt{c_1}x}{\sqrt{x+c_1}}\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 1.872 (sec), leaf count = 1134

$$\left\{\left[x(\_T)=\frac{\cos^4\left(\frac{\arctan\left(\frac{\_T^2c_1^2-2c_1\left(c_1^3\_T^3+54c_1\_T+6\sqrt{3}\sqrt{(\_T^2c_1^2+27)c_1^2\_T^2}\right)^{\frac{1}{3}}\_T+\left(c_1^3\_T^3+54c_1\_T+6\sqrt{3}\sqrt{(\_T^2c_1^2+27)c_1^2\_T^2}\right)^{\frac{2}{3}}}{\left(c_1^3\_T^3+54c_1\_T+6\sqrt{3}\sqrt{(\_T^2c_1^2+27)c_1^2\_T^2}\right)^{\frac{1}{3}}},-\right.}{}\right)}{}\right.\right.$$

2.514 ODE No. 514

$$y'(x)^2(a\cos(y(x))+b)-c\cos(y(x))+d=0$$

✓ **Mathematica** : cpu = 10.673 (sec), leaf count = 605

$$\left\{\left\{y(x)\to \text{InverseFunction}\left[\frac{4\sin^2\left(\frac{\#1}{2}\right)\csc(\#1)\sqrt{a\cos(\#1)+b}\sqrt{\frac{\cot^2\left(\frac{\#1}{2}\right)(c-d)}{c+d}}\sqrt{\frac{\csc^2\left(\frac{\#1}{2}\right)(a+b)(d-c\cos(\#1))}{ad+bc}}\left(c(a\right.}{c(a}\right.\right.\right.$$

✓ **Maple** : cpu = 0.266 (sec), leaf count = 87

$$\left\{-c_1+x-\left(\int^{y(x)}\frac{a\cos(\_a)+b}{\sqrt{(a\cos(\_a)+b)(c\cos(\_a)-d)}}d\_a\right)=0,-c_1+x-\left(\int^{y(x)}-\frac{a\cos(\_a)+b}{\sqrt{(a\cos(\_a)+b)(c\cos(\right.}\right.\right.$$

2.515 ODE No. 515

$$f\left(x^2+y(x)^2\right)\left(y'(x)^2+1\right)-\left(xy'(x)-y(x)\right)^2=0$$

✓ **Mathematica** : cpu = 2.19266 (sec), leaf count = 1922

$$\left\{\text{Solve}\left[\int_1^x\left(\frac{\sqrt{f\left(K[1]^2+y(x)^2\right)\left(K[1]^2+y(x)^2-f\left(K[1]^2+y(x)^2\right)\right)}K[1]}{f\left(K[1]^2+y(x)^2\right)\left(K[1]^2+y(x)^2\right)}-\frac{\sqrt{f\left(K[1]^2+y(x)^2\right)\left(K[1]^2+y(x)\right.}}{f\left(K[1]^2+y(x)^2\right)\left(K[1]^2+y(x\right.}\right.\right.\right.$$

✓ **Maple** : cpu = 1.44 (sec), leaf count = 117

$$\left\{y(x)=\frac{x}{\tan\left(\text{RootOf}\left(2c_1-2\_Z-\left(\int^{\frac{\left(\tan^2(\_Z)+1\right)x^2}{\tan(\_Z)^2}}\frac{\sqrt{-(-\_a+f(\_a))f(\_a)}}{(-\_a+f(\_a))\_a}d\_a\right)\right)\right)},y(x)=\frac{}{\tan\left(\text{RootOf}\left(2c_1\right.\right.}\right.$$

2.516 ODE No. 516

$$(x^2+y(x)^2)\, f\left(\frac{x}{\sqrt{x^2+y(x)^2}}\right)(y'(x)^2+1)-(xy'(x)-y(x))^2=0$$

✓ **Mathematica** : cpu = 0.573276 (sec), leaf count = 253

$$\left\{\text{Solve}\left[\int_1^{\frac{y(x)}{x}}\frac{f\left(\frac{1}{\sqrt{K[1]^2+1}}\right)K[1]^2+f\left(\frac{1}{\sqrt{K[1]^2+1}}\right)-1}{\sqrt{f\left(\frac{1}{\sqrt{K[1]^2+1}}\right)}(K[1]-i)(K[1]+i)\left(\sqrt{f\left(\frac{1}{\sqrt{K[1]^2+1}}\right)}K[1]+i\sqrt{f\left(\frac{1}{\sqrt{K[1]^2+1}}\right)-1}\right)}dK[1]=-\text{lo}\right.\right.$$

✓ **Maple** : cpu = 0.979 (sec), leaf count = 139

$$\left\{y(x)=x\,\text{RootOf}\left(c_1+\int^{\_Z}\frac{-\_af\left(\frac{1}{\sqrt{\_a^2+1}}\right)+\sqrt{-f\left(\frac{1}{\sqrt{\_a^2+1}}\right)^2+f\left(\frac{1}{\sqrt{\_a^2+1}}\right)}}{(\_a^2+1)\,f\left(\frac{1}{\sqrt{\_a^2+1}}\right)}d\_a-\ln(x)\right),y(x)=x\,\text{Ro}\right.$$

2.517 ODE No. 517

$$(x^2+y(x)^2)\, f\left(\frac{y(x)}{\sqrt{x^2+y(x)^2}}\right)(y'(x)^2+1)-(xy'(x)-y(x))^2=0$$

✓ **Mathematica** : cpu = 0.605819 (sec), leaf count = 283

$$\left\{\text{Solve}\left[\int_1^{\frac{y(x)}{x}}\frac{f\left(\frac{K[1]}{\sqrt{K[1]^2+1}}\right)K[1]^2+f\left(\frac{K[1]}{\sqrt{K[1]^2+1}}\right)-1}{\sqrt{f\left(\frac{K[1]}{\sqrt{K[1]^2+1}}\right)}(K[1]-i)(K[1]+i)\left(\sqrt{f\left(\frac{K[1]}{\sqrt{K[1]^2+1}}\right)}K[1]+i\sqrt{f\left(\frac{K[1]}{\sqrt{K[1]^2+1}}\right)-1}\right)}dK[1]=-\text{lo}\right.\right.$$

✓ **Maple** : cpu = 0.972 (sec), leaf count = 78

$$\left\{y(x)=x\,\text{RootOf}\left(c_1+\int^{\_Z}\frac{-\_af\left(\frac{\_a}{\sqrt{\_a^2+1}}\right)+\sqrt{-f\left(\frac{\_a}{\sqrt{\_a^2+1}}\right)^2+f\left(\frac{\_a}{\sqrt{\_a^2+1}}\right)}}{(\_a^2+1)\,f\left(\frac{\_a}{\sqrt{\_a^2+1}}\right)}d\_a-\ln(x)\right)\right\}$$

2.518 ODE No. 518

$$y'(x)^3 - (y(x) - a)^2 (y(x) - b)^2 = 0$$

✓ **Mathematica** : cpu = 0.59083 (sec), leaf count = 236

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[-\frac{3\sqrt[3]{a-\#1}\left(\frac{\#1-b}{a-b}\right)^{2/3} {}_2F_1\left(\frac{1}{3},\frac{2}{3};\frac{4}{3};\frac{a-\#1}{a-b}\right)}{(b-\#1)^{2/3}}\&\right][x+c_1]\right\},\left\{y(x) \to \text{InverseFunctio}\right.\right.$$

✓ **Maple** : cpu = 0.462 (sec), leaf count = 126

$$\left\{-c_1 + x - \left(\int^{y(x)} \frac{1}{\left((\_a-a)^2 (\_a-b)^2\right)^{\frac{1}{3}}} d\_a\right) = 0, -c_1 + x - \left(\int^{y(x)} -\frac{2}{(1+i\sqrt{3})\left((-\_a+a)^2 (-\_a+b)\right.}\right.\right.$$

2.519 ODE No. 519

$$y'(x)^3 - f(x)\left(ay(x)^2 + by(x) + c\right)^2 = 0$$

✓ **Mathematica** : cpu = 0.702302 (sec), leaf count = 353

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[\frac{\sqrt[3]{2}(2\#1a+b)\left(\frac{a(\#1(\#1a+b)+c)}{4ac-b^2}\right)^{2/3} {}_2F_1\left(\frac{1}{2},\frac{2}{3};\frac{3}{2};\frac{(b+2a\#1)^2}{b^2-4ac}\right)}{a(\#1(\#1a+b)+c)^{2/3}}\&\right]\left[\int_1^x \sqrt[3]{f(K[1])}dK[\right.\right.\right.$$

✓ **Maple** : cpu = 0.537 (sec), leaf count = 197

$$\left\{c_1 + \int^{y(x)} \frac{1}{(\_a^2 a + \_ab + c)^{\frac{2}{3}}} d\_a + \int^x -\frac{\left(\left(ay(x)^2 + by(x) + c\right)^2 f(\_a)\right)^{\frac{1}{3}}}{\left(ay(x)^2 + by(x) + c\right)^{\frac{2}{3}}} d\_a = 0, c_1 + \int^{y(x)} \frac{1}{(\_a^2 a + \_a\right.$$

2.520 ODE No. 520

$$y'(x)^3 + y'(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 0.0247629 (sec), leaf count = 1115

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[\int \frac{\sqrt[3]{-27 1^2 \#1 + 2}}{0\ 2\sqrt[3]{-27 1^2 \#1 + 2\ 0^3 - 0\ 27\ 1^2 + \sqrt{4\left(-0^2 + 3\ 1\ 1\right)^3 + \left(-27 1^2 \#1 + 2\ 0^3 - 0\ 2\right.}}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.336 (sec), leaf count = 249

$$\left\{-c_1 + x - \left(\int^{y(x)} \frac{6\left(108\_a + 12\sqrt{81\_a^2 + 12}\right)^{\frac{1}{3}}}{\left(108\_a + 12\sqrt{81\_a^2 + 12}\right)^{\frac{2}{3}} - 12} d\_a\right) = 0, -c_1 + x - \left(\int^{y(x)} \frac{}{\left(1 + i\sqrt{3}\right)\left(-\left(108\_a + 1\right.\right.}\right.\right.$$

2.521 ODE No. 521

$$y'(x)^3 + xy'(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 0.0035012 (sec), leaf count = 14

$$\left\{\left\{y(x) \to c_1 x + c_1{}^3\right\}\right\}$$

✓ **Maple** : cpu = 0.036 (sec), leaf count = 33

$$\left\{y(x) = c_1\left(c_1^2 + x\right), y(x) = -\frac{2\sqrt{-3x}\,x}{9}, y(x) = \frac{2\sqrt{-3x}\,x}{9}\right\}$$

2.522 ODE No. 522

$$y'(x)^3 - (x+5)y'(x) + y(x) = 0$$

✓ **Mathematica** : cpu = 0.0089831 (sec), leaf count = 20

$$\left\{\left\{y(x) \to c_1 x - c_1{}^3 + 5c_1\right\}\right\}$$

✓ **Maple** : cpu = 0.2 (sec), leaf count = 44

$$\left\{y(x) = c_1\left(-c_1^2 + x + 5\right), y(x) = -\frac{2\sqrt{3x+15}\,(x+5)}{9}, y(x) = \frac{2\sqrt{3x+15}\,(x+5)}{9}\right\}$$

2.523 ODE No. 523

$$-axy'(x) + x^3 + y'(x)^3 = 0$$

✓ **Mathematica** : cpu = 145.417 (sec), leaf count = 392

$$\left\{\left\{y(x) \to \int_1^x \left(\frac{\sqrt[3]{\frac{2}{3}}aK[1]}{\sqrt[3]{\sqrt{3}\sqrt{27K[1]^6 - 4a^3K[1]^3} - 9K[1]^3}} + \frac{\sqrt[3]{\sqrt{3}\sqrt{27K[1]^6 - 4a^3K[1]^3} - 9K[1]^3}}{\sqrt[3]{2}3^{2/3}}\right) dK[1] + c_1\right\}\right.$$

✓ **Maple** : cpu = 0.223 (sec), leaf count = 231

$$\left\{y(x) = c_1 + \int \frac{i\left(\left(i-\sqrt{3}\right)ax + \left(\frac{i}{12} + \frac{\sqrt{3}}{12}\right)\left(-108x^3 + 12\sqrt{-12a^3x^3 + 81x^6}\right)^{\frac{2}{3}}\right)}{\left(-108x^3 + 12\sqrt{-12a^3x^3 + 81x^6}\right)^{\frac{1}{3}}} dx, y(x) = c_1 + \int \frac{i\left(\left(\sqrt{3} + i\right.\right.}{}\right.$$

2.524 ODE No. 524

$$y'(x)^3 - 2y(x)y'(x) + y(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.020245 (sec), leaf count = 422

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[\int \frac{\sqrt[3]{\sqrt{3}\sqrt{\#1^3(27\#1 - 32)} - 9\#1^2}}{\sqrt[3]{2}\left(\sqrt{3}\sqrt{\#1^3(27\#1 - 32)} - 9\#1^2\right)^{2/3} + 4\sqrt[3]{3}\#1} d\#1\&\right]\left[\frac{x}{6^{2/3}} + c_1\right]\right\}, \left\{y(x\right.\right.$$

✓ **Maple** : cpu = 0.207 (sec), leaf count = 243

$$\left\{-c_1 + x - \left(\int^{y(x)} \frac{12\left(-108\_a^2 + 12\sqrt{81\_a^4 - 96\_a^3}\right)^{\frac{1}{3}}}{12\left(i\sqrt{3} - 1\right)^2\_a + \left(i\sqrt{3} - 1\right)\left(-108\_a^2 + 12\sqrt{81\_a^4 - 96\_a^3}\right)^{\frac{2}{3}}} d\_a\right) = 0, -c_1 + x - \left(\right.\right.$$

2.525 ODE No. 525

$$-axy(x)y'(x) + 2ay(x)^2 + y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.0889798 (sec), leaf count = 135

$$\left\{\left\{y(x) \to c_1 \exp\left(\frac{1}{2}\left(\frac{ax^2}{2} + \frac{1}{2}\sqrt{a}x\sqrt{ax^2-8} - 4\log\left(\sqrt{a}\sqrt{ax^2-8} + ax\right)\right)\right)\right\}, \left\{y(x) \to c_1 \exp\left(\frac{1}{2}\left(\frac{ax^2}{2} - \frac{1}{2}\sqrt{\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.237 (sec), leaf count = 122

$$\left\{y(x) = c_1\left(\frac{a^2x}{\sqrt{a^2}} + \sqrt{a^2x^2-8a}\right)^{-\frac{2a}{\sqrt{a^2}}} \mathrm{e}^{\frac{\left(ax+\sqrt{a^2x^2-8a}\right)x}{4}}, y(x) = c_1\left(\frac{a^2x}{\sqrt{a^2}} + \sqrt{a^2x^2-8a}\right)^{\frac{2a}{\sqrt{a^2}}} \mathrm{e}^{\frac{a\,x^2}{4} - \frac{\sqrt{a^2x^2-8a}\,x}{4}}\right\}$$

2.526 ODE No. 526

$$-x^3y(x)^3 - \left(x^2 + xy(x) + y(x)^2\right)y'(x)^2 + \left(x^3y(x) + x^2y(x)^2 + xy(x)^3\right)y'(x) + y'(x)^3 = 0$$

✓ **Mathematica** : cpu = 0.0770687 (sec), leaf count = 45

$$\left\{\left\{y(x) \to \frac{1}{-x-c_1}\right\}, \left\{y(x) \to c_1e^{\frac{x^2}{2}}\right\}, \left\{y(x) \to \frac{x^3}{3} + c_1\right\}\right\}$$

✓ **Maple** : cpu = 0.016 (sec), leaf count = 32

$$\left\{y(x) = \frac{1}{c_1 - x}, y(x) = c_1\mathrm{e}^{\frac{x^2}{2}}, y(x) = \frac{x^3}{3} + c_1\right\}$$

2.527 ODE No. 527

$$-xy(x)^4y'(x) + y'(x)^3 - y(x)^5 = 0$$

✓ **Mathematica** : cpu = 0.0167807 (sec), leaf count = 20

$$\left\{\left\{y(x) \to \frac{1}{c_1\left(x - c_1{}^2\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.929 (sec), leaf count = 43

$$\left\{y(x) = c_1\sqrt{\frac{c_1^{10}}{\left(c_1^4x-1\right)^2}}, y(x) = -\frac{3\sqrt{3}}{2x^{\frac{3}{2}}}, y(x) = \frac{3\sqrt{3}}{2x^{\frac{3}{2}}}\right\}$$

2.528 ODE No. 528

$$abx + ay'(x)^2 + by(x) + y'(x)^3 = 0$$

✓ **Mathematica** : cpu = 0.988976 (sec), leaf count = 398

$$\text{Solve}\left[\left\{x = -\frac{-a\left(\frac{\sqrt[3]{-2a^3+\sqrt{(-2a^3-27abx-27by(x))^2-4a^6}-27abx-27by(x)}}{3\sqrt[3]{2}} + \frac{\sqrt[3]{2}a^2}{3\sqrt[3]{-2a^3+\sqrt{(-2a^3-27abx-27by(x))^2-4a^6}-27abx-\right.}}\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.124 (sec), leaf count = 86

$$\left\{y(x) = -ax - \frac{\left(-a + e^{\mathrm{RootOf}\left(-2\_Za^2+2c_1b-5a^2+8a\,e^{\_Z}-2bx-3\,e^{2\_Z}\right)}\right)^2 e^{\mathrm{RootOf}\left(-2\_Za^2+2c_1b-5a^2+8a\,e^{\_Z}-2bx-3\,e^{2\_Z}\right)}}{b}\right\}$$

2.529 ODE No. 529

$$y'(x)^3 + xy'(x)^2 - y(x) = 0$$

✓ **Mathematica** : cpu = 43.4744 (sec), leaf count = 1758

$$\left\{\left\{y(x) \to \frac{1}{2}\left(\frac{4\,2^{2/3}x^4}{3\left(-16x^3-72x^2-108x+216c_1+\sqrt{4\left(-4x^2-12x-9\right)^3+\left(-16x^3-72x^2-108x+216c_1+5\right.}\right.}\right.\right.\right.$$

✓ **Maple** : cpu = 0.195 (sec), leaf count = 1251

$$\left\{y(x) = 0, y(x) = \frac{\left(4x^2+12x+(4x-6)\left(-8x^3-36x^2+108c_1-54x+27+6\sqrt{-6\left(2c_1+1\right)\left(4x^3+18x^2+2\right.}\right.\right.}{}\right.$$

2.530 ODE No. 530

$$y'(x)^3 - y(x)y'(x)^2 + y(x)^2 = 0$$

✓ **Mathematica** : cpu = 8.89628 (sec), leaf count = 648

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[\int_1^{\#1} \frac{\sqrt[3]{2K[1]^3 - 27K[1]^2 + 3\sqrt{3}\sqrt{-K[1]^4(}}}{2\sqrt[3]{2}K[1]^2 + 2\sqrt[3]{2K[1]^3 - 27K[1]^2 + 3\sqrt{3}\sqrt{-K[1]^4(4K[1]-27)}}K[1] + 2^{2/3}\,(}\right.\right.\right.$$

✓ **Maple** : cpu = 0.25 (sec), leaf count = 424

$$\left\{-c_1 + x - \left(\int^{y(x)} -\frac{12(8\_a^3 - 108\_a^2 + 12\sqrt{-12}}{4i\sqrt{3}\_a^2 + 4\_a^2 - 4\left(8\_a^3 - 108\_a^2 + 12\sqrt{-12\_a^5 + 81\_a^4}\right)^{\frac{1}{3}}\_a - i\sqrt{3}\,(8\_a^3 - 108\_}\right.\right.$$

2.531 ODE No. 531

$$-x^3y(x)^6 - \left(x^2 + y(x)^4 + xy(x)^2\right)y'(x)^2 + \left(x^3y(x)^2 + x^2y(x)^4 + xy(x)^6\right)y'(x) + y'(x)^2 = 0$$

✗ **Mathematica** : cpu = 66.2943 (sec), leaf count = 0 , could not solve

```
DSolve[-(x^3*y[x]^6) + (x^3*y[x]^2 + x^2*y[x]^4 + x*y[x]^6)*Derivative[1][y][x] + Derivative
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(y(x),x)^2-(y(x)^4+x*y(x)^2+x^2)*diff(y(x),x)^2+(x*y(x)^6+x^2*y(x)^4+x^3*y(x)^2)*
x^3*y(x)^6=0,y(x))
```

2.532 ODE No. 532

$$ay'(x)^3 + by'(x)^2 + cy'(x) - d - y(x) = 0$$

✓ **Mathematica** : cpu = 0.0291744 (sec), leaf count = 1124

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[\int \frac{\sqrt[3]{2b^3 - 9acb - 27a^2c}}{2b\sqrt[3]{2b^3 - 9acb - 27a^2d - 27a^2\#1 + \sqrt{4\left(3ac-b^2\right)^3 + \left(2b^3 - 9acb - 27a^2d - 27\right.}}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.478 (sec), leaf count = 874

$$\left\{-c_1+x-\left(\int^{y(x)}\frac{6\,6^{\frac{1}{3}}\left(36abc-8b^3+(108\_a\right.}{-12\,6^{\frac{1}{3}}ac+4\,6^{\frac{1}{3}}b^2-4\,27^{\frac{1}{3}}\left(\sqrt{3}\left(\frac{\sqrt{-b^2c^2+(-4\_a-4d)b^3+27(\_a+d)^2a^2+18\left(\frac{2c^2}{9}+(\_a+d)b\right)ac\,a}}{3}+\left(\right.\right.\right.}\right.\right.$$

2.533 ODE No. 533

$$a+xy'(x)^3-y(x)y'(x)^2=0$$

✓ **Mathematica** : cpu = 0.0049101 (sec), leaf count = 16

$$\left\{\left\{y(x)\to\frac{a}{{c_1}^2}+c_1x\right\}\right\}$$

✓ **Maple** : cpu = 0.197 (sec), leaf count = 76

$$\left\{y(x)=\frac{xc_1^3+a}{c_1^2},y(x)=\frac{3\,2^{\frac{1}{3}}\left(a\,x^2\right)^{\frac{1}{3}}}{2},y(x)=-\frac{3\,2^{\frac{1}{3}}\left(a\,x^2\right)^{\frac{1}{3}}\left(1+i\sqrt{3}\right)}{4},y(x)=\frac{3\,2^{\frac{1}{3}}\left(a\,x^2\right)^{\frac{1}{3}}\left(i\sqrt{3}-1\right)}{4}\right\}$$

2.534 ODE No. 534

$$4xy'(x)^3-6y(x)y'(x)^2+3y(x)-x=0$$

✓ **Mathematica** : cpu = 0.0629499 (sec), leaf count = 114

$$\left\{\left\{y(x)\to\frac{-\sqrt{2}\sqrt{c_1x^3+3{c_1}^2x^2+3{c_1}^3x+{c_1}^4}-{c_1}^2}{3c_1}\right\},\left\{y(x)\to\frac{\sqrt{2}\sqrt{c_1x^3+3{c_1}^2x^2+3{c_1}^3x+{c_1}^4}-{c_1}^2}{3c_1}\right\}\right\}$$

✓ **Maple** : cpu = 0.059 (sec), leaf count = 84

$$\left\{y(x)=x,y(x)=-\frac{\left(1+\sqrt{3}\right)x}{2},y(x)=\frac{\left(\sqrt{3}-1\right)x}{2},y(x)=\frac{-c_1^2-\sqrt{2}\left(c_1+x\right)\sqrt{c_1\left(c_1+x\right)}}{3c_1},y(x)=\frac{-c_1^2+\sqrt{2}\,(\right.}{}$$

2.535 ODE No. 535

$$8xy'(x)^3 - 12y(x)y'(x)^2 + 9y(x) = 0$$

✓ **Mathematica** : cpu = 0.0503043 (sec), leaf count = 49

$$\left\{\left\{y(x) \to -\frac{(x+3c_1)^{3/2}}{3\sqrt{c_1}}\right\}, \left\{y(x) \to \frac{(x+3c_1)^{3/2}}{3\sqrt{c_1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.052 (sec), leaf count = 51

$$\left\{y(x) = 0, y(x) = -\frac{3x}{2}, y(x) = \frac{3x}{2}, y(x) = -\frac{(c_1(3c_1+x))^{\frac{3}{2}}}{3c_1^2}, y(x) = \frac{(c_1(3c_1+x))^{\frac{3}{2}}}{3c_1^2}\right\}$$

2.536 ODE No. 536

$$bx\left(x^2 - a^2\right)y'(x)^2 + \left(x^2 - a^2\right)y'(x)^3 + bx + y'(x) = 0$$

✓ **Mathematica** : cpu = 0.0157011 (sec), leaf count = 64

$$\left\{\left\{y(x) \to -\frac{bx^2}{2} + c_1\right\}, \left\{y(x) \to -\tan^{-1}\left(\frac{x}{\sqrt{a^2-x^2}}\right) + c_1\right\}, \left\{y(x) \to \tan^{-1}\left(\frac{x}{\sqrt{a^2-x^2}}\right) + c_1\right\}\right\}$$

✓ **Maple** : cpu = 0.04 (sec), leaf count = 52

$$\left\{y(x) = c_1 - \arctan\left(\frac{x}{\sqrt{a^2-x^2}}\right), y(x) = c_1 + \arctan\left(\frac{x}{\sqrt{a^2-x^2}}\right), y(x) = -\frac{b\,x^2}{2} + c_1\right\}$$

2.537 ODE No. 537

$$\left(x^6 + 3xy(x)^2\right)y'(x) - 2x^5y(x) + x^3y'(x)^3 - 3x^2y(x)y'(x)^2 - y(x)^3 = 0$$

✓ **Mathematica** : cpu = 0.0358459 (sec), leaf count = 16

$$\left\{\left\{y(x) \to x\left(c_1x + c_1{}^3\right)\right\}\right\}$$

✓ **Maple** : cpu = 4.172 (sec), leaf count = 250

$$\left\{y(x) = x^{\frac{5}{2}}\,\mathrm{RootOf}\left(c_1 + \int^{\_Z} \frac{18\left(-\frac{4\left(-9\_a+\sqrt{81\_a^2+12}\right)}{(27\_a^2+4)\sqrt{81\_a^2+12}}\right)^{\frac{2}{3}}\_a^2 - 18\left(-\frac{4\left(-9\_a+\sqrt{81\_a^2+12}\right)}{(27\_a^2+4)\sqrt{81\_a^2+12}}\right)^{\frac{1}{3}}\_a^2 + \frac{8\left(-\frac{4\left(-\right.}{\left(27\right.}\right.}{}}{\left(-\frac{4\left(-9\_a+\sqrt{81\_a^2+12}\right)}{(27\_a^2+4)\sqrt{81\_a^2+12}}\right)^{\frac{1}{3}}\left(27\_a^2+\right.}\right.\right.$$

2.538 ODE No. 538

$$2(xy'(x)+y(x))^3-y(x)y'(x)=0$$

✓ **Mathematica** : cpu = 9.98446 (sec), leaf count = 113

$$\left\{\left\{y(x)\to\frac{\int_1^x\frac{\text{InverseFunction}\left[-\frac{2\sqrt{\#1^2-8\#1^3}\tan^{-1}\left(\sqrt{8\#1-1}\right)}{\#1\sqrt{8\#1-1}}+\log(8\#1-1)+\log\left(1+\frac{1}{8\#1-1}\right)+\frac{3\sqrt{\#1^2-8\#1^3}}{\#1}\&\right][c_1+2\log(K[1])]}{K[1]}dK[1]}{x}\right\}\right\}$$

✓ **Maple** : cpu = 1.191 (sec), leaf count = 1625

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2.539 ODE No. 539

$$\sin(x)y'(x)^3-y'(x)^2\left(y(x)\sin(x)-\cos^2(x)\right)-y'(x)\left(y(x)\cos^2(x)+\sin(x)\right)+y(x)\sin(x)=0$$

✓ **Mathematica** : cpu = 0.0430559 (sec), leaf count = 45

$$\left\{\{y(x)\to c_1e^x\},\{y(x)\to-\cos(x)+c_1\},\left\{y(x)\to-\log\left(\sin\left(\frac{x}{2}\right)\right)+\log\left(\cos\left(\frac{x}{2}\right)\right)+c_1\right\}\right\}$$

✓ **Maple** : cpu = 0.056 (sec), leaf count = 32

$$\{y(x)=c_1\mathrm{e}^x,y(x)=c_1-\cos(x),y(x)=c_1-\ln(-\cot(x)+\csc(x))\}$$

2.540 ODE No. 540

$$2y(x)y'(x)^3-y(x)y'(x)^2+2xy'(x)-x=0$$

✓ **Mathematica** : cpu = 0.0377344 (sec), leaf count = 69

$$\left\{\left\{y(x)\to\frac{x}{2}+c_1\right\},\left\{y(x)\to\frac{\left(3c_1-2ix^{3/2}\right)^{2/3}}{2^{2/3}}\right\},\left\{y(x)\to\frac{\left(2ix^{3/2}+3c_1\right)^{2/3}}{2^{2/3}}\right\}\right\}$$

✓ **Maple** : cpu = 0.076 (sec), leaf count = 109

$$\left\{\frac{c_1x}{\left(\frac{-x+y(x)-\sqrt{-xy(x)}}{y(x)}\right)^{\frac{2}{3}}\left(\frac{y(x)+\sqrt{-xy(x)}}{y(x)}\right)^{\frac{2}{3}}y(x)}+x=0,\frac{c_1x}{\left(\frac{-x+y(x)+\sqrt{-xy(x)}}{y(x)}\right)^{\frac{2}{3}}\left(\frac{y(x)-\sqrt{-xy(x)}}{y(x)}\right)^{\frac{2}{3}}y(x)}+x=0,y(x$$

2.541 ODE No. 541

$$y(x)^2y'(x)^3 + 2xy'(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 0.0312306 (sec), leaf count = 39

$$\left\{\left\{y(x)\to -\sqrt{2c_1x+c_1{}^3}\right\},\left\{y(x)\to \sqrt{2c_1x+c_1{}^3}\right\}\right\}$$

✓ **Maple** : cpu = 0.533 (sec), leaf count = 103

$$\left\{y(x)=\sqrt{c_1^3+2c_1x},y(x)=-\sqrt{c_1^3+2c_1x},y(x)=-\frac{2\,2^{\frac{1}{4}}3^{\frac{1}{4}}\left(-x^3\right)^{\frac{1}{4}}}{3},y(x)=\frac{2\,2^{\frac{1}{4}}3^{\frac{1}{4}}\left(-x^3\right)^{\frac{1}{4}}}{3},y(x)=-\frac{2i2^{\frac{1}{4}}3^{\frac{1}{4}}\left(-\right.}{3}\right.$$

2.542 ODE No. 542

$$16y(x)^2y'(x)^3 + 2xy'(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 0.0342954 (sec), leaf count = 20

$$\left\{\left\{y(x)\to \sqrt{c_1x+2c_1{}^3}\right\}\right\}$$

✓ **Maple** : cpu = 0.522 (sec), leaf count = 107

$$\left\{y(x)=\sqrt{16c_1^3+2c_1x},y(x)=-\sqrt{16c_1^3+2c_1x},y(x)=-\frac{2^{\frac{1}{4}}3^{\frac{1}{4}}\left(-x^3\right)^{\frac{1}{4}}}{3},y(x)=\frac{2^{\frac{1}{4}}3^{\frac{1}{4}}\left(-x^3\right)^{\frac{1}{4}}}{3},y(x)=-\frac{i2^{\frac{1}{4}}3^{\frac{1}{4}}\left(-\right.}{3}\right.$$

2.543 ODE No. 543

$$x\left(x^2+1\right)y'(x) - x^2y(x) + y(x)^3\left(-y'(x)^2\right) + xy(x)^2y'(x)^3 = 0$$

✓ **Mathematica** : cpu = 0.0341982 (sec), leaf count = 55

$$\left\{\left\{y(x)\to -\sqrt{c_1x^2+\frac{c_1}{1+c_1{}^2}}\right\},\left\{y(x)\to \sqrt{c_1x^2+\frac{c_1}{1+c_1{}^2}}\right\}\right\}$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(x*y(x)^2*diff(y(x),x)^3-y(x)^3*diff(y(x),x)^2+x*(x^2+1)*diff(y(x),x)-x^2*y(x)=0,y(x))
```

2.544 ODE No. 544

$$x^7y(x)^2y'(x)^3-\left(3x^6y(x)^3-1\right)y'(x)^2+3x^5y(x)^4y'(x)-x^4y(x)^5=0$$

✓ **Mathematica** : cpu = 0.0830218 (sec), leaf count = 22

$$\left\{\left\{y(x)\to\sqrt[3]{c_1x^3+c_1{}^{2/3}}\right\}\right\}$$

✓ **Maple** : cpu = 0.822 (sec), leaf count = 4201

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2.545 ODE No. 545

$$y'(x)^4-(y(x)-a)^3(y(x)-b)^2=0$$

✓ **Mathematica** : cpu = 0.925847 (sec), leaf count = 323

$$\left\{\left\{y(x)\to\text{InverseFunction}\left[-\frac{4\sqrt[4]{a-\#1}\sqrt{\frac{\#1-b}{a-b}}\,{}_2F_1\left(\frac{1}{4},\frac{1}{2};\frac{5}{4};\frac{a-\#1}{a-b}\right)}{\sqrt{b-\#1}}\&\right]\left[-\sqrt[4]{-1}x+c_1\right]\right\},\left\{y(x)\to\text{InverseFun}\right.\right.$$

✓ **Maple** : cpu = 0.214 (sec), leaf count = 144

$$\left\{-c_1+x-\left(\int^{y(x)}\frac{1}{\left((\_a-a)^3\,(\_a-b)^2\right)^{\frac{1}{4}}}d\_a\right)=0,-c_1+x-\left(\int^{y(x)}\frac{i}{\left(-(-\_a+a)^3\,(-\_a+b)^2\right)^{\frac{1}{4}}}d\_a\right)\right.$$

2.546 ODE No. 546

$$y'(x)^4+3(x-1)y'(x)^2-3(2y(x)-1)y'(x)+3x=0$$

✓ **Mathematica** : cpu = 0.0423178 (sec), leaf count = 113

$$\left\{\left\{y(x)\to\frac{1}{12}\left(-\sqrt{64x^3+48c_1{}^2x^2+12c_1{}^4x+c_1{}^6}-6c_1x+6-c_1{}^3+6c_1\right)\right\},\left\{y(x)\to\frac{1}{12}\left(\sqrt{64x^3+48c_1{}^2x^2+\right.\right.\right.$$

✓ **Maple** : cpu = 0.099 (sec), leaf count = 171

$$\left\{y(x)=\frac{-2c_1^4+(-14x+6)\,c_1^2-16x^2+c_1\left(-\left(c_1^2+4x\right)^{\frac{3}{2}}+6\right)+\left(-c_1^3+c_1(-6x+6)+6\right)\sqrt{c_1^2+4x}}{12c_1+12\sqrt{c_1^2+4x}},y(x)=\frac{-2}{}\right.$$

2.547 ODE No. 547

$$y'(x)^4 - 4y(x)\left(xy'(x) - 2y(x)\right)^2 = 0$$

✓ **Mathematica** : cpu = 3.17277 (sec), leaf count = 490

$$\left\{\text{Solve}\left[\frac{\sqrt{\left(x^2-4\sqrt{y(x)}\right)y(x)}\log\left(\sqrt{x^2-4\sqrt{y(x)}}+x\right)}{\sqrt{x^2-4\sqrt{y(x)}}\sqrt{y(x)}} - \frac{\sqrt{x^2-4\sqrt{y(x)}}\sqrt{y(x)}\log(y(x))}{4\sqrt{\left(x^2-4\sqrt{y(x)}\right)y(x)}} + \frac{1}{4}\log(y(x)) = c\right.\right.$$

✓ **Maple** : cpu = 0.254 (sec), leaf count = 118

$$\left\{\frac{\left(-x+\sqrt{x^2-4\sqrt{y(x)}}\right)^{\frac{\sqrt{x^2y(x)-4y(x)^{\frac{3}{2}}}}{\sqrt{x^2-4\sqrt{y(x)}}\sqrt{y(x)}}}\left(x+\sqrt{x^2-4\sqrt{y(x)}}\right)^{-\frac{\sqrt{x^2y(x)-4y(x)^{\frac{3}{2}}}}{\sqrt{x^2-4\sqrt{y(x)}}\sqrt{y(x)}}}}{\sqrt{y(x)}} - c_1 = 0, y(x) = \frac{x^4}{16}\right\}$$

2.548 ODE No. 548

$$y'(x)^6 - (y(x)-a)^4(y(x)-b)^3 = 0$$

✓ **Mathematica** : cpu = 1.09469 (sec), leaf count = 479

$$\left\{\left\{y(x)\to\text{InverseFunction}\left[-\frac{3\sqrt[3]{a-\#1}\sqrt{\frac{\#1-b}{a-b}}\,{}_2F_1\left(\frac{1}{3},\frac{1}{2};\frac{4}{3};\frac{a-\#1}{a-b}\right)}{\sqrt{b-\#1}}\&\right][c_1-ix]\right\},\left\{y(x)\to\text{InverseFunction}\left[\right.\right.\right.$$

✓ **Maple** : cpu = 0.413 (sec), leaf count = 250

$$\left\{-c_1+x-\left(\int^{y(x)}\frac{1}{\left((\_a-a)^4(\_a-b)^3\right)^{\frac{1}{6}}}d\_a\right)=0, -c_1+x-\left(\int^{y(x)}-\frac{1}{\left(-(-\_a+a)^4(-\_a+b)^3\right)^{\frac{1}{6}}}d\_a\right.\right.$$

2.549 ODE No. 549

$$x^2\left(y'(x)^2+1\right)^3-a^2=0$$

✓ **Mathematica** : cpu = 0.252285 (sec), leaf count = 216

$$\left\{\left\{y(x)\to -x\left(\frac{a^{2/3}}{x^{2/3}}-1\right)^{3/2}+c_1\right\},\left\{y(x)\to x\left(\frac{a^{2/3}}{x^{2/3}}-1\right)^{3/2}+c_1\right\},\left\{y(x)\to c_1-x\left(-1-\frac{i\left(\sqrt{3}-i\right)a^{2/3}}{2x^{2/3}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.758 (sec), leaf count = 553

$$\left\{y(x)=c_1+\frac{\sqrt{-\frac{\left(a^2x\right)^{\frac{4}{3}}\left(-a^2+\left(a^2x\right)^{\frac{2}{3}}\right)}{a^4}}\left(a^2-\left(a^2x\right)^{\frac{2}{3}}\right)}{\left(a^2x\right)^{\frac{2}{3}}},y(x)=c_1+\frac{\sqrt{-\frac{\left(a^2x\right)^{\frac{4}{3}}\left(-a^2+\left(a^2x\right)^{\frac{2}{3}}\right)}{a^4}}\left(-a^2+\left(a^2x\right)^{\frac{2}{3}}\right)}{\left(a^2x\right)^{\frac{2}{3}}},y(x)\right.$$

2.550 ODE No. 550

$$-ay(x)^s-bx^{\frac{rs}{r-s}}+y'(x)^r=0$$

✓ **Mathematica** : cpu = 0.831968 (sec), leaf count = 488

$$\text{Solve}\left[\int_1^{y(x)}\left(\frac{r}{-rx\left(aK[2]^s+bx^{\frac{rs}{r-s}}\right)^{\frac{1}{r}}+sx\left(aK[2]^s+bx^{\frac{rs}{r-s}}\right)^{\frac{1}{r}}+rK[2]}-\int_1^x\left(\frac{asK[2]^{s-1}\left(a\right.}{rK[1]\left(aK[2]^s+bK[1]^{\frac{rs}{r-s}}\right)^{\frac{1}{r}}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.273 (sec), leaf count = 60

$$\left\{-c_1+(-r+s)\left(\int_{\_b}^{y(x)}\frac{1}{-\_ar+(r-s)\,x\left(a\_a^s+b\,x^{\frac{rs}{r-s}}\right)^{\frac{1}{r}}}d\_a\right)+\ln(x)=0\right\}$$

2.551 ODE No. 551

$$y'(x)^n - f(x)^n(y(x)-a)^{n+1}(y(x)-b)^{n-1} = 0$$

✓ **Mathematica** : cpu = 0.184622 (sec), leaf count = 86

$$\left\{\left\{y(x)\to \frac{-bn^n - a(a-b)^n\left(\int_1^x (-1)^{1+\frac{1}{n}} f(K[1])dK[1]+c_1\right)^n}{-n^n-(a-b)^n\left(\int_1^x (-1)^{1+\frac{1}{n}} f(K[1])dK[1]+c_1\right)^n}\right\}\right\}$$

✓ **Maple** : cpu = 0.622 (sec), leaf count = 55

$$\left\{y(x) = \frac{b\left(-\frac{n}{(a-b)(c_1+\int f(x)dx)}\right)^n - a}{\left(-\frac{n}{(a-b)(c_1+\int f(x)dx)}\right)^n - 1}\right\}$$

2.552 ODE No. 552

$$y'(x)^n - f(x)g(y(x)) = 0$$

✓ **Mathematica** : cpu = 0.0533426 (sec), leaf count = 41

$$\left\{\left\{y(x)\to \text{InverseFunction}\left[\int_1^{\#1} g(K[1])^{-1/n}dK[1]\&\right]\left[\int_1^x f(K[2])^{\frac{1}{n}}dK[2]+c_1\right]\right\}\right\}$$

✓ **Maple** : cpu = 0.087 (sec), leaf count = 43

$$\left\{c_1 + \int^{y(x)} g(\_a)^{-\frac{1}{n}}\,d\_a + \int^x -(f(\_a)\,g(y(x)))^{\frac{1}{n}}\,g(y(x))^{-\frac{1}{n}}\,d\_a = 0\right\}$$

2.553 ODE No. 553

$$ay'(x)^m + by'(x)^n - y(x) = 0$$

✓ **Mathematica** : cpu = 0.270773 (sec), leaf count = 56

$$\text{Solve}\left[\left\{x = \frac{amK[1]^{m-1}}{m-1} + \frac{bnK[1]^{n-1}}{n-1} + c_1, y(x) = aK[1]^m + bK[1]^n\right\}, \{y(x), K[1]\}\right]$$

✓ **Maple** : cpu = 0.063 (sec), leaf count = 36

$$\left\{-c_1 + x - \left(\int^{y(x)} \frac{1}{\text{RootOf}\left(-a\_Z^m - b\_Z^n + \_a\right)}d\_a\right) = 0, y(x) = 0\right\}$$

2.554 ODE No. 554

$$x^{n-1}y'(x)^n - nxy'(x) + y(x) = 0$$

✓ **Mathematica** : cpu = 0.170876 (sec), leaf count = 54

$$\text{Solve}\left[\left\{y(x) = \frac{nx^2K[1] - x^nK[1]^n}{x}, x = c_1(K[1] - nK[1])^{\frac{n}{1-n}}\right\}, \{y(x), K[1]\}\right]$$

✓ **Maple** : cpu = 0.39 (sec), leaf count = 32

$$\left\{y(x) = \frac{c_1^2 n\left(\frac{x}{c_1}\right)^{\frac{1}{n}} - \left(\frac{1}{c_1}\right)^{-n}}{c_1}\right\}$$

2.555 ODE No. 555

$$xy'(x) + \sqrt{y'(x)^2 + 1} - y(x) = 0$$

✓ **Mathematica** : cpu = 0.0073882 (sec), leaf count = 20

$$\left\{\left\{y(x) \to c_1x + \sqrt{1 + c_1{}^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.033 (sec), leaf count = 15

$$\left\{y(x) = c_1x + \sqrt{c_1^2 + 1}\right\}$$

2.556 ODE No. 556

$$xy'(x)^2 + \sqrt{y'(x)^2 + 1} + y(x) = 0$$

✓ **Mathematica** : cpu = 5.32891 (sec), leaf count = 67

$$\text{Solve}\left[\left\{x = \frac{-\sqrt{K[1]^2 + 1} - \sinh^{-1}(K[1])}{(K[1] + 1)^2} + \frac{c_1}{(K[1] + 1)^2}, y(x) = -xK[1]^2 - \sqrt{K[1]^2 + 1}\right\}, \{y(x), K[1]\}\right]$$

✓ **Maple** : cpu = 0.213 (sec), leaf count = 581

$$\left\{\frac{c_1x^2}{\left(-2x + \sqrt{-4xy\left(x\right) + 2 + 2\sqrt{4x^2 - 4xy\left(x\right) + 1}}\right)^2} + \frac{2\left(-2\,\mathrm{arcsinh}\left(\frac{\sqrt{-4xy(x)+2+2\sqrt{4x^2-4xy(x)+1}}}{2x}\right) + \sqrt{2}\sqrt{2x \cdots}\right.}{\left(-2x + \sqrt{-4xy\left(x\right) + 2 + 2\sqrt{4x^2 - 4 \cdots}}\right.}\right.$$

2.557 ODE No. 557

$$x\left(y'(x)+\sqrt{y'(x)^2+1}\right)-y(x)=0$$

✓ **Mathematica** : cpu = 0.0489829 (sec), leaf count = 39

$$\left\{\left\{y(x)\to-\sqrt{-x^2+c_1x}\right\},\left\{y(x)\to\sqrt{-x^2+c_1x}\right\}\right\}$$

✓ **Maple** : cpu = 0.26 (sec), leaf count = 74

$$\left\{\frac{2c_1xy(x)}{\sqrt{\frac{\left(x^2+y(x)^2\right)^2}{x^2y(x)^2}}\left(-x^2+\sqrt{\frac{x^4+2x^2y(x)^2+y(x)^4}{x^2y(x)^2}}\,xy\left(x\right)+y\left(x\right)^2\right)}+x=0\right\}$$

2.558 ODE No. 558

$$ax\sqrt{y'(x)^2+1}+xy'(x)-y(x)=0$$

✓ **Mathematica** : cpu = 1.13073 (sec), leaf count = 327

$$\left\{\text{Solve}\left[\frac{2i\tan^{-1}\left(\frac{y(x)}{x\sqrt{a^2-\frac{y(x)^2}{x^2}-1}}\right)+a\tanh^{-1}\left(\frac{-a^2-\frac{iy(x)}{x}+1}{a\sqrt{a^2-\frac{y(x)^2}{x^2}-1}}\right)-a\tanh^{-1}\left(\frac{-a^2+\frac{iy(x)}{x}+1}{a\sqrt{a^2-\frac{y(x)^2}{x^2}-1}}\right)+a\log\left(\frac{y(x)^2}{x^2}+1\right)}{2a^2-2}\right.\right.$$

✓ **Maple** : cpu = 0.341 (sec), leaf count = 223

$$\left\{-\frac{c_1\mathrm{e}^{\frac{\operatorname{arcsinh}\left(\frac{\sqrt{-a^2x^2+x^2+y(x)^2}\,a+y(x)}{\left(a^2-1\right)x}\right)}{a}}}{\sqrt{\frac{-a^2x^2+a^2y(x)^2+2\sqrt{-a^2x^2+x^2+y(x)^2}\,ay(x)+x^2+y(x)^2}{\left(a^2-1\right)^2x^2}}}+x=0,-\frac{c_1\mathrm{e}^{-\frac{\operatorname{arcsinh}\left(\frac{\sqrt{-a^2x^2+x^2+y(x)^2}\,a-y(x)}{\left(a^2-1\right)x}\right)}{a}}}{\sqrt{-\frac{a^2x^2-a^2y(x)^2+2\sqrt{-a^2x^2+x^2+y(x)^2}\,ay(x)-x^2-y(x)^2}{\left(a^2-1\right)^2x^2}}}\right.$$

2.559 ODE No. 559

$$-ay(x)y'(x) - ax + y(x)\sqrt{y'(x)^2 + 1} = 0$$

✓ **Mathematica** : cpu = 0.399837 (sec), leaf count = 212

$$\left\{\left\{y(x) \to -\frac{\sqrt{a^6(-x^2) + 3a^4x^2 - 3a^2x^2 + 2a^2xe^{a^2c_1-c_1} - 2xe^{a^2c_1-c_1} + e^{2a^2c_1-2c_1} + x^2}}{\sqrt{a^6 - 3a^4 + 3a^2 - 1}}\right\}, \left\{y(x) \to \frac{\sqrt{a^6(-x^2)}}{}\right.\right.$$

✓ **Maple** : cpu = 0.248 (sec), leaf count = 215

$$\left\{-c_1 \mathrm{e}^{\int^{\frac{-a^2x - \sqrt{a^2x^2 + (a^2-1)y(x)^2}}{(a^2-1)y(x)}} \frac{(-\_a + \sqrt{\_a^2+1}\,a)a}{\sqrt{\_a^2+1}\,(\_aa - \sqrt{\_a^2+1})(\_a^2a - \sqrt{\_a^2+1}\,\_a + a)} d\_a} + x = 0, -c_1 \mathrm{e}^{\int^{\frac{-a^2x + \sqrt{a^2x^2 + (a^2-1)y(x)^2}}{(a^2-1)y(x)}} \frac{}{\sqrt{\_a^2+1}}}\right.$$

2.560 ODE No. 560

$$ay(x)\sqrt{y'(x)^2 + 1} - x^2 - 2xy(x)y'(x) + y(x)^2 = 0$$

✓ **Mathematica** : cpu = 17.1699 (sec), leaf count = 110

$$\left\{\left\{y(x) \to -\frac{\sqrt{a^2c_1^2(-x^2) - 4a^2c_1x - 4a^2 + 4x^2}}{\sqrt{-4 + a^2c_1^2}}\right\}, \left\{y(x) \to \frac{\sqrt{a^2c_1^2(-x^2) - 4a^2c_1x - 4a^2 + 4x^2}}{\sqrt{-4 + a^2c_1^2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.833 (sec), leaf count = 1120

$$\left\{c_1 + \int_{\_b}^{x} \frac{2\_a^3 - 2\_ay(x)^2 + \sqrt{\left(\_a^4 + 2\_a^2y(x)^2 - a^2y(x)^2 + y\right.}}{2\_a^5 + 4\_a^3y(x)^2 - 2\_a\,a^2y(x)^2 + 2\_ay(x)^4 + \sqrt{\left(\_a^4 + 2\_a^2y(x)^2 - a^2y(x)^2 + y(x)^4\right)a^2}\,\_a^2 -}\right.$$

2.561 ODE No. 561

$$f\left(x^2+y(x)^2\right)\sqrt{y'(x)^2+1}-xy'(x)+y(x)=0$$

✓ **Mathematica** : cpu = 2.05415 (sec), leaf count = 2138

$$\left\{\text{Solve}\left[\int_1^x\left(\frac{\sqrt{f\left(K[1]^2+y(x)^2\right)^2\left(-f\left(K[1]^2+y(x)^2\right)^2+K[1]^2+y(x)^2\right)}K[1]}{f\left(K[1]^2+y(x)^2\right)^2\left(K[1]^2+y(x)^2\right)}-\frac{\sqrt{f\left(K[1]^2+y(x)^2\right)^2\left(-f\left(K\right.\right.}}{f\left(K[1]^2+y(x)^2\right)^2\left(-f\left(\right.\right.}\right.\right.\right.$$

✓ **Maple** : cpu = 2.26 (sec), leaf count = 50

$$\left\{y(x)=\frac{x}{\tan\left(\text{RootOf}\left(2c_1-2\_Z+\int^{\frac{\left(\tan^2(\_Z)+1\right)x^2}{\tan(\_Z)^2}}\frac{f(\_a)}{\sqrt{-f(\_a)^2+\_a}\_a}d\_a\right)\right)}\right\}$$

2.562 ODE No. 562

$$a\sqrt[3]{y'(x)^3+1}+bxy'(x)-y(x)=0$$

✓ **Mathematica** : cpu = 0.156753 (sec), leaf count = 84

$$\text{Solve}\left[\left\{x=K[1]^{\frac{b}{1-b}}\left(\frac{a\int\frac{K[1]^{\frac{2b-1}{b-1}}}{(K[1]^3+1)^{2/3}}dK[1]}{1-b}+c_1\right),y(x)=a\sqrt[3]{K[1]^3+1}+bxK[1]\right\},\{K[1],y(x)\}\right]$$

✓ **Maple** : cpu = 0.185 (sec), leaf count = 3306

Expression too large to display

2.563 ODE No. 563

$$ay(x) + b + xy'(x) + \log\left(y'(x)\right) = 0$$

✓ **Mathematica** : cpu = 0.231577 (sec), leaf count = 59

$$\text{Solve}\left[a\left(\frac{(a+1)\log\left(1 - aW\left(xe^{-ay(x)-b}\right)\right)}{a^2} + \frac{W\left(xe^{-ay(x)-b}\right)}{a}\right) + ay(x) = c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.225 (sec), leaf count = 66

$$\left\{-c_1\left(\mathrm{e}^{-ay(x)-b-\mathrm{LambertW}\left(x\,\mathrm{e}^{-ay(x)-b}\right)}\right)^{-\frac{1}{a+1}} + x - \frac{\mathrm{e}^{ay(x)+b+\mathrm{LambertW}\left(x\,\mathrm{e}^{-ay(x)-b}\right)}}{a} = 0\right\}$$

2.564 ODE No. 564

$$a\left(xy'(x) - y(x)\right) + \log\left(y'(x)\right) = 0$$

✓ **Mathematica** : cpu = 0.0048774 (sec), leaf count = 17

$$\left\{\left\{y(x) \to \frac{\log(c_1)}{a} + c_1 x\right\}\right\}$$

✓ **Maple** : cpu = 0.029 (sec), leaf count = 32

$$\left\{y(x) = \frac{\ln\left(-\frac{1}{ax}\right) - 1}{a}, y(x) = c_1 x + \frac{\ln(c_1)}{a}\right\}$$

2.565 ODE No. 565

$$y'(x) + y(x)\log\left(y'(x)\right) - xy(x) - y(x)\log(y(x)) = 0$$

✓ **Mathematica** : cpu = 0.0301469 (sec), leaf count = 25

$$\left\{\left\{y(x) \to c_1 e^{\frac{1}{2}W(e^x)^2 + W(e^x)}\right\}\right\}$$

✓ **Maple** : cpu = 0.257 (sec), leaf count = 17

$$\left\{y(x) = c_1 \mathrm{e}^{\frac{(\mathrm{LambertW}(\mathrm{e}^x)+2)\,\mathrm{LambertW}(\mathrm{e}^x)}{2}}\right\}$$

2.566 ODE No. 566

$$y'(x) + \sin(y'(x)) - x = 0$$

✓ **Mathematica** : cpu = 0.0453682 (sec), leaf count = 38

$$\text{Solve}\left[\left\{x = K[1] + \sin(K[1]), y(x) = \frac{K[1]^2}{2} + K[1]\sin(K[1]) + \cos(K[1]) + c_1\right\}, \{y(x), K[1]\}\right]$$

✓ **Maple** : cpu = 0.041 (sec), leaf count = 16

$$\left\{y(x) = c_1 + \int \text{RootOf}\left(\_Z - x + \sin\left(\_Z\right)\right) dx\right\}$$

2.567 ODE No. 567

$$a\cos(y'(x)) + by'(x) + x = 0$$

✓ **Mathematica** : cpu = 0.0902049 (sec), leaf count = 49

$$\text{Solve}\left[\left\{y(x) = a\sin(K[1]) - aK[1]\cos(K[1]) - \frac{1}{2}bK[1]^2 + c_1, x = -a\cos(K[1]) - bK[1]\right\}, \{y(x), K[1]\}\right]$$

✓ **Maple** : cpu = 0.055 (sec), leaf count = 18

$$\left\{y(x) = c_1 + \int \text{RootOf}\left(\_Zb + a\cos\left(\_Z\right) + x\right) dx\right\}$$

2.568 ODE No. 568

$$y'(x)^2 \sin(y'(x)) - y(x) = 0$$

✓ **Mathematica** : cpu = 0.104988 (sec), leaf count = 34

$$\text{Solve}\left[\left\{x = K[1]\sin(K[1]) - \cos(K[1]) + c_1, y(x) = K[1]^2\sin(K[1])\right\}, \{y(x), K[1]\}\right]$$

✓ **Maple** : cpu = 0.067 (sec), leaf count = 32

$$\left\{-c_1 + x - \left(\int^{y(x)} \frac{1}{\text{RootOf}\left(\_Z^2\sin\left(\_Z\right) - \_a\right)} d\_a\right) = 0, y(x) = 0\right\}$$

2.569 ODE No. 569

$$\left(y'(x)^2+1\right)\sin^2\left(y(x)-xy'(x)\right)-1=0$$

✓ **Mathematica** : cpu = 0.111325 (sec), leaf count = 59

$$\left\{\left\{y(x)\to c_1x-\frac{1}{2}\cos^{-1}\left(\frac{-1+c_1{}^2}{1+c_1{}^2}\right)\right\},\left\{y(x)\to c_1x+\frac{1}{2}\cos^{-1}\left(\frac{-1+c_1{}^2}{1+c_1{}^2}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.355 (sec), leaf count = 147

$$\left\{y(x)=c_1x-\arcsin\left(\frac{1}{\sqrt{c_1^2+1}}\right),y(x)=c_1x+\arcsin\left(\frac{1}{\sqrt{c_1^2+1}}\right),y(x)=-\sqrt{-x+1}\sqrt{\frac{1}{x}}\,x-\arcsin\left(\sqrt{\frac{1}{x}}\,x\right.\right.$$

2.570 ODE No. 570

$$\left(y'(x)^2+1\right)\left(ax+\tan^{-1}\left(y'(x)\right)\right)+y'(x)=0$$

✓ **Mathematica** : cpu = 1.93517 (sec), leaf count = 58

$$\text{Solve}\left[\left\{y(x)=\frac{1}{a\left(K[1]^2+1\right)}+c_1,x=\frac{-K[1]+K[1]^2\left(-\tan^{-1}(K[1])\right)-\tan^{-1}(K[1])}{a\left(K[1]^2+1\right)}\right\},\{y(x),K[1]\}\right]$$

✓ **Maple** : cpu = 0.065 (sec), leaf count = 30

$$\left\{y(x)=c_1+\int\tan\left(\text{RootOf}\left(ax\left(\tan^2\left(\_Z\right)\right)+\_Z\left(\tan^2\left(\_Z\right)\right)+ax+\_Z+\tan\left(\_Z\right)\right)\right)dx\right\}$$

2.571 ODE No. 571

$$ax^nf\left(y'(x)\right)+xy'(x)-y(x)=0$$

✓ **Mathematica** : cpu = 0.163189 (sec), leaf count = 124

$$\text{Solve}\left[\left\{y(x)=ax^nf(K[1])+xK[1],x=\left(nf(K[1])^{\frac{1}{n}-1}\int_1^{K[1]}-\frac{f(K[2])^{\frac{n-1}{n}-1}}{an}dK[2]-f(K[1])^{\frac{1}{n}-1}\int_1^{K[1]}-\frac{f(K\right.\right.\right.$$

✓ **Maple** : cpu = 0.517 (sec), leaf count = 169

$$\left\{\left[y(\_T)=\_T\left(\frac{c_1an+(-n+1)\left(\int f(\_T)^{-\frac{1}{n}}d\_T\right)}{anf\left(\_T\right)}\right)^{\frac{1}{n-1}}f(\_T)^{\frac{1}{(n-1)n}}+a\left(\left(\frac{c_1an+(-n+1)\left(\int f(\_T)^{-\frac{1}{n}}\right.}{anf\left(\_T\right)}\right.\right.\right.\right.$$

2.572 ODE No. 572

$$f(y'(x))\,(xy'(x)-y(x))^n+y(x)g(y'(x))+xh(y'(x))=0$$

✗ **Mathematica** : cpu = 0.0746323 (sec), leaf count = 0 , could not solve

```
DSolve[x*h[Derivative[1][y][x]] + g[Derivative[1][y][x]]*y[x] + f[Derivative[1][y][x]]*(-
y[x] + x*Derivative[1][y][x])^n == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve((x*diff(y(x),x)-y(x))^n*f(diff(y(x),x))+y(x)*g(diff(y(x),x))+x*h(diff(y(x),x))=0,y(x)
```

2.573 ODE No. 573

$$f\left(xy'(x)^2\right)+2xy'(x)-y(x)=0$$

✓ **Mathematica** : cpu = 0.0293208 (sec), leaf count = 42

$$\left\{\left\{y(x)\to f(c_1)-2\sqrt{c_1}\sqrt{x},y(x)\to f(c_1)+2\sqrt{c_1}\sqrt{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.125 (sec), leaf count = 24

$$\left\{y(x)=2\sqrt{x}\ \mathrm{RootOf}\left(c_1+c_2-2\_Z-f(\_Z^2)\right)+c_1\right\}$$

2.574 ODE No. 574

$$f\left(x-\frac{3}{2}y'(x)^2\right)+y'(x)^3-y(x)=0$$

✓ **Mathematica** : cpu = 0.0377411 (sec), leaf count = 102

$$\left\{\left\{y(x)\to\frac{1}{9}\left(9f(c_1)+2\sqrt{6}x\sqrt{x-c_1}-2\sqrt{6}c_1\sqrt{x-c_1}\right),y(x)\to\frac{1}{9}\left(9f(c_1)-2\sqrt{6}x\sqrt{x-c_1}+2\sqrt{6}c_1\sqrt{x-c_1}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.141 (sec), leaf count = 41

$$\left\{y(x)=f(c_1)-\frac{2\sqrt{6}\sqrt{(-c_1+x)^3}}{9},y(x)=f(c_1)+\frac{2\sqrt{6}\sqrt{(-c_1+x)^3}}{9}\right\}$$

2.575 ODE No. 575

$$y'(x)f\left(xy(x)y'(x)-y(x)^2\right)+x^2(-y'(x))+xy(x)=0$$

✗ **Mathematica** : cpu = 0.0385072 (sec), leaf count = 0 , could not solve

```
DSolve[x*y[x] - x^2*Derivative[1][y][x] + f[-y[x]^2 + x*y[x]*Derivative[1][y][x]]*Derivative
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(y(x),x)*f(x*y(x)*diff(y(x),x)-y(x)^2)-x^2*diff(y(x),x)+x*y(x)=0,y(x))
```

2.576 ODE No. 576

$$\phi\left(f\left(x,y(x),y'(x)\right),g\left(x,y(x),y'(x)\right)\right)=0$$

✗ **Mathematica** : cpu = 0.017354 (sec), leaf count = 0 , could not solve

```
DSolve[phi[f[x, y[x], Derivative[1][y][x]], g[x, y[x], Derivative[1][y][x]]] == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(phi(f(x,y(x),diff(y(x),x)),g(x,y(x),diff(y(x),x)))=0,y(x))
```

2.577 ODE No. 577

$$y'(x)=F\left(\frac{y(x)}{a+x}\right)$$

✓ **Mathematica** : cpu = 0.309148 (sec), leaf count = 243

$$\text{Solve}\left[\int_1^{y(x)}\left(\frac{1}{-aF\left(\frac{K[2]}{a+x}\right)-xF\left(\frac{K[2]}{a+x}\right)+K[2]}-\int_1^x\left(\frac{F'\left(\frac{K[2]}{a+K[1]}\right)}{(a+K[1])\left(aF\left(\frac{K[2]}{a+K[1]}\right)+K[1]F\left(\frac{K[2]}{a+K[1]}\right)-K[2]\right)}-\right.\right.\right.$$

✓ **Maple** : cpu = 0.039 (sec), leaf count = 28

$$\left\{y(x)=-(a+x)\,\text{RootOf}\left(c_1+\int^{\_Z}\frac{1}{\_a+F\left(-\_a\right)}d\_a+\ln\left(a+x\right)\right)\right\}$$

2.578 ODE No. 578

$$y'(x) = F(y(x) - x^2) + 2x$$

✓ **Mathematica** : cpu = 0.256811 (sec), leaf count = 100

$$\text{Solve}\left[\int_1^{y(x)} -\frac{F(K[2]-x^2)\int_1^x -\frac{2K[1]F'(K[2]-K[1]^2)}{F(K[2]-K[1]^2)^2}dK[1]+1}{F(K[2]-x^2)}dK[2] + \int_1^x \left(\frac{2K[1]}{F(y(x)-K[1]^2)}+1\right)dK[1] = c_1,$$

✓ **Maple** : cpu = 0.049 (sec), leaf count = 22

$$\left\{y(x) = x^2 + \text{RootOf}\left(c_1 - x + \int^{\_Z} \frac{1}{F(\_a)}d\_a\right)\right\}$$

2.579 ODE No. 579

$$y'(x) = F\left(\frac{ax^2}{4} + \frac{bx}{2} + y(x)\right) - \frac{ax}{2}$$

✓ **Mathematica** : cpu = 0.322084 (sec), leaf count = 514

$$\text{Solve}\left[\int_1^{y(x)} -\frac{b\int_1^x \left(\frac{2aK[1]F'\left(\frac{1}{4}aK[1]^2+\frac{1}{2}bK[1]+K[2]\right)}{\left(b+2F\left(\frac{1}{4}aK[1]^2+\frac{1}{2}bK[1]+K[2]\right)\right)^2} + \frac{2F'\left(\frac{1}{4}aK[1]^2+\frac{1}{2}bK[1]+K[2]\right)}{b+2F\left(\frac{1}{4}aK[1]^2+\frac{1}{2}bK[1]+K[2]\right)} - \frac{4F\left(\frac{1}{4}aK[1]^2+\frac{1}{2}bK[1]+K[2]\right)F'\left(\frac{1}{4}aK[1]\right.}{\left(b+2F\left(\frac{1}{4}aK[1]^2+\frac{1}{2}bK[1]+K\right.\right.}\right.}{}\right.$$

✓ **Maple** : cpu = 0.052 (sec), leaf count = 35

$$\left\{y(x) = -\frac{a\,x^2}{4} - \frac{bx}{2} + \text{RootOf}\left(c_1 - x + 2\left(\int^{\_Z} \frac{1}{b+2F(\_a)}d\_a\right)\right)\right\}$$

2.580 ODE No. 580

$$y'(x) = e^{bx}F\left(e^{-bx}y(x)\right)$$

✓ **Mathematica** : cpu = 0.330247 (sec), leaf count = 203

$$\text{Solve}\left[\int_1^{y(x)} \left(\frac{1}{bK[2]-e^{bx}F(e^{-bx}K[2])} - \int_1^x \left(\frac{F'(e^{-bK[1]}K[2])}{e^{bK[1]}F(e^{-bK[1]}K[2])-bK[2]} - \frac{e^{bK[1]}F(e^{-bK[1]}K[2])\left(F'(e^{-bK\right.}{\left(e^{bK[1]}F(e^{-bK[1]}K[2])-\right.}\right.\right.\right.$$

✓ **Maple** : cpu = 0.07 (sec), leaf count = 31

$$\left\{y(x) = \text{RootOf}\left(c_1 - x + \int^{\_Z} \frac{1}{-\_ab+F(\_a)}d\_a\right)e^{bx}\right\}$$

2.581 ODE No. 581

$$y'(x) = \frac{xF\left(\frac{x^2y(x)+\frac{1}{4}}{x^2}\right)+\frac{1}{2}}{x^3}$$

✓ **Mathematica** : cpu = 0.303825 (sec), leaf count = 144

$$\text{Solve}\left[\int_1^{y(x)} -\frac{F\left(\frac{K[2]x^2+\frac{1}{4}}{x^2}\right)\int_1^x -\frac{F'\left(\frac{K[2]K[1]^2+\frac{1}{4}}{K[1]^2}\right)}{2F\left(\frac{K[2]K[1]^2+\frac{1}{4}}{K[1]^2}\right)^2 K[1]^3}dK[1]+1}{F\left(\frac{K[2]x^2+\frac{1}{4}}{x^2}\right)}dK[2]+\int_1^x\left(\frac{1}{K[1]^2}+\frac{1}{2K[1]^3F\left(\frac{y(x)K[1]^2+\frac{1}{4}}{K[1]^2}\right)}\right)\right.$$

✓ **Maple** : cpu = 0.101 (sec), leaf count = 32

$$\left\{y(x) = \frac{4x^2\operatorname{RootOf}\left(c_1x+x\left(\int^{-Z}\frac{1}{F(\_a)}d\_a\right)+1\right)-1}{4x^2}\right\}$$

2.582 ODE No. 582

$$y'(x) = \frac{ax^2F\left(\frac{axy(x)+1}{ax}\right)+1}{ax^2}$$

✓ **Mathematica** : cpu = 0.309711 (sec), leaf count = 142

$$\text{Solve}\left[\int_1^{y(x)} -\frac{F\left(\frac{axK[2]+1}{ax}\right)\int_1^x \frac{F'\left(\frac{aK[1]K[2]+1}{aK[1]}\right)}{aF\left(\frac{aK[1]K[2]+1}{aK[1]}\right)^2K[1]^2}dK[1]-1}{F\left(\frac{axK[2]+1}{ax}\right)}dK[2]+\int_1^x\left(-1-\frac{1}{aK[1]^2F\left(\frac{aK[1]y(x)+1}{aK[1]}\right)}\right)dK[1\right.$$

✓ **Maple** : cpu = 0.237 (sec), leaf count = 30

$$\left\{y(x) = \frac{ax\operatorname{RootOf}\left(c_1-x+\int^{-Z}\frac{1}{F(\_a)}d\_a\right)-1}{ax}\right\}$$

2.583 ODE No. 583

$$y'(x) = -\frac{1}{2}x\left(ax^2 - 2F\left(\frac{ax^4}{8} + y(x)\right)\right)$$

✓ **Mathematica** : cpu = 0.278387 (sec), leaf count = 126

$$\text{Solve}\left[\int_1^{y(x)} -\frac{F\left(\frac{ax^4}{8}+K[2]\right)\int_1^x \frac{aK[1]^3F'\left(\frac{1}{8}aK[1]^4+K[2]\right)}{2F\left(\frac{1}{8}aK[1]^4+K[2]\right)^2}dK[1]+1}{F\left(\frac{ax^4}{8}+K[2]\right)}dK[2] + \int_1^x \left(K[1] - \frac{aK[1]^3}{2F\left(\frac{1}{8}aK[1]^4+y(x)\right)}\right) d$$

✓ **Maple** : cpu = 0.148 (sec), leaf count = 31

$$\left\{y(x) = -\frac{a\,x^4}{8} + \text{RootOf}\left(-x^2 + 2c_1 + 2\left(\int^{\_Z} \frac{1}{F(\_a)}d\_a\right)\right)\right\}$$

2.584 ODE No. 584

$$y'(x) = \frac{2a}{2aF\left(y(x)^2 - 4ax\right) + y(x)}$$

✓ **Mathematica** : cpu = 0.330916 (sec), leaf count = 115

$$\text{Solve}\left[\int_1^{y(x)} \left(\frac{K[2]}{4a^2F\left(K[2]^2 - 4ax\right)} - \frac{2a\int_1^x \frac{K[2]F'\left(K[2]^2-4aK[1]\right)}{aF\left(K[2]^2-4aK[1]\right)^2}dK[1] - 1}{2a}\right)dK[2] + \int_1^x -\frac{1}{2aF\left(y(x)^2 - 4aK[1]\right)}$$

✓ **Maple** : cpu = 0.107 (sec), leaf count = 35

$$\left\{-c_1 + \frac{y(x)}{2a} + \frac{\int^{-4ax+y(x)^2} \frac{1}{F(\_a)}d\_a}{8a^2} = 0\right\}$$

2.585 ODE No. 585

$$y'(x) = y(x)F(\log(\log(y(x))) - \log(x))$$

✓ **Mathematica** : cpu = 0.274639 (sec), leaf count = 205

$$\text{Solve}\left[\int_1^{y(x)} \left(\frac{1}{K[2](xF(\log(\log(K[2])) - \log(x)) - \log(K[2]))} - \int_1^x \left(\frac{F(\log(\log(K[2])) - \log(K[1]))\left(\frac{K[1]F'(\log}{F}\right.}{(F(\log(\log(K[2])) - \log(K[1]))F}\right.\right.\right.$$

✓ **Maple** : cpu = 0.451 (sec), leaf count = 120

$$\left\{c_1+\int_{\_b}^{x}\frac{F(-\ln(\_a)+\ln(\ln(y(x))))}{\_aF(-\ln(\_a)+\ln(\ln(y(x))))-\ln(y(x))}d\_a+\int^{y(x)}\left(-\left(\int_{\_b}^{x}\frac{F(-\ln(\_a)+\ln(\ln(\_f)))-D(F)}{(\_aF(-\ln(\_a)+\ln(\ln(\_\right.\right.\right.$$

2.586 ODE No. 586

$$y'(x)=\frac{xF\left(\frac{y(x)}{\sqrt{x^2+1}}\right)}{\sqrt{x^2+1}}$$

✓ **Mathematica** : cpu = 0.728045 (sec), leaf count = 975

$$\text{Solve}\left[\int_1^x\left(-\frac{K[1]\sqrt{K[1]^2+1}F\left(\frac{y(x)}{\sqrt{K[1]^2+1}}\right)^3}{y(x)\left(K[1]^2F\left(\frac{y(x)}{\sqrt{K[1]^2+1}}\right)^2+F\left(\frac{y(x)}{\sqrt{K[1]^2+1}}\right)^2-y(x)^2\right)}-\frac{K[1]F\left(\frac{y(x)}{\sqrt{K[1]^2+1}}\right)^2}{K[1]^2F\left(\frac{y(x)}{\sqrt{K[1]^2+1}}\right)^2+F\left(\frac{y(x)}{\sqrt{K[1]^2+1}}\right)^2\right.\right.$$

✓ **Maple** : cpu = 0.251 (sec), leaf count = 39

$$\left\{y(x)=\sqrt{x^2+1}\,\text{RootOf}\left(2c_1+2\left(\int^{\_Z}\frac{1}{-\_a+F(\_a)}d\_a\right)-\ln(x^2+1)\right)\right\}$$

2.587 ODE No. 587

$$y'(x)=\frac{1}{2}\sqrt{x}\left(2F\left(y(x)-\frac{x^3}{6}\right)+x^{3/2}\right)$$

✓ **Mathematica** : cpu = 0.298573 (sec), leaf count = 123

$$\text{Solve}\left[\int_1^{y(x)}-\frac{F\left(K[2]-\frac{x^3}{6}\right)\int_1^x-\frac{K[1]^2F'\left(K[2]-\frac{K[1]^3}{6}\right)}{2F\left(K[2]-\frac{K[1]^3}{6}\right)^2}dK[1]+1}{F\left(K[2]-\frac{x^3}{6}\right)}dK[2]+\int_1^x\left(\frac{K[1]^2}{2F\left(y(x)-\frac{K[1]^3}{6}\right)}+\sqrt{K[1]}\right)dK\right.$$

✓ **Maple** : cpu = 0.119 (sec), leaf count = 29

$$\left\{-\frac{2x^{\frac{3}{2}}}{3}-c_1+\int_{\_b}^{y(x)}\frac{1}{F\left(-\frac{x^3}{6}+\_a\right)}d\_a=0\right\}$$

2.588 ODE No. 588

$$y'(x) = \frac{F((y(x)-x)(y(x)+x))+x}{y(x)}$$

✓ **Mathematica** : cpu = 0.234941 (sec), leaf count = 109

$$\text{Solve}\left[\int_1^{y(x)}\left(-\frac{K[2]}{F((K[2]-x)(x+K[2]))}-\int_1^x-\frac{2K[1]K[2]F'((K[2]-K[1])(K[1]+K[2]))}{F((K[2]-K[1])(K[1]+K[2]))^2}dK[1]\right)dK[2]+\int_1\right.$$

✓ **Maple** : cpu = 0.121 (sec), leaf count = 53

$$\left\{y(x)=\sqrt{x^2+\text{RootOf}\left(2c_1-2x+\int^{\_Z}\frac{1}{F(\_a)}d\_a\right)}, y(x)=-\sqrt{x^2+\text{RootOf}\left(2c_1-2x+\int^{\_Z}\frac{1}{F(\_a)}d\_\right.}\right.$$

2.589 ODE No. 589

$$y'(x) = \frac{y(x)^2 F\left(\frac{1-y(x)\log(x)}{y(x)}\right)}{x}$$

✓ **Mathematica** : cpu = 0.299659 (sec), leaf count = 245

$$\text{Solve}\left[\int_1^{y(x)}\left(\frac{1}{\left(-F\left(\frac{1-K[2]\log(x)}{K[2]}\right)-1\right)K[2]^2}-\int_1^x\left(\frac{\left(-\frac{\log(K[1])}{K[2]}-\frac{1-K[2]\log(K[1])}{K[2]^2}\right)F'\left(\frac{1-K[2]\log(K[1])}{K[2]}\right)}{\left(F\left(\frac{1-K[2]\log(K[1])}{K[2]}\right)+1\right)K[1]}-\frac{F\left(1\right.}{}\right.\right.\right.$$

✓ **Maple** : cpu = 0.155 (sec), leaf count = 38

$$\left\{-c_1+\int_{\_b}^{y(x)}\frac{1}{\left(F\left(\frac{-\_a\ln(x)+1}{\_a}\right)+1\right)\_a^2}d\_a-\ln(x)=0\right\}$$

2.590 ODE No. 590

$$y'(x) = \frac{x}{F(x^2+y(x)^2)-y(x)}$$

✓ **Mathematica** : cpu = 0.286124 (sec), leaf count = 94

$$\text{Solve}\left[\int_1^{y(x)}\left(-\frac{K[2]}{F(x^2+K[2]^2)}-\int_1^x\frac{2K[1]K[2]F'(K[1]^2+K[2]^2)}{F(K[1]^2+K[2]^2)^2}dK[1]+1\right)dK[2]+\int_1^x-\frac{K[1]}{F(K[1]^2+y(x)^2)}\right.$$

✓ **Maple** : cpu = 0.132 (sec), leaf count = 28

$$\left\{-c_1+\frac{\left(\int^{x^2+y(x)^2}\frac{1}{F(\_a)}d\_a\right)}{2}-y(x)=0\right\}$$

2.591 ODE No. 591

$$y'(x)=\frac{xF\left(\frac{ay(x)^2+bx^2}{a}\right)}{\sqrt{a}y(x)}$$

✓ **Mathematica** : cpu = 0.593163 (sec), leaf count = 253

$$\text{Solve}\left[\int_1^{y(x)}\left(-\frac{bK[2]}{b+\sqrt{a}F\left(\frac{bx^2+aK[2]^2}{a}\right)}-\int_1^x\left(\frac{2bK[1]K[2]F'\left(\frac{bK[1]^2+aK[2]^2}{a}\right)}{\sqrt{a}\left(b+\sqrt{a}F\left(\frac{bK[1]^2+aK[2]^2}{a}\right)\right)}-\frac{2bF\left(\frac{bK[1]^2+aK[2]^2}{a}\right)K[1]K[2]}{\left(b+\sqrt{a}F\left(\frac{bK[1]^2+a}{a}\right.\right.}\right.\right.\right.$$

✓ **Maple** : cpu = 0.226 (sec), leaf count = 108

$$\left\{y(x)=\frac{\sqrt{\left(-b\,x^2+a\,\text{RootOf}\left(a^{\frac{3}{2}}b\left(\int^{-Z}\frac{1}{aF(\_a)+\sqrt{a}\,b}d\_a\right)-b\,x^2+2c_1a\right)\right)a}}{a},y(x)=-\frac{\sqrt{\left(-b\,x^2+a\,\text{RootOf}\left(\right.\right.}}{}\right.$$

2.592 ODE No. 592

$$y'(x)=\frac{F\left(-\frac{2x^3}{5}+y(x)-2\sqrt{x}\right)+\frac{6x^3}{5}+\sqrt{x}}{x}$$

✓ **Mathematica** : cpu = 0.711994 (sec), leaf count = 241

$$\text{Solve}\left[\int_1^{y(x)}-\frac{F\left(-\frac{2x^3}{5}-2\sqrt{x}+K[2]\right)\int_1^x\left(-\frac{6F'\left(-\frac{2}{5}K[1]^3-2\sqrt{K[1]}+K[2]\right)K[1]^2}{5F\left(-\frac{2}{5}K[1]^3-2\sqrt{K[1]}+K[2]\right)^2}-\frac{F'\left(-\frac{2}{5}K[1]^3-2\sqrt{K[1]}+K[2]\right)}{F\left(-\frac{2}{5}K[1]^3-2\sqrt{K[1]}+K[2]\right)^2\sqrt{K[1]}}\right)d}{F\left(-\frac{2x^3}{5}-2\sqrt{x}+K[2]\right)}\right.$$

✓ **Maple** : cpu = 0.168 (sec), leaf count = 33

$$\left\{-c_1+\int_{\_b}^{y(x)}\frac{1}{F\left(-\frac{2x^3}{5}+\_a-2\sqrt{x}\right)}d\_a-\ln(x)=0\right\}$$

2.593 ODE No. 593

$$y'(x) = \frac{e^x F\left(y(x)^{3/2} - \frac{3e^x}{2}\right)}{\sqrt{y(x)}}$$

✓ **Mathematica** : cpu = 0.607303 (sec), leaf count = 221

$$\text{Solve}\left[\int_1^{y(x)} \left(\frac{\sqrt{K[2]}}{F\left(K[2]^{3/2} - \frac{3e^x}{2}\right) - 1} - \int_1^x \left(\frac{3e^{K[1]} F\left(K[2]^{3/2} - \frac{3e^{K[1]}}{2}\right) \sqrt{K[2]} F'\left(K[2]^{3/2} - \frac{3e^{K[1]}}{2}\right)}{2\left(F\left(K[2]^{3/2} - \frac{3e^{K[1]}}{2}\right) - 1\right)^2} - \frac{3e^{K[1]}\sqrt{}}{2\left(F\right.}\right.\right.\right.$$

✓ **Maple** : cpu = 0.274 (sec), leaf count = 35

$$\left\{-c_1 + \int_{\_b}^{y(x)} \frac{\sqrt{\_a}}{F\left(\_a^{\frac{3}{2}} - \frac{3\,\mathrm{e}^x}{2}\right) - 1} d\_a - \mathrm{e}^x = 0\right\}$$

2.594 ODE No. 594

$$y'(x) = \frac{xF\left(\frac{y(x)^2 - b}{x^2}\right)}{y(x)}$$

✓ **Mathematica** : cpu = 0.479769 (sec), leaf count = 236

$$\text{Solve}\left[\int_1^{y(x)} \left(-\frac{K[2]}{-F\left(\frac{K[2]^2-b}{x^2}\right) x^2 + K[2]^2 - b} - \int_1^x \left(\frac{F\left(\frac{K[2]^2-b}{K[1]^2}\right) K[1] \left(2K[2] F'\left(\frac{K[2]^2-b}{K[1]^2}\right) - 2K[2]\right)}{\left(F\left(\frac{K[2]^2-b}{K[1]^2}\right) K[1]^2 - K[2]^2 + b\right)^2} - \frac{}{K[1]\left(\right.}\right.\right.\right.$$

✓ **Maple** : cpu = 0.129 (sec), leaf count = 67

$$\left\{y(x) = \sqrt{x^2 \operatorname{RootOf}\left(2c_1 + \int^{\_Z} \frac{1}{-\_a + F(\_a)} d\_a - 2\ln(x)\right) + b}, y(x) = -\sqrt{x^2 \operatorname{RootOf}\left(2c_1 + \int^{\_Z} \frac{}{-\_a}\right.}\right.$$

2.595 ODE No. 595

$$y'(x) = \frac{F\left(\frac{xy(x)^2+1}{x}\right)}{x^2 y(x)}$$

✓ **Mathematica** : cpu = 0.456962 (sec), leaf count = 204

$$\text{Solve}\left[\int_1^{y(x)} \left(\frac{K[2]}{2F\left(\frac{xK[2]^2+1}{x}\right)-1} - \int_1^x \left(\frac{4F\left(\frac{K[1]K[2]^2+1}{K[1]}\right)K[2]F'\left(\frac{K[1]K[2]^2+1}{K[1]}\right)}{\left(2F\left(\frac{K[1]K[2]^2+1}{K[1]}\right)-1\right)^2 K[1]^2} - \frac{2K[2]F'\left(\frac{K[1]K[2]^2+1}{K[1]}\right)}{\left(2F\left(\frac{K[1]K[2]^2+1}{K[1]}\right)-1\right)K[1\right.\right.\right.$$

✓ **Maple** : cpu = 0.165 (sec), leaf count = 72

$$\left\{y(x) = \frac{\sqrt{\left(x \operatorname{RootOf}\left(c_1 x + x\left(\int^{\_Z} \frac{1}{2F(\_a)-1} d\_a\right)+1\right)-1\right)x}}{x}, y(x) = -\frac{\sqrt{\left(x \operatorname{RootOf}\left(c_1 x + x\left(\int^{\_Z} \frac{1}{2F(\_a)-\right.\right.\right.}}{x}\right.$$

2.596 ODE No. 596

$$y'(x) = \frac{F(x^2 + y(x) - x) - 2x^2 + x}{x}$$

✓ **Mathematica** : cpu = 0.350221 (sec), leaf count = 156

$$\text{Solve}\left[\int_1^{y(x)} -\frac{F(x^2-x+K[2]) \int_1^x \left(\frac{2K[1]F'(K[1]^2-K[1]+K[2])}{F(K[1]^2-K[1]+K[2])^2} - \frac{F'(K[1]^2-K[1]+K[2])}{F(K[1]^2-K[1]+K[2])^2}\right) dK[1] + 1}{F(x^2-x+K[2])} dK[2] + \int_1^x \left(-\frac{}{F}\right.\right.$$

✓ **Maple** : cpu = 0.092 (sec), leaf count = 26

$$\left\{y(x) = -x^2 + x + \operatorname{RootOf}\left(c_1 + \int^{\_Z} \frac{1}{F(\_a)} d\_a - \ln(x)\right)\right\}$$

2.597 ODE No. 597

$$y'(x) = \frac{2a}{x^2\left(2aF\left(\frac{xy(x)^2-4a}{x}\right) - y(x)\right)}$$

✓ **Mathematica** : cpu = 0.431551 (sec), leaf count = 130

$$\text{Solve}\left[\int_1^{y(x)}\left(-\frac{K[2]}{2aF\left(\frac{xK[2]^2-4a}{x}\right)} - \int_1^x \frac{2K[2]F'\left(\frac{K[1]K[2]^2-4a}{K[1]}\right)}{F\left(\frac{K[1]K[2]^2-4a}{K[1]}\right)^2 K[1]^2}dK[1] + 1\right)dK[2] + \int_1^x -\frac{1}{F\left(\frac{K[1]y(x)^2-4a}{K[1]}\right)K[1]$$

✓ **Maple** : cpu = 0.421 (sec), leaf count = 37

$$\left\{-c_1 - \frac{y(x)}{2a} + \frac{\int^{y(x)^2-\frac{4a}{x}} \frac{1}{F(\_a)}d\_a}{8a^2} = 0\right\}$$

2.598 ODE No. 598

$$y'(x) = \frac{F\left(\frac{y(x)}{x}\right) + y(x)}{x-1}$$

✓ **Mathematica** : cpu = 0.189332 (sec), leaf count = 37

$$\text{Solve}\left[\int_1^{\frac{y(x)}{x}} \frac{1}{F(K[1]) + K[1]}dK[1] = \log(1-x) - \log(x) + c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.02 (sec), leaf count = 29

$$\left\{y(x) = x\,\text{RootOf}\left(c_1 - \left(\int^{\_Z} \frac{1}{\_a + F(\_a)}d\_a\right) - \ln(x) + \ln(x-1)\right)\right\}$$

2.599 ODE No. 599

$$y'(x) = \frac{F(x^2+y(x)^2) - x}{y(x)}$$

✓ **Mathematica** : cpu = 0.191244 (sec), leaf count = 95

$$\text{Solve}\left[\int_1^{y(x)}\left(-\frac{K[2]}{F(x^2+K[2]^2)} - \int_1^x \frac{2K[1]K[2]F'(K[1]^2+K[2]^2)}{F(K[1]^2+K[2]^2)^2}dK[1]\right)dK[2] + \int_1^x \left(1 - \frac{K[1]}{F(K[1]^2+y(x)^2)$$

✓ **Maple** : cpu = 0.095 (sec), leaf count = 57

$$\left\{y(x) = \sqrt{-x^2 + \mathrm{RootOf}\left(2c_1 - 2x + \int^{\_Z} \frac{1}{F(\_a)} d\_a\right)}, y(x) = -\sqrt{-x^2 + \mathrm{RootOf}\left(2c_1 - 2x + \int^{\_Z} \frac{1}{F(\_a)}\right.}\right.$$

2.600 ODE No. 600

$$y'(x) = \frac{y(x)^2 F\left(\frac{1-2y(x)\log(x)}{y(x)}\right)}{x}$$

✓ **Mathematica** : cpu = 0.322721 (sec), leaf count = 246

$$\mathrm{Solve}\left[\int_1^{y(x)} \left(-\int_1^x \left(\frac{2\left(-\frac{2\log(K[1])}{K[2]} - \frac{1-2K[2]\log(K[1])}{K[2]^2}\right) F'\left(\frac{1-2K[2]\log(K[1])}{K[2]}\right)}{\left(F\left(\frac{1-2K[2]\log(K[1])}{K[2]}\right) + 2\right) K[1]} - \frac{2F\left(\frac{1-2K[2]\log(K[1])}{K[2]}\right)\left(-\frac{2\log(K[1]}{K[2]}\right.}{\left(F\left(\frac{1-2K[2]}{K}\right.\right.}\right.\right.\right.$$

✓ **Maple** : cpu = 0.137 (sec), leaf count = 38

$$\left\{-c_1 + \int_{\_b}^{y(x)} \frac{1}{\left(F\left(\frac{-2\_a\ln(x)+1}{\_a}\right) + 2\right)\_a^2} d\_a - \ln(x) = 0\right\}$$

2.601 ODE No. 601

$$y'(x) = \frac{xF((y(x) - x)(y(x) + x))}{y(x)}$$

✓ **Mathematica** : cpu = 0.297143 (sec), leaf count = 182

$$\mathrm{Solve}\left[\int_1^{y(x)} \left(\frac{K[2]}{F((K[2] - x)(x + K[2])) - 1} - \int_1^x \left(\frac{2F((K[2] - K[1])(K[1] + K[2]))K[1]K[2]F'((K[2] - K[1])(\right.}{(F((K[2] - K[1])(K[1] + K[2])) - 1)^2}\right.\right.\right.$$

✓ **Maple** : cpu = 0.124 (sec), leaf count = 61

$$\left\{y(x) = \sqrt{x^2 + \mathrm{RootOf}\left(-x^2 + 2c_1 + \int^{\_Z} \frac{1}{F(\_a) - 1} d\_a\right)}, y(x) = -\sqrt{x^2 + \mathrm{RootOf}\left(-x^2 + 2c_1 + \int^{\_Z} \frac{}{F(\right.}\right.$$

2.602 ODE No. 602

$$y'(x) = \frac{y(x)^2 \left(x^2 F\left(\frac{x^2-y(x)}{x^2 y(x)}\right)+2\right)}{x^3}$$

✓ **Mathematica** : cpu = 0.595777 (sec), leaf count = 167

$$\text{Solve}\left[\int_1^{y(x)}\left(-\int_1^x -\frac{2\left(-\frac{K[1]^2-K[2]}{K[1]^2K[2]^2}-\frac{1}{K[1]^2K[2]}\right)F'\left(\frac{K[1]^2-K[2]}{K[1]^2K[2]}\right)}{F\left(\frac{K[1]^2-K[2]}{K[1]^2K[2]}\right)^2 K[1]^3}dK[1]-\frac{1}{F\left(\frac{x^2-K[2]}{x^2K[2]}\right)K[2]^2}\right)dK[2]+\int_1^x\left(\right.\right.$$

✓ **Maple** : cpu = 0.121 (sec), leaf count = 33

$$\left\{y(x) = \frac{x^2}{x^2 \operatorname{RootOf}\left(c_1 - \left(\int^{-Z}\frac{1}{F(\_a)}d\_a\right) - \ln(x)\right)+1}\right\}$$

2.603 ODE No. 603

$$y'(x) = \frac{2xF(y(x)+\log(2x+1))+F(y(x)+\log(2x+1))-2}{2x+1}$$

✓ **Mathematica** : cpu = 0.410144 (sec), leaf count = 117

$$\text{Solve}\left[\int_1^{y(x)} -\frac{F(K[2]+\log(2x+1))\int_1^x -\frac{2F'(K[2]+\log(2K[1]+1))}{F(K[2]+\log(2K[1]+1))^2(2K[1]+1)}dK[1]-1}{F(K[2]+\log(2x+1))}dK[2]+\int_1^x\left(\frac{}{F(\log(2K[1]+1)}\right.\right.$$

✓ **Maple** : cpu = 0.138 (sec), leaf count = 27

$$\left\{y(x) = \operatorname{RootOf}\left(c_1 - x + \int^{-Z}\frac{1}{F(\_a)}d\_a\right) - \ln(2x+1)\right\}$$

2.604 ODE No. 604

$$y'(x) = \frac{2y(x)^3}{2y(x)F\left(\frac{4xy(x)^2+1}{y(x)^2}\right)+1}$$

✓ **Mathematica** : cpu = 0.45576 (sec), leaf count = 143

$$\text{Solve}\left[\int_1^{y(x)}\left(-\int_1^x \frac{\left(\frac{8K[1]}{K[2]}-\frac{2(4K[1]K[2]^2+1)}{K[2]^3}\right)F'\left(\frac{4K[1]K[2]^2+1}{K[2]^2}\right)}{F\left(\frac{4K[1]K[2]^2+1}{K[2]^2}\right)^2}dK[1]+\frac{1}{K[2]^2}+\frac{1}{2F\left(\frac{4xK[2]^2+1}{K[2]^2}\right)K[2]^3}\right)dK[2]\right.$$

✓ **Maple** : cpu = 0.158 (sec), leaf count = 30

$$\left\{-c_1-\frac{\left(\int^{4x+\frac{1}{y(x)^2}}\frac{1}{F(\_a)}d\_a\right)}{4}-\frac{1}{y(x)}=0\right\}$$

2.605 ODE No. 605

$$y'(x)=-\frac{y(x)^2\left(2x-F\left(\frac{1-\frac{1}{2}xy(x)}{y(x)}\right)\right)}{4x}$$

✓ **Mathematica** : cpu = 0.556547 (sec), leaf count = 145

$$\text{Solve}\left[\int_1^{y(x)}\left(-\int_1^x\frac{2\left(-\frac{K[1]}{2K[2]}-\frac{1-\frac{1}{2}K[1]K[2]}{K[2]^2}\right)F'\left(\frac{1-\frac{1}{2}K[1]K[2]}{K[2]}\right)}{F\left(\frac{1-\frac{1}{2}K[1]K[2]}{K[2]}\right)^2}dK[1]-\frac{4}{F\left(\frac{1-\frac{1}{2}xK[2]}{K[2]}\right)K[2]^2}\right)dK[2]+\int_1^x\left(\frac{1}{K[\right.\right.$$

✓ **Maple** : cpu = 0.121 (sec), leaf count = 29

$$\left\{y(x)=\frac{2}{x+2\operatorname{RootOf}\left(c_1-4\left(\int^{-Z}\frac{1}{F(\_a)}d\_a\right)-\ln(x)\right)}\right\}$$

2.606 ODE No. 606

$$y'(x)=x\left(F\left(y(x)-\frac{1}{2}e^{-x^2}x^2\right)-e^{-x^2}x^2+e^{-x^2}\right)$$

✓ **Mathematica** : cpu = 0.689518 (sec), leaf count = 361

$$\text{Solve}\left[\int_1^{y(x)}-\frac{F\left(K[2]-\frac{1}{2}e^{-x^2}x^2\right)\int_1^x\left(\frac{e^{-K[1]^2}F'\left(K[2]-\frac{1}{2}e^{-K[1]^2}K[1]^2\right)K[1]^3}{F\left(K[2]-\frac{1}{2}e^{-K[1]^2}K[1]^2\right)^2}-\frac{e^{-K[1]^2}\left(e^{K[1]^2}F\left(K[2]-\frac{1}{2}e^{-K[1]^2}K[1]^2\right)+1\right)}{F\left(K[2]-\frac{1}{2}e^{-K[1]^2}K\right.}\right.}{F\left(K[2]-\frac{1}{2}e^{-x^2}x^2\right)}\right.$$

✓ **Maple** : cpu = 0.615 (sec), leaf count = 34

$$\left\{y(x)=\frac{x^2\mathrm{e}^{-x^2}}{2}+\operatorname{RootOf}\left(x^2+2c_1-2\left(\int^{-Z}\frac{1}{F(\_a)}d\_a\right)\right)\right\}$$

2.607 ODE No. 607

$$y'(x) = \frac{x^3 F\left(\frac{y(x)}{x^2}\right) + 2y(x)}{x}$$

✓ **Mathematica** : cpu = 0.267311 (sec), leaf count = 121

$$\text{Solve}\left[\int_1^{y(x)} -\frac{F\left(\frac{K[2]}{x^2}\right)\int_1^x\left(\frac{2}{F\left(\frac{K[2]}{K[1]^2}\right)K[1]^3} - \frac{2K[2]F'\left(\frac{K[2]}{K[1]^2}\right)}{F\left(\frac{K[2]}{K[1]^2}\right)^2 K[1]^5}\right)dK[1]x^2 + 1}{x^2 F\left(\frac{K[2]}{x^2}\right)} dK[2] + \int_1^x \left(\frac{2y(x)}{F\left(\frac{y(x)}{K[1]^2}\right)K[1]^3} + 1\right) d\right.$$

✓ **Maple** : cpu = 0.096 (sec), leaf count = 22

$$\left\{y(x) = x^2 \operatorname{RootOf}\left(c_1 - x + \int^{\_Z} \frac{1}{F(\_a)} d\_a\right)\right\}$$

2.608 ODE No. 608

$$y'(x) = \frac{\sqrt{y(x)}}{F\left(\frac{x-y(x)}{\sqrt{y(x)}}\right) + \sqrt{y(x)}}$$

✓ **Mathematica** : cpu = 0.59644 (sec), leaf count = 274

$$\text{Solve}\left[\int_1^{y(x)}\left(-\frac{F\left(\frac{x-K[2]}{\sqrt{K[2]}}\right)}{x\sqrt{K[2]}} - \int_1^x -\frac{-\frac{F\left(\frac{K[1]-K[2]}{\sqrt{K[2]}}\right)}{\sqrt{K[2]}} - 2\left(-\frac{K[1]-K[2]}{2K[2]^{3/2}} - \frac{1}{\sqrt{K[2]}}\right)\sqrt{K[2]}F'\left(\frac{K[1]-K[2]}{\sqrt{K[2]}}\right) - 1}{\left(-2\sqrt{K[2]}F\left(\frac{K[1]-K[2]}{\sqrt{K[2]}}\right) + K[1] - K[2]\right)^2} dK[1] + \right.\right.$$

✓ **Maple** : cpu = 0.157 (sec), leaf count = 40

$$\left\{-c_1 - \left(\int^{\frac{x}{\sqrt{y(x)}} - \sqrt{y(x)}} \frac{1}{-\_a + 2F(\_a)} d\_a\right) + \frac{\ln(y(x))}{2} = 0\right\}$$

2.609 ODE No. 609

$$y'(x) = \frac{F(x^3 y(x)) - 3x^2 y(x)}{x^3}$$

✓ **Mathematica** : cpu = 0.317916 (sec), leaf count = 117

$$\text{Solve}\left[\int_1^{y(x)} -\frac{x^3 + F(x^3 K[2]) \int_1^x \left(\frac{3K[1]^5 K[2] F'(K[1]^3 K[2])}{F(K[1]^3 K[2])^2} - \frac{3K[1]^2}{F(K[1]^3 K[2])}\right) dK[1]}{F(x^3 K[2])} dK[2] + \int_1^x \left(1 - \frac{3K[1]^2 y(x)}{F(K[1]^3 y(x))}\right.\right.$$

✓ **Maple** : cpu = 0.177 (sec), leaf count = 22

$$\left\{y(x) = \frac{\text{RootOf}\left(c_1 + x - \left(\int^{\_Z} \frac{1}{F(\_a)} d\_a\right)\right)}{x^3}\right\}$$

2.610 ODE No. 610

$$y'(x) = \frac{x^2 F\left(\frac{y(x)}{x}\right) + y(x)}{x}$$

✓ **Mathematica** : cpu = 0.106308 (sec), leaf count = 25

$$\text{Solve}\left[\int_1^{\frac{y(x)}{x}} \frac{1}{F(K[1])} dK[1] = x + c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.011 (sec), leaf count = 20

$$\left\{y(x) = x\,\text{RootOf}\left(c_1 + x - \left(\int^{\_Z} \frac{1}{F(\_a)} d\_a\right)\right)\right\}$$

2.611 ODE No. 611

$$y'(x) = \frac{F(x(y(x) + x)) - y(x) - 2x}{x}$$

✓ **Mathematica** : cpu = 0.333128 (sec), leaf count = 191

$$\text{Solve}\left[\int_1^{y(x)} -\frac{x + F(x(x + K[2])) \int_1^x \left(\frac{2F'(K[1](K[1]+K[2]))K[1]^2}{F(K[1](K[1]+K[2]))^2} + \frac{(K[2] - F(K[1](K[1]+K[2])))F'(K[1](K[1]+K[2]))K[1]}{F(K[1](K[1]+K[2]))^2} - \right.}{F(x(x + K[2]))}\right.$$

✓ **Maple** : cpu = 0.083 (sec), leaf count = 28

$$\left\{y(x)=\frac{-x^2+\operatorname{RootOf}\left(c_1-x+\int^{\_Z}\frac{1}{F(\_a)}d\_a\right)}{x}\right\}$$

2.612 ODE No. 612

$$y'(x)=\frac{1}{2}e^{\frac{x^2}{4}}\left(2F\left(e^{-\frac{x^2}{4}}y(x)\right)+e^{-\frac{x^2}{4}}xy(x)\right)$$

✓ **Mathematica** : cpu = 0.452239 (sec), leaf count = 199

$$\text{Solve}\left[\int_1^{y(x)}-\frac{e^{-\frac{x^2}{4}}\left(e^{\frac{x^2}{4}}F\left(e^{-\frac{x^2}{4}}K[2]\right)\int_1^x\left(\frac{e^{-\frac{1}{4}K[1]^2}K[1]}{2F\left(e^{-\frac{1}{4}K[1]^2}K[2]\right)}-\frac{e^{-\frac{1}{2}K[1]^2}K[1]K[2]F'\left(e^{-\frac{1}{4}K[1]^2}K[2]\right)}{2F\left(e^{-\frac{1}{4}K[1]^2}K[2]\right)^2}\right)dK[1]+1\right)}{F\left(e^{-\frac{x^2}{4}}K[2]\right)}dK\right.$$

✓ **Maple** : cpu = 0.125 (sec), leaf count = 27

$$\left\{y(x)=\operatorname{RootOf}\left(c_1-x+\int^{\_Z}\frac{1}{F(\_a)}d\_a\right)e^{\frac{x^2}{4}}\right\}$$

2.613 ODE No. 613

$$y'(x)=\frac{x^2F\left(\frac{y(x)-x\log(x)}{x}\right)+y(x)+x}{x}$$

✓ **Mathematica** : cpu = 0.349883 (sec), leaf count = 226

$$\text{Solve}\left[\int_1^{y(x)}-\frac{xF\left(\frac{K[2]-x\log(x)}{x}\right)\int_1^x\left(-\frac{K[2]F'\left(\frac{K[2]-K[1]\log(K[1])}{K[1]}\right)}{F\left(\frac{K[2]-K[1]\log(K[1])}{K[1]}\right)^2K[1]^3}-\frac{F'\left(\frac{K[2]-K[1]\log(K[1])}{K[1]}\right)}{F\left(\frac{K[2]-K[1]\log(K[1])}{K[1]}\right)^2K[1]^2}+\frac{1}{F\left(\frac{K[2]-K[1]\log(K[1])}{K[1]}\right)F}\right.}{xF\left(\frac{K[2]-x\log(x)}{x}\right)}\right.$$

✓ **Maple** : cpu = 0.105 (sec), leaf count = 23

$$\left\{y(x)=\left(\operatorname{RootOf}\left(c_1-x+\int^{\_Z}\frac{1}{F(\_a)}d\_a\right)+\ln(x)\right)x\right\}$$

2.614 ODE No. 614

$$y'(x) = \frac{(a-1)(a+1)x}{a^2 F\left(-\frac{1}{2}a^2x^2 + \frac{x^2}{2} + \frac{y(x)^2}{2}\right) - F\left(-\frac{1}{2}a^2x^2 + \frac{x^2}{2} + \frac{y(x)^2}{2}\right) + y(x)}$$

✓ **Mathematica** : cpu = 0.463008 (sec), leaf count = 177

$$\text{Solve}\left[\int_1^{y(x)} \left(\frac{K[2]}{(a-1)(a+1)F\left(-\frac{1}{2}a^2x^2 + \frac{x^2}{2} + \frac{K[2]^2}{2}\right)} - \int_1^x \frac{K[1]K[2]F'\left(-\frac{1}{2}a^2K[1]^2 + \frac{K[1]^2}{2} + \frac{K[2]^2}{2}\right)}{F\left(-\frac{1}{2}a^2K[1]^2 + \frac{K[1]^2}{2} + \frac{K[2]^2}{2}\right)^2} dK[1] +\right.\right.$$

✓ **Maple** : cpu = 0.393 (sec), leaf count = 60

$$\left\{-c_1 + \frac{\int^{-a^2x^2+x^2+y(x)^2} \frac{1}{F\left(\frac{\_a}{2}\right)} d\_a}{2a^4 - 4a^2 + 2} + \frac{y(x)}{(a-1)(a+1)} = 0\right\}$$

2.615 ODE No. 615

$$y'(x) = \frac{y(x)}{x(y(x)F(xy(x)) - 1)}$$

✓ **Mathematica** : cpu = 0.310851 (sec), leaf count = 77

$$\text{Solve}\left[\int_1^{y(x)} \left(-\int_1^x \frac{F'(K[1]K[2])}{F(K[1]K[2])^2} dK[1] - \frac{1}{F(xK[2])K[2]} + 1\right) dK[2] + \int_1^x -\frac{1}{F(K[1]y(x))K[1]} dK[1] = c_1, y(x\right.$$

✓ **Maple** : cpu = 0.125 (sec), leaf count = 26

$$\left\{-c_1 + \int^{xy(x)} \frac{1}{\_aF(\_a)} d\_a - y(x) = 0\right\}$$

2.616 ODE No. 616

$$y'(x) = \frac{F(x(xy(x)-1)) - 2x^3y(x) + x^2}{x^4}$$

✓ **Mathematica** : cpu = 0.58307 (sec), leaf count = 177

$$\text{Solve}\left[\int_1^{y(x)} -\frac{x^2 + F(x(xK[2]-1)) \int_1^x \left(\frac{2K[2]F'(K[1](K[1]K[2]-1))K[1]^3}{F(K[1](K[1]K[2]-1))^2} - \frac{F'(K[1](K[1]K[2]-1))K[1]^2}{F(K[1](K[1]K[2]-1))^2} - \frac{2K[1]}{F(K[1](K[1]K[2]-\right.}{F(x(xK[2]-1))}\right.$$

✓ **Maple** : cpu = 0.095 (sec), leaf count = 26

$$\left\{y(x)=\frac{x+\mathrm{RootOf}\left(c_1x+x\left(\int^{-Z}\frac{1}{F(\_a)}d\_a\right)+1\right)}{x^2}\right\}$$

2.617 ODE No. 617

$$y'(x)=\frac{1}{9}e^{-\frac{3x^2}{2}}xy(x)^2F\left(\frac{e^{\frac{3x^2}{2}}(y(x)+3)}{3y(x)}\right)$$

✓ **Mathematica** : cpu = 1.23709 (sec), leaf count = 615

$$\mathrm{Solve}\left[\int_1^{y(x)}\left(\frac{9e^{\frac{3x^2}{2}}-F\left(\frac{e^{\frac{3x^2}{2}}(K[2]+3)}{3K[2]}\right)}{3\left(\left(9e^{\frac{3x^2}{2}}-F\left(\frac{e^{\frac{3x^2}{2}}(K[2]+3)}{3K[2]}\right)\right)K[2]+27e^{\frac{3x^2}{2}}\right)}-\int_1^x\left(-\frac{K[2]\left(\frac{e^{\frac{3K[1]^2}{2}}}{3K[2]}-\frac{e^{\frac{3K[1]^2}{2}}(K[2]+3)}{3K[2]^2}\right)F'\left(\cdots\right.}{-9e^{\frac{3K[1]^2}{2}}K[2]+F\left(\frac{e^{\frac{3K[1]^2}{2}}(K[2]+3)}{3K[2]}\right.\cdots}\right.\right.\right.$$

✓ **Maple** : cpu = 0.243 (sec), leaf count = 47

$$\left\{y(x)=-\frac{3\,\mathrm{e}^{\frac{3x^2}{2}}}{-3\,\mathrm{RootOf}\left(-x^2+2c_1-18\left(\int^{-Z}\frac{1}{-27\_a+F(\_a)}d\_a\right)\right)+\mathrm{e}^{\frac{3x^2}{2}}}\right\}$$

2.618 ODE No. 618

$$y'(x)=\frac{(y(x)+1)(x(y(x)-\log(y(x)+1)-\log(x))+1)}{xy(x)}$$

✓ **Mathematica** : cpu = 0.235213 (sec), leaf count = 25

$$\left\{\left\{y(x)\to-1-W\left(-\frac{e^{-1+c_1e^x}}{x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.513 (sec), leaf count = 34

$$\left\{y(x)=\frac{-x+\mathrm{e}^{c_1\mathrm{e}^x-\mathrm{LambertW}\left(-\frac{\mathrm{e}^{c_1\mathrm{e}^x-1}}{x}\right)-1}}{x}\right\}$$

2.619 ODE No. 619

$$y'(x) = \frac{6y(x)}{-F\left(-\frac{1}{3}y(x)^4 - \frac{y(x)^3}{2} - y(x)^2 - y(x) + x\right) + 8y(x)^4 + 9y(x)^3 + 12y(x)^2 + 6y(x)}$$

✓ **Mathematica** : cpu = 0.837047 (sec), leaf count = 330

$$\text{Solve}\left[\int_1^{y(x)}\left(-\frac{8K[2]^3}{F\left(-\frac{1}{3}K[2]^4 - \frac{K[2]^3}{2} - K[2]^2 - K[2] + x\right)} - \frac{9K[2]^2}{F\left(-\frac{1}{3}K[2]^4 - \frac{K[2]^3}{2} - K[2]^2 - K[2] + x\right)} - \frac{}{F\left(-\right.}\right.\right.$$

✓ **Maple** : cpu = 0.373 (sec), leaf count = 81

$$\left\{-c_1 + \int_{\_b}^{y(x)} \frac{-8\_a^4 - 9\_a^3 - 12\_a^2 - 6\_a + F\left(-\frac{1}{3}\_a^4 - \frac{1}{2}\_a^3 - \_a^2 - \_a + x\right)}{\_aF\left(-\frac{1}{3}\_a^4 - \frac{1}{2}\_a^3 - \_a^2 - \_a + x\right)} d\_a = 0\right\}$$

2.620 ODE No. 620

$$y'(x) = \frac{e^{2F((y(x)-x)(y(x)+x))} + x^2 + 2xy(x) + y(x)^2}{-e^{2F((y(x)-x)(y(x)+x))} + x^2 + 2xy(x) + y(x)^2}$$

✓ **Mathematica** : cpu = 0.936624 (sec), leaf count = 205

$$\text{Solve}\left[\int_1^{y(x)}\left(-\frac{2K[2]}{-x^2 + e^{2F((K[2]-x)(x+K[2]))} + K[2]^2} - \int_1^x \left(\frac{2K[1]\left(-4e^{2F((K[2]-K[1])(K[1]+K[2]))}F'((K[2]-K[1]\right.}{\left(K[1]^2 - e^{2F((K[2]-K[1])(K[1]+K[2]\right.}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.227 (sec), leaf count = 37

$$\left\{y(x) = -x + \mathrm{e}^{\mathrm{RootOf}\left(c_1 - \_Z + \int^{-2x\,\mathrm{e}^{-\_Z} + \mathrm{e}^{2\_Z}} \frac{1}{\_a + \mathrm{e}^{2F(\_a)}} d\_a\right)}\right\}$$

2.621 ODE No. 621

$$y'(x) = \frac{1}{y(x) + \sqrt{x}}$$

✓ **Mathematica** : cpu = 0.0742469 (sec), leaf count = 445

$$\left\{\left\{y(x) \to -\sqrt{x} + \frac{1}{\text{Root}\left[\#1^6\left(16x^3 + 16e^{12c_1}\right) - 24\#1^4x^2 + 8\#1^3x^{3/2} + 9\#1^2x - 6\#1\sqrt{x} + 1\&, 1\right]}\right\}, \left\{y(x) \to\right.\right.$$

✓ **Maple** : cpu = 0.244 (sec), leaf count = 59

$$\left\{y(x) = \frac{\sqrt{x}\,\text{RootOf}\left(c_1\_Z^{18} - 9\_Z^6x - 6\_Z^3\sqrt{x} - 1\right)^3 + 1}{\text{RootOf}\left(c_1\_Z^{18} - 9\_Z^6x - 6\_Z^3\sqrt{x} - 1\right)^3}\right\}$$

2.622 ODE No. 622

$$y'(x) = \frac{1}{y(x) + \sqrt{3x+1} + 2}$$

✓ **Mathematica** : cpu = 0.367691 (sec), leaf count = 140

$$\text{Solve}\left[6\sqrt{33}\tanh^{-1}\left(\frac{3y(x) + 7\sqrt{3x+1} + 6}{\sqrt{33}\left(y(x) + \sqrt{3x+1} + 2\right)}\right) + 44c_1 = 33\left(\log\left(\frac{-3\sqrt{3x+1}y(x)^2 - 3\left(3x + 4\sqrt{3x+1} + 1\right)}{2(3x}\right.\right.\right.$$

✓ **Maple** : cpu = 0.214 (sec), leaf count = 77

$$\left\{-c_1 - \frac{6\sqrt{3x+1}\,\text{arctanh}\left(\frac{6y(x)+3\sqrt{3x+1}+12}{\sqrt{99x+33}}\right)}{\sqrt{99x+33}} + \ln\left(3y(x)^2 - 6x + 12y(x) + (3y(x)+6)\sqrt{3x+1} + 10\right) = 0\right\}$$

2.623 ODE No. 623

$$y'(x) = \frac{x^2}{x^{3/2} + y(x)}$$

✓ **Mathematica** : cpu = 0.306994 (sec), leaf count = 77

$$\text{Solve}\left[6\sqrt{33}\tanh^{-1}\left(\frac{7x^{3/2} + 3y(x)}{\sqrt{33}\left(x^{3/2} + y(x)\right)}\right) + 44c_1 = 33\left(\log\left(-\frac{3y(x)}{2x^{3/2}} - \frac{3y(x)^2}{2x^3} + 1\right) + 3\log(x)\right), y(x)\right]$$

✓ **Maple** : cpu = 0.255 (sec), leaf count = 49

$$\left\{-c_1 - \frac{2\sqrt{33}\,\operatorname{arctanh}\left(\frac{\left(x^{\frac{3}{2}}+2y(x)\right)\sqrt{33}}{11x^{\frac{3}{2}}}\right)}{11} + \ln\left(-2x^3 + 3x^{\frac{3}{2}}y(x) + 3y(x)^2\right) = 0\right\}$$

2.624 ODE No. 624

$$y'(x) = \frac{x^{5/3}}{x^{4/3} + y(x)}$$

✓ **Mathematica** : cpu = 32.1671 (sec), leaf count = 9837

✓ **Maple** : cpu = 33.316 (sec), leaf count = 46

$$\left\{y(x) = \frac{\operatorname{RootOf}\left(\_Z^{192} + 12\_Z^{176}x^{\frac{4}{3}} + 48\_Z^{160}x^{\frac{8}{3}} + 64\_Z^{144}x^4 - c_1\right)^{16}}{2} + \frac{x^{\frac{4}{3}}}{2}\right\}$$

2.625 ODE No. 625

$$y'(x) = \frac{1}{2}ix^2\left(-2\sqrt{6y(x)-x^3}+i\right)$$

✓ **Mathematica** : cpu = 0.347914 (sec), leaf count = 56

$$\left\{\left\{y(x)\to\frac{1}{6}\left(-W\left(ie^{-x^3-1-6c_1}\right)^2-2W\left(ie^{-x^3-1-6c_1}\right)+x^3-1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.299 (sec), leaf count = 53

$$\left\{2x^3-c_1+2i\arctan\left(\sqrt{-x^3+6y(x)}\right)+\ln\left(x^3-6y(x)-1\right)-2i\sqrt{-x^3+6y(x)}=0\right\}$$

2.626 ODE No. 626

$$y'(x) = \frac{x}{\sqrt{x^2+1}+y(x)}$$

✓ **Mathematica** : cpu = 0.244762 (sec), leaf count = 88

$$\text{Solve}\left[\frac{1}{2}\left(\log\left(-\frac{y(x)^2}{x^2+1}-\frac{y(x)}{\sqrt{x^2+1}}+1\right)+\log\left(x^2+1\right)\right)=\frac{\tanh^{-1}\left(\frac{3\sqrt{x^2+1}+y(x)}{\sqrt{5}\left(\sqrt{x^2+1}+y(x)\right)}\right)}{\sqrt{5}}+c_1,y(x)\right]$$

✓ **Maple** : cpu = 0.437 (sec), leaf count = 115

$$\left\{-c_1-\frac{4\sqrt{5}\,\mathrm{arctanh}\left(\frac{\left(y(x)+3\sqrt{x^2+1}\right)\sqrt{5}}{5y(x)+5\sqrt{x^2+1}}\right)}{15}-\frac{4\ln\left(\frac{36\sqrt{x^2+1}}{y(x)+\sqrt{x^2+1}}\right)}{3}+\frac{2\ln\left(-\frac{1296\left(-x^2+y(x)^2+\sqrt{x^2+1}\,y(x)-1\right)}{11\left(y(x)+\sqrt{x^2+1}\right)^2}\right)}{3}+\frac{2\ln\left(\right.}{}\right.$$

2.627 ODE No. 627

$$y'(x) = \frac{(y(x)\log(x) - 1)^2}{x}$$

✓ **Mathematica** : cpu = 0.954642 (sec), leaf count = 25

$$\left\{\left\{y(x) \to \frac{\tan(\log(x) + c_1)}{1 + \log(x)\tan(\log(x) + c_1)}\right\}\right\}$$

✓ **Maple** : cpu = 0.253 (sec), leaf count = 35

$$\left\{y(x) = \frac{c_1 \sin(\ln(x)) + \cos(\ln(x))}{(c_1 + \ln(x))\cos(\ln(x)) + (c_1 \ln(x) - 1)\sin(\ln(x))}\right\}$$

2.628 ODE No. 628

$$y'(x) = \frac{1}{3}x\left(3\sqrt{x^2 + 3y(x)} - 2\right)$$

✓ **Mathematica** : cpu = 0.197082 (sec), leaf count = 38

$$\left\{\left\{y(x) \to \frac{1}{432}\left(81x^4 - 72x^2 - 486c_1x^2 + 16 + 729c_1{}^2 - 216c_1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.31 (sec), leaf count = 23

$$\left\{\frac{3x^2}{4} + c_1 + \frac{2}{3} - \sqrt{x^2 + 3y(x)} = 0\right\}$$

2.629 ODE No. 629

$$y'(x) = \frac{(2y(x)\log(x) - 1)^2}{x}$$

✓ **Mathematica** : cpu = 0.989133 (sec), leaf count = 47

$$\left\{\left\{y(x) \to \frac{1}{\sqrt{2}\left(\sqrt{2}\log(x) - \tan\left(\frac{1}{2}\left(2\sqrt{2}\log(x) + \sqrt{2}c_1\right)\right)\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.251 (sec), leaf count = 62

$$\left\{y(x) = \frac{c_1 \sin\left(\sqrt{2}\ln(x)\right) + \cos\left(\sqrt{2}\ln(x)\right)}{\left(c_1\sqrt{2} + 2\ln(x)\right)\cos\left(\sqrt{2}\ln(x)\right) + \left(2c_1\ln(x) - \sqrt{2}\right)\sin\left(\sqrt{2}\ln(x)\right)}\right\}$$

2.630 ODE No. 630

$$y'(x) = \frac{e^{bx}}{e^{-bx}y(x) + 1}$$

✓ **Mathematica** : cpu = 0.501585 (sec), leaf count = 101

$$\text{Solve}\left[\frac{1}{2}b\left(\log\left(-be^{-2bx}y(x)^2 - be^{-bx}y(x) + 1\right) + 2bx\right) = \frac{b\tan^{-1}\left(\frac{(b+2)(-e^{bx}) - by(x)}{b\sqrt{-\frac{b+4}{b}}(e^{bx}+y(x))}\right)}{\sqrt{-\frac{b+4}{b}}} + c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.386 (sec), leaf count = 98

$$\left\{y(x) = \text{RootOf}\left(\_Z^2 b + \_Zb - \mathrm{e}^{\text{RootOf}\left(b\left(\tanh^2\left(\frac{\sqrt{b^2+4b}\,(-2bx+2c_1 b - \_Z)}{2b}\right)\right) + 4\left(\tanh^2\left(\frac{\sqrt{b^2+4b}\,(-2bx+2c_1 b - \_Z)}{2b}\right)\right) - b - 4\,\mathrm{e}^{\_Z} -\right.}\right.\right.$$

2.631 ODE No. 631

$$y'(x) = \frac{1}{2}x^2\left(2\sqrt{x^3 - 6y(x)} + 1\right)$$

✓ **Mathematica** : cpu = 0.237145 (sec), leaf count = 38

$$\left\{\left\{y(x) \to \frac{1}{96}\left(-16x^6 + 8x^3 - 192c_1x^3 - 1 - 576{c_1}^2 - 48c_1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.249 (sec), leaf count = 23

$$\left\{-x^3 + c_1 - \frac{1}{2} - \sqrt{x^3 - 6y\left(x\right)} = 0\right\}$$

2.632 ODE No. 632

$$y'(x) = \frac{e^x}{e^{-x}y(x) + 1}$$

✓ **Mathematica** : cpu = 0.243452 (sec), leaf count = 65

$$\text{Solve}\left[\frac{1}{2}\log\left(-e^{-2x}y(x)^2 - e^{-x}y(x) + 1\right) + x = \frac{\tanh^{-1}\left(\frac{y(x)+3e^x}{\sqrt{5}(y(x)+e^x)}\right)}{\sqrt{5}} + c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.331 (sec), leaf count = 54

$$\left\{-c_1+x-\frac{\sqrt{5}\,\operatorname{arctanh}\left(\frac{2\sqrt{5}\,\mathrm{e}^{-x}y(x)}{5}+\frac{\sqrt{5}}{5}\right)}{5}+\frac{\ln\left(\mathrm{e}^{-2x}y(x)^2+\mathrm{e}^{-x}y(x)-1\right)}{2}=0\right\}$$

2.633 ODE No. 633

$$y'(x)=\frac{e^{2x/3}}{e^{-2x/3}y(x)+1}$$

✓ **Mathematica** : cpu = 0.267088 (sec), leaf count = 85

$$\text{Solve}\left[7\left(3\log\left(-\frac{2}{3}e^{-4x/3}y(x)^2-\frac{2}{3}e^{-2x/3}y(x)+1\right)+4x-9c_1\right)=6\sqrt{7}\tanh^{-1}\left(\frac{y(x)+4e^{2x/3}}{\sqrt{7}\left(y(x)+e^{2x/3}\right)}\right),y(x)\right]$$

✓ **Maple** : cpu = 1.121 (sec), leaf count = 52

$$\left\{y(x)=\text{RootOf}\left(2\_Z^2+2\_Z-\mathrm{e}^{\text{RootOf}\left(-343\left(\tanh^2\left(\frac{(4c_1-3\_Z-4x)\sqrt{7}}{6}\right)\right)+98\,\mathrm{e}^{\_Z}+343\right)}-3\right)\mathrm{e}^{\frac{2x}{3}}\right\}$$

2.634 ODE No. 634

$$y'(x)=\frac{x^5\sqrt{4x^2y(x)+1}+\frac{1}{2}}{x^3}$$

✓ **Mathematica** : cpu = 0.245539 (sec), leaf count = 33

$$\left\{\left\{y(x)\to\frac{x^{10}-8c_1x^6+16{c_1}^2x^2-4}{16x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.338 (sec), leaf count = 26

$$\left\{\frac{x^4}{2}+c_1-\frac{\sqrt{4x^2y\left(x\right)+1}}{x}=0\right\}$$

2.635 ODE No. 635

$$y'(x) = \frac{1}{2}x\left(2\sqrt{x^3-6y(x)}+x\right)$$

✓ **Mathematica** : cpu = 0.226266 (sec), leaf count = 33

$$\left\{\left\{y(x)\to \frac{1}{24}\left(-9x^4+4x^3+36c_1x^2-36c_1{}^2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.277 (sec), leaf count = 22

$$\left\{-\frac{3x^2}{2}+c_1-\sqrt{x^3-6y\left(x\right)}=0\right\}$$

2.636 ODE No. 636

$$y'(x) = y(x)\left(x^2-\log(y(x))\right)$$

✓ **Mathematica** : cpu = 0.142582 (sec), leaf count = 24

$$\left\{\left\{y(x)\to e^{x^2-2x-2c_1e^{-x}+2}\right\}\right\}$$

✓ **Maple** : cpu = 0.212 (sec), leaf count = 19

$$\{y(x) = \mathrm{e}^{c_1\mathrm{e}^{-x}+x^2-2x+2}\}$$

2.637 ODE No. 637

$$y'(x) = \frac{e^{-x^2}x}{e^{x^2}y(x)+1}$$

✓ **Mathematica** : cpu = 11.4054 (sec), leaf count = 59

$$\text{Solve}\left[-\frac{1}{4}\log\left(2e^{2x^2}y(x)^2+2e^{x^2}y(x)+1\right)-\frac{1}{2}\tan^{-1}\left(2e^{x^2}y(x)+1\right)+\frac{x^2}{2}=c_1,y(x)\right]$$

✓ **Maple** : cpu = 0.197 (sec), leaf count = 84

$$\left\{y(x) = -\frac{\mathrm{e}^{-x^2}\tan\left(\mathrm{RootOf}\left(2x^2+6c_1-2\_Z-\ln\left(\frac{81(\tan^2(\_Z))}{10}+\frac{81}{10}\right)+2\ln\left(\frac{9\tan(\_Z)}{2}-\frac{9}{2}\right)\right)\right)}{\tan\left(\mathrm{RootOf}\left(2x^2+6c_1-2\_Z-\ln\left(\frac{81(\tan^2(\_Z))}{10}+\frac{81}{10}\right)+2\ln\left(\frac{9\tan(\_Z)}{2}-\frac{9}{2}\right)\right)\right)-1}\right\}$$

2.638 ODE No. 638

$$y'(x) = y(x)(\log(\log(y(x))) - \log(x))$$

✓ **Mathematica** : cpu = 0.146057 (sec), leaf count = 41

$$\text{Solve}\left[\int_1^{y(x)} \frac{1}{K[1](x\log(x) + \log(K[1]) - x\log(\log(K[1])))} dK[1] = -\log(x) + c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.196 (sec), leaf count = 35

$$\left\{-c_1 + \int_{\_b}^{y(x)} \frac{1}{(x\ln(x) - x\ln(\ln(\_a)) + \ln(\_a))\_a} d\_a + \ln(x) = 0\right\}$$

2.639 ODE No. 639

$$y'(x) = y(x)(\log(x) - \log(\log(y(x))))^2$$

✓ **Mathematica** : cpu = 0.192856 (sec), leaf count = 53

$$\text{Solve}\left[\int_1^{y(x)} \frac{1}{K[1]\left(x\log^2(x) - 2x\log(\log(K[1]))\log(x) + x\log^2(\log(K[1])) - \log(K[1])\right)} dK[1] = \log(x) + c_1, y(x$$

✓ **Maple** : cpu = 0.247 (sec), leaf count = 50

$$\left\{-c_1 + \int_{\_b}^{y(x)} \frac{1}{\left(x\ln(x)^2 - 2x\ln(x)\ln(\ln(\_a)) + x\ln(\ln(\_a))^2 - \ln(\_a)\right)\_a} d\_a - \ln(x) = 0\right\}$$

2.640 ODE No. 640

$$y'(x) = \frac{y(x)}{\log(\log(y(x))) - \log(x) + 1}$$

✓ **Mathematica** : cpu = 0.310486 (sec), leaf count = 53

$$\text{Solve}\left[\int_1^{y(x)} \frac{\log(x) - \log(\log(K[1])) - 1}{K[1](x + \log(x)\log(K[1]) - \log(K[1]) - \log(K[1])\log(\log(K[1])))} dK[1] = c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.367 (sec), leaf count = 47

$$\left\{-c_1 + \int_{\_b}^{y(x)} \frac{\ln(x) - \ln(\ln(\_a)) - 1}{(\ln(\_a)\ln(x) - \ln(\_a)\ln(\ln(\_a)) + x - \ln(\_a))\_a} d\_a = 0\right\}$$

2.641 ODE No. 641

$$y'(x) = \frac{x^4\sqrt{4x^2y(x)+1}+\frac{1}{2}}{x^3}$$

✓ **Mathematica** : cpu = 0.250966 (sec), leaf count = 35

$$\left\{\left\{y(x)\to \frac{4x^8-24c_1x^5+36{c_1}^2x^2-9}{36x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.339 (sec), leaf count = 26

$$\left\{\frac{2x^3}{3}+c_1-\frac{\sqrt{4x^2y\left(x\right)+1}}{x}=0\right\}$$

2.642 ODE No. 642

$$y'(x) = \frac{\left(4ax-y(x)^2\right)^2}{y(x)}$$

✓ **Mathematica** : cpu = 0.191234 (sec), leaf count = 105

$$\left\{\left\{y(x)\to -\sqrt{4ax-\sqrt{2}\sqrt{a}\tanh\left(\frac{2\sqrt{2}ax-\sqrt{2}c_1}{\sqrt{a}}\right)}\right\},\left\{y(x)\to \sqrt{4ax-\sqrt{2}\sqrt{a}\tanh\left(\frac{2\sqrt{2}ax-\sqrt{2}c_1}{\sqrt{a}}\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.275 (sec), leaf count = 286

$$\left\{y(x)=\frac{\sqrt{4}\sqrt{\left(c_1\mathrm{e}^{2\left(-2ax+\sqrt{2}\sqrt{a}\right)x}+\mathrm{e}^{-2\left(2ax+\sqrt{2}\sqrt{a}\right)x}\right)\left(c_1\left(ax-\frac{\sqrt{2}\sqrt{a}}{4}\right)\mathrm{e}^{2\left(-2ax+\sqrt{2}\sqrt{a}\right)x}+\left(ax+\frac{\sqrt{2}\sqrt{a}}{4}\right)\mathrm{e}^{-2(}}}{c_1\mathrm{e}^{2\left(-2ax+\sqrt{2}\sqrt{a}\right)x}+\mathrm{e}^{-2\left(2ax+\sqrt{2}\sqrt{a}\right)x}}\right.$$

2.643 ODE No. 643

$$y'(x) = \frac{1}{3}x\left(3x\sqrt{x^2+3y(x)}-2\right)$$

✓ **Mathematica** : cpu = 0.230038 (sec), leaf count = 31

$$\left\{\left\{y(x)\to \frac{1}{12}\left(x^6-6c_1x^3-4x^2+9{c_1}^2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.24 (sec), leaf count = 22

$$\left\{\frac{x^3}{2}+c_1-\sqrt{x^2+3y\left(x\right)}=0\right\}$$

2.644 ODE No. 644

$$y'(x) = -\frac{1}{2}x^2\left(ax - 2\sqrt{a\left(ax^4 + 8y(x)\right)}\right)$$

✓ **Mathematica** : cpu = 0.410196 (sec), leaf count = 34

$$\left\{\left\{y(x) \to \frac{1}{72}a\left(16x^6 - 9x^4 - 96c_1x^3 + 144c_1{}^2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.476 (sec), leaf count = 27

$$\left\{\frac{4a\,x^3}{3} + c_1 - \sqrt{\left(a\,x^4 + 8y\left(x\right)\right)a} = 0\right\}$$

2.645 ODE No. 645

$$y'(x) = y(x)(x - \log(y(x)))$$

✓ **Mathematica** : cpu = 0.0958501 (sec), leaf count = 20

$$\left\{\left\{y(x) \to e^{x - e^{-x+c_1} - 1}\right\}\right\}$$

✓ **Maple** : cpu = 0.156 (sec), leaf count = 14

$$\{y(x) = e^{c_1 e^{-x} + x - 1}\}$$

2.646 ODE No. 646

$$y'(x) = \frac{\sqrt{x^3 - 6y(x)} + \frac{x^3}{2} + \frac{x^2}{2}}{x + 1}$$

✓ **Mathematica** : cpu = 0.330144 (sec), leaf count = 35

$$\left\{\left\{y(x) \to \frac{1}{6}\left(x^3 - 9\log^2(x+1) + 18c_1\log(x+1) - 9c_1{}^2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.379 (sec), leaf count = 23

$$\left\{c_1 - 3\ln\left(x+1\right) - \sqrt{x^3 - 6y\left(x\right)} = 0\right\}$$

2.647 ODE No. 647

$$y'(x) = \frac{x\left(ay(x)^2 + bx^2\right)^2}{a^{5/2}y(x)}$$

✓ **Mathematica** : cpu = 0.417613 (sec), leaf count = 115

$$\left\{\left\{y(x)\to -\sqrt{-\frac{bx^2}{a}+\frac{\sqrt{b}\tan\left(\frac{a^{3/2}bx^2+2c_1}{a^{9/4}\sqrt{b}}\right)}{\sqrt[4]{a}}}\right\},\left\{y(x)\to \sqrt{-\frac{bx^2}{a}+\frac{\sqrt{b}\tan\left(\frac{a^{3/2}bx^2+2c_1}{a^{9/4}\sqrt{b}}\right)}{\sqrt[4]{a}}}\right\}\right\}$$

✓ **Maple** : cpu = 0.302 (sec), leaf count = 460

$$\left\{ y(x) = \frac{\sqrt{-\left(c_1\left(b\,x^2+\sqrt{-\frac{b}{a^{\frac{3}{2}}}}\,a^{\frac{3}{2}}\right)e^{\frac{\left(b\,x^2+2\sqrt{-\frac{b}{a^{\frac{3}{2}}}}\,a^{\frac{3}{2}}\right)x^2}{2a^{\frac{3}{2}}}}+\left(b\,x^2-\sqrt{-\frac{b}{a^{\frac{3}{2}}}}\,a^{\frac{3}{2}}\right)e^{\frac{\left(b\,x^2-2\sqrt{-\frac{b}{a^{\frac{3}{2}}}}\,a^{\frac{3}{2}}\right)x^2}{2a^{\frac{3}{2}}}}\right)\left(c_1 e^{\frac{\left(b\,x^2-\cdots\right.}{}}\cdots\right.}}{\left(c_1 e^{\frac{\left(b\,x^2+2\sqrt{-\frac{b}{a^{\frac{3}{2}}}}\,a^{\frac{3}{2}}\right)x^2}{2a^{\frac{3}{2}}}}+e^{\frac{\left(b\,x^2-2\sqrt{-\frac{b}{a^{\frac{3}{2}}}}\,a^{\frac{3}{2}}\right)x^2}{2a^{\frac{3}{2}}}}\right)a} \cdots\right.$$

2.648 ODE No. 648

$$y'(x) = -\frac{\sqrt{a}x^3\left(-2\sqrt{ax^4+8y(x)}+\sqrt{a}x+\sqrt{a}\right)}{2(x+1)}$$

✓ **Mathematica** : cpu = 0.58899 (sec), leaf count = 128

$$\left\{\left\{y(x)\to \frac{1}{72}\left(16ax^6-48ax^5+123ax^4-96ax^3\log(x+1)-96ac_1x^3-72ax^2+144ax^2\log(x+1)+144ac_1x^2 \cdots\right.\right.\right.$$

✓ **Maple** : cpu = 0.843 (sec), leaf count = 41

$$\left\{-\frac{x^3}{3}+\frac{x^2}{2}-c_1-x+\ln(x+1)+\frac{\sqrt{a\,x^4+8y\,(x)}}{4\sqrt{a}}=0\right\}$$

2.649 ODE No. 649

$$y'(x) = x\sqrt{x^2 + 8y(x) - 2x + 1} - \frac{x}{4} + \frac{1}{4}$$

✓ **Mathematica** : cpu = 0.305663 (sec), leaf count = 37

$$\left\{\left\{y(x) \to \frac{1}{8}\left(4x^4 - x^2 - 16c_1x^2 + 2x - 1 + 16{c_1}^2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.296 (sec), leaf count = 27

$$\left\{2x^2 + c_1 + \frac{1}{4} - \sqrt{x^2 - 2x + 8y(x) + 1} = 0\right\}$$

2.650 ODE No. 650

$$y'(x) = x\sqrt{a^2 + 2ax + x^2 + 4y(x)} - \frac{a}{2} - \frac{x}{2}$$

✓ **Mathematica** : cpu = 0.577284 (sec), leaf count = 109

$$\text{Solve}\left[-\frac{1}{2}\sqrt{a^2 + 2ax + x^2 + 4y(x)} - \frac{1}{2}a\log\left(\sqrt{a^2 + 2ax + x^2 + 4y(x)} + a + x\right) + \frac{1}{2}a\tanh^{-1}\left(\frac{2a + 2a}{2\sqrt{a^2 + 2ax + x}}\right.\right.$$

✓ **Maple** : cpu = 0.312 (sec), leaf count = 28

$$\left\{x^2 + c_1 + \frac{1}{2} - \sqrt{a^2 + 2ax + x^2 + 4y(x)} = 0\right\}$$

2.651 ODE No. 651

$$y'(x) = \frac{y(x)\left(x^2 + \log(y(x))\right)}{x}$$

✓ **Mathematica** : cpu = 0.112369 (sec), leaf count = 16

$$\left\{\left\{y(x) \to e^{x^2 + 2c_1x}\right\}\right\}$$

✓ **Maple** : cpu = 0.118 (sec), leaf count = 13

$$\{y(x) = e^{x^2}e^{c_1x}\}$$

2.652 ODE No. 652

$$y'(x) = \frac{x\sqrt{4ax - y(x)^2} + 2a}{y(x)}$$

✓ **Mathematica** : cpu = 1.34762 (sec), leaf count = 101

$$\left\{\left\{y(x) \to -\frac{\sqrt{4096a^5x - 256a^4x^4 + 32a^2e^{c_1}x^2 - e^{2c_1}}}{32a^2}\right\}, \left\{y(x) \to \frac{\sqrt{4096a^5x - 256a^4x^4 + 32a^2e^{c_1}x^2 - e^{2c_1}}}{32a^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.177 (sec), leaf count = 27

$$\left\{-\frac{x^2}{2} - c_1 - \sqrt{4ax - y(x)^2} = 0\right\}$$

2.653 ODE No. 653

$$y'(x) = x\sqrt{x^2 + 4y(x) - 4x} - \frac{x}{2} + 1$$

✓ **Mathematica** : cpu = 0.843046 (sec), leaf count = 94

$$\text{Solve}\left[-\frac{1}{2}\sqrt{x^2 + 4y(x) - 4x} + \log\left(-\sqrt{x^2 + 4y(x) - 4x} - x + 2\right) - \tanh^{-1}\left(\frac{2x - 4}{2\sqrt{x^2 + 4y(x) - 4x}}\right) + \frac{x^2}{2} - \frac{1}{2}\text{lo}$$

✓ **Maple** : cpu = 0.262 (sec), leaf count = 24

$$\left\{x^2 + c_1 + \frac{1}{2} - \sqrt{x^2 - 4x + 4y(x)} = 0\right\}$$

2.654 ODE No. 654

$$y'(x) = \frac{\sqrt{x^2 + 3y(x)} - \frac{2x^2}{3} - \frac{2x}{3}}{x + 1}$$

✓ **Mathematica** : cpu = 0.371279 (sec), leaf count = 37

$$\left\{\left\{y(x) \to \frac{1}{12}\left(-4x^2 + 9\log^2(x + 1) - 18c_1\log(x + 1) + 9c_1{}^2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.372 (sec), leaf count = 23

$$\left\{c_1 + \frac{3\ln(x + 1)}{2} - \sqrt{x^2 + 3y(x)} = 0\right\}$$

2.655 ODE No. 655

$$y'(x) = \frac{e^{-4x/3}y(x)^3}{e^{-2x/3}y(x)+1}$$

✓ **Mathematica** : cpu = 14.4572 (sec), leaf count = 82

$$\text{Solve}\left[\frac{3}{2}\log(y(x)) + \frac{1}{28}\left(-21\log\left(-3y(x)^2 + 2e^{2x/3}y(x) + 2e^{4x/3}\right) + 6\sqrt{7}\tanh^{-1}\left(\frac{y(x)+2e^{2x/3}}{\sqrt{7}y(x)}\right) + 28x\right) = c_1$$

✓ **Maple** : cpu = 0.76 (sec), leaf count = 66

$$\left\{-c_1 + x + \frac{3\sqrt{7}\operatorname{arctanh}\left(\frac{3\sqrt{7}\,e^{-\frac{2x}{3}}y(x)}{7} - \frac{\sqrt{7}}{7}\right)}{14} + \frac{3\ln\left(e^{-\frac{2x}{3}}y(x)\right)}{2} - \frac{3\ln\left(3\,e^{-\frac{4x}{3}}y(x)^2 - 2\,e^{-\frac{2x}{3}}y(x) - 2\right)}{4} = 0\right\}$$

2.656 ODE No. 656

$$y'(x) = \frac{y(x)\left(x^3 + \log(y(x))\right)}{x}$$

✓ **Mathematica** : cpu = 0.140765 (sec), leaf count = 20

$$\left\{\left\{y(x) \to e^{\frac{x^3}{2}+3c_1x}\right\}\right\}$$

✓ **Maple** : cpu = 0.132 (sec), leaf count = 15

$$\left\{y(x) = e^{c_1x}e^{\frac{x^3}{2}}\right\}$$

2.657 ODE No. 657

$$y'(x) = x^2\sqrt{x^2 + 8y(x) - 2x + 1} - \frac{x}{4} + \frac{1}{4}$$

✓ **Mathematica** : cpu = 0.297964 (sec), leaf count = 37

$$\left\{\left\{y(x) \to \frac{1}{72}\left(16x^6 - 96c_1x^3 - 9x^2 + 18x - 9 + 144{c_1}^2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.271 (sec), leaf count = 26

$$\left\{\frac{4x^3}{3} + c_1 - \sqrt{x^2 - 2x + 8y(x) + 1} = 0\right\}$$

2.658 ODE No. 658

$$y'(x) = \frac{\sqrt{x^2 + 8y(x) - 2x + 1} - \frac{x^2}{4} + \frac{1}{4}}{x + 1}$$

✓ **Mathematica** : cpu = 0.53068 (sec), leaf count = 41

$$\left\{\left\{y(x) \to \frac{1}{8}\left(-x^2 + 2x + 16\log^2(x+1) - 32c_1\log(x+1) - 1 + 16{c_1}^2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.422 (sec), leaf count = 28

$$\left\{c_1 + 4\ln(x+1) - \frac{1}{4} - \sqrt{x^2 - 2x + 8y(x) + 1} = 0\right\}$$

2.659 ODE No. 659

$$y'(x) = x\sqrt{a^2x^2 + 2abx + 4ay(x) + b^2 - 4c} - \frac{ax}{2} - \frac{b}{2}$$

✓ **Mathematica** : cpu = 0.989316 (sec), leaf count = 164

$$\text{Solve}\left[-\frac{\sqrt{a^2x^2 + 2abx + 4ay(x) + b^2 - 4c}}{2a} - \frac{b\log\left(\sqrt{a^2x^2 + 2abx + 4ay(x) + b^2 - 4c} + ax + b\right)}{2a} + \frac{b\tanh^{-1}\left(\frac{}{2a}\right.}{}\right.$$

✓ **Maple** : cpu = 0.351 (sec), leaf count = 41

$$\left\{a\,x^2 + c_1 + \frac{a}{2} - \sqrt{a^2x^2 + 2abx + 4ay(x) + b^2 - 4c} = 0\right\}$$

2.660 ODE No. 660

$$y'(x) = x^2\sqrt{a^2 + 2ax + x^2 + 4y(x)} - \frac{a}{2} - \frac{x}{2}$$

✓ **Mathematica** : cpu = 0.593841 (sec), leaf count = 109

$$\text{Solve}\left[-\frac{1}{2}\sqrt{a^2 + 2ax + x^2 + 4y(x)} - \frac{1}{2}a\log\left(\sqrt{a^2 + 2ax + x^2 + 4y(x)} + a + x\right) + \frac{1}{2}a\tanh^{-1}\left(\frac{2a + 2a}{2\sqrt{a^2 + 2ax + x}}\right.\right.$$

✓ **Maple** : cpu = 0.322 (sec), leaf count = 29

$$\left\{\frac{2x^3}{3} + c_1 - \sqrt{a^2 + 2ax + x^2 + 4y(x)} = 0\right\}$$

2.661 ODE No. 661

$$y'(x) = x^2\sqrt{a^2x^2 + 2abx + 4ay(x) + b^2 - 4c} - \frac{ax}{2} - \frac{b}{2}$$

✓ **Mathematica** : cpu = 0.954937 (sec), leaf count = 164

$$\text{Solve}\left[-\frac{\sqrt{a^2x^2 + 2abx + 4ay(x) + b^2 - 4c}}{2a} - \frac{b\log\left(\sqrt{a^2x^2 + 2abx + 4ay(x) + b^2 - 4c} + ax + b\right)}{2a} + \frac{b\tanh^{-1}\left(\frac{}{2a}\right.}{}\right.$$

✓ **Maple** : cpu = 0.349 (sec), leaf count = 39

$$\left\{\frac{2a\,x^3}{3} + c_1 - \sqrt{a^2x^2 + 2abx + 4ay\,(x) + b^2 - 4c} = 0\right\}$$

2.662 ODE No. 662

$$y'(x) = x^2\sqrt{x^2 - 4y(x) + 2x + 1} + \frac{x}{2} + \frac{1}{2}$$

✓ **Mathematica** : cpu = 0.31609 (sec), leaf count = 37

$$\left\{\left\{y(x) \to \frac{1}{36}\left(-4x^6 + 24c_1x^3 + 9x^2 + 18x + 9 - 36{c_1}^2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.301 (sec), leaf count = 26

$$\left\{-\frac{2x^3}{3} + c_1 - \sqrt{x^2 + 2x - 4y\,(x) + 1} = 0\right\}$$

2.663 ODE No. 663

$$y'(x) = \frac{x^2\sqrt{4ax - y(x)^2} + 2a}{y(x)}$$

✓ **Mathematica** : cpu = 1.7102 (sec), leaf count = 101

$$\left\{\left\{y(x) \to -\frac{\sqrt{147456a^7x - 4096a^6x^6 + 128a^3e^{c_1}x^3 - e^{2c_1}}}{192a^3}\right\}, \left\{y(x) \to \frac{\sqrt{147456a^7x - 4096a^6x^6 + 128a^3e^{c_1}x^3 -}}{192a^3}\right.\right.$$

✓ **Maple** : cpu = 0.169 (sec), leaf count = 27

$$\left\{-\frac{x^3}{3} - c_1 - \sqrt{4ax - y\,(x)^2} = 0\right\}$$

2.664 ODE No. 664

$$y'(x) = x^2\sqrt{x^2+4y(x)-4x} - \frac{x}{2} + 1$$

✓ **Mathematica** : cpu = 1.02378 (sec), leaf count = 94

$$\text{Solve}\left[\frac{x^3}{3} - \frac{1}{2}\sqrt{x^2+4y(x)-4x} + \log\left(-\sqrt{x^2+4y(x)-4x}-x+2\right) - \tanh^{-1}\left(\frac{2x-4}{2\sqrt{x^2+4y(x)-4x}}\right) - \frac{1}{2}\log($$

✓ **Maple** : cpu = 0.243 (sec), leaf count = 25

$$\left\{\frac{2x^3}{3} + c_1 - \sqrt{x^2-4x+4y(x)} = 0\right\}$$

2.665 ODE No. 665

$$y'(x) = -\frac{\sqrt{a}\left(-2\sqrt{ax^4+8y(x)} + \sqrt{a}x^4 + \sqrt{a}x^3\right)}{2(x+1)}$$

✓ **Mathematica** : cpu = 0.532765 (sec), leaf count = 41

$$\left\{\left\{y(x) \to \frac{1}{8}\left(-ax^4 + 16a\log^2(x+1) - 32ac_1\log(x+1) + 16ac_1{}^2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.694 (sec), leaf count = 28

$$\left\{-c_1 + \ln(x+1) - \frac{\sqrt{a\,x^4+8y(x)}}{4\sqrt{a}} = 0\right\}$$

2.666 ODE No. 666

$$y'(x) = y(x)\left(x^3+x^2-\log(y(x))+1\right)$$

✓ **Mathematica** : cpu = 0.167724 (sec), leaf count = 29

$$\left\{\left\{y(x) \to e^{x^3-2x^2+4x-c_1e^{-x}-3}\right\}\right\}$$

✓ **Maple** : cpu = 0.249 (sec), leaf count = 24

$$\left\{y(x) = e^{x^3+c_1e^{-x}-2x^2+4x-3}\right\}$$

2.667 ODE No. 667

$$y'(x) = \frac{e^{-2bx}y(x)^3}{e^{-bx}y(x)+1}$$

✓ **Mathematica** : cpu = 1.15861 (sec), leaf count = 90

$$\text{Solve}\left[\frac{\log(y(x))}{b}+\frac{1}{2}\left(-\frac{\log\left(y(x)^2-be^{bx}\left(e^{bx}+y(x)\right)\right)}{b}+\frac{2\tanh^{-1}\left(\frac{\sqrt{\frac{b}{b+4}}\left(2e^{bx}+y(x)\right)}{y(x)}\right)}{\sqrt{b}\sqrt{b+4}}+2x\right)=c_1,y(x)\right]$$

✓ **Maple** : cpu = 0.303 (sec), leaf count = 82

$$\left\{bx-\frac{b\,\mathrm{arctanh}\left(\frac{-2\,\mathrm{e}^{-bx}y(x)+b}{\sqrt{b^2+4b}}\right)}{\sqrt{b^2+4b}}-c_1+\ln\left(\mathrm{e}^{-bx}y(x)\right)-\frac{\ln\left(-b\,\mathrm{e}^{-bx}y(x)+\mathrm{e}^{-2bx}y(x)^2-b\right)}{2}=0\right\}$$

2.668 ODE No. 668

$$y'(x) = \frac{e^{-2x}y(x)^3}{e^{-x}y(x)+1}$$

✓ **Mathematica** : cpu = 0.756247 (sec), leaf count = 78

$$\text{Solve}\left[\log(y(x))+y(x)^2\left(\frac{x}{y(x)^2}-\frac{\log\left(-y(x)^2+e^xy(x)+e^{2x}\right)}{2y(x)^2}+\frac{\tanh^{-1}\left(\frac{y(x)+2e^x}{\sqrt{5}y(x)}\right)}{\sqrt{5}y(x)^2}\right)=c_1,y(x)\right]$$

✓ **Maple** : cpu = 0.86 (sec), leaf count = 58

$$\left\{y(x)=\mathrm{e}^{\mathrm{RootOf}\left(10c_1-10\_Z-10x+2\sqrt{5}\,\mathrm{arctanh}\left(\frac{\left(-2\,\mathrm{e}^{\_Z}+\mathrm{e}^x\right)\sqrt{5}\,\mathrm{e}^{-x}}{5}\right)+5\ln\left(\mathrm{e}^{2\_Z}-\mathrm{e}^{2x}-\mathrm{e}^{\_Z+x}\right)\right)}\right\}$$

2.669 ODE No. 669

$$y'(x) = \frac{e^x \left(3e^x - 2y(x)^{3/2}\right)^2}{4\sqrt{y(x)}}$$

✓ **Mathematica** : cpu = 0.833809 (sec), leaf count = 264

$$\left\{\left\{y(x) \to \frac{\left(-2e^{3e^x} + 3e^{x+3e^x} + 3e^{x+3c_1} + 2e^{3c_1}\right)^{2/3}}{\sqrt[3]{4e^{6e^x} + 8e^{3e^x+3c_1} + 4e^{6c_1}}}\right\}, \left\{y(x) \to -\frac{\sqrt[3]{-1}\left(-2e^{3e^x} + 3e^{x+3e^x} + 3e^{x+3c_1} + 2e^{3c_1}\right)^{2/}}{\sqrt[3]{4e^{6e^x} + 8e^{3e^x+3c_1} + 4e^{6c_1}}}\right.\right.$$

✓ **Maple** : cpu = 0.195 (sec), leaf count = 72

$$\left\{\frac{\left(2\,\mathrm{e}^{x} y(x)^{\frac{3}{2}} - 2\,\mathrm{e}^{x} - 3\,\mathrm{e}^{2x}\right)\mathrm{e}^{-\frac{3\,\mathrm{e}^{x}}{2} - \frac{9\,\mathrm{e}^{2x}}{8}}\,\mathrm{e}^{-\frac{3\,\mathrm{e}^{x}}{2} + \frac{9\,\mathrm{e}^{2x}}{8}}}{2\,\mathrm{e}^{x} y\left(x\right)^{\frac{3}{2}} + 2\,\mathrm{e}^{x} - 3\,\mathrm{e}^{2x}} + c_1 = 0\right\}$$

2.670 ODE No. 670

$$y'(x) = \frac{1}{2} i x y(x)\left(-2\sqrt{4\log(a) - x^2 + 4\log(y(x))} + i\right)$$

✓ **Mathematica** : cpu = 0.590861 (sec), leaf count = 62

$$\left\{\left\{y(x) \to \exp\left(\frac{1}{4}\left(-4\log(a) - W\left(ie^{-x^2-1-4c_1}\right)^2 - 2W\left(ie^{-x^2-1-4c_1}\right) + x^2 - 1\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.365 (sec), leaf count = 70

$$\left\{-\frac{ix^2}{2} - c_1 + \frac{\arctan\left(\sqrt{-x^2 + 4\ln\left(a\right) + 4\ln\left(y\left(x\right)\right)}\right)}{2} - \frac{i\ln\left(x^2 - 4\ln\left(a\right) - 4\ln\left(y(x)\right) - 1\right)}{4} - \frac{\sqrt{-x^2 + 4\ln\left(a\right)}}{2}\right.$$

2.671 ODE No. 671

$$y'(x) = \frac{\left(xy(x)^2 + 1\right)^2}{x^4 y(x)}$$

✓ **Mathematica** : cpu = 0.409398 (sec), leaf count = 192

$$\left\{\left\{y(x) \to -\frac{\sqrt{-\frac{2}{x} + \sqrt{2}e^{\frac{2\sqrt{2}(1+c_1x)}{x}} - \frac{2e^{\frac{2\sqrt{2}(1+c_1x)}{x}}}{x} - \sqrt{2}}}{\sqrt{2 + 2e^{\frac{2\sqrt{2}(1+c_1x)}{x}}}}\right\}, \left\{y(x) \to \frac{\sqrt{-\frac{2}{x} + \sqrt{2}e^{\frac{2\sqrt{2}(1+c_1x)}{x}} - \frac{2e^{\frac{2\sqrt{2}(1+c_1x)}{x}}}{x} - \sqrt{2}}}{\sqrt{2 + 2e^{\frac{2\sqrt{2}(1+c_1x)}{x}}}}\right.\right.$$

✓ **Maple** : cpu = 0.273 (sec), leaf count = 237

$$\left\{y(x) = -\frac{\sqrt{2}\sqrt{-\left(c_1\left(\sqrt{2}\,x+2\right)\mathrm{e}^{\frac{-\sqrt{2}\,x-1}{x^2}} + \left(-\sqrt{2}\,x+2\right)\mathrm{e}^{\frac{\sqrt{2}\,x-1}{x^2}}\right)\left(c_1\mathrm{e}^{\frac{-\sqrt{2}\,x-1}{x^2}} + \mathrm{e}^{\frac{\sqrt{2}\,x-1}{x^2}}\right)x}}{2\left(c_1\mathrm{e}^{\frac{-\sqrt{2}\,x-1}{x^2}} + \mathrm{e}^{\frac{\sqrt{2}\,x-1}{x^2}}\right)x}, y(x) = \frac{\sqrt{2}\sqrt{-\left(\right.}}{}\right.$$

2.672 ODE No. 672

$$y'(x) = \frac{x^2\left(\sqrt{4y(x)^3 - 9x^4} + 3x\right)}{y(x)^2}$$

✓ **Mathematica** : cpu = 2.20507 (sec), leaf count = 4512

$$\text{Solve}\left[\int_1^x \left(-\frac{24\sqrt{4y(x)^3 - 9K[1]^4}y(x)^9}{(9K[1]^4 - 4y(x)^3)(4y(x)^9 - 729)} + \frac{16K[1]^2\sqrt{4y(x)^3 - 9K[1]^4}y(x)^9}{(4K[1]^6 + 9K[1]^4 + 16K[1]^3 - 4y(x)^3 + 16)(4y(x)^9 - 729)} + \right.\right.$$

✓ **Maple** : cpu = 0.195 (sec), leaf count = 36

$$\left\{-\frac{x^3}{3} - c_1 + \int_{\_b}^{y(x)} \frac{\_a^2}{\sqrt{-9x^4 + 4\_a^3}} d\_a = 0\right\}$$

2.673 ODE No. 673

$$y'(x) = \frac{\frac{1}{2}x^2\cos(2y(x)) + \frac{x^2}{2} - \frac{1}{2}\sin(2y(x))}{x}$$

✓ **Mathematica** : cpu = 0.362642 (sec), leaf count = 23

$$\left\{\left\{y(x) \to \tan^{-1}\left(\frac{2x^3 + 3c_1}{6x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.422 (sec), leaf count = 17

$$\left\{y(x) = \arctan\left(\frac{x^3 + 6c_1}{3x}\right)\right\}$$

2.674 ODE No. 674

$$y'(x) = \frac{\sqrt{x^2+4y(x)-4x} - \frac{x^2}{2} + \frac{x}{2} + 1}{x+1}$$

✓ **Mathematica** : cpu = 1.01233 (sec), leaf count = 91

$$\text{Solve}\left[-\frac{1}{2}\sqrt{x^2+4y(x)-4x} + \log\left(-\sqrt{x^2+4y(x)-4x} - x + 2\right) - \tanh^{-1}\left(\frac{2x-4}{2\sqrt{x^2+4y(x)-4x}}\right) - \frac{1}{2}\log(2-\right.$$

✓ **Maple** : cpu = 0.44 (sec), leaf count = 27

$$\left\{c_1 + 2\ln(x+1) - 1 - \sqrt{x^2-4x+4y(x)} = 0\right\}$$

2.675 ODE No. 675

$$y'(x) = \frac{ax^4 + ae^x x^3 + ax^3 - x^2y(x)^2 - e^x xy(x)^2 - xy(x)^2 + y(x)}{x}$$

✓ **Mathematica** : cpu = 0.39486 (sec), leaf count = 48

$$\left\{\left\{y(x) \to \sqrt{a}x\tanh\left(\frac{1}{6}\sqrt{a}(2x^3+3x^2+6e^x x - 6e^x + 6c_1)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.073 (sec), leaf count = 37

$$\left\{y(x) = \sqrt{a}\,x\tanh\left(\frac{(2x^3+3x^2+6c_1+(6x-6)e^x)\sqrt{a}}{6}\right)\right\}$$

2.676 ODE No. 676

$$y'(x) = \frac{x^6\sqrt{4x^2y(x)+1} + \frac{x}{2} + \frac{1}{2}}{x^3(x+1)}$$

✓ **Mathematica** : cpu = 0.533355 (sec), leaf count = 144

$$\left\{\left\{y(x) \to \frac{9x^{10} - 24x^9 + 52x^8 - 120x^7 + 132x^6 + 72x^6\log(x+1) - 72c_1x^6 - 144x^5 - 96x^5\log(x+1) + 96c_1x^5}{}\right.\right.$$

✓ **Maple** : cpu = 0.643 (sec), leaf count = 43

$$\left\{\frac{x^4}{2} - \frac{2x^3}{3} + x^2 + c_1 - 2x + 2\ln(x+1) - \frac{\sqrt{4x^2y(x)+1}}{x} = 0\right\}$$

2.677 ODE No. 677

$$y'(x) = \frac{ax^4 + ax^3 + ax^3 \log(x+1) - x^2 y(x)^2 - xy(x)^2 + y(x) - xy(x)^2 \log(x+1)}{x}$$

✓ **Mathematica** : cpu = 0.232307 (sec), leaf count = 80

$$\left\{\left\{y(x) \to \sqrt{a}x \tanh\left(\frac{1}{12}(4\sqrt{a}x^3 + 3\sqrt{a}x^2 + 6\sqrt{a}x^2 \log(x+1) + 6\sqrt{a}x - 6\sqrt{a}\log(x+1) + 12\sqrt{a}c_1)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.085 (sec), leaf count = 48

$$\left\{y(x) = \sqrt{a}\, x \tanh\left(\frac{(4x^3 + 6x^2 \ln(x+1) + 3x^2 + 12c_1 + 6x - 6\ln(x+1) + 9)\sqrt{a}}{12}\right)\right\}$$

2.678 ODE No. 678

$$y'(x) = \frac{x^2\left(2x\sqrt{x^3 - 6y(x)} + x + 1\right)}{2(x+1)}$$

✓ **Mathematica** : cpu = 0.437452 (sec), leaf count = 101

$$\left\{\left\{y(x) \to \frac{1}{24}(-4x^6 + 12x^5 - 33x^4 + 40x^3 + 24x^3 \log(x+1) + 24c_1x^3 - 36x^2 - 36x^2 \log(x+1) - 36c_1x^2 - 36\,\mathrm{l}\right.\right.$$

✓ **Maple** : cpu = 0.475 (sec), leaf count = 37

$$\left\{-x^3 + \frac{3x^2}{2} + c_1 - 3x + 3\ln(x+1) - \frac{1}{2} - \sqrt{x^3 - 6y(x)} = 0\right\}$$

2.679 ODE No. 679

$$y'(x) = \frac{x^4 + x^3 + x^3 \log(x) + 7x^2 y(x)^2 + 7xy(x)^2 + y(x) + 7xy(x)^2 \log(x)}{x}$$

✓ **Mathematica** : cpu = 0.195112 (sec), leaf count = 59

$$\left\{\left\{y(x) \to \frac{x \tan\left(\frac{1}{12}(4\sqrt{7}x^3 + 3\sqrt{7}x^2 + 6\sqrt{7}x^2 \log(x) + 12\sqrt{7}c_1)\right)}{\sqrt{7}}\right\}\right\}$$

✓ **Maple** : cpu = 0.061 (sec), leaf count = 37

$$\left\{y(x) = \frac{\sqrt{7}\, x \tan\left(\frac{(4x^3 + 6x^2 \ln(x) + 3x^2 + 12c_1)\sqrt{7}}{12}\right)}{7}\right\}$$

2.680 ODE No. 680

$$y'(x) = \frac{\sqrt{x^2 - 4y(x) + 2x + 1} + \frac{x^2}{2} + x + \frac{1}{2}}{x + 1}$$

✓ **Mathematica** : cpu = 1.23419 (sec), leaf count = 89

$$\text{Solve}\left[\frac{1}{2}\left(\sqrt{x^2 - 4y(x) + 2x + 1} + \log\left(\sqrt{x^2 - 4y(x) + 2x + 1} + x + 1\right) - \tanh^{-1}\left(\frac{2x + 2}{2\sqrt{x^2 - 4y(x) + 2x + 1}}\right) +\right.\right.$$

✓ **Maple** : cpu = 0.436 (sec), leaf count = 28

$$\left\{c_1 - 2\ln(x + 1) - \frac{1}{2} - \sqrt{x^2 + 2x - 4y(x) + 1} = 0\right\}$$

2.681 ODE No. 681

$$y'(x) = \frac{ax^2y(x)^2 + axy(x)^2 + axy(x)^2 \log\left(\frac{1}{x}\right) + bx^4 + bx^3 + bx^3 \log\left(\frac{1}{x}\right) + y(x)}{x}$$

✓ **Mathematica** : cpu = 0.268603 (sec), leaf count = 84

$$\left\{\left\{y(x) \to \frac{\sqrt{b}x \tan\left(\frac{1}{12}\left(4\sqrt{a}\sqrt{b}x^3 + 9\sqrt{a}\sqrt{b}x^2 - 6\sqrt{a}\sqrt{b}x^2 \log(x) + 12\sqrt{a}\sqrt{b}c_1\right)\right)}{\sqrt{a}}\right\}\right\}$$

✓ **Maple** : cpu = 0.095 (sec), leaf count = 45

$$\left\{y(x) = \frac{\sqrt{ab}\,x \tan\left(\frac{\sqrt{ab}\left(4x^3 + 6x^2 \ln\left(\frac{1}{x}\right) + 9x^2 + 12c_1\right)}{12}\right)}{a}\right\}$$

2.682 ODE No. 682

$$y'(x) = \frac{2a}{x\left(-8a^2 + 2axy(x)^2 - xy(x)\right)}$$

✓ **Mathematica** : cpu = 0.34566 (sec), leaf count = 39

$$\text{Solve}\left[\frac{y(x)^2 e^{-4ay(x)}}{8a} - \frac{e^{-4ay(x)}}{2x} = c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.356 (sec), leaf count = 28

$$\left\{c_1 + \frac{\left(-xy(x)^2 + 4a\right) \mathrm{e}^{-4ay(x)}}{x} = 0\right\}$$

2.683 ODE No. 683

$$y'(x) = \frac{y(x)\left(x^4 y(x) \log(x(x+1)) - x^3 \log(x(x+1)) - 1\right)}{x}$$

✓ **Mathematica** : cpu = 1.22539 (sec), leaf count = 84

$$\left\{\left\{y(x) \to \frac{e^{\frac{2x^3}{9}+\frac{x}{3}}}{e^{\frac{x^2}{6}+\frac{1}{18}(4x^2-3x+6)x}x + c_1 e^{\frac{x^2}{6}} x\sqrt[3]{x+1}(x(x+1))^{\frac{x^3}{3}}}\right\}\right\}$$

✓ **Maple** : cpu = 0.168 (sec), leaf count = 114

$$\left\{y(x) = \frac{((x+1)\,x)^{-\frac{x^3}{3}}}{c_1\,(x+1)^{\frac{1}{3}}\,x\,\mathrm{e}^{-\frac{2}{9}x^3+\frac{1}{6}x^2-\frac{1}{3}x} + x^{-\frac{x^3}{3}+1}\,(x+1)^{-\frac{x^3}{3}}\,\mathrm{e}^{\frac{i(\mathrm{csgn}(ix)-\mathrm{csgn}(i(x+1)x))(-\mathrm{csgn}(i(x+1)x)+\mathrm{csgn}(ix+i))\pi\,x^3\mathrm{csgn}(i(x+1)x)}{6}}}\right.$$

2.684 ODE No. 684

$$y'(x) = \frac{x^2\sqrt{x^2+y(x)^2} + y(x)}{x}$$

✓ **Mathematica** : cpu = 0.137231 (sec), leaf count = 20

$$\left\{\left\{y(x) \to x\sinh\left(\frac{1}{2}(x^2+2c_1)\right)\right\}\right\}$$

✓ **Maple** : cpu = 4.142 (sec), leaf count = 30

$$\left\{-\frac{x^2}{2} - c_1 - \ln(x) + \ln\left(y(x) + \sqrt{x^2+y(x)^2}\right) = 0\right\}$$

2.685 ODE No. 685

$$y'(x) = \frac{x^3 \log((x-1)(x+1)) + y(x) + 7xy(x)^2 \log((x-1)(x+1))}{x}$$

✓ **Mathematica** : cpu = 0.193616 (sec), leaf count = 87

$$\left\{\left\{y(x) \to \frac{x \tan\left(\frac{1}{2}\left(-\sqrt{7}x^2 + \sqrt{7}x^2 \log(x-1) + \sqrt{7}x^2 \log(x+1) - \sqrt{7}\log(1-x) - \sqrt{7}\log(x+1) + 2\sqrt{7}c_1\right)\right)}{\sqrt{7}}\right\}\right\}$$

✓ **Maple** : cpu = 0.097 (sec), leaf count = 48

$$\left\{y(x) = \frac{\sqrt{7}\,x \tan\left(\frac{(x^2 \ln((x-1)(x+1)) - x^2 + 2c_1 - \ln((x-1)(x+1)) + 1)\sqrt{7}}{2}\right)}{7}\right\}$$

2.686 ODE No. 686

$$y'(x) = \frac{e^{2x^2} x y(x)^3}{e^{x^2} y(x) + 1}$$

✓ **Mathematica** : cpu = 11.2119 (sec), leaf count = 68

$$\text{Solve}\left[\log(y(x)) - 2y(x)^2 \left(\frac{\log\left(e^{2x^2} y(x)^2 + 2e^{x^2} y(x) + 2\right)}{4y(x)^2} - \frac{\tan^{-1}\left(e^{x^2} y(x) + 1\right)}{2y(x)^2}\right) = c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.198 (sec), leaf count = 85

$$\left\{y(x) = \frac{\left(-\tan\left(\text{RootOf}\left(-2x^2 + 6c_1 - 2\_Z - \ln\left(\frac{81(\tan^2(\_Z))}{10} + \frac{81}{10}\right) + 2\ln\left(\frac{9\tan(\_Z)}{2} - \frac{9}{2}\right)\right)\right) + 1\right) e^{-x^2}}{\tan\left(\text{RootOf}\left(-2x^2 + 6c_1 - 2\_Z - \ln\left(\frac{81(\tan^2(\_Z))}{10} + \frac{81}{10}\right) + 2\ln\left(\frac{9\tan(\_Z)}{2} - \frac{9}{2}\right)\right)\right)}\right\}$$

2.687 ODE No. 687

$$y'(x) = \frac{x^3\left(-\log\left(\frac{x+1}{x-1}\right)\right) + y(x) + xy(x)^2 \log\left(\frac{x+1}{x-1}\right)}{x}$$

✓ **Mathematica** : cpu = 0.197236 (sec), leaf count = 130

$$\left\{\left\{y(x) \to \frac{-x^2(x-1)^{x^2} - x(x-1)^{x^2} - x^2(x+1)^{x^2} e^{2x+2c_1} + x(x+1)^{x^2} e^{2x+2c_1}}{-x(x-1)^{x^2} - (x-1)^{x^2} - (x+1)^{x^2} e^{2x+2c_1} + x(x+1)^{x^2} e^{2x+2c_1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.119 (sec), leaf count = 39

$$\left\{y(x) = -x\tanh\left(\frac{x^2\ln\left(\frac{x+1}{x-1}\right)}{2} + c_1 + x - \frac{\ln\left(\frac{x+1}{x-1}\right)}{2} - 1\right)\right\}$$

2.688 ODE No. 688

$$y'(x) = \frac{e^{\frac{x+1}{x-1}}x^3 + e^{\frac{x+1}{x-1}}xy(x)^2 + y(x)}{x}$$

✓ **Mathematica** : cpu = 0.429828 (sec), leaf count = 82

$$\left\{\left\{y(x)\to x\tan\left(\frac{1}{2}\left(-8e\text{Ei}\left(\frac{2}{x-1}\right) + e^{\frac{x}{x-1}+\frac{1}{x-1}}x^2 + 2e^{\frac{x}{x-1}+\frac{1}{x-1}}x - 3e^{\frac{x}{x-1}+\frac{1}{x-1}} + 2c_1\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.119 (sec), leaf count = 42

$$\left\{y(x) = x\tan\left(c_1 + 4\,\mathrm{e}\,\mathrm{expIntegral}\left(1, -\frac{2}{x-1}\right) + \frac{(x^2+2x-3)\,\mathrm{e}^{\frac{x+1}{x-1}}}{2}\right)\right\}$$

2.689 ODE No. 689

$$y'(x) = \frac{-e^{x+1}x^3 + e^{x+1}xy(x)^2 + xy(x) - y(x)}{(x-1)x}$$

✓ **Mathematica** : cpu = 0.39464 (sec), leaf count = 60

$$\left\{\left\{y(x)\to -\frac{x\left(-1 + e^{2e^2\text{Ei}(x-1)+2e^{x+1}+2c_1}\right)}{1 + e^{2e^2\text{Ei}(x-1)+2e^{x+1}+2c_1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.069 (sec), leaf count = 25

$$\{y(x) = -x\tanh\left(c_1 - \mathrm{e}^2\,\mathrm{expIntegral}\,(1, -x+1) + \mathrm{e}^{x+1}\right)\}$$

2.690 ODE No. 690

$$y'(x) = \frac{-\frac{x^2}{4} + x^3\sqrt{x^2 + 8y(x) - 2x + 1} + \frac{1}{4}}{x+1}$$

✓ **Mathematica** : cpu = 0.61275 (sec), leaf count = 105

$$\left\{\left\{y(x) \to \frac{1}{72}\left(16x^6 - 48x^5 + 132x^4 - 144x^3 - 96x^3\log(x+1) - 96c_1x^3 + 135x^2 + 144x^2\log(x+1) + 144c_1x^2 \right.\right.\right.$$

✓ **Maple** : cpu = 0.527 (sec), leaf count = 40

$$\left\{\frac{4x^3}{3} - 2x^2 + c_1 + 4x - 4\ln(x+1) - \sqrt{x^2 - 2x + 8y(x) + 1} = 0\right\}$$

2.691 ODE No. 691

$$y'(x) = \frac{\frac{1}{2}x^3\cos(2y(x)) + \frac{x^3}{2} - \frac{1}{2}\sin(2y(x))}{x}$$

✓ **Mathematica** : cpu = 0.345301 (sec), leaf count = 21

$$\left\{\left\{y(x) \to \tan^{-1}\left(\frac{x^4 + 2c_1}{4x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.626 (sec), leaf count = 17

$$\left\{y(x) = \arctan\left(\frac{x^4 + 8c_1}{4x}\right)\right\}$$

2.692 ODE No. 692

$$y'(x) = \frac{x^3\sqrt{x^2 + y(x)^2} + y(x)}{x}$$

✓ **Mathematica** : cpu = 0.131146 (sec), leaf count = 20

$$\left\{\left\{y(x) \to x\sinh\left(\frac{1}{3}\left(x^3 + 3c_1\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 3.915 (sec), leaf count = 30

$$\left\{-\frac{x^3}{3} - c_1 - \ln(x) + \ln\left(y(x) + \sqrt{x^2 + y(x)^2}\right) = 0\right\}$$

2.693 ODE No. 693

$$y'(x) = e^{bx}\left(e^{-3bx}y(x)^3 + e^{-2bx}y(x)^2 + 1\right)$$

✓ **Mathematica** : cpu = 0.423984 (sec), leaf count = 146

$$\text{Solve}\left[-\frac{1}{3}(9b+29)^{2/3}\text{RootSum}\left[\#1^3(9b+29)^{2/3} - 9\#1b - 3\#1 + (9b+29)^{2/3}\&, \frac{\log\left(\frac{3e^{-2bx}y(x)+e^{-bx}}{\sqrt[3]{(9b+29)e^{-3bx}}} - \#1\right)}{\#1^2\left(-(9b+29)^{2/3}\right) + 3b + 1}\right.\right.$$

✓ **Maple** : cpu = 0.11 (sec), leaf count = 40

$$\left\{y(x) = \text{RootOf}\left(c_1 - x - \left(\int^{\_Z} -\frac{1}{\_a^3 + \_a^2 - \_ab + 1}d\_a\right)\right)\mathrm{e}^{bx}\right\}$$

2.694 ODE No. 694

$$y'(x) = \frac{x^3\sqrt{4x^2y(x)+1} + \frac{x}{2} + \frac{1}{2}}{x^3(x+1)}$$

✓ **Mathematica** : cpu = 0.490293 (sec), leaf count = 66

$$\left\{\left\{y(x) \to \frac{4x^4 - 8x^3\log(x+1) - 8c_1x^3 + 4x^2\log^2(x+1) + 4c_1{}^2x^2 + 8c_1x^2\log(x+1) - 1}{4x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.527 (sec), leaf count = 30

$$\left\{c_1 + 2x - 2\ln(x+1) - \frac{\sqrt{4x^2y(x)+1}}{x} = 0\right\}$$

2.695 ODE No. 695

$$y'(x) = \frac{x^4 + x^3 + x^2y(x)^2 + xy(x)^2 + y(x)\log(x-1)}{x\log(x-1)}$$

✓ **Mathematica** : cpu = 0.253253 (sec), leaf count = 34

$$\{\{y(x) \to x\tan(2\text{Ei}(\log(x-1)) + 3\text{Ei}(2\log(x-1)) + \text{Ei}(3\log(x-1)) + c_1)\}\}$$

✓ **Maple** : cpu = 0.066 (sec), leaf count = 39

$$\{y(x) = x\tan(c_1 - \text{expIntegral}(1, -3\ln(x-1)) - 3\,\text{expIntegral}(1, -2\ln(x-1)) - 2\,\text{expIntegral}(1, -\ln(x-1$$

2.696 ODE No. 696

$$y'(x) = \frac{e^{x+1}x^3 + 7e^{x+1}xy(x)^2 + y(x)\log(x-1)}{x\log(x-1)}$$

✓ **Mathematica** : cpu = 1.11497 (sec), leaf count = 51

$$\left\{\left\{y(x)\to \frac{x\tan\left(\sqrt{7}\int_1^x \frac{e^{K[1]+1}K[1]}{\log(K[1]-1)}dK[1]+\sqrt{7}c_1\right)}{\sqrt{7}}\right\}\right\}$$

✓ **Maple** : cpu = 0.077 (sec), leaf count = 32

$$\left\{y(x) = \frac{\sqrt{7}\,x\tan\left(\left(c_1 + \mathrm{e}\left(\int \frac{x\,\mathrm{e}^x}{\ln(x-1)}dx\right)\right)\sqrt{7}\right)}{7}\right\}$$

2.697 ODE No. 697

$$y'(x) = e^{2x/3}\left(e^{-2x}y(x)^3 + e^{-4x/3}y(x)^2 + 1\right)$$

✓ **Mathematica** : cpu = 0.365443 (sec), leaf count = 114

$$\text{Solve}\left[-\frac{35}{3}\text{RootSum}\left[-35\#1^3+9\sqrt[3]{35}\#1-35\&,\frac{\log\left(\frac{3e^{-4x/3}y(x)+e^{-2x/3}}{\sqrt[3]{35}\sqrt[3]{e^{-2x}}}-\#1\right)}{3\sqrt[3]{35}-35\#1^2}\&\right]=\frac{1}{9}35^{2/3}e^{4x/3}\left(e^{-2x}\right)^{2/3}x+$$

✓ **Maple** : cpu = 0.125 (sec), leaf count = 40

$$\left\{y(x) = \text{RootOf}\left(c_1 - x + 3\left(\int^{\_Z}\frac{1}{3\_a^3+3\_a^2-2\_a+3}d\_a\right)\right)\mathrm{e}^{\frac{2x}{3}}\right\}$$

2.698 ODE No. 698

$$y'(x) = e^x\left(e^{-3x}y(x)^3 + e^{-2x}y(x)^2 + 1\right)$$

✓ **Mathematica** : cpu = 0.377099 (sec), leaf count = 108

$$\text{Solve}\left[-\frac{19}{3}\text{RootSum}\left[-19\#1^3+6\sqrt[3]{38}\#1-19\&,\frac{\log\left(\frac{3e^{-2x}y(x)+e^{-x}}{\sqrt[3]{38}\sqrt[3]{e^{-3x}}}-\#1\right)}{2\sqrt[3]{38}-19\#1^2}\&\right]=\frac{1}{9}38^{2/3}e^{2x}\left(e^{-3x}\right)^{2/3}x+c_1,y($$

✓ **Maple** : cpu = 0.094 (sec), leaf count = 34

$$\left\{y(x) = \text{RootOf}\left(c_1 - x + \int^{\_Z}\frac{1}{\_a^3+\_a^2-\_a+1}d\_a\right)\mathrm{e}^x\right\}$$

2.699 ODE No. 699

$$y'(x) = \frac{x\left(3x^2\sqrt{x^2+3y(x)}-2x-2\right)}{3(x+1)}$$

✓ **Mathematica** : cpu = 0.402997 (sec), leaf count = 101

$$\left\{\left\{y(x)\to \frac{1}{48}(4x^6-12x^5+33x^4-36x^3-24x^3\log(x+1)-24c_1x^3+20x^2+36x^2\log(x+1)+36c_1x^2+36\log$$

✓ **Maple** : cpu = 0.485 (sec), leaf count = 36

$$\left\{\frac{x^3}{2}-\frac{3x^2}{4}+c_1+\frac{3x}{2}-\frac{3\ln(x+1)}{2}-\sqrt{x^2+3y(x)}=0\right\}$$

2.700 ODE No. 700

$$y'(x) = \frac{1}{xy(x)\left(xy(x)^2+x+1\right)}$$

✓ **Mathematica** : cpu = 0.170722 (sec), leaf count = 76

$$\left\{\left\{y(x)\to -\frac{\sqrt{2xW\left(c_1e^{\frac{1}{2x}-\frac{1}{2}}\right)+x-1}}{\sqrt{x}}\right\},\left\{y(x)\to \frac{\sqrt{2xW\left(c_1e^{\frac{1}{2x}-\frac{1}{2}}\right)+x-1}}{\sqrt{x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.128 (sec), leaf count = 62

$$\left\{y(x)=\frac{\sqrt{\left(2x\,\mathrm{LambertW}\left(\frac{c_1\mathrm{e}^{-\frac{x-1}{2x}}}{2}\right)+x-1\right)x}}{x},y(x)=-\frac{\sqrt{\left(2x\,\mathrm{LambertW}\left(\frac{c_1\mathrm{e}^{-\frac{x-1}{2x}}}{2}\right)+x-1\right)x}}{x}\right\}$$

2.701 ODE No. 701

$$y'(x) = \frac{x^4 + x^4 \log(x) - 2x^2 y(x) - 2x^2 y(x) \log(x) + y(x)^2 + y(x)^2 \log(x) + 2e^x x - 2x - \log(x) - 1}{e^x - 1}$$

✓ **Mathematica** : cpu = 2.112 (sec), leaf count = 88

$$\left\{\left\{y(x) \to \frac{\exp\left(\int_1^x \frac{2(\log(K[5])+1)}{-1+e^{K[5]}} dK[5]\right)}{-\int_1^x \frac{\exp\left(\int_1^{K[6]} \frac{2(\log(K[5])+1)}{-1+e^{K[5]}} dK[5]\right)(\log(K[6])+1)}{-1+e^{K[6]}} dK[6] + c_1} + x^2 + 1\right\}\right\}$$

✓ **Maple** : cpu = 8.82 (sec), leaf count = 71

$$\left\{y(x) = \frac{c_1 x^2 - x^2 e^{\int \frac{2\ln(x)+2}{e^x-1} dx} + c_1 + e^{\int \frac{2\ln(x)+2}{e^x-1} dx}}{c_1 - e^{\int \frac{2\ln(x)+2}{e^x-1} dx}}\right\}$$

2.702 ODE No. 702

$$y'(x) = \frac{-x^3 + x^3(-\log(x)) - xy(x)^2 + xy(x) - e^x y(x) - xy(x)^2 \log(x)}{x(x - e^x)}$$

✓ **Mathematica** : cpu = 2.86037 (sec), leaf count = 37

$$\left\{\left\{y(x) \to x \tan\left(\int_1^x \frac{K[1](\log(K[1])+1)}{e^{K[1]} - K[1]} dK[1] + c_1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.097 (sec), leaf count = 35

$$\left\{y(x) = x \tan\left(c_1 + \int \frac{x}{-x + e^x} dx + \int \frac{x \ln(x)}{-x + e^x} dx\right)\right\}$$

2.703 ODE No. 703

$$y'(x) = \frac{y(x)\left(x^3 y(x) + x^2 y(x) \log(x) - x^2 - x - x \log(x) + 1\right)}{(x-1)x}$$

✓ **Mathematica** : cpu = 0.609317 (sec), leaf count = 101

$$\left\{\left\{y(x) \to -\frac{e^{-\mathrm{Li}_2(x)-x}(1-x)^{-\log(x)}}{(x-1)x\left(-\int_1^x \frac{\exp(-K[1]-\log(1-K[1])(\log(K[1])+1)-\mathrm{Li}_2(K[1]))(K[1]^3+\log(K[1])K[1]^2)}{(K[1]-1)K[1]^2} dK[1] + c_1\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.234 (sec), leaf count = 44

$$\left\{y(x)=\frac{\mathrm{e}^{-x}\mathrm{e}^{\mathrm{dilog}(x)}}{\left(c_1+\int-\frac{(x+\ln(x))\mathrm{e}^{-x}\mathrm{e}^{\mathrm{dilog}(x)}}{(x-1)^2}dx\right)(x-1)\,x}\right\}$$

2.704 ODE No. 704

$$y'(x)=\frac{2ax^3y(x)^2+2bx^5-y(x)+xy(x)\log(x)}{x(x\log(x)-1)}$$

✓ **Mathematica** : cpu = 9.0543 (sec), leaf count = 66

$$\left\{\left\{y(x)\to\frac{\sqrt{b}x\tan\left(\sqrt{a}\sqrt{b}\int_1^x\frac{2K[1]^3}{K[1]\log(K[1])-1}dK[1]+\sqrt{a}\sqrt{b}c_1\right)}{\sqrt{a}}\right\}\right\}$$

✓ **Maple** : cpu = 0.072 (sec), leaf count = 38

$$\left\{y(x)=\frac{\sqrt{ab}\,x\tan\left(2\sqrt{ab}\left(c_1+\int\frac{x^3}{x\ln(x)-1}dx\right)\right)}{a}\right\}$$

2.705 ODE No. 705

$$y'(x)=\frac{y(x)\left(x^4+x^3+\log(y(x))+x\right)}{x}$$

✓ **Mathematica** : cpu = 0.167566 (sec), leaf count = 30

$$\left\{\left\{y(x)\to x^x e^{\frac{x^4}{3}+\frac{x^3}{2}+c_1x}\right\}\right\}$$

✓ **Maple** : cpu = 0.214 (sec), leaf count = 24

$$\left\{y(x)=x^x\mathrm{e}^{c_1x}\mathrm{e}^{\frac{x^3}{2}}\mathrm{e}^{\frac{x^4}{3}}\right\}$$

2.706 ODE No. 706

$$y'(x) = -\frac{1}{8}x(y(x)+1)^2(-\log(y(x)-1)+\log(y(x)+1)+2\log(x))$$

✓ **Mathematica** : cpu = 40.5333 (sec), leaf count = 610

$$\text{Solve}\left[\int_1^{y(x)}\left(\frac{-2\log(x)x^2+\log(K[2]-1)x^2-\log(K[2]+1)x^2-8}{2\left(2\log(x)x^2-\log(K[2]-1)x^2+\log(K[2]+1)x^2+K[2]\left(2\log(x)x^2-\log(K[2]-1)x^2+\log(K[\right.\right.}\right.\right.$$

✓ **Maple** : cpu = 0.648 (sec), leaf count = 65

$$\left\{-c_1+\int_{\_b}^{y(x)}\frac{1}{2\left((\_a+1)\,x^2\ln(x)-\frac{(\_a+1)x^2\ln(\_a-1)}{2}+\frac{(\_a+1)x^2\ln(\_a+1)}{2}+4\_a-4\right)(\_a+1)}d\_a+\frac{\ln(x)}{8}=0\right.$$

2.707 ODE No. 707

$$y'(x) = \frac{1}{16}x(y(x)+1)^2(-\log(y(x)-1)+\log(y(x)+1)+2\log(x))^2$$

✓ **Mathematica** : cpu = 5.56484 (sec), leaf count = 1391

$$\text{Solve}\left[\int_1^{x}-\frac{}{4\log^2(K[1])K[1]^2+\log^2(y(x)-1)K[1]^2+\log^2(y(x)+1)K[1]^2-4\log(K[1])\log(y(x)-1)K[1]^2+4\right.$$

✓ **Maple** : cpu = 0.543 (sec), leaf count = 105

$$\left\{-c_1+\int_{\_b}^{y(x)}\frac{1}{4\left((\_a+1)\,x^2\ln(x)^2-(\_a+1)\,x^2\ln(x)\ln(\_a-1)+\frac{(\_a+1)x^2\ln(\_a-1)^2}{4}+\frac{(\_a+1)x^2\ln(\_a+1)^2}{4}+(\right.}\right.$$

2.708 ODE No. 708

$$y'(x) = \frac{(4ax-y(x)^2)^3}{y(x)\left(4ax-y(x)^2-1\right)}$$

✓ **Mathematica** : cpu = 0.40781 (sec), leaf count = 89

$$\text{Solve}\left[2a\left(x-\frac{\text{RootSum}\left[-\#1^3+2\#1a-2a\&,\frac{\#1a\log(-\#1+4ax-y(x)^2)-a\log(-\#1+4ax-y(x)^2)}{2a-3\#1^2}\&\right]}{2a}\right)=c_1,y(x)\right]$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(y(x),x) = (4*a*x-y(x)^2)^3/(-y(x)^2+4*a*x-1)/y(x),y(x))
```

2.709 ODE No. 709

$$y'(x) = \frac{x^3\sqrt{4ax - y(x)^2} + 2ax + 2a}{(x+1)y(x)}$$

✓ **Mathematica** : cpu = 3.54939 (sec), leaf count = 217

$$\left\{\left\{y(x) \to -\frac{1}{6}\sqrt{144ax - 4x^6 + 12x^5 - 33x^4 + 36x^3 + 24x^3\log(x+1) - 24c_1x^3 - 36x^2 - 36x^2\log(x+1) + 36c_1$$

✓ **Maple** : cpu = 0.279 (sec), leaf count = 39

$$\left\{-\frac{x^3}{3} + \frac{x^2}{2} - c_1 - x + \ln(x+1) - \sqrt{4ax - y(x)^2} = 0\right\}$$

2.710 ODE No. 710

$$y'(x) = \frac{2x^3 + 4x^2y(x) + 2xy(x)^2 + 2x + e^{\frac{1}{x}} - \log(x)}{\log(x) - e^{\frac{1}{x}}}$$

✓ **Mathematica** : cpu = 1.32028 (sec), leaf count = 38

$$\left\{\left\{y(x) \to -x + \tan\left(\int_1^x -\frac{2K[5]}{e^{\frac{1}{K[5]}} - \log(K[5])}dK[5] + c_1\right)\right\}\right\}$$

✓ **Maple** : cpu = 3.191 (sec), leaf count = 31

$$\left\{y(x) = -x + \tan\left(2c_1 - 2\left(\int -\frac{x}{-e^{\frac{1}{x}} + \ln(x)}dx\right)\right)\right\}$$

2.711 ODE No. 711

$$y'(x) = \frac{y(x)(-x\log(y(x)) - \log(y(x)) + 1)}{x+1}$$

✓ **Mathematica** : cpu = 0.263492 (sec), leaf count = 28

$$\left\{\left\{y(x) \to e^{e^{-x-1}\mathrm{Ei}(x+1) + c_1e^{-x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.266 (sec), leaf count = 31

$$\{y(x) = e^{c_1e^{-x}}e^{-\mathrm{expIntegral}(1,-x-1)e^{-x-1}}\}$$

2.712 ODE No. 712

$$y'(x)=\frac{\frac{x^2}{2}+x^3\sqrt{x^2-4y(x)+2x+1}+x+\frac{1}{2}}{x+1}$$

✓ **Mathematica** : cpu = 0.514569 (sec), leaf count = 105

$$\left\{\left\{y(x)\to\frac{1}{36}\left(-4x^6+12x^5-33x^4+36x^3+24x^3\log(x+1)+24c_1x^3-27x^2-36x^2\log(x+1)-36c_1x^2+18x\right.\right.\right.$$

✓ **Maple** : cpu = 0.493 (sec), leaf count = 38

$$\left\{-\frac{2x^3}{3}+x^2+c_1-2x+2\ln(x+1)-\sqrt{x^2+2x-4y(x)+1}=0\right\}$$

2.713 ODE No. 713

$$y'(x)=\frac{-a^2-aby(x)-ab\sqrt{x}+ab+b^2x+b^2}{a\left(a(-y(x))-a\sqrt{x}+a+bx+b\right)}$$

✓ **Mathematica** : cpu = 0.143018 (sec), leaf count = 649

$$\left\{\left\{y(x)\to-\frac{a\sqrt{x}-a-bx-b}{a}+\frac{1}{a^2\text{Root}\left[\#1^6\left(16x^3+16e^{12c_1}\right)-\frac{24\#1^4x^2}{a^4}+\frac{8\#1^3x^{3/2}}{a^6}+\frac{9\#1^2x}{a^8}-\frac{6\#1\sqrt{x}}{a^{10}}+\frac{1}{a^{12}}\&,\right.}\right.\right.$$

✓ **Maple** : cpu = 0.385 (sec), leaf count = 86

$$\left\{y(x)=\frac{3a\sqrt{x}\tanh\left(\text{RootOf}\left(729a^6x^3\left(\tanh^6(\_Z)\right)-2187a^6x^3\left(\tanh^4(\_Z)\right)+2187a^6x^3\left(\tanh^2(\_Z)\right)-729a^6\right.\right.}{2a}\right.$$

2.714 ODE No. 714

$$y'(x)=-\frac{y(x)\left(x^3y(x)+x^2y(x)\log(x)-x^2+e^x-x\log(x)-\log\left(\frac{1}{x}\right)\right)}{x\left(e^x-\log\left(\frac{1}{x}\right)\right)}$$

✓ **Mathematica** : cpu = 1.58538 (sec), leaf count = 162

$$\left\{\left\{y(x)\to\frac{\exp\left(\int_1^x-\frac{-K[1]^2-\log(K[1])K[1]+e^{K[1]}-\log\left(\frac{1}{K[1]}\right)}{K[1]\left(e^{K[1]}-\log\left(\frac{1}{K[1]}\right)\right)}dK[1]\right)}{-\int_1^x-\frac{\exp\left(\int_1^{K[2]}-\frac{-K[1]^2-\log(K[1])K[1]+e^{K[1]}-\log\left(\frac{1}{K[1]}\right)}{K[1]\left(e^{K[1]}-\log\left(\frac{1}{K[1]}\right)\right)}dK[1]\right)\left(K[2]^3+\log(K[2])K[2]^2\right)}{K[2]\left(e^{K[2]}-\log\left(\frac{1}{K[2]}\right)\right)}dK[2]+c_1}\right\}\right\}$$

✓ **Maple** : cpu = 0.276 (sec), leaf count = 96

$$\left\{y(x)=\frac{e^{\int \frac{x^2+x\ln(x)-e^x+\ln\left(\frac{1}{x}\right)}{\left(e^x-\ln\left(\frac{1}{x}\right)\right)x}dx}}{c_1+\int \frac{(x+\ln(x))x\,e^{\int \frac{x^2+x\ln(x)-e^x+\ln\left(\frac{1}{x}\right)}{\left(e^x-\ln\left(\frac{1}{x}\right)\right)x}dx}}{e^x-\ln\left(\frac{1}{x}\right)}dx}\right\}$$

2.715 ODE No. 715

$$y'(x)=\frac{-\frac{x^2}{2}+x^3\sqrt{x^2+4y(x)-4x}+\frac{x}{2}+1}{x+1}$$

✓ **Mathematica** : cpu = 0.608698 (sec), leaf count = 104

$$\left\{\left\{y(x)\to\frac{1}{36}\left(4x^6-12x^5+33x^4-36x^3-24x^3\log(x+1)-24c_1x^3+27x^2+36x^2\log(x+1)+36c_1x^2+36x+\right.\right.\right.$$

✓ **Maple** : cpu = 0.449 (sec), leaf count = 39

$$\left\{\frac{2x^3}{3}-x^2+c_1+2x-2\ln(x+1)-\sqrt{x^2-4x+4y(x)}=0\right\}$$

2.716 ODE No. 716

$$y'(x)=\frac{\sqrt{9x^4-4y(x)^3}+3x^4+3x^3}{(x+1)y(x)^2}$$

✓ **Mathematica** : cpu = 3.30506 (sec), leaf count = 133

$$\left\{\left\{y(x)\to\left(-\frac{3}{2}\right)^{2/3}\sqrt[3]{x^4-4\log^2(x+1)+8c_1\log(x+1)-4c_1{}^2}\right\},\left\{y(x)\to\left(\frac{3}{2}\right)^{2/3}\sqrt[3]{x^4-4\log^2(x+1)+8c\right.\right.$$

✓ **Maple** : cpu = 0.294 (sec), leaf count = 37

$$\left\{-c_1+\int_{\_b}^{y(x)}\frac{\_a^2}{\sqrt{9x^4-4\_a^3}}d\_a-\ln(x+1)=0\right\}$$

2.717 ODE No. 717

$$y'(x)=\frac{\sqrt{a^2+2ax+x^2+4y(x)}-\frac{ax}{2}-\frac{a}{2}-\frac{x^2}{2}-\frac{x}{2}}{x+1}$$

✓ **Mathematica** : cpu = 0.7479 (sec), leaf count = 106

$$\text{Solve}\left[-\frac{1}{2}\sqrt{a^2+2ax+x^2+4y(x)}-\frac{1}{2}a\log\left(\sqrt{a^2+2ax+x^2+4y(x)}+a+x\right)+\frac{1}{2}a\tanh^{-1}\left(\frac{2a+2a}{2\sqrt{a^2+2ax+x}}\right.\right.$$

✓ **Maple** : cpu = 0.513 (sec), leaf count = 33

$$\left\{c_1+\frac{a}{2}+2\ln(x+1)-\sqrt{a^2+2ax+x^2+4y(x)}=0\right\}$$

2.718 ODE No. 718

$$y'(x)=e^{-x^2}x\left(e^{3x^2}y(x)^3+e^{2x^2}y(x)^2+1\right)$$

✓ **Mathematica** : cpu = 0.383342 (sec), leaf count = 127

$$\text{Solve}\left[\frac{11}{3}\text{RootSum}\left[11\#1^3+15\sqrt[3]{11}\#1+11\&,\frac{\log\left(\frac{3e^{2x^2}xy(x)+e^{x^2}x}{\sqrt[3]{11}\sqrt[3]{e^{3x^2}x^3}}-\#1\right)}{11\#1^2+5\sqrt[3]{11}}\&\right]=\frac{11^{2/3}e^{x^2}x^3}{18\sqrt[3]{e^{3x^2}x^3}}+c_1,y(x)\right]$$

✓ **Maple** : cpu = 0.069 (sec), leaf count = 44

$$\left\{y(x)=\frac{\left(-11\,\text{RootOf}\left(-5x^2+6c_1+20250\left(\int^{\_Z}\frac{1}{121\_a^3+3375\_a-3375}d\_a\right)\right)-15\right)e^{-x^2}}{45}\right\}$$

2.719 ODE No. 719

$$y'(x)=\frac{e^{-x}y(x)\left(x^2y(x)\log(2x)-e^x-x\log(2x)\right)}{x}$$

✓ **Mathematica** : cpu = 0.500507 (sec), leaf count = 49

$$\left\{\left\{y(x)\to\frac{2^{e^{-x}}x^{e^{-x}-1}}{2^{e^{-x}}x^{e^{-x}}+c_1e^{\text{Ei}(-x)}}\right\}\right\}$$

✓ **Maple** : cpu = 0.147 (sec), leaf count = 34

$$\left\{y(x)=\frac{1}{c_1 2^{-e^{-x}}x^{-e^{-x}+1}e^{-\text{expIntegral}(1,x)}+x}\right\}$$

2.720 ODE No. 720

$$y'(x) = \frac{x^3\left(\sqrt{9x^4 - 4y(x)^3} + 3x + 3\right)}{(x+1)y(x)^2}$$

✓ **Mathematica** : cpu = 3.74297 (sec), leaf count = 314

$$\left\{\left\{y(x) \to \sqrt[3]{-x^6 + 3x^5 - 6x^4 + 9x^3 + 6x^3\log(x+1) + 6c_1x^3 - 9x^2 - 9x^2\log(x+1) - 9c_1x^2 - 9\log^2(x+1) +\right.\right.$$

✓ **Maple** : cpu = 0.2 (sec), leaf count = 48

$$\left\{-\frac{x^3}{3} + \frac{x^2}{2} - c_1 - x + \int_{\_b}^{y(x)} \frac{\_a^2}{\sqrt{9x^4 - 4\_a^3}} d\_a + \ln(x+1) = 0\right\}$$

2.721 ODE No. 721

$$y'(x) = \frac{1}{36}\sqrt{x}\left(18x^{3/2} + x^6 - 12x^3y(x) + 36y(x)^2\right)$$

✓ **Mathematica** : cpu = 0.133799 (sec), leaf count = 27

$$\left\{\left\{y(x) \to \frac{x^3}{6} + \frac{1}{-\frac{2x^{3/2}}{3} + c_1}\right\}\right\}$$

✓ **Maple** : cpu = 0.089 (sec), leaf count = 19

$$\left\{y(x) = \frac{x^3}{6} + \frac{1}{-\frac{2x^{\frac{3}{2}}}{3} + c_1}\right\}$$

2.722 ODE No. 722

$$y'(x) = -\frac{y(x)^3}{x(-y(x) + 2y(x)\log(x) - 1)}$$

✓ **Mathematica** : cpu = 32.2393 (sec), leaf count = 490

$$\text{Solve}\left[-\frac{\sqrt[3]{-2}\left((-2)^{2/3} - \frac{(1-2\log(x))^2\left(-\frac{1}{(2\log(x)-1)^3}\right)^{2/3}(y(x)(5-4\log(x))+2)}{2\sqrt[3]{2}(y(x)(2\log(x)-1)-1)}\right)\left(\frac{y(x)(4\log(x)-5)-2}{\sqrt[3]{2}\sqrt[3]{-\frac{1}{(2\log(x)-1)^3}}(2\log(x)-1)(y(x)(2\log(x)-\right.}{}\right.$$

✓ **Maple** : cpu = 0.493 (sec), leaf count = 70

$$\left\{ y(x) = \frac{e^{\mathrm{RootOf}\left(3c_1 e^{-Z} + \_Z e^{-Z} - e^{-Z} \ln\left(\frac{e^{-Z}+2}{2x^4}\right) + 2\right)}}{(2\ln(x) - 1)\, e^{\mathrm{RootOf}\left(3c_1 e^{-Z} + \_Z e^{-Z} - e^{-Z} \ln\left(\frac{e^{-Z}+2}{2x^4}\right) + 2\right)} + 1} \right\}$$

2.723 ODE No. 723

$$y'(x) = \frac{2a}{32a^3x^2 - 16a^2xy(x)^2 + 2ay(x)^4 + y(x)}$$

✓ **Mathematica** : cpu = 0.254167 (sec), leaf count = 663

$$\left\{ \left\{ y(x) \to -\frac{\sqrt[3]{-1024a^6c_1{}^3 + 9216a^5c_1x - 432a^2 + \sqrt{4\left(-192a^3x - 64a^4c_1{}^2\right)^3 + \left(-1024a^6c_1{}^3 + 9216a^5c_1x - 43\right.}}}{12\sqrt[3]{2}a}\right.\right.$$

✓ **Maple** : cpu = 0.122 (sec), leaf count = 856

$$\left\{ y(x) = \frac{-16c_1^2a^4 - 48a^3x + 8c_1\left(\left(64c_1^3a^4 - 576c_1a^3x + 3\sqrt{-12288c_1^4a^7x + 24576c_1^2a^6x^2 - 12288a^5x^3 + 384c_1^3a^{\cdot}}\right.\right.}{}\right.$$

2.724 ODE No. 724

$$y'(x) = -\frac{y(x)^3}{x(-y(x) + y(x)\log(x) - 1)}$$

✓ **Mathematica** : cpu = 20.114 (sec), leaf count = 422

$$\text{Solve}\left[-\frac{\sqrt[3]{-2}\left(\frac{1-y(x)(\log(x)-4)}{\sqrt[3]{2}\sqrt[3]{-\frac{1}{(\log(x)-1)^3}}(\log(x)-1)(y(x)(\log(x)-1)-1)} + (-2)^{2/3}\right)\left(\frac{2^{2/3}(y(x)(\log(x)-4)-1)}{\sqrt[3]{-\frac{1}{(\log(x)-1)^3}}(\log(x)-1)(y(x)(\log(x)-1)-1)} + (-\right.}{}\right.$$

✓ **Maple** : cpu = 0.065 (sec), leaf count = 18

$$\left\{ y(x) = \frac{1}{-\mathrm{LambertW}\left(c_1 e^{-2}x\right) + \ln(x) - 2} \right\}$$

2.725 ODE No. 725

$$y'(x) = \frac{x^2 \log(2x) + 2xy(x) \log(2x) + y(x)^2 \log(2x) - \log(x) + \log(2x)}{\log(x)}$$

✓ **Mathematica** : cpu = 0.360593 (sec), leaf count = 19

$$\{\{y(x) \to -x + \tan(\log(2)\mathrm{li}(x) + x + c_1)\}\}$$

✓ **Maple** : cpu = 0.942 (sec), leaf count = 25

$$\{y(x) = -x - \tan(c_1 - x + \ln(2) \operatorname{expIntegral}(1, -\ln(x)))\}$$

2.726 ODE No. 726

$$y'(x) = \frac{a^2 - aby(x) - ab\sqrt{x} - b^2x + bc}{a\left(ay(x) + a\sqrt{x} + bx - c\right)}$$

✓ **Mathematica** : cpu = 0.135344 (sec), leaf count = 625

$$\left\{\left\{y(x) \to -\frac{a\sqrt{x} + bx - c}{a} + \frac{1}{a^2 \mathrm{Root}\left[\#1^6\left(16x^3 + 16e^{12c_1}\right) - \frac{24\#1^4x^2}{a^4} + \frac{8\#1^3x^{3/2}}{a^6} + \frac{9\#1^2x}{a^8} - \frac{6\#1\sqrt{x}}{a^{10}} + \frac{1}{a^{12}}\&, 1\right]}\right.\right.$$

✓ **Maple** : cpu = 0.296 (sec), leaf count = 83

$$\left\{y(x) = \frac{3a\sqrt{x}\tanh\left(\mathrm{RootOf}\left(-729a^6x^3\left(\tanh^6(\_Z)\right) + 2187a^6x^3\left(\tanh^4(\_Z)\right) - 2187a^6x^3\left(\tanh^2(\_Z)\right) + 729a\right.\right.}{2a}\right.$$

2.727 ODE No. 727

$$y'(x) = \frac{y(x)(y(x) + 2x + 2)}{(x+1)(\log(y(x)) + 2x - 1)}$$

✓ **Mathematica** : cpu = 0.570013 (sec), leaf count = 29

$$\left\{\left\{y(x) \to \frac{W\left(e^{-2x}(\log(x+1) + c_1)\right)}{\log(x+1) + c_1}\right\}\right\}$$

✓ **Maple** : cpu = 0.282 (sec), leaf count = 25

$$\{y(x) = e^{-2x - \mathrm{LambertW}\left((-c_1 + \ln(x+1))e^{-2x}\right)}\}$$

2.728 ODE No. 728

$$y'(x) = \frac{y(x)\left(x^3 + 3y(x)^2\right)}{x\left(6y(x)^2 + x\right)}$$

✓ **Mathematica** : cpu = 0.364065 (sec), leaf count = 72

$$\left\{\left\{y(x) \to -\frac{\sqrt{x}\sqrt{W\left(\frac{6e^{x^2+2c_1}}{x}\right)}}{\sqrt{6}}\right\}, \left\{y(x) \to \frac{\sqrt{x}\sqrt{W\left(\frac{6e^{x^2+2c_1}}{x}\right)}}{\sqrt{6}}\right\}\right\}$$

✓ **Maple** : cpu = 0.388 (sec), leaf count = 50

$$\left\{\frac{1}{\frac{6}{x} + \frac{1}{y(x)^2}} = \frac{\left(e^{\mathrm{RootOf}\left(x^2 e^{-Z} + 3c_1 e^{-Z} + \_Z e^{-Z} - e^{-Z}\ln\left(\frac{\left(e^{-Z}+9\right)x}{2}\right)+9\right)} + 9\right)x}{54}\right\}$$

2.729 ODE No. 729

$$y'(x) = \frac{(x - y(x))y(x)}{x\left(x - y(x)^3\right)}$$

✓ **Mathematica** : cpu = 0.317317 (sec), leaf count = 327

$$\left\{\left\{y(x) \to \frac{\sqrt[3]{2}(-6\log(x) + 6c_1)}{3\sqrt[3]{54x + \sqrt{2916x^2 + 4(-6\log(x) + 6c_1)^3}}} - \frac{\sqrt[3]{54x + \sqrt{2916x^2 + 4(-6\log(x) + 6c_1)^3}}}{3\sqrt[3]{2}}\right\}, \left\{y(x) \to\right.\right.$$

✓ **Maple** : cpu = 0.121 (sec), leaf count = 404

$$\left\{y(x) = -\frac{-6c_1 + 6\ln(x) + \left(6ic_1 - 6i\ln(x) + i\left(-27x + 3\sqrt{24c_1^3 - 72c_1^2\ln(x) + 72c_1\ln(x)^2 - 24\ln(x)^3 + 81x}\right.\right.}{6\left(-27x + 3\sqrt{24c_1^3 - 72c_1^2\ln(x) + 72c_1\ln(x\right.}}\right.$$

2.730 ODE No. 730

$$y'(x) = \frac{e^x \left(2y(x)^{3/2} - 3e^x\right)^3}{4\sqrt{y(x)}\left(2y(x)^{3/2} - 3e^x + 2\right)}$$

✓ **Mathematica** : cpu = 0.338759 (sec), leaf count = 83

$$\text{Solve}\left[-\frac{2}{3}\text{RootSum}\left[\#1^3 - \#1 - 1\&, \frac{\#1 \log\left(-\#1 + y(x)^{3/2} - \frac{3e^x}{2}\right) + \log\left(-\#1 + y(x)^{3/2} - \frac{3e^x}{2}\right)}{3\#1^2 - 1}\&\right] + e^x - c_1 =$$

✓ **Maple** : cpu = 1.445 (sec), leaf count = 41

$$\left\{-c_1 - \left(\int^{y(x)^{\frac{3}{2}} - \frac{3\,e^x}{2}} \frac{2\_a + 2}{3\_a^3 - 3\_a - 3} d\_a\right) + e^x = 0\right\}$$

2.731 ODE No. 731

$$y'(x) = \frac{2y(x) + 1}{x\left(2xy(x)^3 + xy(x)^2 - 2\right)}$$

✓ **Mathematica** : cpu = 0.541831 (sec), leaf count = 47

$$\text{Solve}\left[\frac{1}{64}\left(-4y(x)^2 + 4y(x) - 2\log(8y(x) + 4) + 3\right) - \frac{1}{4x(2y(x) + 1)} = c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.255 (sec), leaf count = 42

$$\left\{y(x) = \frac{e^{\text{RootOf}\left(8c_1 x\, e^{\_Z} + 2\_Z x\, e^{\_Z} + 3x\, e^{\_Z} - 4x\, e^{2\_Z} + x\, e^{3\_Z} + 16\right)}}{2} - \frac{1}{2}\right\}$$

2.732 ODE No. 732

$$y'(x) = \frac{x^3\sqrt{a^2 + 2ax + x^2 + 4y(x)} - \frac{ax}{2} - \frac{a}{2} - \frac{x^2}{2} - \frac{x}{2}}{x + 1}$$

✓ **Mathematica** : cpu = 0.884886 (sec), leaf count = 116

$$\text{Solve}\left[-\frac{1}{2}\sqrt{a^2 + 2ax + x^2 + 4y(x)} - \frac{1}{2}a\log\left(\sqrt{a^2 + 2ax + x^2 + 4y(x)} + a + x\right) + \frac{1}{2}a\tanh^{-1}\left(\frac{a + x}{\sqrt{a^2 + 2ax + x^2}}\right.\right.$$

✓ **Maple** : cpu = 0.551 (sec), leaf count = 43

$$\left\{\frac{2x^3}{3} - x^2 + c_1 + 2x - 2\ln(x + 1) - \sqrt{a^2 + 2ax + x^2 + 4y(x)} = 0\right\}$$

2.733 ODE No. 733

$$y'(x) = \csc(x)\left(x^4\log(2x) - 2x^2y(x)\log(2x) + y(x)^2\log(2x) - \log(2x) + 2x\sin(x)\right)$$

✓ **Mathematica** : cpu = 13.3368 (sec), leaf count = 73

$$\left\{\left\{y(x)\to\frac{\exp\left(\int_1^x 2\csc(K[5])\log(2K[5])dK[5]\right)}{-\int_1^x \exp\left(\int_1^{K[6]} 2\csc(K[5])\log(2K[5])dK[5]\right)\csc(K[6])\log(2K[6])dK[6]+c_1}+x^2+1\right\}\right\}$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(y(x),x) = (2*x*sin(x)-ln(2*x)+ln(2*x)*x^4-2*ln(2*x)*x^2*y(x)+ln(2*x)*y(x)^2)/sin
```

2.734 ODE No. 734

$$y'(x) = \frac{y(x)\left(x^3 - x\log(y(x)) - \log(y(x))\right)}{x+1}$$

✓ **Mathematica** : cpu = 0.282453 (sec), leaf count = 37

$$\left\{\left\{y(x)\to\exp\left(-e^{-x-1}\text{Ei}(x+1)+x^2-3x-c_1e^{-x}+4\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.481 (sec), leaf count = 39

$$\{y(x) = e^4e^{x^2}e^{c_1e^{-x}}e^{e^{-1}\,\text{expIntegral}(1,-x-1)e^{-x}}e^{-3x}\}$$

2.735 ODE No. 735

$$y'(x) = \frac{(2y(x)\log(x)-1)^3}{x(-y(x)+2y(x)\log(x)-1)}$$

✓ **Mathematica** : cpu = 1.60855 (sec), leaf count = 573

$$\text{Solve}\left[\int_1^{y(x)}\left(\frac{2(2\log(x)K[1]-K[1]-1)}{8\log^3(x)K[1]^3+4\log(x)K[1]^3-2K[1]^3-12\log^2(x)K[1]^2-2K[1]^2+6\log(x)K[1]-1}+2\text{Root}\right.\right.$$

✓ **Maple** : cpu = 0.119 (sec), leaf count = 78

$$\left\{y(x) = \frac{71\,\text{RootOf}\left(3c_1-82944\left(\int^{-Z}\frac{1}{5041\_a^3-27648\_a+27648}d\_a\right)-16\ln(x)\right)-120}{(142\ln(x)-71)\,\text{RootOf}\left(3c_1-82944\left(\int^{-Z}\frac{1}{5041\_a^3-27648\_a+27648}d\_a\right)-16\ln(x)\right)-240\ln(x)+48}\right.$$

2.736 ODE No. 736

$$y'(x) = \frac{x^4 - 2x^2y(x) + 2x^2 + y(x)^2 + 2x - 1}{x+1}$$

✓ **Mathematica** : cpu = 0.235856 (sec), leaf count = 31

$$\left\{\left\{y(x) \to x^2 + \frac{(x+1)^2}{-\frac{x^2}{2} - x + c_1} + 1\right\}\right\}$$

✓ **Maple** : cpu = 0.256 (sec), leaf count = 43

$$\left\{y(x) = \frac{x^2 + c_1(x^4 + 2x^3 - x^2 - 2x - 2) + 1}{c_1(x^2 + 2x) + 1}\right\}$$

2.737 ODE No. 737

$$y'(x) = \frac{x(2x^3 - 2xy(x) + x - 1)}{x^2 - y(x)}$$

✓ **Mathematica** : cpu = 0.0410636 (sec), leaf count = 36

$$\left\{\left\{y(x) \to x^2 + \frac{1}{2}\left(1 + W\left(-e^{\frac{4x^3}{3} - 2x^2 - 1 + c_1}\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.313 (sec), leaf count = 29

$$\left\{y(x) = x^2 + \frac{\mathrm{LambertW}\left(-2c_1 \mathrm{e}^{-1} \mathrm{e}^{-2x^2} \mathrm{e}^{\frac{4x^3}{3}}\right)}{2} + \frac{1}{2}\right\}$$

2.738 ODE No. 738

$$y'(x) = \frac{2a}{32a^3 - 16a^2xy(x)^2 + 2ax^2y(x)^4 - x^2y(x)}$$

✓ **Mathematica** : cpu = 0.530228 (sec), leaf count = 1347

$$\left\{\left\{y(x) \to -\frac{4a + e^{c_1}}{12a} + \frac{\sqrt[3]{4608x^2a^4 - 128x^3a^3 + 1152e^{c_1}x^2a^3 - 96e^{c_1}x^3a^2 - 432x^3a^2 - 24e^{2c_1}x^3a - 2e^{3c_1}x^3 +}{}\right.\right.$$

✓ **Maple** : cpu = 1.059 (sec), leaf count = 1054

$$\left\{ y(x) = \frac{-192c_1^2a^3x - x^2 - 2\left(-216c_1^3a^2x^3 + 576c_1^2a^3x^2 + 12c_1\sqrt{\frac{-49152c_1^4a^7+1536c_1^2a^4x+(324a^2c_1^4+3c_1)x^3+(-1728a^3c_1^3-}{x}}\right.}{} \right.$$

2.739 ODE No. 739

$$y'(x) = \frac{2y(x)+1}{x\left(2xy(x)^2+xy(x)-2\right)}$$

✓ **Mathematica** : cpu = 0.447879 (sec), leaf count = 39

$$\text{Solve}\left[\frac{1}{8}(-2y(x)+\log(4y(x)+2)-1)-\frac{1}{2x(2y(x)+1)}=c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.25 (sec), leaf count = 35

$$\left\{y(x) = \frac{e^{\text{RootOf}\left(2c_1x\,e^{\_Z}-\_Zx\,e^{\_Z}-x\,e^{\_Z}+x\,e^{2\_Z}+4\right)}}{2}-\frac{1}{2}\right\}$$

2.740 ODE No. 740

$$y'(x) = \frac{x^4-2x^2y(x)^2+y(x)^4+x}{y(x)}$$

✓ **Mathematica** : cpu = 0.125116 (sec), leaf count = 74

$$\left\{\left\{y(x)\to -\frac{\sqrt{2x^3+2c_1x^2-1}}{\sqrt{2}\sqrt{x+c_1}}\right\},\left\{y(x)\to \frac{\sqrt{2x^3+2c_1x^2-1}}{\sqrt{2}\sqrt{x+c_1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.096 (sec), leaf count = 72

$$\left\{y(x) = \frac{\sqrt{2}\,\sqrt{(c_1+x)\left(2x^3+2c_1x^2-1\right)}}{2c_1+2x}, y(x) = -\frac{\sqrt{2}\,\sqrt{(c_1+x)\left(2x^3+2c_1x^2-1\right)}}{2c_1+2x}\right\}$$

2.741 ODE No. 741

$$y'(x) = \frac{x\left(ay(x)^2 + bx^2\right)^3}{a^{5/2}y(x)\left(ay(x)^2 + a + bx^2\right)}$$

✓ **Mathematica** : cpu = 2.05997 (sec), leaf count = 175

$$\text{Solve}\left[\frac{1}{2}\left(x^2 - a^{3/2}\text{RootSum}\left[\#1^3b^3 + 3\#1^2ab^2y(x)^2 + \#1a^{3/2}b^2 + 3\#1a^2by(x)^4 + a^{5/2}by(x)^2 + a^{5/2}b + a^3y(x)^6\right.\right.\right.$$

✓ **Maple** : cpu = 1.13 (sec), leaf count = 246

$$\left\{c_1 + \int_{\_b}^{x} \frac{\left(\_a^2b + ay(x)^2\right)^3 \_a}{\left(\_a^2a^{\frac{3}{2}}b^2 + \left(y(x)^2 + 1\right)a^{\frac{5}{2}}b + \left(\_a^2b + ay(x)^2\right)^3\right)a^3} d\_a + \int^{y(x)} \frac{\left(-a^{\frac{3}{2}}b^2x^2 + \left(-\_f^2 - 1\right)a^{\frac{5}{2}}b - \right.}{}\right.$$

2.742 ODE No. 742

$$y'(x) = -\frac{(-\cos(y(x)) + x + 1)\cos(y(x))}{(x+1)(x\sin(y(x)) - 1)}$$

✓ **Mathematica** : cpu = 3.77682 (sec), leaf count = 3913

$$\left\{\left\{y(x) \to -\sec^{-1}\left(\frac{c_1x^3}{x^2-1} + \frac{\log(x+1)x^3}{x^2-1} - \frac{c_1{}^3x^3}{(x^2-1)\left(c_1{}^2 + 2\log(x+1)c_1 + \log^2(x+1) + 1\right)} - \frac{}{(x^2-1)\left(c_1{}^2\right.}\right.\right.\right.$$

✓ **Maple** : cpu = 1.543 (sec), leaf count = 239

$$\left\{y(x) = \arctan\left(\frac{x + (-c_1 + \ln(x+1))\sqrt{c_1^2 - 2c_1\ln(x+1) - x^2 + \ln(x+1)^2 + 1}}{c_1^2 - 2c_1\ln(x+1) + \ln(x+1)^2 + 1}, \frac{-c_1x + x\ln(x+1) - \sqrt{c_1^2}}{c_1^2 - 2c_1\ln(}\right.\right.$$

2.743 ODE No. 743

$$y'(x) = -\frac{i(x^4 + 8x^2y(x)^2 + 16y(x)^4 + 8ix)}{32y(x)}$$

✓ **Mathematica** : cpu = 0.107878 (sec), leaf count = 406

$$\left\{\left\{y(x) \to -\frac{\sqrt{2}\sqrt{\left(\text{Bi}\left(\frac{1}{2}\left(i-\sqrt{3}\right)x\right) + c_1\text{Ai}\left(\frac{1}{2}\left(i-\sqrt{3}\right)x\right)\right)\left(-\frac{1}{2}x^2\left(\text{Bi}\left(\frac{1}{2}\left(i-\sqrt{3}\right)x\right) + c_1\text{Ai}\left(\frac{1}{2}\left(i-\sqrt{3}\right)x\right)\right) + \right.}}{2\text{Bi}\left(\frac{1}{2}\left(i-\sqrt{3}\right)x\right) + 2c_1\text{Ai}\left(\frac{1}{2}\left(i-\sqrt{3}\right.\right.}\right.\right.$$

✓ **Maple** : cpu = 0.521 (sec), leaf count = 296

$$\left\{y(x) = \frac{\sqrt{2}\sqrt{\left(c_1 \text{ AiryAi}\left(\frac{\left(i-\sqrt{3}\right)x}{2}\right) + \text{AiryBi}\left(\frac{\left(i-\sqrt{3}\right)x}{2}\right)\right)\left(c_1\left(1+i\sqrt{3}\right)\text{AiryAi}\left(1, \frac{\left(i-\sqrt{3}\right)x}{2}\right) - \frac{\left(c_1 \text{ AiryAi}\left(\right.\right.}{}\right.}}{2c_1 \text{ AiryAi}\left(\frac{\left(i-\sqrt{3}\right)x}{2}\right) + 2 \text{ AiryBi}\left(\frac{\left(i-\sqrt{3}\right.}{2}\right.}\right.$$

2.744 ODE No. 744

$$y'(x) = \frac{x}{x^4 + 2x^2y(x)^2 + y(x)^4 - y(x)}$$

✓ **Mathematica** : cpu = 0.175062 (sec), leaf count = 510

$$\left\{\left\{y(x) \to \frac{\sqrt[3]{144c_1x^2 + \sqrt{4\left(12x^2 - 4c_1{}^2\right)^3 + \left(144c_1x^2 - 108 + 16c_1{}^3\right)^2} - 108 + 16c_1{}^3}}{6\sqrt[3]{2}} - \frac{}{3\ 2^{2/3}\sqrt[3]{144c_1x^2 + \sqrt{}}}\right.\right.$$

✓ **Maple** : cpu = 0.18 (sec), leaf count = 621

$$\left\{y(x) = -\frac{c_1^2 - 12x^2 + 2c_1\left(-c_1^3 - 36c_1x^2 - 54 + 6\sqrt{24c_1^2x^4 + 48x^6 + 3c_1^3 + \left(3c_1^4 + 108c_1\right)x^2 + 81}\right)^{\frac{1}{3}} + \left(-ic_1^2 + \right.}{12\left(-\right.}\right.$$

2.745 ODE No. 745

$$y'(x) = \frac{(y(x)\log(x) - 1)^3}{x(-y(x) + y(x)\log(x) - 1)}$$

✓ **Mathematica** : cpu = 1.495 (sec), leaf count = 546

$$\text{Solve}\left[\int_1^{y(x)} \left(\frac{\log(x)K[1] - K[1] - 1}{\log^3(x)K[1]^3 + \log(x)K[1]^3 - K[1]^3 - 3\log^2(x)K[1]^2 - K[1]^2 + 3\log(x)K[1] - 1} + \text{RootSum}\left[K\right.\right.\right.$$

✓ **Maple** : cpu = 0.085 (sec), leaf count = 78

$$\left\{y(x) = \frac{47\,\text{RootOf}\left(3c_1 - 27783\left(\int^{-Z} \frac{1}{2209\_a^3 - 9261\_a + 9261} d\_a\right) - 7\ln(x)\right) - 84}{(47\ln(x) - 47)\,\text{RootOf}\left(3c_1 - 27783\left(\int^{-Z} \frac{1}{2209\_a^3 - 9261\_a + 9261} d\_a\right) - 7\ln(x)\right) - 84\ln(x) + 21}\right\}$$

2.746 ODE No. 746

$$y'(x) = -\frac{i(x^4 + 2x^2y(x)^2 + y(x)^4 + ix)}{y(x)}$$

✓ **Mathematica** : cpu = 0.0945512 (sec), leaf count = 274

$$\left\{\left\{y(x) \to -\frac{\sqrt{2}\sqrt{\left(\text{Bi}\left(2(-1)^{5/6}x\right) + c_1\text{Ai}\left(2(-1)^{5/6}x\right)\right)\left(-2x^2\left(\text{Bi}\left(2(-1)^{5/6}x\right) + c_1\text{Ai}\left(2(-1)^{5/6}x\right)\right) + \left(1 + i\sqrt{3}\right.\right.}}{2\text{Bi}\left(2(-1)^{5/6}x\right) + 2c_1\text{Ai}\left(2(-1)^{5/6}x\right)}\right.\right.$$

✓ **Maple** : cpu = 0.469 (sec), leaf count = 232

$$\left\{y(x) = \frac{\sqrt{2}\sqrt{\left(c_1\,\text{AiryAi}\left(-(-8i)^{\frac{1}{3}}x\right) + \text{AiryBi}\left(-(-8i)^{\frac{1}{3}}x\right)\right)\left(c_1\left(1 + i\sqrt{3}\right)\text{AiryAi}\left(1, -(-8i)^{\frac{1}{3}}x\right) - 2\left(c_1\right.\right.}}{2c_1\,\text{AiryAi}\left(-(-8i)^{\frac{1}{3}}x\right) + 2\,\text{Airy}}\right.$$

2.747 ODE No. 747

$$y'(x) = -\frac{y(x)\cot(x)\left(x^2y(x)(-\log(2x)) + x\log(2x) + \tan(x)\right)}{x}$$

✓ **Mathematica** : cpu = 3.21904 (sec), leaf count = 88

$$\left\{\left\{y(x) \to \frac{\exp\left(\int_1^x \frac{-\cot(K[1])K[1]\log(2K[1])-1}{K[1]}dK[1]\right)}{-\int_1^x \exp\left(\int_1^{K[2]} \frac{-\cot(K[1])K[1]\log(2K[1])-1}{K[1]}dK[1]\right)\cot(K[2])K[2]\log(2K[2])dK[2] + c_1}\right\}\right\}$$

✓ **Maple** : cpu = 0.31 (sec), leaf count = 75

$$\left\{y(x) = \frac{e^{\int \frac{-x\ln(x)-\ln(2)x-\tan(x)}{x\tan(x)}dx}}{c_1 + \int -\frac{(\ln(x)+\ln(2))x\,e^{\int \frac{-x\ln(x)-\ln(2)x-\tan(x)}{x\tan(x)}dx}}{\tan(x)}dx}\right\}$$

2.748 ODE No. 748

$$y'(x) = \frac{y(x)(y(x)+x)}{x\left(y(x)^3+x\right)}$$

✓ **Mathematica** : cpu = 0.347576 (sec), leaf count = 285

$$\left\{\left\{y(x) \to \frac{2\sqrt[3]{2}(\log(x)+c_1)}{\sqrt[3]{54x+\sqrt{2916x^2-864(\log(x)+c_1)^3}}} + \frac{\sqrt[3]{54x+\sqrt{2916x^2-864(\log(x)+c_1)^3}}}{3\sqrt[3]{2}}\right\}, \left\{y(x) \to -\frac{}{\sqrt[3]{5}\ldots}\right.$$

✓ **Maple** : cpu = 0.105 (sec), leaf count = 404

$$\left\{y(x) = -\frac{6c_1 + 6\ln(x) + \left(-6ic_1 - 6i\ln(x) + i\left(27x + 3\sqrt{-24c_1^3 - 72c_1^2\ln(x) - 72c_1\ln(x)^2 - 24\ln(x)^3 + 81\ldots}\right.\right.}{6\left(27x + 3\sqrt{-24c_1^3 - 72c_1^2\ln(x) - 72c_1\ln(x\ldots}\right.}\right.$$

2.749 ODE No. 749

$$y'(x) = \frac{x(x - y(x))^2 (y(x) + x)^2}{y(x)}$$

✓ **Mathematica** : cpu = 0.191214 (sec), leaf count = 126

$$\left\{\left\{y(x) \to -\frac{\sqrt{x^2 + x^2 e^{2x^2+4c_1} - e^{2x^2+4c_1} + 1}}{\sqrt{1 + e^{2x^2+4c_1}}}\right\}, \left\{y(x) \to \frac{\sqrt{x^2 + x^2 e^{2x^2+4c_1} - e^{2x^2+4c_1} + 1}}{\sqrt{1 + e^{2x^2+4c_1}}}\right\}\right\}$$

✓ **Maple** : cpu = 0.123 (sec), leaf count = 192

$$\left\{ y(x) = \frac{\sqrt{\left(c_1\left(x^2-1\right)\mathrm{e}^{-\frac{\left(x^2-2\right)x^2}{2}} + \left(x^2+1\right)\mathrm{e}^{-\frac{\left(x^2+2\right)x^2}{2}}\right)\left(c_1 \mathrm{e}^{-\frac{\left(x^2-2\right)x^2}{2}} + \mathrm{e}^{-\frac{\left(x^2+2\right)x^2}{2}}\right)}}{c_1 \mathrm{e}^{-\frac{\left(x^2-2\right)x^2}{2}} + \mathrm{e}^{-\frac{\left(x^2+2\right)x^2}{2}}}, y(x) = -\frac{\sqrt{\left(c_1\left(x^2 - \right.\right.}}{} \right.$$

2.750 ODE No. 750

$$y'(x) = \frac{y(x)\left(x^2 + 3y(x)^2\right)}{x\left(6y(x)^2 + x\right)}$$

✓ **Mathematica** : cpu = 0.345993 (sec), leaf count = 72

$$\left\{\left\{y(x) \to -\frac{\sqrt{x}\sqrt{W\left(\frac{6e^{2x+2c_1}}{x}\right)}}{\sqrt{6}}\right\}, \left\{y(x) \to \frac{\sqrt{x}\sqrt{W\left(\frac{6e^{2x+2c_1}}{x}\right)}}{\sqrt{6}}\right\}\right\}$$

✓ **Maple** : cpu = 0.335 (sec), leaf count = 49

$$\left\{\frac{1}{\frac{6}{x} + \frac{1}{y(x)^2}} = \frac{\left(\mathrm{e}^{\mathrm{RootOf}\left(3c_1\mathrm{e}^{-\_Z} + \_Z\mathrm{e}^{-\_Z} + 2x\,\mathrm{e}^{-\_Z} - \mathrm{e}^{-\_Z}\ln\left(\frac{\left(\mathrm{e}^{-\_Z}+9\right)x}{2}\right) + 9\right)} + 9\right)x}{54}\right\}$$

2.751 ODE No. 751

$$y'(x) = \frac{y(x)\left(x^4 + x\log(y(x)) + \log(y(x))\right)}{x(x+1)}$$

✓ **Mathematica** : cpu = 0.190876 (sec), leaf count = 30

$$\left\{\left\{y(x) \to (x+1)^x e^{\frac{x^3}{2} - x^2 + c_1 x}\right\}\right\}$$

✓ **Maple** : cpu = 0.162 (sec), leaf count = 26

$$\left\{y(x) = (x+1)^x\, \mathrm{e}^{c_1 x} \mathrm{e}^{-x^2} \mathrm{e}^{\frac{x^3}{2}}\right\}$$

2.752 ODE No. 752

$$y'(x) = \frac{\cos(y(x))\left(x^3\cos(y(x)) - x - 1\right)}{(x+1)(x\sin(y(x)) - 1)}$$

✓ **Mathematica** : cpu = 0.242643 (sec), leaf count = 849

$$\left\{\left\{y(x) \to \tan^{-1}\left(\frac{6\left(2x^4 - 3x^3 + 6x^2 + 6c_1 x - 6\log(x+1)x + \sqrt{4x^6 - 12x^5 + 33x^4 + 12(2c_1 - 3)x^3 - 36c_1 x^2}\right.}{4x^6 - 12x^5 + 33x^4 + 12(2c_1 - 3)x^3 - 36(c_1 - 1)x^2 + 72c_1 x + 36\log^2(}\right.\right.\right.$$

✓ **Maple** : cpu = 1.611 (sec), leaf count = 723

$$\left\{y(x) = \arctan\left(\frac{36x + \left(-2x^3 + 3x^2 - 6c_1 - 6x + 6\ln(x+1)\right)\sqrt{4x^6 - 12x^5 + 33x^4 - 36c_1 x^2 + (24c_1 - 36)x^3}}{4x^6 - 12x^5 + 33x^4 + (24c_1 - 36)x^3 + 36c_1^2 + 72c_1 x + (-36c_1 + 36)x^2 + 3}\right.\right.$$

2.753 ODE No. 753

$$y'(x) = \frac{y(x)\log(y(x))\left(x^4\log(y(x)) + x + 1\right)}{x(x+1)}$$

✓ **Mathematica** : cpu = 0.187137 (sec), leaf count = 41

$$\left\{\left\{y(x) \to \exp\left(-\frac{12x}{3x^4 - 4x^3 + 6x^2 - 12x + 12\log(x+1) - 12c_1}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.258 (sec), leaf count = 38

$$\left\{y(x) = \mathrm{e}^{-\frac{12x}{3x^4 - 4x^3 + 6x^2 - 12c_1 - 12x + 12\ln(x+1)}}\right\}$$

2.754 ODE No. 754

$$y'(x) = \frac{x^3 + xy(x)^2 + xy(x) + y(x)^3}{x^2}$$

✓ **Mathematica** : cpu = 0.139996 (sec), leaf count = 47

$$\text{Solve}\left[\text{RootSum}\left[\#1^3 + \#1^2 + 1\&, \frac{\log\left(\frac{y(x)}{x} - \#1\right)}{3\#1^2 + 2\#1}\&\right] = x + c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.022 (sec), leaf count = 26

$$\left\{y(x) = x\,\text{RootOf}\left(c_1 + x - \left(\int^{\_Z} \frac{1}{\_a^3 + \_a^2 + 1} d\_a\right)\right)\right\}$$

2.755 ODE No. 755

$$y'(x) = \frac{y(x)^{3/2}}{x^2 - 2xy(x) + y(x)^2 + y(x)^{3/2}}$$

✓ **Mathematica** : cpu = 0.363633 (sec), leaf count = 2633

$$\left\{\left\{y(x) \to \frac{2}{3}\left(x + e^{c_1} + 2e^{2c_1}\right) - \frac{1}{3}\sqrt[3]{x^3 + 3e^{c_1}x^2 - 12e^{2c_1}x^2 + 3e^{2c_1}x + 12e^{3c_1}x + 48e^{4c_1}x + e^{3c_1} - 30e^{4c_1} - 96e^{5}\right.\right.$$

✓ **Maple** : cpu = 0.134 (sec), leaf count = 44

$$\left\{-c_1 - \frac{2x}{(-x + y(x))\sqrt{y(x)}} + \frac{2\sqrt{y(x)}}{-x + y(x)} + \frac{1}{-x + y(x)} = 0\right\}$$

2.756 ODE No. 756

$$y'(x) = \frac{x^6 + 2x^3y(x) + x^2y(x)^2 + y(x)^3}{x^4}$$

✓ **Mathematica** : cpu = 0.199371 (sec), leaf count = 95

$$\text{Solve}\left[-\frac{29}{3}\text{RootSum}\left[-29\#1^3 + 3\sqrt[3]{29}\#1 - 29\&, \frac{\log\left(\frac{\frac{3y(x)}{x^4} + \frac{1}{x^2}}{\sqrt[3]{29}\sqrt[3]{\frac{1}{x^6}}} - \#1\right)}{\sqrt[3]{29} - 29\#1^2}\&\right] = \frac{1}{9}29^{2/3}\left(\frac{1}{x^6}\right)^{2/3}x^5 + c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.036 (sec), leaf count = 37

$$\left\{y(x)=\frac{\left(29\,\mathrm{RootOf}\left(3c_1+x-81\left(\int^{-Z}\frac{1}{841\_a^3-27\_a+27}d\_a\right)\right)-3\right)x^2}{9}\right\}$$

2.757 ODE No. 757

$$y'(x)=\frac{x^3+2x^2-4xy(x)-4x-8}{2x^2-8y(x)+4x-8}$$

✓ **Mathematica** : cpu = 0.0428142 (sec), leaf count = 36

$$\left\{\left\{y(x)\to\frac{1}{4}(x^2+2x-4)+2\left(1+W\left(-e^{-\frac{x}{4}-1+c_1}\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.1 (sec), leaf count = 26

$$\left\{y(x)=\frac{x^2}{4}+\frac{x}{2}+2\,\mathrm{LambertW}\left(\frac{c_1\mathrm{e}^{-\frac{1}{2}}\mathrm{e}^{-\frac{x}{4}}}{2}\right)+1\right\}$$

2.758 ODE No. 758

$$y'(x)=\frac{y(x)\left(x^3y(x)+2x+2\right)}{(x+1)(\log(y(x))+2x-1)}$$

✓ **Mathematica** : cpu = 0.913132 (sec), leaf count = 459

$$\left\{\left\{y(x)\to\frac{6W\left(-\frac{1}{6}\sqrt[6]{e^{-12x}\left(2x^3-3x^2+6x-6\log(x+1)+6c_1\right)^6}\right)}{2x^3-3x^2+6x-6\log(x+1)+6c_1}\right\},\left\{y(x)\to\frac{6W\left(\frac{1}{6}\sqrt[6]{e^{-12x}\left(2x^3-3x^2+6\right.}\right.}{2x^3-3x^2+6x-6}\right.$$

✓ **Maple** : cpu = 0.278 (sec), leaf count = 41

$$\left\{y(x)=\mathrm{e}^{-2x-\mathrm{LambertW}\left(-\frac{\left(-2x^3+3x^2+6c_1-6x+6\ln(x+1)\right)\mathrm{e}^{-2x}}{6}\right)}\right\}$$

2.759 ODE No. 759

$$y'(x) = -\frac{ix(x^8 + 18x^4y(x)^2 + 54ix^2 + 81y(x)^4)}{243y(x)}$$

✓ **Mathematica** : cpu = 0.103573 (sec), leaf count = 498

$$\left\{\left\{y(x) \to -\frac{\sqrt{\left(Y_{\frac{1}{3}}\left(\left(\frac{2}{9}-\frac{2i}{9}\right)\sqrt{\frac{2}{3}}x^3\right)+c_1J_{\frac{1}{3}}\left(\left(\frac{2}{9}-\frac{2i}{9}\right)\sqrt{\frac{2}{3}}x^3\right)\right)\left((1+i)\sqrt{6}x^3\left(Y_{\frac{4}{3}}\left(\left(\frac{2}{9}-\frac{2i}{9}\right)\sqrt{\frac{2}{3}}x^3\right)+c_1J_{\frac{4}{3}}\left(\right.\right.\right.}}{\sqrt{3}x\left(Y_{\frac{1}{3}}\left(\left(\frac{2}{9}-\frac{2i}{9}\right)\sqrt{\frac{2}{3}}x^3\right)+c\right.}\right.\right.$$

✓ **Maple** : cpu = 0.589 (sec), leaf count = 305

$$\left\{y(x) = -\frac{\sqrt{3}\sqrt{\left((1+i)\left(c_1\operatorname{BesselJ}\left(\frac{4}{3},\left(\frac{2}{27}-\frac{2i}{27}\right)\sqrt{6}\,x^3\right)+\operatorname{BesselY}\left(\frac{4}{3},\left(\frac{2}{27}-\frac{2i}{27}\right)\sqrt{6}\,x^3\right)\right)\sqrt{6}\,x^3-9c_1\left(\frac{x^6}{27}+i\right)\right.}}{3\left(c_1\operatorname{BesselJ}\left(\frac{1}{3}\right.\right.}\right.$$

2.760 ODE No. 760

$$y'(x) = \frac{\left(xy(x)^2+1\right)^3}{x^4y(x)\left(xy(x)^2+x+1\right)}$$

✓ **Mathematica** : cpu = 1.04407 (sec), leaf count = 112

$$\text{Solve}\left[2\left(\frac{1}{10}\log\left(2x^2y(x)^4+2x^2y(x)^2+x^2+4xy(x)^2+2x+2\right)-\frac{1}{5}\log\left(xy(x)^2-x+1\right)-\frac{1}{10}\tan^{-1}\left(2xy(x)^4+\right.\right.\right.$$

✓ **Maple** : cpu = 2.026 (sec), leaf count = 137

$$\left\{\frac{(y(x)-1)\left(2y(x)^4+2y(x)^2+1\right)\left(10c_1x-x\arctan\left(2y(x)^2+1\right)+x\arctan\left(2xy(x)^4+(2x+2)\,y(x)^2+x+\right.\right.}{10\left(2y\left(x\right)^6-y\left(x\right)^2\right.}\right.$$

2.761 ODE No. 761

$$y'(x) = \frac{-x^3 + 4x^2 - 4xy(x) - 4x + 8}{2x^2 + 8y(x) - 8x + 8}$$

✓ **Mathematica** : cpu = 0.0490669 (sec), leaf count = 33

$$\left\{\left\{y(x) \to W\left(-e^{-x-1+c_1}\right) + \frac{1}{4}\left(-x^2 + 4x - 4\right) + 1\right\}\right\}$$

✓ **Maple** : cpu = 0.09 (sec), leaf count = 18

$$\left\{y(x) = -\frac{x^2}{4} + x + \mathrm{LambertW}\left(c_1 \mathrm{e}^{-x}\right)\right\}$$

2.762 ODE No. 762

$$y'(x) = \frac{y(x)(x(-\log(y(x))) - \log(y(x)) + x)}{x(x+1)}$$

✓ **Mathematica** : cpu = 0.224779 (sec), leaf count = 26

$$\left\{\left\{y(x) \to (x+1)^{-1/x} e^{1-\frac{c_1}{x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.176 (sec), leaf count = 22

$$\left\{y(x) = \mathrm{e}(x+1)^{-\frac{1}{x}} \mathrm{e}^{\frac{c_1}{x}}\right\}$$

2.763 ODE No. 763

$$y'(x) = \frac{y(x)(x\log(y(x)) + \log(y(x)) + x)}{x(x+1)}$$

✓ **Mathematica** : cpu = 0.177535 (sec), leaf count = 22

$$\left\{\left\{y(x) \to x^x (x+1)^{-x} e^{c_1 x}\right\}\right\}$$

✓ **Maple** : cpu = 0.122 (sec), leaf count = 14

$$\left\{y(x) = \left(\frac{c_1 x}{x+1}\right)^x\right\}$$

2.764 ODE No. 764

$$y'(x)=\frac{y(x)\left(x^4-x\log(y(x))-\log(y(x))\right)}{x(x+1)}$$

✓ **Mathematica** : cpu = 0.201401 (sec), leaf count = 50

$$\left\{\left\{y(x)\to(x+1)^{\frac{1}{x}}e^{\frac{x^3}{4}-\frac{x^2}{3}+\frac{x}{2}-\frac{25}{12x}-\frac{c_1}{x}-1}\right\}\right\}$$

✓ **Maple** : cpu = 0.218 (sec), leaf count = 36

$$\left\{y(x)=\mathrm{e}^{-1}(x+1)^{\frac{1}{x}}\,\mathrm{e}^{\frac{c_1}{x}}\,\mathrm{e}^{\frac{x}{2}}\,\mathrm{e}^{-\frac{x^2}{3}}\,\mathrm{e}^{\frac{x^3}{4}}\right\}$$

2.765 ODE No. 765

$$y'(x)=\frac{y(x)\left(xy(x)\log\left(\frac{(x-1)(x+1)}{x}\right)-\log\left(\frac{(x-1)(x+1)}{x}\right)-1\right)}{x}$$

✓ **Mathematica** : cpu = 0.420932 (sec), leaf count = 138

$$\left\{\left\{y(x)\to\frac{\exp\left(-\mathrm{Li}_2(1-x)+\mathrm{Li}_2(-x)-\frac{1}{2}\log^2(x)+\log(x+1)\log(x)-\log\left(x-\frac{1}{x}\right)\log(x)\right)}{x\left(-\int_1^x\frac{\exp\left(-\frac{1}{2}\log^2(K[1])+\log(K[1]+1)\log(K[1])-\log\left(K[1]-\frac{1}{K[1]}\right)\log(K[1])-\mathrm{Li}_2(1-K[1])+\mathrm{Li}_2(-K[1])\right)\log\left(\frac{(K[1]-1)(K}{K[1]}\right.}{K[1]}\right.}\right.\right.$$

✓ **Maple** : cpu = 0.198 (sec), leaf count = 106

$$\left\{y(x)=\frac{x^{-\ln\left(\frac{(x-1)(x+1)}{x}\right)}x^{\ln(x+1)}\mathrm{e}^{-\frac{\ln(x)^2}{2}}\mathrm{e}^{-\operatorname{dilog}(x)}\mathrm{e}^{\operatorname{dilog}(x+1)}}{\left(c_1+\int-\frac{x^{-\ln\left(\frac{(x-1)(x+1)}{x}\right)}x^{\ln(x+1)}\mathrm{e}^{-\frac{\ln(x)^2}{2}}\mathrm{e}^{-\operatorname{dilog}(x)}\mathrm{e}^{\operatorname{dilog}(x+1)}\ln\left(\frac{(x-1)(x+1)}{x}\right)}{x}dx\right)x}\right\}$$

2.766 ODE No. 766

$$y'(x) = \frac{y(x)\left(x^2y(x)\log\left(\frac{(x-1)(x+1)}{x}\right) - x\log\left(\frac{(x-1)(x+1)}{x}\right) - \log(x)\right)}{x\log(x)}$$

✓ **Mathematica** : cpu = 0.383213 (sec), leaf count = 129

$$\left\{\left\{y(x)\to\frac{\exp\left(\int_1^x\frac{-\log(K[1])-K[1]\log\left(\frac{(K[1]-1)(K[1]+1)}{K[1]}\right)}{K[1]\log(K[1])}dK[1]\right)}{-\int_1^x\frac{\exp\left(\int_1^{K[2]}\frac{-\log(K[1])-K[1]\log\left(\frac{(K[1]-1)(K[1]+1)}{K[1]}\right)}{K[1]\log(K[1])}dK[1]\right)K[2]\log\left(\frac{(K[2]-1)(K[2]+1)}{K[2]}\right)}{\log(K[2])}dK[2]+c_1}\right\}\right\}$$

✓ **Maple** : cpu = 0.186 (sec), leaf count = 89

$$\left\{y(x)=\frac{e^{\int\frac{-x\ln\left(\frac{(x-1)(x+1)}{x}\right)-\ln(x)}{x\ln(x)}dx}}{c_1+\int-\frac{x\,e^{\int\frac{-x\ln\left(\frac{(x-1)(x+1)}{x}\right)-\ln(x)}{x\ln(x)}dx}\ln\left(\frac{(x-1)(x+1)}{x}\right)}{\ln(x)}dx}\right\}$$

2.767 ODE No. 767

$$y'(x) = \frac{-x^3+2x^2-8xy(x)-8x+32}{4x^2+32y(x)-8x+32}$$

✓ **Mathematica** : cpu = 0.0417176 (sec), leaf count = 38

$$\left\{\left\{y(x)\to\frac{1}{8}\left(-x^2+2x-8\right)+4\left(1+W\left(-e^{-\frac{x}{16}-1+c_1}\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.1 (sec), leaf count = 26

$$\left\{y(x)=-\frac{x^2}{8}+\frac{x}{4}+4\,\mathrm{LambertW}\left(\frac{c_1e^{-\frac{3}{4}}e^{-\frac{x}{16}}}{4}\right)+3\right\}$$

2.768 ODE No. 768

$$y'(x) = \frac{y(x)(y(x)+1)}{x(xy(x)-y(x)-1)}$$

✓ **Mathematica** : cpu = 1.79393 (sec), leaf count = 66

$$\text{Solve}\left[\frac{2^{2/3}\left(xy(x)\left(-\log\left(\frac{xy(x)}{(x-1)y(x)-1}\right)+\log\left(\frac{y(x)+1}{-xy(x)+y(x)+1}\right)+\log(x)+1\right)-1\right)}{9xy(x)}=c_1,y(x)\right]$$

✓ **Maple** : cpu = 0.129 (sec), leaf count = 26

$$\left\{y(x)=-\frac{1}{x\,\text{LambertW}\left(\frac{e^{-\frac{1}{x}}}{c_1 x}\right)+1}\right\}$$

2.769 ODE No. 769

$$y'(x) = -\frac{ix(x^8+8x^4y(x)^2+16ix^2+16y(x)^4)}{32y(x)}$$

✓ **Mathematica** : cpu = 0.100868 (sec), leaf count = 360

$$\left\{\left\{y(x)\to -\frac{\sqrt{\left(Y_{\frac{1}{3}}\left(\left(\frac{1}{3}-\frac{i}{3}\right)x^3\right)+c_1J_{\frac{1}{3}}\left(\left(\frac{1}{3}-\frac{i}{3}\right)x^3\right)\right)\left((1+i)x^3\left(Y_{\frac{4}{3}}\left(\left(\frac{1}{3}-\frac{i}{3}\right)x^3\right)+c_1J_{\frac{4}{3}}\left(\left(\frac{1}{3}-\frac{i}{3}\right)x^3\right)\right)-\frac{1}{4}(x}}{x\left(Y_{\frac{1}{3}}\left(\left(\frac{1}{3}-\frac{i}{3}\right)x^3\right)+c_1J_{\frac{1}{3}}\left(\left(\frac{1}{3}-\frac{i}{3}\right)x^3\right)\right)}\right.\right.$$

✓ **Maple** : cpu = 0.537 (sec), leaf count = 251

$$\left\{y(x)=-\frac{\sqrt{4}\sqrt{\left((1+i)\left(c_1\,\text{BesselJ}\left(\frac{4}{3},\left(\frac{1}{3}-\frac{i}{3}\right)x^3\right)+\text{BesselY}\left(\frac{4}{3},\left(\frac{1}{3}-\frac{i}{3}\right)x^3\right)\right)x^3-2c_1\left(\frac{x^6}{8}+i\right)\text{BesselJ}\left(\frac{1}{3},\left(\frac{1}{3}\right.\right.\right.}}{2\left(c_1\,\text{BesselJ}\left(\frac{1}{3},\left(\frac{1}{3}-\frac{i}{3}\right)x^3\right)\right.}\right.$$

2.770 ODE No. 770

$$y'(x) = \frac{2y(x)^6}{32x^2y(x)^4 + y(x)^3 + 16xy(x)^2 + 2}$$

✓ **Mathematica** : cpu = 0.247344 (sec), leaf count = 705

$$\left\{\left\{y(x) \to \frac{\sqrt[3]{8192x^3 + 18432c_1{}^2x^2 + \sqrt{4\left(-256x^2 + 192c_1{}^2x - 12c_1\right)^3 + \left(8192x^3 + 18432c_1{}^2x^2 - 2880c_1x + 10\right.}}}{3\sqrt[3]{2}(1 - 16c_1x)}\right.\right.$$

✓ **Maple** : cpu = 0.141 (sec), leaf count = 1105

$$\left\{y(x) = \frac{-256c_1^2x^2 + 32c_1\left(\left(4096x^3 + 54\right)c_1^3 + 1440c_1^2x + 9216c_1x^2 + 96\left(\frac{c_1}{16} + x\right)\sqrt{3}\sqrt{\left(4096x^3 + 27\right)c_1^4 + 576c_1^3\right.}\right.}{}\right.$$

2.771 ODE No. 771

$$y'(x) = \frac{-a^2x^3 - 2abx^2 - 4axy(x) - 4ax + 8}{2ax^2 + 4bx + 8y(x) + 8}$$

✓ **Mathematica** : cpu = 0.055505 (sec), leaf count = 46

$$\left\{\left\{y(x) \to \frac{1}{4}\left(-ax^2 - 2bx - 4\right) - \frac{2\left(1 + W\left(-e^{-\frac{b^2x}{4} - 1 + c_1}\right)\right)}{b}\right\}\right\}$$

✓ **Maple** : cpu = 0.255 (sec), leaf count = 84

$$\left\{y(x) = \frac{-ab\,x^2 - 2b^2x - 4b + 4\,\mathrm{e}^{\frac{-2c_1b^2 - 4a\,\mathrm{LambertW}\left(-\frac{\mathrm{e}^{-1}\mathrm{e}^{-\frac{b}{2}}\mathrm{e}^{-\frac{b^2x}{4}}\mathrm{e}^{-\frac{c_1b^2}{2a}}}{2}\right) + \left(-b^2x - 2b - 4\right)a}{4a}} - 8}{4b}\right\}$$

2.772 ODE No. 772

$$y'(x) = \frac{y(x)\log(y(x))(x\log(y(x)) + x + 1)}{x(x+1)}$$

✓ **Mathematica** : cpu = 0.219708 (sec), leaf count = 21

$$\left\{\left\{y(x) \to e^{\frac{x}{-x+\log(x+1)+c_1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.217 (sec), leaf count = 18

$$\left\{y(x) = e^{\frac{x}{c_1 - x + \ln(x+1)}}\right\}$$

2.773 ODE No. 773

$$y'(x) = \frac{y(x)^2 + xy(x) + x}{(x-1)(y(x)+x)}$$

✓ **Mathematica** : cpu = 0.220879 (sec), leaf count = 61

$$\text{Solve}\left[\frac{1}{2}\log\left(\frac{y(x)^2}{x^2} + \frac{y(x)}{x} + 1\right) + \frac{\tan^{-1}\left(\frac{\frac{2y(x)}{x}+1}{\sqrt{3}}\right)}{\sqrt{3}} = \log(1-x) - \log(x) + c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.239 (sec), leaf count = 48

$$\left\{y(x) = \frac{\sqrt{3}\,x\tan\left(\text{RootOf}\left(2c_1\sqrt{3} - 2\_Z - \sqrt{3}\ln\left(\frac{3(\tan^2(\_Z)+1)x^2}{4(x-1)^2}\right)\right)\right)}{2} - \frac{x}{2}\right\}$$

2.774 ODE No. 774

$$y'(x) = \frac{-2ax^2 - x^3 - 4xy(x) - 4x + 8}{4ax + 2x^2 + 8y(x) + 8}$$

✓ **Mathematica** : cpu = 0.0451379 (sec), leaf count = 45

$$\left\{\left\{y(x) \to \frac{1}{4}(-2ax - x^2 - 4) - \frac{2\left(1 + W\left(-e^{-\frac{a^2x}{4} - 1 + c_1}\right)\right)}{a}\right\}\right\}$$

✓ **Maple** : cpu = 0.165 (sec), leaf count = 51

$$\left\{y(x)=\frac{-2a^2x-a\,x^2-4a-8\,\mathrm{LambertW}\left(-\frac{\mathrm{e}^{-1}\mathrm{e}^{-\frac{a}{2}}\mathrm{e}^{\frac{c_1a^2}{4}}\mathrm{e}^{-\frac{a^2x}{4}}}{2}\right)-8}{4a}\right\}$$

2.775 ODE No. 775

$$y'(x)=\frac{-y(x)+\sqrt{y(x)}+x}{-y(x)+\sqrt{y(x)}+x+1}$$

✓ **Mathematica** : cpu = 0.185328 (sec), leaf count = 943

$$\{\{y(x)\to \mathrm{Root}\left[x^6-2e^{3c_1}x^3+e^{6c_1}+\#1^6+(-6x-6)\#1^5+\left(15x^2+24x+9\right)\#1^4+\left(-20x^3-36x^2-18x+2\right.\right.$$

✓ **Maple** : cpu = 0.082 (sec), leaf count = 44

$$\left\{-x^3+y(x)^3+(-3x-3)\,y(x)^2-2y(x)^{\frac{3}{2}}-c_1+\left(3x^2+3x\right)y(x)=0\right\}$$

2.776 ODE No. 776

$$y'(x)=\frac{y(x)\left(x^2y(x)\log\left(\frac{x^2+1}{x}\right)-x\log\left(\frac{x^2+1}{x}\right)-\log\left(\frac{1}{x}\right)\right)}{x\log\left(\frac{1}{x}\right)}$$

✓ **Mathematica** : cpu = 0.430169 (sec), leaf count = 133

$$\left\{\left\{y(x)\to\frac{\exp\left(\int_1^x\frac{-\log\left(\frac{1}{K[1]}\right)-K[1]\log\left(\frac{K[1]^2+1}{K[1]}\right)}{K[1]\log\left(\frac{1}{K[1]}\right)}dK[1]\right)}{-\int_1^x\frac{\exp\left(\int_1^{K[2]}\frac{-\log\left(\frac{1}{K[1]}\right)-K[1]\log\left(\frac{K[1]^2+1}{K[1]}\right)}{K[1]\log\left(\frac{1}{K[1]}\right)}dK[1]\right)K[2]\log\left(\frac{K[2]^2+1}{K[2]}\right)}{\log\left(\frac{1}{K[2]}\right)}dK[2]+c_1}\right\}\right\}$$

✓ **Maple** : cpu = 0.245 (sec), leaf count = 96

$$\left\{y(x)=\frac{\mathrm{e}^{\int\frac{-x\ln\left(\frac{x^2+1}{x}\right)-\ln\left(\frac{1}{x}\right)}{x\ln\left(\frac{1}{x}\right)}dx}}{c_1+\int-\frac{x\,\mathrm{e}^{\int\frac{-x\ln\left(\frac{x^2+1}{x}\right)-\ln\left(\frac{1}{x}\right)}{x\ln\left(\frac{1}{x}\right)}dx}\ln\left(\frac{x^2+1}{x}\right)}{\ln\left(\frac{1}{x}\right)}dx}\right\}$$

2.777 ODE No. 777

$$y'(x) = \frac{y(x)(y(x)+1)}{x\left(xy(x)^4 - y(x) - 1\right)}$$

✓ **Mathematica** : cpu = 0.318293 (sec), leaf count = 39

$$\text{Solve}\left[-\frac{1}{2}(y(x)+1)^2 + 2(y(x)+1) - \frac{1}{xy(x)} - \log(y(x)+1) = c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.263 (sec), leaf count = 51

$$\{y(x) = \mathrm{e}^{\mathrm{RootOf}\left(2c_1 x\,\mathrm{e}^{\_Z} + 2\_Zx\,\mathrm{e}^{\_Z} - 2c_1x - 2\_Zx + 7x\,\mathrm{e}^{\_Z} - 5x\,\mathrm{e}^{2\_Z} + x\,\mathrm{e}^{3\_Z} - 3x + 2\right)} - 1\}$$

2.778 ODE No. 778

$$y'(x) = \frac{x^9y(x)^3 + x^6y(x)^2 - 3x^2y(x) + 1}{x^3}$$

✓ **Mathematica** : cpu = 0.179966 (sec), leaf count = 95

$$\text{Solve}\left[-\frac{29}{3}\text{RootSum}\left[-29\#1^3 + 3\sqrt[3]{29}\#1 - 29\&, \frac{\log\left(\frac{3x^6y(x)+x^3}{\sqrt[3]{29}\sqrt[3]{x^9}} - \#1\right)}{\sqrt[3]{29} - 29\#1^2}\&\right] = \frac{29^{2/3}\left(x^9\right)^{2/3}}{9x^5} + c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.031 (sec), leaf count = 37

$$\left\{y(x) = \frac{29\,\mathrm{RootOf}\left(3c_1 + x - 81\left(\int^{\_Z} \frac{1}{841\_a^3 - 27\_a + 27} d\_a\right)\right) - 3}{9x^3}\right\}$$

2.779 ODE No. 779

$$y'(x) = \frac{x^3y(x) + x^3 + xy(x)^2 + y(x)^3}{(x-1)x^3}$$

✓ **Mathematica** : cpu = 0.182902 (sec), leaf count = 57

$$\text{Solve}\left[-\frac{1}{4}\log\left(\frac{y(x)^2}{x^2}+1\right) + \frac{1}{2}\log\left(\frac{y(x)}{x}+1\right) + \frac{1}{2}\tan^{-1}\left(\frac{y(x)}{x}\right) = \log(1-x) - \log(x) + c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.066 (sec), leaf count = 50

$$\left\{-c_1 + \frac{\arctan\left(\frac{y(x)}{x}\right)}{2} + \ln(x) - \frac{\ln\left(\frac{x^2+y(x)^2}{x^2}\right)}{4} + \frac{\ln\left(\frac{x+y(x)}{x}\right)}{2} - \ln(x-1) = 0\right\}$$

2.780 ODE No. 780

$$y'(x) = \frac{x\sqrt{x^2 + y(x)^2} + xy(x) + y(x)}{x(x+1)}$$

✓ **Mathematica** : cpu = 0.200274 (sec), leaf count = 15

$$\{\{y(x) \to x \sinh(\log(x+1) + c_1)\}\}$$

✓ **Maple** : cpu = 0.615 (sec), leaf count = 27

$$\left\{c_1 + \frac{y(x) + \sqrt{x^2 + y(x)^2}}{(x+1)\,x} = 0\right\}$$

2.781 ODE No. 781

$$y'(x) = \frac{y(x)\left(x^4 + x^3 + 3y(x)^2 + x\right)}{x\left(6y(x)^2 + x\right)}$$

✓ **Mathematica** : cpu = 0.486974 (sec), leaf count = 82

$$\left\{\left\{y(x) \to -\frac{\sqrt{x}\sqrt{W\left(6xe^{\frac{2x^3}{3}+x^2+2c_1}\right)}}{\sqrt{6}}\right\}, \left\{y(x) \to \frac{\sqrt{x}\sqrt{W\left(6xe^{\frac{2x^3}{3}+x^2+2c_1}\right)}}{\sqrt{6}}\right\}\right\}$$

✓ **Maple** : cpu = 0.481 (sec), leaf count = 61

$$\left\{\frac{1}{\frac{6}{x} + \frac{1}{y(x)^2}} = \frac{\left(\mathrm{e}^{\mathrm{RootOf}\left(2x^3\mathrm{e}^{\_Z} + 3x^2\mathrm{e}^{\_Z} + 9c_1\mathrm{e}^{\_Z} + 3\_Z\mathrm{e}^{\_Z} - 3\,\mathrm{e}^{\_Z}\ln\left(\frac{\mathrm{e}^{\_Z}+9}{2x}\right) + 27\right)} + 9\right)x}{54}\right\}$$

2.782 ODE No. 782

$$y'(x) = \frac{y(x)\coth\left(\frac{1}{x}\right)\left(x^2y(x)\log\left(\frac{x^2+1}{x}\right) - x\log\left(\frac{x^2+1}{x}\right) - \tanh\left(\frac{1}{x}\right)\right)}{x}$$

✓ **Mathematica** : cpu = 4.7425 (sec), leaf count = 115

$$\left\{\left\{y(x)\to \frac{\exp\left(\int_1^x \frac{-\coth\left(\frac{1}{K[1]}\right)K[1]\log\left(\frac{K[1]^2+1}{K[1]}\right)-1}{K[1]}dK[1]\right)}{-\int_1^x \exp\left(\int_1^{K[2]} \frac{-\coth\left(\frac{1}{K[1]}\right)K[1]\log\left(\frac{K[1]^2+1}{K[1]}\right)-1}{K[1]}dK[1]\right)\coth\left(\frac{1}{K[2]}\right)K[2]\log\left(\frac{K[2]^2+1}{K[2]}\right)dK[2]+c_1}\right\}\right\}$$

✓ **Maple** : cpu = 2.313 (sec), leaf count = 96

$$\left\{y(x) = \frac{e^{\int \frac{-x\ln\left(\frac{x^2+1}{x}\right)-\tanh\left(\frac{1}{x}\right)}{x\tanh\left(\frac{1}{x}\right)}dx}}{c_1 + \int -\frac{x\,e^{\int \frac{-x\ln\left(\frac{x^2+1}{x}\right)-\tanh\left(\frac{1}{x}\right)}{x\tanh\left(\frac{1}{x}\right)}dx}\ln\left(\frac{x^2+1}{x}\right)}{\tanh\left(\frac{1}{x}\right)}dx}\right\}$$

2.783 ODE No. 783

$$y'(x) = -\frac{y(x)\coth(x)\left(x^2y(x)(-\log(2x)) + x\log(2x) + \tanh(x)\right)}{x}$$

✓ **Mathematica** : cpu = 4.52942 (sec), leaf count = 88

$$\left\{\left\{y(x)\to \frac{\exp\left(\int_1^x \frac{-\coth(K[1])K[1]\log(2K[1])-1}{K[1]}dK[1]\right)}{-\int_1^x \exp\left(\int_1^{K[2]} \frac{-\coth(K[1])K[1]\log(2K[1])-1}{K[1]}dK[1]\right)\coth(K[2])K[2]\log(2K[2])dK[2]+c_1}\right\}\right\}$$

✓ **Maple** : cpu = 0.2 (sec), leaf count = 75

$$\left\{y(x) = \frac{e^{\int \frac{-x\ln(x)-\ln(2)x-\tanh(x)}{x\tanh(x)}dx}}{c_1 + \int -\frac{(\ln(x)+\ln(2))x\,e^{\int \frac{-x\ln(x)-\ln(2)x-\tanh(x)}{x\tanh(x)}dx}}{\tanh(x)}dx}\right\}$$

2.784 ODE No. 784

$$y'(x) = \operatorname{csch}(x)\left(x^2\log(x) + 2xy(x)\log(x) + y(x)^2\log(x) + \log(x) - \sinh(x)\right)$$

✓ **Mathematica** : cpu = 21.9564 (sec), leaf count = 27

$$\left\{\left\{y(x) \to -x + \tan\left(\int_1^x \operatorname{csch}(K[5])\log(K[5])dK[5] + c_1\right)\right\}\right\}$$

✓ **Maple** : cpu = 10.085 (sec), leaf count = 24

$$\left\{y(x) = -x - \tan\left(c_1 - \left(\int \frac{\ln(x)}{\sinh(x)}dx\right)\right)\right\}$$

2.785 ODE No. 785

$$y'(x) = \frac{x^2\sinh(x) + 2xy(x)\sinh(x) + y(x)^2\sinh(x) - \log(x) + \sinh(x)}{\log(x)}$$

✓ **Mathematica** : cpu = 9.23553 (sec), leaf count = 29

$$\left\{\left\{y(x) \to -x + \tan\left(\int_1^x \frac{\sinh(K[5])}{\log(K[5])}dK[5] + c_1\right)\right\}\right\}$$

✓ **Maple** : cpu = 50.054 (sec), leaf count = 24

$$\left\{y(x) = -x - \tan\left(c_1 - \left(\int \frac{\sinh(x)}{\ln(x)}dx\right)\right)\right\}$$

2.786 ODE No. 786

$$y'(x) = \frac{axy(x)^2\cosh(x) + bx^3\cosh(x) + y(x)\log(x)}{x\log(x)}$$

✓ **Mathematica** : cpu = 4.45865 (sec), leaf count = 61

$$\left\{\left\{y(x) \to \frac{\sqrt{b}x\tan\left(\sqrt{a}\sqrt{b}\int_1^x \frac{\cosh(K[1])K[1]}{\log(K[1])}dK[1] + \sqrt{a}\sqrt{b}c_1\right)}{\sqrt{a}}\right\}\right\}$$

✓ **Maple** : cpu = 0.089 (sec), leaf count = 33

$$\left\{y(x) = \frac{\sqrt{ab}\,x\tan\left(\sqrt{ab}\left(c_1 + \int \frac{x\cosh(x)}{\ln(x)}dx\right)\right)}{a}\right\}$$

2.787 ODE No. 787

$$y'(x) = \frac{x(2x^4 - 2x^2y(x) + x^2 - x - 1)}{(x+1)(x^2 - y(x))}$$

✓ **Mathematica** : cpu = 29.7369 (sec), leaf count = 488

$$\text{Solve}\left[\frac{\left(2-\frac{x(x^2-x-1)(2x^2-2y(x)+3)}{\sqrt[3]{x^3(x^2-x-1)^3}(x^2-y(x))}\right)\left(\frac{x(x^2-x-1)(2x^2-2y(x)+3)}{\sqrt[3]{x^3(x^2-x-1)^3}(x^2-y(x))}+4\right)\left(\left(\left(1-\frac{x(x^2-x-1)(2x^2-2y(x)+3)}{2\sqrt[3]{x^3(x^2-x-1)^3}(x^2-y(x))}\right)\log\left(\frac{2-\frac{x(x^2}{\sqrt[3]{x^3}}}{}\right.\right.\right.}{18\sqrt[3]{2}\left(-\frac{(2x^2-2y(x)+3)^3}{8(x^2-y(x))^3}+\frac{3x(x^2-x-1}{2\sqrt[3]{x^3(x^2-}}\right.}\right.$$

✓ **Maple** : cpu = 0.899 (sec), leaf count = 191

$$\left\{y(x) = \frac{4x^2 e^{\text{RootOf}\left(8x^3 e^{-Z}-36x^3-24x^2e^{-Z}+18c_1e^{-Z}-6\_Z e^{-Z}+108x^2+24x e^{-Z}+6e^{-Z}\ln\left(\frac{2e^{-Z}-9}{(x+1)^4}\right)-81c_1+27\_Z-108x-27\ln\left(\frac{2e^{-Z}}{(x+1}\right.\right.}}{4e^{\text{RootOf}\left(8x^3e^{-Z}-36x^3-24x^2e^{-Z}+18c_1e^{-Z}-6\_Z e^{-Z}+108x^2+24x e^{-Z}+6e^{-Z}\ln\left(\frac{2e^{-Z}-9}{(x+1)^4}\right)-81c_1+27\_Z-108x-27\ln\left(\frac{2e}{(x}\right.\right.}}\right.$$

2.788 ODE No. 788

$$y'(x) = -\frac{y(x)\left(x^2y(x)(-\coth(x+1)) + \log(x-1) + x\coth(x+1)\right)}{x\log(x-1)}$$

✓ **Mathematica** : cpu = 27.7885 (sec), leaf count = 348

$$\left\{\left\{y(x) \to \frac{\exp\left(\int_1^x \frac{-e^2\cosh(K[1])K[1]-\cosh(K[1])K[1]-e^2\sinh(K[1])K[1]+\sinh(K[1])K[1]-e^2\text{co}}{K[1]\log(K[1]-1)(e^2\cosh(}\right.}{-\int_1^x \frac{\exp\left(\int_1^{K[2]}\frac{-e^2\cosh(K[1])K[1]-\cosh(K[1])K[1]-e^2\sinh(K[1])K[1]+\sinh(K[1])K[1]-e^2\cosh(K[1])\log(K[1]-1)+\cosh(K[1])\log(K[1]-1}{K[1]\log(K[1]-1)\left(e^2\cosh(K[1])-\cosh(K[1])+e^2\sinh(K[1])+\sinh(K[1])\right)}\right.}{K[2]\log(K[2]-1)(e^2\cosh(K[2]}}\right.\right.$$

✓ **Maple** : cpu = 0.31 (sec), leaf count = 108

$$\left\{y(x) = \frac{e^{\int -\frac{x\cosh(x+1)+\ln(x-1)\sinh(x+1)}{x\ln(x-1)\sinh(x+1)}dx}}{c_1 + \int -\frac{x\cosh(x+1)e^{\int\frac{-x\cosh(x+1)-\ln(x-1)\sinh(x+1)}{x\ln(x-1)\sinh(x+1)}dx}}{\ln(x-1)\sinh(x+1)}dx}\right\}$$

2.789 ODE No. 789

$$y'(x) = \frac{x^2 \coth(x+1) + 2xy(x)\coth(x+1) + y(x)^2\coth(x+1) - \log(x-1) + \coth(x+1)}{\log(x-1)}$$

✓ **Mathematica** : cpu = 76.9654 (sec), leaf count = 120

$$\left\{\left\{y(x) \to -\frac{e^2 x\sinh(x) - x\sinh(x) + e^2 x\cosh(x) + x\cosh(x)}{e^2\sinh(x) - \sinh(x) + e^2\cosh(x) + \cosh(x)} + \tan\left(\int_1^x \frac{e^2\cosh(K[5]) + \cosh(K[5]) +}{\log(K[5]-1)\left(e^2\cosh(K[5]) - \cosh(\right.}\right.\right.\right.$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(y(x),x) = -(ln(x-1)-coth(1+x)*x^2-2*coth(1+x)*x*y(x)-coth(1+x)-coth(1+x)*y(x)^2)
1),y(x))
```

2.790 ODE No. 790

$$y'(x) = \frac{x^4\coth\left(\frac{x+1}{x-1}\right) - 2x^2 y(x)\coth\left(\frac{x+1}{x-1}\right) + y(x)^2\coth\left(\frac{x+1}{x-1}\right) + 2x\log\left(\frac{1}{x-1}\right) - \coth\left(\frac{x+1}{x-1}\right)}{\log\left(\frac{1}{x-1}\right)}$$

✓ **Mathematica** : cpu = 92.8859 (sec), leaf count = 127

$$\left\{\left\{y(x) \to \frac{\exp\left(\int_1^x \frac{2\coth\left(\frac{K[5]}{K[5]-1}+\frac{1}{K[5]-1}\right)}{\log\left(\frac{1}{K[5]-1}\right)}dK[5]\right)}{-\int_1^x \frac{\exp\left(\int_1^{K[6]} \frac{2\coth\left(\frac{K[5]}{K[5]-1}+\frac{1}{K[5]-1}\right)}{\log\left(\frac{1}{K[5]-1}\right)}dK[5]\right)\coth\left(\frac{K[6]}{K[6]-1}+\frac{1}{K[6]-1}\right)}{\log\left(\frac{1}{K[6]-1}\right)}dK[6] + c_1} + x^2 + 1\right\}\right\}$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(y(x),x) = (2*x*ln(1/(x-1))-coth((1+x)/(x-1))+coth((1+x)/(x-1))*y(x)^2-
2*coth((1+x)/(x-1))*x^2*y(x)+coth((1+x)/(x-1))*x^4)/ln(1/(x-1)),y(x))
```

2.791 ODE No. 791

$$y'(x) = \frac{\operatorname{sech}\left(\frac{1}{x-1}\right)\left(x^5 + x^4 - 2x^3 y(x) - 2x^2 y(x) + 2x^2\cosh\left(\frac{1}{x-1}\right) + xy(x)^2 + y(x)^2 - x - 2x\cosh\left(\frac{1}{x-1}\right) - 1\right)}{x-1}$$

✓ **Mathematica** : cpu = 8.21559 (sec), leaf count = 110

$$\left\{\left\{y(x)\to \frac{\exp\left(\int_1^x \frac{2(K[5]+1)\text{sech}\left(\frac{1}{K[5]-1}\right)}{K[5]-1}dK[5]\right)}{-\int_1^x \frac{\exp\left(\int_1^{K[6]} \frac{2(K[5]+1)\text{sech}\left(\frac{1}{K[5]-1}\right)}{K[5]-1}dK[5]\right)(K[6]+1)\text{sech}\left(\frac{1}{K[6]-1}\right)}{K[6]-1}dK[6]+c_1}+\frac{x^3+x^2}{x+1}+1\right\}\right\}$$

✓ **Maple** : cpu = 6.811 (sec), leaf count = 306

$$\left\{y(x)=\frac{\left(-x^2+1\right)e^{\frac{\int \frac{4(x+1)e^{\frac{1}{x-1}}}{\left(e^{\frac{2}{x-1}}+1\right)(x-1)}dx}{e^{\frac{2}{x-1}}+1}}e^{\frac{\left(\int \frac{4(x+1)e^{\frac{1}{x-1}}}{\left(e^{\frac{2}{x-1}}+1\right)(x-1)}dx\right)e^{\frac{2}{x-1}}}{e^{\frac{2}{x-1}}+1}}+\left(x^2+1\right)e^{\frac{4c_1}{e^{\frac{2}{x-1}}+1}}e^{\frac{4c_1e^{\frac{2}{x-1}}}{e^{\frac{2}{x-1}}+1}}}{-e^{\frac{\int \frac{4(x+1)e^{\frac{1}{x-1}}}{\left(e^{\frac{2}{x-1}}+1\right)(x-1)}dx}{e^{\frac{2}{x-1}}+1}}e^{\frac{\left(\int \frac{4(x+1)e^{\frac{1}{x-1}}}{\left(e^{\frac{2}{x-1}}+1\right)(x-1)}dx\right)e^{\frac{2}{x-1}}}{e^{\frac{2}{x-1}}+1}}+e^{\frac{4c_1}{e^{\frac{2}{x-1}}+1}}e^{\frac{4c_1e^{\frac{2}{x-1}}}{e^{\frac{2}{x-1}}+1}}}\right\}$$

2.792 ODE No. 792

$$y'(x)=\frac{y(x)\text{sech}\left(\frac{1}{x+1}\right)\left(x^3y(x)+x^2y(x)-x^2-x-x\cosh\left(\frac{1}{x+1}\right)+\cosh\left(\frac{1}{x+1}\right)\right)}{(x-1)x}$$

✓ **Mathematica** : cpu = 3.10096 (sec), leaf count = 157

$$\left\{\left\{y(x)\to \frac{\exp\left(\int_1^x \frac{-\text{sech}\left(\frac{1}{K[1]+1}\right)K[1]^2-\text{sech}\left(\frac{1}{K[1]+1}\right)K[1]-K[1]+1}{(K[1]-1)K[1]}dK[1]\right)}{-\int_1^x \frac{\exp\left(\int_1^{K[2]} \frac{-\text{sech}\left(\frac{1}{K[1]+1}\right)K[1]^2-\text{sech}\left(\frac{1}{K[1]+1}\right)K[1]-K[1]+1}{(K[1]-1)K[1]}dK[1]\right)\left(\text{sech}\left(\frac{1}{K[2]+1}\right)K[2]^3+\text{sech}\left(\frac{1}{K[2]+1}\right)K[2]^2\right)}{(K[2]-1)K[2]}dK[2]-}\right.\right.$$

✓ **Maple** : cpu = 0.437 (sec), leaf count = 112

$$\left\{y(x)=\frac{e^{\int \frac{-x^2-x+(-x+1)\cosh\left(\frac{1}{x+1}\right)}{(x-1)x\cosh\left(\frac{1}{x+1}\right)}dx}}{c_1+\int -\frac{(x+1)x\,e^{\int \frac{-x^2-x+(-x+1)\cosh\left(\frac{1}{x+1}\right)}{(x-1)x\cosh\left(\frac{1}{x+1}\right)}dx}}{(x-1)\cosh\left(\frac{1}{x+1}\right)}dx}\right\}$$

2.793 ODE No. 793

$$y'(x) = -\frac{y(x)(xy(x)+1)}{x(xy(x)-y(x)+1)}$$

✓ **Mathematica** : cpu = 14.8539 (sec), leaf count = 399

$$\text{Solve}\left[-\frac{\sqrt[3]{-2}\left(\frac{2^{2/3}((x-1)y(x)-2)}{\sqrt[3]{-\frac{1}{(x-1)^3}}(x-1)((x-1)y(x)+1)}+(-2)^{2/3}\right)\left(\frac{-xy(x)+y(x)+2}{\sqrt[3]{2}\sqrt[3]{-\frac{1}{(x-1)^3}}(x-1)((x-1)y(x)+1)}+(-2)^{2/3}\right)\left(\left(\frac{\sqrt[3]{-1}(-x}{\sqrt[3]{-\frac{1}{(x-1)^3}}(x}\right.\right.}{}\right.$$

✓ **Maple** : cpu = 2.147 (sec), leaf count = 32

$$\left\{y(x) = -\frac{2\,\mathrm{e}^{3c_1-\mathrm{LambertW}\left(-\frac{2(x-1)\mathrm{e}^{-1}\mathrm{e}^{3c_1}}{x}\right)-1}}{x}\right\}$$

2.794 ODE No. 794

$$y'(x) = \frac{y(x)}{x\left(x^3y(x)^4+x^2y(x)^3+y(x)-1\right)}$$

✓ **Mathematica** : cpu = 0.229709 (sec), leaf count = 67

$$\text{Solve}\left[\text{RootSum}\left[\#1^3y(x)^3+\#1^2y(x)^2+1\&,\frac{\#1y(x)\log(x-\#1)+\log(x-\#1)}{3\#1y(x)+2}\&\right]+y(x)-\log(x)=c_1,y(x)\right]$$

✓ **Maple** : cpu = 0.59 (sec), leaf count = 32

$$\left\{-c_1+\int^{xy(x)}\frac{1}{(\_a^3+\_a^2+1)\_a}d\_a-y(x)=0\right\}$$

2.795 ODE No. 795

$$y'(x) = \frac{a^3 + 3a^2x + 3ax^2 + ay(x)^2 + x^3 + y(x)^3 + xy(x)^2}{(a+x)^3}$$

✓ **Mathematica** : cpu = 0.504701 (sec), leaf count = 111

$$\text{Solve}\left[-\frac{19}{3}\text{RootSum}\left[-19\#1^3 + 6\sqrt[3]{38}\#1 - 19\&, \frac{\log\left(\frac{\frac{3y(x)}{(a+x)^3}+\frac{1}{(a+x)^2}}{\sqrt[3]{38}\sqrt[3]{\frac{1}{(a+x)^6}}} - \#1\right)}{2\sqrt[3]{38} - 19\#1^2}\&\right] = \frac{1}{9}38^{2/3}\left(\frac{1}{(a+x)^6}\right)^{2/3}(a+x$$

✓ **Maple** : cpu = 0.029 (sec), leaf count = 37

$$\left\{y(x) = -(a+x)\,\text{RootOf}\left(c_1 - \left(\int^{\_Z} \frac{1}{\_a^3 - \_a^2 - \_a - 1}d\_a\right) + \ln(a+x)\right)\right\}$$

2.796 ODE No. 796

$$y'(x) = \frac{e^{-\frac{3x^2}{2}}xy(x)^3}{3\left(e^{\frac{3x^2}{2}}y(x) + 3e^{\frac{3x^2}{2}} + 3y(x)\right)}$$

✓ **Mathematica** : cpu = 11.6067 (sec), leaf count = 102

$$\text{Solve}\left[\frac{1}{62}\left(-31\log\left(9e^{\frac{3x^2}{2}}(y(x)+3)y(x) + 3e^{3x^2}(y(x)+3)^2 - y(x)^2\right) + 6\sqrt{93}\tanh^{-1}\left(\frac{\sqrt{\frac{3}{31}}\left(2e^{\frac{3x^2}{2}}(y(x)+3) -\right.}{y(x)}\right.\right.\right.$$

✓ **Maple** : cpu = 1.647 (sec), leaf count = 143

$$\left\{y(x) = \text{RootOf}\left(\left(\left(9\,e^{3x^2} + 27\,e^{\frac{3x^2}{2}} + 7\,e^{3x^2+\text{RootOf}\left(\left(217\,e^{3x^2+\_Z}\left(\tanh^2\left(\frac{(c_1-5\_Z)\sqrt{93}}{90}\right)\right)+42\sqrt{93}\,e^{3x^2+\_Z}\tanh\left(\frac{(c_1-5\_Z)\sqrt{93}}{90}\right)\right.\right.}\right.\right.\right.\right.$$

2.797 ODE No. 797

$$y'(x) = \frac{y(x)\left(x^3 y(x)\cosh\left(\frac{x+1}{x-1}\right) + x^2 y(x)\cosh\left(\frac{x+1}{x-1}\right) - x^2\cosh\left(\frac{x+1}{x-1}\right) - x\cosh\left(\frac{x+1}{x-1}\right) - 1\right)}{x}$$

✓ **Mathematica** : cpu = 2.13721 (sec), leaf count = 349

$$\left\{\left\{y(x) \to \frac{\exp\left(\frac{(3e^2-1)\mathrm{Chi}\left(\frac{2}{x-1}\right)}{e} + \frac{(1+3e^2)\mathrm{Shi}\left(\frac{2}{x-1}\right)}{e} - \frac{1}{4}ex^2\sinh\left(\frac{2}{x-1}\right) + \frac{x^2\sinh\left(\frac{2}{x-1}\right)}{4e} - \frac{1}{4}ex^2\cosh\left(\frac{2}{x-1}\right) - \frac{x^2\cos\cdots}{\cdots}\right.}{x\left(\exp\left(\frac{(3e^2-1)\mathrm{Chi}\left(\frac{2}{x-1}\right)}{e} + \cdots\right.\right.}\right.\right.$$

✓ **Maple** : cpu = 0.696 (sec), leaf count = 168

$$\left\{y(x) = \frac{e^{-3\,e\,\mathrm{expIntegral}\left(1,-\frac{2}{x-1}\right)+e^{-1}\,\mathrm{expIntegral}\left(1,\frac{2}{x-1}\right)-\frac{\left(x^2-1\right)e^{\frac{-x-1}{x-1}}}{4}-\frac{\left(x^2+4x-5\right)e^{\frac{x+1}{x-1}}}{4}}}{\left(c_1 + \int -(x+1)\cosh\left(\frac{x+1}{x-1}\right)e^{-3\,e\,\mathrm{expIntegral}\left(1,-\frac{2}{x-1}\right)+e^{-1}\,\mathrm{expIntegral}\left(1,\frac{2}{x-1}\right)+\frac{\left(-x^2+1\right)e^{\frac{-x-1}{x-1}}}{4}+\frac{\left(-x^2-4x+5\right)e^{\frac{x+1}{x-1}}}{4}\cdots}\right.}\right.$$

2.798 ODE No. 798

$$y'(x) = \frac{y(x)(y(x)+x+1)}{(x+1)\left(2y(x)^3 + y(x) + x\right)}$$

✓ **Mathematica** : cpu = 0.62424 (sec), leaf count = 27

$$\mathrm{Solve}\left[y(x)^2 - \frac{x}{y(x)} + \log(y(x)) - \log(x+1) = c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.208 (sec), leaf count = 30

$$\left\{y(x) = e^{\mathrm{RootOf}\left(c_1 e^{-Z} - \_Z e^{-Z} + e^{-Z}\ln(x+1) + x - e^{3\_Z}\right)}\right\}$$

2.799 ODE No. 799

$$y'(x) = \frac{y(x)\left(e^{\frac{x+1}{x-1}}x^3y(x) + e^{\frac{x+1}{x-1}}x^2y(x) - e^{\frac{x+1}{x-1}}x^2 - e^{\frac{x+1}{x-1}}x - 1\right)}{x}$$

✓ **Mathematica** : cpu = 1.29574 (sec), leaf count = 126

$$\left\{\left\{y(x) \to \frac{\exp\left(6e\text{Ei}\left(\frac{2}{x-1}\right) + \frac{1}{2}e^{\frac{x}{x-1}+\frac{1}{x-1}}\left(x^2+4x-5\right) - e^{\frac{2}{x-1}}\left(\frac{1}{2}e(x-1)^2 + 3e(x-1)\right)\right)}{x\left(e^{6e\text{Ei}\left(\frac{2}{x-1}\right)} + c_1 e^{\frac{1}{2}e^{\frac{x}{x-1}+\frac{1}{x-1}}(x^2+4x-5)}\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.309 (sec), leaf count = 147

$$\left\{y(x) = \frac{e^{-2x\,e^{\frac{x+1}{x-1}}}e^{-\frac{x^2 e^{\frac{x+1}{x-1}}}{2}}e^{-6\,e\,\text{expIntegral}\left(1,-\frac{2}{x-1}\right)}e^{\frac{5\,e^{\frac{x+1}{x-1}}}{2}}}{\left(c_1 + \int -(x+1)\,e^{\frac{x+1}{x-1}}e^{-2x\,e^{\frac{x+1}{x-1}}}e^{-\frac{x^2 e^{\frac{x+1}{x-1}}}{2}}e^{-6\,e\,\text{expIntegral}\left(1,-\frac{2}{x-1}\right)}e^{\frac{5\,e^{\frac{x+1}{x-1}}}{2}}dx\right)x}\right\}$$

2.800 ODE No. 800

$$y'(x) = \frac{-b^3 + 6b^2x - 12bx^2 - 4by(x)^2 + 8x^3 + 8y(x)^3 + 8xy(x)^2}{(2x-b)^3}$$

✓ **Mathematica** : cpu = 0.489692 (sec), leaf count = 128

$$\text{Solve}\left[-\frac{19}{3}\text{RootSum}\left[-19\#1^3 + 6\sqrt[3]{38}\#1 - 19\&, \frac{\log\left(\frac{\frac{4}{(b-2x)^2} - \frac{24y(x)}{(b-2x)^3}}{4\sqrt[3]{38}\sqrt[3]{\frac{1}{(b-2x)^6}}} - \#1\right)}{2\sqrt[3]{38} - 19\#1^2}\&\right] = \frac{1}{9}38^{2/3}\left(\frac{1}{(b-2x)^6}\right)^{2/3}(b-$$

✓ **Maple** : cpu = 0.024 (sec), leaf count = 41

$$\left\{y(x) = \frac{(b-2x)\,\text{RootOf}\left(c_1 - \left(\int^{-Z}\frac{1}{\_a^3 - \_a^2 - \_a - 1}d\_a\right) + \ln(b-2x)\right)}{2}\right\}$$

2.801 ODE No. 801

$$y'(x) = \frac{1}{2}e^{\frac{x^2}{4}}\left(2e^{-\frac{3x^2}{4}}y(x)^3 + 2e^{-\frac{x^2}{2}}y(x)^2 + e^{-\frac{x^2}{4}}xy(x) + 2\right)$$

✓ **Mathematica** : cpu = 0.4164 (sec), leaf count = 126

$$\text{Solve}\left[-\frac{29}{3}\text{RootSum}\left[-29\#1^3 + 3\sqrt[3]{29}\#1 - 29\&, \frac{\log\left(\frac{3e^{-\frac{x^2}{2}}y(x)+e^{-\frac{x^2}{4}}}{\sqrt[3]{29}\sqrt[3]{e^{-\frac{3x^2}{4}}}} - \#1\right)}{\sqrt[3]{29} - 29\#1^2}\&\right] = \frac{1}{9}29^{2/3}e^{\frac{x^2}{2}}\left(e^{-\frac{3x^2}{4}}\right)^{2/3}x +$$

✓ **Maple** : cpu = 0.07 (sec), leaf count = 63

$$\left\{y(x) = \frac{\left(-3\,e^{-\frac{x^2}{4}}e^{\frac{x^2}{4}} + 29\,\text{RootOf}\left(3c_1 + x - 81\left(\int^{\_Z}\frac{1}{841\_a^3-27\_a+27}d\_a\right)\right)\right)e^{-\frac{x^2}{4}}e^{\frac{x^2}{2}}}{9}\right\}$$

2.802 ODE No. 802

$$y'(x) = \frac{\_F1\left(y(x)+\frac{1}{x}\right)+\frac{1}{x}}{x}$$

✓ **Mathematica** : cpu = 0.148624 (sec), leaf count = 101

$$\text{Solve}\left[\int_1^{y(x)} -\frac{\_F1\left(K[2]+\frac{1}{x}\right)\int_1^x -\frac{\_F1'\left(K[2]+\frac{1}{K[1]}\right)}{K[1]^2\left(\_F1\left(K[2]+\frac{1}{K[1]}\right)\right)^2}dK[1]+1}{\_F1\left(K[2]+\frac{1}{x}\right)}dK[2] + \int_1^x\left(\frac{1}{K[1]} + \frac{1}{\_F1\left(y(x)+\frac{1}{K[1]}\right)K\right.$$

✓ **Maple** : cpu = 0.272 (sec), leaf count = 27

$$\left\{y(x) = \frac{x\,\text{RootOf}\left(c_1 + \int^{\_Z}\frac{1}{\_F1(\_a)}d\_a - \ln(x)\right) - 1}{x}\right\}$$

2.803 ODE No. 803

$$y'(x) = \frac{\_F1\left(y(x)^2 - 2\log(x)\right)}{x\sqrt{y(x)^2}}$$

✓ **Mathematica** : cpu = 0.488373 (sec), leaf count = 637

$$\text{Solve}\left[\int_1^{y(x)}\left(\frac{K[2]}{(\_F1\,(K[2]^2 - 2\log(x)) - 1)\,(\_F1\,(K[2]^2 - 2\log(x)) + 1)} - \int_1^x\left(\frac{2K[2]\_F1'\left(K[2]^2 - 2\log(\right.}{K[1]\,(\_F1\,(K[2]^2 - 2\log(K[1])}\right.\right.\right.$$

✓ **Maple** : cpu = 0.442 (sec), leaf count = 65

$$\left\{y(x) = \sqrt{2\,\text{RootOf}\left(c_1 - \left(\int^{\_Z}\frac{1}{\_F1\,(2\_a) - 1}d\_a\right) + \ln(x)\right) + 2\ln(x)}, y(x) = -\sqrt{2\,\text{RootOf}\left(c_1 - \left(\int^{\_Z}\right.\right.}\right.$$

2.804 ODE No. 804

$$y'(x) = \frac{\frac{1}{2}x^4\cos(2y(x)) + \frac{x^4}{2} - \frac{1}{2}x\sin(2y(x)) - \frac{1}{2}\sin(2y(x))}{x(x+1)}$$

✓ **Mathematica** : cpu = 0.676966 (sec), leaf count = 43

$$\left\{\left\{y(x) \to \tan^{-1}\left(\frac{3x^4 - 4x^3 + 6x^2 - 12x + 12\log(x+1) - 25 - 12c_1}{12x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.986 (sec), leaf count = 38

$$\left\{y(x) = \arctan\left(\frac{3x^4 - 4x^3 + 6x^2 - 12c_1 - 12x + 12\ln(x+1)}{12x}\right)\right\}$$

2.805 ODE No. 805

$$y'(x) = \frac{x^4\sqrt{x^2 + y(x)^2} + xy(x) + y(x)}{x(x+1)}$$

✓ **Mathematica** : cpu = 0.196832 (sec), leaf count = 37

$$\left\{\left\{y(x) \to x\sinh\left(\frac{1}{6}(2x^3 - 3x^2 + 6x - 6\log(x+1) + 11 + 6c_1)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.761 (sec), leaf count = 42

$$\left\{-\frac{x^3}{3} + \frac{x^2}{2} - c_1 - x - \ln(x) + \ln(x+1) + \ln\left(y(x) + \sqrt{x^2 + y(x)^2}\right) = 0\right\}$$

2.806 ODE No. 806

$$y'(x) = \frac{-\frac{1}{2}x\sin(2y(x)) - \frac{1}{2}\sin(2y(x)) + \frac{1}{2}x\cos(2y(x)) + \frac{x}{2}}{x(x+1)}$$

✓ **Mathematica** : cpu = 0.479953 (sec), leaf count = 22

$$\left\{\left\{y(x) \to \tan^{-1}\left(\frac{x - \log(x+1) - c_1}{x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.587 (sec), leaf count = 22

$$\left\{y(x) = -\arctan\left(\frac{-c_1 - x + \ln(x+1)}{x}\right)\right\}$$

2.807 ODE No. 807

$$y'(x) = -\frac{1}{-e^{y(x)}y(x)\_F1(y(x) - \log(x)) - x}$$

✓ **Mathematica** : cpu = 0.321982 (sec), leaf count = 59

$$\text{Solve}\left[-\int_1^{y(x)-\log(x)} \frac{K[1]\_F1(K[1]) + e^{-K[1]}}{\_F1(K[1])} dK[1] - y(x)\log(x) + \frac{\log^2(x)}{2} = -c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.522 (sec), leaf count = 43

$$\left\{\frac{\ln(x)^2}{2} - \ln(x)\,y(x) + c_1 - \left(\int^{-\ln(x)+y(x)} \frac{\_a\_F1(\_a) + e^{-\_a}}{\_F1(\_a)} d\_a\right) = 0\right\}$$

2.808 ODE No. 808

$$y'(x) = \frac{(y(x)+1)(2y(x)+1)}{x(2xy(x) - 2y(x) + x - 2)}$$

✓ **Mathematica** : cpu = 2.34826 (sec), leaf count = 149

$$\text{Solve}\left[\frac{2^{2/3}\left(x\log\left(-\frac{6\ 2^{2/3}(y(x)+1)}{2(x-1)y(x)+x-2}\right) - x\log\left(\frac{3\ 2^{2/3}(2xy(x)+x)}{2(x-1)y(x)+x-2}\right) + 2xy(x)\left(\log\left(-\frac{6\ 2^{2/3}(y(x)+1)}{2(x-1)y(x)+x-2}\right) - \log\left(\frac{3\ 2^{2/3}(2xy}{2(x-1)y(x}\right.\right.\right.}{9(2xy(x)+x)}\right.$$

✓ **Maple** : cpu = 0.299 (sec), leaf count = 45

$$\left\{y(x) = \frac{-x \operatorname{LambertW}\left(\frac{e^{-\frac{1}{x}}}{c_1 x}\right) - 2}{2x \operatorname{LambertW}\left(\frac{e^{-\frac{1}{x}}}{c_1 x}\right) + 2}\right\}$$

2.809 ODE No. 809

$$y'(x) = \frac{64x^3 - 240x^2 + 64xy(x)^2 + 64y(x)^3 - 80y(x)^2 + 300x - 125}{(4x-5)^3}$$

✓ **Mathematica** : cpu = 0.392603 (sec), leaf count = 128

$$\text{Solve}\left[-\frac{19}{3}\text{RootSum}\left[-19\#1^3 + 6\sqrt[3]{38}\#1 - 19\&, \frac{\log\left(\frac{\frac{192y(x)}{(4x-5)^3} + \frac{16}{(4x-5)^2}}{16\sqrt[3]{38}\sqrt[3]{\frac{1}{(4x-5)^6}}} - \#1\right)}{2\sqrt[3]{38} - 19\#1^2}\&\right] = \frac{1}{9}38^{2/3}\left(\frac{1}{(5-4x)^6}\right)^{2/3}(5-$$

✓ **Maple** : cpu = 0.022 (sec), leaf count = 41

$$\left\{y(x) = -\frac{(4x-5)\operatorname{RootOf}\left(c_1 - \left(\int^{-Z} \frac{1}{\_a^3 - \_a^2 - \_a - 1} d\_a\right) + \ln(4x-5)\right)}{4}\right\}$$

2.810 ODE No. 810

$$y'(x) = \frac{x^2 \log^2(x) + y(x)^2 + y(x) - 2xy(x)\log(x) + x}{x}$$

✓ **Mathematica** : cpu = 0.134703 (sec), leaf count = 40

$$\left\{\left\{y(x) \to -\frac{1}{2}x^2\left(\frac{1-2x\log(x)}{x^2} - \frac{1}{x^2}\right) + \frac{1}{-1 + \frac{c_1}{x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.065 (sec), leaf count = 16

$$\left\{y(x) = \left(\ln(x) + \frac{1}{c_1 - x}\right)x\right\}$$

2.811 ODE No. 811

$$y'(x) = \frac{x^4 + x^3 e^{y(x)} + xy(x) + e^{y(x)} y(x) - x \log\left(e^{y(x)} + x\right) - e^{y(x)} \log\left(e^{y(x)} + x\right) + x}{x^2}$$

✓ **Mathematica** : cpu = 2.04327 (sec), leaf count = 33

$$\left\{\left\{y(x) \to -\log\left(-\frac{1}{x} + \frac{e^{-\frac{x^3}{2} - c_1 x}}{x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 1.769 (sec), leaf count = 32

$$\left\{y(x) = \frac{x^3}{2} + c_1 x + \ln\left(-\frac{x}{e^{c_1 x} e^{\frac{x^3}{2}} - 1}\right)\right\}$$

2.812 ODE No. 812

$$y'(x) = x^3 \sqrt{x^3 - 6y(x)} + \sqrt{x^3 - 6y(x)} + \frac{x^2}{2} + x^2 \sqrt{x^3 - 6y(x)}$$

✓ **Mathematica** : cpu = 0.440085 (sec), leaf count = 78

$$\left\{\left\{y(x) \to \frac{1}{96}\left(-9x^8 - 24x^7 - 16x^6 - 72x^5 - 102x^4 + 72c_1 x^4 + 8x^3 + 96c_1 x^3 - 144x^2 - 24x + 288c_1 x - 1 - 144\right.\right.\right.$$

✓ **Maple** : cpu = 0.389 (sec), leaf count = 30

$$\left\{-\frac{3x^4}{4} - x^3 + c_1 - 3x - \sqrt{x^3 - 6y(x)} = 0\right\}$$

2.813 ODE No. 813

$$y'(x) = \frac{1}{2}\sqrt{a}\left(2\sqrt{ax^4 + 8y(x)} - \sqrt{a}x^3 + 2x^3\sqrt{ax^4 + 8y(x)} + 2x^2\sqrt{ax^4 + 8y(x)}\right)$$

✓ **Mathematica** : cpu = 0.659587 (sec), leaf count = 93

$$\left\{\left\{y(x) \to \frac{144ax^8 + 384ax^7 + 256ax^6 + 1152ax^5 + 1464ax^4 - 1152ac_1x^4 + 96ax^3 - 1536ac_1x^3 + 2304ax^2 + 288}{1152}\right.\right.$$

✓ **Maple** : cpu = 0.707 (sec), leaf count = 40

$$\left\{-c_1 + \frac{\left(-3x^4 - 4x^3 - 12x\right)\sqrt{a}}{12} + \frac{\sqrt{a\,x^4 + 8y(x)}}{4} = 0\right\}$$

2.814 ODE No. 814

$$y'(x) = \frac{y(x)\left(x^7y(x)^2 - 3x^3y(x) - 3\right)}{x\left(x^3y(x) + 1\right)}$$

✓ **Mathematica** : cpu = 0.151694 (sec), leaf count = 72

$$\left\{\left\{y(x) \to \frac{x}{-x^4 + \frac{\sqrt{x+x(-2x+c_1)}}{\sqrt{\frac{1}{x^7}}}}\right\}, \left\{y(x) \to -\frac{x}{x^4 + \frac{\sqrt{x+x(-2x+c_1)}}{\sqrt{\frac{1}{x^7}}}}\right\}\right\}$$

✓ **Maple** : cpu = 0.039 (sec), leaf count = 38

$$\left\{y(x) = \frac{1}{\left(\sqrt{c_1 - 2x} - 1\right)x^3}, y(x) = -\frac{1}{\left(\sqrt{c_1 - 2x} + 1\right)x^3}\right\}$$

2.815 ODE No. 815

$$y'(x) = \frac{e^{3x^2}x(y(x) + 3)^3}{81\left(e^{\frac{3x^2}{2}}y(x) + 3e^{\frac{3x^2}{2}} + 3y(x)\right)}$$

✓ **Mathematica** : cpu = 12.8585 (sec), leaf count = 99

$$\text{Solve}\left[\frac{1}{186}\left(\left(31 + 3\sqrt{93}\right)\log\left(9\left(9 + \sqrt{93}\right)y(x) - 2e^{\frac{3x^2}{2}}(y(x) + 3)\right) + \left(31 - 3\sqrt{93}\right)\log\left(2e^{\frac{3x^2}{2}}(y(x) + 3) + 9\left(\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.975 (sec), leaf count = 168

$$\left\{15x^2 - c_1 - \frac{30\sqrt{93}\,\text{arctanh}\left(\frac{\left(29\,\mathrm{e}^{\frac{3x^2}{2}}y(x)+87\,\mathrm{e}^{\frac{3x^2}{2}}+81y(x)\right)\sqrt{93}}{(279y(x)+837)\mathrm{e}^{\frac{3x^2}{2}}+837y(x)}\right)}{31} + 5\ln\left(\frac{-24300y(x)^2 + 100(y(x)+3)^2\,\mathrm{e}^{3x^2} + \left(\right.}{189\left((y(x)+3)\,\mathrm{e}^{\frac{3x^2}{2}}\right.}\right.\right.$$

2.816 ODE No. 816

$$y'(x) = \frac{x(x-y(x))^3(y(x)+x)^3}{y(x)\left(x^2-y(x)^2-1\right)}$$

✓ **Mathematica** : cpu = 0.288363 (sec), leaf count = 74

$$\text{Solve}\left[\frac{1}{2}\left(\text{RootSum}\left[\#1^3-\#1+1\&,\frac{\#1\log\left(-\#1+x^2-y(x)^2\right)-\log\left(-\#1+x^2-y(x)^2\right)}{3\#1^2-1}\&\right]+x^2\right)=c_1,y(x$$

✓ **Maple** : cpu = 0.611 (sec), leaf count = 190

$$\left\{c_1+\int_{\_b}^{x}\frac{\left(\_a-y(x)\right)^3\left(\_a+y(x)\right)^3\_a}{\_a^6-3\_a^4y(x)^2+3\_a^2y(x)^4-y(x)^6-\_a^2+y(x)^2+1}d\_a+\int^{y(x)}\left(-\frac{\left(-\_f^2+x^2\right.}{-\_f^6+3\_f^4x^2-3\_f^2x^4}\right.\right.$$

2.817 ODE No. 817

$$y'(x) = \frac{\csc(y(x))\left(\frac{1}{2}x^3\log(x)\cos(2y(x))+\frac{1}{2}x^3\log(x)-\cos(y(x))\right)}{x\log(x)}$$

✓ **Mathematica** : cpu = 0.677796 (sec), leaf count = 63

$$\left\{\left\{y(x)\to-\sec^{-1}\left(\frac{-x^3+3x^3\log(x)-9c_1}{9\log(x)}\right)\right\},\left\{y(x)\to\sec^{-1}\left(\frac{-x^3+3x^3\log(x)-9c_1}{9\log(x)}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.824 (sec), leaf count = 27

$$\left\{y(x)=\arccos\left(\frac{9\ln(x)}{3x^3\ln(x)-x^3+9c_1}\right)\right\}$$

2.818 ODE No. 818

$$y'(x) = \frac{y(x)}{x\left(xy(x)^4+xy(x)^3+xy(x)-1\right)}$$

✓ **Mathematica** : cpu = 0.265931 (sec), leaf count = 34

$$\text{Solve}\left[\frac{y(x)^3}{3}+\frac{y(x)^2}{2}+\frac{1}{xy(x)}+\log(y(x))=c_1,y(x)\right]$$

✓ **Maple** : cpu = 0.317 (sec), leaf count = 34

$$\left\{y(x)=\mathrm{e}^{\mathrm{RootOf}\left(6c_1x\,\mathrm{e}^{\_Z}-6\_Zx\,\mathrm{e}^{\_Z}-3x\,\mathrm{e}^{3\_Z}-2x\,\mathrm{e}^{4\_Z}-6\right)}\right\}$$

2.819 ODE No. 819

$$y'(x)=x^2\sqrt{x^2+3y(x)}+\sqrt{x^2+3y(x)}+x^3\sqrt{x^2+3y(x)}-\frac{2x}{3}$$

✓ **Mathematica** : cpu = 0.353813 (sec), leaf count = 65

$$\left\{\left\{y(x)\to \frac{1}{192}\left(9x^8+24x^7+16x^6+72x^5+96x^4-72c_1x^4-96c_1x^3+80x^2-288c_1x+144c_1{}^2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.429 (sec), leaf count = 30

$$\left\{\frac{3x^4}{8}+\frac{x^3}{2}+c_1+\frac{3x}{2}-\sqrt{x^2+3y\left(x\right)}=0\right\}$$

2.820 ODE No. 820

$$y'(x)=\frac{\csc(y(x))\left(\frac{1}{2}x^2\log(x)\cos(2y(x))+\frac{1}{2}x^2\log(x)-\cos(y(x))\right)}{x\log(x)}$$

✓ **Mathematica** : cpu = 0.573191 (sec), leaf count = 63

$$\left\{\left\{y(x)\to -\sec^{-1}\left(\frac{-x^2+2x^2\log(x)-4c_1}{4\log(x)}\right)\right\},\left\{y(x)\to \sec^{-1}\left(\frac{-x^2+2x^2\log(x)-4c_1}{4\log(x)}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.737 (sec), leaf count = 27

$$\left\{y(x)=\arccos\left(\frac{4\ln\left(x\right)}{2x^2\ln\left(x\right)-x^2+4c_1}\right)\right\}$$

2.821 ODE No. 821

$$y'(x)=\frac{y(x)(xy(x)+1)}{x\left(x^3y(x)^4-xy(x)-1\right)}$$

✓ **Mathematica** : cpu = 0.241739 (sec), leaf count = 2093

$$\left\{\left\{y(x)\to \frac{c_1}{4}-\frac{1}{2}\sqrt{\frac{c_1{}^2}{4}+\frac{\sqrt[3]{1944c_1{}^2x^6+1458x^5+\sqrt{\left(1944c_1{}^2x^6+1458x^5\right)^2-4\left(54c_1x^4+144x^3\right)^3}}}{18\sqrt[3]{2}x^3}+\frac{}{x^3\sqrt[3]{19}}}\right.\right.$$

✓ **Maple** : cpu = 0.177 (sec), leaf count = 27

$$\left\{c_1-y(x)-\frac{1}{2x^2y\left(x\right)^2}-\frac{1}{3x^3y\left(x\right)^3}=0\right\}$$

2.822 ODE No. 822

$$y'(x) = \frac{1}{4}x\left(-4e^{-x^2}x^2y(x) - 4e^{-x^2}x^2 + 4e^{-x^2} + e^{-2x^2}x^4 + 4y(x)^2\right)$$

✓ **Mathematica** : cpu = 0.364136 (sec), leaf count = 32

$$\left\{\left\{y(x) \to \frac{1}{2}e^{-x^2}x^2 + \frac{1}{-\frac{x^2}{2} + c_1}\right\}\right\}$$

✓ **Maple** : cpu = 0.146 (sec), leaf count = 25

$$\left\{y(x) = \frac{x^2 \mathrm{e}^{-x^2}}{2} + \frac{1}{-\frac{x^2}{2} + c_1}\right\}$$

2.823 ODE No. 823

$$y'(x) = \frac{y(x)(y(x) + x)}{x\left(y(x)^4 + y(x)^3 + y(x) + x\right)}$$

✓ **Mathematica** : cpu = 0.486311 (sec), leaf count = 39

$$\text{Solve}\left[\frac{y(x)^3}{3} + \frac{y(x)^2}{2} + \log(y(x)) - \frac{y(x)\log(x) + x}{y(x)} = c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.234 (sec), leaf count = 38

$$\left\{y(x) = \mathrm{e}^{\mathrm{RootOf}\left(6c_1\mathrm{e}^{-\_Z} - 6\_Z\mathrm{e}^{-\_Z} + 6\,\mathrm{e}^{-\_Z}\ln(x) + 6x - 3\,\mathrm{e}^{3\_Z} - 2\,\mathrm{e}^{4\_Z}\right)}\right\}$$

2.824 ODE No. 824

$$y'(x) = \frac{y(x)\left(x^3 + x^2y(x) + y(x)^2\right)}{(x-1)x^2(y(x) + x)}$$

✓ **Mathematica** : cpu = 0.281078 (sec), leaf count = 68

$$\text{Solve}\left[-\frac{1}{2}\log\left(\frac{y(x)^2}{x^2} + \frac{y(x)}{x} + 1\right) + \log\left(\frac{y(x)}{x}\right) + \frac{\tan^{-1}\left(\frac{\frac{2y(x)}{x} + 1}{\sqrt{3}}\right)}{\sqrt{3}} = \log(1-x) - \log(x) + c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.392 (sec), leaf count = 61

$$\left\{-c_1 + \frac{\sqrt{3}\arctan\left(\frac{(x+2y(x))\sqrt{3}}{3x}\right)}{3} + \ln(x) - \frac{\ln\left(\frac{x^2+xy(x)+y(x)^2}{x^2}\right)}{2} + \ln\left(\frac{y(x)}{x}\right) - \ln(x-1) = 0\right\}$$

2.825 ODE No. 825

$$y'(x) = \frac{x\left(x^2y(x)^3 + \left(x^2+1\right)^{3/2} y(x)^2 + x^2\left(x^2+1\right)^{3/2} + \left(x^2+1\right)^{3/2} + y(x)^3\right)}{\left(x^2+1\right)^3}$$

✓ **Mathematica** : cpu = 0.587979 (sec), leaf count = 148

$$\text{Solve}\left[-\frac{19}{3}\text{RootSum}\left[-19\#1^3 + 6\sqrt[3]{38}\#1 - 19\&, \frac{\log\left(\frac{\frac{3xy(x)}{\left(x^2+1\right)^2} + \frac{x}{\left(x^2+1\right)^{3/2}}}{\sqrt[3]{38}\sqrt[3]{\frac{x^3}{\left(x^2+1\right)^{9/2}}}} - \#1\right)}{2\sqrt[3]{38} - 19\#1^2}\&\right] = \frac{19^{2/3}\left(\frac{x^3}{(x^2+1)^{9/2}}\right)^{2/3}\left(x^2\right.}{9\sqrt[3]{2}x^2}$$

✓ **Maple** : cpu = 0.126 (sec), leaf count = 48

$$\left\{y(x) = \frac{\left(19\,\text{RootOf}\left(3c_1 - 1296\left(\int^{-Z}\frac{1}{361\_a^3 - 432\_a + 432}d\_a\right) + 2\ln\left(x^2+1\right)\right) - 6\right)\sqrt{x^2+1}}{18}\right\}$$

2.826 ODE No. 826

$$y'(x) = \frac{y(x)\left(3xy(x)^2 + 3y(x)^2 + x\right)}{x(x+1)\left(6y(x)^2 + x\right)}$$

✓ **Mathematica** : cpu = 0.580116 (sec), leaf count = 70

$$\left\{\left\{y(x) \to -\frac{\sqrt{x}\sqrt{W\left(\frac{6e^{2c_1}x}{(x+1)^2}\right)}}{\sqrt{6}}\right\}, \left\{y(x) \to \frac{\sqrt{x}\sqrt{W\left(\frac{6e^{2c_1}x}{(x+1)^2}\right)}}{\sqrt{6}}\right\}\right\}$$

✓ **Maple** : cpu = 0.426 (sec), leaf count = 51

$$\left\{\frac{1}{\frac{6}{x} + \frac{1}{y(x)^2}} = \frac{\left(\mathrm{e}^{\text{RootOf}\left(3c_1\mathrm{e}^{\_Z} + \_Z\mathrm{e}^{\_Z} - \mathrm{e}^{\_Z}\ln\left(\frac{(x+1)^2\left(\mathrm{e}^{\_Z}+9\right)}{2x}\right) + 9\right)} + 9\right)x}{54}\right\}$$

2.827 ODE No. 827

$$y'(x)=\frac{x^2y(x)\sqrt{x^2+y(x)^2}+x^3\left(-\sqrt{x^2+y(x)^2}\right)+y(x)}{x}$$

✓ **Mathematica** : cpu = 0.305578 (sec), leaf count = 221

$$\left\{\left\{y(x)\to \frac{x-2\sqrt{x^2\tanh^2\left(\frac{1}{3}\left(-\sqrt{2}x^3-3\sqrt{2}c_1\right)\right)-x^2\tanh^4\left(\frac{1}{3}\left(-\sqrt{2}x^3-3\sqrt{2}c_1\right)\right)}}{-1+2\tanh^2\left(\frac{1}{3}\left(-\sqrt{2}x^3-3\sqrt{2}c_1\right)\right)}\right\},\left\{y(x)\to \frac{x+2\sqrt{x^2\tan\right.$$

✓ **Maple** : cpu = 0.341 (sec), leaf count = 49

$$\left\{\frac{\sqrt{2}\,x^3}{3}-c_1-\ln(x)+\ln\left(\frac{2\left(x+y(x)+\sqrt{2x^2+2y(x)^2}\right)x}{-x+y(x)}\right)=0\right\}$$

2.828 ODE No. 828

$$y'(x)=\frac{(y(x)+1)(2y(x)+1)}{x\left(2xy(x)^4+xy(x)^3-2y(x)-2\right)}$$

✓ **Mathematica** : cpu = 0.687373 (sec), leaf count = 56

$$\text{Solve}\left[-\frac{1}{8}y(x)^2+\frac{3y(x)}{8}-\frac{1}{2x(2y(x)+1)}-\frac{1}{2}\log(y(x)+1)+\frac{1}{16}\log(2y(x)+1)=c_1,y(x)\right]$$

✓ **Maple** : cpu = 0.318 (sec), leaf count = 54

$$\left\{y(x)=\frac{\mathrm{e}^{\mathrm{RootOf}\left(8c_1x\,\mathrm{e}^{\_Z}-2\_Zx\,\mathrm{e}^{\_Z}+16x\,\mathrm{e}^{\_Z}\ln\left(\frac{\mathrm{e}^{\_Z}}{2}+\frac{1}{2}\right)+7x\,\mathrm{e}^{\_Z}-8x\,\mathrm{e}^{2\_Z}+x\,\mathrm{e}^{3\_Z}+16\right)}}{2}-\frac{1}{2}\right\}$$

2.829 ODE No. 829

$$y'(x) = \frac{x^6\sqrt{4x^2y(x)+1} + x^5\sqrt{4x^2y(x)+1} + x^3\sqrt{4x^2y(x)+1} + \frac{1}{2}}{x^3}$$

✓ **Mathematica** : cpu = 0.532115 (sec), leaf count = 74

$$\left\{\left\{y(x) \to \frac{16x^{12} + 40x^{11} + 25x^{10} + 80x^9 + 100x^8 - 160c_1x^7 + 100x^6 - 200c_1x^6 - 400c_1x^4 + 400c_1{}^2x^2 - 100}{400x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.431 (sec), leaf count = 34

$$\left\{\frac{2x^5}{5} + \frac{x^4}{2} + x^2 + c_1 - \frac{\sqrt{4x^2y(x)+1}}{x} = 0\right\}$$

2.830 ODE No. 830

$$y'(x) = \frac{(x - y(x))y(x)}{x(-y(x)^4 - y(x)^3 - y(x) + x)}$$

✓ **Mathematica** : cpu = 0.513535 (sec), leaf count = 37

$$\text{Solve}\left[-\frac{1}{3}y(x)^3 - \frac{y(x)^2}{2} - \frac{x}{y(x)} - \log(y(x)) + \log(x) = c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.23 (sec), leaf count = 38

$$\{y(x) = e^{\mathrm{RootOf}\left(6c_1e^{-\_Z} + 6\_Ze^{-\_Z} - 6e^{-\_Z}\ln(x) + 6x + 3e^{3\_Z} + 2e^{4\_Z}\right)}\}$$

2.831 ODE No. 831

$$y'(x) = \frac{x^3\sqrt{4ax - y(x)^2} + x^2\sqrt{4ax - y(x)^2} + \sqrt{4ax - y(x)^2} + 2a}{y(x)}$$

✓ **Mathematica** : cpu = 3.37839 (sec), leaf count = 145

$$\left\{\left\{y(x) \to -\frac{1}{12}\sqrt{576ax - 9x^8 - 24x^7 - 16x^6 - 72x^5 - 96x^4 - 72c_1x^4 - 96c_1x^3 - 144x^2 - 288c_1x - 144c_1{}^2}\right\}, \left\{\right.$$

✓ **Maple** : cpu = 0.386 (sec), leaf count = 35

$$\left\{-\frac{x^4}{4} - \frac{x^3}{3} - c_1 - x - \sqrt{4ax - y(x)^2} = 0\right\}$$

2.832 ODE No. 832

$$y'(x) = \frac{y(x)(y(x)+x+1)}{(x+1)\left(y(x)^4+y(x)^3+y(x)^2+x\right)}$$

✓ **Mathematica** : cpu = 2.37499 (sec), leaf count = 2497

$$\left\{\left\{y(x) \to -\frac{1}{2}\sqrt{\frac{3\sqrt[3]{2}(-8x+3c_1+3\log(x}{\sqrt[3]{1944(c_1+\log(x+1))^2+972(c_1+\log(x+1))+3726x+\sqrt{(1944(c_1+\log(x+1))^2+972(c}}}}\right.\right.$$

✓ **Maple** : cpu = 0.189 (sec), leaf count = 31

$$\left\{-\frac{y(x)^3}{3}-\frac{y(x)^2}{2}+c_1+\ln(x+1)-y(x)+\frac{x}{y(x)}=0\right\}$$

2.833 ODE No. 833

$$y'(x) = \frac{x^4\left(-\sqrt{x^2+y(x)^2}\right)+x^3y(x)\sqrt{x^2+y(x)^2}+y(x)}{x}$$

✓ **Mathematica** : cpu = 0.305299 (sec), leaf count = 221

$$\left\{\left\{y(x) \to \frac{x-2\sqrt{x^2\tanh^2\left(\frac{1}{4}\left(-\sqrt{2}x^4-4\sqrt{2}c_1\right)\right)-x^2\tanh^4\left(\frac{1}{4}\left(-\sqrt{2}x^4-4\sqrt{2}c_1\right)\right)}}{-1+2\tanh^2\left(\frac{1}{4}\left(-\sqrt{2}x^4-4\sqrt{2}c_1\right)\right)}\right\},\left\{y(x) \to \frac{x+2\sqrt{x^2\tan}}{}\right.\right.$$

✓ **Maple** : cpu = 0.301 (sec), leaf count = 49

$$\left\{\frac{\sqrt{2}\,x^4}{4}-c_1-\ln(x)+\ln\left(\frac{2\left(x+y(x)+\sqrt{2x^2+2y(x)^2}\right)x}{-x+y(x)}\right)=0\right\}$$

2.834 ODE No. 834

$$y'(x) = \frac{y(x)\left(x^4 + 3xy(x)^2 + 3y(x)^2\right)}{x(x+1)\left(6y(x)^2 + x\right)}$$

✓ **Mathematica** : cpu = 0.687405 (sec), leaf count = 90

$$\left\{\left\{y(x) \to -\frac{\sqrt{x}\sqrt{W\left(\frac{6(x+1)^2 e^{x^2-2x-3+2c_1}}{x}\right)}}{\sqrt{6}}\right\}, \left\{y(x) \to \frac{\sqrt{x}\sqrt{W\left(\frac{6(x+1)^2 e^{x^2-2x-3+2c_1}}{x}\right)}}{\sqrt{6}}\right\}\right\}$$

✓ **Maple** : cpu = 0.736 (sec), leaf count = 60

$$\left\{\frac{1}{\frac{6}{x} + \frac{1}{y(x)^2}} = \frac{\left(e^{\mathrm{RootOf}\left(x^2 e^{\_Z} + 3c_1 e^{\_Z} + \_Z e^{\_Z} - 2x\, e^{\_Z} - e^{\_Z} \ln\left(\frac{\left(e^{\_Z}+9\right)x}{2(x+1)^2}\right) + 9\right)} + 9\right)x}{54}\right\}$$

2.835 ODE No. 835

$$y'(x) = -\frac{1}{x\left(-\sqrt[3]{y(x)^3}\right)\_\mathrm{F1}\left(y(x)^3 - 3\log(x)\right) - x\left(y(x)^3\right)^{2/3}}$$

✗ **Mathematica** : cpu = 1.85578 (sec), leaf count = 0 , could not solve

```
DSolve[Derivative[1][y][x] == -(-(x*(y[x]^3)^(2/3)) - x*(y[x]^3)^(1/3)*_F1[-3*Log[x] + y[x]^
1), y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(y(x),x) = -1/(-(y(x)^3)^(2/3)*x-_F1(y(x)^3-3*ln(x))*(y(x)^3)^(1/3)*x),y(x))
```

2.836 ODE No. 836

$$y'(x) = \frac{(x - y(x))y(x)(y(x)+1)}{x(xy(x) - y(x) + x)}$$

✓ **Mathematica** : cpu = 14.7816 (sec), leaf count = 379

$$\mathrm{Solve}\left[\frac{1}{9}2^{2/3}\left(\frac{\left(1 - \frac{(x-1)^2\left(\frac{x^6}{(x-1)^3}\right)^{2/3}((x+2)y(x)+x)}{x^4((x-1)y(x)+x)}\right)\left(\frac{\left(\frac{x^6}{(x-1)^3}\right)^{2/3}(x-1)^2((x+2)y(x)+x)}{x^4((x-1)y(x)+x)} + 2\right)\left(\left(1 - \frac{(x-1)^2\left(\frac{x^6}{(x-1)^3}\right)^{2/3}(}{x^4((x-1)y(x}\right.\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.301 (sec), leaf count = 73

$$\left\{y(x)=-\frac{x\,\mathrm{e}^{\mathrm{RootOf}\left(3c_1\mathrm{e}^{\_Z}+\_Z\mathrm{e}^{\_Z}-x\,\mathrm{e}^{\_Z}-\mathrm{e}^{\_Z}\ln\left(\frac{\mathrm{e}^{\_Z}}{2}+\frac{9}{2}\right)+9\right)}}{(x-1)\,\mathrm{e}^{\mathrm{RootOf}\left(3c_1\mathrm{e}^{\_Z}+\_Z\mathrm{e}^{\_Z}-x\,\mathrm{e}^{\_Z}-\mathrm{e}^{\_Z}\ln\left(\frac{\mathrm{e}^{\_Z}}{2}+\frac{9}{2}\right)+9\right)}-9}\right\}$$

2.837 ODE No. 837

$$y'(x)=-\frac{1}{-\sqrt[3]{y(x)^3}\log(x)\_\mathrm{F1}\left(3\mathrm{Ei}(-\log(x))+y(x)^3\right)-\left(y(x)^3\right)^{2/3}\log(x)}$$

✗ **Mathematica** : cpu = 2.20892 (sec), leaf count = 0 , could not solve

```
DSolve[Derivative[1][y][x] == -(-(Log[x]*(y[x]^3)^(2/3)) - Log[x]*(y[x]^3)^(1/3)*_F1[3*ExpIn
Log[x]] + y[x]^3])^(-1), y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(y(x),x) = -1/(-ln(x)*(y(x)^3)^(2/3)-_F1(y(x)^3+3*Ei(1,-ln(x)))*ln(x)*(y(x)^3)^(1
```

2.838 ODE No. 838

$$y'(x)=\frac{\frac{8x^{7/2}}{5}+\frac{4x^6}{25}-\frac{4}{5}x^3y(x)+\frac{6x^3}{5}-4\sqrt{x}y(x)+y(x)^2+4x+\sqrt{x}}{x}$$

✓ **Mathematica** : cpu = 0.197133 (sec), leaf count = 31

$$\left\{\left\{y(x)\to\frac{2}{5}\sqrt{x}\left(x^{5/2}+5\right)+\frac{1}{-\log(x)+c_1}\right\}\right\}$$

✓ **Maple** : cpu = 0.118 (sec), leaf count = 25

$$\left\{y(x)=\frac{2\left(x^2+\frac{5}{\sqrt{x}}\right)x}{5}+\frac{1}{c_1-\ln(x)}\right\}$$

2.839 ODE No. 839

$$y'(x) = \frac{e^{\frac{y(x)}{x}}\left(x^2 + xe^{-\frac{y(x)}{x}} + e^{-\frac{y(x)}{x}}y(x)\right)}{x}$$

✓ **Mathematica** : cpu = 0.346186 (sec), leaf count = 28

$$\left\{\left\{y(x) \to -x\log\left(-\frac{x}{2} + \frac{e^{2c_1}}{2x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.076 (sec), leaf count = 19

$$\left\{y(x) = x\ln\left(\frac{2x}{-x^2 + c_1}\right)\right\}$$

2.840 ODE No. 840

$$y'(x) = \frac{e^{\frac{y(x)}{x}}\left(x^3 + xe^{-\frac{y(x)}{x}} + e^{-\frac{y(x)}{x}}y(x)\right)}{x}$$

✓ **Mathematica** : cpu = 0.340677 (sec), leaf count = 30

$$\left\{\left\{y(x) \to -x\log\left(-\frac{x^2}{3} + \frac{e^{3c_1}}{3x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.069 (sec), leaf count = 19

$$\left\{y(x) = x\ln\left(\frac{3x}{-x^3 + c_1}\right)\right\}$$

2.841 ODE No. 841

$$y'(x) = \frac{-2a^{3/2}bx^2y(x)^2 + 2a^{3/2}cy(x)^2 + a^{5/2}y(x)^4 + \sqrt{a}b^2x^4 - 2\sqrt{a}bcx^2 + \sqrt{a}c^2 + bx^3}{ax^2y(x)}$$

✓ **Mathematica** : cpu = 1.31015 (sec), leaf count = 236

$$\left\{\left\{y(x) \to -\frac{\sqrt{2a^{5/2}bx^2 - 2a^{5/2}c + 4a^3b^2x^3 - 4a^3bcx + a^2x + 4\sqrt{a}b^2c_1x^2 - 4\sqrt{a}bcc_1 + 2bc_1x}}{\sqrt{2}\sqrt{2a^{3/2}bc_1 + a^{7/2} + 2a^4bx}}\right\}, \left\{y(x) \to \frac{\sqrt{2a^{5}}}{}\right.\right.$$

✓ **Maple** : cpu = 0.295 (sec), leaf count = 97

$$\left\{y(x) = \frac{\sqrt{(c_1x+1)\left(\frac{x}{2} + (c_1x+1)(b\,x^2 - c)\sqrt{a}\right)a^{\frac{3}{2}}}}{(c_1x+1)\,a^{\frac{3}{2}}}, y(x) = -\frac{2\sqrt{(c_1x+1)\left(\frac{x}{2} + (c_1x+1)(b\,x^2 - c)\sqrt{a}\right)a^{\frac{3}{2}}}}{(2c_1x+2)\,a^{\frac{3}{2}}}\right\}$$

2.842 ODE No. 842

$$y'(x) = \frac{2x^2 y(x)\log^2(x) + x^2 y(x)^2 \log(x) + x^2 \log^3(x) + y(x)}{x\log(x)}$$

✓ **Mathematica** : cpu = 0.265561 (sec), leaf count = 186

$$\left\{\left\{y(x) \to -\frac{\frac{1}{4}x^2 e^{\frac{1}{4}x^2(2\log(x)-1)}(2\log(x)-1)\left(\frac{x}{2}+\frac{1}{2}x(2\log(x)-1)\right)+\frac{1}{2}xe^{\frac{1}{4}x^2(2\log(x)-1)}+\frac{1}{2}xe^{\frac{1}{4}x^2(2\log(x)-1)}(2\log}{x\left(\frac{1}{4}x^2 e^{\frac{1}{4}x^2(2\log(x)-1)}(2\log(x)-1)+c_1 e^{\frac{1}{4}x^2(2\log(x)-}\right.}\right.\right.$$

✓ **Maple** : cpu = 0.033 (sec), leaf count = 43

$$\left\{y(x) = -\frac{(2x^2\ln(x) - x^2 + 2c_1 + 4)\ln(x)}{2x^2\ln(x) - x^2 + 2c_1}\right\}$$

2.843 ODE No. 843

$$y'(x) = \frac{2x^3 y(x)\log^2(x) + x^3 y(x)^2 \log(x) + x^3 \log^3(x) + y(x)}{x\log(x)}$$

✓ **Mathematica** : cpu = 0.23954 (sec), leaf count = 198

$$\left\{\left\{y(x) \to -\frac{\frac{1}{9}x^3 e^{\frac{1}{9}x^3(3\log(x)-1)}(3\log(x)-1)\left(\frac{x^2}{3}+\frac{1}{3}x^2(3\log(x)-1)\right)+\frac{1}{3}x^2 e^{\frac{1}{9}x^3(3\log(x)-1)}+\frac{1}{3}x^2 e^{\frac{1}{9}x^3(3\log(x)-1)}}{x^2\left(\frac{1}{9}x^3 e^{\frac{1}{9}x^3(3\log(x)-1)}(3\log(x)-1)+c_1 e^{\frac{1}{9}x^3(3\log}\right.}\right.\right.$$

✓ **Maple** : cpu = 0.03 (sec), leaf count = 43

$$\left\{y(x) = -\frac{(6x^3\ln(x) - 2x^3 + 9c_1 + 18)\ln(x)}{6x^3\ln(x) - 2x^3 + 9c_1}\right\}$$

2.844 ODE No. 844

$$y'(x) = \frac{y(x)(y(x)+1)(y(x)+x)}{x(xy(x)+y(x)+x)}$$

✓ **Mathematica** : cpu = 15.8113 (sec), leaf count = 386

$$\text{Solve}\left[\frac{2^{2/3}\left(1-\frac{\left(\frac{x^6}{(x+1)^3}\right)^{2/3}(x+1)^2((x-2)y(x)+x)}{x^4((x+1)y(x)+x)}\right)\left(\frac{\left(\frac{x^6}{(x+1)^3}\right)^{2/3}(x+1)^2((x-2)y(x)+x)}{x^4((x+1)y(x)+x)}+2\right)\left(\left(1-\frac{\left(\frac{x^6}{(x+1)^3}\right)^{2/3}(x+1)^2((x-2}{x^4((x+1)y(x)+x)}\right.\right.}{9\left(\frac{3(}{}\right.}\right.$$

✓ **Maple** : cpu = 0.304 (sec), leaf count = 97

$$\left\{y(x)=-\frac{x\,\mathrm{e}^{\mathrm{RootOf}\left(3c_1\mathrm{e}^{-Z}+\_Z\mathrm{e}^{-Z}+x\,\mathrm{e}^{-Z}-\mathrm{e}^{-Z}\ln\left(\frac{\mathrm{e}^{-Z}}{2}+\frac{9}{2}\right)+9\right)}}{x\,\mathrm{e}^{\mathrm{RootOf}\left(3c_1\mathrm{e}^{-Z}+\_Z\mathrm{e}^{-Z}+x\,\mathrm{e}^{-Z}-\mathrm{e}^{-Z}\ln\left(\frac{\mathrm{e}^{-Z}}{2}+\frac{9}{2}\right)+9\right)}+\mathrm{e}^{\mathrm{RootOf}\left(3c_1\mathrm{e}^{-Z}+\_Z\mathrm{e}^{-Z}+x\,\mathrm{e}^{-Z}-\mathrm{e}^{-Z}\ln\left(\frac{\mathrm{e}^{-Z}}{2}+\frac{9}{2}\right)+9\right)}+9}\right\}$$

2.845 ODE No. 845

$$y'(x)=\frac{\sqrt{4y(x)^3-9x^4}+3x^3+x^3\sqrt{4y(x)^3-9x^4}+x^2\sqrt{4y(x)^3-9x^4}}{y(x)^2}$$

✓ **Mathematica** : cpu = 4.34805 (sec), leaf count = 266

$$\left\{\left\{y(x)\to-\frac{1}{2}\sqrt[3]{-\frac{1}{2}\sqrt[3]{9x^8+24x^7+16x^6+72x^5+114x^4+72c_1x^4-24x^3+96c_1x^3+144x^2-72x+288c_1x+}}\right.\right.$$

✓ **Maple** : cpu = 0.234 (sec), leaf count = 44

$$\left\{-\frac{x^4}{4}-\frac{x^3}{3}-c_1-x+\int_{\_b}^{y(x)}\frac{\_a^2}{\sqrt{-9x^4+4\_a^3}}d\_a=0\right\}$$

2.846 ODE No. 846

$$y'(x)=\frac{1}{-\left(x^2\left(\frac{1}{y(x)}+1\right)\_\mathrm{F1}\left(x\left(\frac{1}{y(x)}+1\right)\right)\right)+x^2\_\mathrm{F1}\left(x\left(\frac{1}{y(x)}+1\right)\right)+x\left(\frac{1}{y(x)}+1\right)-x}$$

✓ **Mathematica** : cpu = 0.926777 (sec), leaf count = 365

$$\mathrm{Solve}\left[\int_1^{y(x)}\left(\frac{x\_\mathrm{F1}\left(x\left(1+\frac{1}{K[2]}\right)\right)-1}{x\_\mathrm{F1}\left(x\left(1+\frac{1}{K[2]}\right)\right)K[2]-K[2]+x\_\mathrm{F1}\left(x\left(1+\frac{1}{K[2]}\right)\right)}-\int_1^x\left(\frac{\_\mathrm{F1}\left(K[1]\left(1+\frac{1}{K[2]}\right)\right)-\frac{K[1}{}}{K[1]\left(K[2]\_\mathrm{F1}\left(K[1]\left(1+\right.\right.\right.}\right.\right.\right.$$

✓ **Maple** : cpu = 0.306 (sec), leaf count = 40

$$\left\{y(x)=\mathrm{e}^{\mathrm{RootOf}\left(c_1-\_Z-\left(\int^{\frac{x\,\mathrm{e}^{-Z}}{\mathrm{e}^{-Z}-1}}\frac{1}{(\_a\_F1(\_a)-1)\_a}d\_a\right)\right)}-1\right\}$$

2.847 ODE No. 847

$$y'(x) = x^2\sqrt{x^2 - 4y(x) + 2x + 1} + \sqrt{x^2 - 4y(x) + 2x + 1} + x^3\sqrt{x^2 - 4y(x) + 2x + 1} + \frac{x}{2} + \frac{1}{2}$$

✓ **Mathematica** : cpu = 1.44182 (sec), leaf count = 103

$$\text{Solve}\left[\frac{x^4}{4} + \frac{x^3}{3} + \frac{1}{2}\sqrt{x^2 - 4y(x) + 2x + 1} + \frac{1}{2}\log\left(\sqrt{x^2 - 4y(x) + 2x + 1} + x + 1\right) - \frac{1}{2}\tanh^{-1}\left(\frac{2x +}{2\sqrt{x^2 - 4y(x)}}\right.\right.$$

✓ **Maple** : cpu = 0.384 (sec), leaf count = 34

$$\left\{-\frac{x^4}{2} - \frac{2x^3}{3} + c_1 - 2x - \sqrt{x^2 + 2x - 4y\left(x\right) + 1} = 0\right\}$$

2.848 ODE No. 848

$$y'(x) = \_F1(y(x) - \log(\sinh(x))) + \coth(x)$$

✓ **Mathematica** : cpu = 0.268143 (sec), leaf count = 157

$$\text{Solve}\left[\int_1^{y(x)} -\frac{\_F1(K[2] - \log(\sinh(x)))\int_1^x\left(\frac{(\coth(K[1]) + \_F1(K[2] - \log(\sinh(K[1]))))\_F1'(K[2] - \log(\sinh(K[1])))}{(\_F1(K[2] - \log(\sinh(K[1]))))^2} - \frac{\_F1'(K[2}{\_F1(K[2}\right.}{\_F1(K[2] - \log(\sinh(x)))}\right.$$

✓ **Maple** : cpu = 0.545 (sec), leaf count = 27

$$\left\{-c_1 - x + \int_{\_b}^{y(x)} \frac{1}{\_F1\left(\_a - \ln\left(\sinh\left(x\right)\right)\right)} d\_a = 0\right\}$$

2.849 ODE No. 849

$$y'(x) = x^2\sqrt{x^2 + 4y(x) - 4x} + \sqrt{x^2 + 4y(x) - 4x} + x^3\sqrt{x^2 + 4y(x) - 4x} - \frac{x}{2} + 1$$

✓ **Mathematica** : cpu = 1.27731 (sec), leaf count = 102

$$\text{Solve}\left[\frac{x^4}{4} + \frac{x^3}{3} - \frac{1}{2}\sqrt{x^2 + 4y(x) - 4x} + \log\left(-\sqrt{x^2 + 4y(x) - 4x} - x + 2\right) - \tanh^{-1}\left(\frac{2x - 4}{2\sqrt{x^2 + 4y(x) - 4x}}\right) - \right.$$

✓ **Maple** : cpu = 0.388 (sec), leaf count = 33

$$\left\{\frac{x^4}{2} + \frac{2x^3}{3} + c_1 + 2x - \sqrt{x^2 - 4x + 4y\left(x\right)} = 0\right\}$$

2.850 ODE No. 850

$$y'(x) = \_\mathrm{F1}(y(x) - \log(\sin(x)) + \log(\cos(x) + 1)) + \csc(x)$$

✓ **Mathematica** : cpu = 0.405695 (sec), leaf count = 1485

$$\mathrm{Solve}\left[\int_1^x -\frac{\left(\cot^2(K[1]) + \csc(K[1])\cot(K[1]) + 1\right)\sin(K[1])(\csc(K[1]) + \_\mathrm{F1}(\log(\cos(K[1]\right.}{-\cot^2(K[1]) + \_\mathrm{F1}(\log(\cos(K[1]) + 1) - \log(\sin(K[1])) + y(x))\cot(K[1]) + \csc^2(K[1]) + \csc(K[1])}\right.$$

✓ **Maple** : cpu = 1.058 (sec), leaf count = 32

$$\left\{-c_1 - x + \int_{\_b}^{y(x)} \frac{1}{\_F1\left(\_a + \ln\left(\cos\left(x\right) + 1\right) - \ln\left(\sin\left(x\right)\right)\right)} d\_a = 0\right\}$$

2.851 ODE No. 851

$$y'(x) = \frac{a^3x^3 + 3a^2bx^2y(x) + a^2bx^2 + 3ab^2xy(x)^2 + 2ab^2xy(x) + b^3y(x)^3 + b^3y(x)^2 + b^3}{b^3}$$

✓ **Mathematica** : cpu = 0.439095 (sec), leaf count = 145

$$\mathrm{Solve}\left[-\frac{1}{3}(27a + 29b)^{2/3}\mathrm{RootSum}\left[\#1^3(27a + 29b)^{2/3} - 3\#1b^{2/3} + (27a + 29b)^{2/3}\&, \frac{\log\left(\frac{\frac{3ax+b}{b} + 3y(x)}{\sqrt[3]{\frac{27a+29b}{b}}} - \#1\right)}{b^{2/3} - \#1^2(27a + 29b)^{2/3}}\&\right.\right.$$

✓ **Maple** : cpu = 0.061 (sec), leaf count = 42

$$\left\{y(x) = \frac{-ax + b\,\mathrm{RootOf}\left(b\left(\int^{\_Z} \frac{1}{\_a^3b + \_a^2b + a + b} d\_a\right) + c_1 - x\right)}{b}\right\}$$

2.852 ODE No. 852

$$y'(x) = \frac{\alpha^3 y(x)^3 + \alpha^3 y(x)^2 + \alpha^3 + 3\alpha^2 \beta x y(x)^2 + 2\alpha^2 \beta x y(x) + 3\alpha\beta^2 x^2 y(x) + \alpha\beta^2 x^2 + \beta^3 x^3}{\alpha^3}$$

✓ **Mathematica** : cpu = 0.417481 (sec), leaf count = 145

$$\text{Solve}\left[-\frac{1}{3}(29\alpha+27\beta)^{2/3}\text{RootSum}\left[\#1^3(29\alpha+27\beta)^{2/3} - 3\#1\alpha^{2/3} + (29\alpha+27\beta)^{2/3}\&, \frac{\log\left(\frac{\frac{\alpha+3\beta x}{\alpha}+3y(x)}{\sqrt[3]{\frac{29\alpha+27\beta}{\alpha}}} - \#1\right.}{\alpha^{2/3} - \#1^2(29\alpha+27\beta)^{2}}\right.\right.$$

✓ **Maple** : cpu = 0.069 (sec), leaf count = 42

$$\left\{y(x) = \frac{\alpha \operatorname{RootOf}\left(\alpha\left(\int^{-Z} \frac{1}{\_a^3\alpha + \_a^2\alpha + \alpha + \beta} d\_a\right) + c_1 - x\right) - \beta x}{\alpha}\right\}$$

2.853 ODE No. 853

$$y'(x) = \frac{x^3 y(x)^3 + 6x^2 y(x)^2 + 14 x y(x) + 2x + 12}{x^2(x y(x) + x + 2)}$$

✓ **Mathematica** : cpu = 0.198384 (sec), leaf count = 76

$$\left\{\left\{y(x) \to -\frac{x+2}{x} + \frac{1}{x^3\left(\frac{1}{x^3} - \frac{1}{x^3\sqrt{-2x+c_1}}\right)}\right\}, \left\{y(x) \to -\frac{x+2}{x} + \frac{1}{x^3\left(\frac{1}{x^3} + \frac{1}{x^3\sqrt{-2x+c_1}}\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.04 (sec), leaf count = 63

$$\left\{y(x) = \frac{-x - 2\sqrt{c_1 - 2x} - 2}{\left(\sqrt{c_1 - 2x} + 1\right)x}, y(x) = \frac{x - 2\sqrt{c_1 - 2x} + 2}{\left(\sqrt{c_1 - 2x} - 1\right)x}\right\}$$

2.854 ODE No. 854

$$y'(x) = \frac{y(x)\left(x^2 \log^2(y(x)) + 2x^2 \log(x) \log(y(x)) + x^2 \log^2(x) + \log(y(x)) + \log(x) - 1\right)}{x}$$

✓ **Mathematica** : cpu = 0.168058 (sec), leaf count = 24

$$\left\{\left\{y(x) \to \frac{e^{-\frac{3x}{x^3+3c_1}}}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.272 (sec), leaf count = 51

$$\left\{y(x) = x^{-\frac{3c_1}{x^3+3c_1}} x^{-\frac{x^3}{x^3+3c_1}} e^{-\frac{3x}{x^3+3c_1}}\right\}$$

2.855 ODE No. 855

$$y'(x) = \frac{y(x)\left(x^3 \log^2(y(x)) + 2x^3 \log(x) \log(y(x)) + x^3 \log^2(x) + \log(y(x)) + \log(x) - 1\right)}{x}$$

✓ **Mathematica** : cpu = 0.160301 (sec), leaf count = 24

$$\left\{\left\{y(x) \to \frac{e^{-\frac{4x}{x^4+4c_1}}}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.244 (sec), leaf count = 51

$$\left\{y(x) = x^{-\frac{4c_1}{x^4+4c_1}} x^{-\frac{x^4}{x^4+4c_1}} e^{-\frac{4x}{x^4+4c_1}}\right\}$$

2.856 ODE No. 856

$$y'(x) = \frac{x\left(\_F1\left(y(x)^2 - 2x\right) + \frac{1}{x}\right)}{\sqrt{y(x)^2}}$$

✓ **Mathematica** : cpu = 0.634202 (sec), leaf count = 103

$$\text{Solve}\left[\int_1^{y(x)} \left(\frac{\sqrt{K[2]^2}}{\_F1\left(K[2]^2 - 2x\right)} - \int_1^x \frac{2K[2]\_F1'\left(K[2]^2 - 2K[1]\right)}{\left(\_F1\left(K[2]^2 - 2K[1]\right)\right)^2} dK[1]\right) dK[2] + \int_1^x \left(-K[1] - \frac{1}{\_F1\left(y(x)^2 - \right.}\right.\right.$$

✓ **Maple** : cpu = 0.318 (sec), leaf count = 65

$$\left\{y(x) = \sqrt{2x + 2\,\text{RootOf}\left(x^2 + 4c_1 - 2\left(\int^{\_Z} \frac{1}{\_F1(2\_a)} d\_a\right)\right)}, y(x) = -\sqrt{2x + 2\,\text{RootOf}\left(x^2 + 4c_1 - 2\left(\int\right.\right.}\right.$$

2.857 ODE No. 857

$$y'(x) = x^2\sqrt{x^2+8y(x)-2x+1}+\sqrt{x^2+8y(x)-2x+1}+x^3\sqrt{x^2+8y(x)-2x+1}-\frac{x}{4}+\frac{1}{4}$$

✓ **Mathematica** : cpu = 1.04202 (sec), leaf count = 107

$$\text{Solve}\left[\frac{x^4}{4}+\frac{x^3}{3}-\frac{1}{4}\sqrt{x^2+8y(x)-2x+1}+\frac{1}{4}\log\left(-\sqrt{x^2+8y(x)-2x+1}-x+1\right)-\frac{1}{4}\tanh^{-1}\left(\frac{2x \cdots}{2\sqrt{x^2+8y(\cdots}}\right.\right.$$

✓ **Maple** : cpu = 0.362 (sec), leaf count = 32

$$\left\{x^4+\frac{4x^3}{3}+c_1+4x-\sqrt{x^2-2x+8y\left(x\right)+1}=0\right\}$$

2.858 ODE No. 858

$$y'(x) = \frac{a^3y(x)^3+a^3y(x)^2+a^3+3a^2bxy(x)^2+2a^2bxy(x)+3ab^2x^2y(x)+ab^2x^2+b^3x^3}{a^3}$$

✓ **Mathematica** : cpu = 0.442401 (sec), leaf count = 145

$$\text{Solve}\left[-\frac{1}{3}(29a+27b)^{2/3}\text{RootSum}\left[\#1^3(29a+27b)^{2/3}-3\#1a^{2/3}+(29a+27b)^{2/3}\&,\frac{\log\left(\frac{\frac{a+3bx}{a}+3y(x)}{\sqrt[3]{\frac{29a+27b}{a}}}-\#1\right)}{a^{2/3}-\#1^2(29a+27b)^{2/3}}\& \cdots\right.\right.$$

✓ **Maple** : cpu = 0.056 (sec), leaf count = 42

$$\left\{y(x)=\frac{a\,\text{RootOf}\left(a\left(\int^{\_Z}\frac{1}{\_a^3a+\_a^2a+a+b}d\_a\right)+c_1-x\right)-bx}{a}\right\}$$

2.859 ODE No. 859

$$y'(x) = \frac{\_F1(y(x)^2-2x)+x}{x\sqrt{y(x)^2}}$$

✓ **Mathematica** : cpu = 0.895476 (sec), leaf count = 105

$$\text{Solve}\left[\int_1^{y(x)}\left(\frac{\sqrt{K[2]^2}}{\_F1\left(K[2]^2-2x\right)}-\int_1^x\frac{2K[2]\_F1'\left(K[2]^2-2K[1]\right)}{\left(\_F1\left(K[2]^2-2K[1]\right)\right)^2}dK[1]\right)dK[2]+\int_1^x\left(-\frac{1}{\_F1\left(y(x)^2-2K[1]\right)\cdots}\right.\right.$$

✓ **Maple** : cpu = 0.265 (sec), leaf count = 63

$$\left\{y(x)=\sqrt{2x+2\operatorname{RootOf}\left(2c_1-\left(\int^{\_Z}\frac{1}{\_F1(2\_a)}d\_a\right)+\ln(x)\right)},y(x)=-\sqrt{2x+2\operatorname{RootOf}\left(2c_1-\left(\int^{\_Z}\right.\right.}\right.$$

2.860 ODE No. 860

$$y'(x)=\frac{\frac{1}{2}x^4\cos(2y(x))+\frac{x^4}{2}+\frac{1}{2}x^3\cos(2y(x))+\frac{x^3}{2}-\frac{1}{2}\sin(2y(x))+\frac{1}{2}x\cos(2y(x))+\frac{x}{2}}{x}$$

✓ **Mathematica** : cpu = 0.403556 (sec), leaf count = 33

$$\left\{\left\{y(x)\to\tan^{-1}\left(\frac{4x^5+5x^4+10x^2+10c_1}{20x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 1.744 (sec), leaf count = 29

$$\left\{y(x)=\arctan\left(\frac{4x^5+5x^4+10x^2+40c_1}{20x}\right)\right\}$$

2.861 ODE No. 861

$$y'(x)=\frac{e^{-1/x}\left(\_\mathrm{F1}\left(e^{\frac{1}{x}}y(x)\right)+\frac{e^{\frac{1}{x}}y(x)}{x}\right)}{x}$$

✓ **Mathematica** : cpu = 1.55982 (sec), leaf count = 158

$$\mathrm{Solve}\left[\int_1^{y(x)}-\frac{\_\mathrm{F1}\left(e^{\frac{1}{x}}K[2]\right)\int_1^x\left(\frac{e^{\frac{1}{K[1]}}}{K[1]^2\_\mathrm{F1}\left(e^{\frac{1}{K[1]}}K[2]\right)}-\frac{e^{\frac{2}{K[1]}}K[2]\_\mathrm{F1}'\left(e^{\frac{1}{K[1]}}K[2]\right)}{K[1]^2\left(\_\mathrm{F1}\left(e^{\frac{1}{K[1]}}K[2]\right)\right)^2}\right)dK[1]+e^{\frac{1}{x}}}{\_\mathrm{F1}\left(e^{\frac{1}{x}}K[2]\right)}dK[2]+\int_1^x\left(\frac{}{K[}\right.\right.$$

✓ **Maple** : cpu = 0.158 (sec), leaf count = 26

$$\left\{y(x)=\operatorname{RootOf}\left(c_1+\int^{\_Z}\frac{1}{\_F1(\_a)}d\_a-\ln(x)\right)\mathrm{e}^{-\frac{1}{x}}\right\}$$

2.862 ODE No. 862

$$y'(x) = \log(y(x)-1)\left(\_\mathrm{F1}(x) - \frac{\mathrm{Ei}(-\log(y(x)-1))}{x}\right)$$

✗ **Mathematica** : cpu = 0.805693 (sec), leaf count = 0 , could not solve

```
DSolve[Derivative[1][y][x] == Log[-1 + y[x]]*(-(ExpIntegralEi[-Log[-1 + y[x]]]/x) + _F1[x]),
```

✓ **Maple** : cpu = 0.207 (sec), leaf count = 27

$$\left\{y(x) = \mathrm{e}^{\mathrm{RootOf}\left(c_1 x + x\left(\int -\frac{F1(x)}{x}\,dx\right) + \mathrm{expIntegral}(1, -\_Z)\right)} + 1\right\}$$

2.863 ODE No. 863

$$y'(x) = \frac{x\sqrt{x^2+y(x)^2} + x^4\sqrt{x^2+y(x)^2} + x^3\sqrt{x^2+y(x)^2} + y(x)}{x}$$

✓ **Mathematica** : cpu = 0.243957 (sec), leaf count = 30

$$\left\{\left\{y(x) \to x\sinh\left(\frac{1}{12}(3x^4+4x^3+12x+12c_1)\right)\right\}\right\}$$

✓ **Maple** : cpu = 14.23 (sec), leaf count = 38

$$\left\{-\frac{x^4}{4} - \frac{x^3}{3} - c_1 - x - \ln(x) + \ln\left(y(x) + \sqrt{x^2+y(x)^2}\right) = 0\right\}$$

2.864 ODE No. 864

$$y'(x) = \frac{e^{\frac{x^2}{4}}y(x)\left(2e^{-\frac{3x^2}{4}}y(x)^2 + e^{-\frac{x^2}{2}}xy(x) + e^{-\frac{x^2}{4}}x\right)}{2e^{-\frac{x^2}{4}}y(x)+2}$$

✓ **Mathematica** : cpu = 0.391417 (sec), leaf count = 137

$$\left\{\left\{y(x) \to \frac{2e^{\frac{x^2}{2}}}{-2e^{\frac{x^2}{4}} + \sqrt{2}\sqrt{2e^{\frac{x^2}{2}} + 2e^{\frac{x^2}{2}}(-2x+c_1)}}\right\}, \left\{y(x) \to -\frac{2e^{\frac{x^2}{2}}}{2e^{\frac{x^2}{4}} + \sqrt{2}\sqrt{2e^{\frac{x^2}{2}} + 2e^{\frac{x^2}{2}}(-2x+c_1)}}\right\}\right\}$$

✓ **Maple** : cpu = 0.097 (sec), leaf count = 162

$$\left\{y(x) = \frac{\left(\left(\sqrt{c_1-2x}-1\right)\mathrm{e}^{-\frac{x^2}{4}}\mathrm{e}^{\frac{x^2}{2}} - \sqrt{c_1-2x}\,\mathrm{e}^{\frac{x^2}{4}}\right)\mathrm{e}^{\frac{x^2}{4}}}{\mathrm{e}^{-\frac{x^2}{4}}\mathrm{e}^{\frac{x^2}{2}} + \sqrt{c_1-2x}\,\mathrm{e}^{\frac{x^2}{4}}}, y(x) = \frac{\left(\left(\sqrt{c_1-2x}+1\right)\mathrm{e}^{-\frac{x^2}{4}}\mathrm{e}^{\frac{x^2}{2}} - \sqrt{c_1-2x}\,\mathrm{e}^{\frac{x^2}{4}}\right)\mathrm{e}^{\frac{x^2}{4}}}{-\mathrm{e}^{-\frac{x^2}{4}}\mathrm{e}^{\frac{x^2}{2}} + \sqrt{c_1-2x}\,\mathrm{e}^{\frac{x^2}{4}}}\right.$$

2.865 ODE No. 865

$$y'(x) = (1 - y(x))\left(-f(x) + \frac{y(x)\log(y(x)-1)}{x(1-y(x))\log(x)} - \frac{\log(y(x)-1)}{x(1-y(x))\log(x)}\right)$$

✓ **Mathematica** : cpu = 0.399838 (sec), leaf count = 87

$$\text{Solve}\left[\int_1^x \left(-\frac{f(K[1])}{\log(K[1])} - \frac{\log(y(x)-1)}{K[1]\log^2(K[1])}\right) dK[1] + \int_1^{y(x)} \left(\frac{1}{(K[2]-1)\log(x)} - \int_1^x -\frac{1}{K[1](K[2]-1)\log^2(K[1}\right.\right.$$

✓ **Maple** : cpu = 0.2 (sec), leaf count = 23

$$\left\{y(x) = x^{c_1} e^{\left(\int \frac{f(x)}{\ln(x)} dx\right)\ln(x)} + 1\right\}$$

2.866 ODE No. 866

$$y'(x) = x^2\sqrt{a^2+2ax+x^2+4y(x)} + \sqrt{a^2+2ax+x^2+4y(x)} + x^3\sqrt{a^2+2ax+x^2+4y(x)} - \frac{a}{2} - \frac{x}{2}$$

✓ **Mathematica** : cpu = 0.888697 (sec), leaf count = 117

$$\text{Solve}\left[-\frac{1}{2}\sqrt{a^2+2ax+x^2+4y(x)} - \frac{1}{2}a\log\left(\sqrt{a^2+2ax+x^2+4y(x)}+a+x\right) + \frac{1}{2}a\tanh^{-1}\left(\frac{2a+2a}{2\sqrt{a^2+2ax+x}}\right.\right.$$

✓ **Maple** : cpu = 0.405 (sec), leaf count = 37

$$\left\{\frac{x^4}{2} + \frac{2x^3}{3} + c_1 + 2x - \sqrt{a^2+2ax+x^2+4y(x)} = 0\right\}$$

2.867 ODE No. 867

$$y'(x) = \frac{x^6}{27} + \frac{1}{3}x^4 y(x) + \frac{x^4}{9} + x^2 y(x)^2 + \frac{2}{3}x^2 y(x) + y(x)^3 + y(x)^2 - \frac{2x}{3} + 1$$

✓ **Mathematica** : cpu = 0.227419 (sec), leaf count = 77

$$\text{Solve}\left[-\frac{29}{3}\text{RootSum}\left[-29\#1^3 + 3\sqrt[3]{29}\#1 - 29\&, \frac{\log\left(\frac{x^2+3y(x)+1}{\sqrt[3]{29}} - \#1\right)}{\sqrt[3]{29} - 29\#1^2}\&\right] = \frac{1}{9}29^{2/3}x + c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.059 (sec), leaf count = 30

$$\left\{y(x) = -\frac{x^2}{3} + \text{RootOf}\left(c_1 - x + \int^{\_Z} \frac{1}{\_a^3 + \_a^2 + 1} d\_a\right)\right\}$$

2.868 ODE No. 868

$$y'(x) = -x^6 + 3x^4y(x) + x^4 - 3x^2y(x)^2 - 2x^2y(x) + y(x)^3 + y(x)^2 + 2x + 1$$

✓ **Mathematica** : cpu = 0.197384 (sec), leaf count = 79

$$\text{Solve}\left[-\frac{29}{3}\text{RootSum}\left[-29\#1^3 + 3\sqrt[3]{29}\#1 - 29\&, \frac{\log\left(\frac{-3x^2+3y(x)+1}{\sqrt[3]{29}} - \#1\right)}{\sqrt[3]{29} - 29\#1^2}\&\right] = \frac{1}{9}29^{2/3}x + c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.056 (sec), leaf count = 28

$$\left\{y(x) = x^2 + \text{RootOf}\left(c_1 - x + \int^{\_Z} \frac{1}{\_a^3 + \_a^2 + 1} d\_a\right)\right\}$$

2.869 ODE No. 869

$$y'(x) = \frac{2x^5 + 2x^4 - 2x^3y(x) + x^3 - 2x^2y(x) + 3x^2 - 2y(x) - x + 1}{x^2 - y(x)}$$

✓ **Mathematica** : cpu = 0.0525664 (sec), leaf count = 42

$$\left\{\left\{y(x) \to x^2 + \frac{1}{2}\left(1 + W\left(-e^{x^4 + \frac{4x^3}{3} - 2x^2 + 4x - 1 + c_1}\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.334 (sec), leaf count = 37

$$\left\{y(x) = x^2 + \frac{\text{LambertW}\left(-2c_1 e^{-1} e^{x^4} e^{4x} e^{-2x^2} e^{\frac{4x^3}{3}}\right)}{2} + \frac{1}{2}\right\}$$

2.870 ODE No. 870

$$y'(x) = \frac{e^{\frac{y(x)}{x}}\left(x^4 + x^3 + xe^{-\frac{y(x)}{x}} + e^{-\frac{y(x)}{x}}y(x) + x\right)}{x}$$

✓ **Mathematica** : cpu = 1.74947 (sec), leaf count = 35

$$\left\{\left\{y(x) \to -x\log\left(\frac{-\frac{x^4}{4} - \frac{x^3}{3} - x - c_1}{x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.708 (sec), leaf count = 30

$$\left\{y(x) = -x\ln\left(-\frac{3x^4 + 4x^3 + 12x + 12c_1}{12x}\right)\right\}$$

2.871 ODE No. 871

$$y'(x) = \frac{2xy(x)^2 + y(x)^2 + 4xy(x)\log(2x+1) + 2y(x)\log(2x+1) + 2x\log^2(2x+1) + \log^2(2x+1) - 2}{2x+1}$$

✓ **Mathematica** : cpu = 0.34061 (sec), leaf count = 22

$$\left\{\left\{y(x) \to -\log(2x+1) + \frac{1}{-x+c_1}\right\}\right\}$$

✓ **Maple** : cpu = 0.092 (sec), leaf count = 26

$$\left\{y(x) = \frac{(c_1 - x)\ln(2x+1) - 1}{-c_1 + x}\right\}$$

2.872 ODE No. 872

$$y'(x) = \frac{14x^{7/2} + \frac{12x^6}{5} - 6x^3y(x) - 6x^3 - 5\sqrt{x}y(x) + 10x - 5\sqrt{x} - 5}{x\left(2x^3 - 5y(x) + 10\sqrt{x} - 5\right)}$$

✓ **Mathematica** : cpu = 0.0663165 (sec), leaf count = 215

$$\left\{\left\{y(x) \to \frac{1}{5}(2x^3 + 10\sqrt{x} - 5) - \frac{\sqrt{-x\left(2x^3 + 10\sqrt{x} - 5\right)^2 - 50x\left(-\frac{4x^{7/2}}{5} - \frac{2x^6}{25} + \frac{2x^3}{5} - 2x + 2\sqrt{x} + \log(x)\right) -}}{5\sqrt{-\frac{1}{x}}x}\right.\right.$$

✓ **Maple** : cpu = 0.063 (sec), leaf count = 49

$$\left\{y(x) = \frac{2x^3}{5} + 2\sqrt{x} - \sqrt{c_1 + 2\ln(x)} - 1, y(x) = \frac{2x^3}{5} + 2\sqrt{x} + \sqrt{c_1 + 2\ln(x)} - 1\right\}$$

2.873 ODE No. 873

$$y'(x) = \frac{2y(x) + 1}{x\left(2xy(x)^4 + 3xy(x)^3 + xy(x)^2 + 2xy(x) + x - 2\right)}$$

✓ **Mathematica** : cpu = 0.947725 (sec), leaf count = 53

$$\text{Solve}\left[\frac{1}{192}\left(-16y(x)^3 - 12y(x)^2 + 12y(x) - 54\log(4y(x)+2) + 7\right) - \frac{1}{2x(2y(x)+1)} = c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.361 (sec), leaf count = 50

$$\left\{y(x) = \frac{e^{\mathrm{RootOf}\left(48c_1 x\,e^{\_Z} + 54\_Z x\,e^{\_Z} + 7x\,e^{\_Z} - 6x\,e^{2\_Z} - 3x\,e^{3\_Z} + 2x\,e^{4\_Z} + 96\right)}}{2} - \frac{1}{2}\right\}$$

2.874 ODE No. 874

$$y'(x) = \frac{1}{512}x\left(a^3x^{12} + 24a^2x^8y(x) + 8a^2x^8 + 192ax^4y(x)^2 + 128ax^4y(x) - 256ax^2 + 512y(x)^3 + 512y(x)^2 + 512\right.$$

✓ **Mathematica** : cpu = 0.270099 (sec), leaf count = 101

$$\text{Solve}\left[-\frac{29}{3}\text{RootSum}\left[-29\#1^3 + 3\sqrt[3]{29}\#1 - 29\&, \frac{\log\left(\frac{\frac{1}{8}(3ax^5+8x)+3xy(x)}{\sqrt[3]{29}\sqrt[3]{x^3}} - \#1\right)}{\sqrt[3]{29} - 29\#1^2}\&\right] = \frac{1}{18}29^{2/3}\left(x^3\right)^{2/3} + c_1, y(x)\right.$$

✓ **Maple** : cpu = 0.057 (sec), leaf count = 40

$$\left\{y(x) = -\frac{a\,x^4}{8} + \frac{29\,\text{RootOf}\left(x^2 + 6c_1 - 162\left(\int^{\_Z} \frac{1}{841\_a^3 - 27\_a + 27}d\_a\right)\right)}{9} - \frac{1}{3}\right\}$$

2.875 ODE No. 875

$$y'(x) = \frac{x^5\left(-\sqrt{x^2 + y(x)^2}\right) + x^4y(x)\sqrt{x^2 + y(x)^2} + xy(x) + y(x)}{x(x+1)}$$

✓ **Mathematica** : cpu = 0.300839 (sec), leaf count = 497

$$\left\{\left\{y(x) \to \frac{x - 2\sqrt{x^2\tanh^2\left(\frac{1}{12}\left(-3\sqrt{2}x^4 + 4\sqrt{2}x^3 - 6\sqrt{2}x^2 + 12\sqrt{2}x - 12\sqrt{2}\log(x+1) + 25\sqrt{2} - 12\sqrt{2}c_1\right)\right) -}}{-1 + 2\tanh^2\left(\frac{1}{12}\left(-3\sqrt{2}x^4 + 4\sqrt{2}x^3 - 6\sqrt{2}x^2 + 12\sqrt{}\right.\right.}\right.\right.$$

✓ **Maple** : cpu = 0.238 (sec), leaf count = 73

$$\left\{-c_1 - \ln(x) + \ln\left(\frac{2\left(x + y(x) + \sqrt{2x^2 + 2y(x)^2}\right)x}{-x + y(x)}\right) + \sqrt{2}\ln(x+1) + \frac{(3x^4 - 4x^3 + 6x^2 - 12x)\sqrt{2}}{12} = 0\right\}$$

2.876 ODE No. 876

$$y'(x) = -\frac{y(x)^2\left(x^2y(x) - 2xy(x) + y(x) - 2x\right)}{2x(xy(x) - 2y(x) - 2)}$$

✓ **Mathematica** : cpu = 0.203807 (sec), leaf count = 135

$$\left\{\left\{y(x) \to -\frac{4x}{-2(x-2)x + \frac{2\sqrt{-x(x-2)^2-4x\left(-2\left(\frac{x^2}{8}-\frac{x}{2}+\frac{\log(x)}{4}\right)+c_1\right)}}{\sqrt{-\frac{1}{x}}}}\right\}, \left\{y(x) \to \frac{4x}{2(x-2)x + \frac{2\sqrt{-x(x-2)^2-4x\left(-2\left(\frac{x^2}{8}\right.\right.}}{\sqrt{-\frac{1}{x}}}}\right.\right.$$

✓ **Maple** : cpu = 0.056 (sec), leaf count = 41

$$\left\{y(x) = -\frac{4}{-2x + \sqrt{c_1 - 8\ln(x)} + 4}, y(x) = \frac{4}{2x + \sqrt{c_1 - 8\ln(x)} - 4}\right\}$$

2.877 ODE No. 877

$$y'(x) = \frac{x^6 - 3x^4y(x) + 2x^3 + 3x^2y(x)^2 - 2xy(x) - y(x)^3 - 2x}{x^2 - y(x) - 1}$$

✓ **Mathematica** : cpu = 0.207238 (sec), leaf count = 49

$$\left\{\left\{y(x) \to x^2 + \frac{1}{1 - \frac{1}{\sqrt{-2x+c_1}}} - 1\right\}, \left\{y(x) \to x^2 + \frac{1}{1 + \frac{1}{\sqrt{-2x+c_1}}} - 1\right\}\right\}$$

✓ **Maple** : cpu = 0.04 (sec), leaf count = 73

$$\left\{y(x) = \frac{-2c_1x^2 + 2x^3 + \sqrt{2c_1 - 2x + 1} - 1}{-2c_1 + 2x}, y(x) = \frac{2c_1x^2 - 2x^3 + \sqrt{2c_1 - 2x + 1} + 1}{2c_1 - 2x}\right\}$$

2.878 ODE No. 878

$$y'(x) = \frac{-64a^3x^3 + 48a^2x^2y(x)^2 + 16a^2x^2 - 12axy(x)^4 - 8axy(x)^2 + y(x)^6 + y(x)^4 + 1}{y(x)}$$

✓ **Mathematica** : cpu = 0.475851 (sec), leaf count = 130

$$\text{Solve}\left[2a\left(x - \frac{1}{2}\text{RootSum}\left[64\#1^3a^3 - 48\#1^2a^2y(x)^2 - 16\#1^2a^2 + 12\#1ay(x)^4 + 8\#1ay(x)^2 + 2a - y(x)^6 - y(x\right.\right.\right.$$

✓ **Maple** : cpu = 39.088 (sec), leaf count = 75

$$\left\{-c_1+x+\int_{\_b}^{y(x)}\frac{\_a}{-\_a^6+12\_a^4ax-48\_a^2a^2x^2+64a^3x^3-\_a^4+8\_a^2ax-16a^2x^2+2a-1}d\_a=0\right\}$$

2.879 ODE No. 879

$$y'(x)=\frac{x^2\left(-\sqrt{x^2+y(x)^2}\right)+xy(x)\sqrt{x^2+y(x)^2}+xy(x)+y(x)}{x(x+1)}$$

✓ **Mathematica** : cpu = 0.38423 (sec), leaf count = 239

$$\left\{\left\{y(x)\to\frac{x-2\sqrt{x^2\tanh^2\left(\sqrt{2}x-\sqrt{2}\log(x+1)+\sqrt{2}c_1\right)-x^2\tanh^4\left(\sqrt{2}x-\sqrt{2}\log(x+1)+\sqrt{2}c_1\right)}}{-1+2\tanh^2\left(\sqrt{2}x-\sqrt{2}\log(x+1)+\sqrt{2}c_1\right)}\right\},\left\{y(x\right.\right.$$

✓ **Maple** : cpu = 0.275 (sec), leaf count = 55

$$\left\{-c_1+\sqrt{2}\,x-\ln\left(x\right)+\ln\left(\frac{2\left(x+y(x)+\sqrt{2x^2+2y\left(x\right)^2}\right)x}{-x+y\left(x\right)}\right)-\sqrt{2}\,\ln\left(x+1\right)=0\right\}$$

2.880 ODE No. 880

$$y'(x)=-\frac{2a}{128a^4x^3-96a^3x^2y(x)^2-32a^3x^2+24a^2xy(x)^4+16a^2xy(x)^2-2ay(x)^6-2ay(x)^4-2a-y(x)}$$

✓ **Mathematica** : cpu = 0.525248 (sec), leaf count = 131

$$\text{Solve}\left[\frac{\text{RootSum}\left[-64\#1^3a^3+48\#1^2a^2y(x)^2+16\#1^2a^2-12\#1ay(x)^4-8\#1ay(x)^2+y(x)^6+y(x)^4+1\&,\frac{}{48\#}\right.}{8a^2}\right.$$

✓ **Maple** : cpu = 0.176 (sec), leaf count = 41

$$\left\{-c_1+\frac{y(x)}{2a}+\frac{\int^{-4ax+y(x)^2}\frac{1}{\_a^3+\_a^2+1}d\_a}{8a^2}=0\right\}$$

2.881 ODE No. 881

$$y'(x) = \frac{x^6 + 9x^4y(x) - 6x^3 + 27x^2y(x)^2 - 18xy(x) + 27y(x)^3 - 18x}{9x^2 + 27y(x) + 27}$$

✓ **Mathematica** : cpu = 0.1963 (sec), leaf count = 75

$$\left\{\left\{y(x) \to \frac{1}{3}\left(-x^2 - 3\right) + \frac{1}{27\left(\frac{1}{27} - \frac{1}{\sqrt{-1458x+c_1}}\right)}\right\}, \left\{y(x) \to \frac{1}{3}\left(-x^2 - 3\right) + \frac{1}{27\left(\frac{1}{27} + \frac{1}{\sqrt{-1458x+c_1}}\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.046 (sec), leaf count = 77

$$\left\{y(x) = \frac{-2c_1x^2 + 2x^3 - 3\sqrt{2c_1 - 2x + 1} + 3}{6c_1 - 6x}, y(x) = \frac{-2c_1x^2 + 2x^3 + 3\sqrt{2c_1 - 2x + 1} + 3}{6c_1 - 6x}\right\}$$

2.882 ODE No. 882

$$y'(x) = -\frac{1}{216}\sqrt{x}\left(-108x^{3/2} + x^9 - 18x^6y(x) - 6x^6 + 108x^3y(x)^2 + 72x^3y(x) - 216y(x)^3 - 216y(x)^2 - 216\right)$$

✓ **Mathematica** : cpu = 0.290022 (sec), leaf count = 119

$$\text{Solve}\left[-\frac{29}{3}\text{RootSum}\left[-29\#1^3 + 3\sqrt[3]{29}\#1 - 29\&, \frac{\log\left(\frac{\frac{1}{2}(2\sqrt{x}-x^{7/2})+3\sqrt{x}y(x)}{\sqrt[3]{29}\sqrt[3]{x^{3/2}}} - \#1\right)}{\sqrt[3]{29} - 29\#1^2}\&\right] = \frac{2}{27}29^{2/3}\sqrt{x}\left(x^{3/2}\right)^{2/3}$$

✓ **Maple** : cpu = 0.065 (sec), leaf count = 41

$$\left\{y(x) = \frac{x^3}{6} + \frac{29\,\text{RootOf}\left(2x^{\frac{3}{2}} + 9c_1 - 243\left(\int^{-Z}\frac{1}{841\_a^3 - 27\_a + 27}d\_a\right)\right)}{9} - \frac{1}{3}\right\}$$

2.883 ODE No. 883

$$y'(x) = \frac{x\left(a^3y(x)^6 + a^3y(x)^4 + a^3 + 3a^2bx^2y(x)^4 + 2a^2bx^2y(x)^2 + 3ab^2x^4y(x)^2 + ab^2x^4 + b^3x^6\right)}{a^{7/2}y(x)}$$

✓ **Mathematica** : cpu = 1.37261 (sec), leaf count = 164

$$\text{Solve}\left[\frac{x^2}{2} - \frac{1}{2}a^{5/2}\text{RootSum}\left[\#1^3b^3 + 3\#1^2ab^2y(x)^2 + \#1^2ab^2 + 3\#1a^2by(x)^4 + 2\#1a^2by(x)^2 + a^{5/2}b + a^3y(x)^6\right.\right.$$

✓ **Maple** : cpu = 0.68 (sec), leaf count = 352

$$\left\{c_1 + \int_{\_b}^{x} \frac{\left(\_a^6 b^3 + 3\_a^4 a b^2 y(x)^2 + 3\_a^2 a^2 b y(x)^4 + a^3 y(x)^6 + \_a^4 a b^2 + 2\_a^2 a^2 b y(x)^2 + a^3 y(x)^4 + a^3\right)\_}{\left(\_a^6 b^3 + 3\_a^4 a b^2 y(x)^2 + 3\_a^2 a^2 b y(x)^4 + a^3 y(x)^6 + \_a^4 a b^2 + 2\_a^2 a^2 b y(x)^2 + a^3 y(x)^4 + a^{\frac{5}{2}} b + a\right.}\right.$$

2.884 ODE No. 884

$$y'(x) = \frac{x(-x^6 + 3x^4 y(x)^2 + x^4 - 3x^2 y(x)^4 - 2x^2 y(x)^2 + y(x)^6 + y(x)^4 + 1)}{y(x)}$$

✓ **Mathematica** : cpu = 0.871618 (sec), leaf count = 71

$$\text{Solve}\left[\frac{1}{4}\left(2\log\left(-x^2 + y(x)^2 + 1\right) - 2x^2 - \frac{1}{y(x)(y(x)+x)} + \frac{1}{xy(x) - y(x)^2} - 2\log(x - y(x)) - 2\log(y(x)+x)\right)\right.$$

✓ **Maple** : cpu = 0.451 (sec), leaf count = 107

$$\left\{y(x) = -x + e^{\text{RootOf}\left(6x^3 e^{\_Z} + 4c_1 x e^{\_Z} + 6\_Z x e^{\_Z} - 3x^2 e^{2\_Z} - 6x e^{\_Z} \ln\left(\frac{-2x e^{\_Z} + e^{2\_Z} + 1}{-2x + e^{\_Z}}\right) - 2c_1 e^{2\_Z} - 3\_Z e^{2\_Z} + 3 e^{2\_Z} \ln\left(\frac{-2x e^{\_Z} +}{-2x +}\right.\right.}\right.$$

2.885 ODE No. 885

$$y'(x) = -\frac{i(x^6 + 12x^4 y(x)^2 + 4x^4 + 48x^2 y(x)^4 + 32x^2 y(x)^2 + 64y(x)^6 + 64y(x)^4 + 32ix + 64)}{128y(x)}$$

✗ **Mathematica** : cpu = 40.8199 (sec), leaf count = 0 , could not solve

```
DSolve[Derivative[1][y][x] == ((-1/128*I)*(64 + (32*I)*x + 4*x^4 + x^6 + 32*x^2*y[x]^2 + 12*
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(y(x),x) = -1/128*I*(32*I*x+64+64*y(x)^4+32*x^2*y(x)^2+4*x^4+64*y(x)^6+48*x^2*y(x
```

2.886 ODE No. 886

$$y'(x) = \frac{x^6 y(x)^3 - 3x^5 y(x)^2 + x^4 y(x)^2 + 3x^4 y(x) - 4x^3 y(x) - x^3 + 2x^2 + 1}{x^4}$$

✓ **Mathematica** : cpu = 0.234412 (sec), leaf count = 82

$$\text{Solve}\left[-\frac{29}{3}\text{RootSum}\left[-29\#1^3 + 3\sqrt[3]{29}\#1 - 29\&, \frac{\log\left(\frac{3x^2 y(x) - 3x + 1}{\sqrt[3]{29}} - \#1\right)}{\sqrt[3]{29} - 29\#1^2}\&\right] = -\frac{29^{2/3}}{9x} + c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.028 (sec), leaf count = 42

$$\left\{y(x)=\frac{9x+29\,\mathrm{RootOf}\left(3c_1x-81x\left(\int^{-Z}\frac{1}{841\_a^3-27\_a+27}d\_a\right)-1\right)-3}{9x^2}\right\}$$

2.887 ODE No. 887

$$y'(x)=\frac{a^3x^3y(x)^3+3a^2x^2y(x)^2+a^2xy(x)+a^2x+3axy(x)+a+1}{a^2x^2(axy(x)+ax+1)}$$

✓ **Mathematica** : cpu = 0.283454 (sec), leaf count = 106

$$\left\{\left\{y(x)\to-\frac{ax+1}{ax}+\frac{1}{a^3x^3\left(\frac{1}{a^3x^3}-\frac{1}{x^3\sqrt{-2a^6x+c_1}}\right)}\right\},\left\{y(x)\to-\frac{ax+1}{ax}+\frac{1}{a^3x^3\left(\frac{1}{a^3x^3}+\frac{1}{x^3\sqrt{-2a^6x+c_1}}\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.051 (sec), leaf count = 72

$$\left\{y(x)=\frac{-ax-\sqrt{c_1-2x}-1}{\left(\sqrt{c_1-2x}+1\right)ax},y(x)=\frac{ax-\sqrt{c_1-2x}+1}{\left(\sqrt{c_1-2x}-1\right)ax}\right\}$$

2.888 ODE No. 888

$$y'(x)=\frac{x^4y(x)^3-5x^3y(x)^2+6x^2y(x)-2xy(x)-2x+1}{x^2\left(x^2y(x)-x+1\right)}$$

✓ **Mathematica** : cpu = 0.196148 (sec), leaf count = 78

$$\left\{\left\{y(x)\to\frac{x-1}{x^2}+\frac{1}{x^4\left(\frac{1}{x^2}-\frac{1}{x^2\sqrt{\frac{2}{x}+c_1}}\right)}\right\},\left\{y(x)\to\frac{x-1}{x^2}+\frac{1}{x^4\left(\frac{1}{x^2}+\frac{1}{x^2\sqrt{\frac{2}{x}+c_1}}\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.059 (sec), leaf count = 79

$$\left\{y(x)=\frac{\sqrt{\frac{c_1x+2}{x}}\,x-x+1}{\left(\sqrt{\frac{c_1x+2}{x}}-1\right)x^2},y(x)=\frac{\sqrt{\frac{c_1x+2}{x}}\,x+x-1}{\left(\sqrt{\frac{c_1x+2}{x}}+1\right)x^2}\right\}$$

2.889 ODE No. 889

$$y'(x) = -\frac{e^x\left(-8y(x)^{9/2} + 36e^x y(x)^3 - 8y(x)^3 + 24e^x y(x)^{3/2} - 54e^{2x}y(x)^{3/2} - 18e^{2x} + 27e^{3x} - 8\right)}{8\sqrt{y(x)}}$$

✓ **Mathematica** : cpu = 1.82973 (sec), leaf count = 68

$$\text{Solve}\left[\frac{2}{3}\log\left(y(x)^{3/2} - \frac{3e^x}{2}\right) + e^x = \frac{4}{9e^x - 6y(x)^{3/2}} + \frac{2}{3}\log\left(y(x)^{3/2} - \frac{3e^x}{2} + 1\right) + c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.911 (sec), leaf count = 49

$$\left\{-c_1 + e^x + \frac{2\ln\left(y(x)^{\frac{3}{2}} - \frac{3\,e^x}{2}\right)}{3} - \frac{2\ln\left(y(x)^{\frac{3}{2}} - \frac{3\,e^x}{2} + 1\right)}{3} - \frac{4}{-6y\left(x\right)^{\frac{3}{2}} + 9\,e^x} = 0\right\}$$

2.890 ODE No. 890

$$y'(x) = \frac{x}{x^6 + 3x^4y(x)^2 + x^4 + 3x^2y(x)^4 + 2x^2y(x)^2 + y(x)^6 + y(x)^4 - y(x) + 1}$$

✓ **Mathematica** : cpu = 0.213356 (sec), leaf count = 103

$$\text{Solve}\left[y(x) - \frac{1}{2}\text{RootSum}\left[\#1^3 + 3\#1^2y(x)^2 + \#1^2 + 3\#1y(x)^4 + 2\#1y(x)^2 + y(x)^6 + y(x)^4 + 1\&, \frac{}{3\#1^2 + 6\#1}\right.\right.$$

✓ **Maple** : cpu = 0.655 (sec), leaf count = 34

$$\left\{-c_1 + \frac{\left(\int^{x^2+y(x)^2}\frac{1}{\_a^3+\_a^2+1}d\_a\right)}{2} - y(x) = 0\right\}$$

2.891 ODE No. 891

$$y'(x) = \frac{y(x)^2\left(x^4y(x) + 2x^2y(x) + 2x^2 - 2y(x)\right)}{x^3\left(x^2y(x) + x^2 - y(x)\right)}$$

✓ **Mathematica** : cpu = 0.21048 (sec), leaf count = 135

$$\left\{\left\{y(x) \to \frac{x^5}{-x^3\left(x^2-1\right) + \frac{\sqrt{(x^2-1)^2x + x^5\left(-2\left(\frac{1}{2x^4} - \frac{1}{x^2} + \log(x)\right) + c_1\right)}}{\sqrt{\frac{1}{x^5}}}}\right\}, \left\{y(x) \to -\frac{x^5}{\left(x^2-1\right)x^3 + \frac{\sqrt{(x^2-1)^2x + x^5\left(-2\left(\frac{1}{2x}\right.\right.}}{\sqrt{\frac{1}{x}}}}\right.\right.$$

✓ **Maple** : cpu = 0.065 (sec), leaf count = 56

$$\left\{y(x)=\frac{x^2}{\sqrt{c_1-2\ln(x)\,x^2-x^2+1}},y(x)=-\frac{x^2}{\sqrt{c_1-2\ln(x)\,x^2+x^2-1}}\right\}$$

2.892 ODE No. 892

$$y'(x)=\frac{e^{-\frac{2}{x^2-y(x)^2-1}}+x^2+2xy(x)+y(x)^2}{-e^{-\frac{2}{x^2-y(x)^2-1}}+x^2+2xy(x)+y(x)^2}$$

✓ **Mathematica** : cpu = 2.49072 (sec), leaf count = 1283

$$\text{Solve}\left[\int_1^x\left(-e^{\int_1^{(K[2]-y(x))(K[2]+y(x))}\frac{2((K[1]-3)K[1]+1)}{\left(e^{-\frac{2}{K[1]-1}}-K[1]\right)(K[1]-1)^2}dK[1]+\frac{2}{K[2]^2-y(x)^2-1}}K[2]^2-2e^{\int_1^{(K[2]-y(x))(K[2]+y(x))}\frac{2((K[1}{\left(e^{-\frac{2}{K[1]-1}}\right.}}\right.\right.$$

✓ **Maple** : cpu = 0.635 (sec), leaf count = 40

$$\left\{y(x)=-x+\mathrm{e}^{\mathrm{RootOf}\left(c_1-\_Z+\int^{-2x\,\mathrm{e}^{\_Z}+\mathrm{e}^{2\_Z}}\frac{1}{\_a+\mathrm{e}^{-\frac{2}{\_a+1}}}d\_a\right)}\right\}$$

2.893 ODE No. 893

$$y'(x)=\frac{x^3y(x)^3+x^3y(x)^2+x^3+6x^2y(x)^2+4x^2y(x)+12xy(x)+6x+8}{x^3}$$

✓ **Mathematica** : cpu = 0.211733 (sec), leaf count = 80

$$\text{Solve}\left[-\frac{29}{3}\text{RootSum}\left[-29\#1^3+3\sqrt[3]{29}\#1-29\&,\frac{\log\left(\frac{3y(x)+\frac{x+6}{x}}{\sqrt[3]{29}}-\#1\right)}{\sqrt[3]{29}-29\#1^2}\&\right]=\frac{1}{9}29^{2/3}x+c_1,y(x)\right]$$

✓ **Maple** : cpu = 0.029 (sec), leaf count = 41

$$\left\{y(x)=\frac{29x\,\mathrm{RootOf}\left(3c_1+x-81\left(\int^{\_Z}\frac{1}{841\_a^3-27\_a+27}d\_a\right)\right)-3x-18}{9x}\right\}$$

2.894 ODE No. 894

$$y'(x) = -\frac{i(x^6 + 3x^4y(x)^2 + x^4 + 3x^2y(x)^4 + 2x^2y(x)^2 + y(x)^6 + y(x)^4 + ix + 1)}{y(x)}$$

✗ **Mathematica** : cpu = 40.725 (sec), leaf count = 0 , could not solve

```
DSolve[Derivative[1][y][x] == ((-I)*(1 + I*x + x^4 + x^6 + 2*x^2*y[x]^2 + 3*x^4*y[x]^2 + y[x
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(y(x),x) = -I*(I*x+1+x^4+2*x^2*y(x)^2+y(x)^4+x^6+3*x^4*y(x)^2+3*x^2*y(x)^4+y(x)^6
```

2.895 ODE No. 895

$$y'(x) = \frac{x(a^3x^{12} + 24a^2x^8y(x) - 32a^2x^6 + 192ax^4y(x)^2 - 256ax^2y(x) - 256ax^2 + 512y(x)^3)}{64ax^4 + 512y(x) + 512}$$

✓ **Mathematica** : cpu = 0.315249 (sec), leaf count = 81

$$\left\{\left\{y(x) \to \frac{1}{8}(-ax^4 - 8) + \frac{1}{512\left(\frac{1}{512} - \frac{1}{\sqrt{-262144x^2+c_1}}\right)}\right\}, \left\{y(x) \to \frac{1}{8}(-ax^4 - 8) + \frac{1}{512\left(\frac{1}{512} + \frac{1}{\sqrt{-262144x^2+c_1}}\right)}\right.$$

✓ **Maple** : cpu = 0.062 (sec), leaf count = 79

$$\left\{y(x) = \frac{\left(-\sqrt{-x^2+c_1}-1\right)a\,x^4 - 8}{8+8\sqrt{-x^2+c_1}}, y(x) = \frac{\left(-\sqrt{-x^2+c_1}+1\right)a\,x^4 + 8}{-8+8\sqrt{-x^2+c_1}}\right\}$$

2.896 ODE No. 896

$$y'(x) = \frac{-x^6 + 3x^4y(x)^2 + x^4 - 3x^2y(x)^4 - 2x^2y(x)^2 + y(x)^6 + y(x)^4 + x + 1}{y(x)}$$

✓ **Mathematica** : cpu = 0.349855 (sec), leaf count = 106

$$\text{Solve}\left[\frac{1}{2}\text{RootSum}\left[-\#1^3 + 3\#1^2y(x)^2 + \#1^2 - 3\#1y(x)^4 - 2\#1y(x)^2 + y(x)^6 + y(x)^4 + 1\&, \frac{\log}{3\#1^2 - 6\#1y(x)^2}\right.\right.$$

✓ **Maple** : cpu = 0.511 (sec), leaf count = 63

$$\left\{-c_1 + x + \int_{\_b}^{y(x)} \frac{\_a}{-\_a^6 + 3\_a^4x^2 - 3\_a^2x^4 + x^6 - \_a^4 + 2\_a^2x^2 - x^4 - 1}d\_a = 0\right\}$$

2.897 ODE No. 897

$$y'(x) = \frac{\sqrt{x}\left(-108x^{3/2}y(x) + 18x^{9/2} - 108x^{3/2} + x^9 - 18x^6y(x) + 108x^3y(x)^2 - 216y(x)^3\right)}{36x^3 - 216y(x) - 216}$$

✓ **Mathematica** : cpu = 0.256293 (sec), leaf count = 79

$$\left\{\left\{y(x) \to \frac{1}{6}(x^3-6) - \frac{1}{216\left(-\frac{1}{216} - \frac{1}{\sqrt{-62208x^{3/2}+c_1}}\right)}\right\}, \left\{y(x) \to \frac{1}{6}(x^3-6) - \frac{1}{216\left(-\frac{1}{216} + \frac{1}{\sqrt{-62208x^{3/2}+c_1}}\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.086 (sec), leaf count = 87

$$\left\{y(x) = \frac{\sqrt{-12x^{\frac{3}{2}}+9c_1}\,x^3 - 3x^3 + 18}{6\sqrt{-12x^{\frac{3}{2}}+9c_1} - 18}, y(x) = \frac{\sqrt{-12x^{\frac{3}{2}}+9c_1}\,x^3 + 3x^3 - 18}{6\sqrt{-12x^{\frac{3}{2}}+9c_1} + 18}\right\}$$

2.898 ODE No. 898

$$y'(x) = \frac{4x^6y(x)^3 + 2x^5y(x) + 2x^5 + 3x^4y(x)^2 + \frac{x^3}{2} + \frac{3}{4}x^2y(x) + \frac{1}{16}}{x^6\left(4x^2y(x) + 4x^2 + 1\right)}$$

✓ **Mathematica** : cpu = 0.236031 (sec), leaf count = 106

$$\left\{\left\{y(x) \to -\frac{4x^2+1}{4x^2} + \frac{1}{64x^8\left(\frac{1}{64x^8} - \frac{1}{x^8\sqrt{\frac{8192}{x}+c_1}}\right)}\right\}, \left\{y(x) \to -\frac{4x^2+1}{4x^2} + \frac{1}{64x^8\left(\frac{1}{64x^8} + \frac{1}{x^8\sqrt{\frac{8192}{x}+c_1}}\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.043 (sec), leaf count = 87

$$\left\{y(x) = \frac{-4x^2 - \sqrt{\frac{c_1x+2}{x}} - 1}{4\left(\sqrt{\frac{c_1x+2}{x}} + 1\right)x^2}, y(x) = \frac{4x^2 - \sqrt{\frac{c_1x+2}{x}} + 1}{4\left(\sqrt{\frac{c_1x+2}{x}} - 1\right)x^2}\right\}$$

2.899 ODE No. 899

$$y'(x) = \frac{x^6y(x)^3 + x^6y(x)^2 + x^6 + \frac{x^5}{2} + \frac{3}{4}x^4y(x)^2 + \frac{1}{2}x^4y(x) + \frac{3}{16}x^2y(x) + \frac{x^2}{16} + \frac{1}{64}}{x^8}$$

✓ **Mathematica** : cpu = 0.265867 (sec), leaf count = 106

$$\text{Solve}\left[-\frac{29}{3}\text{RootSum}\left[-29\#1^3 + 3\sqrt[3]{29}\#1 - 29\&, \frac{\log\left(\frac{\frac{3y(x)}{x^2}+\frac{4x^2+3}{4x^4}}{\sqrt[3]{29}\sqrt[3]{\frac{1}{x^6}}} - \#1\right)}{\sqrt[3]{29} - 29\#1^2}\&\right] = -\frac{1}{9}29^{2/3}\left(\frac{1}{x^6}\right)^{2/3}x^3 + c_1, y(x$$

✓ **Maple** : cpu = 0.035 (sec), leaf count = 47

$$\left\{y(x) = \frac{116x^2\,\text{RootOf}\left(3c_1x - 81x\left(\int^{-Z}\frac{1}{841\_a^3 - 27\_a + 27}d\_a\right) - 1\right) - 12x^2 - 9}{36x^2}\right\}$$

2.900 ODE No. 900

$$y'(x) = \frac{2a(4ax - y(x)^2 - 1)}{128a^4x^3 - 96a^3x^2y(x)^2 + 24a^2xy(x)^4 - 2ay(x)^6 + 4axy(x) - y(x)^3 - y(x)}$$

✓ **Mathematica** : cpu = 0.237031 (sec), leaf count = 381

$$\{\{y(x) \to \text{Root}[8\#1^5a - 16\#1^4a^2c_1 - 64\#1^3a^2x + \#1^2(-2 + 128a^3c_1x) + 128\#1a^3x^2 - 256a^4c_1x^2 + 8ax - 1\&$$

✓ **Maple** : cpu = 0.074 (sec), leaf count = 48

$$\left\{-c_1 + \frac{y(x)}{2a} - \frac{1}{16\left(-4ax + y(x)^2\right)^2a^2} + \frac{1}{32a^3x - 8a^2y(x)^2} = 0\right\}$$

2.901 ODE No. 901

$$y'(x) = \frac{y(x)\left(-ax\log(y(x)) + x^2 + y(x)\right)}{x(ax - y(x) - y(x)\log(x) - y(x)\log(y(x)))}$$

✓ **Mathematica** : cpu = 0.700215 (sec), leaf count = 33

$$\text{Solve}\left[ax\log(y(x)) - \frac{x^2}{2} - y(x)\log(x) - y(x)\log(y(x)) = c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.547 (sec), leaf count = 30

$$\left\{y(x) = \mathrm{e}^{\mathrm{RootOf}\left(-2\_Zax+2c_1a+2\_Z\mathrm{e}^{-\_Z}+x^2+2\,\mathrm{e}^{-\_Z}\ln(x)\right)}\right\}$$

2.902 ODE No. 902

$$y'(x) = \frac{x^6 - 3x^4y(x)^2 + x^3 + 3x^2y(x)^4 - xy(x)^2 - y(x)^6 - x}{y(x)\left(x^2 - y(x)^2 - 1\right)}$$

✓ **Mathematica** : cpu = 0.245378 (sec), leaf count = 295

$$\left\{\left\{y(x) \to -\frac{1}{2}\sqrt{\frac{4x^3}{x-c_1} - \frac{4c_1x^2}{x-c_1} - \frac{\sqrt{-4x+1+4c_1}}{x-c_1} - \frac{1}{x-c_1}}\right\}, \left\{y(x) \to \frac{1}{2}\sqrt{\frac{4x^3}{x-c_1} - \frac{4c_1x^2}{x-c_1} - \frac{\sqrt{-4x+1+}}{x-c_1}}\right.\right.$$

✓ **Maple** : cpu = 0.224 (sec), leaf count = 183

$$\left\{y(x) = \frac{\sqrt{(c_1+3x)\left(4c_1x^2+12x^3-\sqrt{-12c_1-36x+9}-3\right)}}{2c_1+6x}, y(x) = \frac{\sqrt{(c_1+3x)\left(4c_1x^2+12x^3+\sqrt{-12c_1-3}\right.}}{2c_1+6x}\right.$$

2.903 ODE No. 903

$$y'(x) = \frac{\sin\left(\frac{y(x)}{x}\right)\csc\left(\frac{y(x)}{2x}\right)\sec\left(\frac{y(x)}{2x}\right)\left(2x^2\sin\left(\frac{y(x)}{2x}\right)\cos\left(\frac{y(x)}{2x}\right) + y(x)\right)}{2x}$$

✓ **Mathematica** : cpu = 0.139949 (sec), leaf count = 19

$$\left\{\left\{y(x) \to 2x\cot^{-1}\left(e^{-x-c_1}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.168 (sec), leaf count = 48

$$\left\{y(x) = x\arctan\left(\frac{2c_1\mathrm{e}^{x}}{c_1^2\mathrm{e}^{2x}+1}, \frac{-c_1^2\mathrm{e}^{2x}+1}{c_1^2\mathrm{e}^{2x}+1}\right)\right\}$$

2.904 ODE No. 904

$$y'(x) = \frac{\sin\left(\frac{y(x)}{x}\right)\csc\left(\frac{y(x)}{2x}\right)\sec\left(\frac{y(x)}{2x}\right)\left(2x^3\sin\left(\frac{y(x)}{2x}\right)\cos\left(\frac{y(x)}{2x}\right)+y(x)\right)}{2x}$$

✓ **Mathematica** : cpu = 0.123113 (sec), leaf count = 23

$$\left\{\left\{y(x)\to 2x\cot^{-1}\left(e^{-\frac{x^2}{2}-c_1}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.177 (sec), leaf count = 64

$$\left\{y(x) = x\arctan\left(\frac{2c_1\mathrm{e}^{\frac{x^2}{2}}}{c_1^2\mathrm{e}^{x^2}+1}, \frac{-c_1^2\mathrm{e}^{x^2}+1}{c_1^2\mathrm{e}^{x^2}+1}\right)\right\}$$

2.905 ODE No. 905

$$y'(x) = \frac{a^3x^3y(x)^3+a^3x^3y(x)^2+a^3x^3+3a^2x^2y(x)^2+2a^2x^2y(x)+a^2x+3axy(x)+ax+1}{a^3x^3}$$

✓ **Mathematica** : cpu = 0.262629 (sec), leaf count = 85

$$\text{Solve}\left[-\frac{29}{3}\text{RootSum}\left[-29\#1^3+3\sqrt[3]{29}\#1-29\&, \frac{\log\left(\frac{\frac{ax+3}{ax}+3y(x)}{\sqrt[3]{29}}-\#1\right)}{\sqrt[3]{29}-29\#1^2}\&\right] = \frac{1}{9}29^{2/3}x+c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.044 (sec), leaf count = 46

$$\left\{y(x) = \frac{29ax\,\text{RootOf}\left(3c_1+x-81\left(\int^{\_Z}\frac{1}{841\_a^3-27\_a+27}d\_a\right)\right)-3ax-9}{9ax}\right\}$$

2.906 ODE No. 906

$$y'(x) = \frac{x(x^2+y(x)^2+1)}{x^6+3x^4y(x)^2+3x^2y(x)^4-x^2y(x)+y(x)^6-y(x)^3-y(x)}$$

✓ **Mathematica** : cpu = 0.160783 (sec), leaf count = 326

$$\{\{y(x)\to \text{Root}\left[4\#1^5-4\#1^4c_1+8\#1^3x^2+\#1^2\left(2-8c_1x^2\right)+4\#1x^4-4c_1x^4+2x^2+1\&,1\right]\}, \{y(x)\to \text{Root}[$$

✓ **Maple** : cpu = 0.298 (sec), leaf count = 37

$$\left\{c_1 - y(x) - \frac{1}{2x^2 + 2y(x)^2} - \frac{1}{4\left(x^2 + y(x)^2\right)^2} = 0\right\}$$

2.907 ODE No. 907

$$y'(x) = \frac{\frac{3x^2}{2} + x^2\sin(x) - 2x^2\cos(x) + \frac{1}{2}x^2\cos(2x) - 2xy(x) + y(x)^2 + 2xy(x)\cos(x) + x - x\cos(x)}{x}$$

✓ **Mathematica** : cpu = 0.286452 (sec), leaf count = 22

$$\left\{\left\{y(x) \to -x(\cos(x) - 1) + \frac{1}{-\log(x) + c_1}\right\}\right\}$$

✓ **Maple** : cpu = 0.168 (sec), leaf count = 20

$$\left\{y(x) = -(\cos(x) - 1)x + \frac{1}{c_1 - \ln(x)}\right\}$$

2.908 ODE No. 908

$$y'(x) = \frac{4(a-1)(a+1)x}{a^6x^4 - 3a^4x^4 - 2a^4x^2y(x)^2 + 3a^2x^4 + 4a^2x^2y(x)^2 + a^2y(x)^4 - x^4 - 2x^2y(x)^2 - y(x)^4 + 4y(x)}$$

✓ **Mathematica** : cpu = 1.14253 (sec), leaf count = 1269

$$\left\{\left\{y(x) \to \frac{c_1}{3(a^2-1)} + \frac{\sqrt[3]{-18x^2c_1a^6 + 54x^2c_1a^4 + 54a^4 - 54x^2c_1a^2 - 108a^2 + 2c_1{}^3 + 18x^2c_1 + \sqrt{4(-3x^2a^6 +}}}{}\right.\right.$$

✓ **Maple** : cpu = 0.343 (sec), leaf count = 1742

$$\left\{y(x) = \frac{9^{\frac{2}{3}}\left(3a^6x^2 + (-9x^2 + c_1^2)a^4 + c_1^2 + (9x^2 - 2c_1^2)a^2 - 3x^2 + (-c_1a^2 + c_1)9^{\frac{1}{3}}\left((a-1)^2(a+1)^2\left(\left(-\frac{a^2}{9}\right.\right.\right.\right.}{}\right.$$

2.909 ODE No. 909

$$y'(x) = \frac{x^3y(x)^6 + x^3y(x)^4 + x^3 + 3x^2y(x)^4 + 2x^2y(x)^2 + 3xy(x)^2 + x + 1}{x^5y(x)}$$

✓ **Mathematica** : cpu = 0.185983 (sec), leaf count = 64

$$\text{Solve}\left[\frac{1}{2}\text{RootSum}\left[2\#1^3 + 2\#1^2 + 1\&, \frac{\log\left(\frac{xy(x)^2+1}{x} - \#1\right)}{3\#1^2 + 2\#1}\&\right] + \frac{1}{x} + c_1 = 0, y(x)\right]$$

✓ **Maple** : cpu = 0.559 (sec), leaf count = 84

$$\left\{y(x) = \frac{\sqrt{\left(x\,\text{RootOf}\left(c_1x + x\left(\int^{-Z}\frac{1}{2\_a^3+2\_a^2+1}d\_a\right) + 1\right) - 1\right)x}}{x}, y(x) = -\frac{\sqrt{\left(x\,\text{RootOf}\left(c_1x + x\left(\int^{-Z}\frac{}{2\_a}\right.\right.\right.}}{x}\right.$$

2.910 ODE No. 910

$$y'(x) = \frac{x^6 + 3x^5y(x) + 3x^4y(x)^2 + x^4 + x^3y(x)^3 + 2x^3y(x) + x^2y(x)^2 - y(x) - 2x + 1}{x}$$

✓ **Mathematica** : cpu = 0.237156 (sec), leaf count = 98

$$\text{Solve}\left[-\frac{29}{3}\text{RootSum}\left[-29\#1^3 + 3\sqrt[3]{29}\#1 - 29\&, \frac{\log\left(\frac{3x^3+3x^2y(x)+x}{\sqrt[3]{29}\sqrt[3]{x^3}} - \#1\right)}{\sqrt[3]{29} - 29\#1^2}\&\right] = \frac{29^{2/3}\left(x^3\right)^{2/3}}{9x} + c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.029 (sec), leaf count = 42

$$\left\{y(x) = \frac{-9x^2 + 29\,\text{RootOf}\left(3c_1 + x - 81\left(\int^{-Z}\frac{1}{841\_a^3-27\_a+27}d\_a\right)\right) - 3}{9x}\right\}$$

2.911 ODE No. 911

$$y'(x) = y(x)\left(\_\text{F1}(x) + \frac{\log(y(x))}{x} - \cot(x)\log(y(x))\right)$$

✓ **Mathematica** : cpu = 0.931995 (sec), leaf count = 106

$$\text{Solve}\left[\int_1^x \left(\frac{2\log(y(x))\sin(K[1])}{K[1]^2} - \frac{2(\cos(K[1])\log(y(x)) - \sin(K[1])\_\text{F1}(K[1]))}{K[1]}\right) dK[1] + \int_1^{y(x)} \left(-\frac{2\sin(x)}{xK[2]} - \right.\right.$$

✓ **Maple** : cpu = 0.796 (sec), leaf count = 30

$$\left\{ y(x) = e^{\frac{c_1 x}{\sin(x)}} e^{\frac{x\left(\int \frac{\_F1(x)\sin(x)}{x}\,dx\right)}{\sin(x)}} \right\}$$

2.912 ODE No. 912

$$y'(x) = \frac{2ax}{-128a^4 + 96a^3xy(x)^2 + 32a^3x - 24a^2x^2y(x)^4 - 16a^2x^2y(x)^2 + 2ax^3y(x)^6 + 2ax^3y(x)^4 + 2ax^3 - x^3y(x)}$$

✓ **Mathematica** : cpu = 1.36998 (sec), leaf count = 201

$$\text{Solve}\left[-\text{RootSum}\left[-\#1^3y(x)^6 - \#1^3y(x)^4 - \#1^3 + 12\#1^2ay(x)^4 + 8\#1^2ay(x)^2 - 48\#1a^2y(x)^2 - 16\#1a^2 + 64\right.\right.$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(y(x),x) = 2*a*x/(-x^3*y(x)+2*a*x^3+2*a*y(x)^4*x^3-16*y(x)^2*a^2*x^2+32*a^3*x+2*a
24*y(x)^4*a^2*x^2+96*y(x)^2*x*a^3-128*a^4),y(x))
```

2.913 ODE No. 913

$$y'(x) = \frac{y(x)^3 + y(x) + y(x)^3\left(-\log^3(x)\right) + y(x)^3\log^2(x) + 3y(x)^2\log^2(x) - 2y(x)^2\log(x) - 3y(x)\log(x) + 1}{xy(x)}$$

✓ **Mathematica** : cpu = 0.907636 (sec), leaf count = 716

$$\text{Solve}\left[\int_1^{y(x)} \left(2\text{RootSum}\left[\#1^3K[1]^3 - \#1^2K[1]^3 - 2K[1]^3 - 3\#1^2K[1]^2 + 2\#1K[1]^2 + 3\#1K[1] - K[1] - 1\&,\right.\right.\right.$$

✓ **Maple** : cpu = 0.086 (sec), leaf count = 43

$$\left\{y(x)=\frac{9}{56\,\mathrm{RootOf}\left(3c_1-81\left(\int^{\_Z}\frac{1}{3136\_a^3-27\_a+27}d\_a\right)-\ln(x)\right)+9\ln(x)-3}\right\}$$

2.914 ODE No. 914

$$y'(x)=\frac{2a\left(-4a+xy(x)^2+x\right)}{-128a^4+96a^3xy(x)^2-24a^2x^2y(x)^4+2ax^3y(x)^6+4ax^2y(x)-x^3y(x)^3-x^3y(x)}$$

✓ **Mathematica** : cpu = 1.301 (sec), leaf count = 401

$$\{\{y(x)\to \mathrm{Root}\left[8\#1^5ax^2-8\#1^4ac_1x^2-64\#1^3a^2x+\#1^2\left(2x^2+64a^2c_1x\right)+128\#1a^3-128a^3c_1-8ax+x^2\&,\right.$$

✓ **Maple** : cpu = 3.685 (sec), leaf count = 71

$$\left\{c_1+\frac{xy(x)^4+(-4a+x)\,y(x)^2-2a}{2\left(-xy(x)^2+4a\right)^2ay(x)^4}+\frac{8ay(x)^5+2y(x)^2+1}{16a^2y(x)^4}=0\right\}$$

2.915 ODE No. 915

$$y'(x)=\frac{y(x)^3+y(x)-8y(x)^3\log^3(x)+4y(x)^3\log^2(x)+12y(x)^2\log^2(x)-4y(x)^2\log(x)-6y(x)\log(x)+1}{xy(x)}$$

✓ **Mathematica** : cpu = 0.985306 (sec), leaf count = 724

$$\mathrm{Solve}\left[\int_1^{y(x)}\left(4\mathrm{RootSum}\left[8\#1^3K[1]^3-4\#1^2K[1]^3-3K[1]^3-12\#1^2K[1]^2+4\#1K[1]^2+6\#1K[1]-K[1]-1\right.\right.\right.$$

✓ **Maple** : cpu = 0.083 (sec), leaf count = 43

$$\left\{y(x)=\frac{9}{83\,\mathrm{RootOf}\left(3c_1-81\left(\int^{\_Z}\frac{1}{6889\_a^3-27\_a+27}d\_a\right)-\ln(x)\right)+18\ln(x)-3}\right\}$$

2.916 ODE No. 916

$$y'(x) = \frac{y(x)\left(x^4\log^2(y(x)) + 2x^4\log(x)\log(y(x)) + x^4\log^2(x) + x\log(y(x)) + \log(y(x)) - x + x\log(x) + \log(x)\right.}{x(x+1)}$$

✓ **Mathematica** : cpu = 0.251155 (sec), leaf count = 43

$$\left\{\left\{y(x) \to \frac{\exp\left(\frac{12x}{-3x^4+4x^3-6x^2+12x-12\log(x+1)+c_1}\right)}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.318 (sec), leaf count = 73

$$\left\{y(x) = e^{\frac{-12\ln(x)\ln(x+1)-12x+\left(-3x^4+4x^3-6x^2+12x+12c_1\right)\ln(x)}{3x^4-4x^3+6x^2-12c_1-12x+12\ln(x+1)}}\right\}$$

2.917 ODE No. 917

$$y'(x) = \frac{y(x)\left(x\log^2(y(x)) + 2x\log(x)\log(y(x)) + x\log(y(x)) + \log(y(x)) - x + x\log^2(x) + x\log(x) + \log(x) - \right.}{x(x+1)}$$

✓ **Mathematica** : cpu = 0.250359 (sec), leaf count = 28

$$\left\{\left\{y(x) \to \frac{e^{-\frac{x}{x-\log(x+1)-c_1}}}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.218 (sec), leaf count = 38

$$\left\{y(x) = e^{\frac{\ln(x)\ln(x+1)-x+(c_1-x)\ln(x)}{-c_1+x-\ln(x+1)}}\right\}$$

2.918 ODE No. 918

$$y'(x) = \frac{2y(x)^8}{128x^3y(x)^6 + 32x^2y(x)^6 + 96x^2y(x)^4 + 2y(x)^6 + y(x)^5 + 16xy(x)^4 + 24xy(x)^2 + 2y(x)^2 + 2}$$

✓ **Mathematica** : cpu = 0.591407 (sec), leaf count = 720

$$\text{Solve}\left[\int_1^{y(x)} \left(\text{RootSum}\left[64\#1^3K[1]^6 + 16\#1^2K[1]^6 + K[1]^6 + 48\#1^2K[1]^4 + 8\#1K[1]^4 + 12\#1K[1]^2 + K[1]^2 \right.\right.\right.$$

✓ **Maple** : cpu = 1.016 (sec), leaf count = 41

$$\left\{x - \text{RootOf}\left(c_1y(x) + \left(\int^{\_Z} \frac{1}{64\_a^3+16\_a^2+1}d\_a\right)y(x) + 1\right) + \frac{1}{4y(x)^2} = 0\right\}$$

2.919 ODE No. 919

$$y'(x) = \frac{\left(-y(x) + \sqrt{y(x)} + x\right) y(x)^{3/2}}{x^3 - 3x^2 y(x) + 3xy(x)^2 + xy(x)^{3/2} - y(x)^3 - y(x)^{5/2} + y(x)^2}$$

✓ **Mathematica** : cpu = 0.355592 (sec), leaf count = 251

$$\{\{y(x) \to \text{Root}[\#1^9 c_1{}^4 - 6\#1^8 c_1{}^4 x + \#1^7 (15 c_1{}^4 x^2 - 6 c_1{}^2) + \#1^6 (-20 c_1{}^4 x^3 + 30 c_1{}^2 x - 4 + 2 c_1{}^2) + \#1^5 (15 c_1{}^4$$

✓ **Maple** : cpu = 0.167 (sec), leaf count = 61

$$\left\{ -\frac{c_1 (-x + y(x))^{\frac{3}{2}} y(x)^{\frac{3}{4}} + \left(x - y(x) - \sqrt{y(x)}\right) \sqrt{-2x + 2y(x) - \sqrt{y(x)}}}{(-x + y(x))^{\frac{3}{2}} y(x)^{\frac{3}{4}}} = 0 \right\}$$

2.920 ODE No. 920

$$y'(x) = \frac{2y(x)^6 \left(4xy(x)^2 + y(x)^2 + 1\right)}{128x^3 y(x)^6 + 96x^2 y(x)^4 + 4xy(x)^5 + y(x)^5 + y(x)^3 + 24xy(x)^2 + 2}$$

✓ **Mathematica** : cpu = 0.467939 (sec), leaf count = 301

$$\{\{y(x) \to \text{Root}[\#1^5 (128 c_1 x^2 - 8x - 1) + 128\#1^4 x^2 + \#1^3 (-2 + 64 c_1 x) + 64\#1^2 x + 8\#1 c_1 + 8\&, 1]\}, \{y(x) -$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(y(x),x) = 2*y(x)^6*(1+4*x*y(x)^2+y(x)^2)/(y(x)^3+4*y(x)^5*x+y(x)^5+2+24*x*y(x)^2
```

2.921 ODE No. 921

$$y'(x) = y(x) \left(\_F1(x) + \frac{\log(y(x))}{x} - \frac{\log(y(x))}{x \log(x)}\right)$$

✓ **Mathematica** : cpu = 0.295569 (sec), leaf count = 92

$$\text{Solve}\left[\int_1^x \left(\frac{\log(y(x)) - \log(K[1]) \log(y(x))}{K[1]^2} - \frac{\log(K[1])\_F1(K[1])}{K[1]}\right) dK[1] + \int_1^{y(x)} \left(\frac{\log(x)}{xK[2]} - \int_1^x \frac{\frac{1}{K[2]} - \frac{\log(K}{K[2}}{K[1]^2}\right.\right.$$

✓ **Maple** : cpu = 0.196 (sec), leaf count = 30

$$\left\{ y(x) = e^{\frac{c_1 x}{\ln(x)}} e^{\frac{x \left(\int \frac{\_F1(x) \ln(x)}{x} dx\right)}{\ln(x)}} \right\}$$

2.922 ODE No. 922

$$y'(x) = \frac{y(x)^2}{x^3 - 3x^2y(x) + x^2\sqrt{y(x)} + 3xy(x)^2 - 2xy(x)^{3/2} - y(x)^3 + y(x)^{5/2} + y(x)^2 + y(x)^{3/2}}$$

✓ **Mathematica** : cpu = 1.42762 (sec), leaf count = 882

$$\text{Solve}\left[\int_1^{y(x)} \left(\frac{-x - K[1]}{2\left(-2x^3 + 6K[1]x^2 - 2\sqrt{K[1]}x^2 - 6K[1]^2x + 4K[1]^{3/2}x + K[1]x + 2K[1]^3 - 2K[1]^{5/2} - K[1]^2 -\right.}\right.\right.$$

✓ **Maple** : cpu = 0.18 (sec), leaf count = 47

$$\left\{-c_1 - \left(\int^{\frac{x}{\sqrt{y(x)}} - \sqrt{y(x)}} \frac{1}{2\_a^3 + 2\_a^2 - \_a + 2} d\_a\right) + \frac{\ln(y(x))}{2} = 0\right\}$$

2.923 ODE No. 923

$$y'(x) = \frac{x^2 + 2xy(x) + e^{-2(x-y(x))(y(x)+x)} + y(x)^2}{x^2 + 2xy(x) - e^{-2(x-y(x))(y(x)+x)} + y(x)^2}$$

✓ **Mathematica** : cpu = 1.62935 (sec), leaf count = 432

$$\text{Solve}\left[\int_1^{y(x)} \left(-\frac{2e^{2(x-K[2])(x+K[2])}K[2]}{-e^{2(x-K[2])(x+K[2])}x^2 + e^{2(x-K[2])(x+K[2])}K[2]^2 + 1} - \int_1^x \left(-\frac{2e^{2(K[1]-K[2])(K[1]+K[2])}K[1](2(K[1]}{e^{2(K[1]-K[2])(K[1]+K[2])}K[1]^2 - e^{2(K}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.413 (sec), leaf count = 36

$$\left\{y(x) = -x + \mathrm{e}^{\mathrm{RootOf}\left(c_1 - \_Z + \int^{-2x\,\mathrm{e}^{-\_Z} + \mathrm{e}^{2\_Z}} \frac{1}{\_a + \mathrm{e}^{2\_a}} d\_a\right)}\right\}$$

2.924 ODE No. 924

$$y'(x) = \frac{y(x)\left(\_F1(x) + \frac{\log^2(y(x))}{2x}\right)}{\log(y(x))}$$

✓ **Mathematica** : cpu = 0.312793 (sec), leaf count = 80

$$\text{Solve}\left[\int_1^x \left(-\frac{\log^2(y(x))}{2K[1]^2} - \frac{\_F1(K[1])}{K[1]}\right) dK[1] + \int_1^{y(x)} \left(\frac{\log(K[2])}{xK[2]} - \int_1^x -\frac{\log(K[2])}{K[1]^2K[2]} dK[1]\right) dK[2] = c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.128 (sec), leaf count = 46

$$\left\{y(x)=\mathrm{e}^{\sqrt{2c_1x+2x\left(\int\frac{\_F1(x)}{x}dx\right)}},y(x)=\mathrm{e}^{-\sqrt{2}\sqrt{\left(c_1+\int\frac{\_F1(x)}{x}dx\right)x}}\right\}$$

2.925 ODE No. 925

$$y'(x)=\frac{x^2+2xy(x)+e^{2(x-y(x))^2(y(x)+x)^2}+y(x)^2}{x^2+2xy(x)-e^{2(x-y(x))^2(y(x)+x)^2}+y(x)^2}$$

✓ **Mathematica** : cpu = 2.25506 (sec), leaf count = 228

$$\text{Solve}\left[\int_1^{y(x)}\left(-\frac{2K[2]}{-x^2+e^{2(x-K[2])^2(x+K[2])^2}+K[2]^2}-\int_1^x\left(\frac{2K[1]\left(-2K[2]-e^{2(K[1]-K[2])^2(K[1]+K[2])^2}(4(K[1]-\right.}{\left(K[1]^2-e^{2(K[1]-K[\right.}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.312 (sec), leaf count = 38

$$\left\{y(x)=-x+\mathrm{e}^{\mathrm{RootOf}\left(c_1-\_Z+\int^{-2x\,\mathrm{e}^{\_Z}+\mathrm{e}^{2\_Z}}\frac{1}{\_a+\mathrm{e}^{2}\_a^{2}}d\_a\right)}\right\}$$

2.926 ODE No. 926

$$y'(x)=\frac{\frac{1}{16}x^3y(x)^3-\frac{1}{2}x^2y(x)^3-\frac{3}{8}x^2y(x)^2+xy(x)^3+xy(x)^2+\frac{3}{4}xy(x)-\frac{1}{2}}{x(xy(x)-2y(x)-2)}$$

✓ **Mathematica** : cpu = 0.234324 (sec), leaf count = 128

$$\left\{\left\{y(x)\to\frac{2}{x-2}+\frac{1}{16x(x-2)\left(-\frac{1}{64}-\frac{e^{2\left(\frac{1}{2}\log(2-x)-\frac{\log(x)}{2}\right)}}{\sqrt{2048\log(x)+c_1}}\right)}\right\},\left\{y(x)\to\frac{2}{x-2}+\frac{1}{16x(x-2)\left(-\frac{1}{64}+\frac{e^{2\left(\frac{1}{2}\log(2-\right.}}{\sqrt{2048\,\mathrm{l}}}\right.}\right.\right.$$

✓ **Maple** : cpu = 0.059 (sec), leaf count = 67

$$\left\{y(x)=\frac{2\sqrt{c_1+8\ln(x)}-8}{\sqrt{c_1+8\ln(x)}\,x-4x+8},y(x)=\frac{2\sqrt{c_1+8\ln(x)}+8}{\sqrt{c_1+8\ln(x)}\,x+4x-8}\right\}$$

2.927 ODE No. 927

$$y'(x) = -\frac{1}{8}x\Big(12e^{-x^2}x^2y(x)^2 + 8e^{-x^2}x^2y(x) + 8e^{-x^2}x^2 - 8e^{-x^2} + e^{-3x^2}x^6 - 6e^{-2x^2}x^4y(x) - 2e^{-2x^2}x^4 - 8y(x)^3$$

✓ **Mathematica** : cpu = 0.737036 (sec), leaf count = 112

$$\text{Solve}\left[-\frac{29}{3}\text{RootSum}\left[-29\#1^3 + 3\sqrt[3]{29}\#1 - 29\&, \frac{\log\left(\frac{\frac{1}{2}e^{-x^2}x\left(2e^{x^2}-3x^2\right)+3xy(x)}{\sqrt[3]{29}\sqrt[3]{x^3}} - \#1\right)}{\sqrt[3]{29} - 29\#1^2}\&\right] = \frac{1}{18}29^{2/3}\left(x^3\right)^{2/3} +$$

✓ **Maple** : cpu = 0.114 (sec), leaf count = 68

$$\left\{y(x) = \frac{\left(58\,\text{RootOf}\left(x^2 + 6c_1 - 162\left(\int^{-Z}\frac{1}{841\_a^3-27\_a+27}d\_a\right)\right) + \left(9x^2 - 6\,e^{x^2}\right)e^{-x^2}\right)e^{x^2}e^{-x^2}}{18}\right\}$$

2.928 ODE No. 928

$$y'(x) = \frac{e^{\frac{y(x)}{x}}\left(x^2e^{-\frac{y(x)}{x}} + xe^{-\frac{y(x)}{x}} + xe^{-\frac{y(x)}{x}}y(x) + e^{-\frac{y(x)}{x}}y(x) + x\right)}{x(x+1)}$$

✓ **Mathematica** : cpu = 1.26893 (sec), leaf count = 23

$$\left\{\left\{y(x) \to -x\log\left(-\frac{\log(x+1) - c_1}{x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.294 (sec), leaf count = 20

$$\left\{y(x) = -x\ln\left(\frac{c_1 - \ln(x+1)}{x}\right)\right\}$$

2.929 ODE No. 929

$$y'(x) = \frac{-\frac{1}{32}x^3y(x)^3 + \frac{1}{16}x^2y(x)^3 + \frac{3}{16}x^2y(x)^2 - \frac{1}{2}xy(x)^3 + \frac{y(x)^3}{4} - \frac{1}{4}xy(x)^2 - \frac{3}{8}xy(x) + \frac{y(x)}{4} + \frac{1}{4}}{xy(x)}$$

✓ **Mathematica** : cpu = 0.940212 (sec), leaf count = 683

$$\text{Solve}\left[\int_1^{y(x)}\left(-32\text{RootSum}\left[\#1^3K[1]^3 - 2\#1^2K[1]^3 - 8K[1]^3 - 6\#1^2K[1]^2 + 8\#1K[1]^2 + 12\#1K[1] - 8K[1]\right.\right.\right.$$

✓ **Maple** : cpu = 0.038 (sec), leaf count = 42

$$\left\{ y(x) = \frac{18}{9x + 58\,\mathrm{RootOf}\left(12c_1 - 324\left(\int^{-Z} \frac{1}{841\_a^3 - 27\_a + 27} d\_a\right) - \ln(x)\right) - 6} \right\}$$

2.930 ODE No. 930

$$y'(x) = \frac{e^{\frac{y(x)}{x}}\left(x^4 + x^2 e^{-\frac{y(x)}{x}} + x e^{-\frac{y(x)}{x}} + x e^{-\frac{y(x)}{x}} y(x) + e^{-\frac{y(x)}{x}} y(x)\right)}{x(x+1)}$$

✓ **Mathematica** : cpu = 1.59835 (sec), leaf count = 39

$$\left\{\left\{y(x) \to -x \log\left(\frac{-\frac{x^3}{3} + \frac{x^2}{2} - x + \log(x+1) - c_1}{x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.434 (sec), leaf count = 36

$$\left\{ y(x) = -x \ln\left(\frac{-2x^3 + 3x^2 - 6c_1 - 6x + 6\ln(x+1)}{6x}\right) \right\}$$

2.931 ODE No. 931

$$y'(x) = \frac{x^6 + 3x^5 y(x) + 3x^4 y(x)^2 + x^3 y(x)^3 - 2x^3 - 3x^2 y(x) - x y(x)^2 - y(x) - 2x}{x\left(x^2 + x y(x) + 1\right)}$$

✓ **Mathematica** : cpu = 0.211762 (sec), leaf count = 80

$$\left\{\left\{y(x) \to -\frac{x^2+1}{x} + \frac{1}{x^2\left(\frac{1}{x} - \frac{1}{x\sqrt{-2x+c_1}}\right)}\right\}, \left\{y(x) \to -\frac{x^2+1}{x} + \frac{1}{x^2\left(\frac{1}{x} + \frac{1}{x\sqrt{-2x+c_1}}\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.038 (sec), leaf count = 73

$$\left\{ y(x) = \frac{-\sqrt{c_1 - 2x}\, x^2 - x^2 - 1}{\left(\sqrt{c_1 - 2x} + 1\right) x}, y(x) = \frac{-\sqrt{c_1 - 2x}\, x^2 + x^2 + 1}{\left(\sqrt{c_1 - 2x} - 1\right) x} \right\}$$

2.932 ODE No. 932

$$y'(x) = \frac{e^{-\frac{3x^2}{2}}x\left(3e^{3x^2}y(x)^3 + e^{\frac{9x^2}{2}}y(x)^3 + 18e^{3x^2}y(x)^2 + 9e^{\frac{9x^2}{2}}y(x)^2 + 27e^{3x^2}y(x) + 27e^{\frac{9x^2}{2}}y(x) + 27e^{\frac{9x^2}{2}} + 27y(\right.}{243y(x)}$$

✓ **Mathematica** : cpu = 5.82178 (sec), leaf count = 4323

$$\text{Solve}\left[\frac{x^2}{2} + \frac{27}{2}\text{RootSum}\left[y(x)^3\#1^3 + 9y(x)^2\#1^3 + 27y(x)\#1^3 + 27\#1^3 + 3y(x)^3\#1^2 + 18y(x)^2\#1^2 + 27y(x)\#\right.\right.$$

✓ **Maple** : cpu = 0.133 (sec), leaf count = 54

$$\left\{y(x) = -\frac{369\,\mathrm{e}^{\frac{3x^2}{2}}}{-136\,\text{RootOf}\left(-41x^2 + 27c_1 - 50243409\left(\int^{\_Z}\frac{1}{9248\_a^3 - 1860867\_a + 1860867}d\_a\right)\right) + 123\,\mathrm{e}^{\frac{3x^2}{2}} + 123}\right\}$$

2.933 ODE No. 933

$$y'(x) = \frac{x^3 + x^3\left(-\log^3(x)\right) + x^3\log^2(x) + 3x^2y(x)\log^2(x) - 2x^2y(x)\log(x) + x^2 + xy(x)^2 + xy(x) + y(x)^3 - 3x}{x^2}$$

✓ **Mathematica** : cpu = 0.27893 (sec), leaf count = 99

$$\text{Solve}\left[-\frac{29}{3}\text{RootSum}\left[-29\#1^3 + 3\sqrt[3]{29}\#1 - 29\&, \frac{\log\left(\frac{\frac{3y(x)}{x^2} + \frac{1-3\log(x)}{x}}{\sqrt[3]{29}\sqrt[3]{\frac{1}{x^3}}} - \#1\right)}{\sqrt[3]{29} - 29\#1^2}\&\right] = \frac{29^{2/3}}{9\sqrt[3]{\frac{1}{x^3}}} + c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.061 (sec), leaf count = 39

$$\left\{y(x) = \frac{\left(29\,\text{RootOf}\left(3c_1 + x - 81\left(\int^{\_Z}\frac{1}{841\_a^3 - 27\_a + 27}d\_a\right)\right) + 9\ln(x) - 3\right)x}{9}\right\}$$

2.934 ODE No. 934

$$y'(x)=-\frac{x^6}{64}-\frac{3x^5}{32}+\frac{3}{16}x^4y(x)-\frac{x^4}{8}+\frac{3}{4}x^3y(x)+\frac{x^3}{8}-\frac{3}{4}x^2y(x)^2+\frac{1}{4}x^2y(x)+\frac{x^2}{4}-\frac{3}{2}xy(x)^2-xy(x)+y(x)^3+y(x)^2+\frac{x}{2}+\cdots$$

✓ **Mathematica** : cpu = 0.323667 (sec), leaf count = 102

$$\text{Solve}\left[-\frac{31}{3}\text{RootSum}\left[-31\#1^3+3\ 2^{2/3}\sqrt[3]{31}\#1-31\&,\frac{\log\left(\sqrt[3]{\frac{2}{31}}\left(\frac{1}{4}\left(-3x^2-6x+4\right)+3y(x)\right)-\#1\right)}{2^{2/3}\sqrt[3]{31}-31\#1^2}\&\right]=\frac{1}{9}\Big(\cdots$$

✓ **Maple** : cpu = 0.068 (sec), leaf count = 39

$$\left\{y(x)=\frac{x^2}{4}+\frac{x}{2}+\text{RootOf}\left(c_1-x+2\left(\int^{\_Z}\frac{1}{2\_a^3+2\_a^2+1}d\_a\right)\right)\right\}$$

2.935 ODE No. 935

$$y'(x)=\frac{x^6}{64}-\frac{3x^5}{16}+\frac{3}{16}x^4y(x)+\frac{13x^4}{16}-\frac{3}{2}x^3y(x)-\frac{3x^3}{2}+\frac{3}{4}x^2y(x)^2+\frac{7}{2}x^2y(x)+x^2-3xy(x)^2-2xy(x)+y(x)^3+y(x)^2-\cdots$$

✓ **Mathematica** : cpu = 62.1944 (sec), leaf count = 248

$$\text{Solve}\left[\frac{\sqrt[3]{2}\left(\frac{\frac{1}{4}(3x^2-12x+4)+3y(x)}{\sqrt[3]{2}}+2^{2/3}\right)\left(2^{2/3}-2^{2/3}\left(\frac{1}{4}\left(3x^2-12x+4\right)+3y(x)\right)\right)\left(\left(\frac{1}{4}\left(-3x^2+12x-4\right)-3y(x)+\cdots\right.\right.}{9\left(-\left(\frac{1}{4}\left(3x^2-12x+4\right)+\cdots\right.\right.}\cdots\right.$$

✓ **Maple** : cpu = 0.212 (sec), leaf count = 55

$$\left\{y(x)=-\frac{x^2}{4}+x+\frac{e^{\text{RootOf}\left(c_1e^{-\_Z}-\_Ze^{-\_Z}+x\,e^{-\_Z}+e^{-\_Z}\ln\left(e^{-\_Z}-4\right)-4c_1+4\_Z-4x-4\ln\left(e^{-\_Z}-4\right)+4\right)}}{4}-1\right\}$$

2.936 ODE No. 936

$$y'(x)=\frac{x^6}{512}-\frac{3x^5}{256}+\frac{3}{64}x^4y(x)+\frac{5x^4}{128}-\frac{3}{16}x^3y(x)-\frac{5x^3}{64}+\frac{3}{8}x^2y(x)^2+\frac{7}{16}x^2y(x)+\frac{x^2}{16}-\frac{3}{4}xy(x)^2-\frac{1}{2}xy(x)+y(x)^3+y(x)\cdots$$

✓ **Mathematica** : cpu = 0.353172 (sec), leaf count = 99

$$\text{Solve}\left[-\frac{89}{3}\text{RootSum}\left[-89\#1^3+6\sqrt[3]{178}\#1-89\&,\frac{\log\left(\frac{2^{2/3}\left(\frac{1}{8}\left(3x^2-6x+8\right)+3y(x)\right)}{\sqrt[3]{89}}-\#1\right)}{2\sqrt[3]{178}-89\#1^2}\&\right]=\frac{89^{2/3}x}{18\sqrt[3]{2}}+c_1,y(x)\right]$$

✓ **Maple** : cpu = 0.068 (sec), leaf count = 39

$$\left\{y(x)=-\frac{x^2}{8}+\frac{x}{4}+\mathrm{RootOf}\left(c_1-x+4\left(\int^{-Z}\frac{1}{4\_a^3+4\_a^2+3}d\_a\right)\right)\right\}$$

2.937 ODE No. 937

$$y'(x)=\frac{2xy(x)^3+y(x)^3-2y(x)+6xy(x)\log^2(2x+1)+3y(x)\log^2(2x+1)+6xy(x)^2\log(2x+1)+3y(x)^2\log(}{(2x+1)(y(x)+\log(2x+1)+1)}$$

✓ **Mathematica** : cpu = 0.330358 (sec), leaf count = 124

$$\left\{\left\{y(x)\to\frac{1}{(2x+1)\left(\frac{2x+1}{4x^2+4x+1}-\frac{1}{(2x+1)\sqrt{-2x+c_1}}\right)}-\log(2x+1)-1\right\},\left\{y(x)\to\frac{1}{(2x+1)\left(\frac{2x+1}{4x^2+4x+1}+\frac{1}{(2x+1)\sqrt{-}}\right.}\right.\right.$$

✓ **Maple** : cpu = 0.092 (sec), leaf count = 79

$$\left\{y(x)=\frac{-\sqrt{c_1-2x}\,\ln(2x+1)-\ln(2x+1)-1}{\sqrt{c_1-2x}+1},y(x)=\frac{-\sqrt{c_1-2x}\,\ln(2x+1)+\ln(2x+1)+1}{\sqrt{c_1-2x}-1}\right\}$$

2.938 ODE No. 938

$$y'(x)=\frac{x^6-3x^5+3x^4y(x)+4x^4-6x^3y(x)-3x^3+3x^2y(x)^2+5x^2y(x)-x^2-3xy(x)^2-2xy(x)+y(x)^3+y(}{x}$$

✓ **Mathematica** : cpu = 0.27716 (sec), leaf count = 108

$$\text{Solve}\left[-\frac{29}{3}\text{RootSum}\left[-29\#1^3+3\sqrt[3]{29}\#1-29\&,\frac{\log\left(\frac{\frac{3x^2-3x+1}{x}+\frac{3y(x)}{x}}{\sqrt[3]{29}\sqrt[3]{\frac{1}{x^3}}}-\#1\right)}{\sqrt[3]{29}-29\#1^2}\&\right]=\frac{1}{9}29^{2/3}\left(\frac{1}{x^3}\right)^{2/3}x^2\log(x)+\right.$$

✓ **Maple** : cpu = 0.029 (sec), leaf count = 39

$$\left\{y(x)=-x^2+x+\frac{29\,\mathrm{RootOf}\left(3c_1-81\left(\int^{-Z}\frac{1}{841\_a^3-27\_a+27}d\_a\right)+\ln(x)\right)}{9}-\frac{1}{3}\right\}$$

2.939 ODE No. 939

$$y'(x) = \frac{x^6 + 6x^5 - 12x^4y(x) + 12x^4 - 48x^3y(x) + 16x^3 + 48x^2y(x)^2 - 48x^2y(x) + 16x^2 + 96xy(x)^2 - 32xy(x) -}{16x^2 - 64y(x) + 32x - 64}$$

✓ **Mathematica** : cpu = 0.593567 (sec), leaf count = 136

$$\text{Solve}\left[\frac{2}{5}\text{RootSum}\left[\#1^4 + 4\#1^3 - 8\#1^2y(x) - 16\#1y(x) - 8\#1 + 16y(x)^2 + 16y(x) + 8\&, \frac{\#1^2(-\log(x - \#1)) -}{}\right.\right.$$

✓ **Maple** : cpu = 0.085 (sec), leaf count = 70

$$\left\{ -c_1 + x - \frac{2\arctan\left(\frac{x^2}{2} + x - 2y(x) - 1\right)}{5} - \frac{4\ln\left(-\frac{x^2}{4} - \frac{x}{2} + y(x) - 1\right)}{5} + \frac{2\ln\left(-\frac{x^2}{2} - x + 2y(x) + 2\left(-\frac{x^2}{4} - \right.\right.}{5}\right.$$

2.940 ODE No. 940

$$y'(x) = \frac{x^3\log^3(x) - 3x^2y(x)\log^2(x) - x^2 + x^2\log(x) - y(x)^3 - y(x)^2 - 2xy(x) + 3xy(x)^2\log(x) + xy(x)\log(x)}{x(-y(x) - x + x\log(x))}$$

✓ **Mathematica** : cpu = 0.283742 (sec), leaf count = 80

$$\left\{\left\{y(x) \to -\frac{1}{x\left(-\frac{1}{x^2} - \frac{1}{x^2\sqrt{-2x+c_1}}\right)} - x + x\log(x)\right\}, \left\{y(x) \to -\frac{1}{x\left(-\frac{1}{x^2} + \frac{1}{x^2\sqrt{-2x+c_1}}\right)} - x + x\log(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.069 (sec), leaf count = 63

$$\left\{y(x) = \frac{\left(\sqrt{c_1 - 2x}\,\ln(x) - \ln(x) + 1\right)x}{\sqrt{c_1 - 2x} - 1}, y(x) = \frac{\left(\sqrt{c_1 - 2x}\,\ln(x) + \ln(x) - 1\right)x}{\sqrt{c_1 - 2x} + 1}\right\}$$

2.941 ODE No. 941

$$y'(x) = \frac{x^6 - 12x^5 + 12x^4y(x) + 48x^4 - 96x^3y(x) - 72x^3 + 48x^2y(x)^2 + 192x^2y(x) + 32x^2 - 192xy(x)^2 - 32xy(}{16x^2 + 64y(x) - 64x + 64}$$

✓ **Mathematica** : cpu = 0.509399 (sec), leaf count = 53

$$\text{Solve}\left[x - 8\text{RootSum}\left[11776\#1^3 - 40\#1 - 1\&, \#1\log\left(17664\#1^2 - 1472\#1 + 11x^2 + 44y(x) - 44x - 40\right)\&\right] = \right.$$

✓ **Maple** : cpu = 0.055 (sec), leaf count = 35

$$\left\{y(x) = -\frac{x^2}{4} + x + \text{RootOf}\left(c_1 - x + \int^{\_Z} \frac{\_a + 1}{\_a^3 - \_a - 1}d\_a\right)\right\}$$

2.942 ODE No. 942

$$y'(x) = \frac{-\exp\left(\frac{2(x-y(x))^3(y(x)+x)^3}{x^2-y(x)^2-1}\right) - x^2 - 2xy(x) - y(x)^2}{\exp\left(\frac{2(x-y(x))^3(y(x)+x)^3}{x^2-y(x)^2-1}\right) - x^2 - 2xy(x) - y(x)^2}$$

✓ **Mathematica** : cpu = 4.93284 (sec), leaf count = 349

$$\text{Solve}\left[\int_1^{y(x)} \left(-\frac{2K[2]}{-x^2+\exp\left(\frac{2(x-K[2])^3(x+K[2])^3}{x^2-K[2]^2-1}\right)+K[2]^2} - \int_1^x \left(\frac{2K[1]\left(-2K[2]-\exp\left(\frac{2(K[1]-K[2])^3(K[1]+K[2])^3}{K[1]^2-K[2]^2-1}\right.\right.}{\left(K[1\right.}\right.\right.\right.$$

✓ **Maple** : cpu = 0.71 (sec), leaf count = 43

$$\left\{y(x) = -x + \mathrm{e}^{\mathrm{RootOf}\left(c_1 - \_Z + \int^{-2x\,\mathrm{e}^{-\_Z} + \mathrm{e}^{2\_Z}} \frac{1}{\_a + \mathrm{e}^{\frac{2\_a^3}{\_a+1}}} d\_a\right)}\right\}$$

2.943 ODE No. 943

$$y'(x) = \frac{x^6 - 6x^5 + 24x^4y(x) + 12x^4 - 96x^3y(x) - 24x^3 + 192x^2y(x)^2 + 96x^2y(x) + 32x^2 - 384xy(x)^2 - 128xy(}{64x^2 + 512y(x) - 128x + 512}$$

✓ **Mathematica** : cpu = 0.594247 (sec), leaf count = 53

$$\text{Solve}\left[x - 16\text{RootSum}\left[6656\#1^3 - 23\#1 - 1\&, \#1\log\left(79872\#1^2 - 18304\#1 + 181x^2 + 1448y(x) - 362x - 184\right)\right.\right.$$

✓ **Maple** : cpu = 0.056 (sec), leaf count = 40

$$\left\{y(x) = -\frac{x^2}{8} + \frac{x}{4} + \mathrm{RootOf}\left(c_1 - x + \int^{\_Z} \frac{4\_a + 4}{4\_a^3 - \_a - 1} d\_a\right)\right\}$$

2.944 ODE No. 944

$$y'(x) = \frac{a^3x^6 + 6a^2bx^5 + 12a^2x^4y(x) - 8a^2x^3 + 12ab^2x^4 + 48abx^3y(x) - 16abx^2 + 48ax^2y(x)^2 - 32axy(x) - 32a}{16ax^2 + 32bx + 64y(x) + 64}$$

✓ **Mathematica** : cpu = 1.92047 (sec), leaf count = 233

$$\text{Solve}\left[x - 4\text{RootSum}\left[\#1^6a^3 + 6\#1^5a^2b + 12\#1^4a^2y(x) + 12\#1^4ab^2 + 48\#1^3aby(x) + 8\#1^3b^3 + 8\#1^2ab + 48\#\right.\right.$$

✓ **Maple** : cpu = 0.08 (sec), leaf count = 47

$$\left\{y(x) = -\frac{a\,x^2}{4} - \frac{bx}{2} + \mathrm{RootOf}\left(bx + 2c_1 + 2\left(\int^{\_Z} -\frac{(\_a+1)\,b}{2\_a^3 + \_ab + b} d\_a\right)\right)\right\}$$

2.945 ODE No. 945

$$y'(x) = \frac{8a^3x^3 + 12a^2x^4 + 48a^2x^2y(x) + 6ax^5 + 48ax^3y(x) - 16ax^2 + 96axy(x)^2 + x^6 + 12x^4y(x) - 8x^3 + 48x^2y}{32ax + 16x^2 + 64y(x) + 64}$$

✓ **Mathematica** : cpu = 1.45908 (sec), leaf count = 213

$$\mathrm{Solve}\left[x - 4\mathrm{RootSum}\left[\#1^6 + 6\#1^5a + 12\#1^4a^2 + 12\#1^4y(x) + 8\#1^3a^3 + 48\#1^3ay(x) + 48\#1^2a^2y(x) + 8\#1^2a\right.\right.$$

✓ **Maple** : cpu = 0.059 (sec), leaf count = 41

$$\left\{y(x) = -\frac{ax}{2} - \frac{x^2}{4} + \mathrm{RootOf}\left(c_1 - x + \int^{\_Z} \frac{2\_a+2}{2\_a^3 + \_aa + a} d\_a\right)\right\}$$

2.946 ODE No. 946

$$y'(x) = \frac{x\left(12e^{-x^2}x^2y(x)^2 + 8e^{-x^2}x^2y(x) - 8e^{-x^2}y(x) + 4e^{-2x^2}x^2 + 8e^{-x^2}x^2 - 8e^{-x^2} + e^{-3x^2}x^6 - 6e^{-2x^2}x^4y(x)\right.}{4e^{-x^2}x^2 - 8y(x) - 8}$$

✓ **Mathematica** : cpu = 0.747656 (sec), leaf count = 150

$$\left\{\left\{y(x) \to -\frac{1}{2}e^{-x^2}\left(2e^{x^2} - x^2\right) + \frac{e^{-3x^2}}{8\left(\frac{1}{8}e^{-3x^2} - \frac{e^{-3x^2}}{\sqrt{-64x^2+c_1}}\right)}\right\}, \left\{y(x) \to -\frac{1}{2}e^{-x^2}\left(2e^{x^2} - x^2\right) + \frac{e^{-3x^2}}{8\left(\frac{1}{8}e^{-3x^2} + \frac{}{\sqrt{}}\right.}\right.\right.$$

✓ **Maple** : cpu = 0.15 (sec), leaf count = 85

$$\left\{y(x) = \frac{\left(\sqrt{-x^2+c_1} - 1\right)x^2\mathrm{e}^{-x^2} + 2}{2\sqrt{-x^2+c_1} - 2}, y(x) = \frac{\left(\sqrt{-x^2+c_1} + 1\right)x^2\mathrm{e}^{-x^2} - 2}{2\sqrt{-x^2+c_1} + 2}\right\}$$

2.947 ODE No. 947

$$y'(x) = \frac{x^3 \sin(x) + x^2 y(x)^2 + 2x^2 y(x) \cos(x) + \frac{x^2}{2} + x^2 \cos(x) + \frac{1}{2}x^2 \cos(2x) + 2xy(x) - 2xy(x)\sin(x) + x - x \mathrm{si}}{x^3}$$

✓ **Mathematica** : cpu = 0.421973 (sec), leaf count = 30

$$\left\{\left\{y(x) \to -\frac{-\sin(x) + x\cos(x) + 1}{x} + \frac{1}{-\log(x) + c_1}\right\}\right\}$$

✓ **Maple** : cpu = 0.273 (sec), leaf count = 44

$$\left\{y(x) = \frac{-c_1 x \cos(x) + c_1 \sin(x) - c_1 + x + (x\cos(x) - \sin(x) + 1)\ln(x)}{(c_1 - \ln(x))\, x}\right\}$$

2.948 ODE No. 948

$$y'(x) = -\frac{216y(x)}{36x^2 + 4y(x)^8 + 12y(x)^7 + 33y(x)^6 + 60y(x)^5 - 24xy(x)^4 - 216y(x)^4 - 36xy(x)^3 - 252y(x)^3 - 72xy(}$$

✓ **Mathematica** : cpu = 0.750967 (sec), leaf count = 39

$$\text{Solve}\left[\frac{36}{y(x)\,(2y(x)^3 + 3y(x)^2 + 6y(x) + 6) - 6x} + \log(y(x)) = c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.323 (sec), leaf count = 68

$$\{y(x) = e^{\mathrm{RootOf}(36c_1x - 36c_1 e^{\_Z} - 36c_1 e^{2\_Z} - 18c_1 e^{3\_Z} - 12c_1 e^{4\_Z} + 6\_Zx - 6\_Z e^{\_Z} - 6\_Z e^{2\_Z} - 3\_Z e^{3\_Z} - 2\_Z e^{4\_Z} - 36)}\}$$

2.949 ODE No. 949

$$y'(x) = \frac{x^6 - 3x^5 + 3x^4 y(x) + x^4 - 6x^3 y(x) + 2x^3 + 3x^2 y(x)^2 + x^2 y(x) - 3x^2 - 3xy(x)^2 + xy(x) + y(x)^3 + x}{x\,(x^2 + y(x) - x + 1)}$$

✓ **Mathematica** : cpu = 0.235079 (sec), leaf count = 76

$$\left\{\left\{y(x) \to -x^2 + x + \frac{1}{x\left(\frac{1}{x} - \frac{1}{x\sqrt{-2\log(x) + c_1}}\right)} - 1\right\}, \left\{y(x) \to -x^2 + x + \frac{1}{x\left(\frac{1}{x} + \frac{1}{x\sqrt{-2\log(x) + c_1}}\right)} - 1\right\}\right\}$$

✓ **Maple** : cpu = 0.048 (sec), leaf count = 81

$$\left\{y(x) = \frac{-x^2 + x + (-x^2 + x)\sqrt{c_1 - 2\ln(x)} - 1}{1 + \sqrt{c_1 - 2\ln(x)}}, y(x) = \frac{x^2 - x + (-x^2 + x)\sqrt{c_1 - 2\ln(x)} + 1}{-1 + \sqrt{c_1 - 2\ln(x)}}\right\}$$

2.950 ODE No. 950

$$y'(x) = \frac{a^3x^6}{64} + \frac{3}{32}a^2bx^5 + \frac{3}{16}a^2x^4y(x) + \frac{a^2x^4}{16} + \frac{3}{16}ab^2x^4 + \frac{3}{4}abx^3y(x) + \frac{1}{4}abx^3 + \frac{3}{4}ax^2y(x)^2 + \frac{1}{2}ax^2y(x) - \frac{ax}{2} + \frac{b^3x^3}{8} +$$

✓ **Mathematica** : cpu = 0.560059 (sec), leaf count = 141

$$\text{Solve}\left[-\frac{1}{3}(27b+58)^{2/3}\text{RootSum}\left[\#1^3(27b+58)^{2/3} - 3\ 2^{2/3}\#1 + (27b+58)^{2/3}\&, \frac{\log\left(\frac{\sqrt[3]{2}\left(\frac{1}{4}(3ax^2+6bx+4)+3y(x)\right)}{\sqrt[3]{27b+58}}\right.}{2^{2/3} - \#1^2(27b+58)^{2/3}}\right.\right.$$

✓ **Maple** : cpu = 0.085 (sec), leaf count = 42

$$\left\{y(x) = -\frac{a\,x^2}{4} - \frac{bx}{2} + \text{RootOf}\left(c_1 - x + 2\left(\int^{\_Z} \frac{1}{2\_a^3 + 2\_a^2 + b + 2}d\_a\right)\right)\right\}$$

2.951 ODE No. 951

$$y'(x) = \frac{a^3x^3}{8} + \frac{3a^2x^4}{16} + \frac{3}{4}a^2x^2y(x) + \frac{a^2x^2}{4} + \frac{3ax^5}{32} + \frac{3}{4}ax^3y(x) + \frac{ax^3}{4} + \frac{3}{2}axy(x)^2 + axy(x) + \frac{x^6}{64} + \frac{3}{16}x^4y(x) + \frac{x^4}{16} + \frac{3}{4}x^2y$$

✓ **Mathematica** : cpu = 0.459707 (sec), leaf count = 140

$$\text{Solve}\left[-\frac{1}{3}(27a+58)^{2/3}\text{RootSum}\left[\#1^3(27a+58)^{2/3} - 3\ 2^{2/3}\#1 + (27a+58)^{2/3}\&, \frac{\log\left(\frac{\sqrt[3]{2}\left(\frac{1}{4}(6ax+3x^2+4)+3y(x)\right)}{\sqrt[3]{27a+58}}\right.}{2^{2/3} - \#1^2(27a+58)^{2/}}\right.\right.$$

✓ **Maple** : cpu = 0.07 (sec), leaf count = 41

$$\left\{y(x) = -\frac{ax}{2} - \frac{x^2}{4} + \text{RootOf}\left(c_1 - x + 2\left(\int^{\_Z} \frac{1}{2\_a^3 + 2\_a^2 + a + 2}d\_a\right)\right)\right\}$$

2.952 ODE No. 952

$$y'(x) = \frac{-x^2\sqrt{x^2+y(x)^2} + xy(x)\sqrt{x^2+y(x)^2} + x^5\left(-\sqrt{x^2+y(x)^2}\right) + x^4y(x)\sqrt{x^2+y(x)^2} - x^4\sqrt{x^2+y(x)^2} +}{x}$$

✓ **Mathematica** : cpu = 0.418874 (sec), leaf count = 341

$$\left\{\left\{y(x) \to \frac{x - 2\sqrt{x^2\tanh^2\left(\frac{1}{20}\left(-4\sqrt{2}x^5 - 5\sqrt{2}x^4 - 10\sqrt{2}x^2 - 20\sqrt{2}c_1\right)\right) - x^2\tanh^4\left(\frac{1}{20}\left(-4\sqrt{2}x^5 - 5\sqrt{2}x^4 - \right.\right.}}{-1 + 2\tanh^2\left(\frac{1}{20}\left(-4\sqrt{2}x^5 - 5\sqrt{2}x^4 - 10\sqrt{2}x^2 - 20\sqrt{2}c_1\right)\right)}\right.\right.$$

✓ **Maple** : cpu = 0.263 (sec), leaf count = 62

$$\left\{-c_1 - \ln(x) + \ln\left(\frac{2\left(x + y(x) + \sqrt{2x^2 + 2y(x)^2}\right)x}{-x + y(x)}\right) + \frac{(4x^5 + 5x^4 + 10x^2)\sqrt{2}}{20} = 0\right\}$$

2.953 ODE No. 953

$$y'(x) = \frac{y(x)\left(x^4 \log^2(y(x)) + 2x^4 \log(x)\log(y(x)) + x^4 \log^2(x) + x^3 \log^2(y(x)) + 2x^3 \log(x)\log(y(x)) + x^3 \log^2(x\right.}{x}$$

✓ **Mathematica** : cpu = 0.285284 (sec), leaf count = 36

$$\left\{\left\{y(x) \to \frac{e^{-\frac{20x}{4x^5+5x^4+10x^2+20c_1}}}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.41 (sec), leaf count = 145

$$\left\{y(x) = x^{-\frac{20c_1}{4x^5+5x^4+10x^2+20c_1}} x^{-\frac{10x^2}{4x^5+5x^4+10x^2+20c_1}} x^{-\frac{5x^4}{4x^5+5x^4+10x^2+20c_1}} x^{-\frac{4x^5}{4x^5+5x^4+10x^2+20c_1}} \mathrm{e}^{-\frac{20x}{4x^5+5x^4+10x^2+20c_1}}\right\}$$

2.954 ODE No. 954

$$y'(x) = \frac{\frac{24}{5}x^{7/2}y(x) - \frac{24x^{13/2}}{25} + \frac{8x^{7/2}}{5} - 8x^{3/2} - \frac{8x^9}{125} + \frac{12}{25}x^6 y(x) + \frac{4x^6}{25} - \frac{24x^4}{5} - \frac{6}{5}x^3 y(x)^2 - \frac{4}{5}x^3 y(x) + \frac{6x^3}{5} + 12xy}{x}$$

✓ **Mathematica** : cpu = 0.386415 (sec), leaf count = 115

$$\text{Solve}\left[-\frac{29}{3}\text{RootSum}\left[-29\#1^3 + 3\sqrt[3]{29}\#1 - 29\&, \frac{\log\left(\frac{\frac{-6x^3-30\sqrt{x}+5}{5x} + \frac{3y(x)}{x}}{\sqrt[3]{29}\sqrt[3]{\frac{1}{x^3}}} - \#1\right)}{\sqrt[3]{29} - 29\#1^2}\&\right] = \frac{1}{9}29^{2/3}\left(\frac{1}{x^3}\right)^{2/3} x^2 \log(x\right.$$

✓ **Maple** : cpu = 0.09 (sec), leaf count = 53

$$\left\{y(x) = \frac{18x^{\frac{7}{2}} + 145\sqrt{x}\ \mathrm{RootOf}\left(3c_1 - 81\left(\int^{-Z} \frac{1}{841\_a^3 - 27\_a + 27} d\_a\right) + \ln(x)\right) + 90x - 15\sqrt{x}}{45\sqrt{x}}\right\}$$

2.955 ODE No. 955

$$y'(x) = \frac{-24x^{7/2}y(x) + \frac{24x^{13/2}}{5} + 14x^{7/2} + 40x^{3/2} + \frac{8x^9}{25} - \frac{12}{5}x^6y(x) + \frac{12x^6}{5} + 24x^4 + 6x^3y(x)^2 - 6x^3y(x) - 6x^3 -}{x\left(2x^3 - 5y(x) + 10\sqrt{x} - 5\right)}$$

✓ **Mathematica** : cpu = 0.365493 (sec), leaf count = 112

$$\left\{\left\{y(x) \to \frac{1}{5}\left(2x^3 + 10\sqrt{x} - 5\right) - \frac{1}{125x\left(-\frac{1}{125x} - \frac{1}{x\sqrt{-31250\log(x)+c_1}}\right)}\right\}, \left\{y(x) \to \frac{1}{5}\left(2x^3 + 10\sqrt{x} - 5\right) - \frac{}{125x\left(\right.}\right.$$

✓ **Maple** : cpu = 0.109 (sec), leaf count = 101

$$\left\{y(x) = \frac{-2x^3 - 10\sqrt{x} + \left(2x^3 + 10\sqrt{x}\right)\sqrt{c_1 - 2\ln(x)} + 5}{5\sqrt{c_1 - 2\ln(x)} - 5}, y(x) = \frac{2x^3 + 10\sqrt{x} + \left(2x^3 + 10\sqrt{x}\right)\sqrt{c_1 - 2\ln(x)}}{5\sqrt{c_1 - 2\ln(x)} + 5}\right.$$

2.956 ODE No. 956

$$y'(x) = \frac{y(x)\left(y(x)e^{\frac{2\log^2(x)}{\log(x)+1}}x^{\frac{2}{\log(x)+1}+2} + y(x)e^{\frac{2\log^2(x)}{\log(x)+1}}\log^2(x)x^{\frac{2}{\log(x)+1}+2} + 2y(x)e^{\frac{2\log^2(x)}{\log(x)+1}}\log(x)x^{\frac{2}{\log(x)+1}+2} - e^{\frac{2\log^2(x)}{\log(x)+1}}\right.}{x(\log(x)+1)}$$

✓ **Mathematica** : cpu = 1.3383 (sec), leaf count = 28

$$\left\{\left\{y(x) \to \frac{1}{\left(1 + c_1e^{\frac{x^4}{4}}\right)(\log(x) + 1)}\right\}\right\}$$

✓ **Maple** : cpu = 0.181 (sec), leaf count = 79

$$\left\{y(x) = \frac{e^{-\frac{x^4}{4}}}{(\ln(x) + 1)\left((\ln(x) + 1)\,x^{-\frac{2\ln(x)}{\ln(x)+1}}e^{\frac{-x^4\ln(x) - x^4 + 8\ln(x)^2 + (-4\ln(x) - 4)\ln(\ln(x)+1)}{4\ln(x)+4}} + c_1\right)}\right\}$$

2.957 ODE No. 957

$$y'(x) = \frac{y(x)\left(y(x)e^{\frac{2\log^2(x)}{\log(x)+1}}x^{\frac{2}{\log(x)+1}+3} + y(x)e^{\frac{2\log^2(x)}{\log(x)+1}}\log^2(x)x^{\frac{2}{\log(x)+1}+3} + 2y(x)e^{\frac{2\log^2(x)}{\log(x)+1}}\log(x)x^{\frac{2}{\log(x)+1}+3} - e^{\frac{2\log^2(}{\log(x)+}}\right.}{x(\log(x)+1)}$$

✓ **Mathematica** : cpu = 1.32372 (sec), leaf count = 28

$$\left\{\left\{y(x)\to\frac{1}{\left(1+c_1e^{\frac{x^5}{5}}\right)(\log(x)+1)}\right\}\right\}$$

✓ **Maple** : cpu = 0.112 (sec), leaf count = 79

$$\left\{y(x)=\frac{\mathrm{e}^{-\frac{x^5}{5}}}{(\ln(x)+1)\left((\ln(x)+1)\,x^{-\frac{2\ln(x)}{\ln(x)+1}}\mathrm{e}^{\frac{-x^5\ln(x)-x^5+10\ln(x)^2+(-5\ln(x)-5)\ln(\ln(x)+1)}{5\ln(x)+5}}+c_1\right)}\right\}$$

2.958 ODE No. 958

$$y'(x) = \frac{2xy(x)^3 + y(x)^3 + 2xy(x)^2 + y(x)^2 + 6xy(x)\log^2(2x+1) + 3y(x)\log^2(2x+1) + 6xy(x)^2\log(2x+1) +}{}$$

✓ **Mathematica** : cpu = 0.481477 (sec), leaf count = 82

$$\text{Solve}\left[-\frac{29}{3}\text{RootSum}\left[-29\#1^3+3\sqrt[3]{29}\#1-29\&,\frac{\log\left(\frac{3y(x)+3\log(2x+1)+1}{\sqrt[3]{29}}-\#1\right)}{\sqrt[3]{29}-29\#1^2}\&\right]=\frac{1}{9}29^{2/3}x+c_1,y(x)\right]$$

✓ **Maple** : cpu = 0.071 (sec), leaf count = 40

$$\left\{y(x)=\frac{29\,\text{RootOf}\left(3c_1+x-81\left(\int^{\_Z}\frac{1}{841\_a^3-27\_a+27}d\_a\right)\right)}{9}-\ln(2x+1)-\frac{1}{3}\right\}$$

2.959 ODE No. 959

$$y'(x) = \frac{\csc\left(\frac{y(x)}{2x}\right)\sec\left(\frac{y(x)}{2x}\right)\sec\left(\frac{y(x)}{x}\right)\left(x^3\sin\left(\frac{y(x)}{2x}\right)\sin\left(\frac{y(x)}{x}\right)\cos\left(\frac{y(x)}{2x}\right) - \frac{1}{2}y(x)\sin\left(\frac{y(x)}{x}\right) + \frac{1}{2}y(x)\sin\left(\frac{y(x)}{2x}\right)\right.}{x}$$

✓ **Mathematica** : cpu = 0.25737 (sec), leaf count = 20

$$\left\{\left\{y(x)\to x\sin^{-1}\left(e^{\frac{x^2}{2}+c_1}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.154 (sec), leaf count = 15

$$\left\{y(x) = x\arcsin\left(c_1 \mathrm{e}^{\frac{x^2}{2}}\right)\right\}$$

2.960 ODE No. 960

$$y'(x) = \frac{\csc\left(\frac{y(x)}{2x}\right)\sec\left(\frac{y(x)}{2x}\right)\sec\left(\frac{y(x)}{x}\right)\left(x^2\sin\left(\frac{y(x)}{2x}\right)\sin\left(\frac{y(x)}{x}\right)\cos\left(\frac{y(x)}{2x}\right) - \frac{1}{2}y(x)\sin\left(\frac{y(x)}{x}\right) + \frac{1}{2}y(x)\sin\left(\frac{y(x)}{2x}\right)\right.}{x}$$

✓ **Mathematica** : cpu = 0.197503 (sec), leaf count = 14

$$\left\{\left\{y(x)\to x\sin^{-1}\left(e^{x+c_1}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.152 (sec), leaf count = 11

$$\left\{y(x) = x\arcsin\left(c_1 \mathrm{e}^{x}\right)\right\}$$

2.961 ODE No. 961

$$y'(x) = \frac{\exp\left(-2x^6+6x^4y(x)^2+2x^4-6x^2y(x)^4-4x^2y(x)^2+2y(x)^6+2y(x)^4+2\right)+x^2+2xy(x)+y(x)^2}{-\exp\left(-2x^6+6x^4y(x)^2+2x^4-6x^2y(x)^4-4x^2y(x)^2+2y(x)^6+2y(x)^4+2\right)+x^2+2xy(x)+y(x)^2}$$

✓ **Mathematica** : cpu = 5.85944 (sec), leaf count = 813

$$\text{Solve}\left[\int_1^x\left(\frac{1}{K[1]+y(x)} - \frac{2e^{2K[1]^6+6y(x)^4K[1]^2+4y(x)^2K[1]^2}K[1]}{e^{2K[1]^6+6y(x)^4K[1]^2+4y(x)^2K[1]^2}K[1]^2 - e^{2y(x)^6+2y(x)^4+6K[1]^4y(x)^2+2K[1]^4+2} - e^{2K[1]^6+6y(x}\right.\right.$$

✓ **Maple** : cpu = 0.437 (sec), leaf count = 45

$$\left\{y(x) = -x + \mathrm{e}^{\mathrm{RootOf}\left(c_1 - \_Z + \int^{-2x\,\mathrm{e}^{-\_Z}+\mathrm{e}^{2\_Z}} \frac{1}{\_a+\mathrm{e}^{2\_a^3+2\_a^2+2}}d\_a\right)}\right\}$$

2.962 ODE No. 962

$$y'(x) = \frac{4(a-1)(a+1)x(a^2x^2 - x^2 -}{a^8x^6 - 4a^6x^6 - 3a^6x^4y(x)^2 + 6a^4x^6 + 9a^4x^4y(x)^2 + 3a^4x^2y(x)^4 - 4a^2x^6 - 9a^2x^4y(x)^2 - 6a^2x^2y(x)^4 + 4}$$

✓ **Mathematica** : cpu = 5.3234 (sec), leaf count = 1191

$$\{\{y(x) \to \text{Root}\left[2x^4a^8 - 8x^4a^6 + e^{c_1}x^4a^4 + 11x^4a^4 - 2e^{c_1}x^4a^2 - 6x^4a^2 + 4x^2a^2 + (2a^2-2)\#1^5 + e^{c_1}x^4 + x^4 +\right.$$

✓ **Maple** : cpu = 1.338 (sec), leaf count = 79

$$\left\{c_1 - \frac{y(x)}{(a-1)(a+1)} + \frac{2}{(a^2-1)^2\left(a^2x^2 - x^2 - y(x)^2\right)^2} - \frac{2}{(a^2-1)^2\left(a^2x^2 - x^2 - y(x)^2\right)} = 0\right\}$$

2.963 ODE No. 963

$$y'(x) = \frac{-\frac{5x^3}{2} + \frac{15}{4}x^3\cos(x) - \frac{3}{2}x^3\cos(2x) + \frac{1}{4}x^3\cos(3x) + \frac{9}{2}x^2y(x) - 6x^2y(x)\cos(x) + \frac{3}{2}x^2y(x)\cos(2x) + \frac{3x^2}{2} +}{}$$

✓ **Mathematica** : cpu = 0.545794 (sec), leaf count = 108

$$\text{Solve}\left[-\frac{29}{3}\text{RootSum}\left[-29\#1^3 + 3\sqrt[3]{29}\#1 - 29\&, \frac{\log\left(\frac{\frac{3y(x)}{x} + \frac{-3x+3x\cos(x)+1}{x}}{\sqrt[3]{29}\sqrt[3]{\frac{1}{x^3}}} - \#1\right)}{\sqrt[3]{29} - 29\#1^2}\&\right] = \frac{1}{9}29^{2/3}\left(\frac{1}{x^3}\right)^{2/3}x^2\log(\right.$$

✓ **Maple** : cpu = 0.196 (sec), leaf count = 39

$$\left\{y(x) = -x\cos(x) + x + \frac{29\,\text{RootOf}\left(3c_1 - 81\left(\int^{\_Z}\frac{1}{841\_a^3 - 27\_a + 27}d\_a\right) + \ln(x)\right)}{9} - \frac{1}{3}\right\}$$

2.964 ODE No. 964

$$y'(x) = -\frac{}{a^8x^6 - 4a^6x^6 - 3a^6x^4y(x)^2 - 2a^6x^4 + 6a^4x^6 + 9a^4x^4y(x)^2 + 6a^4x^4 + 3a^4x^2y(x)^4 + 4a^4x^2y(x)^2 - 4a^2x}$$

✓ **Mathematica** : cpu = 4.92098 (sec), leaf count = 264

$$\text{Solve}\left[\frac{y(x)}{(a-1)(a+1)} - \frac{8\text{RootSum}\left[-\#1^3a^6 + 3\#1^3a^4 - 3\#1^3a^2 + \#1^3 + 3\#1^2a^4y(x)^2 + 2\#1^2a^4 - 6\#1^2a^2y(x\right.}{}\right.$$

✓ **Maple** : cpu = 2.188 (sec), leaf count = 80

$$\left\{-c_1 + \frac{4\ln\left(-a^2x^2 + x^2 + y(x)^2 - \text{RootOf}\left(\_Z^3 + 2\_Z^2 + 8\right)\right)}{(a^4 - 2a^2 + 1)\left(3\,\text{RootOf}\left(\_Z^3 + 2\_Z^2 + 8\right)^2 + 4\,\text{RootOf}\left(\_Z^3 + 2\_Z^2 + 8\right)\right)} + \frac{y(x)}{(a-1)(a+1)} = 0\right\}$$

2.965 ODE No. 965

$$y'(x) = \frac{\csc\left(\frac{y(x)}{2x}\right)\sec\left(\frac{y(x)}{2x}\right)\sec\left(\frac{y(x)}{x}\right)\left(x^4\sin\left(\frac{y(x)}{2x}\right)\sin\left(\frac{y(x)}{x}\right)\cos\left(\frac{y(x)}{2x}\right) + x^3\sin\left(\frac{y(x)}{2x}\right)\sin\left(\frac{y(x)}{x}\right)\cos\left(\frac{y(x)}{2x}\right) -\right.}{}$$

✓ **Mathematica** : cpu = 0.321281 (sec), leaf count = 29

$$\left\{\left\{y(x) \to x\sin^{-1}\left(xe^{\frac{x^3}{3}+\frac{x^2}{2}+c_1}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.155 (sec), leaf count = 26

$$\left\{y(x) = x\arcsin\left(c_1x\,\mathrm{e}^{\frac{x^2}{2}}\,\mathrm{e}^{\frac{x^3}{3}}\right)\right\}$$

2.966 ODE No. 966

$$y'(x) = -\frac{}{216x^3 - 216x^2y(x)^4 - 324x^2y(x)^3 - 648x^2y(x)^2 - 648x^2y(x) + 216x^2 - 8y(x)^{12} - 36y(x)^{11} - 126y(x)}$$

✓ **Mathematica** : cpu = 0.817517 (sec), leaf count = 292

$$\text{Solve}\left[72\text{RootSum}\left[-216\#1^3 + 216\#1^2y(x)^4 + 324\#1^2y(x)^3 + 648\#1^2y(x)^2 + 648\#1^2y(x) - 216\#1^2 - 72\#1y(\right.\right.$$

✓ **Maple** : cpu = 0.625 (sec), leaf count = 50

$$\left\{y(x) = \mathrm{e}^{\text{RootOf}\left(c_1 - \_Z - 6\left(\int^{x-\mathrm{e}^{-\_Z}-\mathrm{e}^{2\_Z}-\frac{\mathrm{e}^{3\_Z}}{2}-\frac{\mathrm{e}^{4\_Z}}{3}}\frac{1}{\_a^3+\_a^2+1}d\_a\right)\right)}\right\}$$

2.967 ODE No. 967

$$y'(x) = -\frac{x(64x^9 - 288x^8y(x) - 96x^8 + 432x^7y(x)^2 + 288x^7y(x) - 144x^7 - 216x^6y(x)^3 - 216x^6y(x)^2 - 288x^6y(}{}$$

✓ **Mathematica** : cpu = 0.585163 (sec), leaf count = 151

$$\text{Solve}\left[-\frac{29}{3}\text{RootSum}\left[-29\#1^3+3\sqrt[3]{29}\#1-29\&,\frac{\log\left(\frac{\frac{3xy(x)}{x^2+1}+\frac{-4x^4+2x^3+5x}{2\left(x^2+1\right)^2}}{\sqrt[3]{29}\sqrt[3]{\frac{x^3}{\left(x^2+1\right)^3}}}-\#1\right)}{\sqrt[3]{29}-29\#1^2}\&\right]=\frac{29^{2/3}\left(\frac{x^3}{\left(x^2+1\right)^3}\right)^{2/3}\left(x^2+\right.}{18x^2}\right.$$

✓ **Maple** : cpu = 0.092 (sec), leaf count = 91

$$\left\{y(x)=\frac{12x^3+58x^2\,\text{RootOf}\left(6c_1-162\left(\int^{-Z}\frac{1}{841\_a^3-27\_a+27}d\_a\right)+\ln\left(x^2+1\right)\right)-6x^2+58\,\text{RootOf}\left(6c_1-16\right.}{18x^2+18}\right.$$

2.968 ODE No. 968

$$y'(x)=\frac{\csc\left(\frac{y(x)}{2x}\right)\sec\left(\frac{y(x)}{2x}\right)\sec\left(\frac{y(x)}{x}\right)\left(x^4\sin\left(\frac{y(x)}{2x}\right)\sin\left(\frac{y(x)}{x}\right)\cos\left(\frac{y(x)}{2x}\right)-\frac{1}{2}xy(x)\sin\left(\frac{y(x)}{x}\right)-\frac{1}{2}y(x)\sin\left(\frac{y(x)}{x}\right.}{}$$

✓ **Mathematica** : cpu = 0.403314 (sec), leaf count = 30

$$\left\{\left\{y(x)\to x\sin^{-1}\left((x+1)e^{\frac{x^2}{2}-x-\frac{3}{2}+c_1}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.179 (sec), leaf count = 22

$$\left\{y(x)=x\arcsin\left(c_1(x+1)\,\mathrm{e}^{-x}\mathrm{e}^{\frac{x^2}{2}}\right)\right\}$$

2.969 ODE No. 969

$$y'(x) = \frac{\csc\left(\frac{y(x)}{2x}\right)\sec\left(\frac{y(x)}{2x}\right)\sec\left(\frac{y(x)}{x}\right)\left(-\frac{1}{2}xy(x)\sin\left(\frac{y(x)}{x}\right) - \frac{1}{2}y(x)\sin\left(\frac{y(x)}{x}\right) + x\sin\left(\frac{y(x)}{2x}\right)\sin\left(\frac{y(x)}{x}\right)\cos\left(\frac{y(x}{2x}\right.}{}$$

✓ **Mathematica** : cpu = 0.280139 (sec), leaf count = 19

$$\left\{\left\{y(x)\to x\sin^{-1}\left(\frac{e^{c_1}x}{x+1}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.175 (sec), leaf count = 15

$$\left\{y(x) = x\arcsin\left(\frac{c_1x}{x+1}\right)\right\}$$

2.970 ODE No. 970

$$y'(x) = -\frac{}{216x^3 - 216x^2y(x)^4 - 324x^2y(x)^3 - 648x^2y(x)^2 - 648x^2y(x) - 8y(x)^{12} - 36y(x)^{11} - 126y(x)^{10} - 315}$$

✓ **Mathematica** : cpu = 0.806748 (sec), leaf count = 66

$$\text{Solve}\left[\frac{36\left(2y(x)^4+3y(x)^3+6y(x)^2+6y(x)-6x-3\right)}{\left(y(x)\left(2y(x)^3+3y(x)^2+6y(x)+6\right)-6x\right)^2}+\log(y(x))=c_1,y(x)\right]$$

✓ **Maple** : cpu = 0.671 (sec), leaf count = 181

$$\left\{\frac{-2c_1y(x)^4 - 3c_1y(x)^3 - 6c_1y(x)^2 + 6c_1x - 6c_1y(x) + \left(2y(x)^4+3y(x)^3+6y(x)^2-6x+6y(x)\right)\ln(y(x)) - 6\sqrt{}}{6c_1 - 6\ln(y(x))}\right.$$

2.971 ODE No. 971

$$y'(x) = \frac{(xy(x)+1)^3}{x^5}$$

✓ **Mathematica** : cpu = 0.32885 (sec), leaf count = 157

$$\text{Solve}\left[\frac{1}{3}\log\left(\frac{\frac{3}{x^3}+\frac{3y(x)}{x^2}}{3\sqrt[3]{-\frac{1}{x^6}}}+1\right)-\frac{1}{6}\log\left(\frac{\left(\frac{3}{x^3}+\frac{3y(x)}{x^2}\right)^2}{9\left(-\frac{1}{x^6}\right)^{2/3}}-\frac{\frac{3}{x^3}+\frac{3y(x)}{x^2}}{3\sqrt[3]{-\frac{1}{x^6}}}+1\right)+\frac{\tan^{-1}\left(\frac{\frac{2\left(\frac{3}{x^3}+\frac{3y(x)}{x^2}\right)}{3\sqrt[3]{-\frac{1}{x^6}}}-1}{\sqrt{3}}\right)}{\sqrt{3}}=-\left(-\right.\right.$$

✓ **Maple** : cpu = 0.309 (sec), leaf count = 86

$$\left\{y(x)=\frac{\left(3\left(-\frac{1}{x^6}\right)^{\frac{1}{3}}x^3\tan\left(\text{RootOf}\left(-18\left(-\frac{1}{x^6}\right)^{\frac{2}{3}}x^3+18c_1-6\sqrt{3}\_Z-\ln\left(\frac{\left(\tan(\_Z)+\sqrt{3}\right)^6}{\left(\tan^2(\_Z)+1\right)^3}\right)\right)\right)+\sqrt{3}\left(\left(-\frac{1}{x^6}\right)\right.\right.}{6x}\right.$$

2.972 ODE No. 972

$$y'(x)=\frac{x\left(-2x^4+2x^2y(x)-x^2+1\right)}{y(x)-x^2}$$

✓ **Mathematica** : cpu = 0.0387993 (sec), leaf count = 32

$$\left\{\left\{y(x)\to x^2+\frac{1}{2}\left(1+W\left(-e^{x^4-2x^2-1+c_1}\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.223 (sec), leaf count = 27

$$\left\{y(x)=x^2+\frac{\text{LambertW}\left(-2c_1\mathrm{e}^{-1}\mathrm{e}^{x^4}\mathrm{e}^{-2x^2}\right)}{2}+\frac{1}{2}\right\}$$

2.973 ODE No. 973

$$y'(x) = e^{-2bx}y(x)\left(e^{bx}y(x) + e^{2bx} + y(x)^2\right)$$

✓ **Mathematica** : cpu = 0.463225 (sec), leaf count = 146

$$\text{Solve}\left[-\frac{1}{3}(9b-7)^{2/3}\text{RootSum}\left[\#1^3(9b-7)^{2/3} - 9\#1b + 6\#1 + (9b-7)^{2/3}\&, \frac{\log\left(\frac{3e^{-2bx}y(x)+e^{-bx}}{\sqrt[3]{(9b-7)e^{-3bx}}} - \#1\right)}{\#1^2\left(-(9b-7)^{2/3}\right) + 3b - 2}\&\right] =$$

✓ **Maple** : cpu = 0.414 (sec), leaf count = 134

$$\left\{y(x) = -\frac{e^{bx}}{2} - \frac{\sqrt{(-4b+3)\,e^{2bx}}\,\tan\left(\text{RootOf}\left(2\_Ze^{bx} + c_1\sqrt{-(4b-3)\,e^{2bx}} - 2\sqrt{-(4b-3)\,e^{2bx}}\,x - \sqrt{-(4b\right.\right.}{2}\right.$$

2.974 ODE No. 974

$$y'(x) = -x^6 + 3x^4y(x) - 3x^2y(x)^2 + y(x)^3 + 2x$$

✓ **Mathematica** : cpu = 0.102738 (sec), leaf count = 39

$$\left\{\left\{y(x) \to x^2 - \frac{1}{\sqrt{-2x+c_1}}\right\}, \left\{y(x) \to x^2 + \frac{1}{\sqrt{-2x+c_1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.039 (sec), leaf count = 57

$$\left\{y(x) = \frac{\sqrt{2c_1-2x}\,x^2-1}{\sqrt{2c_1-2x}}, y(x) = \frac{\sqrt{2c_1-2x}\,x^2+1}{\sqrt{2c_1-2x}}\right\}$$

2.975 ODE No. 975

$$y'(x) = \frac{x^6}{27} + \frac{1}{3}x^4y(x) + x^2y(x)^2 + y(x)^3 - \frac{2x}{3}$$

✓ **Mathematica** : cpu = 0.112429 (sec), leaf count = 47

$$\left\{\left\{y(x) \to -\frac{x^2}{3} - \frac{1}{\sqrt{-2x+c_1}}\right\}, \left\{y(x) \to -\frac{x^2}{3} + \frac{1}{\sqrt{-2x+c_1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.036 (sec), leaf count = 59

$$\left\{y(x) = -\frac{\sqrt{-54c_1-2x}\,x^2-3}{3\sqrt{-54c_1-2x}}, y(x) = -\frac{\sqrt{-54c_1-2x}\,x^2+3}{3\sqrt{-54c_1-2x}}\right\}$$

2.976 ODE No. 976

$$y'(x) = \frac{y(x)\left(x^7 y(x)^2 + x^4 y(x) + x - 3\right)}{x}$$

✓ **Mathematica** : cpu = 0.2118 (sec), leaf count = 101

$$\text{Solve}\left[-\frac{7}{3}\text{RootSum}\left[-7\#1^3 + 6\sqrt[3]{-7}\#1 - 7\&, \frac{\log\left(\frac{3x^6 y(x)+x^3}{\sqrt[3]{7}\sqrt[3]{-x^9}} - \#1\right)}{2\sqrt[3]{-7} - 7\#1^2}\&\right] = \frac{7^{2/3}\left(-x^9\right)^{2/3}}{9x^5} + c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.251 (sec), leaf count = 57

$$\left\{y(x) = \frac{\sqrt{3}\tan\left(\text{RootOf}\left(3c_1\sqrt{3} - 2\_Z - 2\sqrt{3}\,x - \sqrt{3}\ln\left(\frac{\frac{9\left(\tan^2(\_Z)\right)}{7} + \frac{9}{7}}{\left(-3\tan(\_Z)+\sqrt{3}\right)^2}\right)\right)\right) - 1}{2x^3}\right\}$$

2.977 ODE No. 977

$$y'(x) = e^{2x^2} x y(x)\left(e^{-x^2} y(x) + e^{-2x^2} + y(x)^2\right)$$

✓ **Mathematica** : cpu = 0.447476 (sec), leaf count = 139

$$\text{Solve}\left[-\frac{25}{3}\text{RootSum}\left[-25\#1^3 + 24\sqrt[3]{-1}5^{2/3}\#1 - 25\&, \frac{\log\left(\frac{3e^{2x^2} x y(x)+e^{x^2} x}{5^{2/3}\sqrt[3]{-e^{3x^2} x^3}} - \#1\right)}{8\sqrt[3]{-1}5^{2/3} - 25\#1^2}\&\right] = -\frac{5\sqrt[3]{5}e^{x^2} x^3}{18\sqrt[3]{-e^{3x^2} x^3}} + c_1, y$$

✓ **Maple** : cpu = 0.228 (sec), leaf count = 122

$$\left\{y(x) = \frac{\left(\sqrt{11}\tan\left(\text{RootOf}\left(-4\sqrt{11}\,x^2 + 9c_1\sqrt{11} - 8\_Z + 8\sqrt{11}\ln\left(36\tan(\_Z) - \frac{36\sqrt{11}}{11}\right) - 4\sqrt{11}\ln\left(\frac{14256\,e}{}\right.\right.\right.\right.}{2}\right.$$

2.978 ODE No. 978

$$y'(x) = \frac{y(x)\left(x^2 + xy(x) + y(x)^2 + x\right)}{x^2}$$

✓ **Mathematica** : cpu = 0.231291 (sec), leaf count = 60

$$\text{Solve}\left[-\frac{1}{2}\log\left(\frac{y(x)^2}{x^2} + \frac{y(x)}{x} + 1\right) + \log\left(\frac{y(x)}{x}\right) - \frac{\tan^{-1}\left(\frac{\frac{2y(x)}{x}+1}{\sqrt{3}}\right)}{\sqrt{3}} = x + c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.2 (sec), leaf count = 71

$$\left\{y(x) = \frac{\sqrt{3}\,x\tan\left(\text{RootOf}\left(2c_1\sqrt{3} + 2\_Z + 2\sqrt{3}\,x - \sqrt{3}\,\ln\left(\frac{4}{3(\tan^2(\_Z)+1)}\right) - 2\sqrt{3}\,\ln\left(\frac{\tan(\_Z)}{2} - \frac{\sqrt{3}}{6}\right) - \sqrt{3}\,\ln(\right.\right.\right.}{2}\right.$$

2.979 ODE No. 979

$$y'(x) = \frac{-x^3 + 3x^2y(x) - 3xy(x)^2 + y(x)^3 + x}{x}$$

✓ **Mathematica** : cpu = 0.15847 (sec), leaf count = 37

$$\left\{\left\{y(x) \to x - \frac{1}{\sqrt{-2\log(x) + c_1}}\right\}, \left\{y(x) \to x + \frac{1}{\sqrt{-2\log(x) + c_1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.043 (sec), leaf count = 57

$$\left\{y(x) = \frac{\sqrt{2c_1 - 2\ln(x)}\,x - 1}{\sqrt{2c_1 - 2\ln(x)}}, y(x) = \frac{\sqrt{2c_1 - 2\ln(x)}\,x + 1}{\sqrt{2c_1 - 2\ln(x)}}\right\}$$

2.980 ODE No. 980

$$y'(x) = \frac{x^3y(x)^3 + 6x^2y(x)^2 + 12xy(x) + 2x + 8}{x^3}$$

✓ **Mathematica** : cpu = 0.147835 (sec), leaf count = 43

$$\left\{\left\{y(x) \to -\frac{2}{x} - \frac{1}{\sqrt{-2x + c_1}}\right\}, \left\{y(x) \to -\frac{2}{x} + \frac{1}{\sqrt{-2x + c_1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.015 (sec), leaf count = 35

$$\left\{y(x) = -\frac{2}{x} - \frac{1}{\sqrt{c_1 - 2x}}, y(x) = -\frac{2}{x} + \frac{1}{\sqrt{c_1 - 2x}}\right\}$$

2.981 ODE No. 981

$$y'(x) = \frac{a^3x^3y(x)^3 + 3a^2x^2y(x)^2 + a^2x + 3axy(x) + 1}{a^3x^3}$$

✓ **Mathematica** : cpu = 0.167589 (sec), leaf count = 49

$$\left\{\left\{y(x) \to -\frac{1}{ax} - \frac{1}{\sqrt{-2x+c_1}}\right\}, \left\{y(x) \to -\frac{1}{ax} + \frac{1}{\sqrt{-2x+c_1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.023 (sec), leaf count = 41

$$\left\{y(x) = -\frac{1}{ax} - \frac{1}{\sqrt{c_1 - 2x}}, y(x) = -\frac{1}{ax} + \frac{1}{\sqrt{c_1 - 2x}}\right\}$$

2.982 ODE No. 982

$$y'(x) = \frac{1}{2}e^{-\frac{x^2}{2}}y(x)\left(2e^{\frac{x^2}{4}}y(x) + 2e^{\frac{x^2}{2}} + e^{\frac{x^2}{2}}x + 2y(x)^2\right)$$

✓ **Mathematica** : cpu = 0.465858 (sec), leaf count = 132

$$\text{Solve}\left[-\frac{7}{3}\text{RootSum}\left[-7\#1^3 + 6\sqrt[3]{-7}\#1 - 7\&, \frac{\log\left(\frac{3e^{-\frac{x^2}{2}}y(x)+e^{-\frac{x^2}{4}}}{\sqrt[3]{7}\sqrt[3]{-e^{-\frac{3x^2}{4}}}} - \#1\right)}{2\sqrt[3]{-7} - 7\#1^2}\&\right] = \frac{1}{9}7^{2/3}e^{\frac{x^2}{2}}\left(-e^{-\frac{3x^2}{4}}\right)^{2/3}x + c_1$$

✓ **Maple** : cpu = 0.315 (sec), leaf count = 145

$$\left\{-c_1 + \frac{2x}{3} + \frac{2\sqrt{3}\arctan\left(\frac{\left(6\,e^{-\frac{x^2}{2}}y(x)+2\,e^{-\frac{x^2}{4}}\right)\sqrt{3}\,e^{\frac{x^2}{4}}}{9} + \frac{\sqrt{3}}{9}\right)}{9} - \frac{2\ln\left(\left(\left(18\,e^{-\frac{x^2}{2}}y(x) + 6\,e^{-\frac{x^2}{4}}\right)e^{\frac{x^2}{4}} - 6\right)}{3} + \frac{\ln\left(\right.}{}\right.$$

2.983 ODE No. 983

$$y'(x) = \frac{-x^3 + 3x^2 y(x) + x^2 - 3xy(x)^2 + y(x)^3}{(x-1)(x+1)}$$

✓ **Mathematica** : cpu = 0.881286 (sec), leaf count = 238

$$\text{Solve}\left[\frac{1}{3}\log\left(\frac{\frac{3y(x)}{x^2-1}-\frac{3x}{x^2-1}}{3\sqrt[3]{\frac{1}{(x-1)^3(x+1)^3}}}+1\right)-\frac{1}{6}\log\left(\frac{\left(\frac{3y(x)}{x^2-1}-\frac{3x}{x^2-1}\right)^2}{9\left(\frac{1}{(x-1)^3(x+1)^3}\right)^{2/3}}-\frac{\frac{3y(x)}{x^2-1}-\frac{3x}{x^2-1}}{3\sqrt[3]{\frac{1}{(x-1)^3(x+1)^3}}}+1\right)+\frac{\tan^{-1}\left(\frac{\frac{2\left(\frac{3y(x)}{x^2-1}-\frac{3}{x^2}\cdots\right.}{3\sqrt[3]{\frac{1}{(x-1)^3(x\cdots}}}\cdots}{\sqrt{3}}\right.}{\sqrt{3}}\cdots\right.$$

✓ **Maple** : cpu = 0.566 (sec), leaf count = 188

$$\left\{y(x) = \frac{\sqrt{3}\left(\frac{2\sqrt{3}\,x}{3}+\frac{(x^2-1)\left(3\tan\left(\mathrm{RootOf}\left(9\left(\frac{1}{(x+1)^3(x-1)^3}\right)^{\frac{2}{3}}x^4\ln\left(\frac{x-1}{x+1}\right)-18\left(\frac{1}{(x+1)^3(x-1)^3}\right)^{\frac{2}{3}}x^2\ln\left(\frac{x-1}{x+1}\right)+18c_1-6\sqrt{3}\,\_Z+2\ln\left(\cdots\right.\right.\right.\right.}{\cdots}\right.}{2\cdots}\right.$$

2.984 ODE No. 984

$$y'(x) = \frac{e^{-2x}(x-1)y(x)\left(x^2y(x)^2 + e^x xy(x) + e^{2x}\right)}{x}$$

✓ **Mathematica** : cpu = 14.0122 (sec), leaf count = 428

$$\text{Solve}\left[\frac{\sqrt[3]{2}\left(\frac{3e^{-2x}x(x-1)y(x)+e^{-x}(x-1)}{\sqrt[3]{2}\sqrt[3]{e^{-3x}(x-1)^3}}+2^{2/3}\right)\left(2^{2/3}-\frac{2^{2/3}\left(3e^{-2x}x(x-1)y(x)+e^{-x}(x-1)\right)}{\sqrt[3]{e^{-3x}(x-1)^3}}\right)\left(\left(1-\frac{3e^{-2x}x(x-1)y(x)+e^{-x}(x-1\cdots}{\sqrt[3]{e^{-3x}(x-1)^3}}\right.\right.}{9\left(-\frac{e^{3x}(3e^{-2x}x(x-1)y(x)+e\cdots}{(x-1)^3}\right.}\cdots\right.$$

✓ **Maple** : cpu = 0.32 (sec), leaf count = 40

$$\left\{y(x) = \frac{e^{x+\mathrm{RootOf}\left(3c_1e^{-\_Z}+\_Ze^{-\_Z}+xe^{-\_Z}-e^{-\_Z}\ln\left(\frac{(e^{-\_Z}+9)x}{2}\right)+9\right)}}{9x}\right\}$$

2.985 ODE No. 985

$$y'(x) = \frac{(xy(x)+1)\left(x^2y(x)^2+x^2y(x)+x^2+2xy(x)+x+1\right)}{x^5}$$

✓ **Mathematica** : cpu = 0.375672 (sec), leaf count = 103

$$\text{Solve}\left[-\frac{17}{3}\text{RootSum}\left[-17\#1^3+3\sqrt[3]{-34}\#1-17\&,\frac{\log\left(\frac{\frac{x+3}{x^3}+\frac{3y(x)}{x^2}}{\sqrt[3]{34}\sqrt[3]{-\frac{1}{x^6}}}-\#1\right)}{\sqrt[3]{-34}-17\#1^2}\&\right]=-\frac{1}{9}34^{2/3}\left(-\frac{1}{x^6}\right)^{2/3}x^3+c_1,y(\right.$$

✓ **Maple** : cpu = 0.042 (sec), leaf count = 43

$$\left\{y(x)=\frac{17x\,\text{RootOf}\left(3c_1x+162x\left(\int^{-Z}\frac{1}{289\_a^3+54\_a-54}d\_a\right)+2\right)-3x-9}{9x}\right\}$$

2.986 ODE No. 986

$$y'(x) = \frac{-x^3\log^3(x)+3x^2y(x)\log^2(x)+x^2+y(x)^3+xy(x)-3xy(x)^2\log(x)}{x^2}$$

✓ **Mathematica** : cpu = 0.13045 (sec), leaf count = 44

$$\left\{\left\{y(x)\to x\log(x)-\frac{x}{\sqrt{-2x+c_1}}\right\},\left\{y(x)\to x\log(x)+\frac{x}{\sqrt{-2x+c_1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.048 (sec), leaf count = 36

$$\left\{y(x)=x\ln(x)-\frac{x}{\sqrt{c_1-2x}},y(x)=x\ln(x)+\frac{x}{\sqrt{c_1-2x}}\right\}$$

2.987 ODE No. 987

$$y'(x) = \frac{y(x)}{x}-F(x)\left(y(x)^2-ax^2\right)$$

✓ **Mathematica** : cpu = 0.171068 (sec), leaf count = 41

$$\left\{\left\{y(x)\to\sqrt{a}x\tanh\left(\sqrt{a}\int_1^x F(K[1])K[1]dK[1]+\sqrt{a}c_1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.055 (sec), leaf count = 22

$$\left\{y(x)=\sqrt{a}\,x\tanh\left(\left(c_1+\int xF(x)\,dx\right)\sqrt{a}\right)\right\}$$

2.988 ODE No. 988

$$y'(x) = \frac{y(x)}{x} - F(x)\left(-x^2 - 2xy(x) + y(x)^2\right)$$

✓ **Mathematica** : cpu = 0.232251 (sec), leaf count = 107

$$\left\{\left\{y(x) \to -\frac{x\left(-\exp\left(2\sqrt{2}\left(\int_1^x -F(K[1])K[1]dK[1] + c_1\right)\right) + \sqrt{2}\exp\left(2\sqrt{2}\left(\int_1^x -F(K[1])K[1]dK[1] + c_1\right)\right) - 1 -}{1 + \exp\left(2\sqrt{2}\left(\int_1^x -F(K[1])K[1]dK[1] + c_1\right)\right)}\right.\right.$$

✓ **Maple** : cpu = 0.042 (sec), leaf count = 29

$$\left\{y(x) = \frac{\left(2\tanh\left(\left(c_1 + \int xF(x)\,dx\right)\sqrt{2}\right) + \sqrt{2}\right)\sqrt{2}\,x}{2}\right\}$$

2.989 ODE No. 989

$$y'(x) = \frac{y(x)}{x} - F(x)\left(-ay(x)^2 - bx^2\right)$$

✓ **Mathematica** : cpu = 0.263336 (sec), leaf count = 56

$$\left\{\left\{y(x) \to \frac{\sqrt{b}x\tan\left(\sqrt{a}\sqrt{b}\int_1^x F(K[1])K[1]dK[1] + \sqrt{a}\sqrt{b}c_1\right)}{\sqrt{a}}\right\}\right\}$$

✓ **Maple** : cpu = 0.049 (sec), leaf count = 29

$$\left\{y(x) = \frac{\sqrt{ab}\,x\tan\left(\sqrt{ab}\left(c_1 + \int xF(x)\,dx\right)\right)}{a}\right\}$$

2.990 ODE No. 990

$$y'(x) = 2x - F(x)\left(-x^4 + 2x^2y(x) - y(x)^2 + 1\right)$$

✓ **Mathematica** : cpu = 0.231306 (sec), leaf count = 58

$$\left\{\left\{y(x) \to \frac{\exp\left(\int_1^x 2F(K[5])dK[5]\right)}{-\int_1^x \exp\left(\int_1^{K[6]} 2F(K[5])dK[5]\right)F(K[6])dK[6] + c_1} + x^2 + 1\right\}\right\}$$

✓ **Maple** : cpu = 0.469 (sec), leaf count = 44

$$\left\{y(x) = \frac{c_1x^2 - x^2\mathrm{e}^{\int 2F(x)dx} + c_1 + \mathrm{e}^{\int 2F(x)dx}}{c_1 - \mathrm{e}^{\int 2F(x)dx}}\right\}$$

2.991 ODE No. 991

$$y'(x) = \frac{y(x)}{x} - F(x)\left(x^2 + 2xy(x) - y(x)^2\right)$$

✓ **Mathematica** : cpu = 0.206408 (sec), leaf count = 104

$$\left\{\left\{y(x) \to -\frac{x\left(-\exp\left(2\sqrt{2}\left(\int_1^x F(K[1])K[1]dK[1] + c_1\right)\right) + \sqrt{2}\exp\left(2\sqrt{2}\left(\int_1^x F(K[1])K[1]dK[1] + c_1\right)\right) - 1 - \sqrt{2}\right.}{1 + \exp\left(2\sqrt{2}\left(\int_1^x F(K[1])K[1]dK[1] + c_1\right)\right)}\right.\right.$$

✓ **Maple** : cpu = 0.037 (sec), leaf count = 29

$$\left\{y(x) = \frac{\left(-2\tanh\left(\left(c_1 + \int xF(x)\,dx\right)\sqrt{2}\right) + \sqrt{2}\right)\sqrt{2}\,x}{2}\right\}$$

2.992 ODE No. 992

$$y'(x) = \frac{y(x)}{x} - F(x)\left(-x^3 - 7xy(x)^2\right)$$

✓ **Mathematica** : cpu = 0.141589 (sec), leaf count = 43

$$\left\{\left\{y(x) \to \frac{x\tan\left(\sqrt{7}\int_1^x F(K[1])K[1]^2dK[1] + \sqrt{7}c_1\right)}{\sqrt{7}}\right\}\right\}$$

✓ **Maple** : cpu = 0.042 (sec), leaf count = 25

$$\left\{y(x) = \frac{\sqrt{7}\,x\tan\left(\left(c_1 + \int x^2F(x)\,dx\right)\sqrt{7}\right)}{7}\right\}$$

2.993 ODE No. 993

$$y'(x) = \frac{y(x)}{x\log(x)} - F(x)\left(-y(x)^2 - 2y(x)\log(x) - \log^2(x)\right)$$

✓ **Mathematica** : cpu = 1.82952 (sec), leaf count = 73

$$\left\{\left\{y(x) \to \frac{\int_1^x \frac{F(K[5])}{\sqrt{\frac{1}{\log^2(K[5])}}}dK[5] - 1 + c_1}{\sqrt{\frac{1}{\log^2(x)}}\int_1^x \frac{F(K[5])}{\sqrt{\frac{1}{\log^2(K[5])}}}dK[5] + c_1\sqrt{\frac{1}{\log^2(x)}}}\right\}\right\}$$

✓ **Maple** : cpu = 0.03 (sec), leaf count = 35

$$\left\{y(x) = -\frac{\left(-c_1 + \int -2F(x)\ln(x)\,dx - 2\right)\ln(x)}{-c_1 + \int -2F(x)\ln(x)\,dx}\right\}$$

2.994 ODE No. 994

$$y'(x) = \frac{y(x)}{x\log(x)} - x^3\left(-y(x)^2 - 2y(x)\log(x) - \log^2(x)\right)$$

✓ **Mathematica** : cpu = 0.244527 (sec), leaf count = 198

$$\left\{\left\{y(x) \to -\frac{\frac{1}{16}x^4 e^{\frac{1}{16}x^4(4\log(x)-1)}(4\log(x)-1)\left(\frac{x^3}{4} + \frac{1}{4}x^3(4\log(x)-1)\right) + \frac{1}{4}x^3 e^{\frac{1}{16}x^4(4\log(x)-1)} + \frac{1}{4}x^3 e^{\frac{1}{16}x^4(4\log(x)}}{x^3\left(\frac{1}{16}x^4 e^{\frac{1}{16}x^4(4\log(x)-1)}(4\log(x)-1) + c_1 e^{\frac{1}{16}x^4}\right.}\right.\right.$$

✓ **Maple** : cpu = 0.036 (sec), leaf count = 43

$$\left\{y(x) = -\frac{\left(4x^4\ln(x) - x^4 + 8c_1 + 16\right)\ln(x)}{4x^4\ln(x) - x^4 + 8c_1}\right\}$$

2.995 ODE No. 995

$$y'(x) = (y(x) - e^x)^2 + e^x$$

✓ **Mathematica** : cpu = 0.23995 (sec), leaf count = 17

$$\left\{\left\{y(x) \to e^x + \frac{1}{-x + c_1}\right\}\right\}$$

✓ **Maple** : cpu = 0.144 (sec), leaf count = 14

$$\left\{y(x) = e^x + \frac{1}{c_1 - x}\right\}$$

2.996 ODE No. 996

$$y'(x) = \frac{(y(x) - \mathrm{Si}(x))^2 + \sin(x)}{x}$$

✓ **Mathematica** : cpu = 0.177101 (sec), leaf count = 17

$$\left\{\left\{y(x) \to \mathrm{Si}(x) + \frac{1}{-\log(x) + c_1}\right\}\right\}$$

✓ **Maple** : cpu = 0.079 (sec), leaf count = 15

$$\left\{y(x) = \mathrm{sinIntegral}(x) + \frac{1}{c_1 - \ln(x)}\right\}$$

2.997 ODE No. 997

$$y'(x) = (y(x) + \cos(x))^2 + \sin(x)$$

✓ **Mathematica** : cpu = 0.13083 (sec), leaf count = 18

$$\left\{\left\{y(x) \to -\cos(x) + \frac{1}{-x + c_1}\right\}\right\}$$

✓ **Maple** : cpu = 0.068 (sec), leaf count = 16

$$\left\{y(x) = -\cos(x) + \frac{1}{c_1 - x}\right\}$$

2.998 ODE No. 998

$$y'(x) = \frac{(-\text{Ci}(x) + y(x) - \log(x))^2 + \cos(x)}{x}$$

✓ **Mathematica** : cpu = 0.601298 (sec), leaf count = 27

$$\left\{\left\{y(x) \to \text{Ci}(x) + \frac{x^2}{-\frac{x^2}{2} + c_1} + \log(x) + 1\right\}\right\}$$

✓ **Maple** : cpu = 0.267 (sec), leaf count = 27

$$\left\{y(x) = \text{cosineIntegral}(x) + \ln(x) + \frac{-c_1 x^2 + 1}{c_1 x^2 + 1}\right\}$$

2.999 ODE No. 999

$$y'(x) = \frac{(y(x) - x + \log(x+1))^2 + x}{x + 1}$$

✓ **Mathematica** : cpu = 0.334976 (sec), leaf count = 24

$$\left\{\left\{y(x) \to x - \log(x+1) + \frac{1}{-\log(x+1) + c_1}\right\}\right\}$$

✓ **Maple** : cpu = 0.06 (sec), leaf count = 36

$$\left\{y(x) = \frac{c_1 x - \ln(x+1)^2 + (-c_1 + x)\ln(x+1) - 1}{c_1 + \ln(x+1)}\right\}$$

2.1000 ODE No. 1000

$$y'(x) = \frac{x^3 + 2x^2y(x) - xy(x) - y(x)^2 + xy(x)\log(x)}{x^2(x + \log(x))}$$

✓ **Mathematica** : cpu = 1.19896 (sec), leaf count = 351

$$\left\{\left\{y(x) \to \frac{x^2(x + \log(x)) \left(-\frac{\sqrt{x}(x+\log(x)+2)\log(x)\exp\left(-\frac{1}{2}\int_1^x \frac{K[5]+\log(K[5])+2}{K[5]^2+\log(K[5])K[5]}dK[5]\right)}{2(x^2+x\log(x))} + c_1 \left(\frac{\exp\left(-\frac{1}{2}\int_1^x \frac{K[5]+\log(K[5])+2}{K[5]^2+\log(K[5])K[5]} d\right.}{2\sqrt{x}}\right.\right.}{\sqrt{x}\log(x)\exp\left(-\frac{1}{2}\int_1^x \frac{K[5]+\log(}{K[5]^2+\log(}\right.}\right.\right.$$

✓ **Maple** : cpu = 0.135 (sec), leaf count = 19

$$\left\{y(x) = \frac{(c_1x - 1)\,x}{c_1\ln(x) + 1}\right\}$$

2.1001 ODE No. 1001

$$y''(x) = 0$$

✓ **Mathematica** : cpu = 0.003507 (sec), leaf count = 12

$$\{\{y(x) \to c_2x + c_1\}\}$$

✓ **Maple** : cpu = 0.004 (sec), leaf count = 9

$$\{y(x) = c_1x + c_2\}$$

$$\boxed{\textbf{Hand solution}}$$

$$y'' = 0$$

Integration twice gives

$$y(x) = c_1x + c_2$$

2.1002 ODE No. 1002

$$y''(x) + y(x) = 0$$

✓ **Mathematica** : cpu = 0.0048476 (sec), leaf count = 16

$$\{\{y(x) \to c_1 \cos(x) + c_2 \sin(x)\}\}$$

✓ **Maple** : cpu = 0.005 (sec), leaf count = 13

$$\{y(x) = c_1 \sin(x) + c_2 \cos(x)\}$$

Hand solution

$$y'' + y = 0$$

Let $y = e^{\lambda x}$, substitution in above gives

$$\begin{aligned}\lambda^2 e^{\lambda x} + e^{\lambda x} &= 0\\ \lambda^2 + 1 &= 0\end{aligned}$$

Hence $\lambda = \pm i$, therefore the solution is

$$\begin{aligned}y &= Ae^{ix} + Be^{-ix}\\ &= A(\cos x + i \sin x) + B(\cos x - i \sin x)\\ &= \cos x(A + B) + \sin x(Ai - iB)\\ &= \cos x(A + B) + \sin x(i(A - B))\end{aligned}$$

Let $A + B = c_1, i(A - B) = c_2$ hence

$$y = c_1 \cos x + c_2 \sin x$$

2.1003 ODE No. 1003

$$-\sin(nx) + y''(x) + y(x) = 0$$

✓ **Mathematica** : cpu = 0.108472 (sec), leaf count = 45

$$\left\{\left\{y(x) \to \frac{\cos^2(x)(-\sin(nx)) - \sin^2(x)\sin(nx)}{n^2-1} + c_1\cos(x) + c_2\sin(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.07 (sec), leaf count = 26

$$\left\{y(x) = c_1\cos(x) + c_2\sin(x) - \frac{\sin(nx)}{n^2-1}\right\}$$

Hand solution

$$y'' + y = \sin nx \tag{1}$$

We start by solving the homogeneous equation

$$y'' + y = 0$$

Let $y = e^{\lambda x}$, substitution in above gives

$$\begin{aligned} \lambda^2 e^{\lambda x} + e^{\lambda x} &= 0 \\ \lambda^2 + 1 &= 0 \end{aligned}$$

Hence $\lambda = \pm i$, therefore the solution is

$$\begin{aligned} y_h &= Ae^{ix} + Be^{-ix} \\ &= A(\cos x + i\sin x) + B(\cos x - i\sin x) \\ &= \cos x(A+B) + \sin x(Ai - iB) \\ &= \cos x(A+B) + \sin x(i(A-B)) \end{aligned}$$

Let $A + B = c_1, i(A-B) = c_2$ hence

$$y_h = c_1\cos x + c_2\sin x$$

Now we solve for the particular solution using variation of parameters. Let

$$\begin{aligned} y_p &= u_1(x)\cos x + u_2(x)\sin x \\ y_p' &= u_1'\cos x - u_1\sin x + u_2'\sin x + u_2\cos x \\ &= u_2\cos x - u_1\sin x + u_1'\cos x + u_2'\sin x \end{aligned}$$

Let first condition be

$$u_1'\cos x + u_2'\sin x = 0 \tag{2}$$

Hence

$$
\begin{aligned}
y_p' &= u_2 \cos x - u_1 \sin x \\
y_p'' &= u_2' \cos x - u_2 \sin x - u_1' \sin x - u_1 \cos x
\end{aligned}
$$

Substituting in (1) gives

$$
\begin{aligned}
y_p'' + y_p &= \sin nx \\
u_2' \cos x - u_2 \sin x - u_1' \sin x - u_1 \cos x + u_1 \cos x + u_2 \sin x &= \sin nx \\
u_2' \cos x - u_1' \sin x &= \sin nx \qquad (3)
\end{aligned}
$$

So we have two equations (1)(2) to solve for u_1, u_2

$$
\begin{aligned}
u_1' \cos x + u_2' \sin x &= 0 \\
u_2' \cos x - u_1' \sin x &= \sin nx
\end{aligned}
$$

From the first equation

$$
u_1' = -u_2' \frac{\sin x}{\cos x} \tag{4}
$$

Substituting in the second equation

$$
\begin{aligned}
u_2' \cos x - \left(-u_2' \frac{\sin x}{\cos x}\right) \sin x &= \sin nx \\
u_2' \left(\cos x + \frac{\sin x}{\cos x} \sin x\right) &= \sin nx \\
u_2' \left(\frac{\cos^2 x + \sin^2 x}{\cos x}\right) &= \sin nx \\
u_2' &= \cos x \sin nx
\end{aligned}
$$

Hence

$$
\begin{aligned}
u_2 &= \int \cos x \sin (nx) \, dx \\
&= \frac{-n \cos x \cos (nx) - \sin x \sin (nx)}{n^2 - 1}
\end{aligned}
$$

From (4)

$$
\begin{aligned}
u_1' &= -\cos x \sin nx \frac{\sin x}{\cos x} \\
u_1 &= -\int \sin (nx) \sin x dx \\
&= \frac{n \cos (nx) \sin x - \cos x \sin (nx)}{n^2 - 1}
\end{aligned}
$$

Since $y_p = u_1(x)\cos x + u_2(x)\sin x$ then

$$\begin{aligned}
y_p &= \left(\frac{n\cos(nx)\sin x - \cos x\sin(nx)}{n^2-1}\right)\cos x + \left(\frac{-n\cos x\cos(nx) - \sin x\sin(nx)}{n^2-1}\right)\sin x \\
&= \frac{n\cos(nx)\cos x\sin x - \cos^2 x\sin(nx) - n\cos x\sin x\cos(nx) - \sin^2 x\sin(nx)}{n^2-1} \\
&= \frac{-\sin(nx)\left(\cos^2 x + \sin^2 x\right)}{n^2-1} \\
&= \frac{\sin(nx)}{1-n^2}
\end{aligned}$$

Therefore, the full solution is (for $n^2 \neq 1$)

$$\begin{aligned}
y &= y_h + y_p \\
&= c_1\cos x + c_2\sin x + \frac{\sin(nx)}{1-n^2}
\end{aligned}$$

Solution using undetermined coefficients: Since RHS is $\sin nx$ we guess $y_p = A\cos(nx) + B\sin(nx)$, therefore

$$\begin{aligned}
y_p' &= -An\sin(nx) + Bn\cos(nx) \\
y_p'' &= -An^2\cos(nx) - Bn^2\sin(nx)
\end{aligned}$$

Plug into the ODE gives

$$\begin{aligned}
y_p'' + y_p &= \sin nx \\
-An^2\cos(nx) - Bn^2\sin(nx) + A\cos(nx) + B\sin(nx) &= \sin nx \\
\cos(nx)\left(-An^2 + A\right) + \sin(nx)\left(-Bn^2 + B\right) &= \sin(nx)
\end{aligned}$$

Hence $-Bn^2 - B = 1$ and $-An^2 + A = 0$. Therefore $A = 0$ and from the first equation

$$\begin{aligned}
B\left(n^2+1\right) &= -1 \\
B &= \frac{-1}{n^2+1}
\end{aligned}$$

Hence

$$\begin{aligned}
y_p &= A\cos(nx) + B\sin(nx) \\
&= \frac{\sin(nx)}{1-n^2}
\end{aligned}$$

Which is the same as variation of parameters method.

Note: Full solution should also really consider the case for $n = 1$. Will update later.

```
restart;
ode:=diff(diff(y(x),x),x)+y(x)-sin(n*x)=0;
y0:=_C1*cos(x)+_C2*sin(x)+sin(n*x)/(1-n^2);
odetest(y(x)=y0,ode);
0
```

2.1004 ODE No. 1004

$$-a\cos(bx) + y''(x) + y(x) = 0$$

✓ **Mathematica** : cpu = 0.115846 (sec), leaf count = 47

$$\left\{\left\{y(x) \to \frac{-a\cos^2(x)\cos(bx) - a\sin^2(x)\cos(bx)}{b^2-1} + c_1\cos(x) + c_2\sin(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.063 (sec), leaf count = 27

$$\left\{y(x) = c_1\cos(x) + c_2\sin(x) - \frac{a\cos(bx)}{b^2-1}\right\}$$

Hand solution

$$y'' + y = a\cos bx \tag{1}$$

We start by solving the homogeneous equation

$$y'' + y = 0$$

Let $y = e^{\lambda x}$, substitution in above gives

$$\begin{aligned} \lambda^2 e^{\lambda x} + e^{\lambda x} &= 0 \\ \lambda^2 + 1 &= 0 \end{aligned}$$

Hence $\lambda = \pm i$, therefore the solution is

$$\begin{aligned} y_h &= Ae^{ix} + Be^{-ix} \\ &= A(\cos x + i\sin x) + B(\cos x - i\sin x) \\ &= \cos x(A+B) + \sin x(Ai - iB) \\ &= \cos x(A+B) + \sin x(i(A-B)) \end{aligned}$$

Let $A + B = c_1, i(A-B) = c_2$ hence

$$y_h = c_1\cos x + c_2\sin x$$

Now we solve for the particular solution using variation of parameters. Let

$$
\begin{aligned}
y_p &= u_1(x)\cos x + u_2(x)\sin x \\
y_p' &= u_1'\cos x - u_1\sin x + u_2'\sin x + u_2\cos x \\
&= u_2\cos x - u_1\sin x + u_1'\cos x + u_2'\sin x
\end{aligned}
$$

Let first condition be

$$
u_1'\cos x + u_2'\sin x = 0 \tag{2}
$$

Hence

$$
\begin{aligned}
y_p' &= u_2\cos x - u_1\sin x \\
y_p'' &= u_2'\cos x - u_2\sin x - u_1'\sin x - u_1\cos x
\end{aligned}
$$

Substituting in (1) gives

$$
\begin{aligned}
y_p'' + y_p &= a\cos bx \\
u_2'\cos x - u_2\sin x - u_1'\sin x - u_1\cos x + u_1\cos x + u_2\sin x &= a\cos bx \\
u_2'\cos x - u_1'\sin x &= a\cos bx \qquad (3)
\end{aligned}
$$

So we have two equations (1)(2) to solve for u_1, u_2

$$
\begin{aligned}
u_1'\cos x + u_2'\sin x &= 0 \\
u_2'\cos x - u_1'\sin x &= a\cos bx
\end{aligned}
$$

From the first equation

$$
u_1' = -u_2'\frac{\sin x}{\cos x} \tag{4}
$$

Substituting in the second equation

$$
\begin{aligned}
u_2'\cos x - \left(-u_2'\frac{\sin x}{\cos x}\right)\sin x &= a\cos bx \\
u_2'\left(\cos x + \frac{\sin x}{\cos x}\sin x\right) &= a\cos bx \\
u_2'\left(\frac{\cos^2 x + \sin^2 x}{\cos x}\right) &= a\cos bx \\
u_2' &= a\cos x\cos bx
\end{aligned}
$$

Hence

$$
\begin{aligned}
u_2 &= a\int \cos x\cos(bx)\,dx \\
&= a\frac{-\cos(bx)\sin x + b\cos x\sin(bx)}{b^2-1}
\end{aligned}
$$

From (4)

$$
\begin{aligned}
u_1' &= -a\cos(bx)\sin x \\
u_1 &= -a\int \cos(bx)\sin x dx \\
&= -a\frac{\cos(bx)\cos x + b\sin x\sin(bx)}{b^2-1}
\end{aligned}
$$

Since $y_p = u_1(x)\cos x + u_2(x)\sin x$ then

$$
\begin{aligned}
y_p &= \left(-a\frac{\cos(bx)\cos x + b\sin x\sin(bx)}{b^2-1}\right)\cos x + \left(a\frac{-\cos(bx)\sin x + b\cos x\sin(bx)}{b^2-1}\right)\sin x \\
&= \frac{-a\cos(bx)\cos^2 x - ab\cos x\sin x\sin(bx) - a\cos(bx)\sin^2 x + ab\sin x\cos x\sin(bx)}{b^2-1} \\
&= \frac{-a\cos(bx)\cos^2 x - a\cos(bx)\sin^2 x}{b^2-1} \\
&= \frac{-a\cos(bx)\left(\cos^2 x + \sin^2 x\right)}{b^2-1} \\
&= \frac{-a\cos(bx)}{b^2-1} \\
&= \frac{a\cos(bx)}{1-b^2}
\end{aligned}
$$

Therefore, the full solution is (for $b^2 \neq 1$)

$$
\begin{aligned}
y &= y_h + y_p \\
&= c_1\cos x + c_2\sin x + \frac{a\cos(bx)}{1-b^2}
\end{aligned}
$$

```
restart;
ode:=diff(diff(y(x),x),x)+y(x)-a*cos(b*x)=0;
y0:=_C1*cos(x)+_C2*sin(x)+a*cos(b*x)/(1-b^2);
odetest(y(x)=y0,ode);
0
```

2.1005 ODE No. 1005

$$
-\sin(ax)\sin(bx) + y''(x) + y(x) = 0
$$

✓ **Mathematica** : cpu = 0.549023 (sec), leaf count = 1163

$$
\left\{\left\{y(x) \to c_1\cos(x) + c_2\sin(x) + \frac{-\cos(x)\cos((a-b-1)x)a^3 + \cos(x)\cos((a-b+1)x)a^3 + \cos(x)\cos((a+b}{}\right.\right.
$$

✓ **Maple** : cpu = 0.128 (sec), leaf count = 82

$$\left\{y(x) = c_1 \cos(x) + c_2 \sin(x) + \frac{-(a+b+1)(a+b-1)\cos((a-b)x) + (a-b+1)(a-b-1)\cos((a+b)x)}{2a^4 + 2b^4 + (-4b^2-4)a^2 - 4b^2 + 2}\right\}$$

Hand solution

$$y'' + y = \sin ax \sin bx \tag{1}$$

We start by solving the homogeneous equation

$$y'' + y = 0$$

Let $y = e^{\lambda x}$, substitution in above gives

$$\begin{aligned} \lambda^2 e^{\lambda x} + e^{\lambda x} &= 0 \\ \lambda^2 + 1 &= 0 \end{aligned}$$

Hence $\lambda = \pm i$, therefore the solution is

$$\begin{aligned} y_h &= Ae^{ix} + Be^{-ix} \\ &= A(\cos x + i \sin x) + B(\cos x - i \sin x) \\ &= \cos x(A+B) + \sin x(Ai - iB) \\ &= \cos x(A+B) + \sin x(i(A-B)) \end{aligned}$$

Let $A + B = c_1, i(A-B) = c_2$ hence

$$\begin{aligned} y_h &= c_1 \cos x + c_2 \sin x \\ &= y_h = c_1 y_1 + c_2 y_2 \end{aligned}$$

Now we solve for the particular solution using variation of parameters.

$$y_p = u_1 y_1 + u_2 y_2$$

Wonskian is

$$W = \begin{vmatrix} y_1 & y_2 \\ y_1' & y_2' \end{vmatrix} = \begin{vmatrix} \cos x & \sin x \\ -\sin x & \cos x \end{vmatrix} = \cos^2 x + \sin^2 x = 1$$

Hence, using $f = \sin ax \sin bx$, which is the RHS of the ODE, and noting that a_0 is the coefficient of y'' which is one here, then

$$\begin{aligned} u_1 &= \int \frac{-y_2}{W} \frac{f}{a_0} dx = -\int \sin x \sin(ax) \sin(bx)\, dx \\ &= -\frac{1}{4}\left(\frac{\cos((a-b-1)x)}{a-b-1} - \frac{\cos((a-b+1)x)}{a-b+1} - \frac{\cos((a+b-1)x)}{a+b-1} + \frac{\cos((a+b+1)x)}{a+b+1}\right) \end{aligned}$$

And

$$
\begin{aligned}
u_2 &= \int \frac{y_1}{W}\frac{f}{a_0}dx = -\int \cos x \sin(ax)\sin(bx)\,dx \\
&= \frac{1}{4}\left(\frac{\sin((a-b-1)x)}{a-b-1} + \frac{\sin((a-b+1)x)}{a-b+1} - \frac{\sin((a+b-1)x)}{a+b-1} - \frac{\sin((a+b+1)x)}{a+b+1}\right)
\end{aligned}
$$

Since $y_p = u_1(x)\cos x + u_2(x)\sin x$ then

$$
\begin{aligned}
y_p = &-\frac{1}{4}\left(\frac{\cos((a-b-1)x)}{a-b-1} - \frac{\cos((a-b+1)x)}{a-b+1} - \frac{\cos((a+b-1)x)}{a+b-1} + \frac{\cos((a+b+1)x)}{a+b+1}\right)\cos x \\
&+ \frac{1}{4}\left(\frac{\sin((a-b-1)x)}{a-b-1} + \frac{\sin((a-b+1)x)}{a-b+1} - \frac{\sin((a+b-1)x)}{a+b-1} - \frac{\sin((a+b+1)x)}{a+b+1}\right)\sin x
\end{aligned}
$$

$$
\begin{aligned}
&= \frac{1}{4}\left(-\frac{\cos^2((a-b-1)x)}{a-b-1} + \frac{\sin^2((a-b-1)x)}{a-b-1}\right) + \frac{1}{4}\left(\frac{\cos^2((a-b+1)x)}{a-b+1} + \frac{\sin^2((a-b+1)x)}{a-b+1}\right) \\
&+ \frac{1}{4}\left(\frac{\cos^2((a+b-1)x)}{a+b-1} - \frac{\sin^2((a+b-1)x)}{a+b-1}\right) + \frac{1}{4}\left(-\frac{\cos^2((a+b+1)x)}{a+b+1} - \frac{\sin^2((a+b+1)x)}{a+b+1}\right)
\end{aligned}
$$

$$
\begin{aligned}
&= \frac{1}{4}\left(-\frac{\cos^2((a-b-1)x)}{a-b-1} + \frac{\sin^2((a-b-1)x)}{a-b-1}\right) + \frac{1}{4}\left(\frac{1}{a-b+1}\right) \\
&+ \frac{1}{4}\left(\frac{\cos^2((a+b-1)x)}{a+b-1} - \frac{\sin^2((a+b-1)x)}{a+b-1}\right) - \frac{1}{4}\left(\frac{1}{a+b+1}\right)
\end{aligned}
$$

Let $a-b-1=\alpha, a+b-1=\beta$ then

$$
\begin{aligned}
y_p &= \frac{1}{4}\left(\frac{\sin^2(\alpha x) - \cos^2(\alpha x)}{\alpha}\right) + \frac{1}{4}\left(\frac{\cos^2(\beta x) - \sin^2(\beta x)}{\beta}\right) + \frac{1}{4}\left(\frac{1}{\alpha+2}\right) - \frac{1}{4}\left(\frac{1}{\beta+2}\right) \\
&= \frac{1}{4}\left(\frac{\sin^2(\alpha x) - \cos^2(\alpha x)}{\alpha} + \frac{\cos^2(\beta x) - \sin^2(\beta x)}{\beta} + \frac{1}{\alpha+2} - \frac{1}{\beta+2}\right)
\end{aligned}
$$

Therefore, the full solution is

$$
\begin{aligned}
y &= y_h + y_p \\
&= c_1\cos x + c_2\sin x + \frac{1}{4}\left(\frac{\sin^2(\alpha x) - \cos^2(\alpha x)}{\alpha} + \frac{\cos^2(\beta x) - \sin^2(\beta x)}{\beta} + \frac{1}{\alpha+2} - \frac{1}{\beta+2}\right)
\end{aligned}
$$

I made mistake. Need to go over it again. I do not see it now. Maple does not verify.

```
restart;
ode:=diff(diff(y(x),x),x)+y(x)-sin(a*x)*sin(b*x)=0;
```

```
alpha:=a-b-1;
beta:=a+b-1;
yp:=1/4*(1/alpha* (sin(alpha*x)^2-cos(alpha*x)^2)+1/beta* (cos(beta*x)^2-sin(beta*x)^2))+(1/4)*(1/(a
y0:=yp+_C1*sin(x)+_C2*cos(x);
not zero
```

2.1006 ODE No. 1006

$$y''(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 0.0039138 (sec), leaf count = 20

$$\{\{y(x) \to c_1 e^x + c_2 e^{-x}\}\}$$

✓ **Maple** : cpu = 0.009 (sec), leaf count = 15

$$\{y(x) = c_1 \mathrm{e}^{-x} + c_2 \mathrm{e}^{x}\}$$

Hand solution

$$y'' - y = 0 \tag{1}$$

Let $y = e^{\lambda x}$, substitution in above gives

$$\begin{aligned} \lambda^2 e^{\lambda x} - e^{\lambda x} &= 0 \\ \lambda^2 - 1 &= 0 \end{aligned}$$

Hence $\lambda = \pm 1$, therefore the solution is

$$y_h = Ae^x + Be^{-x}$$

2.1007 ODE No. 1007

$$-4e^{x^2} x^2 + y''(x) - 2y(x) = 0$$

✓ **Mathematica** : cpu = 0.0989217 (sec), leaf count = 135

$$\left\{\left\{y(x) \to \frac{e^{-\sqrt{2}x}\left(-2e^{x\left(x+\sqrt{2}\right)}x + 2e^{\left(x-\sqrt{2}\right)x+2\sqrt{2}x}x + \sqrt{2}e^{x\left(x+\sqrt{2}\right)} + \sqrt{2}e^{\left(x-\sqrt{2}\right)x+2\sqrt{2}x}\right)}{2\sqrt{2}} + c_1 e^{\sqrt{2}x} + c_2 e^{-\sqrt{2}x}\right.\right.$$

✓ **Maple** : cpu = 0.018 (sec), leaf count = 26

$$\left\{y(x) = c_1 \mathrm{e}^{-\sqrt{2}\,x} + c_2 \mathrm{e}^{\sqrt{2}\,x} + \mathrm{e}^{x^2}\right\}$$

Hand solution

$$y'' - 2y = 4x^2 e^{x^2} \tag{1}$$

We start by solving the homogeneous equation

$$y'' - 2y = 0$$

Let $y = e^{\lambda x}$, substitution in above gives

$$\begin{aligned} \lambda^2 e^{\lambda x} - 2e^{\lambda x} &= 0 \\ \lambda^2 - 2 &= 0 \end{aligned}$$

Hence $\lambda = \pm\sqrt{2}$, therefore the solution is

$$\begin{aligned} y_h &= Ae^{\sqrt{2}x} + Be^{-\sqrt{2}x} \\ &= Ay_1 + By_2 \end{aligned}$$

Now we solve for the particular solution using variation of parameters.

$$y_p = u_1 y_1 + u_2 y_2$$

wronskian is

$$W = \begin{vmatrix} y_1 & y_2 \\ y_1' & y_2' \end{vmatrix} = \begin{vmatrix} e^{\sqrt{2}x} & e^{-\sqrt{2}x} \\ \sqrt{2}e^{\sqrt{2}x} & -\sqrt{2}e^{-\sqrt{2}x} \end{vmatrix} = -\sqrt{2} - \sqrt{2} = -2\sqrt{2}$$

Hence, using $f = 4x^2 e^{x^2}$, which is the RHS of the ODE, and noting that a_0 is the coefficient of y'' which is one here, then

$$\begin{aligned} u_1 &= \int \frac{-y_2}{W} \frac{f}{a_0} dx = -\int \frac{e^{-\sqrt{2}x}}{-2\sqrt{2}} 4x^2 e^{x^2} dx \\ &= \frac{2}{\sqrt{2}} \int x^2 e^{x^2 - \sqrt{2}x} dx \\ &= \frac{2}{\sqrt{2}} \left(\frac{1}{4} e^{x\left(x-\sqrt{2}\right)} \left(\sqrt{2} + 2x\right) \right) \end{aligned}$$

And

$$
\begin{aligned}
u_2 &= \int \frac{y_1}{W}\frac{f}{a_0}dx = \int \frac{e^{\sqrt{2}x}}{-2\sqrt{2}}4x^2e^{x^2}dx \\
&= \frac{-2}{\sqrt{2}}\int x^2e^{x^2+\sqrt{2}x}dx \\
&= \frac{-2}{\sqrt{2}}\left(-\frac{1}{4}e^{x\left(x+\sqrt{2}\right)}\left(\sqrt{2}-2x\right)\right)
\end{aligned}
$$

Since $y_p = u_1e^{\sqrt{2}x} + u_2e^{\;\sqrt{2}x}$ then

$$
\begin{aligned}
y_p &= \frac{2}{\sqrt{2}}\left(\frac{1}{4}e^{x\left(x-\sqrt{2}\right)}\left(\sqrt{2}+2x\right)\right)e^{\sqrt{2}x} - \frac{2}{\sqrt{2}}\left(-\frac{1}{4}e^{x\left(x+\sqrt{2}\right)}\left(\sqrt{2}-2x\right)\right)e^{\;\sqrt{2}x} \\
&= \frac{2}{\sqrt{2}}\frac{1}{4}e^{x^2}\left(\sqrt{2}+2x\right) + \frac{2}{\sqrt{2}}\frac{1}{4}e^{x^2}\left(\sqrt{2}-2x\right) \\
&= \frac{1}{2}e^{x^2} + \frac{1}{2}e^{x^2} \\
&= e^{x^2}
\end{aligned}
$$

Therefore, the full solution is

$$
\begin{aligned}
y &= y_h + y_p \\
&= Ae^{\sqrt{2}x} + Be^{\;\sqrt{2}x} + e^{x^2}
\end{aligned}
$$

```
restart;
ode:=diff(y(x),x$2)-2*y(x)=4*x^2*exp(x^2);
y0:=_C1*exp(sqrt(2)*x)+_C2*exp(-sqrt(2)*x)+exp(x^2);
odetest(y(x)=y0,ode);
0
```

2.1008 ODE No. 1008

$$a^2y(x) - \cot(ax) + y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0428319 (sec), leaf count = 48

$$\left\{\left\{y(x) \to -\frac{\sin(ax)\left(\log\left(\cos\left(\frac{ax}{2}\right)\right) - \log\left(\sin\left(\frac{ax}{2}\right)\right)\right)}{a^2} + c_1\cos(ax) + c_2\sin(ax)\right\}\right\}$$

✓ **Maple** : cpu = 0.121 (sec), leaf count = 41

$$\left\{y(x) = c_1\cos(ax) + c_2\sin(ax) + \frac{\ln\left(\frac{-\cos(ax)+1}{\sin(ax)}\right)\sin(ax)}{a^2}\right\}$$

2.1009 ODE No. 1009

$$ly(x) + y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0057355 (sec), leaf count = 28

$$\left\{\left\{y(x) \to c_1 \cos\left(\sqrt{l}x\right) + c_2 \sin\left(\sqrt{l}x\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.02 (sec), leaf count = 21

$$\left\{y(x) = c_1 \sin\left(\sqrt{l}\,x\right) + c_2 \cos\left(\sqrt{l}\,x\right)\right\}$$

2.1010 ODE No. 1010

$$y(x)(ax + b) + y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0065964 (sec), leaf count = 46

$$\left\{\left\{y(x) \to c_1 \mathrm{Ai}\left(\frac{-b - ax}{(-a)^{2/3}}\right) + c_2 \mathrm{Bi}\left(\frac{-b - ax}{(-a)^{2/3}}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.132 (sec), leaf count = 31

$$\left\{y(x) = c_1 \operatorname{AiryAi}\left(-\frac{ax + b}{a^{\frac{2}{3}}}\right) + c_2 \operatorname{AiryBi}\left(-\frac{ax + b}{a^{\frac{2}{3}}}\right)\right\}$$

Hand solution

$$y'' + (ax + b)\,y = 0 \tag{1}$$

For $a \neq 0$. Let $y = \eta(\xi)\,, \xi = ax + b$, hence

$$\begin{aligned} \frac{dy}{dx} &= \frac{d\eta}{d\xi}\frac{d\xi}{dx} \\ &= \frac{d\eta}{d\xi}a \end{aligned}$$

And

$$
\begin{aligned}
\frac{d^2y}{dx^2} &= \frac{d}{dx}\left(\frac{d\eta}{d\xi}a\right) \\
&= a\frac{d}{dx}\left(\frac{d\eta}{d\xi}\right) \\
&= a\left(\frac{d^2\eta}{d\xi^2}\frac{d\xi}{dx}\right) \\
&= a^2\frac{d^2\eta}{d\xi^2}
\end{aligned}
$$

Therefore (1) becomes

$$
\begin{aligned}
a^2\frac{d^2\eta}{d\xi^2} + \xi\eta(\xi) &= 0 \\
a^2\eta'' + \xi\eta &= 0 \qquad (2)
\end{aligned}
$$

This is Airy ODE but with plus sign instead of the normal Airy $\eta'' - \xi\eta = 0$. Let

$$
\begin{aligned}
\eta &= \sum_{n=0}^{\infty} c_n\xi^n \\
\eta' &= \sum_{n=0}^{\infty} nc_n\xi^{n-1} = \sum_{n=1}^{\infty} nc_n\xi^{n-1} = \sum_{n=0}^{\infty}(n+1)\,c_{n+1}\xi^n \\
\eta'' &= \sum_{n=0}^{\infty} n(n+1)\,c_{n+1}\xi^{n-1} = \sum_{n=1}^{\infty} n(n+1)\,c_{n+1}\xi^{n-1} = \sum_{n=0}^{\infty}(n+1)\,(n+2)\,c_{n+2}\xi^n
\end{aligned}
$$

Hence (2) becomes

$$
\begin{aligned}
a^2\sum_{n=0}^{\infty}(n+1)\,(n+2)\,c_{n+2}\xi^n + \xi\sum_{n=0}^{\infty}c_n\xi^n &= 0 \\
\sum_{n=0}^{\infty}a^2(n+1)\,(n+2)\,c_{n+2}\xi^n + \sum_{n=0}^{\infty}c_n\xi^{n+1} &= 0 \\
\sum_{n=0}^{\infty}a^2(n+1)\,(n+2)\,c_{n+2}\xi^n + \sum_{n=1}^{\infty}c_{n-1}\xi^n &= 0 \\
2a^2c_2 + \sum_{n=1}^{\infty}\left(a^2(n+1)\,(n+2)\,c_{n+2} + c_{n-1}\right)\xi^n &= 0
\end{aligned}
$$

Hence

$$2a^2 c_2 = 0 \tag{3}$$
$$a^2(n+1)(n+2)\, c_{n+2} + c_{n-1} = 0 \qquad n \geq 1 \tag{4}$$

From (3) and since $a \neq 0$

$$c_2 = 0$$

From (4)

$$c_{n+2} = \frac{-c_{n-1}}{a^2 (n+1)(n+2)}$$

Hence for $n = 3$, we see from the above recurrence equation and because $c_2 = 0$ that

$$c_5 = \frac{-c_2}{a^2 (4)(6)} = 0$$

Similarly, for $n = 6$

$$c_8 = \frac{-c_5}{a^2 (7)(8)} = 0$$

Similarly, for $n = 9$

$$c_{11} = \frac{-c_8}{a^2 (10)(11)} = 0$$

And so on. Hence we found so far that for $n = 3, 6, 9, 12, \cdots$ all terms generated which are $c_5, c_8, c_{11}, \cdots$ are zero.

Now, for $n = 1$, the recurrence equation gives

$$c_3 = \frac{-c_0}{a^2} \frac{1}{2 \cdot 3}$$

For $n = 2$

$$c_4 = \frac{-c_1}{a^2} \frac{1}{3 \cdot 4}$$

For $n = 4$

$$c_6 = \frac{-c_3}{a^2 (5)(6)} = c_0 \left(\frac{1}{a^2} \frac{1}{5 \cdot 6} \right) \left(\frac{1}{a^2} \frac{1}{2 \cdot 3} \right)$$

For $n=5$

$$c_7 = \frac{-c_4}{a^2\,(6)\,(7)} = c_1\left(\frac{1}{a^2}\frac{1}{6\cdot 7}\right)\left(\frac{1}{a^2}\frac{1}{3\cdot 4}\right)$$

For $n=7$

$$c_9 = \frac{-c_6}{a^2\,(8)\,(9)} = -c_0\left(\frac{1}{a^2}\frac{1}{8\cdot 9}\right)\left(\frac{1}{a^2}\frac{1}{5\cdot 6}\right)\left(\frac{1}{a^2}\frac{1}{2\cdot 3}\right)$$

For $n=8$

$$c_{10} = \frac{-c_7}{a^2\,(9)\,(10)} = -c_1\left(\frac{1}{a^2}\frac{1}{9\cdot 10}\right)\left(\frac{1}{a^2}\frac{1}{6\cdot 7}\right)\left(\frac{1}{a^2}\frac{1}{3\cdot 4}\right)$$

Therefore, in summary, this is what we have so far. For $n=3,6,9,12,\cdots$ all terms are zero. For $n=1,4,7,\cdots$ all terms are expressed using c_0 and for $n=2,5,8,\cdots$ all terms are expressed using c_1. So there are two arbitrary constants c_0, c_1.

In other words, $c_2, c_5, c_8, c_{11}, \cdots = 0$ and $c_3, c_6, c_9, c_{12}, \cdots = f(c_0)$ and $c_4, c_7, c_{10}, c_{13}, \cdots = f(c_1)$.

$$\begin{aligned}
\eta &= \sum_{n=0}^{\infty} c_n \xi^n \\
&= c_0 + c_1\xi^1 + c_2\xi^2 + c_3\xi^3 + \cdots \\
&= c_0 + \left(c_1\xi^1\right) + 0 - \left(c_0\frac{\xi^3}{a^2}\frac{1}{2\cdot 3}\right) - \left(c_1\frac{\xi^4}{a^2}\frac{1}{3\cdot 4}\right) + 0 + c_0\frac{\xi^6}{a^4}\frac{1}{2\cdot 3\cdot 5\cdot 6} + c_1\frac{\xi^7}{a^4}\frac{1}{3\cdot 4\cdot 6\cdot 7} + 0 \\
&= c_0\left(1 - \frac{\xi^3}{a^2}\frac{1}{2\cdot 3} + \frac{\xi^6}{a^4}\frac{1}{2\cdot 3\cdot 5\cdot 6} - \cdots\right) + c_1\left(\xi - \frac{\xi^4}{a^2}\frac{1}{3\cdot 4} + \frac{\xi^7}{a^4}\frac{1}{3\cdot 4\cdot 6\cdot 7} - \cdots\right) \\
&= c_0\left(1 - \frac{1}{a^2}\frac{\xi^3}{3!} + \frac{1\cdot 4}{a^4}\frac{\xi^6}{6!} - \frac{1\cdot 4\cdot 7}{a^6}\frac{\xi^9}{9!} + \cdots\right) + c_1\left(\xi - \frac{\xi^4}{a^2}\frac{2}{4!} + \frac{\xi^7}{a^4}\frac{2\cdot 5}{7!} - \frac{\xi^{10}}{a^6}\frac{2\cdot 5\cdot 8}{10!} + \cdots\right)
\end{aligned}$$

Hence

$$\eta = c_0\left(\sum_{n=0}^{\infty} 3^n\left(\frac{1}{3}\right)_n \frac{(-1)^n}{a^{2n}}\frac{\xi^{3n}}{(3n)!}\right) + c_1\left(\sum_{n=0}^{\infty} 3^n\left(\frac{2}{3}\right)_n \frac{(-1)^n}{a^{2n}}\frac{\xi^{3n+1}}{(3n+1)!}\right) \tag{5}$$

Where

$$\begin{aligned}
3^n\left(\frac{1}{3}\right)_n &= (1)\cdot(4)\cdot(7)\ldots(3n-2) \\
3^n\left(\frac{2}{3}\right)_n &= (2)\cdot(5)\cdot(8)\ldots(3n-1)
\end{aligned}$$

And

$$\left(\frac{1}{3}\right)_0 = \left(\frac{2}{3}\right)_0 = 1$$

Equation (5) can be simplified more by moving $\frac{(-1)^n}{a^{2n}}$ into ξ as follows

$$\eta = c_0\left(\sum_{n=0}^{\infty} 3^n \left(\frac{1}{3}\right)_n \frac{1}{(3n)!}\left(\frac{-\xi}{a^{\frac{2}{3}}}\right)^{3n}\right) + ac_1\left(\sum_{n=0}^{\infty} 3^n \left(\frac{2}{3}\right)_n \frac{1}{(3n+1)!}\left(\frac{-\xi}{a^{\frac{2}{3}}}\right)^{3n+1}\right)$$

Let $\left(\frac{-\xi}{a^{\frac{2}{3}}}\right) = z$ then the above is

$$\eta = c_0\left(\sum_{n=0}^{\infty} 3^n \left(\frac{1}{3}\right)_n \frac{z^{3n}}{(3n)!}\right) + ac_1\left(\sum_{n=0}^{\infty} 3^n \left(\frac{2}{3}\right)_n \frac{z^{3n+1}}{(3n+1)!}\right)$$

Let

$$f(\xi) = \sum_{n=0}^{\infty} 3^n \left(\frac{1}{3}\right)_n \frac{\xi^{3n}}{(3n)!}$$
$$g(\xi) = \sum_{n=0}^{\infty} 3^n \left(\frac{2}{3}\right)_n \frac{\xi^{3n+1}}{(3n+1)!}$$

Now looking at definition of $\operatorname{AiryAI}(z)$ we see

$$\operatorname{AiryAI}(z) = r_1 f(z) - r_2 g(z)$$
$$\operatorname{AiryBI}(z) = \sqrt{3}(r_1 f(z) + r_2 g(z))$$

These are Airy functions AiryAI and AiryBI with appropriate choice of c_0, c_1. See definition of these special functions. Converting back to x using $\xi = ax + b$ should result in solution given by CAS. Need to write these final details to make sure. Will finish later.

2.1011 ODE No. 1011

$$(-x^2 - 1)\, y(x) + y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0064255 (sec), leaf count = 33

$$\left\{\left\{y(x) \to c_1 D_{-1}\left(\sqrt{2}x\right) + c_2 D_0\left(i\sqrt{2}x\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.034 (sec), leaf count = 17

$$\left\{y(x) = (c_2 \operatorname{erf}(x) + c_1)\, e^{\frac{x^2}{2}}\right\}$$

Hand solution

$$y'' - (x^2 + 1)\, y = 0 \tag{1}$$

Second order with varying coefficient. Using power series, let $y = \sum_{n=0}^{\infty} c_n x^n$, hence

$$\begin{aligned}
y' &= \sum_{n=0}^{\infty} n c_n x^{n-1} = \sum_{n=1}^{\infty} n c_n x^{n-1} = \sum_{n=0}^{\infty} (n+1)\, c_{n+1} x^n \\
y'' &= \sum_{n=0}^{\infty} n(n+1)\, c_{n+1} x^{n-1} = \sum_{n=1}^{\infty} n(n+1)\, c_{n+1} x^{n-1} = \sum_{n=0}^{\infty} (n+1)\,(n+2)\, c_{n+2} x^n
\end{aligned}$$

Substituting back in the original ODE gives

$$\begin{aligned}
\sum_{n=0}^{\infty} (n+1)\,(n+2)\, c_{n+2} x^n - (x^2+1) \sum_{n=0}^{\infty} c_n x^n &= 0 \\
\sum_{n=0}^{\infty} (n+1)\,(n+2)\, c_{n+2} x^n - x^2 \sum_{n=0}^{\infty} c_n x^n - \sum_{n=0}^{\infty} c_n x^n &= 0 \\
\sum_{n=0}^{\infty} (n+1)\,(n+2)\, c_{n+2} x^n - \sum_{n=0}^{\infty} c_n x^{n+2} - \sum_{n=0}^{\infty} c_n x^n &= 0 \\
\sum_{n=0}^{\infty} (n+1)\,(n+2)\, c_{n+2} x^n - \sum_{n=2}^{\infty} c_{n-2} x^n - \sum_{n=0}^{\infty} c_n x^n &= 0
\end{aligned}$$

For $n = 0$

$$\begin{aligned}
(n+1)\,(n+2)\, c_{n+2} - c_n &= 0 \\
2c_2 - c_0 &= 0 \\
c_2 &= \frac{c_0}{2}
\end{aligned}$$

For $n = 1$

$$\begin{aligned}
(n+1)\,(n+2)\, c_{n+2} - c_n &= 0 \\
(2)\,(3)\, c_3 - c_1 &= 0 \\
c_3 &= \frac{c_1}{6}
\end{aligned}$$

For $n \geq 2$

$$\begin{aligned}
(n+1)\,(n+2)\, c_{n+2} - c_{n-2} - c_n &= 0 \\
c_{n+2} &= \frac{c_{n-2} + c_n}{(n+1)\,(n+2)}
\end{aligned}$$

Hence for $n = 2$

$$c_4 = \frac{c_0 + c_2}{(3)\,(4)} = \frac{c_0 + \frac{c_0}{2}}{(3)\,(4)} = \frac{2c_0 + c_0}{(2)\,(3)\,(4)} = c_0 \frac{3}{(2)\,(3)\,(4)}$$

For $n=3$

$$c_5=\frac{c_1+c_3}{(4)(5)}=\frac{c_1+\frac{c_1}{6}}{(4)(5)}=\frac{6c_1+c_1}{(4)(5)(6)}=c_1\frac{7}{(4)(5)(6)}$$

For $n=4$

$$c_6=\frac{c_2+c_4}{(5)(6)}=\frac{\frac{c_0}{2}+c_0\frac{3}{(2)(3)(4)}}{(5)(6)}=\frac{c_0(3)(4)+3c_0}{(2)(3)(4)(5)(6)}=c_0\frac{15}{(2)(3)(4)(5)(6)}$$

For $n=5$

$$\begin{aligned}c_7&=\frac{c_3+c_5}{(6)(7)}\\&=\frac{\frac{c_1}{6}+c_1\frac{7}{(4)(5)(6)}}{(6)(7)}=\frac{3}{560}c_1\end{aligned}$$

And so on. Hence the series is

$$\begin{aligned}y&=\sum_{n=0}^{\infty}c_nx^n\\&=c_0+c_1x+c_2x^2+c_3x^3+\cdots\\&=c_0+c_1x+\frac{c_0}{2}x^2+\frac{c_1}{6}x^3+c_0\frac{3}{(2)(3)(4)}x^4+c_1\frac{7}{(4)(5)(6)}x^5+c_0\frac{15}{(2)(3)(4)(5)(6)}x^6+c_1\frac{3}{560}x^7+\cdots\\&=c_0+c_1x+\frac{c_0}{2}x^2+\frac{c_1}{6}x^3+c_0\frac{1}{8}x^4+c_1\frac{7}{120}x^5+c_0\frac{1}{48}x^6+c_1\frac{3}{560}x^7+\cdots\\&=c_0\left(1+\frac{x^2}{2}+\frac{1}{8}x^4+\frac{1}{48}x^6+\cdots\right)+c_1\left(x+\frac{1}{6}x^3+\frac{7}{120}x^5+\frac{3}{560}x^7+\cdots\right)\end{aligned}$$

Now the power series for $e^{\frac{x^2}{2}}=1+\frac{x^2}{2}+\frac{x^4}{8}+\frac{x^6}{48}+\cdots$, so we can convert the first term above (the expression for c_0 to be $e^{\frac{x^2}{2}}$. Hence

$$c_0\left(1+\frac{x^2}{2}+\frac{1}{8}x^4+\frac{1}{48}x^6+\cdots\right)=c_0e^{\frac{x^2}{2}}$$

So now we have to work on the second term (the expression for c_1)

$$c_1\left(x+\frac{1}{6}x^3+\frac{7}{120}x^5+\frac{3}{560}x^7+\cdots\right)=?$$

Recall that series for error function is

$$\operatorname{erf}(x)=\frac{2}{\sqrt{\pi}}\left(x-\frac{x^3}{3}+\frac{x^5}{10}-\frac{x^7}{48}+\cdots\right)$$

Multiplying $e^{\frac{x^2}{2}}$ by $\operatorname{erf}(x)$ gives

$$\begin{aligned}e^{\frac{x^2}{2}}\operatorname{erf}(x)&=\frac{2}{\sqrt{\pi}}\left(1+\frac{x^2}{2}+\frac{x^4}{(2)(4)}+\frac{x^6}{(2)(4)(6)}+\cdots\right)\left(x-\frac{x^3}{3}+\frac{x^5}{10}-\frac{x^7}{48}+\cdots\right)\\&=\frac{2}{\sqrt{\pi}}\left(x-\frac{x^3}{3}+\frac{x^5}{10}-\frac{x^7}{48}+\cdots+\frac{x^3}{2}-\frac{x^5}{6}+\frac{x^7}{20}-\frac{x^{15}}{96}+\cdots\right)\\&=\frac{2}{\sqrt{\pi}}\left(x+\frac{x^3}{6}+\frac{7x^5}{120}+\frac{3}{560}x^7+\cdots\right)\end{aligned}$$

Comparing the above to the term next to c_1 above, we see they are the same with a multiplier $\frac{2}{\sqrt{\pi}}$, which can be absorbed into the constant c_1, Hence

$$
\begin{aligned}
y &= c_0\left(1+\frac{x^2}{2}+\frac{1}{8}x^4+\frac{1}{48}x^6+\cdots\right)+c_1\left(x+\frac{1}{6}x^3+\frac{7}{120}x^5+\frac{3}{560}x^7+\cdots\right)\\
&= c_0 e^{\frac{x^2}{2}}+c_1\left(e^{\frac{x^2}{2}}\operatorname{erf}(x)\right)
\end{aligned}
$$

Hence final solution is

$$
y = c_0 e^{\frac{x^2}{2}}+c_2\left(e^{\frac{x^2}{2}}\operatorname{erf}(x)\right)
$$

Verification

```
restart;
ode:=diff(diff(y(x),x),x)-(x^2+1)*y(x)=0;
y0:=_C1*exp(x^2/2)+_C2*exp(x^2/2)*erf(x);
odetest(y(x)=y0,ode);
0
```

2.1012 ODE No. 1012

$$
(-a-x^2)\,y(x)+y''(x)=0
$$

✓ **Mathematica** : cpu = 0.0080078 (sec), leaf count = 47

$$
\left\{\left\{y(x)\to c_1 D_{\frac{1}{2}(-a-1)}\left(\sqrt{2}x\right)+c_2 D_{\frac{a-1}{2}}\left(i\sqrt{2}x\right)\right\}\right\}
$$

✓ **Maple** : cpu = 0.164 (sec), leaf count = 29

$$
\left\{y(x)=\frac{c_1\,\mathrm{WhittakerM}\left(-\frac{a}{4},\frac{1}{4},x^2\right)+c_2\,\mathrm{WhittakerW}\left(-\frac{a}{4},\frac{1}{4},x^2\right)}{\sqrt{x}}\right\}
$$

2.1013 ODE No. 1013

$$
(-a^2x^2-a)\,y(x)+y''(x)=0
$$

✓ **Mathematica** : cpu = 0.0143334 (sec), leaf count = 43

$$
\left\{\left\{y(x)\to c_1 D_{-1}\left(\sqrt{2}\sqrt{a}x\right)+c_2 D_0\left(i\sqrt{2}\sqrt{a}x\right)\right\}\right\}
$$

✓ **Maple** : cpu = 0.039 (sec), leaf count = 22

$$
\left\{y(x)=\left(c_2\operatorname{erf}\left(\sqrt{a}\,x\right)+c_1\right)\mathrm{e}^{\frac{a\,x^2}{2}}\right\}
$$

2.1014 ODE No. 1014

$$y''(x) - cx^a y(x) = 0$$

✓ **Mathematica** : cpu = 0.0229783 (sec), leaf count = 170

$$\left\{\left\{y(x) \to (a+2)^{-\frac{1}{a+2}} c_1 c^{\frac{1}{2(a+2)}} x^{\frac{\frac{a}{2}+1}{a+2}} \Gamma\left(1 - \frac{1}{a+2}\right) I_{-\frac{1}{a+2}}\left(\frac{2\sqrt{c}x^{\frac{a+2}{2}}}{a+2}\right) + (-1)^{\frac{1}{a+2}} (a+2)^{-\frac{1}{a+2}} c_2 c^{\frac{1}{2(a+2)}} x^{1-\frac{\frac{a}{2}+1}{a+2}} \Gamma\right.\right.$$

✓ **Maple** : cpu = 0.231 (sec), leaf count = 63

$$\left\{y(x) = \left(c_1 \operatorname{BesselJ}\left(\frac{1}{a+2}, \frac{2\sqrt{-c}\, x^{\frac{a}{2}+1}}{a+2}\right) + c_2 \operatorname{BesselY}\left(\frac{1}{a+2}, \frac{2\sqrt{-c}\, x^{\frac{a}{2}+1}}{a+2}\right)\right)\sqrt{x}\right\}$$

2.1015 ODE No. 1015

$$y(x)\left(1 - a^2 x^{2n}\right) + y''(x) = 0$$

✗ **Mathematica** : cpu = 0.332561 (sec), leaf count = 0 , could not solve

```
DSolve[(1 - a^2*x^(2*n))*y[x] + Derivative[2][y][x] == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x) = DESol\left(\left\{\left(-a^2x^{2n}+1\right)\_Y(x) + \frac{d^2}{dx^2}\_Y(x)\right\}, \{\_Y(x)\}\right)\right\}$$

2.1016 ODE No. 1016

$$y(x)\left(ax^{2c} + bx^{c-1}\right) + y''(x) = 0$$

✓ **Mathematica** : cpu = 0.12795 (sec), leaf count = 312

$$\left\{\left\{y(x) \to 2^{\frac{c}{2(c+1)}} c_1 \left(x^{c+1}\right)^{\frac{c}{2(c+1)}} x^{-c/2} e^{-\frac{\sqrt{a}x^{c+1}}{\sqrt{-c^2-2c-1}}} U\left(\frac{\frac{\sqrt{a}cb}{\sqrt{-(c+1)^2}} + \frac{\sqrt{a}b}{\sqrt{-(c+1)^2}} + ac}{2(ca+a)}, \frac{c}{c+1}, \frac{2\sqrt{a}x^{c+1}}{\sqrt{-c^2-2c-1}}\right) + 2^{\frac{c}{2(c}}\right.\right.$$

✓ **Maple** : cpu = 0.346 (sec), leaf count = 91

$$\left\{y(x) = \left(c_1 \operatorname{WhittakerM}\left(-\frac{ib}{(2c+2)\sqrt{a}}, \frac{1}{2c+2}, \frac{2i\sqrt{a}\, x^{c+1}}{c+1}\right) + c_2 \operatorname{WhittakerW}\left(-\frac{ib}{(2c+2)\sqrt{a}}, \frac{1}{2c+2}, \frac{2i\sqrt{a}\, x}{c+}\right.\right.\right.$$

2.1017 ODE No. 1017

$$\left(e^{2x}-v^2\right)y(x)+y''(x)=0$$

✓ **Mathematica** : cpu = 0.023942 (sec), leaf count = 46

$$\left\{\left\{y(x)\to c_1\Gamma(1-v)J_{-v}\left(\sqrt{e^{2x}}\right)+c_2\Gamma(v+1)J_v\left(\sqrt{e^{2x}}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.056 (sec), leaf count = 17

$$\{y(x)=c_1\,\mathrm{BesselJ}\left(v,\mathrm{e}^x\right)+c_2\,\mathrm{BesselY}\left(v,\mathrm{e}^x\right)\}$$

2.1018 ODE No. 1018

$$ae^{bx}y(x)+y''(x)=0$$

✓ **Mathematica** : cpu = 0.0208097 (sec), leaf count = 55

$$\left\{\left\{y(x)\to c_1J_0\left(\frac{2\sqrt{a}\sqrt{e^{bx}}}{b}\right)+2c_2Y_0\left(\frac{2\sqrt{a}\sqrt{e^{bx}}}{b}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.131 (sec), leaf count = 39

$$\left\{y(x)=c_1\,\mathrm{BesselJ}\left(0,\frac{2\sqrt{a}\,\mathrm{e}^{\frac{bx}{2}}}{b}\right)+c_2\,\mathrm{BesselY}\left(0,\frac{2\sqrt{a}\,\mathrm{e}^{\frac{bx}{2}}}{b}\right)\right\}$$

2.1019 ODE No. 1019

$$y(x)\left(1-4a^2b^2x^2e^{2bx^2}\right)+y''(x)=0$$

✗ **Mathematica** : cpu = 0.699897 (sec), leaf count = 0 , could not solve

```
DSolve[(1 - 4*a^2*b^2*E^(2*b*x^2)*x^2)*y[x] + Derivative[2][y][x] == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x)=\mathit{DESol}\left(\left\{\left(-4a^2b^2x^2\mathrm{e}^{2b\,x^2}+1\right)\_Y(x)+\frac{d^2}{dx^2}\_Y(x)\right\},\{\_Y(x)\}\right)\right\}$$

2.1020 ODE No. 1020

$$y(x)\left(ae^{2x}+be^{x}+c\right)+y''(x)=0$$

✓ **Mathematica** : cpu = 0.577643 (sec), leaf count = 180

$$\left\{\left\{y(x)\to c_1e^{i\left(\sqrt{c}\log(e^x)-\sqrt{a}e^x\right)}U\left(\frac{i\left(b-i\sqrt{a}+2\sqrt{a}\sqrt{c}\right)}{2\sqrt{a}},2i\sqrt{c}+1,2i\sqrt{a}e^x\right)+c_2e^{i\left(\sqrt{c}\log(e^x)-\sqrt{a}e^x\right)}L^{2i\sqrt{c}}_{-\frac{i(b-i\sqrt{a}+2\sqrt{a}}{2\sqrt{a}}}\right.\right.$$

✓ **Maple** : cpu = 0.29 (sec), leaf count = 58

$$\left\{y(x)=\left(c_1\,\mathrm{WhittakerM}\left(-\frac{ib}{2\sqrt{a}},i\sqrt{c},2i\sqrt{a}\,\mathrm{e}^{x}\right)+c_2\,\mathrm{WhittakerW}\left(-\frac{ib}{2\sqrt{a}},i\sqrt{c},2i\sqrt{a}\,\mathrm{e}^{x}\right)\right)\mathrm{e}^{-\frac{x}{2}}\right\}$$

2.1021 ODE No. 1021

$$y(x)\left(a\cos^2(x)+b\right)+y''(x)=0$$

✓ **Mathematica** : cpu = 0.0278065 (sec), leaf count = 44

$$\left\{\left\{y(x)\to c_1\mathrm{MathieuC}\left[\frac{1}{2}(a+2b),-\frac{a}{4},x\right]+c_2\mathrm{MathieuS}\left[\frac{1}{2}(a+2b),-\frac{a}{4},x\right]\right\}\right\}$$

✓ **Maple** : cpu = 0.295 (sec), leaf count = 39

$$\left\{y(x)=c_1\,\mathrm{MathieuC}\left(-\frac{a}{2}-b,\frac{a}{4},ix\right)+c_2\,\mathrm{MathieuS}\left(-\frac{a}{2}-b,\frac{a}{4},ix\right)\right\}$$

2.1022 ODE No. 1022

$$y(x)(a\cos(2x)+b)+y''(x)=0$$

✓ **Mathematica** : cpu = 0.0203225 (sec), leaf count = 28

$$\left\{\left\{y(x)\to c_1\mathrm{MathieuC}\left[b,-\frac{a}{2},x\right]+c_2\mathrm{MathieuS}\left[b,-\frac{a}{2},x\right]\right\}\right\}$$

✓ **Maple** : cpu = 0.302 (sec), leaf count = 21

$$\left\{y(x)=c_1\,\mathrm{MathieuC}\left(b,-\frac{a}{2},x\right)+c_2\,\mathrm{MathieuS}\left(b,-\frac{a}{2},x\right)\right\}$$

2.1023 ODE No. 1023

$$y(x)\left(a\cos^2(x)+b\right)+y''(x)=0$$

✓ **Mathematica** : cpu = 0.0120762 (sec), leaf count = 44

$$\left\{\left\{y(x)\to c_1\text{MathieuC}\left[\frac{1}{2}(a+2b),-\frac{a}{4},x\right]+c_2\text{MathieuS}\left[\frac{1}{2}(a+2b),-\frac{a}{4},x\right]\right\}\right\}$$

✓ **Maple** : cpu = 0.306 (sec), leaf count = 29

$$\left\{y(x)=c_1\,\text{MathieuC}\left(\frac{a}{2}+b,-\frac{a}{4},x\right)+c_2\,\text{MathieuS}\left(\frac{a}{2}+b,-\frac{a}{4},x\right)\right\}$$

2.1024 ODE No. 1024

$$y''(x)+y(x)\left(-2\tan^2(x)-1\right)=0$$

✓ **Mathematica** : cpu = 0.158162 (sec), leaf count = 84

$$\left\{\left\{y(x)\to\frac{c_1\sqrt[4]{1-\cos^2(x)}\sec(x)}{\sqrt[4]{\cos^2(x)-1}}-\frac{c_2\sqrt[4]{1-\cos^2(x)}\sec(x)\left(\cos(x)\sqrt{1-\cos^2(x)}-\sin^{-1}(\cos(x))\right)}{2\sqrt[4]{\cos^2(x)-1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.167 (sec), leaf count = 30

$$\left\{y(x)=\frac{ic_2\cos(x)\sin(x)+c_2\ln(\cos(x)+i\sin(x))+c_1}{\cos(x)}\right\}$$

2.1025 ODE No. 1025

$$y(x)\left(-a-(m-1)m\sec^2(x)-\left((n-1)n\csc^2(x)\right)\right)+y''(x)=0$$

✓ **Mathematica** : cpu = 1.05856 (sec), leaf count = 615

$$\left\{\left\{y(x)\to\frac{c_2(-1)^{\frac{1}{2}(-2m-1)+1}\cos^2(x)^{\frac{1}{4}(-2m-1)+1}\left(\cos^2(x)-1\right)^{\frac{1}{2}\left(\frac{4am+4\sqrt{-a}n^2+4an-4\sqrt{-a}n+4(-a)^{3/2}+8\sqrt{-a}a+\sqrt{-a}+4mn^2-4}{8a+8n^2-8n+2}\right.}}{}\right.\right.$$

✓ **Maple** : cpu = 0.257 (sec), leaf count = 102

$$\left\{y(x)=\left(c_1(\cos^m(x))\,\text{hypergeom}\left(\left[\frac{m}{2}+\frac{n}{2}+\frac{i\sqrt{a}}{2},\frac{m}{2}+\frac{n}{2}-\frac{i\sqrt{a}}{2}\right],\left[m+\frac{1}{2}\right],\cos^2(x)\right)+c_2\left(\cos^{-m+1}(x)\right)\,\text{hy}\right.\right.$$

2.1026 ODE No. 1026

$$y''(x) - y(x)(B + n(n+1)\wp(x; \mathrm{g2}, \mathrm{g3})) = 0$$

✗ **Mathematica** : cpu = 0.200477 (sec), leaf count = 0 , could not solve

```
DSolve[-((B + n*(1 + n)*WeierstrassP[x, {g2, g3}])*y[x]) + Derivative[2][y][x] == 0, y[x], x
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x) = DESol\left(\left\{(-(n+1)\, n \operatorname{WeierstrassP}(x, g2, g3) - B)\_Y(x) + \frac{d^2}{dx^2}\_Y(x)\right\}, \{\_Y(x)\}\right)\right\}$$

2.1027 ODE No. 1027

$$y(x)\left(a\operatorname{sn}(x|k)^2 + b\right) + y''(x) = 0$$

✓ **Mathematica** : cpu = 0.991642 (sec), leaf count = 235

$$\left\{\left\{y(x) \to c_1\sqrt{k\operatorname{sn}(x|k)^2 - 1}\operatorname{HeunG}\left[\frac{1}{k}, -\frac{b-k}{4k}, \frac{\sqrt{k-4a}+3\sqrt{k}}{4\sqrt{k}}, \frac{\sqrt{k}\sqrt{k-4a}+2a+k}{2\sqrt{k}\left(\sqrt{k-4a}+\sqrt{k}\right)}, \frac{1}{2}, \frac{1}{2}, \operatorname{sn}(x|k)^2\right] + c_2\mathrm{s}\right.\right.$$

✓ **Maple** : cpu = 0.459 (sec), leaf count = 69

$$\left\{y(x) = c_2 HG\left(\frac{1}{k^2}, \frac{k^2+b+1}{4k^2}, \frac{n}{2}+1, -\frac{n}{2}+\frac{1}{2}, \frac{3}{2}, \frac{1}{2}, \operatorname{sn}(x|k)^2\right)\operatorname{sn}(x|k) + c_1 HG\left(\frac{1}{k^2}, \frac{b}{4k^2}, -\frac{n}{2}, \frac{n}{2}+\frac{1}{2}, \frac{1}{2}, \frac{1}{2}, \operatorname{sn}(x\right.\right.$$

2.1028 ODE No. 1028

$$y''(x) - y(x)\left(ap(x) + b + \frac{p^4(x)}{30} + \frac{7p''(x)}{3}\right) = 0$$

✗ **Mathematica** : cpu = 0.286493 (sec), leaf count = 0 , could not solve

```
DSolve[-(y[x]*(b + a*p[x] + (p^4)[x]/30 + (7*Derivative[2][p][x])/3)) + Derivative[2][y][x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x) = DESol\left(\left\{\left(-ap(x) - b - \frac{\frac{d^4}{dx^4}p(x)}{30} - \frac{7\frac{d^2}{dx^2}p(x)}{3}\right)\_Y(x) + \frac{d^2}{dx^2}\_Y(x)\right\}, \{\_Y(x)\}\right)\right\}$$

2.1029 ODE No. 1029

$$y''(x) - y(x)\left(f'(x) + f(x)^2\right) = 0$$

✓ **Mathematica** : cpu = 0.0229259 (sec), leaf count = 58

$$\left\{\left\{y(x) \to c_1 \exp\left(\int_1^x f(K[1])dK[1]\right) + c_2 \exp\left(\int_1^x f(K[2])dK[2]\right)\int_1^x \exp\left(\int_1^{K[4]} -2f(K[3])dK[3]\right)dK[4]\right\}\right\}$$

✓ **Maple** : cpu = 0.136 (sec), leaf count = 22

$$\left\{y(x) = c_2\left(c_1 + \int e^{\int -2f(x)dx}dx\right)e^{\int f(x)dx}\right\}$$

2.1030 ODE No. 1030

$$y(x)(l + P(x)) + y''(x) = 0$$

✗ **Mathematica** : cpu = 0.197984 (sec), leaf count = 0 , could not solve

```
DSolve[(l + P[x])*y[x] + Derivative[2][y][x] == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x) = DESol\left(\left\{(l + P(x))\_Y(x) + \frac{d^2}{dx^2}\_Y(x)\right\}, \{\_Y(x)\}\right)\right\}$$

2.1031 ODE No. 1031

$$y''(x) - f(x)y(x) = 0$$

✗ **Mathematica** : cpu = 0.133659 (sec), leaf count = 0 , could not solve

```
DSolve[-(f[x]*y[x]) + Derivative[2][y][x] == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x) = DESol\left(\left\{-\_Y(x)\,f(x) + \frac{d^2}{dx^2}\_Y(x)\right\}, \{\_Y(x)\}\right)\right\}$$

2.1032 ODE No. 1032

$$y(x)\left(\frac{\left(\frac{1}{4}-v^2\right)g'(x)^2}{g(x)}+g'(x)^2+\frac{g^3(x)}{2g'(x)}-\frac{3g''(x)^2}{4g'(x)^2}\right)+y''(x)=0$$

✗ **Mathematica** : cpu = 0.434963 (sec), leaf count = 0 , could not solve

```
DSolve[y[x]*((g^3)[x]/(2*Derivative[1][g][x]) + Derivative[1][g][x]^2 + ((1/4 - v^2)*Derivat
```

✓ **Maple** : cpu = 0.132 (sec), leaf count = 48

$$\left\{y(x)=\frac{c_1\,\mathrm{WhittakerM}\left(\frac{1}{2}iv^2-\frac{1}{8}i,\frac{1}{2},2ig(x)\right)+c_2\,\mathrm{WhittakerW}\left(\frac{1}{2}iv^2-\frac{1}{8}i,\frac{1}{2},2ig(x)\right)}{\sqrt{\frac{d}{dx}g\left(x\right)}}\right\}$$

2.1033 ODE No. 1033

$$ae^{-2x}y(x)+y''(x)+y'(x)=0$$

✓ **Mathematica** : cpu = 0.0129288 (sec), leaf count = 37

$$\left\{\left\{y(x)\to c_1\cos\left(\sqrt{a}e^{-x}\right)-c_2\sin\left(\sqrt{a}e^{-x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.019 (sec), leaf count = 27

$$\left\{y(x)=c_1\sin\left(\sqrt{a}\,\mathrm{e}^{-x}\right)+c_2\cos\left(\sqrt{a}\,\mathrm{e}^{-x}\right)\right\}$$

Hand solution

$$y''+y'+ae^{-2x}y=0$$

Let $y(x)=\eta(\xi)$ where $\xi=e^{-x}$, hence

$$\begin{aligned}\frac{dy}{dx}&=\frac{d\eta}{d\xi}\frac{d\xi}{dx}\\&=\frac{d\eta}{d\xi}\left(-e^{-x}\right)\end{aligned}$$

And

$$
\begin{aligned}
\frac{d^2y}{dx^2} &= \frac{d}{dx}\left(\frac{d\eta}{d\xi}(-e^{-x})\right) \\
&= \frac{d^2\eta}{d\xi^2}\frac{d\xi}{dx}(-e^{-x}) + \frac{d\eta}{d\xi}(e^{-x}) \\
&= \frac{d^2\eta}{d\xi^2}(-e^{-x})(-e^{-x}) + \frac{d\eta}{d\xi}(e^{-x}) \\
&= \frac{d^2\eta}{d\xi^2}(e^{-2x}) + \frac{d\eta}{d\xi}(e^{-x})
\end{aligned}
$$

Hence the original ODE becomes

$$
\begin{aligned}
\frac{d^2\eta}{d\xi^2}(e^{-2x}) + \frac{d\eta}{d\xi}(e^{-x}) + \frac{d\eta}{d\xi}(-e^{-x}) + ae^{-2x}\eta(\xi) = 0 \\
\eta'' + a\eta = 0
\end{aligned}
$$

This is standard second order with constant coefficients. The solution is

$$
\eta = c_1 \cos\left(\sqrt{a}\xi\right) + c_2 \sin\left(\sqrt{a}\xi\right)
$$

Substituting back

$$
y(x) = c_1 \cos\left(\sqrt{a}e^{-x}\right) + c_2 \sin\left(\sqrt{a}e^{-x}\right)
$$

Verification

```
restart;
ode:=diff(diff(y(x),x),x)+diff(y(x),x)+a*exp(-2*x)*y(x)=0;
ys:=_C1*cos(sqrt(a)*exp(-x))+_C2*sin(sqrt(a)*exp(-x));
odetest(y(x)=ys,ode);
0
```

2.1034 ODE No. 1034

$$
y''(x) - y'(x) + e^{2x}y(x) = 0
$$

✓ **Mathematica** : cpu = 0.0096618 (sec), leaf count = 20

$$
\{\{y(x) \to c_1 \cos(e^x) + c_2 \sin(e^x)\}\}
$$

✓ **Maple** : cpu = 0.014 (sec), leaf count = 15

$$
\{y(x) = c_1 \sin(\mathrm{e}^x) + c_2 \cos(\mathrm{e}^x)\}
$$

Hand solution

$$
y'' - y' + e^{2x}y = 0
$$

Let $y(x) = \eta(\xi)$ where $\xi = e^x$, hence

$$
\begin{aligned}
\frac{dy}{dx} &= \frac{d\eta}{d\xi}\frac{d\xi}{dx} \\
&= \frac{d\eta}{d\xi}e^x
\end{aligned}
$$

And

$$
\begin{aligned}
\frac{d^2y}{dx^2} &= \frac{d}{dx}\left(\frac{d\eta}{d\xi}e^x\right) \\
&= \frac{d^2\eta}{d\xi^2}\frac{d\xi}{dx}(e^x) + \frac{d\eta}{d\xi}(e^x) \\
&= \frac{d^2\eta}{d\xi^2}(e^x)(e^x) + \frac{d\eta}{d\xi}(e^x) \\
&= \frac{d^2\eta}{d\xi^2}(e^{2x}) + \frac{d\eta}{d\xi}(e^x)
\end{aligned}
$$

Hence the original ODE becomes

$$
\begin{aligned}
\frac{d^2\eta}{d\xi^2}(e^{2x}) + \frac{d\eta}{d\xi}(e^x) - \frac{d\eta}{d\xi}(e^x) + e^{2x}\eta = 0 \\
\eta'' + \eta = 0
\end{aligned}
$$

This is standard second order with constant coefficients. The solution is

$$
\eta = c_1 \cos(\xi) + c_2 \sin(\xi)
$$

Substituting back

$$
y(x) = c_1 \cos(e^x) + c_2 \sin(e^x)
$$

Verification

```
restart;
ode:=diff(diff(y(x),x),x)-diff(y(x),x)+exp(2*x)*y(x)=0;
ys:=_C1*cos(exp(x))+_C2*sin(exp(x));
odetest(y(x)=ys,ode);
0
```

2.1035 ODE No. 1035

$$ay'(x) + by(x) + y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0059992 (sec), leaf count = 58

$$\left\{\left\{y(x) \to c_1 e^{\frac{1}{2}x\left(-\sqrt{a^2-4b}-a\right)} + c_2 e^{\frac{1}{2}x\left(\sqrt{a^2-4b}-a\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.01 (sec), leaf count = 41

$$\left\{y(x) = c_1 \mathrm{e}^{-\frac{\left(a-\sqrt{a^2-4b}\right)x}{2}} + c_2 \mathrm{e}^{-\frac{\left(a+\sqrt{a^2-4b}\right)x}{2}}\right\}$$

2.1036 ODE No. 1036

$$ay'(x) + by(x) - f(x) + y''(x) = 0$$

✓ **Mathematica** : cpu = 0.155964 (sec), leaf count = 209

$$\left\{\left\{y(x) \to e^{\frac{1}{2}x\left(-\sqrt{a^2-4b}-a\right)} \int_1^x -\frac{e^{aK[1]+\frac{1}{2}\left(\sqrt{a^2-4b}-a\right)K[1]} f(K[1])}{\sqrt{a^2-4b}} dK[1] + e^{\frac{1}{2}x\left(\sqrt{a^2-4b}-a\right)} \int_1^x \frac{e^{aK[2]+\frac{1}{2}\left(-a-\sqrt{a^2-4b}\right.}}{\sqrt{a^2-4}}\right.\right.$$

✓ **Maple** : cpu = 0.145 (sec), leaf count = 134

$$\left\{y(x) = c_1 \mathrm{e}^{-\frac{\left(a+\sqrt{a^2-4b}\right)x}{2}} + c_2 \mathrm{e}^{-\frac{\left(a-\sqrt{a^2-4b}\right)x}{2}} + \frac{\left(\left(\int \mathrm{e}^{-\frac{\left(-a+\sqrt{a^2-4b}\right)x}{2}} f(x)\, dx\right) \mathrm{e}^{\frac{\left(a+\sqrt{a^2-4b}\right)x}{2}} - \left(\int \mathrm{e}^{\frac{\left(a+\sqrt{a^2-4b}\right)x}{2}} f(x\right.\right.}{\sqrt{a^2-4b}}\right.$$

2.1037 ODE No. 1037

$$ay'(x) + y(x)\left(-b^2x^2 - c\right) + y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0215399 (sec), leaf count = 101

$$\left\{\left\{y(x) \to c_1 e^{-\frac{ax}{2}-\frac{bx^2}{2}} H_{\frac{-a^2-4b-4c}{8b}}\left(\sqrt{b}x\right) + c_2 e^{-\frac{ax}{2}-\frac{bx^2}{2}} {}_1F_1\left(-\frac{-a^2-4b-4c}{16b}; \frac{1}{2}; bx^2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.157 (sec), leaf count = 64

$$\left\{y(x) = \left(c_1 \operatorname{KummerM}\left(\frac{a^2+12b+4c}{16b}, \frac{3}{2}, b\,x^2\right) + c_2 \operatorname{KummerU}\left(\frac{a^2+12b+4c}{16b}, \frac{3}{2}, b\,x^2\right)\right) x\,\mathrm{e}^{-\frac{(bx+a)x}{2}}\right\}$$

2.1038 ODE No. 1038

$$2ay'(x) + f(x)y(x) + y''(x) = 0$$

✗ **Mathematica** : cpu = 0.372802 (sec), leaf count = 0 , could not solve

```
DSolve[f[x]*y[x] + 2*a*Derivative[1][y][x] + Derivative[2][y][x] == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\{y(x) = DESol\left(\left\{2a\left(\frac{d}{dx}\_Y(x)\right) + \_Y(x)\,f(x) + \frac{d^2}{dx^2}\_Y(x)\right\}, \{\_Y(x)\}\right)\}$$

2.1039 ODE No. 1039

$$y''(x) + xy'(x) + y(x) = 0$$

✓ **Mathematica** : cpu = 0.0099841 (sec), leaf count = 47

$$\left\{\left\{y(x) \to \sqrt{\frac{\pi}{2}} c_1 e^{-\frac{x^2}{2}} \operatorname{erfi}\left(\frac{x}{\sqrt{2}}\right) + c_2 e^{-\frac{x^2}{2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.014 (sec), leaf count = 25

$$\left\{y(x) = \left(c_1 \operatorname{erf}\left(\frac{i\sqrt{2}\,x}{2}\right) + c_2\right) \mathrm{e}^{-\frac{x^2}{2}}\right\}$$

2.1040 ODE No. 1040

$$y''(x) + xy'(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 0.0494561 (sec), leaf count = 53

$$\left\{\left\{y(x) \to c_1 x - \frac{1}{2} c_2 e^{-\frac{x^2}{2}} \left(\sqrt{2\pi} e^{\frac{x^2}{2}} x \text{erf}\left(\frac{x}{\sqrt{2}}\right) + 2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.066 (sec), leaf count = 34

$$\left\{y(x) = -c_2 \mathrm{e}^{-\frac{x^2}{2}} + \left(-\frac{c_2 \sqrt{\pi} \sqrt{2} \operatorname{erf}\left(\frac{\sqrt{2}\,x}{2}\right)}{2} + c_1\right) x\right\}$$

2.1041 ODE No. 1041

$$(n+1)y(x) + y''(x) + xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.0108278 (sec), leaf count = 55

$$\left\{\left\{y(x) \to c_1 e^{-\frac{x^2}{2}} H_n\left(\frac{x}{\sqrt{2}}\right) + c_2 e^{-\frac{x^2}{2}} {}_1F_1\left(-\frac{n}{2}; \frac{1}{2}; \frac{x^2}{2}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.141 (sec), leaf count = 41

$$\left\{y(x) = \left(c_1 \operatorname{KummerM}\left(-\frac{n}{2} + \frac{1}{2}, \frac{3}{2}, \frac{x^2}{2}\right) + c_2 \operatorname{KummerU}\left(-\frac{n}{2} + \frac{1}{2}, \frac{3}{2}, \frac{x^2}{2}\right)\right) x\,\mathrm{e}^{-\frac{x^2}{2}}\right\}$$

2.1042 ODE No. 1042

$$-ny(x) + y''(x) + xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.0087322 (sec), leaf count = 61

$$\left\{\left\{y(x) \to c_1 e^{-\frac{x^2}{2}} H_{-n-1}\left(\frac{x}{\sqrt{2}}\right) + c_2 e^{-\frac{x^2}{2}} {}_1F_1\left(\frac{n+1}{2}; \frac{1}{2}; \frac{x^2}{2}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.147 (sec), leaf count = 41

$$\left\{y(x) = \left(c_1 \operatorname{KummerM}\left(\frac{n}{2} + 1, \frac{3}{2}, \frac{x^2}{2}\right) + c_2 \operatorname{KummerU}\left(\frac{n}{2} + 1, \frac{3}{2}, \frac{x^2}{2}\right)\right) x\,\mathrm{e}^{-\frac{x^2}{2}}\right\}$$

2.1043 ODE No. 1043

$$y''(x) - xy'(x) + 2y(x) = 0$$

✓ **Mathematica** : cpu = 0.116475 (sec), leaf count = 69

$$\left\{\left\{y(x)\to \frac{1}{4}c_2\left(\sqrt{2\pi}x^2\text{erfi}\left(\frac{x}{\sqrt{2}}\right)-\sqrt{2\pi}\text{erfi}\left(\frac{x}{\sqrt{2}}\right)-2e^{\frac{x^2}{2}}x\right)+c_1\left(x^2-1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.293 (sec), leaf count = 39

$$\left\{y(x) = -2c_1 x\,e^{\frac{x^2}{2}} + (x-1)(x+1)\left(c_1\sqrt{2}\sqrt{\pi}\,\text{erfi}\left(\frac{\sqrt{2}\,x}{2}\right)+c_2\right)\right\}$$

Hand solution

$$y'' - xy' + 2y = 0 \tag{1}$$

Second order with varying coefficient. Using power series, let $y = \sum_{n=0}^{\infty} c_n x^n$, hence

$$y' = \sum_{n=0}^{\infty} n c_n x^{n-1} = \sum_{n=1}^{\infty} n c_n x^{n-1} = \sum_{n=0}^{\infty} (n+1)\, c_{n+1} x^n$$
$$y'' = \sum_{n=0}^{\infty} n(n+1)\, c_{n+1} x^{n-1} = \sum_{n=1}^{\infty} n(n+1)\, c_{n+1} x^{n-1} = \sum_{n=0}^{\infty} (n+1)(n+2)\, c_{n+2} x^n$$

Substituting back in the original ODE gives

$$\sum_{n=0}^{\infty} (n+1)(n+2)\, c_{n+2} x^n - x\sum_{n=0}^{\infty} (n+1)\, c_{n+1} x^n + 2\sum_{n=0}^{\infty} c_n x^n = 0$$
$$\sum_{n=0}^{\infty} (n+1)(n+2)\, c_{n+2} x^n - \sum_{n=0}^{\infty} (n+1)\, c_{n+1} x^{n+1} + \sum_{n=0}^{\infty} 2c_n x^n = 0$$
$$\sum_{n=0}^{\infty} (n+1)(n+2)\, c_{n+2} x^n - \sum_{n=1}^{\infty} n c_n x^n + \sum_{n=0}^{\infty} 2c_n x^n = 0$$

For $n = 0$

$$(n+1)(n+2)\, c_{n+2} + 2c_n = 0$$
$$(1)(2)\, c_2 + 2c_0 = 0$$
$$c_2 = -c_0$$

For $n \geq 1$

$$(n+1)(n+2)\, c_{n+2} - nc_n + 2c_n = 0$$
$$c_{n+2} = \frac{c_n(n-2)}{(n+1)(n+2)}$$

Hence for $n = 1$

$$c_3 = \frac{-c_1}{(2)(3)}$$

For $n = 2$

$$c_4 = \frac{c_2(2-2)}{(3)(4)} = 0$$

For $n = 3$

$$c_5 = \frac{c_3}{(4)(5)} = \frac{-c_1}{(2)(3)(4)(5)}$$

For $n = 4$ and since $c_4 = 0$ then

$$c_6 = \frac{c_4(n-2)}{(n+1)(n+2)} = 0$$

For $n = 5$

$$c_7 = \frac{3c_5}{(6)(7)} = -\frac{3c_1}{(2)(3)(4)(5)(6)(7)}$$

For $n = 6$ and since $c_6 = 0$ then

$$c_8 = \frac{c_6(n-2)}{(n+1)(n+2)} = 0$$

For $n = 7$

$$c_9 = \frac{5c_7}{(8)(9)} = -\frac{(3)(5)c_1}{(2)(3)(4)(5)(6)(7)(8)(9)}$$

And so on. Hence

$$\begin{aligned}
y &= \sum_{n=0}^{\infty} c_n x^n \\
&= c_0 + c_1 x + c_2 x^2 + c_3 x^3 + \cdots \\
&= c_0 + c_1 x - c_0 x^2 - \frac{c_1}{(2)(3)} x^3 - \frac{c_1}{(2)(3)(4)(5)} x^5 - \frac{3c_1}{(2)(3)(4)(5)(6)(7)} x^7 - \frac{(3)(5)c_1}{(2)(3)(4)(5)(6)(7)(8)(9)} x^9 - \cdots \\
&= c_0(1 - x^2) + c_1 \left(x - \frac{1}{(2)(3)} x^3 - \frac{1}{(2)(3)(4)(5)} x^5 - \frac{3}{(2)(3)(4)(5)(6)(7)} x^7 - \frac{(3)(5)}{(2)(3)(4)(5)(6)(7)(8)(9)} x^9 \right) \\
&= c_0(1 - x^2) + c_1 \left(x - \frac{1}{3!} x^3 - \frac{1}{5!} x^5 - \frac{3}{7!} x^7 - \frac{15}{9!} x^9 - \cdots \right)
\end{aligned}$$

Hence

$$y(x) = c_0(1 - x^2) + c_1 \left(x - \frac{1}{6} x^3 - \frac{1}{120} x^5 - \frac{1}{1680} x^7 - \frac{1}{24\,192} x^9 - \cdots \right)$$

Verification

```
restart;
Order:=10:
sol:=dsolve(ode,y(x),series):
subs({y(0)=c0,D(y)(0)=c1},rhs(sol)):
```

```
sol:=convert(%,polynom):

sol:=collect(sol,{c0,c1});
sol := (-x^2+1)*c0+(x-(1/6)*x^3-(1/120)*x^5-(1/1680)*x^7-(1/24192)*x^9)*c1
```

2.1044 ODE No. 1044

$$-ay(x) + y''(x) - xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.0069817 (sec), leaf count = 39

$$\left\{\left\{y(x) \to c_1 H_{-a}\left(\frac{x}{\sqrt{2}}\right) + c_2\, {}_1F_1\left(\frac{a}{2}; \frac{1}{2}; \frac{x^2}{2}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.152 (sec), leaf count = 35

$$\left\{y(x) = \left(c_1 \operatorname{KummerM}\left(\frac{a}{2} + \frac{1}{2}, \frac{3}{2}, \frac{x^2}{2}\right) + c_2 \operatorname{KummerU}\left(\frac{a}{2} + \frac{1}{2}, \frac{3}{2}, \frac{x^2}{2}\right)\right) x\right\}$$

2.1045 ODE No. 1045

$$y''(x) - xy'(x) + (x-1)y(x) = 0$$

✓ **Mathematica** : cpu = 0.0465083 (sec), leaf count = 39

$$\left\{\left\{y(x) \to \sqrt{\frac{\pi}{2}} c_2 e^{x-2} \operatorname{erfi}\left(\frac{x-2}{\sqrt{2}}\right) + c_1 e^x\right\}\right\}$$

✓ **Maple** : cpu = 0.016 (sec), leaf count = 21

$$\left\{y(x) = \left(c_1 \operatorname{erf}\left(\frac{i\sqrt{2}\,(x-2)}{2}\right) + c_2\right) \mathrm{e}^x\right\}$$

2.1046 ODE No. 1046

$$ay(x) + y''(x) - 2xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.007764 (sec), leaf count = 31

$$\left\{\left\{y(x) \to c_1 H_{\frac{a}{2}}(x) + c_2\, {}_1F_1\left(-\frac{a}{4}; \frac{1}{2}; x^2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.151 (sec), leaf count = 31

$$\left\{y(x) = \left(c_1 \operatorname{KummerM}\left(-\frac{a}{4} + \frac{1}{2}, \frac{3}{2}, x^2\right) + c_2 \operatorname{KummerU}\left(-\frac{a}{4} + \frac{1}{2}, \frac{3}{2}, x^2\right)\right) x\right\}$$

2.1047 ODE No. 1047

$$\left(4x^2+2\right)y(x)+y''(x)+4xy'(x)=0$$

✓ **Mathematica** : cpu = 0.0141536 (sec), leaf count = 27

$$\left\{\left\{y(x)\to c_1e^{-x^2}+c_2e^{-x^2}x\right\}\right\}$$

✓ **Maple** : cpu = 0.029 (sec), leaf count = 16

$$\left\{y(x)=\left(c_2x+c_1\right)\mathrm{e}^{-x^2}\right\}$$

Hand solution

$$y''+4xy'+\left(4x^2+2\right)y=0 \tag{1}$$

Second order with varying coefficient. Using power series, let $y=\sum_{n=0}^{\infty}c_nx^n$, hence

$$
\begin{aligned}
y'&=\sum_{n=0}^{\infty}nc_nx^{n-1}=\sum_{n=1}^{\infty}nc_nx^{n-1}=\sum_{n=0}^{\infty}(n+1)\,c_{n+1}x^n\\
y''&=\sum_{n=0}^{\infty}n(n+1)\,c_{n+1}x^{n-1}=\sum_{n=1}^{\infty}n(n+1)\,c_{n+1}x^{n-1}=\sum_{n=0}^{\infty}(n+1)\,(n+2)\,c_{n+2}x^n
\end{aligned}
$$

Substituting back in the original ODE gives

$$
\begin{aligned}
\sum_{n=0}^{\infty}(n+1)\,(n+2)\,c_{n+2}x^n+4x\sum_{n=0}^{\infty}(n+1)\,c_{n+1}x^n+\left(4x^2+2\right)\sum_{n=0}^{\infty}c_nx^n&=0\\
\sum_{n=0}^{\infty}(n+1)\,(n+2)\,c_{n+2}x^n+\sum_{n=0}^{\infty}4(n+1)\,c_{n+1}x^{n+1}+\sum_{n=0}^{\infty}4c_nx^{n+2}+\sum_{n=0}^{\infty}2c_nx^n&=0\\
\sum_{n=0}^{\infty}(n+1)\,(n+2)\,c_{n+2}x^n+\sum_{n=1}^{\infty}4nc_nx^n+\sum_{n=2}^{\infty}4c_{n-2}x^n+\sum_{n=0}^{\infty}2c_nx^n&=0
\end{aligned}
$$

For $n=0$

$$
\begin{aligned}
(n+1)\,(n+2)\,c_{n+2}+2c_n&=0\\
(1)\,(2)\,c_2+2c_0&=0\\
c_2&=-c_0
\end{aligned}
$$

For $n=1$

$$
\begin{aligned}
(n+1)\,(n+2)\,c_{n+2}+4nc_n+2c_n&=0\\
(2)\,(3)\,c_3+4c_1+2c_1&=0\\
c_3&=-c_1
\end{aligned}
$$

For $n \geq 2$

$$(n+1)(n+2)c_{n+2} + 4nc_n + 4c_{n-2} + 2c_n = 0$$
$$c_{n+2} = \frac{(-4n-2)c_n - 4c_{n-2}}{(n+1)(n+2)}$$

Hence for $n = 2$

$$c_4 = \frac{(-8-2)c_2 - 4c_0}{(3)(4)} = \frac{(-8-2)(-c_0) - 4c_0}{(3)(4)} = c_0 \frac{6}{(3)(4)}$$

For $n = 3$

$$c_5 = \frac{(-12-2)c_3 - 4c_1}{(4)(5)} = \frac{(-12-2)(-c_1) - 4c_1}{(4)(5)} = c_1 \frac{10}{(4)(5)}$$

For $n = 4$

$$c_6 = \frac{(-16-2)c_4 - 4c_2}{(5)(6)} = \frac{(-16-2)\left(c_0 \frac{6}{(3)(4)}\right) - 4(-c_0)}{(5)(6)} = c_0 \frac{-5}{(5)(6)}$$

For $n = 5$

$$c_7 = \frac{(-20-2)c_5 - 4c_3}{(6)(7)} = \frac{(-20-2)\left(c_1 \frac{10}{(4)(5)}\right) - 4(-c_1)}{(6)(7)} = c_1 \frac{-7}{(6)(7)}$$

For $n = 6$

$$c_8 = \frac{(-24-2)c_6 - 4c_4}{(7)(8)} = \frac{(-24-2)\left(c_0 \frac{-5}{(5)(6)}\right) - 4\left(c_0 \frac{6}{(3)(4)}\right)}{(7)(8)} = c_0 \frac{7}{3} \frac{1}{(7)(8)}$$

And so on. Hence

$$\begin{aligned}
y &= \sum_{n=0}^{\infty} c_n x^n \\
&= c_0 + c_1 x + c_2 x^2 + \cdots \\
&= c_0 + c_1 x - c_0 x^2 - c_1 x^3 + c_0 \frac{6}{(3)(4)} x^4 + c_1 \frac{10}{(4)(5)} x^5 - c_0 \frac{5}{(5)(7)} x^6 - c_1 \frac{7}{(6)(7)} x^7 + c_0 \frac{12}{7} \frac{1}{(7)(8)} x^8 + \cdots \\
&= c_0 \left(1 - x^2 + \frac{6}{(3)(4)} x^4 - \frac{5}{(5)(6)} x^6 + \frac{7}{3} \frac{1}{(7)(8)} x^8 + \cdots \right) + c_1 \left(x - x^3 + \frac{10}{(4)(5)} x^5 - \frac{7}{(6)(7)} x^7 + \cdots \right) \\
&= c_0 \left(1 - x^2 + \frac{1}{2} x^4 - \frac{1}{6} x^6 + \frac{1}{24} x^8 + \cdots \right) + c_1 \left(x - x^3 + \frac{1}{2} x^5 - \frac{1}{6} x^7 + \cdots \right)
\end{aligned}$$

But Taylor series for $e^{-x^2} = 1 - x^2 + \frac{1}{2}x^4 - \frac{x^6}{4} + \cdots$, therefore the above becomes

$$y = c_0 e^{-x^2} + c_1 x e^{-x^2}$$

Verification

```
restart;
restart;
ode:=diff(diff(y(x),x),x)+4*x*diff(y(x),x)+(4*x^2+2)*y(x)=0;
y0:=_C0*exp(-x^2)+_C1*x*exp(-x^2);
odetest(y(x)=y0,ode);
0
```

2.1048 ODE No. 1048

$$(2n+3x^2-1)\,y(x)+y''(x)-4xy'(x)=0$$

✓ **Mathematica** : cpu = 0.0095042 (sec), leaf count = 45

$$\left\{\left\{y(x)\to c_1e^{\frac{x^2}{2}}H_n(x)+c_2e^{\frac{x^2}{2}}\,{}_1F_1\left(-\frac{n}{2};\frac{1}{2};x^2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.129 (sec), leaf count = 37

$$\left\{y(x)=\left(c_1\,\mathrm{KummerM}\left(-\frac{n}{2}+\frac{1}{2},\frac{3}{2},x^2\right)+c_2\,\mathrm{KummerU}\left(-\frac{n}{2}+\frac{1}{2},\frac{3}{2},x^2\right)\right)x\,\mathrm{e}^{\frac{x^2}{2}}\right\}$$

2.1049 ODE No. 1049

$$(4x^2-1)\,y(x)+y''(x)-4xy'(x)-e^x=0$$

✓ **Mathematica** : cpu = 0.0597842 (sec), leaf count = 109

$$\left\{\left\{y(x)\to\frac{1}{4}\sqrt{\pi}e^{x(x-i)-\frac{i}{2}}\left(e^{2ix}\mathrm{erfi}\left(\left(\frac{1}{2}+\frac{i}{2}\right)-ix\right)-ie^{i}\mathrm{erf}\left(-x+\left(\frac{1}{2}+\frac{i}{2}\right)\right)\right)+c_1e^{x(x-i)}-\frac{1}{2}ic_2e^{(x-i)x+2ix}\right\}\right\}$$

✓ **Maple** : cpu = 0.182 (sec), leaf count = 66

$$\left\{y(x)=\frac{\left(4c_1\sin(x)+4c_2\cos(x)+(i\cos(x)+\sin(x))\,\mathrm{e}^{\frac{i}{2}}\sqrt{\pi}\,\mathrm{erf}\left(x-\frac{1}{2}-\frac{i}{2}\right)-(i\cos(x)-\sin(x))\,\mathrm{e}^{-\frac{i}{2}}\sqrt{\pi}\,\mathrm{erf}\left(\right.\right.}{4}\right.$$

2.1050 ODE No. 1050

$$(4x^2-2)\,y(x)+y''(x)-4xy'(x)=0$$

✓ **Mathematica** : cpu = 0.0113013 (sec), leaf count = 23

$$\left\{\left\{y(x)\to c_1e^{x^2}+c_2e^{x^2}x\right\}\right\}$$

✓ **Maple** : cpu = 0.026 (sec), leaf count = 14

$$\{y(x)=(c_2x+c_1)\,\mathrm{e}^{x^2}\}$$

2.1051 ODE No. 1051

$$(4x^2-3)\,y(x)-e^{x^2}+y''(x)-4xy'(x)=0$$

✓ **Mathematica** : cpu = 0.0231736 (sec), leaf count = 44

$$\left\{\left\{y(x)\to -e^{(x-1)x+x}+c_1e^{(x-1)x}+\frac{1}{2}c_2e^{(x-1)x+2x}\right\}\right\}$$

✓ **Maple** : cpu = 0.036 (sec), leaf count = 27

$$\{y(x)=c_1\mathrm{e}^{(x-1)x}+c_2\mathrm{e}^{(x+1)x}-\mathrm{e}^{x^2}\}$$

2.1052 ODE No. 1052

$$axy'(x)+by(x)+y''(x)=0$$

✓ **Mathematica** : cpu = 0.0162794 (sec), leaf count = 78

$$\left\{\left\{y(x)\to c_1e^{-\frac{ax^2}{2}}H_{\frac{b-a}{a}}\left(\frac{\sqrt{a}x}{\sqrt{2}}\right)+c_2e^{-\frac{ax^2}{2}}\,{}_1F_1\left(-\frac{b-a}{2a};\frac{1}{2};\frac{ax^2}{2}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.164 (sec), leaf count = 58

$$\left\{y(x)=\left(c_1\,\mathrm{KummerM}\left(\frac{2a-b}{2a},\frac{3}{2},\frac{a\,x^2}{2}\right)+c_2\,\mathrm{KummerU}\left(\frac{2a-b}{2a},\frac{3}{2},\frac{a\,x^2}{2}\right)\right)x\,\mathrm{e}^{-\frac{a\,x^2}{2}}\right\}$$

2.1053 ODE No. 1053

$$a^2x^2y(x) + 2axy'(x) + y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0255472 (sec), leaf count = 57

$$\left\{\left\{y(x) \to c_1 e^{-\frac{ax^2}{2}-\sqrt{a}x} + \frac{c_2 e^{\sqrt{a}x-\frac{ax^2}{2}}}{2\sqrt{a}}\right\}\right\}$$

✓ **Maple** : cpu = 0.054 (sec), leaf count = 35

$$\left\{y(x) = c_1 \mathrm{e}^{-\frac{(ax-2\sqrt{a})x}{2}} + c_2 \mathrm{e}^{-\frac{(ax+2\sqrt{a})x}{2}}\right\}$$

2.1054 ODE No. 1054

$$(ax+b)y'(x) + y(x)(cx+d) + y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0452633 (sec), leaf count = 172

$$\left\{\left\{y(x) \to c_1 e^{\frac{cx}{a}-\frac{ax^2}{2}-bx} H_{\frac{-a^3+da^2-bca+c^2}{a^3}}\left(\frac{ab-2c}{\sqrt{2}a^{3/2}} + \frac{\sqrt{a}x}{\sqrt{2}}\right) + c_2 e^{\frac{cx}{a}-\frac{ax^2}{2}-bx} {}_1F_1\left(-\frac{-a^3+da^2-bca+c^2}{2a^3}; \frac{1}{2}; \left(\frac{ab}{\sqrt{}}\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.122 (sec), leaf count = 98

$$\left\{y(x) = \left(c_1 \operatorname{KummerM}\left(\frac{d\,a^2 - abc + c^2}{2a^3}, \frac{1}{2}, -\frac{\left(a^2x + ab - 2c\right)^2}{2a^3}\right) + c_2 \operatorname{KummerU}\left(\frac{d\,a^2 - abc + c^2}{2a^3}, \frac{1}{2}, -\frac{(a^2x +}{}\right.\right.\right.$$

2.1055 ODE No. 1055

$$(ax+b)y'(x) + y(x)\left(\mathrm{a1}x^2 + \mathrm{b1}x + \mathrm{c1}\right) + y''(x) = 0$$

✓ **Mathematica** : cpu = 0.140322 (sec), leaf count = 421

$$\left\{\left\{y(x) \to c_1 \exp\left(\frac{-bx\sqrt{a^2-4\mathrm{a1}} - \frac{1}{2}ax^2\sqrt{a^2-4\mathrm{a1}} - \frac{1}{2}a^2x^2 - abx + 2\mathrm{a1}x^2 + 2\mathrm{b1}x}{2\sqrt{a^2-4\mathrm{a1}}}\right) H_{\frac{-a^3+2\mathrm{c1}a^2-\sqrt{a^2-4\mathrm{a1}}a^2+4\mathrm{a1}a}{2(}}\right.\right.$$

✓ **Maple** : cpu = 0.289 (sec), leaf count = 262

$$\left\{y(x) = \left(c_1 \operatorname{hypergeom}\left(\left[\frac{a^3 - 2a^2c1 - 2b1^2 + (2b1b - 4a1)a + \left(-2b^2 + 8c1\right)a1 + \left(a^2 - 4a1\right)^{\frac{3}{2}}}{4\left(a^2-4a1\right)^{\frac{3}{2}}}\right], \left[\frac{1}{2}\right], \frac{(a}{}\right.\right.\right.$$

2.1056 ODE No. 1056

$$x^2(-y'(x)) + y''(x) + xy(x) = 0$$

✓ **Mathematica** : cpu = 0.0516783 (sec), leaf count = 41

$$\left\{\left\{y(x) \to c_1 x - \frac{c_2 \sqrt[3]{-x^3}\Gamma\left(-\frac{1}{3}, -\frac{x^3}{3}\right)}{3\sqrt[3]{3}}\right\}\right\}$$

✓ **Maple** : cpu = 0.101 (sec), leaf count = 52

$$\left\{y(x) = c_1 x + c_2\left(-6\, 3^{\frac{2}{3}}\left(-x^3\right)^{\frac{1}{3}}\Gamma\left(\frac{2}{3}, -\frac{x^3}{3}\right) + 18\, e^{\frac{x^3}{3}} + 6\, 3^{\frac{2}{3}}\left(-x^3\right)^{\frac{1}{3}}\Gamma\left(\frac{2}{3}\right)\right)\right\}$$

2.1057 ODE No. 1057

$$x^2(-y'(x)) + y''(x) - (x+1)^2 y(x) = 0$$

✓ **Mathematica** : cpu = 0.0559956 (sec), leaf count = 56

$$\left\{\left\{y(x) \to c_2 e^{\frac{x^3}{3}+x}\int_1^x e^{-\frac{1}{3}K[1]^3-2K[1]}dK[1] + c_1 e^{\frac{x^3}{3}+x}\right\}\right\}$$

✓ **Maple** : cpu = 0.264 (sec), leaf count = 50

$$\left\{y(x) = c_1 HT\left(0, -3, 2\, 3^{\frac{1}{3}}, \frac{3^{\frac{2}{3}}x}{3}\right)e^{-x} + c_2 HT\left(0, 3, 2\, 3^{\frac{1}{3}}, -\frac{3^{\frac{2}{3}}x}{3}\right)e^{\frac{\left(x^2+3\right)x}{3}}\right\}$$

2.1058 ODE No. 1058

$$\left(x^4 - 2\right)xy(x) - \left((x+1)x^2 y'(x)\right) + y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0641929 (sec), leaf count = 56

$$\left\{\left\{y(x) \to c_2 e^{\frac{x^3}{3}}\int_1^x e^{\frac{K[1]^4}{4}-\frac{K[1]^3}{3}}dK[1] + c_1 e^{\frac{x^3}{3}}\right\}\right\}$$

✓ **Maple** : cpu = 0.261 (sec), leaf count = 29

$$\left\{y(x) = \left(c_2\left(\int e^{\frac{1}{4}x^4-\frac{1}{3}x^3}dx\right) + c_1\right)e^{\frac{x^3}{3}}\right\}$$

2.1059 ODE No. 1059

$$x^4y'(x) - x^3y(x) + y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0877516 (sec), leaf count = 39

$$\left\{\left\{y(x)\to c_1x - \frac{c_2\sqrt[5]{x^5}\Gamma\left(-\frac{1}{5},\frac{x^5}{5}\right)}{5\sqrt[5]{5}}\right\}\right\}$$

✓ **Maple** : cpu = 0.085 (sec), leaf count = 56

$$\left\{y(x) = \frac{\left(c_2x^2 \operatorname{WhittakerM}\left(\frac{2}{5},\frac{9}{10},\frac{x^5}{5}\right)\mathrm{e}^{-\frac{x^5}{10}} + c_1\right)x^8 + 9c_2\left(x^5+4\right)\operatorname{WhittakerM}\left(\frac{7}{5},\frac{9}{10},\frac{x^5}{5}\right)\mathrm{e}^{-\frac{x^5}{10}}}{x^7}\right\}$$

2.1060 ODE No. 1060

$$ax^{q-1}y'(x) + bx^{q-2}y(x) + y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0306881 (sec), leaf count = 83

$$\left\{\left\{y(x)\to c_2q^{-1/q}a^{\frac{1}{q}}\left(x^q\right)^{\frac{1}{q}}\,{}_1F_1\left(\frac{b}{aq}+\frac{1}{q};1+\frac{1}{q};-\frac{ax^q}{q}\right) + c_1\,{}_1F_1\left(\frac{b}{aq};1-\frac{1}{q};-\frac{ax^q}{q}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.293 (sec), leaf count = 81

$$\left\{y(x) = \left(c_1 \operatorname{KummerM}\left(\frac{aq-b}{aq},\frac{q+1}{q},\frac{a\,x^q}{q}\right) + c_2 \operatorname{KummerU}\left(\frac{aq-b}{aq},\frac{q+1}{q},\frac{a\,x^q}{q}\right)\right)x\,\mathrm{e}^{-\frac{a\,x^q}{q}}\right\}$$

2.1061 ODE No. 1061

$$-e^{-\frac{x^{3/2}}{3}}x + y''(x) + \sqrt{x}y'(x) + \left(\frac{x}{4}+\frac{1}{4\sqrt{x}}-9\right)y(x) = 0$$

✓ **Mathematica** : cpu = 0.0672842 (sec), leaf count = 70

$$\left\{\left\{y(x)\to -\frac{1}{9}e^{3x-\frac{1}{3}\left(\sqrt{x}+9\right)x}x + c_1e^{-\frac{1}{3}\left(\sqrt{x}+9\right)x} + \frac{1}{6}c_2e^{6x-\frac{1}{3}\left(\sqrt{x}+9\right)x}\right\}\right\}$$

✓ **Maple** : cpu = 0.104 (sec), leaf count = 28

$$\left\{y(x) = -\frac{\left(-9c_1\cosh(3x) - 9c_2\sinh(3x) + x\right)\mathrm{e}^{-\frac{x^{\frac{3}{2}}}{3}}}{9}\right\}$$

2.1062 ODE No. 1062

$$\frac{\left(x+\sqrt{x}-8\right)y(x)}{4x^2}+y''(x)-\frac{y'(x)}{\sqrt{x}}=0$$

✓ **Mathematica** : cpu = 0.0211938 (sec), leaf count = 35

$$\left\{\left\{y(x)\to \frac{1}{3}c_2e^{\sqrt{x}}x^2+\frac{c_1e^{\sqrt{x}}}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.023 (sec), leaf count = 19

$$\left\{y(x)=\frac{\left(c_2x^3+c_1\right)\mathrm{e}^{\sqrt{x}}}{x}\right\}$$

2.1063 ODE No. 1063

$$y''(x)-\left(2e^x+1\right)y'(x)+e^{2x}y(x)-e^{3x}=0$$

✓ **Mathematica** : cpu = 0.0487571 (sec), leaf count = 28

$$\left\{\left\{y(x)\to e^x+c_1e^{e^x}+c_2e^{x+e^x}+2\right\}\right\}$$

✓ **Maple** : cpu = 0.31 (sec), leaf count = 34

$$\left\{y(x)=c_1\cosh\left(\frac{x}{2}\right)\mathrm{e}^{\frac{x}{2}+\mathrm{e}^x}+c_2\mathrm{e}^{\frac{x}{2}+\mathrm{e}^x}\sinh\left(\frac{x}{2}\right)+\mathrm{e}^x+2\right\}$$

2.1064 ODE No. 1064

$$ay'(x)+by(x)+y''(x)+\tan(x)=0$$

✓ **Mathematica** : cpu = 0.519272 (sec), leaf count = 1400

$$\left\{\left\{y(x)\to e^{\frac{1}{2}\left(-a-\sqrt{a^2-4b}\right)x}c_1+e^{\frac{1}{2}\left(\sqrt{a^2-4b}-a\right)x}c_2+\frac{8\left(2\,{}_2F_1\left(1,\frac{1}{4}i\left(\sqrt{a^2-4b}-a\right);\frac{1}{4}i\left(\sqrt{a^2-4b}-a\right)+1;-e^{2ix}\right.\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.445 (sec), leaf count = 134

$$\left\{y(x)=c_1\mathrm{e}^{-\frac{\left(a+\sqrt{a^2-4b}\right)x}{2}}+c_2\mathrm{e}^{-\frac{\left(a-\sqrt{a^2-4b}\right)x}{2}}+\frac{\left(-\left(\int\mathrm{e}^{-\frac{\left(-a+\sqrt{a^2-4b}\right)x}{2}}\tan(x)\,dx\right)\mathrm{e}^{\frac{\left(a+\sqrt{a^2-4b}\right)x}{2}}+\left(\int\mathrm{e}^{\frac{\left(a+\sqrt{a^2-4b}\right)x}{2}}\right.\right.}{\sqrt{a^2-4b}}\right.$$

2.1065 ODE No. 1065

$$(n^2 - a^2)\, y(x) + 2n\cot(x)y'(x) + y''(x) = 0$$

✓ **Mathematica** : cpu = 0.158271 (sec), leaf count = 114

$$\left\{\left\{y(x)\to c_1\left(\cos^2(x)-1\right)^{\frac{1}{4}(1-2n)}P_{\frac{1}{2}\left(2\sqrt{2n^2-a^2}-1\right)}^{\frac{1}{2}(2n-1)}(\cos(x))+c_2\left(\cos^2(x)-1\right)^{\frac{1}{4}(1-2n)}Q_{\frac{1}{2}\left(2\sqrt{2n^2-a^2}-1\right)}^{\frac{1}{2}(2n-1)}(\cos(x))\right\}\right\}$$

✓ **Maple** : cpu = 0.271 (sec), leaf count = 60

$$\left\{y(x) = \left(c_1 \operatorname{LegendreP}\left(-\frac{1}{2}+\sqrt{-a^2+2n^2}, n-\frac{1}{2}, \cos(x)\right) + c_2 \operatorname{LegendreQ}\left(-\frac{1}{2}+\sqrt{-a^2+2n^2}, n-\frac{1}{2}, \cos(\right.\right.\right.$$

2.1066 ODE No. 1066

$$y''(x) + \tan(x)y'(x) + y(x)\cos^2(x) = 0$$

✓ **Mathematica** : cpu = 0.0258846 (sec), leaf count = 18

$$\{\{y(x)\to c_2\sin(\sin(x))+c_1\cos(\sin(x))\}\}$$

✓ **Maple** : cpu = 0.151 (sec), leaf count = 15

$$\{y(x) = c_1\sin(\sin(x)) + c_2\cos(\sin(x))\}$$

2.1067 ODE No. 1067

$$y''(x) + \tan(x)y'(x) - y(x)\cos^2(x) = 0$$

✓ **Mathematica** : cpu = 0.0277072 (sec), leaf count = 21

$$\{\{y(x)\to c_1\cosh(\sin(x))+ic_2\sinh(\sin(x))\}\}$$

✓ **Maple** : cpu = 0.053 (sec), leaf count = 17

$$\{y(x) = c_1 e^{\sin(x)} + c_2 e^{-\sin(x)}\}$$

2.1068 ODE No. 1068

$$v(v+1)y(x)+y''(x)+\cot(x)y'(x)=0$$

✓ **Mathematica** : cpu = 0.129742 (sec), leaf count = 20

$$\{\{y(x)\to c_1P_v(\cos(x))+c_2Q_v(\cos(x))\}\}$$

✓ **Maple** : cpu = 0.288 (sec), leaf count = 45

$$\left\{y(x)=c_2\,\mathrm{hypergeom}\left(\left[\frac{v}{2}+1,-\frac{v}{2}+\frac{1}{2}\right],\left[\frac{3}{2}\right],\cos^2(x)\right)\cos(x)+c_1\,\mathrm{hypergeom}\left(\left[-\frac{v}{2},\frac{v}{2}+\frac{1}{2}\right],\left[\frac{1}{2}\right],\cos^2(x)\right.\right.$$

2.1069 ODE No. 1069

$$y''(x)-\cot(x)y'(x)+y(x)\sin^2(x)=0$$

✓ **Mathematica** : cpu = 0.0306345 (sec), leaf count = 19

$$\{\{y(x)\to c_1\cos(\cos(x))-c_2\sin(\cos(x))\}\}$$

✓ **Maple** : cpu = 0.151 (sec), leaf count = 15

$$\{y(x)=c_1\sin(\cos(x))+c_2\cos(\cos(x))\}$$

2.1070 ODE No. 1070

$$a\tan(x)y'(x)+by(x)+y''(x)=0$$

✓ **Mathematica** : cpu = 0.285034 (sec), leaf count = 143

$$\left\{\left\{y(x)\to c_1\,{}_2F_1\left(-\frac{a}{4}-\frac{1}{4}\sqrt{a^2+4b},\frac{1}{4}\sqrt{a^2+4b}-\frac{a}{4};\frac{1}{2}-\frac{a}{2};\cos^2(x)\right)+i^{a+1}c_2\cos^{a+1}(x)\,{}_2F_1\left(\frac{a}{4}-\frac{1}{4}\sqrt{a^2+4b}\right.\right.\right.$$

✓ **Maple** : cpu = 0.231 (sec), leaf count = 60

$$\left\{y(x)=\left(c_1\,\mathrm{LegendreP}\left(\frac{\sqrt{a^2+4b}}{2}-\frac{1}{2},\frac{a}{2}+\frac{1}{2},\sin(x)\right)+c_2\,\mathrm{LegendreQ}\left(\frac{\sqrt{a^2+4b}}{2}-\frac{1}{2},\frac{a}{2}+\frac{1}{2},\sin(x)\right)\right)\left(\mathrm{co}\right.\right.$$

2.1071 ODE No. 1071

$$\left(b^2-a^2\right)y(x)+2a\cot(ax)y'(x)+y''(x)=0$$

✓ **Mathematica** : cpu = 0.074339 (sec), leaf count = 44

$$\left\{\left\{y(x)\to c_1e^{-ibx}\csc(ax)-\frac{ic_2e^{ibx}\csc(ax)}{2b}\right\}\right\}$$

✓ **Maple** : cpu = 0.077 (sec), leaf count = 24

$$\left\{y(x)=\frac{c_1\sin(bx)+c_2\cos(bx)}{\sin(ax)}\right\}$$

2.1072 ODE No. 1072

$$y(x)\left(-4anp(x)^2+a+bp(x)\right)+ap''(x)y'(x)+y''(x)=0$$

✗ **Mathematica** : cpu = 0.346867 (sec), leaf count = 0 , could not solve

```
DSolve[(a + b*p[x] - 4*a*n*p[x]^2)*y[x] + a*Derivative[1][y][x]*Derivative[2][p][x] + Deriva
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\{y(x)=DESol\left(\left\{a\left(\frac{d}{dx}\_Y(x)\right)\left(\frac{d^2}{dx^2}p(x)\right)+\left(-4anp(x)^2+bp(x)+a\right)\_Y(x)+\frac{d^2}{dx^2}\_Y(x)\right\},\{\_Y(x)\}\right)\}$$

2.1073 ODE No. 1073

$$\frac{y'(x)\left(-\wp(x;a,b)\wp'(x;a,b)+\wp(x;a,b)^3-6\wp(x;a,b)^2+\frac{a}{2}\right)}{\wp'(x;a,b)-\wp(x;a,b)^2}+\frac{y(x)\left(\wp(x;a,b)^2(-\wp'(x;a,b))-\left(6\wp(x;a,b)^2-\frac{a}{2}\right)\wp\right.}{\wp(x;a,b)^2+\wp'(x;a,b)}$$

✗ **Mathematica** : cpu = 1.41828 (sec), leaf count = 0 , could not solve

```
DSolve[((-(WeierstrassP[x, {a, b}]*(-1/2*a + 6*WeierstrassP[x, {a, b}]^2)) - WeierstrassP[x,
WeierstrassP[x, {a, b}]^2 + WeierstrassPPrime[x, {a, b}]) + Derivative[2][y][x] == 0, y[x],
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x)=DESol\left(\left\{\frac{\left(-\mathrm{WeierstrassP}(x,a,b)^2\mathcal{P}'(x;a,b)+\mathcal{P}'(x;a,b)^2-\left(6\,\mathrm{WeierstrassP}(x,a,b)^2-\frac{a}{2}\right)\mathrm{Weierstr}\right.}{\mathrm{WeierstrassP}(x,a,b)^2+\mathcal{P}'(x;a,b)}\right.\right.\right.$$

2.1074 ODE No. 1074

$$\frac{k^2 \text{cn}(x|k)\text{sn}(x|k)y'(x)}{\text{dn}(x|k)} + n^2 y(x)\text{dn}(x|k)^2 + y''(x) = 0$$

✗ **Mathematica** : cpu = 5.06514 (sec), leaf count = 0 , could not solve

```
DSolve[n^2*JacobiDN[x, k]^2*y[x] + (k^2*JacobiCN[x, k]*JacobiSN[x, k]*Derivative[1][y][x])/J
```

✓ **Maple** : cpu = 0.037 (sec), leaf count = 21

$$\{y(x) = c_1 \sin(n \operatorname{am}(x|k)) + c_2 \cos(n \operatorname{am}(x|k))\}$$

2.1075 ODE No. 1075

$$f(x)y'(x) + g(x)y(x) + y''(x) = 0$$

✗ **Mathematica** : cpu = 0.241473 (sec), leaf count = 0 , could not solve

```
DSolve[g[x]*y[x] + f[x]*Derivative[1][y][x] + Derivative[2][y][x] == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\{y(x) = DESol\left(\left\{\_Y(x)\, g(x) + \left(\frac{d}{dx}\_Y(x)\right) f(x) + \frac{d^2}{dx^2}\_Y(x)\right\}, \{\_Y(x)\}\right)\}$$

2.1076 ODE No. 1076

$$y(x)\left(a + f'(x)\right) + f(x)y'(x) - g(x) + y''(x) = 0$$

✗ **Mathematica** : cpu = 0.230854 (sec), leaf count = 0 , could not solve

```
DSolve[-g[x] + y[x]*(a + Derivative[1][f][x]) + f[x]*Derivative[1][y][x] + Derivative[2][y][
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\{y(x) = DESol\left(\left\{\left(\frac{d}{dx}\_Y(x)\right) f(x) + \left(a + \frac{d}{dx} f(x)\right)\_Y(x) + \frac{d^2}{dx^2}\_Y(x) - g(x)\right\}, \{\_Y(x)\}\right)\}$$

2.1077 ODE No. 1077

$$y'(x)(af(x)+b)+y(x)(cf(x)+d)+y''(x)=0$$

✗ **Mathematica** : cpu = 0.427753 (sec), leaf count = 0 , could not solve

```
DSolve[(d + c*f[x])*y[x] + (b + a*f[x])*Derivative[1][y][x] + Derivative[2][y][x] == 0, y[x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\{y(x)=DESol\left(\left\{(cf(x)+d)\_Y(x)+(af(x)+b)\left(\frac{d}{dx}\_Y(x)\right)+\frac{d^2}{dx^2}\_Y(x)\right\},\{\_Y(x)\}\right)\}$$

2.1078 ODE No. 1078

$$y(x)\left(a+\frac{f'(x)}{2}+\frac{f(x)^2}{4}\right)+f(x)y'(x)+y''(x)=0$$

✓ **Mathematica** : cpu = 0.0432429 (sec), leaf count = 76

$$\left\{\left\{y(x)\to c_1\exp\left(-\frac{1}{2}\int_1^x f(K[1])dK[1]-i\sqrt{a}x\right)-\frac{ic_2\exp\left(-\frac{1}{2}\int_1^x f(K[1])dK[1]+i\sqrt{a}x\right)}{2\sqrt{a}}\right\}\right\}$$

✓ **Maple** : cpu = 0.037 (sec), leaf count = 33

$$\left\{y(x)=\left(c_1\sinh\left(\sqrt{-a}\,x\right)+c_2\cosh\left(\sqrt{-a}\,x\right)\right)e^{-\frac{(\int f(x)dx)}{2}}\right\}$$

2.1079 ODE No. 1079

$$by(x)f(x)^{2a}-\frac{af'(x)y'(x)}{f(x)}+y''(x)=0$$

✓ **Mathematica** : cpu = 0.229097 (sec), leaf count = 315

$$\left\{\left\{y(x)\to-\frac{\sqrt{c_1}\exp\left(-\int_1^x-i\sqrt{b}f(K[1])^a dK[1]-c_2\right)\left(-1+\exp\left(2\int_1^x-i\sqrt{b}f(K[1])^a dK[1]+2c_2\right)\right)}{\sqrt{2}}\right\},\left\{y(x)\right.\right.$$

✓ **Maple** : cpu = 0.027 (sec), leaf count = 37

$$\left\{y(x)=c_1e^{\int i\sqrt{b}\,f(x)^a dx}+c_2e^{-\left(\int i\sqrt{b}\,f(x)^a dx\right)}\right\}$$

2.1080 ODE No. 1080

$$y(x)\left(a^2+\frac{af'(x)}{f(x)}-b^2f(x)^2\right)-y'(x)\left(2a+\frac{f'(x)}{f(x)}\right)+y''(x)=0$$

✓ **Mathematica** : cpu = 0.0665177 (sec), leaf count = 49

$$\left\{\left\{y(x)\to c_1\exp\left(b\int_1^x f(K[1])dK[1]+ax\right)+c_2\exp\left(ax-b\int_1^x f(K[2])dK[2]\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.577 (sec), leaf count = 74

$$\left\{y(x)=c_2\mathrm{e}^{\int -\frac{b\,\mathrm{e}^{2c_1b}\mathrm{e}^{\int -2bf(x)dx}f(x)-a\,\mathrm{e}^{2c_1b}\mathrm{e}^{\int -2bf(x)dx}+bf(x)+a}{\mathrm{e}^{2c_1b}\mathrm{e}^{\int -2bf(x)dx}-1}dx}\right\}$$

2.1081 ODE No. 1081

$$-\frac{a^2y(x)f'(x)^2}{b^2+f(x)^2}+\frac{f(x)f^3(x)y'(x)}{b^2+f(x)^2}+y''(x)=0$$

✗ **Mathematica** : cpu = 0.748464 (sec), leaf count = 0 , could not solve

```
DSolve[-((a^2*y[x]*Derivative[1][f][x]^2)/(b^2 + f[x]^2)) + (f[x]*(f^3)[x]*Derivative[1][y][
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x)=DESol\left(\left\{-\frac{a^2\_Y(x)\left(\frac{d}{dx}f(x)\right)^2}{b^2+f(x)^2}+\frac{\left(\frac{d}{dx}\_Y(x)\right)\left(\frac{d^3}{dx^3}f(x)\right)f(x)}{b^2+f(x)^2}+\frac{d^2}{dx^2}\_Y(x)\right\},\{\_Y(x)\}\right)\right\}$$

2.1082 ODE No. 1082

$$y(x)\left(\frac{(m^2-v^2)\,g'(x)^2}{g(x)}+g'(x)^2\right)-y'(x)\left(\frac{(2m-1)g'(x)}{g(x)}+\frac{g''(x)}{g'(x)}\right)+y''(x)=0$$

✗ **Mathematica** : cpu = 0.614736 (sec), leaf count = 0 , could not solve

```
DSolve[y[x]*(Derivative[1][g][x]^2 + ((m^2 - v^2)*Derivative[1][g][x]^2)/g[x]) - Derivative[
1 + 2*m)*Derivative[1][g][x])/g[x] + Derivative[2][g][x]/Derivative[1][g][x]) + Derivative[2
```

✓ **Maple** : cpu = 0.201 (sec), leaf count = 74

$$\left\{y(x)=\left(c_1\,\mathrm{KummerM}\left(\frac{1}{2}im^2-\frac{1}{2}iv^2+m+\frac{1}{2},2m+1,2ig(x)\right)+c_2\,\mathrm{KummerU}\left(\frac{1}{2}im^2-\frac{1}{2}iv^2+m+\frac{1}{2},2m\right.\right.$$

2.1083 ODE No. 1083

$$-\frac{f'(x)y'(x)}{f(x)}+y(x)\left(-\frac{f''(x)}{2f(x)}+\frac{3f'(x)^2}{4f(x)^2}+\frac{\left(\frac{1}{4}-v^2\right)g'(x)^2}{g(x)^2}+g'(x)^2+\frac{g^3(x)}{2g'(x)}-\frac{3g''(x)^2}{4g'(x)^2}\right)+y''(x)=0$$

✗ **Mathematica** : cpu = 0.752187 (sec), leaf count = 0 , could not solve

```
DSolve[-((Derivative[1][f][x]*Derivative[1][y][x])/f[x]) + y[x]*((3*Derivative[1][f][x]^2)/(
```

✓ **Maple** : cpu = 0.122 (sec), leaf count = 31

$$\left\{y(x)=\sqrt{\frac{f(x)\,g(x)}{\frac{d}{dx}g(x)}}\,(c_1\,\mathrm{BesselJ}\,(v,g(x))+c_2\,\mathrm{BesselY}\,(v,g(x)))\right\}$$

2.1084 ODE No. 1084

$$-y'(x)\left(\frac{2f'(x)}{f(x)}-\frac{g'(x)}{g(x)}+\frac{g''(x)}{g'(x)}\right)+y(x)\left(-\frac{f''(x)}{f(x)}+\frac{f'(x)\left(\frac{2f'(x)}{f(x)}-\frac{g'(x)}{g(x)}+\frac{g''(x)}{g'(x)}\right)}{f(x)}-\frac{v^2g'(x)^2}{g(x)^2}+g'(x)^2\right)+y''(x$$

✓ **Mathematica** : cpu = 0.162916 (sec), leaf count = 36

$$\left\{\left\{y(x)\to c_1f(x)J_{\sqrt{v^2}}(g(x))+c_2f(x)Y_{\sqrt{v^2}}(g(x))\right\}\right\}$$

✓ **Maple** : cpu = 0.105 (sec), leaf count = 20

$$\{y(x)=(c_1\,\mathrm{BesselJ}\,(v,g(x))+c_2\,\mathrm{BesselY}\,(v,g(x)))\,f(x)\}$$

2.1085 ODE No. 1085

$$-y'(x)\left(\frac{(2v-1)g'(x)}{g(x)}+\frac{g''(x)}{g'(x)}+\frac{2h'(x)}{h(x)}\right)+y(x)\left(g'(x)^2+\frac{h'(x)\left(\frac{(2v-1)g'(x)}{g(x)}+\frac{g''(x)}{g'(x)}+\frac{2h'(x)}{h(x)}\right)}{h(x)}-\frac{h''(x)}{h(x)}\right)+y''(x$$

✓ **Mathematica** : cpu = 0.158404 (sec), leaf count = 32

$$\{\{y(x)\to c_1h(x)g(x)^vJ_v(g(x))+c_2h(x)g(x)^vY_v(g(x))\}\}$$

✓ **Maple** : cpu = 0.094 (sec), leaf count = 24

$$\{y(x)=(c_1\,\mathrm{BesselJ}\,(v,g(x))+c_2\,\mathrm{BesselY}\,(v,g(x)))\,g(x)^v\,h(x)\}$$

2.1086 ODE No. 1086

$$4y''(x) + 9xy(x) = 0$$

✓ **Mathematica** : cpu = 0.0054594 (sec), leaf count = 42

$$\left\{\left\{y(x) \to c_1 \text{Ai}\left(\sqrt[3]{-1}\left(\frac{3}{2}\right)^{2/3} x\right) + c_2 \text{Bi}\left(\sqrt[3]{-1}\left(\frac{3}{2}\right)^{2/3} x\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.023 (sec), leaf count = 29

$$\left\{y(x) = c_1 \operatorname{AiryAi}\left(-\frac{3^{\frac{2}{3}} 2^{\frac{1}{3}} x}{2}\right) + c_2 \operatorname{AiryBi}\left(-\frac{3^{\frac{2}{3}} 2^{\frac{1}{3}} x}{2}\right)\right\}$$

2.1087 ODE No. 1087

$$\left(-a - x^2\right) y(x) + 4y''(x) = 0$$

✓ **Mathematica** : cpu = 0.007803 (sec), leaf count = 36

$$\left\{\left\{y(x) \to c_1 D_{\frac{1}{4}(-a-2)}(x) + c_2 D_{\frac{a-2}{4}}(ix)\right\}\right\}$$

✓ **Maple** : cpu = 0.131 (sec), leaf count = 33

$$\left\{y(x) = \frac{c_1 \operatorname{WhittakerM}\left(-\frac{a}{8}, \frac{1}{4}, \frac{x^2}{2}\right) + c_2 \operatorname{WhittakerW}\left(-\frac{a}{8}, \frac{1}{4}, \frac{x^2}{2}\right)}{\sqrt{x}}\right\}$$

2.1088 ODE No. 1088

$$4y''(x) + 4\tan(x)y'(x) + y(x)\left(-5\tan^2(x) - 2\right) = 0$$

✓ **Mathematica** : cpu = 0.0756578 (sec), leaf count = 180

$$\left\{\left\{y(x) \to \frac{3(-1)^{5/8} c_2 \left(4\sqrt[4]{-1}2^{3/4} \sinh^{-1}\left(\frac{1}{2}\sqrt[4]{-\frac{1}{2}}\sqrt[4]{-8\cos^2(2x) - 16\cos(2x) - 8}\right) - i\sqrt[4]{-8\cos^2(2x) - 16\cos(2\cdots}\right.}{8\sqrt[8]{2}\sqrt[8]{-8\cos^2(2x) - 16\cos(2x) - 8}\cdots}\right.\right.$$

✓ **Maple** : cpu = 0.184 (sec), leaf count = 31

$$\left\{y(x) = \frac{ic_2 \cos(x)\sin(x) - c_2 \ln(i\cos(x) + \sin(x)) + c_1}{\sqrt{\cos(x)}}\right\}$$

2.1089 ODE No. 1089

$$-y'(x)(ab+c+x)+ay''(x)+y(x)(b(c+x)+d)=0$$

✓ **Mathematica** : cpu = 0.0441027 (sec), leaf count = 99

$$\left\{\left\{y(x)\to c_1e^{bx}H_d\left(\frac{x}{\sqrt{2}\sqrt{a}}-\frac{ab-c}{\sqrt{2}\sqrt{a}}\right)+c_2e^{bx}\,{}_1F_1\left(-\frac{d}{2};\frac{1}{2};\left(\frac{x}{\sqrt{2}\sqrt{a}}-\frac{ab-c}{\sqrt{2}\sqrt{a}}\right)^2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.153 (sec), leaf count = 58

$$\left\{y(x)=\left(c_1\,\mathrm{KummerM}\left(-\frac{d}{2},\frac{1}{2},\frac{(ab-c-x)^2}{2a}\right)+c_2\,\mathrm{KummerU}\left(-\frac{d}{2},\frac{1}{2},\frac{(ab-c-x)^2}{2a}\right)\right)\mathrm{e}^{bx}\right\}$$

2.1090 ODE No. 1090

$$a\left(a^2-2be^{-ax}\right)y'(x)+a^2y''(x)+b^2e^{-2ax}y(x)=0$$

✓ **Mathematica** : cpu = 0.0285192 (sec), leaf count = 50

$$\left\{\left\{y(x)\to c_1e^{-\frac{be^{-ax}}{a^2}}-\frac{bc_2e^{-\frac{be^{-ax}}{a^2}-ax}}{a^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.047 (sec), leaf count = 40

$$\left\{y(x)=\left(c_1\sinh\left(\frac{ax}{2}\right)+c_2\cosh\left(\frac{ax}{2}\right)\right)\mathrm{e}^{-\frac{a^3x+2b\,\mathrm{e}^{-ax}}{2a^2}}\right\}$$

2.1091 ODE No. 1091

$$x\left(y''(x)+y(x)\right)-\cos(x)=0$$

✓ **Mathematica** : cpu = 0.0202742 (sec), leaf count = 41

$$\left\{\left\{y(x)\to\frac{1}{2}(\mathrm{Ci}(2x)\sin(x)-\mathrm{Si}(2x)\cos(x)+\log(x)\sin(x))+c_1\cos(x)+c_2\sin(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.066 (sec), leaf count = 35

$$\left\{y(x)=c_1\cos(x)+\frac{\mathrm{cosineIntegral}(2x)\sin(x)}{2}-\frac{\mathrm{sinIntegral}(2x)\cos(x)}{2}+\frac{(2c_2+\ln(x))\sin(x)}{2}\right\}$$

2.1092 ODE No. 1092

$$(a+x)y(x)+xy''(x)=0$$

✓ **Mathematica** : cpu = 0.0775898 (sec), leaf count = 72

$$\left\{\left\{y(x)\to c_2e^{-ix}x\,{}_1F_1\left(1-\frac{1}{4}i(-2(a-2)-4);2;2ix\right)+c_1e^{-ix}xU\left(1-\frac{1}{4}i(-2(a-2)-4),2,2ix\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.055 (sec), leaf count = 29

$$\left\{y(x)=c_1\,\mathrm{WhittakerM}\left(-\frac{ia}{2},\frac{1}{2},2ix\right)+c_2\,\mathrm{WhittakerW}\left(-\frac{ia}{2},\frac{1}{2},2ix\right)\right\}$$

2.1093 ODE No. 1093

$$xy''(x)+y'(x)=0$$

✓ **Mathematica** : cpu = 0.0163188 (sec), leaf count = 13

$$\{\{y(x)\to c_1\log(x)+c_2\}\}$$

✓ **Maple** : cpu = 0.006 (sec), leaf count = 10

$$\{y(x)=c_2\ln(x)+c_1\}$$

2.1094 ODE No. 1094

$$ay(x)+xy''(x)+y'(x)=0$$

✓ **Mathematica** : cpu = 0.0194233 (sec), leaf count = 41

$$\left\{\left\{y(x)\to c_1J_0\left(2\sqrt{a}\sqrt{x}\right)+2c_2Y_0\left(2\sqrt{a}\sqrt{x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.01 (sec), leaf count = 29

$$\left\{y(x)=c_1\,\mathrm{BesselJ}\left(0,2\sqrt{a}\,\sqrt{x}\right)+c_2\,\mathrm{BesselY}\left(0,2\sqrt{a}\,\sqrt{x}\right)\right\}$$

2.1095 ODE No. 1095

$$lxy(x) + xy''(x) + y'(x) = 0$$

✓ **Mathematica** : cpu = 0.0075629 (sec), leaf count = 30

$$\left\{\left\{y(x) \to c_1 J_0\left(\sqrt{l}x\right) + c_2 Y_0\left(\sqrt{l}x\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.042 (sec), leaf count = 23

$$\left\{y(x) = c_1 \operatorname{BesselJ}\left(0, \sqrt{l}\, x\right) + c_2 \operatorname{BesselY}\left(0, \sqrt{l}\, x\right)\right\}$$

2.1096 ODE No. 1096

$$(a + x)y(x) + xy''(x) + y'(x) = 0$$

✓ **Mathematica** : cpu = 0.0121195 (sec), leaf count = 61

$$\left\{\left\{y(x) \to c_1 e^{-ix} U\left(\frac{1}{2} i(a-i), 1, 2ix\right) + c_2 e^{-ix} L_{-\frac{1}{2}i(a-i)}(2ix)\right\}\right\}$$

✓ **Maple** : cpu = 0.148 (sec), leaf count = 39

$$\left\{y(x) = \left(c_1 \operatorname{KummerM}\left(\frac{ia}{2} + \frac{1}{2}, 1, 2ix\right) + c_2 \operatorname{KummerU}\left(\frac{ia}{2} + \frac{1}{2}, 1, 2ix\right)\right) \mathrm{e}^{-ix}\right\}$$

2.1097 ODE No. 1097

$$ay(x) + xy''(x) - y'(x) = 0$$

✓ **Mathematica** : cpu = 0.0212636 (sec), leaf count = 46

$$\left\{\left\{y(x) \to 2ac_1 x J_2\left(2\sqrt{a}\sqrt{x}\right) - 2ac_2 x Y_2\left(2\sqrt{a}\sqrt{x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.01 (sec), leaf count = 31

$$\left\{y(x) = \left(c_1 \operatorname{BesselJ}\left(2, 2\sqrt{a}\,\sqrt{x}\right) + c_2 \operatorname{BesselY}\left(2, 2\sqrt{a}\,\sqrt{x}\right)\right) x\right\}$$

2.1098 ODE No. 1098

$$-ax^3y(x) + xy''(x) - y'(x) = 0$$

✓ **Mathematica** : cpu = 0.0085315 (sec), leaf count = 41

$$\left\{\left\{y(x)\to c_1\cosh\left(\frac{\sqrt{a}x^2}{2}\right)+ic_2\sinh\left(\frac{\sqrt{a}x^2}{2}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.01 (sec), leaf count = 27

$$\left\{y(x)=c_1\sinh\left(\frac{\sqrt{a}\,x^2}{2}\right)+c_2\cosh\left(\frac{\sqrt{a}\,x^2}{2}\right)\right\}$$

2.1099 ODE No. 1099

$$x^3\left(e^{x^3}-v^2\right)y(x)+xy''(x)-y'(x)=0$$

✗ **Mathematica** : cpu = 0.990392 (sec), leaf count = 0 , could not solve

```
DSolve[(E^x^3 - v^2)*x^3*y[x] - Derivative[1][y][x] + x*Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 0.148 (sec), leaf count = 25

$$\left\{y(x)=c_1\,\mathrm{BesselJ}\left(v,\mathrm{e}^{\frac{x^2}{2}}\right)+c_2\,\mathrm{BesselY}\left(v,\mathrm{e}^{\frac{x^2}{2}}\right)\right\}$$

2.1100 ODE No. 1100

$$xy''(x)+2y'(x)-xy(x)-e^x=0$$

✓ **Mathematica** : cpu = 0.0162022 (sec), leaf count = 44

$$\left\{\left\{y(x)\to\frac{e^x(2x-1)}{4x}+\frac{c_1e^{-x}}{x}+\frac{c_2e^x}{2x}\right\}\right\}$$

✓ **Maple** : cpu = 0.037 (sec), leaf count = 23

$$\left\{y(x)=\frac{c_1\cosh(x)}{x}+\frac{c_2\sinh(x)}{x}+\frac{\mathrm{e}^x}{2}\right\}$$

Hand solution

$$xy''+2y'-xy=e^x \tag{1}$$

First method, much shorter, using transformation. Let $y_h=\frac{u(x)}{x}$, hence (now we are solving only the homogeneous part).

$$
\begin{aligned}
y' &= \frac{u'}{x} - \frac{u}{x^2} \\
y'' &= \frac{u''}{x} - \frac{u'}{x^2} - \frac{u'}{x^2} + 2\frac{u}{x^3}
\end{aligned}
$$

And (1) becomes

$$
\begin{aligned}
x\left(\frac{u''}{x} - \frac{u'}{x^2} - \frac{u'}{x^2} + 2\frac{u}{x^3}\right) + 2\left(\frac{u'}{x} - \frac{u}{x^2}\right) - x\left(\frac{u}{x}\right) &= 0 \\
u'' - 2\frac{u'}{x} + 2\frac{u}{x^2} + \frac{2u'}{x} - \frac{2u}{x^2} - u &= 0 \\
u'' - u &= 0
\end{aligned}
$$

Hence the roots of the characteristic equation are ± 1 and the solution is

$$
u = Ae^{x} + Be^{-x}
$$

Hence

$$
y_h = \frac{1}{x}\left(Ae^{x} + Be^{-x}\right)
$$

The particular solution is found below, and given in the second method. The transformation method is much simpler.

The second method, which is much longer, using series method. This is used if a transformation is not known or can not be found. There is singularity at $x = 0$. We need to check if the singularity is regular or not. Writing in standard form $y'' + p(x)\, y' + q(x)\, y = 0$ gives (we are looking at the homogeneous part now only)

$$
y'' + \frac{2}{x}y' - y = 0
$$

Hence $\lim_{x\to 0} xp(x) = \lim_{x\to 0} x\frac{2}{x} = 2$ which is analytic at $x = 0$. And $\lim_{x\to 0} x^2 q(x) = \lim_{x\to 0} -x^2 = 0$ which is analytic. Hence the singularity is regular (removable). Using Frobenius series, assume that

$$
y = \sum_{n=-\infty}^{\infty} c_n x^{n+r}
$$

Where $c_n = 0$ for $n < 0$. Hence

$$
\begin{aligned}
y' &= \sum (n+r)\, c_n x^{n+r-1} \\
y'' &= \sum (n+r)\,(n+r-1)\, c_n x^{n+r-2}
\end{aligned}
$$

Substituting back in the original ODE gives

$$\sum (n+r)(n+r-1)\, c_n x^{n+r-1} + \sum 2(n+r)\, c_n x^{n+r-1} - \sum c_n x^{n+r+1} = 0$$

Adjusting so that all have same power x^{n+r} gives

$$\sum (n+r+1)(n+r)\, c_{n+1} x^{n+r} + \sum 2(n+r+1)\, c_{n+1} x^{n+r} - \sum c_{n-1} x^{n+r} = 0$$

Hence

$$\begin{aligned}(n+r+1)(n+r)\, c_{n+1} + 2(n+r+1)\, c_{n+1} - c_{n-1} &= 0\\ (n+r+1)(2+(n+r))\, c_{n+1} - c_{n-1} &= 0\end{aligned} \tag{2}$$

We want equation with c_0 in it. Hence let $n=-1$

$$(-1+r+1)(2+(-1+r))\, c_0 - c_{-2} = 0$$

But $c_n = 0$ for all $n < 0$ hence

$$(-1+r+1)(2+(-1+r))\, c_0 = 0$$

But $c_0 \neq 0$, as this is the basis for this method. Therefore, we obtain the indicial equation for r

$$\begin{aligned}(-1+r+1)(2+(-1+r)) &= 0\\ r(r+1) &= 0\end{aligned}$$

Hence $r=0$ or $r=-1$ are the roots. Now for each r we find a solution. Using $r=0$, we go back the recurrence equation (2)

$$\begin{aligned}(n+1)(2+n)\, c_{n+1} - c_{n-1} &= 0\\ c_{n+1} &= \frac{c_{n-1}}{(n+1)(2+n)}\end{aligned}$$

For $n=0$

$$c_1 = \frac{c_{-1}}{(n+1)(2+n)} = 0$$

For $n=1$

$$c_2 = \frac{c_0}{(2)(3)}$$

For $n=2$

$$c_3 = \frac{c_1}{(n+1)(2+n)} = 0$$

For $n=3$

$$c_4 = \frac{c_2}{(4)(5)} = \frac{c_0}{(2)(3)(4)(5)}$$

And so on. Hence, for $r = 0$ we have

$$\begin{aligned}
y_{r=0} &= \sum_{n=0}^{\infty} c_n x^n = c_0 + c_1 x^1 + c_2 x^2 + c_3 x^3 + \cdots \\
&= c_0 + \frac{c_0}{6} x^2 + \frac{c_0}{120} x^4 + \cdots \\
&= A\left(1 + \frac{1}{6} x^2 + \frac{1}{120} x^4 + \cdots\right)
\end{aligned} \tag{3}$$

Where A is used as arbitrary constant instead of a_0. Now we find the solution for $r = -1$. we go back the recurrence equation (2)

$$\begin{aligned}
(n - 1 + 1)\left(2 + (n - 1)\right) c_{n+1} - c_{n-1} &= 0 \\
n(1 + n)\, c_{n+1} - c_{n-1} &= 0 \\
c_{n+1} &= \frac{c_{n-1}}{n\,(1 + n)}
\end{aligned}$$

For $n = 0$

$$c_1 = \frac{c_{-1}}{n\,(1 + n)} = 0$$

For $n = 1$

$$c_2 = \frac{c_0}{2}$$

For $n = 2$

$$c_3 = \frac{c_1}{n\,(1 + n)} = 0$$

For $n = 3$

$$c_4 = \frac{c_2}{(3)\,(4)} = \frac{c_0}{(2)\,(3)\,(4)}$$

For $n = 4$

$$c_5 = \frac{c_3}{n\,(1 + n)} = 0$$

For $n = 5$

$$c_6 = \frac{c_4}{(5)\,(6)} = \frac{c_0}{(2)\,(3)\,(4)\,(5)\,(6)}$$

And so on. Hence solution is

$$\begin{aligned}
y_{r=-1} &= \frac{1}{x} \sum_{n=0}^{\infty} c_n x^n = \frac{1}{x}\left(c_0 + \frac{c_0}{2} x^2 + \frac{c_0}{(2)\,(3)\,(4)} x^4 + \frac{c_0}{(2)\,(3)\,(4)\,(5)\,(6)} x^6 + \cdots\right) \\
&= \frac{B}{x}\left(1 + \frac{1}{2} x^2 + \frac{1}{24} x^4 + \frac{1}{720} x^6 + \cdots\right)
\end{aligned}$$

Where B is used as arbitrary constant instead of a_0. Therefore, the homogeneous solution found is

$$\begin{aligned}
y_h &= y_{r=0} + y_{r=-1} \\
&= A\left(1 + \frac{1}{6} x^2 + \frac{1}{120} x^4 + \cdots\right) + \frac{B}{x}\left(1 + \frac{1}{2} x^2 + \frac{1}{24} x^4 + \frac{1}{720} x^6 + \cdots\right)
\end{aligned}$$

But

$$e^x = 1 + x + \frac{1}{2}x^2 + \frac{1}{6}x^3 + \frac{1}{24}x^4 + \frac{1}{120}x^5 + \cdots \tag{3}$$

And

$$e^{-x} = 1 - x + \frac{1}{2}x^2 - \frac{1}{6}x^3 + \frac{1}{24}x^4 - \frac{1}{120}x^5 + \cdots \tag{4}$$

Hence adding (3)+(4) gives

$$\begin{aligned} e^x + e^{-x} &= 2 + 2\frac{1}{2}x^2 + 2\frac{1}{24}x^4 + \cdots \\ &= 2\left(1 + \frac{1}{2}x^2 + \frac{1}{24}x^4 + \frac{1}{720}x^6 \cdots\right) \end{aligned}$$

But $y_{r=-1} = \frac{B}{x}\left(1 + \frac{1}{2}x^2 + \frac{1}{24}x^4 + \frac{1}{720}x^6 + \cdots\right)$, therefore comparing the result we found above, we see that we can write $y_{r=-1}$ as

$$y_{r=-1} = \frac{B}{x}\left(\frac{e^x + e^{-x}}{2}\right)$$

Similarly, we obtain $y_{r=0}$ expression

$$\begin{aligned} \frac{1}{x}e^x &= \frac{1}{x}\left(1 + x + \frac{1}{2}x^2 + \frac{1}{6}x^3 + \frac{1}{24}x^4 + \frac{1}{120}x^5 + \cdots\right) \\ &= \frac{1}{x} + 1 + \frac{1}{2}x + \frac{1}{6}x^2 + \frac{1}{24}x^3 + \frac{1}{120}x^4 + \cdots \end{aligned} \tag{3A}$$

And

$$\begin{aligned} \frac{1}{x}e^{-x} &= \frac{1}{x}\left(1 - x + \frac{1}{2}x^2 - \frac{1}{6}x^3 + \frac{1}{24}x^4 - \frac{1}{120}x^5 + \cdots\right) \\ &= \frac{1}{x} - 1 + \frac{1}{2}x - \frac{1}{6}x^2 + \frac{1}{24}x^3 - \frac{1}{120}x^4 + \cdots \end{aligned} \tag{4A}$$

Now (3A)-(4A) gives

$$\begin{aligned} \frac{1}{x}e^x - \frac{1}{x}e^{-x} &= \left(\frac{1}{x} + 1 + \frac{1}{2}x + \frac{1}{6}x^2 + \frac{1}{24}x^3 + \frac{1}{120}x^4 + \cdots\right) - \left(\frac{1}{x} - 1 + \frac{1}{2}x - \frac{1}{6}x^2 + \frac{1}{24}x^3 - \frac{1}{120}x^4 + \cdots\right) \\ &= 2 + 2\frac{1}{6}x^2 + 2\frac{1}{120}x^4 + \cdots \\ &= 2\left(1 + \frac{1}{6}x^2 + \frac{1}{120}x^4 + \cdots\right) \end{aligned}$$

Hence

$$\left(1 + \frac{1}{6}x^2 + \frac{1}{120}x^4 + \cdots\right) = \frac{1}{2x}\left(e^x - e^{-x}\right)$$

But $y_{r=0} = A\left(1 + \frac{1}{6}x^2 + \frac{1}{120}x^4 + \cdots\right)$, therefore comparing the result we found above, wee see that we can write $y_{r=0}$ as

$$\begin{aligned} y_{r=0} &= A\left(\frac{1}{2x}\left(e^x - e^{-x}\right)\right) \\ &= \frac{A}{2x}\left(e^x - e^{-x}\right) \end{aligned}$$

Therefore

$$
\begin{aligned}
y_h &= y_{r=0} + y_{r=-1} \\
&= \frac{A}{2x}\left(e^x - e^{-x}\right) + \frac{B}{2x}\left(e^x + e^{-x}\right) \\
&= \frac{1}{x}\left(\frac{A}{2}e^x - \frac{A}{2}e^{-x} + \frac{B}{2}e^x + \frac{B}{2}e^{-x}\right) \\
&= \frac{1}{x}\left(e^x\left(\frac{A}{2} + \frac{B}{2}\right) + e^{-x}\left(-\frac{A}{2} + \frac{B}{2}\right)\right)
\end{aligned}
$$

Let $\frac{A+B}{2} = A_0$, $\frac{B-A}{2} = B_0$ hence the above becomes

$$
y_h = \frac{1}{x}\left(A_0 e^x + B_0 e^{-x}\right)
$$

We see this is the same solution using the transformation method given above. We now need to find particular solution. Let $y_1 = \frac{e^x}{x}, y_2 = \frac{e^{-x}}{x}$, hence $y_1' = \frac{e^x}{x} - \frac{e^x}{x^2}$ and $y_2' = \frac{-e^{-x}}{x^2} - \frac{e^{-x}}{x}$, hence the Wronskian is

$$
\begin{aligned}
W &= \begin{vmatrix} y_1 & y_2 \\ y_1' & y_2' \end{vmatrix} \\
&= \begin{vmatrix} \frac{e^x}{x} & \frac{e^{-x}}{x} \\ \frac{e^x}{x} - \frac{e^x}{x^2} & \frac{-e^{-x}}{x^2} - \frac{e^{-x}}{x} \end{vmatrix} \\
&= \frac{e^x}{x}\left(\frac{-e^{-x}}{x^2} - \frac{e^{-x}}{x}\right) - \frac{e^{-x}}{x}\left(\frac{e^x}{x} - \frac{e^x}{x^2}\right) \\
&= \left(\frac{-1}{x^3} - \frac{1}{x^2}\right) - \left(\frac{1}{x^2} - \frac{1}{x^3}\right) \\
&= -\frac{2}{x^2}
\end{aligned}
$$

Therefore, let $y_p = u_1 y_1 + u_2 y_2$ and hence

$$
u_1 = -\int \frac{y_2}{aW} e^x dx
$$

Where $a = x$ since the original ODE is $xy'' + 2y' - xy = e^x$, and a is the coefficient of y'' always. Hence the above becomes

$$
u_1 = -\int \frac{\frac{e^{-x}}{x}}{x\left(-\frac{2}{x^2}\right)} e^x dx = \int \frac{e^{-x}}{2} e^x dx = \int \frac{1}{2} dx = \frac{x}{2}
$$

And

$$
u_2 = \int \frac{\frac{e^x}{x}}{x\left(-\frac{2}{x^2}\right)} e^x dx = -\int \frac{\frac{e^x}{x}}{\frac{2}{x}} e^x dx = -\frac{1}{2}\int e^{2x} dx = -\frac{1}{2}\frac{e^{2x}}{2} = \frac{-1}{4}e^{2x}
$$

Hence

$$
\begin{aligned}
y_p &= u_1 y_1 + u_2 y_2 \\
&= \frac{x}{2}\frac{e^x}{x} - \frac{1}{4}e^{2x}\frac{e^{-x}}{x} \\
&= \frac{1}{2}e^x - \frac{1}{4x}e^x
\end{aligned}
$$

Therefore

$$
y_p = e^x\left(\frac{1}{2} - \frac{1}{4x}\right)
$$

Hence the general solution is

$$
\begin{aligned}
y &= y_h + y_p \\
&= \frac{1}{x}\left(A_0 e^x + B_0 e^{-x}\right) + e^x\left(\frac{1}{2} - \frac{1}{4x}\right)
\end{aligned}
$$

Verification

```
restart;
ode:=x*diff(diff(y(x),x),x)+2*diff(y(x),x)-x*y(x)=exp(x);
y0:=1/x*( _C1* exp(x)+ _C2*exp(-x))+ (1/2-1/(4*x))*exp(x);
odetest(y(x)=y0,ode);
0
```

2.1101 ODE No. 1101

$$
axy(x) + xy''(x) + 2y'(x) = 0
$$

✓ **Mathematica** : cpu = 0.0216162 (sec), leaf count = 52

$$
\left\{\left\{y(x) \to \frac{c_1 e^{-i\sqrt{a}x}}{x} - \frac{i c_2 e^{i\sqrt{a}x}}{2\sqrt{a}x}\right\}\right\}
$$

✓ **Maple** : cpu = 0.039 (sec), leaf count = 29

$$
\left\{y(x) = \frac{c_1 \sinh\left(\sqrt{-a}\, x\right) + c_2 \cosh\left(\sqrt{-a}\, x\right)}{x}\right\}
$$

Hand solution

$$
xy'' + 2y' + axy = 0 \tag{1}
$$

First method much shorter, using transformation suggested by Kamke. Let $y = \frac{u(x)}{x}$, hence

$$\begin{aligned}
y' &= \frac{u'}{x} - \frac{u}{x^2} \\
y'' &= \frac{u''}{x} - \frac{u'}{x^2} - \frac{u'}{x^2} + 2\frac{u}{x^3}
\end{aligned}$$

And (1) becomes

$$\begin{aligned}
x\left(\frac{u''}{x} - \frac{u'}{x^2} - \frac{u'}{x^2} + 2\frac{u}{x^3}\right) + 2\left(\frac{u'}{x} - \frac{u}{x^2}\right) + ax\left(\frac{u}{x}\right) &= 0 \\
u'' - 2\frac{u'}{x} + 2\frac{u}{x^2} + \frac{2u'}{x} - \frac{2u}{x^2} + au &= 0 \\
u'' + au &= 0
\end{aligned}$$

Hence the roots of the characteristic equation are $\pm\sqrt{-a}$ and the solution is

$$u = A\cos\left(\sqrt{a}x\right) + B\sin\left(\sqrt{a}x\right)$$

Hence

$$y = \frac{1}{x}\left(A\cos\left(\sqrt{a}x\right) + B\sin\left(\sqrt{a}x\right)\right)$$

<u>Second method</u> Using series method.

There is singularity at $x = 0$. We need to check if it regular or not. Writing in standard form $y'' + p(x)\,y' + q(x)\,y = 0$ gives (we are looking at the homogeneous part now only)

$$y'' + \frac{2}{x}y' + ay = 0$$

Hence $\lim_{x\to 0} xp(x) = \lim_{x\to 0} x\frac{2}{x} = 2$ which is analytic at $x = 0$. And $\lim_{x\to 0} x^2 q(x) = \lim_{x\to 0} -ax^2 = 0$ which is analytic. Hence the singularity is regular (removable). Using Frobenius series, assume that

$$y = \sum_{n=-\infty}^{\infty} c_n x^{n+r}$$

Where $c_n = 0$ for $n < 0$. Hence

$$\begin{aligned}
y' &= \sum (n+r)\, c_n x^{n+r-1} \\
y'' &= \sum (n+r)\,(n+r-1)\, c_n x^{n+r-2}
\end{aligned}$$

Substituting back in the original ODE gives

$$\sum (n+r)\,(n+r-1)\, c_n x^{n+r-1} + \sum 2(n+r)\, c_n x^{n+r-1} + \sum a c_n x^{n+r+1} = 0$$

Adjusting so that all have same power x^{n+r} gives

$$\sum (n+r+1)(n+r)\,c_{n+1}x^{n+r} + \sum 2(n+r+1)\,c_{n+1}x^{n+r} + \sum ac_{n-1}x^{n+r} = 0$$

Hence

$$\begin{aligned}(n+r+1)(n+r)\,c_{n+1} + 2(n+r+1)\,c_{n+1} + ac_{n-1} &= 0\\ (n+r+1)(2+(n+r))\,c_{n+1} + ac_{n-1} &= 0 \end{aligned} \tag{2}$$

We want equation with c_0 in it. Hence let $n=-1$

$$(-1+r+1)(2+(-1+r))\,c_0 + ac_{-2} = 0$$

But $c_n = 0$ for all $n<0$ hence

$$(-1+r+1)(2+(-1+r))\,c_0 = 0$$

But $c_0 \neq 0$, as this is the basis for this method. Therefore, we obtain the indicial equation for r

$$\begin{aligned}(-1+r+1)(2+(-1+r)) &= 0\\ r(r+1) &= 0\end{aligned}$$

Hence $r=0$ or $r=-1$ are the roots. Now for each r we find a solution. Using $r=0$, we go back the recurrence equation (2)

$$\begin{aligned}(n+1)(2+n)\,c_{n+1} + ac_{n-1} &= 0\\ c_{n+1} &= \frac{-ac_{n-1}}{(n+1)(2+n)}\end{aligned}$$

For $n=0$

$$c_1 = \frac{-ac_{-1}}{(n+1)(2+n)} = 0$$

For $n=1$

$$c_2 = \frac{-ac_0}{(2)(3)}$$

For $n=2$

$$c_3 = \frac{-ac_1}{(n+1)(2+n)} = 0$$

For $n=3$

$$c_4 = \frac{-ac_2}{(4)(5)} = \frac{-a(-ac_0)}{(2)(3)(4)(5)} = \frac{a^2c_0}{(2)(3)(4)(5)}$$

And so on. Hence, for $r=0$ we have

$$\begin{aligned} y_{r=0} &= \sum_{n=0}^{\infty} c_n x^n = c_0 + c_1x^1 + c_2x^2 + c_3x^3 + \cdots\\ &= c_0 - a\frac{c_0}{6}x^2 + a^2\frac{c_0}{120}x^4 + \cdots\\ &= A\left(1 - a\frac{1}{6}x^2 + a^2\frac{1}{120}x^4 + \cdots\right) \end{aligned} \tag{3}$$

Where A is used as arbitrary constant instead of a_0. Now we find the solution for $r = -1$. we go back the recurrence equation (2)

$$
\begin{aligned}
(n-1+1)\,(2+(n-1))\,c_{n+1} + ac_{n-1} &= 0 \\
n(1+n)\,c_{n+1} + ac_{n-1} &= 0 \\
c_{n+1} &= \frac{-ac_{n-1}}{n\,(1+n)}
\end{aligned}
$$

For $n = 0$

$$c_1 = \frac{-ac_{-1}}{n\,(1+n)} = 0$$

For $n = 1$

$$c_2 = \frac{-ac_0}{2}$$

For $n = 2$

$$c_3 = \frac{-ac_1}{n\,(1+n)} = 0$$

For $n = 3$

$$c_4 = \frac{-ac_2}{(3)\,(4)} = \frac{-a(-ac_0)}{(2)\,(3)\,(4)} = \frac{a^2c_0}{(2)\,(3)\,(4)}$$

For $n = 4$

$$c_5 = \frac{-ac_3}{n\,(1+n)} = 0$$

For $n = 5$

$$c_6 = \frac{-ac_4}{(5)\,(6)} = \frac{-a\left(a^2c_0\right)}{(2)\,(3)\,(4)\,(5)\,(6)} = \frac{-a^3c_0}{(2)\,(3)\,(4)\,(5)\,(6)}$$

And so on. Hence solution is

$$
\begin{aligned}
y_{r=-1} &= \frac{1}{x}\sum_{n=0}^{\infty} c_n x^n = \frac{1}{x}\left(c_0 - \frac{ac_0}{2}x^2 + \frac{a^2c_0}{(2)\,(3)\,(4)}x^4 - \frac{a^3c_0}{(2)\,(3)\,(4)\,(5)\,(6)}x^6 + \cdots\right) \\
&= \frac{B}{x}\left(1 - \frac{a}{2}x^2 + \frac{a^2}{24}x^4 - \frac{a^3}{720}x^6 + \cdots\right)
\end{aligned}
$$

Where B is used as arbitrary constant instead of a_0. Therefore, the homogeneous solution found is

$$
\begin{aligned}
y_h &= y_{r=0} + y_{r=-1} \\
&= A\left(1 - a\frac{1}{6}x^2 + a^2\frac{1}{120}x^4 + \cdots\right) + \frac{B}{x}\left(1 - \frac{a}{2}x^2 + \frac{a^2}{24}x^4 - \frac{a^3}{720}x^6 + \cdots\right) \\
&= A\left(1 - \frac{1}{6}\left(\sqrt{a}x\right)^2 + \frac{1}{120}\left(\sqrt{a}x\right)^4 + \cdots\right) + \frac{B}{x}\left(1 - \frac{1}{2}\left(\sqrt{a}x\right)^2 + \frac{1}{24}\left(\sqrt{a}x\right)^4 - \frac{1}{720}\left(\sqrt{a}x\right)^6 + \cdots\right)
\end{aligned}
$$

But

$$\sin x = x - \frac{1}{6}x^3 + \frac{1}{120}x^5 - \cdots \tag{3}$$

And

$$\cos x = 1 - \frac{1}{2}x^2 + \frac{1}{24}x^4 - \frac{1}{720}x^6 + \cdots \tag{4}$$

Therefore

$$\begin{aligned}
\sin\left(\sqrt{a}x\right) &= \sqrt{a}x - \frac{1}{6}\left(\sqrt{a}x\right)^3 + \frac{1}{120}\left(\sqrt{a}x\right)^5 - \cdots \\
\cos\left(\sqrt{a}x\right) &= 1 - \frac{1}{2}\left(\sqrt{a}x\right)^2 + \frac{1}{24}\left(\sqrt{a}x\right)^4 - \frac{1}{720}\left(\sqrt{a}x\right)^6 + \cdots
\end{aligned}$$

Therefore, using the above, we can write y_h as

$$\begin{aligned}
y_h &= \frac{A}{\sqrt{a}x}\sqrt{a}x\left(1 - \frac{1}{6}\left(\sqrt{a}x\right)^2 + \frac{1}{120}\left(\sqrt{a}x\right)^4 + \cdots\right) + \frac{B}{x}\cos\left(\sqrt{a}x\right) \\
&= \frac{A}{\sqrt{a}x}\left(\sqrt{a}x - \frac{1}{6}\left(\sqrt{a}x\right)^3 + \frac{1}{120}\left(\sqrt{a}x\right)^5 + \cdots\right) + \frac{B}{x}\cos\left(\sqrt{a}x\right) \\
&= \frac{A}{\sqrt{a}x}\sin\left(\sqrt{a}x\right) + \frac{B}{x}\cos\left(\sqrt{a}x\right)
\end{aligned}$$

Let $A_0 = \frac{A}{\sqrt{a}}$, hence the above becomes the same solution found using the transformation method

$$y(x) = \frac{1}{x}\left(A_0 \sin\left(\sqrt{a}x\right) + B\cos\left(\sqrt{a}x\right)\right)$$

Clearly, the transformation method is much faster and better. But the trick is to see the correct transformation needed and this is not always easy.

<u>Third method</u> Using Laplace transform. Using property $\mathcal{L}xf(x) = -\frac{d}{ds}F(s)$ then the Laplace transform of the ODE becomes

$$\begin{aligned}
\mathcal{L}\left(xy'' + 2y' + axy\right) &= 0 \\
-\frac{d}{ds}\left(\mathcal{L}y''\right) + 2\left(-\frac{d}{ds}\left(\mathcal{L}y'\right)\right) + a\left(-\frac{d}{ds}Y\right) &= 0 \\
-\frac{d}{ds}\left(s^2Y - sA - B\right) + 2\left(-\frac{d}{ds}(sY - A)\right) + a\left(-Y'\right) &= 0
\end{aligned}$$

Where $A = y(0)\,, B = y'(0)$. Simplifying gives

$$\begin{aligned}
-\left(2sY + s^2Y' - A\right) - 2\left(Y + sY'\right) - aY' &= 0 \\
Y'\left(-s^2 - 2s - a\right) + Y(-2s - 2) + A &= 0 \\
Y' + Y\frac{2s + 2}{s^2 + 2s + a} &= \frac{A}{s^2 + 2s + a}
\end{aligned}$$

This is first order ODE, which is solved easily using an integrating factor. Solving for $Y(s)$ gives

$$Y(s) = \frac{As + c_1}{s^2 + a + 2s}$$

Where c_1 is constant of integration. The inverse Laplace of the above is

$$y(x) = e^{-x}\left(A\cos\left(x\sqrt{1-a}\right) + \frac{(-A+c_1)}{\sqrt{1-a}}\sinh\left(x\sqrt{1-a}\right)\right)$$

I need to find why the above does not verify. May be I made a mistake somewhere. Verification of the result of the first two methods is below.

```
restart;
ode:=x*diff(diff(y(x),x),x)+2*diff(y(x),x)+a*x*y(x)=0;
y0:=1/x*( _C1* cos(sqrt(a)*x)+ _C2*sin(sqrt(a)*x));
odetest(y(x)=y0,ode);
0
```

2.1102 ODE No. 1102

$$ax^2y(x) + xy''(x) + 2y'(x) = 0$$

✓ **Mathematica** : cpu = 0.0066601 (sec), leaf count = 42

$$\left\{\left\{y(x)\to \frac{c_1\text{Ai}\left(-\frac{ax}{(-a)^{2/3}}\right)}{x} + \frac{c_2\text{Bi}\left(-\frac{ax}{(-a)^{2/3}}\right)}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.118 (sec), leaf count = 33

$$\left\{y(x) = \frac{c_1\,\text{BesselJ}\left(\frac{1}{3}, \frac{2\sqrt{a}\,x^{\frac{3}{2}}}{3}\right) + c_2\,\text{BesselY}\left(\frac{1}{3}, \frac{2\sqrt{a}\,x^{\frac{3}{2}}}{3}\right)}{\sqrt{x}}\right\}$$

Hand solution

$$xy'' + 2y' + ax^2y = 0 \tag{1}$$

Since there is a term $2y$, we can use $y = \frac{u(x)}{x}$, hence

$$y' = \frac{u'}{x} - \frac{u}{x^2}$$
$$y'' = \frac{u''}{x} - \frac{u'}{x^2} - \frac{u'}{x^2} + 2\frac{u}{x^3}$$

And (1) becomes

$$
\begin{aligned}
x\left(\frac{u''}{x}-\frac{u'}{x^2}-\frac{u'}{x^2}+2\frac{u}{x^3}\right)+2\left(\frac{u'}{x}-\frac{u}{x^2}\right)+ax^2\left(\frac{u}{x}\right)&=0\\
u''-2\frac{u'}{x}+2\frac{u}{x^2}+\frac{2u'}{x}-\frac{2u}{x^2}+axu&=0\\
u''+axu&=0 \qquad (2)
\end{aligned}
$$

This is Emdon-Fowler. (form is $u''+x^n u=0$) with $n=1$. Assume that

$$
u=\sum_{n=0}^{\infty} c_n x^n
$$

Hence

$$
\begin{aligned}
u'&=\sum_{n=0} n c_n x^{n-1}=\sum_{n=1} n c_n x^{n-1}=\sum_{n=0}(n+1)\,c_{n+1}x^n\\
u''&=\sum_{n=0} n(n+1)\,c_{n+1}x^{n-1}=\sum_{n=1} n(n+1)\,c_{n+1}x^{n-1}=\sum_{n=0}(n+1)\,(n+2)\,c_{n+2}x^n
\end{aligned}
$$

Substituting back in (2) gives

$$
\begin{aligned}
\sum_{n=0}(n+1)\,(n+2)\,c_{n+2}x^n+\sum_{n=0} a c_n x^{n+1}&=0\\
\sum_{n=0}(n+1)\,(n+2)\,c_{n+2}x^n+\sum_{n=1} a c_{n-1} x^{n}&=0
\end{aligned}
$$

For $n=0$

$$
(1)\,(2)\,c_2=0
$$

Hence $c_2=0$. For $n\geq 1$

$$
\begin{aligned}
(n+1)\,(n+2)\,c_{n+2}+ac_{n-1}&=0\\
c_{n+2}&=\frac{-ac_{n-1}}{(n+1)\,(n+2)} \qquad (3)
\end{aligned}
$$

For $n=1$, from (3)

$$
c_3=\frac{-ac_0}{(2)\,(3)}
$$

For $n=2$, from (3)

$$
c_4=\frac{-ac_1}{(3)\,(4)}
$$

For $n=3$, from (3)

$$
c_5=\frac{-ac_2}{(4)\,(5)}=0
$$

For $n=4$, from (3)

$$
c_6=\frac{-ac_3}{(5)\,(6)}=\frac{-a}{(5)\,(6)}\left(\frac{-ac_0}{(2)\,(3)}\right)=\frac{a^2c_0}{(2)\,(3)\,(5)\,(6)}
$$

For $n = 5$, from (3)

$$c_7 = \frac{-ac_4}{(6)(7)} = \frac{-a}{(6)(7)}\left(\frac{-ac_1}{(3)(4)}\right) = \frac{a^2 c_1}{(3)(4)(6)(7)}$$

For $n = 6$, from (3)

$$c_8 = \frac{-ac_5}{(7)(8)} = 0$$

For $n = 7$, from (3)

$$c_9 = \frac{-ac_6}{(8)(9)} = \frac{-a}{(8)(9)}\left(\frac{a^2 c_0}{(2)(3)(5)(6)}\right) = \frac{-a^3 c_0}{(2)(3)(5)(6)(8)(9)}$$

For $n = 8$, from (3)

$$c_{10} = \frac{-ac_7}{(9)(10)} = \frac{-a}{(9)(10)}\left(\frac{a^2 c_1}{(3)(4)(6)(7)}\right) = \frac{-a^3 c_1}{(3)(4)(6)(7)(9)(10)}$$

And so on. Hence,

$$\begin{aligned}
u &= \sum_{n=0}^{\infty} c_n x^n = c_0 + c_1 x^1 + c_2 x^2 + c_3 x^3 + \cdots \\
&= c_0 + c_1 x + 0 + c_3 x^3 + c_4 x^4 + 0 + c_6 x^6 + c_7 x^7 + 0 + c_9 x^9 + \cdots \\
&= c_0 + c_1 x - \frac{ac_0}{(2)(3)} x^3 - \frac{ac_1}{(3)(4)} x^4 + \frac{a^2 c_0}{(2)(3)(5)(6)} x^6 + \frac{a^2 c_1}{(3)(4)(6)(7)} x^7 - \frac{a^3 c_0}{(2)(3)(5)(6)(8)(9)} x^9 - \cdots \\
&= c_0\left(1 - \frac{a}{6}x^3 + \frac{a^2}{180}x^6 - \frac{a^3}{12\,960}x^9 + \cdots\right) + xc_1\left(1 - \frac{a}{12}x^3 + \frac{a^2}{504}x^6 - \frac{a^3}{45\,360}x^9 + \cdots\right) \\
&= c_0\left(1 - \frac{1}{6}\left(a^{\frac{1}{3}}x\right)^3 + \frac{1}{180}\left(a^{\frac{1}{3}}x\right)^6 - \frac{1}{12\,960}\left(a^{\frac{1}{3}}x\right)^9 + \cdots\right) + xc_1\left(1 - \frac{1}{12}\left(a^{\frac{1}{3}}x\right)^3 + \frac{1}{504}\left(a^{\frac{1}{3}}x\right)^6 - \frac{1}{45\,360}(a^{\frac{1}{3}} \cdots
\end{aligned}$$

Comparing the above to the series expansion of Airy functions, we see that

$$u = c_0 \operatorname{AiryAI}\left(-a^{\frac{1}{3}}x\right) + c_1 \operatorname{AiryBI}\left(-a^{\frac{1}{3}}x\right)$$

And since $y = \frac{u(x)}{x}$ then

$$y = \frac{1}{x}\left(c_0 \operatorname{AiryAI}\left(-a^{\frac{1}{3}}x\right) + c_1 \operatorname{AiryBI}\left(-a^{\frac{1}{3}}x\right)\right)$$

Verification

```
restart;
#for series solution of u''+axu=0, use this:
Order:=10;
sol:=dsolve(ode,u(x),series);
sol:=convert(sol,polynom);
sol:=subs({u(0)=c0,D(u)(0)=c1},rhs(sol));
```

```
collect(sol,{c0,c1});
(1-(1/6)*a*x^3+(1/180)*a^2*x^6-(1/12960)*a^3*x^9)*c0+(x-(1/12)*a*x^4+(1/504)*a^2*x^7)*c1
#to verify final solution use this:
ode:=x*diff(y(x),x$2)+2*diff(y(x),x)+a*x^2*y(x)=0;
y0:=(1/x)*(_C0*AiryAi(-a^(1/3)*x)+_C1*AiryBi(-a^(1/3)*x));
odetest(y(x)=y0,ode);
0
```

2.1103 ODE No. 1103

$$ay(x) + xy''(x) - 2y'(x) = 0$$

✓ **Mathematica** : cpu = 0.0225669 (sec), leaf count = 64

$$\left\{\left\{y(x) \to 6a^{3/2}c_1x^{3/2}J_3\left(2\sqrt{a}\sqrt{x}\right) - 2ia^{3/2}c_2x^{3/2}Y_3\left(2\sqrt{a}\sqrt{x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.01 (sec), leaf count = 33

$$\left\{y(x) = \left(c_1 \operatorname{BesselJ}\left(3, 2\sqrt{a}\,\sqrt{x}\right) + c_2 \operatorname{BesselY}\left(3, 2\sqrt{a}\,\sqrt{x}\right)\right) x^{\frac{3}{2}}\right\}$$

2.1104 ODE No. 1104

$$ay(x) + vy'(x) + xy''(x) = 0$$

✓ **Mathematica** : cpu = 0.0350844 (sec), leaf count = 104

$$\left\{\left\{y(x) \to c_2a^{\frac{v-1}{2}-v+1}x^{\frac{v-1}{2}-v+1}\Gamma(2-v)J_{1-v}\left(2\sqrt{a}\sqrt{x}\right) + c_1a^{\frac{1-v}{2}}x^{\frac{1-v}{2}}\Gamma(v)J_{v-1}\left(2\sqrt{a}\sqrt{x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.014 (sec), leaf count = 41

$$\left\{y(x) = \left(c_1 \operatorname{BesselJ}\left(v-1, 2\sqrt{a}\,\sqrt{x}\right) + c_2 \operatorname{BesselY}\left(v-1, 2\sqrt{a}\,\sqrt{x}\right)\right) x^{-\frac{v}{2}+\frac{1}{2}}\right\}$$

2.1105 ODE No. 1105

$$ay'(x) + bxy(x) + xy''(x) = 0$$

✓ **Mathematica** : cpu = 0.0153551 (sec), leaf count = 64

$$\left\{\left\{y(x) \to c_1 x^{\frac{1-a}{2}} J_{\frac{a-1}{2}}\left(\sqrt{b}x\right) + c_2 x^{\frac{1-a}{2}} Y_{\frac{a-1}{2}}\left(\sqrt{b}x\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.05 (sec), leaf count = 39

$$\left\{y(x) = \left(c_1 \operatorname{BesselJ}\left(\frac{a}{2} - \frac{1}{2}, \sqrt{b}\,x\right) + c_2 \operatorname{BesselY}\left(\frac{a}{2} - \frac{1}{2}, \sqrt{b}\,x\right)\right) x^{-\frac{a}{2}+\frac{1}{2}}\right\}$$

2.1106 ODE No. 1106

$$ay'(x) + bx^{\mathrm{a1}} y(x) + xy''(x) = 0$$

✓ **Mathematica** : cpu = 0.0403912 (sec), leaf count = 441

$$\left\{\left\{y(x) \to c_1 \left(\frac{1}{\mathrm{a1}} + 1\right)^{\frac{a}{\left(\frac{1}{\mathrm{a1}}+1\right)\mathrm{a1}} - \frac{1}{\left(\frac{1}{\mathrm{a1}}+1\right)\mathrm{a1}}} \mathrm{a1}^{\frac{a}{\left(\frac{1}{\mathrm{a1}}+1\right)\mathrm{a1}} - \frac{1}{\left(\frac{1}{\mathrm{a1}}+1\right)\mathrm{a1}}} b^{\frac{1}{2}\left(\frac{1}{\left(\frac{1}{\mathrm{a1}}+1\right)\mathrm{a1}} - \frac{a}{\left(\frac{1}{\mathrm{a1}}+1\right)\mathrm{a1}}\right)} \left(x^{\mathrm{a1}}\right)^{\frac{1}{2}\left(\frac{1}{\mathrm{a1}}+1\right)\left(\frac{1}{\left(\frac{1}{\mathrm{a1}}+1\right)\mathrm{a1}} - \frac{a}{\left(\frac{1}{\mathrm{a1}}+\right.}\right.}\right.\right.$$

✓ **Maple** : cpu = 0.237 (sec), leaf count = 71

$$\left\{y(x) = \left(c_1 \operatorname{BesselJ}\left(\frac{a-1}{a1+1}, \frac{2\sqrt{b}\,x^{\frac{a1}{2}+\frac{1}{2}}}{a1+1}\right) + c_2 \operatorname{BesselY}\left(\frac{a-1}{a1+1}, \frac{2\sqrt{b}\,x^{\frac{a1}{2}+\frac{1}{2}}}{a1+1}\right)\right) x^{-\frac{a}{2}+\frac{1}{2}}\right\}$$

2.1107 ODE No. 1107

$$ay(x) + (b+x)y'(x) + xy''(x) = 0$$

✓ **Mathematica** : cpu = 0.023153 (sec), leaf count = 40

$$\left\{\left\{y(x) \to c_1 e^{-x} U(b-a, b, x) + c_2 e^{-x} L_{a-b}^{b-1}(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.204 (sec), leaf count = 30

$$\{y(x) = (c_1 \operatorname{KummerM}(-a+b, b, x) + c_2 \operatorname{KummerU}(-a+b, b, x))\,\mathrm{e}^{-x}\}$$

2.1108 ODE No. 1108

$$(a+b+x)y'(x)+ay(x)+xy''(x)=0$$

✓ **Mathematica** : cpu = 0.0264551 (sec), leaf count = 37

$$\left\{\left\{y(x)\to c_1e^{-x}U(b,a+b,x)+c_2e^{-x}L_{-b}^{a+b-1}(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.183 (sec), leaf count = 26

$$\{y(x)=(c_1\,\mathrm{KummerM}\,(b,a+b,x)+c_2\,\mathrm{KummerU}\,(b,a+b,x))\,\mathrm{e}^{-x}\}$$

2.1109 ODE No. 1109

$$xy''(x)-xy'(x)-y(x)-e^xx(x+1)=0$$

✓ **Mathematica** : cpu = 0.133269 (sec), leaf count = 45

$$\{\{y(x)\to c_2(-e^xx\mathrm{Ei}(-x)-1)+e^x\left(x^2+x-x\log(-x)-1\right)+c_1e^xx\}\}$$

✓ **Maple** : cpu = 0.034 (sec), leaf count = 33

$$\{y(x)=\left(-c_1x\,\mathrm{expIntegral}\,(1,x)+c_1\mathrm{e}^{-x}+c_2x+x^2-x\ln(x)-1\right)\mathrm{e}^{x}\}$$

2.1110 ODE No. 1110

$$-ay(x)+xy''(x)-xy'(x)=0$$

✓ **Mathematica** : cpu = 0.0349301 (sec), leaf count = 36

$$\left\{\left\{y(x)\to c_2G_{1,2}^{2,0}\left(-x\middle|\begin{array}{c}1-a\\0,1\end{array}\right)+c_1x\,{}_1F_1(a+1;2;x)\right\}\right\}$$

✓ **Maple** : cpu = 0.059 (sec), leaf count = 23

$$\{y(x)=(c_1\,\mathrm{KummerM}\,(a+1,2,x)+c_2\,\mathrm{KummerU}\,(a+1,2,x))\,x\}$$

2.1111 ODE No. 1111

$$xy''(x) - (x+1)y'(x) + y(x) = 0$$

✓ **Mathematica** : cpu = 0.0199932 (sec), leaf count = 20

$$\{\{y(x) \to c_1 e^x + c_2(-x-1)\}\}$$

✓ **Maple** : cpu = 0.023 (sec), leaf count = 13

$$\{y(x) = c_1 x + c_2 e^x + c_1\}$$

Hand solution

$$xy'' - (x+1)\,y' + y = 0 \tag{1}$$

Taking Laplace transform of each term and using property of $\mathcal{L}(xf(x)) = -\frac{d}{ds}F(s)$ where $F(s) = \mathcal{L}f(x)$, then

$$\mathcal{L}(xy'') = -\frac{d}{ds}(\mathcal{L}y'')$$

Let $\mathcal{L}y(x) = Y(s) \equiv Y$. Now $\mathcal{L}y'' = s^2Y - sy(0) - y'(0)$. Assuming $y(0) = A, y'(0) = B$ then

$$\begin{aligned}
\mathcal{L}(xy'') &= -\frac{d}{ds}(s^2Y - As - B) \\
&= -(2sY + s^2Y' - A)
\end{aligned}$$

And

$$\begin{aligned}
\mathcal{L}((x+1)\,y') &= \mathcal{L}(xy' + y') \\
&= -\frac{d}{ds}(\mathcal{L}y') + \mathcal{L}y' \\
&= -\frac{d}{ds}(sY - y(0)) + (sY - y(0)) \\
&= -\frac{d}{ds}(sY - A) + (sY - y(0)) \\
&= -(Y + sY') + (sY - A) \\
&= -Y - sY' + sY - A
\end{aligned}$$

Hence Laplace transform of the ODE becomes

$$\begin{aligned}
-(2sY + s^2Y' - A) - (-Y - sY' + sY - A) + Y &= 0 \\
-2sY - s^2Y' + A + Y + sY' - sY + A + Y &= 0 \\
Y'(s - s^2) + Y(-2s + 1 - s + 1) &= -2A \\
Y'(s^2 - s) + Y(3s - 2) &= 2A \\
Y' + \frac{(3s-2)}{s\,(s-1)}Y &= \frac{2A}{s\,(s-1)}
\end{aligned}$$

The integrating factor is $\mu = e^{\int \frac{(3s-2)}{s(s-1)}} = e^{\ln(s-1)+2\ln(s)} = (s-1)\,s^2$, hence

$$d\left((s-1)\,s^2 Y\right) = (s-1)\,s^2 \frac{2A}{s\,(s-1)}$$
$$(s-1)\,s^2 Y = 2A \int s ds + c_1$$
$$(s-1)\,s^2 Y = 2A \frac{s^2}{2} + c_1$$
$$Y = \frac{As^2 + c_1}{(s-1)\,s^2}$$

Inverse Laplace transform gives

$$\begin{aligned} y(x) &= -c_1 + (A + c_1)\,e^x - c_1 x \\ &= -c_1(1+x) + (A+c_1)\,e^x \end{aligned}$$

Let $-c_1 = A_0, A + c_1 + B_0$, hence

$$y(x) = A_0(1+x) + B_0 e^x$$

Verification

```
rrestart;
ode:=x*diff(diff(y(x),x),x)-(1+x)*diff(y(x),x)+y(x)=0;
y0:=_C0*(1+x)+_C1*exp(x);
odetest(y(x)=y0,ode);
0
```

2.1112 ODE No. 1112

$$xy''(x) - (x+1)y'(x) - 2(x-1)y(x) = 0$$

✓ **Mathematica** : cpu = 0.0223318 (sec), leaf count = 30

$$\left\{\left\{y(x) \to c_1 e^{2x} - \frac{1}{9} c_2 e^{-x}(3x+1)\right\}\right\}$$

✓ **Maple** : cpu = 0.033 (sec), leaf count = 22

$$\left\{y(x) = c_1 \mathrm{e}^{2x} + c_2(3x+1)\,\mathrm{e}^{-x}\right\}$$

2.1113 ODE No. 1113

$$-ay(x) + (b - x)y'(x) + xy''(x) = 0$$

✓ **Mathematica** : cpu = 0.0139356 (sec), leaf count = 24

$$\{\{y(x) \to c_1 U(a, b, x) + c_2 L_{-a}^{b-1}(x)\}\}$$

✓ **Maple** : cpu = 0.178 (sec), leaf count = 17

$$\{y(x) = c_1 \operatorname{KummerM}(a, b, x) + c_2 \operatorname{KummerU}(a, b, x)\}$$

2.1114 ODE No. 1114

$$xy''(x) - 2(x - 1)y'(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 0.0419303 (sec), leaf count = 39

$$\left\{\left\{y(x) \to c_2 G_{1,2}^{2,0}\left(-2x \middle| \begin{array}{c} \frac{1}{2} \\ -1, 0 \end{array}\right) + c_1 e^x (I_0(x) - I_1(x))\right\}\right\}$$

✓ **Maple** : cpu = 0.056 (sec), leaf count = 34

$$\{y(x) = (-c_2 \operatorname{BesselK}(0, -x) + c_2 \operatorname{BesselK}(1, -x) + c_1(\operatorname{BesselI}(0, x) - \operatorname{BesselI}(1, x)))\, \mathrm{e}^x\}$$

2.1115 ODE No. 1115

$$xy''(x) - (3x - 2)y'(x) + (3 - 2x)y(x) = 0$$

✓ **Mathematica** : cpu = 0.0519023 (sec), leaf count = 76

$$\left\{\left\{y(x) \to c_2 e^{-\frac{1}{2}\left(\sqrt{17}-3\right)x} {}_1F_1\left(1 - \frac{6}{\sqrt{17}}; 2; \sqrt{17}x\right) + c_1 e^{-\frac{1}{2}\left(\sqrt{17}-3\right)x} U\left(1 - \frac{6}{\sqrt{17}}, 2, \sqrt{17}x\right)\right\}\right\}$$

✓ **Maple** : cpu = 1.483 (sec), leaf count = 47

$$\left\{y(x) = \left(c_1 \operatorname{KummerM}\left(1 - \frac{6\sqrt{17}}{17}, 2, \sqrt{17}\, x\right) + c_2 \operatorname{KummerU}\left(1 - \frac{6\sqrt{17}}{17}, 2, \sqrt{17}\, x\right)\right) \mathrm{e}^{-\frac{\left(-3+\sqrt{17}\right)x}{2}}\right\}$$

2.1116 ODE No. 1116

$$y'(x)(ax+b+n)+any(x)+xy''(x)=0$$

✓ **Mathematica** : cpu = 0.0486651 (sec), leaf count = 43

$$\left\{\left\{y(x)\to c_1e^{-ax}U(b,b+n,ax)+c_2e^{-ax}L_{-b}^{b+n-1}(ax)\right\}\right\}$$

✓ **Maple** : cpu = 0.204 (sec), leaf count = 31

$$\{y(x)=(c_1\,\mathrm{KummerM}\,(b,b+n,ax)+c_2\,\mathrm{KummerU}\,(b,b+n,ax))\,\mathrm{e}^{-ax}\}$$

2.1117 ODE No. 1117

$$-(x+1)(a+b)y'(x)+abxy(x)+xy''(x)=0$$

✓ **Mathematica** : cpu = 0.071989 (sec), leaf count = 107

$$\left\{\left\{y(x)\to c_1U\left(-\frac{-a^2-ba-a+b}{a-b},a+b+2,(a-b)x\right)e^{(a+b+1)\log(x)+bx}+c_2L_{\frac{-a^2-ba-a+b}{a-b}}^{a+b+1}((a-b)x)e^{(a+b+1)\log(}\right.\right.$$

✓ **Maple** : cpu = 0.204 (sec), leaf count = 82

$$\left\{y(x)=\left(c_1\,\mathrm{KummerM}\left(\frac{a^2+ab+a-b}{a-b},a+b+2,(a-b)\,x\right)+c_2\,\mathrm{KummerU}\left(\frac{a^2+ab+a-b}{a-b},a+b+2,(a-\right.\right.\right.$$

2.1118 ODE No. 1118

$$y'(x)(x(a+b)+m+n)+y(x)(abx+an+bm)+xy''(x)=0$$

✓ **Mathematica** : cpu = 0.0657251 (sec), leaf count = 51

$$\{\{y(x)\to c_1e^{-ax}U(m,m+n,(a-b)x)+c_2e^{-ax}L_{-m}^{m+n-1}((a-b)x)\}\}$$

✓ **Maple** : cpu = 0.207 (sec), leaf count = 39

$$\{y(x)=(c_1\,\mathrm{KummerM}\,(m,m+n,(a-b)\,x)+c_2\,\mathrm{KummerU}\,(m,m+n,(a-b)\,x))\,\mathrm{e}^{-ax}\}$$

2.1119 ODE No. 1119

$$y(x)\left(a^2x+2ab\right)-2(ax+b)y'(x)+xy''(x)=0$$

✓ **Mathematica** : cpu = 0.127317 (sec), leaf count = 77

$$\left\{\left\{y(x)\to c_1e^{ax}x^{b-\frac{1}{2}\sqrt{(2b+1)^2}+\frac{1}{2}}+\frac{c_2e^{ax}x^{b+\frac{1}{2}\sqrt{(2b+1)^2}+\frac{1}{2}}}{\sqrt{(2b+1)^2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.051 (sec), leaf count = 20

$$\left\{y(x)=\left(c_2x^{2b+1}+c_1\right)\mathrm{e}^{ax}\right\}$$

2.1120 ODE No. 1120

$$(ax+b)y'(x)+y(x)(cx+d)+xy''(x)=0$$

✓ **Mathematica** : cpu = 0.0430742 (sec), leaf count = 168

$$\left\{\left\{y(x)\to c_1e^{-\frac{1}{2}x\sqrt{a^2-4c}-\frac{ax}{2}}U\left(-\frac{-ab-\sqrt{a^2-4c}b+2d}{2\sqrt{a^2-4c}},b,\sqrt{a^2-4c}x\right)+c_2e^{-\frac{1}{2}x\sqrt{a^2-4c}-\frac{ax}{2}}L^{b-1}_{\frac{-ab-\sqrt{a^2-4c}b+2d}{2\sqrt{a^2-4c}}}\left(\sqrt{\right.\right.\right.$$

✓ **Maple** : cpu = 0.284 (sec), leaf count = 109

$$\left\{y(x)=\left(c_1\,\mathrm{KummerM}\left(\frac{ab+\sqrt{a^2-4c}\,b-2d}{2\sqrt{a^2-4c}},b,\sqrt{a^2-4c}\,x\right)+c_2\,\mathrm{KummerU}\left(\frac{ab+\sqrt{a^2-4c}\,b-2d}{2\sqrt{a^2-4c}},b,\sqrt{a^2\right.\right.\right.$$

2.1121 ODE No. 1121

$$-\left(x^2-x\right)y'(x)+xy''(x)+(x-1)y(x)=0$$

✓ **Mathematica** : cpu = 0.227533 (sec), leaf count = 41

$$\left\{\left\{y(x)\to c_2x\int_1^x\frac{e^{\frac{K[1]^2}{2}-K[1]}}{K[1]^2}dK[1]+c_1x\right\}\right\}$$

✓ **Maple** : cpu = 0.033 (sec), leaf count = 23

$$\left\{y(x)=\left(c_1\left(\int\frac{\mathrm{e}^{\frac{(x-2)x}{2}}}{x^2}dx\right)+c_2\right)x\right\}$$

2.1122 ODE No. 1122

$$-(x^2-x-2)\,y'(x)+xy''(x)-x(x+3)y(x)=0$$

✓ **Mathematica** : cpu = 0.234063 (sec), leaf count = 57

$$\left\{\left\{y(x)\to c_2e^{\frac{x^2}{2}}\int_1^x\frac{e^{-\frac{1}{2}K[1]^2-K[1]}}{K[1]^2}dK[1]+c_1e^{\frac{x^2}{2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.25 (sec), leaf count = 28

$$\left\{y(x)=\left(c_2\left(\int\frac{\mathrm{e}^{-\frac{(x+2)x}{2}}}{x^2}dx\right)+c_1\right)\mathrm{e}^{\frac{x^2}{2}}\right\}$$

2.1123 ODE No. 1123

$$-(2ax^2+1)\,y'(x)+bx^3y(x)+xy''(x)=0$$

✓ **Mathematica** : cpu = 0.0106146 (sec), leaf count = 91

$$\left\{\left\{y(x)\to c_1e^{\frac{1}{2}\sqrt{b}x^2\left(\frac{a}{\sqrt{b}}-\frac{\sqrt{a^2-b}}{\sqrt{b}}\right)}+c_2e^{\frac{1}{2}\sqrt{b}x^2\left(\frac{\sqrt{a^2-b}}{\sqrt{b}}+\frac{a}{\sqrt{b}}\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.073 (sec), leaf count = 45

$$\left\{y(x)=c_1\mathrm{e}^{\frac{\left(a+\sqrt{a^2-b}\right)x^2}{2}}+c_2\mathrm{e}^{-\frac{\left(-a+\sqrt{a^2-b}\right)x^2}{2}}\right\}$$

2.1124 ODE No. 1124

$$-2(x^2-a)\,y'(x)+2nxy(x)+xy''(x)=0$$

✓ **Mathematica** : cpu = 0.0683357 (sec), leaf count = 65

$$\left\{\left\{y(x)\to c_1\,{}_1F_1\left(-\frac{n}{2};a+\frac{1}{2};x^2\right)+i^{1-2a}c_2x^{1-2a}\,{}_1F_1\left(-a-\frac{n}{2}+\frac{1}{2};\frac{3}{2}-a;x^2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.194 (sec), leaf count = 29

$$\left\{y(x)=c_1\,\mathrm{KummerM}\left(-\frac{n}{2},a+\frac{1}{2},x^2\right)+c_2\,\mathrm{KummerU}\left(-\frac{n}{2},a+\frac{1}{2},x^2\right)\right\}$$

2.1125 ODE No. 1125

$$-4x^5 - 4x^3y(x) + \left(4x^2 - 1\right) y'(x) + xy''(x) = 0$$

✓ **Mathematica** : cpu = 0.112457 (sec), leaf count = 84

$$\left\{\left\{y(x) \to -\frac{3\sqrt{2}x^2 + 4x^2 + 6\sqrt{2} + 8}{\sqrt{2}\left(3 + 2\sqrt{2}\right)} + c_1 e^{-\left(\left(1-\sqrt{2}\right)x^2\right)} + c_2 e^{-\left(\left(1+\sqrt{2}\right)x^2\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.059 (sec), leaf count = 36

$$\left\{y(x) = c_1 \mathrm{e}^{-\left(1+\sqrt{2}\right)x^2} + c_2 \mathrm{e}^{\left(\sqrt{2}-1\right)x^2} - x^2 - 2\right\}$$

2.1126 ODE No. 1126

$$\left(a^2x^3 + a\right) y(x) + \left(2ax^3 - 1\right) y'(x) + xy''(x) = 0$$

✗ **Mathematica** : cpu = 1.00992 (sec), leaf count = 0 , DifferentialRoot result

$$\{\{y(x) \to (x)\}\}$$

✓ **Maple** : cpu = 0.034 (sec), leaf count = 19

$$\left\{y(x) = \left(c_2 x^2 + c_1\right) \mathrm{e}^{-\frac{a x^3}{3}}\right\}$$

2.1127 ODE No. 1127

$$y(x)\left(a^2 x \log^2(x) + a\log(x) + a\right) + (2ax\log(x) + 1)y'(x) + xy''(x) = 0$$

✓ **Mathematica** : cpu = 0.0287341 (sec), leaf count = 36

$$\left\{\left\{y(x) \to c_1 e^{ax} x^{-ax} + c_2 e^{ax} x^{-ax} \log(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.024 (sec), leaf count = 21

$$\{y(x) = \left(c_2 \ln(x) + c_1\right) x^{-ax} \mathrm{e}^{ax}\}$$

2.1128 ODE No. 1128

$$(xf(x)+2)y'(x)+f(x)y(x)+xy''(x)=0$$

✓ **Mathematica** : cpu = 0.0210337 (sec), leaf count = 40

$$\left\{\left\{y(x)\to \frac{c_2\int_1^x \exp\left(-\int_1^{K[2]} f(K[1])dK[1]\right)dK[2]}{x}+\frac{c_1}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.235 (sec), leaf count = 32

$$\left\{y(x)=\frac{c_2\left(\int x^2 \mathrm{e}^{\int \frac{-xf(x)-2}{x}dx}dx\right)+c_1}{x}\right\}$$

2.1129 ODE No. 1129

$$(x-3)y''(x)-(4x-9)y'(x)+(3x-6)y(x)=0$$

✓ **Mathematica** : cpu = 0.0622467 (sec), leaf count = 42

$$\left\{\left\{y(x)\to \frac{1}{8}c_2e^{3x-9}(4x^3-42x^2+150x-183)+c_1e^{x-3}\right\}\right\}$$

✓ **Maple** : cpu = 0.032 (sec), leaf count = 30

$$\{y(x)=c_1\mathrm{e}^x+c_2\left(4x^3-42x^2+150x-183\right)\mathrm{e}^{3x}\}$$

2.1130 ODE No. 1130

$$ay(x)+2xy''(x)+y'(x)=0$$

✓ **Mathematica** : cpu = 0.0119579 (sec), leaf count = 46

$$\left\{\left\{y(x)\to c_1\cos\left(\sqrt{2}\sqrt{a}\sqrt{x}\right)+c_2\sin\left(\sqrt{2}\sqrt{a}\sqrt{x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.016 (sec), leaf count = 31

$$\left\{y(x)=c_1\sin\left(\sqrt{2}\,\sqrt{a}\,\sqrt{x}\right)+c_2\cos\left(\sqrt{2}\,\sqrt{a}\,\sqrt{x}\right)\right\}$$

2.1131 ODE No. 1131

$$ay(x) + 2xy''(x) - (x-1)y'(x) = 0$$

✓ **Mathematica** : cpu = 0.0097759 (sec), leaf count = 58

$$\left\{\left\{y(x) \to c_1\sqrt{x}U\left(\frac{1}{2}(1-2a), \frac{3}{2}, \frac{x}{2}\right) + c_2\sqrt{x}L_{\frac{1}{2}(2a-1)}^{\frac{1}{2}}\left(\frac{x}{2}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.176 (sec), leaf count = 33

$$\left\{y(x) = \left(c_1 \operatorname{KummerM}\left(-a+\frac{1}{2}, \frac{3}{2}, \frac{x}{2}\right) + c_2 \operatorname{KummerU}\left(-a+\frac{1}{2}, \frac{3}{2}, \frac{x}{2}\right)\right)\sqrt{x}\right\}$$

2.1132 ODE No. 1132

$$ay(x) + 2xy''(x) - (2x-1)y'(x) = 0$$

✓ **Mathematica** : cpu = 0.0098392 (sec), leaf count = 48

$$\left\{\left\{y(x) \to c_1\sqrt{x}U\left(\frac{1-a}{2}, \frac{3}{2}, x\right) + c_2\sqrt{x}L_{\frac{a-1}{2}}^{\frac{1}{2}}(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.198 (sec), leaf count = 29

$$\left\{y(x) = \left(c_1 \operatorname{KummerM}\left(-\frac{a}{2}+\frac{1}{2}, \frac{3}{2}, x\right) + c_2 \operatorname{KummerU}\left(-\frac{a}{2}+\frac{1}{2}, \frac{3}{2}, x\right)\right)\sqrt{x}\right\}$$

2.1133 ODE No. 1133

$$(2x-1)y''(x) - (3x-4)y'(x) + (x-3)y(x) = 0$$

✓ **Mathematica** : cpu = 0.0548494 (sec), leaf count = 52

$$\left\{\left\{y(x) \to 2^{5/8}c_1e^{x-\frac{1}{2}} - \frac{c_2e^{x-\frac{1}{2}}\Gamma\left(-\frac{1}{4}, \frac{1}{4}(2x-1)\right)}{4\sqrt[8]{2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.192 (sec), leaf count = 37

$$\left\{y(x) = \frac{\left(c_1 \operatorname{KummerM}\left(1, \frac{3}{4}, \frac{x}{2}-\frac{1}{4}\right) + c_2 \operatorname{KummerU}\left(1, \frac{3}{4}, \frac{x}{2}-\frac{1}{4}\right)\right)e^{\frac{x}{2}}}{(2x-1)^{\frac{1}{4}}}\right\}$$

2.1134 ODE No. 1134

$$(-a-x)y(x)+4xy''(x)=0$$

✓ **Mathematica** : cpu = 0.0808838 (sec), leaf count = 78

$$\left\{\left\{y(x)\to\frac{1}{4}c_2e^{-x/2}x\,{}_1F_1\left(\frac{1}{128}(-32(-a-4i)-128i)+1;2;x\right)+\frac{1}{4}c_1e^{-x/2}xU\left(\frac{1}{128}(-32(-a-4i)-128i)+1\right.\right.\right.$$

✓ **Maple** : cpu = 0.045 (sec), leaf count = 21

$$\left\{y(x)=c_1\,\mathrm{WhittakerM}\left(-\frac{a}{4},\frac{1}{2},x\right)+c_2\,\mathrm{WhittakerW}\left(-\frac{a}{4},\frac{1}{2},x\right)\right\}$$

2.1135 ODE No. 1135

$$4xy''(x)+2y'(x)-y(x)=0$$

✓ **Mathematica** : cpu = 0.0081757 (sec), leaf count = 27

$$\{\{y(x)\to c_1\cosh\left(\sqrt{x}\right)+ic_2\sinh\left(\sqrt{x}\right)\}\}$$

✓ **Maple** : cpu = 0.012 (sec), leaf count = 17

$$\{y(x)=c_1\sinh\left(\sqrt{x}\right)+c_2\cosh\left(\sqrt{x}\right)\}$$

2.1136 ODE No. 1136

$$4xy''(x)+4y'(x)+(-x-2)y(x)=0$$

✓ **Mathematica** : cpu = 0.0201868 (sec), leaf count = 30

$$\left\{\left\{y(x)\to c_2e^{x/2}\mathrm{Ei}(-x)+c_1e^{x/2}\right\}\right\}$$

✓ **Maple** : cpu = 0.039 (sec), leaf count = 16

$$\left\{y(x)=(c_2\,\mathrm{expIntegral}\,(1,x)+c_1)\,\mathrm{e}^{\frac{x}{2}}\right\}$$

2.1137 ODE No. 1137

$$ly(x) + 4xy''(x) - (x+2)y(x) + 4y(x) = 0$$

✓ **Mathematica** : cpu = 0.0801933 (sec), leaf count = 74

$$\left\{\left\{y(x) \to \frac{1}{4}c_2 e^{-x/2} x\, {}_1F_1\left(\frac{1}{128}(-32(l+(2-4i))-128i)+1;2;x\right) + \frac{1}{4}c_1 e^{-x/2} xU\left(\frac{1}{128}(-32(l+(2-4i))-12\right.\right.\right.$$

✓ **Maple** : cpu = 0.053 (sec), leaf count = 25

$$\left\{y(x) = c_1 \operatorname{WhittakerM}\left(\frac{l}{4}+\frac{1}{2}, \frac{1}{2}, x\right) + c_2 \operatorname{WhittakerW}\left(\frac{l}{4}+\frac{1}{2}, \frac{1}{2}, x\right)\right\}$$

2.1138 ODE No. 1138

$$y(x)(2m+4n-x) + 4my'(x) + 4xy''(x) = 0$$

✓ **Mathematica** : cpu = 0.0218624 (sec), leaf count = 38

$$\left\{\left\{y(x) \to c_1 e^{-x/2} U(-n,m,x) + c_2 e^{-x/2} L_n^{m-1}(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.177 (sec), leaf count = 26

$$\left\{y(x) = \left(c_1 \operatorname{KummerM}(-n,m,x) + c_2 \operatorname{KummerU}(-n,m,x)\right) \mathrm{e}^{-\frac{x}{2}}\right\}$$

2.1139 ODE No. 1139

$$(-a-x)y(x) + 16xy''(x) + 8y'(x) = 0$$

✓ **Mathematica** : cpu = 0.012738 (sec), leaf count = 74

$$\left\{\left\{y(x) \to c_1 e^{\frac{1}{4}(2\log(x)-x)} U\left(\frac{a+6}{8}, \frac{3}{2}, \frac{x}{2}\right) + c_2 e^{\frac{1}{4}(2\log(x)-x)} L_{\frac{1}{8}(-a-6)}^{\frac{1}{2}}\left(\frac{x}{2}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.187 (sec), leaf count = 37

$$\left\{y(x) = \left(c_1 \operatorname{KummerM}\left(\frac{a}{8}+\frac{3}{4}, \frac{3}{2}, \frac{x}{2}\right) + c_2 \operatorname{KummerU}\left(\frac{a}{8}+\frac{3}{4}, \frac{3}{2}, \frac{x}{2}\right)\right) \sqrt{x}\, \mathrm{e}^{-\frac{x}{4}}\right\}$$

2.1140 ODE No. 1140

$$axy''(x) + by'(x) + cy(x) = 0$$

✓ **Mathematica** : cpu = 0.0376252 (sec), leaf count = 190

$$\left\{\left\{y(x) \to c_1 a^{\frac{1}{2}\left(\frac{b}{a}-1\right)} c^{\frac{1}{2}\left(1-\frac{b}{a}\right)} x^{\frac{1}{2}\left(1-\frac{b}{a}\right)} \Gamma\left(\frac{b}{a}\right) J_{\frac{b}{a}-1}\left(\frac{2\sqrt{c}\sqrt{x}}{\sqrt{a}}\right) + c_2 a^{\frac{1}{2}\left(1-\frac{b}{a}\right)-\frac{a-b}{a}} c^{\frac{a-b}{a}+\frac{1}{2}\left(\frac{b}{a}-1\right)} x^{\frac{a-b}{a}+\frac{1}{2}\left(\frac{b}{a}-1\right)} \Gamma\left(2 -\right.\right.\right.$$

✓ **Maple** : cpu = 0.023 (sec), leaf count = 66

$$\left\{y(x) = \left(c_1 \operatorname{BesselJ}\left(\frac{-a+b}{a}, 2\sqrt{\frac{c}{a}}\sqrt{x}\right) + c_2 \operatorname{BesselY}\left(\frac{-a+b}{a}, 2\sqrt{\frac{c}{a}}\sqrt{x}\right)\right) x^{\frac{a-b}{2a}}\right\}$$

2.1141 ODE No. 1141

$$(3a + bx)y'(x) + axy''(x) + 3by(x) = 0$$

✓ **Mathematica** : cpu = 0.126842 (sec), leaf count = 79

$$\left\{\left\{y(x) \to c_1 e^{-\frac{bx}{a}} - \frac{c_2 e^{-\frac{bx}{a}}\left(a^2 e^{\frac{bx}{a}} - b^2 x^2 \operatorname{Ei}\left(\frac{bx}{a}\right) + abxe^{\frac{bx}{a}}\right)}{2a^2 x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.056 (sec), leaf count = 55

$$\left\{y(x) = \frac{c_2 b^2 x^2 \operatorname{expIntegral}\left(1, -\frac{bx}{a}\right) \mathrm{e}^{-\frac{bx}{a}} + c_1 x^2 \mathrm{e}^{-\frac{bx}{a}} + c_2(bx + a)\, a}{x^2}\right\}$$

2.1142 ODE No. 1142

$$cy(x)\sqrt[5]{ax + b} + 5(ax + b)y''(x) + 8ay'(x) = 0$$

✓ **Mathematica** : cpu = 0.0399267 (sec), leaf count = 108

$$\left\{\left\{y(x) \to \frac{6ac_1 \cos\left(\frac{\sqrt{5}\sqrt{c}(ax+b)^{3/5}}{3a}\right)}{\sqrt{5}\sqrt{c}(ax + b)^{3/5}} + \frac{3ac_2 \sin\left(\frac{\sqrt{5}\sqrt{c}(ax+b)^{3/5}}{3a}\right)}{\sqrt{5}\sqrt{c}(ax + b)^{3/5}}\right\}\right\}$$

✓ **Maple** : cpu = 0.224 (sec), leaf count = 53

$$\left\{y(x) = \frac{c_1 \sinh\left(\frac{(ax+b)^{\frac{3}{5}}\sqrt{-5c}}{3a}\right) + c_2 \cosh\left(\frac{(ax+b)^{\frac{3}{5}}\sqrt{-5c}}{3a}\right)}{(ax + b)^{\frac{3}{5}}}\right\}$$

2.1143 ODE No. 1143

$$(a+bx)y'(x)+2axy''(x)+cy(x)=0$$

✓ **Mathematica** : cpu = 0.0289427 (sec), leaf count = 93

$$\left\{\left\{y(x)\to c_1e^{\frac{a\log(x)-bx}{2a}}U\left(-\frac{c-b}{b},\frac{3}{2},\frac{bx}{2a}\right)+c_2e^{\frac{a\log(x)-bx}{2a}}L_{\frac{c-b}{b}}^{\frac{1}{2}}\left(\frac{bx}{2a}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.231 (sec), leaf count = 57

$$\left\{y(x)=\left(c_1\,\mathrm{KummerM}\left(\frac{b-c}{b},\frac{3}{2},\frac{bx}{2a}\right)+c_2\,\mathrm{KummerU}\left(\frac{b-c}{b},\frac{3}{2},\frac{bx}{2a}\right)\right)\sqrt{x}\,\mathrm{e}^{-\frac{bx}{2a}}\right\}$$

2.1144 ODE No. 1144

$$(3a+bx)y'(x)+2axy''(x)+cy(x)=0$$

✓ **Mathematica** : cpu = 0.0261744 (sec), leaf count = 88

$$\left\{\left\{y(x)\to c_1e^{-\frac{bx}{2a}}U\left(-\frac{2c-3b}{2b},\frac{3}{2},\frac{bx}{2a}\right)+c_2e^{-\frac{bx}{2a}}L_{\frac{2c-3b}{2b}}^{\frac{1}{2}}\left(\frac{bx}{2a}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.23 (sec), leaf count = 60

$$\left\{y(x)=\left(c_1\,\mathrm{KummerM}\left(\frac{3b-2c}{2b},\frac{3}{2},\frac{bx}{2a}\right)+c_2\,\mathrm{KummerU}\left(\frac{3b-2c}{2b},\frac{3}{2},\frac{bx}{2a}\right)\right)\mathrm{e}^{-\frac{bx}{2a}}\right\}$$

2.1145 ODE No. 1145

$$y(x)(\mathrm{a0}x+\mathrm{b0})+(\mathrm{a1}x+\mathrm{b1})y'(x)+(\mathrm{a2}x+\mathrm{b2})y''(x)=0$$

✓ **Mathematica** : cpu = 0.256016 (sec), leaf count = 386

$$\left\{\left\{y(x)\to c_1U\left(-\frac{\mathrm{b2a1}^2-\mathrm{a2b1a1}-\sqrt{\mathrm{a1}^2-4\mathrm{a0a2}}\mathrm{b2a1}+2\mathrm{a2}^2\mathrm{b0}+\mathrm{a2}\sqrt{\mathrm{a1}^2-4\mathrm{a0a2}}\mathrm{b1}-2\mathrm{a0a2b2}-2\mathrm{a2}^2\sqrt{\mathrm{a1}^2}}{2\mathrm{a2}^2\sqrt{\mathrm{a1}^2-4\mathrm{a0a2}}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.238 (sec), leaf count = 248

$$\left\{y(x)=\left(c_1\,\mathrm{KummerM}\left(\frac{-a1^2b2-2a2^2b0+(2a0\,b2+a1\,b1)\,a2+\left(a1\,b2+2a2^2-a2\,b1\right)\sqrt{-4a0\,a2+a1^2}}{2\sqrt{-4a0\,a2+a1^2}\,a2^2},\right.\right.\right.$$

2.1146 ODE No. 1146

$$x^2y''(x) - 6y(x) = 0$$

✓ **Mathematica** : cpu = 0.0057946 (sec), leaf count = 18

$$\left\{\left\{y(x)\to c_2x^3+\frac{c_1}{x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.008 (sec), leaf count = 15

$$\left\{y(x)=\frac{c_1x^5+c_2}{x^2}\right\}$$

2.1147 ODE No. 1147

$$x^2y''(x) - 12y(x) = 0$$

✓ **Mathematica** : cpu = 0.0048163 (sec), leaf count = 18

$$\left\{\left\{y(x)\to c_2x^4+\frac{c_1}{x^3}\right\}\right\}$$

✓ **Maple** : cpu = 0.009 (sec), leaf count = 15

$$\left\{y(x)=\frac{c_2x^7+c_1}{x^3}\right\}$$

2.1148 ODE No. 1148

$$ay(x) + x^2y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0110452 (sec), leaf count = 77

$$\left\{\left\{y(x)\to c_1x^{\frac{1}{2}\left(\frac{1}{\sqrt{a}}-\frac{\sqrt{1-4a}}{\sqrt{a}}\right)\sqrt{a}}+c_2x^{\frac{1}{2}\left(\frac{\sqrt{1-4a}}{\sqrt{a}}+\frac{1}{\sqrt{a}}\right)\sqrt{a}}\right\}\right\}$$

✓ **Maple** : cpu = 0.012 (sec), leaf count = 35

$$\left\{y(x)=c_1x^{\frac{1}{2}+\frac{\sqrt{-4a+1}}{2}}+c_2x^{\frac{1}{2}-\frac{\sqrt{-4a+1}}{2}}\right\}$$

2.1149 ODE No. 1149

$$y(x)(ax+b)+x^2y''(x)=0$$

✓ **Mathematica** : cpu = 0.0513605 (sec), leaf count = 212

$$\left\{\left\{y(x)\to c_2a^{\frac{1}{2}\left(\sqrt{1-4b}+1\right)-\frac{1}{2}\sqrt{1-4b}}x^{\frac{1}{2}\left(\sqrt{1-4b}+1\right)-\frac{1}{2}\sqrt{1-4b}}\Gamma\left(\sqrt{1-4b}+1\right)J_{\sqrt{1-4b}}\left(2\sqrt{a}\sqrt{x}\right)+c_1a^{\frac{1}{2}\left(1-\sqrt{1-4b}\right)+\frac{1}{2}\sqrt{1-4b}}\right.\right.$$

✓ **Maple** : cpu = 0.02 (sec), leaf count = 45

$$\left\{y(x)=\left(c_1\,\mathrm{BesselJ}\left(\sqrt{-4b+1},2\sqrt{a}\,\sqrt{x}\right)+c_2\,\mathrm{BesselY}\left(\sqrt{-4b+1},2\sqrt{a}\,\sqrt{x}\right)\right)\sqrt{x}\right\}$$

2.1150 ODE No. 1150

$$x^2y''(x)+\left(x^2-2\right)y(x)=0$$

✓ **Mathematica** : cpu = 0.0081937 (sec), leaf count = 53

$$\left\{\left\{y(x)\to\sqrt{\frac{2}{\pi}}c_2\left(-\sin(x)-\frac{\cos(x)}{x}\right)+\sqrt{\frac{2}{\pi}}c_1\left(\frac{\sin(x)}{x}-\cos(x)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.089 (sec), leaf count = 27

$$\left\{y(x)=\frac{(c_1x+c_2)\cos(x)+(c_2x-c_1)\sin(x)}{x}\right\}$$

2.1151 ODE No. 1151

$$\left(-ax^2-2\right)y(x)+x^2y''(x)=0$$

✓ **Mathematica** : cpu = 0.0166555 (sec), leaf count = 129

$$\left\{\left\{y(x)\to\frac{\sqrt{\frac{2}{\pi}}c_2\sqrt{x}\left(i\sinh\left(\sqrt{a}x\right)-\frac{i\cosh\left(\sqrt{a}x\right)}{\sqrt{a}x}\right)}{\sqrt{-i\sqrt{a}x}}+\frac{\sqrt{\frac{2}{\pi}}c_1\sqrt{x}\left(\frac{\sinh\left(\sqrt{a}x\right)}{\sqrt{a}x}-\cosh\left(\sqrt{a}x\right)\right)}{\sqrt{-i\sqrt{a}x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.114 (sec), leaf count = 43

$$\left\{y(x)=\frac{-c_1\left(ax-\sqrt{a}\right)e^{\sqrt{a}\,x}+c_2\left(ax+\sqrt{a}\right)e^{-\sqrt{a}\,x}}{x}\right\}$$

2.1152 ODE No. 1152

$$\left(a^2x^2-6\right)y(x)+x^2y''(x)=0$$

✓ **Mathematica** : cpu = 0.0149217 (sec), leaf count = 114

$$\left\{\left\{y(x)\to\frac{\sqrt{\frac{2}{\pi}}c_1\sqrt{x}\left(\frac{3\sin(ax)}{a^2x^2}-\sin(ax)-\frac{3\cos(ax)}{ax}\right)}{\sqrt{ax}}+\frac{\sqrt{\frac{2}{\pi}}c_2\sqrt{x}\left(-\frac{3\cos(ax)}{a^2x^2}-\frac{3\sin(ax)}{ax}+\cos(ax)\right)}{\sqrt{ax}}\right\}\right\}$$

✓ **Maple** : cpu = 0.246 (sec), leaf count = 53

$$\left\{y(x)=\frac{\left(c_1a^2x^2+3c_2ax-3c_1\right)\cos\left(ax\right)+\left(c_2a^2x^2-3c_1ax-3c_2\right)\sin\left(ax\right)}{x^2}\right\}$$

2.1153 ODE No. 1153

$$y(x)\left(ax^2+(1-v)v\right)+x^2y''(x)=0$$

✓ **Mathematica** : cpu = 0.0285052 (sec), leaf count = 56

$$\left\{\left\{y(x)\to c_1\sqrt{x}J_{\frac{1}{2}(2v-1)}\left(\sqrt{a}x\right)+c_2\sqrt{x}Y_{\frac{1}{2}(2v-1)}\left(\sqrt{a}x\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.036 (sec), leaf count = 31

$$\left\{y(x)=\left(c_1\,\mathrm{BesselJ}\left(v-\frac{1}{2},\sqrt{a}\,x\right)+c_2\,\mathrm{BesselY}\left(v-\frac{1}{2},\sqrt{a}\,x\right)\right)\sqrt{x}\right\}$$

2.1154 ODE No. 1154

$$y(x)\left(ax^2+bx+c\right)+x^2y''(x)=0$$

✓ **Mathematica** : cpu = 0.0168315 (sec), leaf count = 88

$$\left\{\left\{y(x)\to c_1M_{-\frac{ib}{2\sqrt{a}},-\frac{1}{2}i\sqrt{4c-1}}\left(2i\sqrt{a}x\right)+c_2W_{-\frac{ib}{2\sqrt{a}},-\frac{1}{2}i\sqrt{4c-1}}\left(2i\sqrt{a}x\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.243 (sec), leaf count = 57

$$\left\{y(x)=c_1\,\mathrm{WhittakerM}\left(-\frac{ib}{2\sqrt{a}},\frac{\sqrt{-4c+1}}{2},2i\sqrt{a}\,x\right)+c_2\,\mathrm{WhittakerW}\left(-\frac{ib}{2\sqrt{a}},\frac{\sqrt{-4c+1}}{2},2i\sqrt{a}\,x\right)\right\}$$

2.1155 ODE No. 1155

$$y(x)\left(ax^k+(1-b)b\right)+x^2y''(x)=0$$

✓ **Mathematica** : cpu = 0.0514049 (sec), leaf count = 225

$$\left\{\left\{y(x)\to c_1k^{-\frac{2(1-b)}{k}-\frac{2b}{k}+\frac{1}{k}}a^{\frac{1-b}{k}+\frac{1}{2}\left(\frac{2b}{k}-\frac{1}{k}\right)}\left(x^k\right)^{\frac{1-b}{k}+\frac{1}{2}\left(\frac{2b}{k}-\frac{1}{k}\right)}\Gamma\left(-\frac{2b}{k}+\frac{1}{k}+1\right)J_{\frac{1-2b}{k}}\left(\frac{2\sqrt{a}\sqrt{x^k}}{k}\right)+c_2k^{-1/k}a^{\frac{b}{k}+}\right.\right.$$

✓ **Maple** : cpu = 0.17 (sec), leaf count = 67

$$\left\{y(x)=\left(c_1\,\mathrm{BesselJ}\left(\frac{\sqrt{(2b-1)^2}}{k},\frac{2\sqrt{a}\,x^{\frac{k}{2}}}{k}\right)+c_2\,\mathrm{BesselY}\left(\frac{\sqrt{(2b-1)^2}}{k},\frac{2\sqrt{a}\,x^{\frac{k}{2}}}{k}\right)\right)\sqrt{x}\right\}$$

2.1156 ODE No. 1156

$$x^2y''(x)+\frac{y(x)}{\log(x)}-e^x x(x\log(x)+2)=0$$

✓ **Mathematica** : cpu = 0.0916499 (sec), leaf count = 32

$$\left\{\left\{y(x)\to c_2\log(x)\left(\mathrm{li}(x)-\frac{x}{\log(x)}\right)+e^x\log(x)+c_1\log(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.247 (sec), leaf count = 71

$$\left\{y(x)=c_2\ln(x)-c_1(\mathrm{expIntegral}(1,-\ln(x))\ln(x)+x)-\left((\mathrm{expIntegral}(1,-\ln(x))\ln(x)+x)\,\mathrm{e}^x\ln(x)-\left(\int\right.\right.\right.$$

2.1157 ODE No. 1157

$$ay'(x)+x^2y''(x)-xy(x)=0$$

✗ **Mathematica** : cpu = 0.569527 (sec), leaf count = 0 , DifferentialRoot result

$$\{\{y(x)\to(x)\}\}$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x)=DESol\left(\left\{\frac{d^2}{dx^2}\_Y(x)+\frac{a\left(\frac{d}{dx}\_Y(x)\right)}{x^2}-\frac{\_Y(x)}{x}\right\},\{\_Y(x)\}\right)\right\}$$

2.1158 ODE No. 1158

$$y(x)\left(-ab-b^2x^2\right)+ay'(x)+x^2y''(x)=0$$

✓ **Mathematica** : cpu = 0.18039 (sec), leaf count = 43

$$\left\{\left\{y(x)\to c_2e^{bx}\int_1^x e^{\frac{a}{K[1]}-2bK[1]}dK[1]+c_1e^{bx}\right\}\right\}$$

✓ **Maple** : cpu = 0.289 (sec), leaf count = 178

$$\left\{y(x)=\left(c_1HD\left(4\sqrt{2}\sqrt{ab},-1-4\sqrt{2}\sqrt{ab},8\sqrt{2}\sqrt{ab},-4\sqrt{2}\sqrt{ab}+1,\frac{-a+\sqrt{2}\sqrt{ab}\,x}{a+\sqrt{2}\sqrt{ab}\,x}\right)\mathrm{e}^{\frac{-b\,x^2+a}{x}}+c_2HD\left(-4\sqrt{2}\right.\right.\right.$$

2.1159 ODE No. 1159

$$-ax^2+x^2y''(x)+xy'(x)-y(x)=0$$

✓ **Mathematica** : cpu = 0.0070615 (sec), leaf count = 24

$$\left\{\left\{y(x)\to\frac{ax^2}{3}+c_2x+\frac{c_1}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.015 (sec), leaf count = 19

$$\left\{y(x)=\frac{a\,x^2}{3}+c_2x+\frac{c_1}{x}\right\}$$

2.1160 ODE No. 1160

$$ay(x)+x^2y''(x)+xy'(x)=0$$

✓ **Mathematica** : cpu = 0.0124501 (sec), leaf count = 30

$$\left\{\left\{y(x)\to c_1\cos\left(\sqrt{a}\log(x)\right)+c_2\sin\left(\sqrt{a}\log(x)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.017 (sec), leaf count = 23

$$\left\{y(x)=c_1\sin\left(\sqrt{a}\,\ln(x)\right)+c_2\cos\left(\sqrt{a}\,\ln(x)\right)\right\}$$

2.1161 ODE No. 1161

$$(-a-x)y(x)+x^2y''(x)+xy'(x)=0$$

✓ **Mathematica** : cpu = 0.0384322 (sec), leaf count = 78

$$\left\{\left\{y(x)\to(-1)^{-\sqrt{a}}c_1\Gamma\left(1-2\sqrt{a}\right)I_{-2\sqrt{a}}\left(2\sqrt{x}\right)+(-1)^{\sqrt{a}}c_2\Gamma\left(2\sqrt{a}+1\right)I_{2\sqrt{a}}\left(2\sqrt{x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.013 (sec), leaf count = 31

$$\left\{y(x)=c_1\,\mathrm{BesselI}\left(2\sqrt{a},2\sqrt{x}\right)+c_2\,\mathrm{BesselK}\left(2\sqrt{a},2\sqrt{x}\right)\right\}$$

2.1162 ODE No. 1162

$$\left(x^2-v^2\right)y(x)+x^2y''(x)+xy'(x)=0$$

✓ **Mathematica** : cpu = 0.0518565 (sec), leaf count = 18

$$\{\{y(x)\to c_1J_v(x)+c_2Y_v(x)\}\}$$

✓ **Maple** : cpu = 0.013 (sec), leaf count = 15

$$\{y(x)=c_1\,\mathrm{BesselJ}\,(v,x)+c_2\,\mathrm{BesselY}\,(v,x)\}$$

2.1163 ODE No. 1163

$$-f(x)+\left(x^2-v^2\right)y(x)+x^2y''(x)+xy'(x)=0$$

✓ **Mathematica** : cpu = 0.127894 (sec), leaf count = 72

$$\left\{\left\{y(x)\to J_v(x)\int_1^x-\frac{\pi Y_v(K[1])f(K[1])}{2K[1]}dK[1]+Y_v(x)\int_1^x\frac{\pi J_v(K[2])f(K[2])}{2K[2]}dK[2]+c_1J_v(x)+c_2Y_v(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.046 (sec), leaf count = 49

$$\left\{y(x)=c_1\,\mathrm{BesselY}\,(v,x)+c_2\,\mathrm{BesselJ}\,(v,x)-\frac{\pi\,\mathrm{BesselJ}\,(v,x)\left(\int\frac{\mathrm{BesselY}(v,x)f(x)}{x}dx\right)}{2}+\frac{\pi\,\mathrm{BesselY}\,(v,x)\left(\int\frac{\mathrm{BesselJ}\right.}{}\right.}{2}\right.$$

2.1164 ODE No. 1164

$$y(x)\left(lx^2-v^2\right)+x^2y''(x)+xy'(x)=0$$

✓ **Mathematica** : cpu = 0.020164 (sec), leaf count = 30

$$\left\{\left\{y(x)\to c_1J_v\left(\sqrt{l}x\right)+c_2Y_v\left(\sqrt{l}x\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.033 (sec), leaf count = 23

$$\left\{y(x)=c_1\operatorname{BesselJ}\left(v,\sqrt{l}\,x\right)+c_2\operatorname{BesselY}\left(v,\sqrt{l}\,x\right)\right\}$$

2.1165 ODE No. 1165

$$(a+x)y'(x)+x^2y''(x)-y(x)=0$$

✓ **Mathematica** : cpu = 0.121724 (sec), leaf count = 26

$$\left\{\left\{y(x)\to\frac{c_2(a+x)}{a^2}+c_1xe^{a/x}\right\}\right\}$$

✓ **Maple** : cpu = 0.018 (sec), leaf count = 19

$$\left\{y(x)=c_2x\,\mathrm{e}^{\frac{a}{x}}+c_1(a+x)\right\}$$

2.1166 ODE No. 1166

$$-3x^3+x^2y''(x)-xy'(x)+y(x)=0$$

✓ **Mathematica** : cpu = 0.0108962 (sec), leaf count = 23

$$\left\{\left\{y(x)\to\frac{3x^3}{4}+c_1x+c_2x\log(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.013 (sec), leaf count = 21

$$\left\{y(x)=\frac{\left(4c_1\ln\left(x\right)+3x^2+4c_2\right)x}{4}\right\}$$

2.1167 ODE No. 1167

$$y(x)\left(ax^m+b\right)+x^2y''(x)-xy'(x)=0$$

✓ **Mathematica** : cpu = 0.0589438 (sec), leaf count = 326

$$\left\{\left\{y(x)\to c_1 m^{-\frac{2\left(m-i\sqrt{b-1}m\right)}{m^2}-\frac{2i\sqrt{b-1}}{m}} a^{\frac{m-i\sqrt{b-1}m}{m^2}+\frac{i\sqrt{b-1}}{m}} \left(x^m\right)^{\frac{m-i\sqrt{b-1}m}{m^2}+\frac{i\sqrt{b-1}}{m}} \Gamma\left(1-\frac{2i\sqrt{b-1}}{m}\right) J_{-\frac{2i\sqrt{b-1}}{m}}\left(\frac{2\sqrt{a}\sqrt{x^m}}{m}\right.\right.\right.$$

✓ **Maple** : cpu = 0.177 (sec), leaf count = 63

$$\left\{y(x)=\left(c_1\operatorname{BesselJ}\left(\frac{2\sqrt{-b+1}}{m},\frac{2\sqrt{a}\,x^{\frac{m}{2}}}{m}\right)+c_2\operatorname{BesselY}\left(\frac{2\sqrt{-b+1}}{m},\frac{2\sqrt{a}\,x^{\frac{m}{2}}}{m}\right)\right)x\right\}$$

2.1168 ODE No. 1168

$$x^2y''(x)+2xy'(x)=0$$

✓ **Mathematica** : cpu = 0.0220508 (sec), leaf count = 15

$$\left\{\left\{y(x)\to c_2-\frac{c_1}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.007 (sec), leaf count = 11

$$\left\{y(x)=c_1+\frac{c_2}{x}\right\}$$

2.1169 ODE No. 1169

$$y(x)\left(ax-b^2\right)+x^2y''(x)+2xy'(x)=0$$

✓ **Mathematica** : cpu = 0.0612584 (sec), leaf count = 236

$$\left\{\left\{y(x)\to c_1 a^{\frac{1}{2}\left(-\sqrt{4b^2+1}-1\right)+\frac{1}{2}\sqrt{4b^2+1}} x^{\frac{1}{2}\left(-\sqrt{4b^2+1}-1\right)+\frac{1}{2}\sqrt{4b^2+1}}\Gamma\left(1-\sqrt{4b^2+1}\right) J_{-\sqrt{4b^2+1}}\left(2\sqrt{a}\sqrt{x}\right)+c_2 a^{\frac{1}{2}\left(\sqrt{4b^2+\right.}}\right.\right.$$

✓ **Maple** : cpu = 0.189 (sec), leaf count = 49

$$\left\{y(x)=\frac{c_1\operatorname{BesselJ}\left(\sqrt{4b^2+1},2\sqrt{a}\,\sqrt{x}\right)+c_2\operatorname{BesselY}\left(\sqrt{4b^2+1},2\sqrt{a}\,\sqrt{x}\right)}{\sqrt{x}}\right\}$$

2.1170 ODE No. 1170

$$y(x)\left(ax^2+b\right)+x^2y''(x)+2xy'(x)=0$$

✓ **Mathematica** : cpu = 0.0173903 (sec), leaf count = 58

$$\left\{\left\{y(x)\to c_1 j_{\frac{1}{2}\left(\sqrt{1-4b}-1\right)}\left(\sqrt{a}x\right)+c_2 y_{\frac{1}{2}\left(\sqrt{1-4b}-1\right)}\left(\sqrt{a}x\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.142 (sec), leaf count = 43

$$\left\{y(x)=\frac{c_1\,\mathrm{BesselJ}\left(\frac{\sqrt{-4b+1}}{2},\sqrt{a}\,x\right)+c_2\,\mathrm{BesselY}\left(\frac{\sqrt{-4b+1}}{2},\sqrt{a}\,x\right)}{\sqrt{x}}\right\}$$

2.1171 ODE No. 1171

$$y(x)\left(ax+lx^2-n(n+1)\right)+x^2y''(x)+2xy'(x)=0$$

✓ **Mathematica** : cpu = 0.0400409 (sec), leaf count = 142

$$\left\{\left\{y(x)\to c_1 e^{n\log(x)-i\sqrt{l}x}U\left(\frac{i\left(a-2i\sqrt{l}n-2i\sqrt{l}\right)}{2\sqrt{l}},2n+2,2i\sqrt{l}x\right)+c_2 e^{n\log(x)-i\sqrt{l}x}L^{2n+1}_{-\frac{i\left(a-2i\sqrt{l}n-2i\sqrt{l}\right)}{2\sqrt{l}}}\left(2i\sqrt{l}x\right)\right.\right.$$

✓ **Maple** : cpu = 0.221 (sec), leaf count = 49

$$\left\{y(x)=\frac{c_1\,\mathrm{WhittakerM}\left(-\frac{ia}{2\sqrt{l}},n+\frac{1}{2},2i\sqrt{l}\,x\right)+c_2\,\mathrm{WhittakerW}\left(-\frac{ia}{2\sqrt{l}},n+\frac{1}{2},2i\sqrt{l}\,x\right)}{x}\right\}$$

2.1172 ODE No. 1172

$$ay(x)+x^2y''(x)+2(x-1)y'(x)=0$$

✓ **Mathematica** : cpu = 0.0669312 (sec), leaf count = 158

$$\left\{\left\{y(x)\to 2^{\frac{1}{2}\left(1-\sqrt{1-4a}\right)}c_1\left(\frac{1}{x}\right)^{\frac{1}{2}\left(1-\sqrt{1-4a}\right)}{}_1F_1\left(\frac{1}{2}-\frac{1}{2}\sqrt{1-4a};1-\sqrt{1-4a};-\frac{2}{x}\right)+2^{\frac{1}{2}\left(\sqrt{1-4a}+1\right)}c_2\left(\frac{1}{x}\right)^{\frac{1}{2}\left(\sqrt{1-4a}\right.}\right.\right.$$

✓ **Maple** : cpu = 0.154 (sec), leaf count = 47

$$\left\{y(x)=\sqrt{\frac{1}{x}}\left(c_1\,\mathrm{BesselI}\left(\frac{\sqrt{-4a+1}}{2},\frac{1}{x}\right)+c_2\,\mathrm{BesselK}\left(\frac{\sqrt{-4a+1}}{2},\frac{1}{x}\right)\right)\mathrm{e}^{-\frac{1}{x}}\right\}$$

2.1173 ODE No. 1173

$$2(a+x)y'(x)+(1-b)by(x)+x^2y''(x)=0$$

✓ **Mathematica** : cpu = 0.130936 (sec), leaf count = 74

$$\left\{\left\{y(x)\to(-2)^{1-b}c_1a^{1-b}\left(\frac{1}{x}\right)^{1-b}{}_1F_1\left(1-b;2-2b;\frac{2a}{x}\right)+(-2)^bc_2a^b\left(\frac{1}{x}\right)^b{}_1F_1\left(b;2b;\frac{2a}{x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.213 (sec), leaf count = 37

$$\left\{y(x)=\frac{\left(c_1\,\mathrm{BesselI}\left(b-\frac{1}{2},\frac{a}{x}\right)+c_2\,\mathrm{BesselK}\left(b-\frac{1}{2},\frac{a}{x}\right)\right)\mathrm{e}^{\frac{a}{x}}}{\sqrt{x}}\right\}$$

2.1174 ODE No. 1174

$$x^5(-\log(x))+x^2y''(x)-2xy'(x)+2y(x)=0$$

✓ **Mathematica** : cpu = 0.0082954 (sec), leaf count = 33

$$\left\{\left\{y(x)\to\frac{1}{144}\left(12x^5\log(x)-7x^5\right)+c_2x^2+c_1x\right\}\right\}$$

✓ **Maple** : cpu = 0.026 (sec), leaf count = 25

$$\left\{y(x)=\frac{x^5\ln(x)}{12}-\frac{7x^5}{144}+c_2x^2+c_1x\right\}$$

2.1175 ODE No. 1175

$$\left(-ax^2-12a-4\right)\cos(x)+x^2y''(x)-2xy'(x)-4y(x)-x\sin(x)=0$$

✓ **Mathematica** : cpu = 0.228381 (sec), leaf count = 38

$$\left\{\left\{y(x)\to\frac{-2a\sin(x)-ax\cos(x)-\sin(x)}{x}+c_2x^4+\frac{c_1}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.087 (sec), leaf count = 29

$$\left\{y(x)=\frac{c_2x^5-ax\cos(x)+c_1+(-2a-1)\sin(x)}{x}\right\}$$

2.1176 ODE No. 1176

$$x^2y''(x) + (x^2+2)\,y(x) - 2xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.0166349 (sec), leaf count = 33

$$\left\{\left\{y(x)\to c_1e^{-ix}x - \frac{1}{2}ic_2e^{ix}x\right\}\right\}$$

✓ **Maple** : cpu = 0.03 (sec), leaf count = 15

$$\{y(x) = (c_1\sin(x) + c_2\cos(x))\,x\}$$

2.1177 ODE No. 1177

$$x^2y''(x) + (x^2+2)\,y'(x) + x^2(-\sec(x)) - 2xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.830027 (sec), leaf count = 141

$$\left\{\left\{y(x)\to \int_1^x e^{\frac{2}{K[1]}-K[1]}K[1]^2dK[1]\int_1^x \frac{e^{K[3]-\frac{2}{K[3]}}\sec(K[3])}{K[3]^2}dK[3] + \int_1^x -\frac{e^{K[2]-\frac{2}{K[2]}}\sec(K[2])\int_1^{K[2]} e^{\frac{2}{K[1]}-K[1]}K}{K[2]^2}\right.\right.$$

✓ **Maple** : cpu = 0.123 (sec), leaf count = 34

$$\left\{y(x) = \left(c_1\cos(x) - \left(\int\frac{\sin(x)}{x\cos(x)}dx\right)\cos(x) + (c_2+\ln(x))\sin(x)\right)x\right\}$$

2.1178 ODE No. 1178

$$x^3(-\sec(x)) + x^2y''(x) + (x^2+2)\,y(x) - 2xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.0372219 (sec), leaf count = 74

$$\left\{\left\{y(x)\to \frac{1}{2}e^{-ix}x\left(e^{2ix}\log\left(1+e^{-2ix}\right) + \log\left(1+e^{2ix}\right)\right) + c_1e^{-ix}x - \frac{1}{2}ic_2e^{ix}x\right\}\right\}$$

✓ **Maple** : cpu = 0.033 (sec), leaf count = 23

$$\{y(x) = (c_1\cos(x) + \cos(x)\ln(\cos(x)) + (c_2+x)\sin(x))\,x\}$$

2.1179 ODE No. 1179

$$(a^2x^2+2)\,y(x)+x^2y''(x)-2xy'(x)=0$$

✓ **Mathematica** : cpu = 0.0178435 (sec), leaf count = 38

$$\left\{\left\{y(x)\to c_1xe^{-iax}-\frac{ic_2xe^{iax}}{2a}\right\}\right\}$$

✓ **Maple** : cpu = 0.033 (sec), leaf count = 19

$$\{y(x)=(c_1\sin(ax)+c_2\cos(ax))\,x\}$$

2.1180 ODE No. 1180

$$-f(x)+(-v^2+x^2+1)\,y(x)+x^2y''(x)+3xy'(x)=0$$

✓ **Mathematica** : cpu = 0.065767 (sec), leaf count = 75

$$\left\{\left\{y(x)\to\frac{J_v(x)\int_1^x-\frac{1}{2}\pi Y_v(K[1])f(K[1])dK[1]+Y_v(x)\int_1^x\frac{1}{2}\pi J_v(K[2])f(K[2])dK[2]}{x}+\frac{c_1J_v(x)}{x}+\frac{c_2Y_v(x)}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.065 (sec), leaf count = 49

$$\left\{y(x)=\frac{2c_1\,\mathrm{BesselY}(v,x)+2c_2\,\mathrm{BesselJ}(v,x)-\pi\,\mathrm{BesselJ}(v,x)\left(\int\mathrm{BesselY}(v,x)\,f(x)\,dx\right)+\pi\,\mathrm{BesselY}(v,x)\left(\int\right.}{2x}\right.$$

2.1181 ODE No. 1181

$$x^2y''(x)+(3x-1)y'(x)+y(x)=0$$

✓ **Mathematica** : cpu = 0.0467607 (sec), leaf count = 37

$$\left\{\left\{y(x)\to\frac{c_1e^{-1/x}}{x}-\frac{c_2e^{-1/x}\mathrm{Ei}\left(\frac{1}{x}\right)}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.021 (sec), leaf count = 25

$$\left\{y(x)=\frac{\left(c_1\,\mathrm{expIntegral}\left(1,-\frac{1}{x}\right)+c_2\right)\mathrm{e}^{-\frac{1}{x}}}{x}\right\}$$

2.1182 ODE No. 1182

$$x^2y''(x) - 3xy'(x) + 4y(x) - 5x = 0$$

✓ **Mathematica** : cpu = 0.0108615 (sec), leaf count = 24

$$\{\{y(x) \to c_1x^2 + 2c_2x^2\log(x) + 5x\}\}$$

✓ **Maple** : cpu = 0.013 (sec), leaf count = 20

$$\{y(x) = c_1x^2\ln(x) + c_2x^2 + 5x\}$$

2.1183 ODE No. 1183

$$x^2y''(x) + x^2(-\log(x)) - 3xy'(x) - 5y(x) = 0$$

✓ **Mathematica** : cpu = 0.0096156 (sec), leaf count = 27

$$\left\{\left\{y(x) \to c_2x^5 - \frac{1}{9}x^2\log(x) + \frac{c_1}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.013 (sec), leaf count = 22

$$\left\{y(x) = c_2x^5 - \frac{x^2\ln(x)}{9} + \frac{c_1}{x}\right\}$$

2.1184 ODE No. 1184

$$-x^4 + x^2y''(x) + x^2 - 4xy'(x) + 6y(x) = 0$$

✓ **Mathematica** : cpu = 0.0079021 (sec), leaf count = 38

$$\left\{\left\{y(x) \to c_2x^3 + c_1x^2 + \frac{1}{2}\left(x^4 + 2x^2 + 2x^2\log(x)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.026 (sec), leaf count = 25

$$\left\{y(x) = \frac{(2c_2x + x^2 + 2c_1 + 2\ln(x) + 2)\,x^2}{2}\right\}$$

2.1185 ODE No. 1185

$$\left(4-2x^3\right)y(x)+x^2y''(x)+5xy'(x)=0$$

✓ **Mathematica** : cpu = 0.0303128 (sec), leaf count = 67

$$\left\{\left\{y(x)\to \frac{3\sqrt[3]{6}c_2K_0\left(\frac{2}{3}\sqrt{2}x^{3/2}\right)}{x^2}-\frac{3\sqrt[3]{-3}c_1I_0\left(\frac{2}{3}\sqrt{2}x^{3/2}\right)}{2^{2/3}x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.024 (sec), leaf count = 33

$$\left\{y(x)=\frac{c_1\,\mathrm{BesselI}\left(0,\frac{2\sqrt{2}\,x^{\frac{3}{2}}}{3}\right)+c_2\,\mathrm{BesselK}\left(0,\frac{2\sqrt{2}\,x^{\frac{3}{2}}}{3}\right)}{x^2}\right\}$$

2.1186 ODE No. 1186

$$x^3(-\sin(x))+x^2y''(x)-5xy'(x)+8y(x)=0$$

✓ **Mathematica** : cpu = 0.0156754 (sec), leaf count = 42

$$\left\{\left\{y(x)\to \frac{1}{2}\left(x^4\mathrm{Ci}(x)-x^3\sin(x)+x^2\cos(x)\right)+c_2x^4+c_1x^2\right\}\right\}$$

✓ **Maple** : cpu = 0.036 (sec), leaf count = 36

$$\left\{y(x)=\frac{x^4\,\mathrm{cosineIntegral}\,(x)}{2}-\frac{x^3\sin\,(x)}{2}+\frac{\left(2c_2x^2+2c_1+\cos\,(x)\right)x^2}{2}\right\}$$

2.1187 ODE No. 1187

$$axy'(x)+by(x)+x^2y''(x)=0$$

✓ **Mathematica** : cpu = 0.0099878 (sec), leaf count = 99

$$\left\{\left\{y(x)\to c_1x^{\frac{1}{2}\sqrt{b}\left(-\frac{\sqrt{a^2-2a-4b+1}}{\sqrt{b}}-\frac{a-1}{\sqrt{b}}\right)}+c_2x^{\frac{1}{2}\sqrt{b}\left(\frac{\sqrt{a^2-2a-4b+1}}{\sqrt{b}}-\frac{a-1}{\sqrt{b}}\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.011 (sec), leaf count = 53

$$\left\{y(x)=c_1x^{-\frac{a}{2}+\frac{1}{2}+\frac{\sqrt{a^2-2a-4b+1}}{2}}+c_2x^{-\frac{a}{2}+\frac{1}{2}-\frac{\sqrt{a^2-2a-4b+1}}{2}}\right\}$$

2.1188 ODE No. 1188

$$(ax+b)y'(x)+cy(x)+x^2y''(x)=0$$

✓ **Mathematica** : cpu = 0.169052 (sec), leaf count = 266

$$\left\{\left\{y(x)\to c_1 i^{-\sqrt{a^2-2a-4c+1}+a-1}b^{\frac{1}{2}\left(-\sqrt{a^2-2a-4c+1}+a-1\right)}\left(\frac{1}{x}\right)^{\frac{1}{2}\left(-\sqrt{a^2-2a-4c+1}+a-1\right)}\,{}_1F_1\left(\frac{a}{2}-\frac{1}{2}\sqrt{a^2-2a-4c+\right.\right.\right.$$

✓ **Maple** : cpu = 0.273 (sec), leaf count = 114

$$\left\{y(x)=\left(c_1\,\mathrm{KummerM}\left(\frac{a}{2}-\frac{1}{2}+\frac{\sqrt{a^2-2a-4c+1}}{2},1+\sqrt{a^2-2a-4c+1},\frac{b}{x}\right)+c_2\,\mathrm{KummerU}\left(\frac{a}{2}-\frac{1}{2}+\right.\right.\right.$$

2.1189 ODE No. 1189

$$axy'(x)+y(x)\left(bx^m+c\right)+x^2y''(x)=0$$

✓ **Mathematica** : cpu = 0.0581196 (sec), leaf count = 445

$$\left\{\left\{y(x)\to c_1 m^{-\frac{-\sqrt{a^2-2a-4c+1}-a+1}{m}-\frac{\sqrt{a^2-2a-4c+1}}{m}}b^{\frac{-\sqrt{a^2-2a-4c+1}-a+1}{2m}+\frac{\sqrt{a^2-2a-4c+1}}{2m}}\left(x^m\right)^{\frac{-\sqrt{a^2-2a-4c+1}-a+1}{2m}+\frac{\sqrt{a^2-2a-4c+1}}{2m}}\right.\right.$$

✓ **Maple** : cpu = 0.164 (sec), leaf count = 79

$$\left\{y(x)=\left(c_1\,\mathrm{BesselJ}\left(\frac{\sqrt{a^2-2a-4c+1}}{m},\frac{2\sqrt{b}\,x^{\frac{m}{2}}}{m}\right)+c_2\,\mathrm{BesselY}\left(\frac{\sqrt{a^2-2a-4c+1}}{m},\frac{2\sqrt{b}\,x^{\frac{m}{2}}}{m}\right)\right)x^{-\frac{a}{2}+\frac{1}{2}}\right\}$$

2.1190 ODE No. 1190

$$y(x)(ax+b)+x^2y''(x)+x^2y'(x)=0$$

✓ **Mathematica** : cpu = 0.0230653 (sec), leaf count = 122

$$\left\{\left\{y(x)\to c_1 e^{\frac{1}{2}\left(\left(\sqrt{1-4b}+1\right)\log(x)-2x\right)}U\left(\frac{1}{2}\left(-2a+\sqrt{1-4b}+1\right),\sqrt{1-4b}+1,x\right)+c_2 e^{\frac{1}{2}\left(\left(\sqrt{1-4b}+1\right)\log(x)-2x\right)}L_{\frac{1}{2}(2a}^{\sqrt{1-}}\right.\right.$$

✓ **Maple** : cpu = 0.192 (sec), leaf count = 38

$$\left\{y(x)=\left(c_1\,\mathrm{WhittakerM}\left(a,\frac{\sqrt{-4b+1}}{2},x\right)+c_2\,\mathrm{WhittakerW}\left(a,\frac{\sqrt{-4b+1}}{2},x\right)\right)\mathrm{e}^{-\frac{x}{2}}\right\}$$

2.1191 ODE No. 1191

$$x^2y''(x) + x^2y'(x) - 2y(x) = 0$$

✓ **Mathematica** : cpu = 0.0083381 (sec), leaf count = 110

$$\left\{\left\{y(x) \to \frac{2c_2e^{\frac{1}{2}(\log(x)-x)}\left(i\sinh\left(\frac{x}{2}\right) - \frac{2i\cosh\left(\frac{x}{2}\right)}{x}\right)}{\sqrt{\pi}\sqrt{-ix}} + \frac{2c_1e^{\frac{1}{2}(\log(x)-x)}\left(\frac{2\sinh\left(\frac{x}{2}\right)}{x} - \cosh\left(\frac{x}{2}\right)\right)}{\sqrt{\pi}\sqrt{-ix}}\right\}\right\}$$

✓ **Maple** : cpu = 0.015 (sec), leaf count = 23

$$\left\{y(x) = \frac{c_2(x+2)\,\mathrm{e}^{-x} + c_1(x-2)}{x}\right\}$$

2.1192 ODE No. 1192

$$x^2y''(x) + \left(x^2-1\right)y'(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 0.0887329 (sec), leaf count = 40

$$\left\{\left\{y(x) \to c_2e^{-x}\int_1^x e^{K[1]-\frac{1}{K[1]}}dK[1] + c_1e^{-x}\right\}\right\}$$

✓ **Maple** : cpu = 0.22 (sec), leaf count = 51

$$\left\{y(x) = \left(c_1 HD\left(4,3,-8,5,\frac{x-1}{x+1}\right)\mathrm{e}^{-x} + c_2 HD\left(-4,3,-8,5,\frac{x-1}{x+1}\right)\mathrm{e}^{-\frac{1}{x}}\right)\sqrt{x}\right\}$$

2.1193 ODE No. 1193

$$x^2y''(x) + (x+1)xy'(x) + (x-9)y(x) = 0$$

✓ **Mathematica** : cpu = 0.213288 (sec), leaf count = 44

$$\left\{\left\{y(x) \to \frac{c_1((x-8)x+20)}{x^3} - \frac{c_2e^{-x}\left(x^3+9x^2+36x+60\right)}{x^3}\right\}\right\}$$

✓ **Maple** : cpu = 0.033 (sec), leaf count = 38

$$\left\{y(x) = \frac{c_2\left(x^3+9x^2+36x+60\right)\mathrm{e}^{-x} + c_1\left(x^2-8x+20\right)}{x^3}\right\}$$

2.1194 ODE No. 1194

$$x^2y''(x) + (x+1)xy'(x) + (3x-1)y(x) = 0$$

✓ **Mathematica** : cpu = 0.0999675 (sec), leaf count = 65

$$\left\{\left\{y(x) \to c_1e^{-x}(x-3)x - \frac{c_2e^{-x}\left(x^3(-\text{Ei}(x)) + 3x^2\text{Ei}(x) + e^xx^2 - 2e^xx - e^x\right)}{6x}\right\}\right\}$$

✓ **Maple** : cpu = 0.048 (sec), leaf count = 48

$$\left\{y(x) = \frac{c_2(x-3)\,x^2\,\text{expIntegral}\,(1,-x)\,\mathrm{e}^{-x} + c_1(x-3)\,x^2\mathrm{e}^{-x} + c_2\left(x^2-2x-1\right)}{x}\right\}$$

2.1195 ODE No. 1195

$$x^2y''(x) + (x+3)xy'(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 0.0293922 (sec), leaf count = 80

$$\left\{\left\{y(x) \to c_1U\left(2+\sqrt{2}, 1+2\sqrt{2}, x\right)e^{\left(\sqrt{2}-1\right)\log(x)-x} + c_2L_{-2-\sqrt{2}}^{2\sqrt{2}}(x)e^{\left(\sqrt{2}-1\right)\log(x)-x}\right\}\right\}$$

✓ **Maple** : cpu = 0.23 (sec), leaf count = 93

$$\left\{y(x) = -\frac{\left(-c_1\left(x+\sqrt{2}+1\right)\text{BesselI}\left(-\frac{1}{2}+\sqrt{2}, \frac{x}{2}\right) - c_1\left(x-\sqrt{2}+1\right)\text{BesselI}\left(\frac{1}{2}+\sqrt{2}, \frac{x}{2}\right) + c_2\left(\left(-x-\sqrt{2}-1\right)\text{B}\right.\right.}{\sqrt{x}}\right.$$

2.1196 ODE No. 1196

$$x^2y''(x) - (x-1)xy'(x) + (x-1)y(x) = 0$$

✓ **Mathematica** : cpu = 0.0294775 (sec), leaf count = 37

$$\left\{\left\{y(x) \to \frac{c_2\left(x^2\text{Ei}(x) - e^xx - e^x\right)}{2x} + c_1x\right\}\right\}$$

✓ **Maple** : cpu = 0.034 (sec), leaf count = 31

$$\left\{y(x) = \frac{c_2x^2\,\text{expIntegral}\,(1,-x) + c_1x^2 + c_2(x+1)\,\mathrm{e}^x}{x}\right\}$$

2.1197 ODE No. 1197

$$(-a-x)y(x)+x^2y''(x)-\left(x^2-2x\right)y'(x)=0$$

✓ **Mathematica** : cpu = 0.0152671 (sec), leaf count = 78

$$\left\{\left\{y(x)\to c_1e^{\frac{1}{2}(x-\log(x))}J_{\frac{1}{2}\sqrt{4a+1}}\left(-\frac{ix}{2}\right)+c_2e^{\frac{1}{2}(x-\log(x))}Y_{\frac{1}{2}\sqrt{4a+1}}\left(-\frac{ix}{2}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.132 (sec), leaf count = 43

$$\left\{y(x)=\frac{\left(c_1\,\mathrm{BesselI}\left(\frac{\sqrt{4a+1}}{2},\frac{x}{2}\right)+c_2\,\mathrm{BesselK}\left(\frac{\sqrt{4a+1}}{2},\frac{x}{2}\right)\right)\mathrm{e}^{\frac{x}{2}}}{\sqrt{x}}\right\}$$

2.1198 ODE No. 1198

$$x^2y''(x)-\left(x^2-2x\right)y'(x)+(-3x-2)y(x)=0$$

✓ **Mathematica** : cpu = 0.04673 (sec), leaf count = 41

$$\left\{\left\{y(x)\to c_1e^xx-\frac{c_2\left(e^xx^3\mathrm{Ei}(-x)+x^2-x+2\right)}{6x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.034 (sec), leaf count = 37

$$\left\{y(x)=\frac{c_2x^3\,\mathrm{expIntegral}\left(1,x\right)\mathrm{e}^x+c_1x^3\mathrm{e}^x-c_2\left(x^2-x+2\right)}{x^2}\right\}$$

2.1199 ODE No. 1199

$$x^2y''(x)-(x+4)xy'(x)+4y(x)=0$$

✓ **Mathematica** : cpu = 0.0147162 (sec), leaf count = 41

$$\left\{\left\{y(x)\to c_2e^xx^4-\frac{1}{6}c_1x\left(e^xx^3\mathrm{Ei}(-x)+x^2-x+2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.017 (sec), leaf count = 35

$$\left\{y(x)=\left(c_2x^3\,\mathrm{expIntegral}\left(1,x\right)\mathrm{e}^x+c_1x^3\mathrm{e}^x-c_2\left(x^2-x+2\right)\right)x\right\}$$

2.1200 ODE No. 1200

$$(1-v)vy(x)+x^2y''(x)+2x^2y'(x)=0$$

✓ **Mathematica** : cpu = 0.0164944 (sec), leaf count = 62

$$\left\{\left\{y(x)\to c_1e^{-x}\sqrt{x}J_{\frac{1}{2}(2v-1)}(-ix)+c_2e^{-x}\sqrt{x}Y_{\frac{1}{2}(2v-1)}(-ix)\right\}\right\}$$

✓ **Maple** : cpu = 0.017 (sec), leaf count = 27

$$\left\{y(x)=\left(c_1\,\mathrm{BesselI}\left(v-\frac{1}{2},x\right)+c_2\,\mathrm{BesselK}\left(v-\frac{1}{2},x\right)\right)\sqrt{x}\,\mathrm{e}^{-x}\right\}$$

2.1201 ODE No. 1201

$$x^2y''(x)+(2x+1)xy'(x)-4y(x)=0$$

✓ **Mathematica** : cpu = 0.119682 (sec), leaf count = 44

$$\left\{\left\{y(x)\to\frac{c_1e^{-2x}(2x+3)}{2x^2}+\frac{c_2\left(2x^2-4x+3\right)}{4x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.019 (sec), leaf count = 34

$$\left\{y(x)=\frac{c_2(2x+3)\,\mathrm{e}^{-2x}}{x^2}+\frac{c_1\left(2x^2-4x+3\right)}{x^2}\right\}$$

2.1202 ODE No. 1202

$$x^2y''(x)-2(x+1)xy'(x)+2(x+1)y(x)=0$$

✓ **Mathematica** : cpu = 0.0124109 (sec), leaf count = 22

$$\left\{\left\{y(x)\to c_1x+\frac{1}{2}c_2e^{2x}x\right\}\right\}$$

✓ **Maple** : cpu = 0.031 (sec), leaf count = 14

$$\left\{y(x)=\left(c_2\mathrm{e}^{2x}+c_1\right)x\right\}$$

2.1203 ODE No. 1203

$$ax^2y'(x) + x^2y''(x) - 2y(x) = 0$$

✓ **Mathematica** : cpu = 0.0161188 (sec), leaf count = 124

$$\left\{\left\{y(x) \to \frac{2c_2e^{\frac{1}{2}(\log(x)-ax)}\left(i\sinh\left(\frac{ax}{2}\right) - \frac{2i\cosh\left(\frac{ax}{2}\right)}{ax}\right)}{\sqrt{\pi}\sqrt{-iax}} + \frac{2c_1e^{\frac{1}{2}(\log(x)-ax)}\left(\frac{2\sinh\left(\frac{ax}{2}\right)}{ax} - \cosh\left(\frac{ax}{2}\right)\right)}{\sqrt{\pi}\sqrt{-iax}}\right\}\right\}$$

✓ **Maple** : cpu = 0.02 (sec), leaf count = 28

$$\left\{y(x) = \frac{c_2(ax+2)\,\mathrm{e}^{-ax} + c_1(ax-2)}{x}\right\}$$

2.1204 ODE No. 1204

$$x^2(a+2b)y'(x) + y(x)\left(bx^2(a+b) - 2\right) + x^2y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0164735 (sec), leaf count = 132

$$\left\{\left\{y(x) \to \frac{2c_2e^{\frac{1}{2}(-ax-2bx+\log(x))}\left(i\sinh\left(\frac{ax}{2}\right) - \frac{2i\cosh\left(\frac{ax}{2}\right)}{ax}\right)}{\sqrt{\pi}\sqrt{-iax}} + \frac{2c_1e^{\frac{1}{2}(-ax-2bx+\log(x))}\left(\frac{2\sinh\left(\frac{ax}{2}\right)}{ax} - \cosh\left(\frac{ax}{2}\right)\right)}{\sqrt{\pi}\sqrt{-iax}}\right\}\right\}$$

✓ **Maple** : cpu = 0.043 (sec), leaf count = 35

$$\left\{y(x) = \frac{c_1(ax-2)\,\mathrm{e}^{-bx} + c_2(ax+2)\,\mathrm{e}^{-(a+b)x}}{x}\right\}$$

2.1205 ODE No. 1205

$$ax^2y'(x) + f(x)y(x) + x^2y''(x) = 0$$

✗ **Mathematica** : cpu = 0.26733 (sec), leaf count = 0 , could not solve

```
DSolve[f[x]*y[x] + a*x^2*Derivative[1][y][x] + x^2*Derivative[2][y][x] == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x) = DESol\left(\left\{a\left(\frac{d}{dx}\_Y(x)\right) + \frac{d^2}{dx^2}\_Y(x) + \frac{\_Y(x)\,f(x)}{x^2}\right\}, \{\_Y(x)\}\right)\right\}$$

2.1206 ODE No. 1206

$$y(x)\left(abx+cx^2+d\right)+x(2ax+b)y'(x)+x^2y''(x)=0$$

✓ **Mathematica** : cpu = 0.0881391 (sec), leaf count = 120

$$\left\{\left\{y(x)\to c_1e^{\frac{1}{2}(-2ax-(b-1)\log(x))}J_{\frac{1}{2}\sqrt{b^2-2b-4d+1}}\left(-i\sqrt{a^2-cx}\right)+c_2e^{\frac{1}{2}(-2ax-(b-1)\log(x))}Y_{\frac{1}{2}\sqrt{b^2-2b-4d+1}}\left(-i\sqrt{a^2-c}\right.\right.\right.$$

✓ **Maple** : cpu = 0.081 (sec), leaf count = 76

$$\left\{y(x)=\left(c_1\operatorname{BesselJ}\left(\frac{\sqrt{b^2-2b-4d+1}}{2},\sqrt{-a^2+c}\,x\right)+c_2\operatorname{BesselY}\left(\frac{\sqrt{b^2-2b-4d+1}}{2},\sqrt{-a^2+c}\,x\right)\right)x^{-\frac{b}{2}}\right.$$

2.1207 ODE No. 1207

$$x(ax+b)y'(x)+y(x)\left(\mathrm{a1}x^2+\mathrm{b1}x+\mathrm{c1}\right)+x^2y''(x)=0$$

✓ **Mathematica** : cpu = 0.090494 (sec), leaf count = 294

$$\left\{\left\{y(x)\to c_1U\left(-\frac{-ab+2\mathrm{b1}-\sqrt{a^2-4\mathrm{a1}}-\sqrt{a^2-4\mathrm{a1}}\sqrt{b^2-2b-4\mathrm{c1}+1}}{2\sqrt{a^2-4\mathrm{a1}}},\sqrt{b^2-2b-4\mathrm{c1}+1}+1,\sqrt{a^2-4\mathrm{a1}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.333 (sec), leaf count = 110

$$\left\{y(x)=\left(c_1\operatorname{WhittakerM}\left(-\frac{ab-2b1}{2\sqrt{a^2-4a1}},\frac{\sqrt{b^2-2b-4c1+1}}{2},\sqrt{a^2-4a1}\,x\right)+c_2\operatorname{WhittakerW}\left(-\frac{ab-2b1}{2\sqrt{a^2-4a}}\right.\right.\right.$$

2.1208 ODE No. 1208

$$x^3y'(x)+x^2y''(x)+\left(x^2-2\right)y(x)=0$$

✓ **Mathematica** : cpu = 0.0470233 (sec), leaf count = 59

$$\left\{\left\{y(x)\to\frac{c_2e^{-\frac{x^2}{2}}\left(\sqrt{2\pi}e^{\frac{x^2}{2}}\operatorname{erf}\left(\frac{x}{\sqrt{2}}\right)-2x\right)}{2x}+\frac{c_1}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.056 (sec), leaf count = 35

$$\left\{y(x)=\frac{-2c_2x\,\mathrm{e}^{-\frac{x^2}{2}}+c_2\sqrt{\pi}\sqrt{2}\operatorname{erf}\left(\frac{\sqrt{2}\,x}{2}\right)+c_1}{x}\right\}$$

2.1209 ODE No. 1209

$$x^2y''(x) + (x^2+2)\,xy'(x) + (x^2-2)\,y(x) = 0$$

✓ **Mathematica** : cpu = 0.0175744 (sec), leaf count = 67

$$\left\{\left\{y(x)\to \frac{c_1e^{-\frac{x^2}{2}}\left(e^{\frac{x^2}{2}}x-\sqrt{\frac{\pi}{2}}\text{erfi}\left(\frac{x}{\sqrt{2}}\right)\right)}{x^2}+\frac{c_2e^{-\frac{x^2}{2}}}{x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.073 (sec), leaf count = 41

$$\left\{y(x) = \frac{ic_2\sqrt{\pi}\,\sqrt{2}\,x+\left(-c_2\pi\,\mathrm{erf}\left(\frac{i\sqrt{2}\,x}{2}\right)+c_1\right)\mathrm{e}^{-\frac{x^2}{2}}}{x^2}\right\}$$

2.1210 ODE No. 1210

$$y(x)\left(a((-1)^n-1)+2nx^2\right)-2x\left(x^2-a\right)y'(x)+x^2y''(x) = 0$$

✓ **Mathematica** : cpu = 0.22301 (sec), leaf count = 252

$$\left\{\left\{y(x)\to c_1(-1)^{\frac{1}{4}\left(-\sqrt{4a^2-4a(-1)^n+1}-2a+1\right)}x^{\frac{1}{2}\left(-\sqrt{4a^2-4a(-1)^n+1}-2a+1\right)}\,{}_1F_1\left(-\frac{a}{2}-\frac{n}{2}-\frac{1}{4}\sqrt{4a^2-4(-1)^na+1}+\right.\right.\right.$$

✓ **Maple** : cpu = 0.281 (sec), leaf count = 81

$$\left\{y(x) = \left(c_1\,\mathrm{WhittakerM}\left(\frac{a}{2}+\frac{n}{2}+\frac{1}{4},\frac{\sqrt{4a^2-4a\,(-1)^n+1}}{4},x^2\right)+c_2\,\mathrm{WhittakerW}\left(\frac{a}{2}+\frac{n}{2}+\frac{1}{4},\frac{\sqrt{4a^2-4a\,(}}{4}\right.\right.\right.$$

2.1211 ODE No. 1211

$$4x^3y'(x)+x^2y''(x)+\left(4x^4+2x^2+1\right)y(x) = 0$$

✓ **Mathematica** : cpu = 0.0541553 (sec), leaf count = 68

$$\left\{\left\{y(x)\to c_1e^{-x^2}x^{\frac{1}{2}-\frac{i\sqrt{3}}{2}}-\frac{ic_2e^{-x^2}x^{\frac{1}{2}+\frac{i\sqrt{3}}{2}}}{\sqrt{3}}\right\}\right\}$$

✓ **Maple** : cpu = 0.065 (sec), leaf count = 36

$$\left\{y(x) = \left(c_1x^{\frac{1}{2}+\frac{i\sqrt{3}}{2}}+c_2x^{\frac{1}{2}-\frac{i\sqrt{3}}{2}}\right)\mathrm{e}^{-x^2}\right\}$$

2.1212 ODE No. 1212

$$x\left(ax^2+b\right)y'(x)+f(x)y(x)+x^2y''(x)=0$$

✗ **Mathematica** : cpu = 0.554137 (sec), leaf count = 0 , could not solve

```
DSolve[f[x]*y[x] + x*(b + a*x^2)*Derivative[1][y][x] + x^2*Derivative[2][y][x] == 0, y[x], x
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x)=DESol\left(\left\{\frac{d^2}{dx^2}\_Y(x)+\frac{(a\,x^2+b)\left(\frac{d}{dx}\_Y(x)\right)}{x}+\frac{\_Y(x)\,f(x)}{x^2}\right\},\{\_Y(x)\}\right)\right\}$$

2.1213 ODE No. 1213

$$\left(x^3+1\right)xy'(x)+x^2y''(x)-y(x)=0$$

✓ **Mathematica** : cpu = 0.0876336 (sec), leaf count = 54

$$\left\{\left\{y(x)\to\frac{\sqrt[3]{3}c_1\,{}_1F_1\left(-\frac{1}{3};\frac{1}{3};-\frac{x^3}{3}\right)}{x}+\frac{c_2x\,{}_1F_1\left(\frac{1}{3};\frac{5}{3};-\frac{x^3}{3}\right)}{\sqrt[3]{3}}\right\}\right\}$$

✓ **Maple** : cpu = 0.234 (sec), leaf count = 53

$$\left\{y(x)=\left(c_1\operatorname{BesselI}\left(-\frac{1}{6},\frac{x^3}{6}\right)+c_1\operatorname{BesselI}\left(\frac{5}{6},\frac{x^3}{6}\right)-c_2\left(\operatorname{BesselK}\left(\frac{1}{6},\frac{x^3}{6}\right)-\operatorname{BesselK}\left(\frac{5}{6},\frac{x^3}{6}\right)\right)\right)x^{\frac{3}{2}}\mathrm{e}^{-\frac{x^3}{6}}\right\}$$

2.1214 ODE No. 1214

$$y(x)\left(-a^2+x^2(2a+2n+1)+a(-1)^n-x^4\right)+x^2y''(x)=0$$

✓ **Mathematica** : cpu = 0.226946 (sec), leaf count = 260

$$\left\{\left\{y(x)\to\frac{c_1e^{-\frac{x^2}{2}}2^{\frac{1}{4}\left(\sqrt{4a^2-4a(-1)^n+1}+2\right)}\left(x^2\right)^{\frac{1}{4}\left(\sqrt{4a^2-4a(-1)^n+1}+2\right)}U\left(\frac{1}{4}\left(-2a-2n+\sqrt{4a^2-4(-1)^na+1}+1\right)\right.}{\sqrt{x}}\right.\right.$$

✓ **Maple** : cpu = 0.26 (sec), leaf count = 71

$$\left\{y(x)=\frac{c_1\operatorname{WhittakerM}\left(\frac{a}{2}+\frac{n}{2}+\frac{1}{4},\frac{\sqrt{4a^2-4a(-1)^n+1}}{4},x^2\right)+c_2\operatorname{WhittakerW}\left(\frac{a}{2}+\frac{n}{2}+\frac{1}{4},\frac{\sqrt{4a^2-4a(-1)^n+1}}{4},x^2\right)}{\sqrt{x}}\right\}$$

2.1215 ODE No. 1215

$$xy'(x)\left(ax^n+b\right)+y(x)\left(\text{a1}x^{2n}+\text{b1}x^n+\text{c1}\right)+x^2y''(x)=0$$

✓ **Mathematica** : cpu = 0.12285 (sec), leaf count = 664

$$\left\{\left\{y(x)\to c_1x^{\frac{1-n}{2}}2^{\frac{\sqrt{b^2n^2-2bn^2-4\text{c1}n^2+n^2}+n^2}{2n^2}}\left(x^n\right)^{\frac{\sqrt{b^2n^2-2bn^2-4\text{c1}n^2+n^2}+n^2}{2n^2}}\exp\left(\frac{1}{2}\left(-\frac{ax^n}{n}-b\log(x)\right)-\frac{\sqrt{a^2-4\text{a1}}x^n}{2n}\right.\right.\right.$$

✓ **Maple** : cpu = 0.318 (sec), leaf count = 148

$$\left\{y(x)=\left(c_1\,\text{WhittakerM}\left(-\frac{(b+n-1)\,a-2b\mathit{1}}{2\sqrt{a^2-4a\mathit{1}}\,n},\frac{\sqrt{b^2-2b-4c\mathit{1}+1}}{2n},\frac{\sqrt{a^2-4a\mathit{1}}\,x^n}{n}\right)+c_2\,\text{WhittakerW}\left(-\frac{(b\right.\right.\right.$$

2.1216 ODE No. 1216

$$xy'(x)\left(ax^{\text{a1}}+b\right)+y(x)\left(Ax^{2\text{a1}}+Bx^{\text{a1}}+Cx^{\text{b1}}+\text{DD}\right)+x^2y''(x)=0$$

✗ **Mathematica** : cpu = 1.28436 (sec), leaf count = 0 , could not solve

```
DSolve[(DD + B*x^a1 + A*x^(2*a1) + C*x^b1)*y[x] + x*(b + a*x^a1)*Derivative[1][y][x] + x^2*D
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x)=DESol\left(\left\{\frac{d^2}{dx^2}\_Y(x)+\frac{\left(a\,x^{a\mathit{1}}+b\right)\left(\frac{d}{dx}\_Y(x)\right)}{x}+\frac{\left(A\,x^{2a\mathit{1}}+B\,x^{a\mathit{1}}+C\,x^{b\mathit{1}}+DD\right)\_Y(x)}{x^2}\right\},\{\_Y(x)\}\right.\right.$$

2.1217 ODE No. 1217

$$y(x)(-a-x\tan(x))+x^2y''(x)-\left(2x^2\tan(x)-x\right)y'(x)=0$$

✓ **Mathematica** : cpu = 0.12077 (sec), leaf count = 30

$$\left\{\left\{y(x)\to c_1\sec(x)J_{\sqrt{a}}(x)+c_2\sec(x)Y_{\sqrt{a}}(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.045 (sec), leaf count = 24

$$\left\{y(x)=\frac{c_1\,\text{BesselJ}\left(\sqrt{a},x\right)+c_2\,\text{BesselY}\left(\sqrt{a},x\right)}{\cos\left(x\right)}\right\}$$

2.1218 ODE No. 1218

$$y(x)(a + x\cot(x)) + x^2 y''(x) + \left(2x^2\cot(x) + x\right) y'(x) = 0$$

✓ **Mathematica** : cpu = 0.125385 (sec), leaf count = 38

$$\left\{\left\{y(x) \to c_1 \csc(x) J_{i\sqrt{a}}(x) + c_2 \csc(x) Y_{i\sqrt{a}}(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.047 (sec), leaf count = 30

$$\left\{y(x) = \frac{c_1 \operatorname{BesselJ}\left(i\sqrt{a}, x\right) + c_2 \operatorname{BesselY}\left(i\sqrt{a}, x\right)}{\sin(x)}\right\}$$

2.1219 ODE No. 1219

$$y(x)\left(ax^2 + bx + c + xf'(x) + f(x)^2 - f(x)\right) + 2xf(x)y'(x) + x^2 y''(x) = 0$$

✓ **Mathematica** : cpu = 0.143317 (sec), leaf count = 218

$$\left\{\left\{y(x) \to c_1 U\left(-\frac{-ib - \sqrt{a} - \sqrt{a}\sqrt{1-4c}}{2\sqrt{a}}, \sqrt{1-4c} + 1, 2i\sqrt{a}x\right) \exp\left(\int_1^x \frac{-2f(K[1]) - 2i\sqrt{a}K[1] + \sqrt{1-4c} +}{2K[1]}\right.\right.\right.$$

✓ **Maple** : cpu = 0.231 (sec), leaf count = 69

$$\left\{y(x) = \left(c_1 \operatorname{WhittakerM}\left(-\frac{ib}{2\sqrt{a}}, \frac{\sqrt{-4c+1}}{2}, 2i\sqrt{a}\,x\right) + c_2 \operatorname{WhittakerW}\left(-\frac{ib}{2\sqrt{a}}, \frac{\sqrt{-4c+1}}{2}, 2i\sqrt{a}\,x\right)\right) e^{-\left(\int f\right.}\right.$$

2.1220 ODE No. 1220

$$y(x)\left(x^2\left(a + f'(x) + f(x)^2\right) + (1-v)v\right) + 2x^2 f(x)y'(x) + x^2 y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0477669 (sec), leaf count = 98

$$\left\{\left\{y(x) \to c_1 J_{\frac{1}{2}(2v-1)}\left(\sqrt{a}x\right) \exp\left(\int_1^x \frac{1 - 2f(K[1])K[1]}{2K[1]} dK[1]\right) + c_2 Y_{\frac{1}{2}(2v-1)}\left(\sqrt{a}x\right) \exp\left(\int_1^x \frac{1 - 2f(K[1])K[1]}{2K[1]} d\right.\right.\right.$$

✓ **Maple** : cpu = 0.019 (sec), leaf count = 40

$$\left\{y(x) = \left(c_1 \operatorname{BesselJ}\left(v - \frac{1}{2}, \sqrt{a}\,x\right) + c_2 \operatorname{BesselY}\left(v - \frac{1}{2}, \sqrt{a}\,x\right)\right) \sqrt{x}\, e^{-\frac{\left(\int 2f(x)dx\right)}{2}}\right\}$$

2.1221 ODE No. 1221

$$y(x)\left(x^2\left(-f'(x)+f(x)^2+1\right)-xf(x)-v^2\right)+\left(x-2x^2f(x)\right)y'(x)+x^2y''(x)=0$$

✓ **Mathematica** : cpu = 0.0286243 (sec), leaf count = 42

$$\left\{\left\{y(x)\to c_1J_v(x)\exp\left(\int_1^x f(K[1])dK[1]\right)+c_2Y_v(x)\exp\left(\int_1^x f(K[1])dK[1]\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.026 (sec), leaf count = 35

$$\left\{y(x)=\left(c_1\,\mathrm{BesselJ}\left(v,x\right)+c_2\,\mathrm{BesselY}\left(v,x\right)\right)\sqrt{x}\,\mathrm{e}^{-\frac{\left(\int\frac{-2xf(x)+1}{x}dx\right)}{2}}\right\}$$

2.1222 ODE No. 1222

$$\left(x^2+1\right)y''(x)+xy'(x)+2y(x)=0$$

✓ **Mathematica** : cpu = 0.0162585 (sec), leaf count = 30

$$\left\{\left\{y(x)\to c_1\cos\left(\sqrt{2}\sinh^{-1}(x)\right)+c_2\sin\left(\sqrt{2}\sinh^{-1}(x)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.02 (sec), leaf count = 23

$$\left\{y(x)=c_1\sin\left(\sqrt{2}\,\mathrm{arcsinh}\left(x\right)\right)+c_2\cos\left(\sqrt{2}\,\mathrm{arcsinh}\left(x\right)\right)\right\}$$

2.1223 ODE No. 1223

$$\left(x^2+1\right)y''(x)+xy'(x)-9y(x)=0$$

✓ **Mathematica** : cpu = 0.0155568 (sec), leaf count = 25

$$\left\{\left\{y(x)\to ic_2\sinh\left(3\sinh^{-1}(x)\right)+c_1\cosh\left(3\sinh^{-1}(x)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.018 (sec), leaf count = 19

$$\left\{y(x)=c_1\sinh\left(3\,\mathrm{arcsinh}\left(x\right)\right)+c_2\cosh\left(3\,\mathrm{arcsinh}\left(x\right)\right)\right\}$$

2.1224 ODE No. 1224

$$ay(x) + \left(x^2 + 1\right) y''(x) + xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.0146912 (sec), leaf count = 30

$$\left\{\left\{y(x) \to c_1 \cos\left(\sqrt{a}\sinh^{-1}(x)\right) + c_2 \sin\left(\sqrt{a}\sinh^{-1}(x)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.016 (sec), leaf count = 23

$$\left\{y(x) = c_1 \sin\left(\sqrt{a}\ \operatorname{arcsinh}(x)\right) + c_2 \cos\left(\sqrt{a}\ \operatorname{arcsinh}(x)\right)\right\}$$

2.1225 ODE No. 1225

$$\left(x^2 + 1\right) y''(x) - xy'(x) + y(x) = 0$$

✓ **Mathematica** : cpu = 0.0220558 (sec), leaf count = 29

$$\left\{\left\{y(x) \to c_2\left(x\sinh^{-1}(x) - \sqrt{x^2 + 1}\right) + c_1 x\right\}\right\}$$

✓ **Maple** : cpu = 0.039 (sec), leaf count = 23

$$\left\{y(x) = -c_2\sqrt{x^2 + 1} + \left(c_2 \operatorname{arcsinh}(x) + c_1\right) x\right\}$$

2.1226 ODE No. 1226

$$(1 - v)vy(x) + \left(x^2 + 1\right) y''(x) + 2xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.0122555 (sec), leaf count = 30

$$\{\{y(x) \to c_1 P_{v-1}(ix) + c_2 Q_{v-1}(ix)\}\}$$

✓ **Maple** : cpu = 0.167 (sec), leaf count = 25

$$\{y(x) = c_1 \operatorname{LegendreP}(v - 1, ix) + c_2 \operatorname{LegendreQ}(v - 1, ix)\}$$

2.1227 ODE No. 1227

$$(x^2+1)\,y''(x)-2xy'(x)+2y(x)=0$$

✓ **Mathematica** : cpu = 0.0268058 (sec), leaf count = 21

$$\left\{\left\{y(x)\to c_2x-c_1(x-i)^2\right\}\right\}$$

✓ **Maple** : cpu = 0.013 (sec), leaf count = 16

$$\{y(x)=c_2x^2+c_1x-c_2\}$$

2.1228 ODE No. 1228

$$ay(x)+(x^2+1)\,y''(x)+3xy'(x)=0$$

✓ **Mathematica** : cpu = 0.0135503 (sec), leaf count = 82

$$\left\{\left\{y(x)\to\frac{c_1P_{\frac{1}{2}\left(2\sqrt{1-a}-1\right)}^{\frac{1}{2}}(ix)}{\sqrt[4]{x^2+1}}+\frac{c_2Q_{\frac{1}{2}\left(2\sqrt{1-a}-1\right)}^{\frac{1}{2}}(ix)}{\sqrt[4]{x^2+1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.253 (sec), leaf count = 53

$$\left\{y(x)=\frac{c_1\left(x+\sqrt{x^2+1}\right)^{\sqrt{-a+1}}+c_2\left(x+\sqrt{x^2+1}\right)^{-\sqrt{-a+1}}}{\sqrt{x^2+1}}\right\}$$

2.1229 ODE No. 1229

$$(x^2+1)\,y''(x)+4xy'(x)+2y(x)+2x-2\cos(x)=0$$

✓ **Mathematica** : cpu = 0.032205 (sec), leaf count = 48

$$\left\{\left\{y(x)\to\frac{c_1}{x^2+1}+\frac{c_2x}{x^2+1}+\frac{-x^3-6\cos(x)}{3\,(x^2+1)}\right\}\right\}$$

✓ **Maple** : cpu = 0.02 (sec), leaf count = 31

$$\left\{y(x)=\frac{-x^3+3c_1x+3c_2-6\cos{(x)}}{3x^2+3}\right\}$$

2.1230 ODE No. 1230

$$axy'(x) + (a-2)y(x) + (x^2+1)\,y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0203666 (sec), leaf count = 82

$$\left\{\left\{y(x)\to c_1\left(x^2+1\right)^{\frac{2-a}{4}}P_{\frac{a-4}{2}}^{\frac{a-2}{2}}(ix)+c_2\left(x^2+1\right)^{\frac{2-a}{4}}Q_{\frac{a-4}{2}}^{\frac{a-2}{2}}(ix)\right\}\right\}$$

✓ **Maple** : cpu = 0.214 (sec), leaf count = 36

$$\left\{y(x)=c_2x\,\mathrm{hypergeom}\left(\left[1,\frac{a}{2}-\frac{1}{2}\right],\left[\frac{3}{2}\right],-x^2\right)+c_1\left(x^2+1\right)^{-\frac{a}{2}+1}\right\}$$

2.1231 ODE No. 1231

$$\left(x^2-1\right)y''(x)-v(v+1)y(x)=0$$

✓ **Mathematica** : cpu = 0.0674738 (sec), leaf count = 58

$$\left\{\left\{y(x)\to c_1\,{}_2F_1\left(-\frac{v}{2}-\frac{1}{2},\frac{v}{2};\frac{1}{2};x^2\right)+ic_2x\,{}_2F_1\left(\frac{v}{2}+\frac{1}{2},-\frac{v}{2};\frac{3}{2};x^2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.19 (sec), leaf count = 52

$$\left\{y(x)=-(x-1)\,(x+1)\left(c_2x\,\mathrm{hypergeom}\left(\left[-\frac{v}{2}+1,\frac{v}{2}+\frac{3}{2}\right],\left[\frac{3}{2}\right],x^2\right)+c_1\,\mathrm{hypergeom}\left(\left[\frac{v}{2}+1,-\frac{v}{2}+\frac{1}{2}\right],\left[\right.\right.\right.$$

2.1232 ODE No. 1232

$$\frac{nxP_n(x)-nP_{n-1}(x)}{x^2-1}-n(n+1)y(x)+\left(x^2-1\right)y''(x)=0$$

✓ **Mathematica** : cpu = 8.03994 (sec), leaf count = 6628

$$\left\{\left\{y(x)\to c_1\,{}_2F_1\left(-\frac{n}{2}-\frac{1}{2},\frac{n}{2};\frac{1}{2};x^2\right)+\int_1^x\left(\frac{}{4\left({}_2F_1\left(\frac{1}{2}(-n-1),\frac{n}{2};\frac{1}{2};K[1]^2\right)\,{}_2F_1\left(1-\frac{n}{2},\frac{n+3}{2};\frac{5}{2};K[1]^2\right)n^2+\right.}\right.\right.\right.$$

✓ **Maple** : cpu = 0.28 (sec), leaf count = 409

$$\left\{y(x)=3(x-1)\,(x+1)\left(-\frac{c_1x\,\mathrm{hypergeom}\left(\left[-\frac{n}{2}+1,\frac{n}{2}+\frac{3}{2}\right],\left[\frac{3}{2}\right],x^2\right)}{3}+(n+1)\,x\,\mathrm{hypergeom}\left(\left[-\frac{n}{2}+1,\frac{n}{2}+\right.\right.\right.\right.$$

2.1233 ODE No. 1233

$$\frac{nxQ_n(x) - nQ_{n-1}(x)}{x^2 - 1} - n(n+1)y(x) + (x^2 - 1)\,y''(x) = 0$$

✓ **Mathematica** : cpu = 0.541844 (sec), leaf count = 6628

$$\left\{\left\{y(x) \to c_1\,{}_2F_1\left(-\frac{n}{2} - \frac{1}{2}, \frac{n}{2}; \frac{1}{2}; x^2\right) + \int_1^x \left(\frac{}{4\left({}_2F_1\left(\frac{1}{2}(-n-1), \frac{n}{2}; \frac{1}{2}; K[1]^2\right)\,{}_2F_1\left(1 - \frac{n}{2}, \frac{n+3}{2}; \frac{5}{2}; K[1]^2\right) n^2 + 2\right.}\right.\right.\right.$$

✓ **Maple** : cpu = 0.255 (sec), leaf count = 409

$$\left\{y(x) = 3(x-1)(x+1)\left(-\frac{c_1 x \operatorname{hypergeom}\left(\left[-\frac{n}{2}+1, \frac{n}{2}+\frac{3}{2}\right], \left[\frac{3}{2}\right], x^2\right)}{3} + (n+1)\,x \operatorname{hypergeom}\left(\left[-\frac{n}{2}+1, \frac{n}{2}+\right.\right.\right.\right.$$

2.1234 ODE No. 1234

$$(x^2 - 1)\,y''(x) + xy'(x) + 2 = 0$$

✓ **Mathematica** : cpu = 0.0787783 (sec), leaf count = 48

$$\left\{\left\{y(x) \to c_2 - \frac{1}{4}\left(\log\left(1 - \frac{x}{\sqrt{x^2-1}}\right) - \log\left(\frac{x}{\sqrt{x^2-1}} + 1\right) + c_1\right)^2\right\}\right\}$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve((x^2-1)*diff(diff(y(x),x),x)+x*diff(y(x),x)+2=0,y(x))
```

2.1235 ODE No. 1235

$$ay(x) + (x^2 - 1)\,y''(x) + xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.0414979 (sec), leaf count = 97

$$\left\{\left\{y(x) \to c_1 \cos\left(\frac{1}{2}\sqrt{a}\left(\log\left(1 - \frac{x}{\sqrt{x^2-1}}\right) - \log\left(\frac{x}{\sqrt{x^2-1}} + 1\right)\right)\right) - c_2 \sin\left(\frac{1}{2}\sqrt{a}\left(\log\left(1 - \frac{x}{\sqrt{x^2-1}}\right) - \mathrm{lo}\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.036 (sec), leaf count = 45

$$\left\{y(x) = \left(c_1\left(x + \sqrt{x^2-1}\right)^{2i\sqrt{a}} + c_2\right)\left(x + \sqrt{x^2-1}\right)^{-i\sqrt{a}}\right\}$$

2.1236 ODE No. 1236

$$f(x)y(x) + (x^2 - 1) y''(x) + xy'(x) = 0$$

✗ **Mathematica** : cpu = 0.527588 (sec), leaf count = 0 , could not solve

```
DSolve[f[x]*y[x] + x*Derivative[1][y][x] + (-1 + x^2)*Derivative[2][y][x] == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x) = DESol\left(\left\{\frac{x\left(\frac{d}{dx}\_Y(x)\right)}{x^2 - 1} + \frac{\_Y(x)\,f(x)}{x^2 - 1} + \frac{d^2}{dx^2}\_Y(x)\right\}, \{\_Y(x)\}\right)\right\}$$

2.1237 ODE No. 1237

$$(x^2 - 1) y''(x) + 2xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.0250307 (sec), leaf count = 30

$$\left\{\left\{y(x) \to c_1\left(\frac{1}{2}\log(1-x) - \frac{1}{2}\log(x+1)\right) + c_2\right\}\right\}$$

✓ **Maple** : cpu = 0.017 (sec), leaf count = 20

$$\left\{y(x) = c_1 - \frac{c_2(\ln(x+1) - \ln(x-1))}{2}\right\}$$

2.1238 ODE No. 1238

$$-a + (x^2 - 1) y''(x) + 2xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.0311523 (sec), leaf count = 36

$$\left\{\left\{y(x) \to \frac{1}{2}(a + c_1)\log(1-x) + \frac{1}{2}(a - c_1)\log(x+1) + c_2\right\}\right\}$$

✓ **Maple** : cpu = 0.026 (sec), leaf count = 26

$$\left\{y(x) = c_2 + \frac{(-c_1 + a)\ln(x+1)}{2} + \frac{(c_1 + a)\ln(x-1)}{2}\right\}$$

2.1239 ODE No. 1239

$$-ly(x)+\left(x^2-1\right)y''(x)+2xy'(x)=0$$

✓ **Mathematica** : cpu = 0.0112002 (sec), leaf count = 46

$$\left\{\left\{y(x)\to c_1P_{\frac{1}{2}\left(\sqrt{4l+1}-1\right)}(x)+c_2Q_{\frac{1}{2}\left(\sqrt{4l+1}-1\right)}(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.168 (sec), leaf count = 35

$$\left\{y(x)=c_1\,\mathrm{LegendreP}\left(\frac{\sqrt{4l+1}}{2}-\frac{1}{2},x\right)+c_2\,\mathrm{LegendreQ}\left(\frac{\sqrt{4l+1}}{2}-\frac{1}{2},x\right)\right\}$$

2.1240 ODE No. 1240

$$-v(v+1)y(x)+\left(x^2-1\right)y''(x)+2xy'(x)=0$$

✓ **Mathematica** : cpu = 0.014132 (sec), leaf count = 18

$$\{\{y(x)\to c_1P_v(x)+c_2Q_v(x)\}\}$$

✓ **Maple** : cpu = 0.15 (sec), leaf count = 15

$$\{y(x)=c_1\,\mathrm{LegendreP}\,(v,x)+c_2\,\mathrm{LegendreQ}\,(v,x)\}$$

2.1241 ODE No. 1241

$$(1-v)(v+2)y(x)+\left(x^2-1\right)y''(x)-2xy'(x)=0$$

✓ **Mathematica** : cpu = 0.0129755 (sec), leaf count = 30

$$\left\{\left\{y(x)\to c_1\left(x^2-1\right)P_v^2(x)+c_2\left(x^2-1\right)Q_v^2(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.16 (sec), leaf count = 24

$$\{y(x)=(x-1)\,(x+1)\,(c_1\,\mathrm{LegendreP}\,(v,2,x)+c_2\,\mathrm{LegendreQ}\,(v,2,x))\}$$

2.1242 ODE No. 1242

$$\left(x^2-1\right)y''(x)+\left(x-x^2\right)y(x)-(3x+1)y'(x)=0$$

✓ **Mathematica** : cpu = 0.226209 (sec), leaf count = 68

$$\left\{\left\{y(x)\to c_1e^{-x}(x+1)^2-c_2e^{-x-2}\left(x^2(-\text{Ei}(2(x+1)))-2x\text{Ei}(2(x+1))-\text{Ei}(2(x+1))+2e^{2x+2}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.074 (sec), leaf count = 41

$$\left\{y(x)=c_2(x+1)^2\,\text{expIntegral}\left(1,-2x-2\right)\text{e}^{-x-2}+c_1(x+1)^2\,\text{e}^{-x}+2c_2\text{e}^{x}\right\}$$

2.1243 ODE No. 1243

$$\left(x^2-1\right)y''(x)+\left(x^2+1\right)y(x)+4xy'(x)=0$$

✓ **Mathematica** : cpu = 0.0366797 (sec), leaf count = 45

$$\left\{\left\{y(x)\to\frac{c_1e^{-ix}}{x^2-1}-\frac{ic_2e^{ix}}{2\left(x^2-1\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.038 (sec), leaf count = 21

$$\left\{y(x)=\frac{c_1\sin\left(x\right)+c_2\cos\left(x\right)}{x^2-1}\right\}$$

2.1244 ODE No. 1244

$$(n-v)(n+v+1)y(x)+2(n+1)xy'(x)+\left(x^2-1\right)y''(x)=0$$

✓ **Mathematica** : cpu = 0.0238543 (sec), leaf count = 42

$$\left\{\left\{y(x)\to c_1\left(x^2-1\right)^{-n/2}P_v^n(x)+c_2\left(x^2-1\right)^{-n/2}Q_v^n(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.161 (sec), leaf count = 27

$$\left\{y(x)=\left(c_1\,\text{LegendreP}\left(v,n,x\right)+c_2\,\text{LegendreQ}\left(v,n,x\right)\right)\left(x^2-1\right)^{-\frac{n}{2}}\right\}$$

2.1245 ODE No. 1245

$$(n-v-1)(n+v)y(x) - 2(n-1)xy'(x) + \left(x^2-1\right)y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0197263 (sec), leaf count = 42

$$\left\{\left\{y(x) \to c_1 \left(x^2-1\right)^{n/2} P_v^n(x) + c_2 \left(x^2-1\right)^{n/2} Q_v^n(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.166 (sec), leaf count = 27

$$\left\{y(x) = \left(c_1 \operatorname{LegendreP}(v,n,x) + c_2 \operatorname{LegendreQ}(v,n,x)\right)\left(x^2-1\right)^{\frac{n}{2}}\right\}$$

2.1246 ODE No. 1246

$$-2(v-1)xy'(x) - 2vy(x) + \left(x^2-1\right)y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0153973 (sec), leaf count = 42

$$\left\{\left\{y(x) \to c_1 \left(x^2-1\right)^{v/2} P_v^v(x) + c_2 \left(x^2-1\right)^{v/2} Q_v^v(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.224 (sec), leaf count = 28

$$\left\{y(x) = \left(c_2 x \operatorname{hypergeom}\left(\left[\frac{1}{2}, v+1\right], \left[\frac{3}{2}\right], x^2\right) + c_1\right)\left(x^2-1\right)^v\right\}$$

2.1247 ODE No. 1247

$$2axy'(x) + (a-1)ay(x) + \left(x^2-1\right)y''(x) = 0$$

✓ **Mathematica** : cpu = 0.18418 (sec), leaf count = 128

$$\left\{\left\{y(x) \to \frac{c_2\sqrt{1-x^2}(x+1)^{\sqrt{(a-1)^2}}\left(x^2-1\right)^{-a/2}(1-x)^{-\sqrt{(a-1)^2}}e^{-\sqrt{(a-1)^2}\tanh^{-1}(x)}}{2\sqrt{(a-1)^2}} + c_1\sqrt{1-x^2}\left(x^2-1\right)^{-a/2} e\right.\right.$$

✓ **Maple** : cpu = 0.039 (sec), leaf count = 27

$$\left\{y(x) = c_1(x-1)^{-a+1} + c_2(x+1)^{-a+1}\right\}$$

2.1248 ODE No. 1248

$$axy'(x) + y(x)\left(bx^2 + cx + d\right) + \left(x^2 - 1\right)y''(x) = 0$$

✓ **Mathematica** : cpu = 0.29482 (sec), leaf count = 238

$$\left\{\left\{y(x) \to c_2\left(\frac{x}{2} - \frac{1}{2}\right)^{a/4}\left(x^2 - 1\right)^{-a/4}\left(\frac{x}{2} + \frac{1}{2}\right)^{1-\frac{a}{4}} e^{\sqrt{-b}x}\text{HeunC}\left[\frac{1}{4}a\left(a - 4\sqrt{-b} - 2\right) - b + 4\sqrt{-b} + c - d, 2\left(\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.293 (sec), leaf count = 134

$$\left\{y(x) = \left(c_2\left(\frac{x}{2} - \frac{1}{2}\right)^{\frac{a}{4}}\left(\frac{x}{2} + \frac{1}{2}\right)^{-\frac{a}{4}+1}\text{HeunC}\left(4\sqrt{-b}, -\frac{a}{2} + 1, \frac{a}{2} - 1, 2c, -\frac{a^2}{8} + b - c + d + \frac{1}{2}, \frac{x}{2} + \frac{1}{2}\right) + c_1((\right.\right.$$

2.1249 ODE No. 1249

$$(ax + b)y'(x) + cy(x) + \left(x^2 - 1\right)y''(x) = 0$$

✓ **Mathematica** : cpu = 0.141176 (sec), leaf count = 193

$$\left\{\left\{y(x) \to c_2 2^{\frac{1}{2}(a+b-2)}(x - 1)^{\frac{1}{2}(-a-b+2)}\,{}_2F_1\left(-\frac{b}{2} - \frac{1}{2}\sqrt{a^2 - 2a - 4c + 1} + \frac{1}{2}, -\frac{b}{2} + \frac{1}{2}\sqrt{a^2 - 2a - 4c + 1} + \frac{1}{2}; -\right.\right.\right.$$

✓ **Maple** : cpu = 0.18 (sec), leaf count = 134

$$\left\{y(x) = c_2\left(\frac{x}{2} + \frac{1}{2}\right)^{-\frac{a}{2}+\frac{b}{2}+1}\text{hypergeom}\left(\left[\frac{b}{2} + \frac{1}{2} + \frac{\sqrt{a^2 - 2a - 4c + 1}}{2}, \frac{b}{2} + \frac{1}{2} - \frac{\sqrt{a^2 - 2a - 4c + 1}}{2}\right], \left[-\frac{a}{2} + \right.\right.\right.$$

2.1250 ODE No. 1250

$$\left(x^2 - a^2\right)y''(x) + 8xy'(x) + 12y(x) = 0$$

✓ **Mathematica** : cpu = 0.0415534 (sec), leaf count = 41

$$\left\{\left\{y(x) \to \frac{c_2\left(a^2 + 3x^2\right)}{3(a - x)^3(a + x)^3} + \frac{c_1}{(a + x)^3}\right\}\right\}$$

✓ **Maple** : cpu = 0.022 (sec), leaf count = 41

$$\left\{y(x) = \frac{3c_2a^2x + c_2x^3 + c_1a^2 + 3c_1x^2}{(a - x)^3\,(a + x)^3}\right\}$$

2.1251 ODE No. 1251

$$x(x+1)y''(x) - (x-1)y'(x) + y(x) = 0$$

✓ **Mathematica** : cpu = 0.0377426 (sec), leaf count = 25

$$\{\{y(x) \to c_1(x-1) + c_2(x\log(x) - \log(x) - 4)\}\}$$

✓ **Maple** : cpu = 0.024 (sec), leaf count = 20

$$\{y(x) = c_2(x-1)\ln(x) + c_1(x-1) - 4c_2\}$$

2.1252 ODE No. 1252

$$(ax+b)y'(x) + cy(x) + x(x+1)y''(x) = 0$$

✓ **Mathematica** : cpu = 0.130369 (sec), leaf count = 151

$$\left\{\left\{y(x) \to c_2 x^{1-b}\,{}_2F_1\left(\frac{a}{2} - b - \frac{1}{2}\sqrt{a^2-2a-4c+1} + \frac{1}{2}, \frac{a}{2} - b + \frac{1}{2}\sqrt{a^2-2a-4c+1} + \frac{1}{2}; 2-b; -x\right) + c_1\,{}_2F_1\right.\right.$$

✓ **Maple** : cpu = 0.145 (sec), leaf count = 124

$$\left\{y(x) = c_2(x+1)^{-a+b+1}\operatorname{hypergeom}\left(\left[-\frac{a}{2} + b + \frac{1}{2} + \frac{\sqrt{a^2-2a-4c+1}}{2}, -\frac{a}{2} + b + \frac{1}{2} - \frac{\sqrt{a^2-2a-4c+1}}{2}\right],\right.\right.$$

2.1253 ODE No. 1253

$$x(x+1)y''(x) + (3x+2)y'(x) + y(x) = 0$$

✓ **Mathematica** : cpu = 0.0217195 (sec), leaf count = 34

$$\left\{\left\{y(x) \to \frac{\sqrt{2}c_1}{x} + \frac{c_2\log(2x+2)}{\sqrt{2}x}\right\}\right\}$$

✓ **Maple** : cpu = 0.007 (sec), leaf count = 16

$$\left\{y(x) = \frac{c_1\ln(x+1) + c_2}{x}\right\}$$

2.1254 ODE No. 1254

$$\left(x^2+x-2\right)y''(x)+\left(x^2-x\right)y'(x)+\left(-6x^2-7x\right)y(x)=0$$

✓ **Mathematica** : cpu = 0.150906 (sec), leaf count = 69

$$\left\{\left\{y(x)\to\frac{1}{5}c_2e^{-3x-5}\left(195e^{5x}x\text{Ei}(5-5x)-195e^{5x}\text{Ei}(5-5x)+e^5x+44e^5\right)-c_1e^{2x}(x-1)\right\}\right\}$$

✓ **Maple** : cpu = 0.074 (sec), leaf count = 43

$$\left\{y(x)=195c_2(x-1)\,\text{expIntegral}\left(1,5x-5\right)\mathrm{e}^{2x-5}+c_1(x-1)\,\mathrm{e}^{2x}-c_2(x+44)\,\mathrm{e}^{-3x}\right\}$$

2.1255 ODE No. 1255

$$ay'(x)+(x-1)xy''(x)-2y(x)=0$$

✓ **Mathematica** : cpu = 0.714749 (sec), leaf count = 360

$$\left\{\left\{y(x)\to\frac{c_2x^a\left(a^2+2ax-a+2x^2-2x\right)(1-x)^{-a}\left(-\frac{a\,{}_2F_1\left(1,-a;1-a;\frac{\left(-a+\sqrt{1-a^2}+1\right)(x-1)}{\left(-a+\sqrt{1-a^2}-1\right)x}\right)}{(1-a^2)^{3/2}}+\frac{a\,{}_2F_1\left(1,-a;1-a;\frac{\left(a+\sqrt{1\cdots}\right.}{\left(a+\cdots\right.}\right.}{(1-a^2)^{3/2}}\cdots\right.}{2a^2\cdots}\right.\right.$$

✓ **Maple** : cpu = 0.017 (sec), leaf count = 42

$$\left\{y(x)=c_2(x-1)\,x\,x^a(x-1)^{-a}+c_1\left(a^2+2x^2+(2x-1)\,a-2x\right)\right\}$$

2.1256 ODE No. 1256

$$-v(v+1)y(x)+(x-1)xy''(x)+(2x-1)y'(x)=0$$

✓ **Mathematica** : cpu = 0.0184036 (sec), leaf count = 26

$$\{\{y(x)\to c_1P_v(2x-1)+c_2Q_v(2x-1)\}\}$$

✓ **Maple** : cpu = 0.258 (sec), leaf count = 51

$$\left\{y(x)=c_1x^v\,\text{hypergeom}\left(\left[-v,-v\right],\left[-2v\right],\frac{1}{x}\right)+c_2x^{-v-1}\,\text{hypergeom}\left(\left[v+1,v+1\right],\left[2v+2\right],\frac{1}{x}\right)\right\}$$

2.1257 ODE No. 1257

$$((a+1)x+b)y'(x)+(x-1)xy''(x)=0$$

✓ **Mathematica** : cpu = 0.043411 (sec), leaf count = 33

$$\left\{\left\{y(x)\to \frac{c_1 x^{b+1}\, {}_2F_1(b+1,a+b+1;b+2;x)}{b+1}+c_2\right\}\right\}$$

✓ **Maple** : cpu = 0.219 (sec), leaf count = 27

$$\{y(x)=c_2x^{b+1}\,\mathrm{hypergeom}\left([b+1,a+b+1],[b+2],x\right)+c_1\}$$

2.1258 ODE No. 1258

$$(ax+b)y'(x)+cy(x)+(x-1)xy''(x)=0$$

✓ **Mathematica** : cpu = 0.134097 (sec), leaf count = 146

$$\left\{\left\{y(x)\to (-1)^{b+1}c_2x^{b+1}\,{}_2F_1\left(\frac{a}{2}+b-\frac{1}{2}\sqrt{a^2-2a-4c+1}+\frac{1}{2},\frac{a}{2}+b+\frac{1}{2}\sqrt{a^2-2a-4c+1}+\frac{1}{2};b+2;x\right)+\right.\right.$$

✓ **Maple** : cpu = 0.155 (sec), leaf count = 110

$$\left\{y(x)=c_2x^{b+1}\,\mathrm{hypergeom}\left(\left[\frac{a}{2}+b+\frac{1}{2}+\frac{\sqrt{a^2-2a-4c+1}}{2},\frac{a}{2}+b+\frac{1}{2}-\frac{\sqrt{a^2-2a-4c+1}}{2}\right],[b+2],x\right)+\right.$$

2.1259 ODE No. 1259

$$((a+1)x+b)y'(x)-ly(x)+(x-1)xy''(x)=0$$

✓ **Mathematica** : cpu = 0.116602 (sec), leaf count = 120

$$\left\{\left\{y(x)\to (-1)^{b+1}c_2x^{b+1}\,{}_2F_1\left(\frac{a}{2}+b-\frac{1}{2}\sqrt{a^2+4l}+1,\frac{a}{2}+b+\frac{1}{2}\sqrt{a^2+4l}+1;b+2;x\right)+c_1\,{}_2F_1\left(\frac{a}{2}-\frac{1}{2}\sqrt{a^2-\right.\right.\right.$$

✓ **Maple** : cpu = 0.16 (sec), leaf count = 92

$$\left\{y(x)=c_2x^{b+1}\,\mathrm{hypergeom}\left(\left[\frac{a}{2}+b-\frac{\sqrt{a^2+4l}}{2}+1,\frac{a}{2}+b+\frac{\sqrt{a^2+4l}}{2}+1\right],[b+2],x\right)+c_1\,\mathrm{hypergeom}\left(\left[\frac{a}{2}\right.\right.\right.$$

2.1260 ODE No. 1260

$$y'(x)(x(\mathrm{a1}+\mathrm{b1}+1)-\mathrm{d1})+\mathrm{a1b1d1}+(x-1)xy''(x)=0$$

✓ **Mathematica** : cpu = 0.246186 (sec), leaf count = 65

$$\left\{\left\{y(x)\to \mathrm{a1b1}x\Gamma(\mathrm{d1}+1)\,{}_3\tilde{F}_2(1,\mathrm{a1}+\mathrm{b1}+1,1;\mathrm{d1}+1,2;x)-\frac{c_1x^{1-\mathrm{d1}}\,{}_2F_1(1-\mathrm{d1},\mathrm{a1}+\mathrm{b1}-\mathrm{d1}+1;2-\mathrm{d1};x)}{\mathrm{d1}-1}\right.\right.$$

✓ **Maple** : cpu = 0.712 (sec), leaf count = 77

$$\{y(x)=c_2+\int -\left(a1\,b1\,(-\mathrm{signum}(x-1))^{-a1-b1+d1}\,\mathrm{signum}(x-1)^{a1+b1-d1}\,\mathrm{hypergeom}\left([d1,-a1-b1+d1],[c\right.\right.$$

2.1261 ODE No. 1261

$$y(x)(2lx(-n+p-1)+2lp+m)+2\left(x(-2l+n+1)-lx^2+n+1\right)y'(x)+x(x+2)y''(x)=0$$

✓ **Mathematica** : cpu = 0.476033 (sec), leaf count = 148

$$\left\{\left\{y(x)\to c_2\left(-\frac{x}{2}-1\right)^{\frac{n}{2}+\frac{1}{2}}x^{-n}(x+2)^{-\frac{n}{2}-\frac{1}{2}}\mathrm{HeunC}\left[-4ln-2lp-m+n^2+n,-4l(p-1),1-n,n+1,4l,-\frac{x}{2}\right]\right.\right.$$

✓ **Maple** : cpu = 0.302 (sec), leaf count = 105

$$\left\{y(x)=\left(c_2x^{-n}\,\mathrm{HeunC}\left(4l,-n,n,-4lp,-\frac{n^2}{2}+\frac{(4n+4p+4)\,l}{2}+m-n,-\frac{x}{2}\right)+c_1\,\mathrm{HeunC}\left(4l,n,n,-4lp,-\frac{n^2}{2}\right.\right.\right.$$

2.1262 ODE No. 1262

$$\left(x^2+x-1\right)y'(x)+(x+1)^2y''(x)+(-x-2)y(x)=0$$

✓ **Mathematica** : cpu = 0.294084 (sec), leaf count = 88

$$\left\{\left\{y(x)\to c_2e^{-x}\int_1^x \exp\left(-\frac{K[1]^2}{K[1]+1}-\frac{K[1]}{K[1]+1}+2K[1]-\frac{1}{K[1]+1}\right)(K[1]+1)^{\frac{K[1]}{K[1]+1}+\frac{1}{K[1]+1}}dK[1]+c_1e^{-x}\right\}\right.$$

✓ **Maple** : cpu = 0.273 (sec), leaf count = 53

$$\left\{y(x)=(x+1)\left(c_1HD\left(4,4,-8,12,\frac{x}{x+2}\right)\mathrm{e}^{-x}+c_2HD\left(-4,4,-8,12,\frac{x}{x+2}\right)\mathrm{e}^{\frac{x-1}{2x+2}}\right)\right\}$$

2.1263 ODE No. 1263

$$(-20x-30)\left(x^2+3x\right)^{7/3}+x(x+3)y''(x)+(3x-1)y'(x)+y(x)=0$$

✓ **Mathematica** : cpu = 0.429478 (sec), leaf count = 276

$$\left\{\left\{y(x)\to\frac{4x^{4/3}\int_1^x\left(45\sqrt[3]{3}\,{}_2F_1\left(-\frac{4}{3},-\frac{4}{3};-\frac{1}{3};-\frac{K[1]}{3}\right)\sqrt[3]{K[1](K[1]+3)}K[1]^{11/3}+\frac{675}{2}\sqrt[3]{3}\,{}_2F_1\left(-\frac{4}{3},-\frac{4}{3};-\frac{1}{3};-\frac{K[1}{3}\right.\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.138 (sec), leaf count = 52

$$\left\{y(x)=\frac{\left(c_2+\int\frac{\left(c_1+3\left(x^2+3x\right)^{\frac{7}{3}}(x+3)x\right)(x+3)^{\frac{7}{3}}}{\left(x^2+3x\right)x^{\frac{4}{3}}}dx\right)x^{\frac{4}{3}}}{(x+3)^{\frac{7}{3}}}\right\}$$

2.1264 ODE No. 1264

$$\left(x^2+3x+4\right)y''(x)+\left(x^2+x+1\right)y'(x)+(-2x-3)y(x)=0$$

✓ **Mathematica** : cpu = 0.0570627 (sec), leaf count = 23

$$\left\{\left\{y(x)\to c_2\left(x^2+x+3\right)+c_1e^{-x}\right\}\right\}$$

✓ **Maple** : cpu = 0.041 (sec), leaf count = 19

$$\left\{y(x)=c_1\mathrm{e}^{-x}+c_2\left(x^2+x+3\right)\right\}$$

2.1265 ODE No. 1265

$$(x-2)(x-1)y''(x)-(2x-3)y'(x)+y(x)=0$$

✓ **Mathematica** : cpu = 0.0360861 (sec), leaf count = 64

$$\left\{\left\{y(x)\to c_1\left(x^2-3x+2\right)P^2_{\frac{1}{2}\left(-1+\sqrt{5}\right)}(2x-3)+c_2\left(x^2-3x+2\right)Q^2_{\frac{1}{2}\left(-1+\sqrt{5}\right)}(2x-3)\right\}\right\}$$

✓ **Maple** : cpu = 1.132 (sec), leaf count = 93

$$\left\{y(x)=(x-2)^2\left(c_1(x-1)^{\frac{\sqrt{5}}{2}-\frac{1}{2}}\operatorname{hypergeom}\left(\left[\frac{1}{2}-\frac{\sqrt{5}}{2},\frac{5}{2}-\frac{\sqrt{5}}{2}\right],\left[-\sqrt{5}+1\right],\frac{1}{x-1}\right)+c_2(x-1)^{-\frac{1}{2}-\frac{\sqrt{5}}{2}}\text{hyp}\right.\right.$$

2.1266 ODE No. 1266

$$(x-2)^2 y''(x) - (x-2)y'(x) - 3y(x) = 0$$

✓ **Mathematica** : cpu = 0.0233969 (sec), leaf count = 22

$$\left\{\left\{y(x) \to c_1(x-2)^3 + \frac{c_2}{x-2}\right\}\right\}$$

✓ **Maple** : cpu = 0.01 (sec), leaf count = 19

$$\left\{y(x) = \frac{c_1(x-2)^4 + c_2}{x-2}\right\}$$

2.1267 ODE No. 1267

$$-\left(l+2x^2-5x\right)y'(x) + 2x^2 y''(x) + (1-4x)y(x) = 0$$

✓ **Mathematica** : cpu = 0.413805 (sec), leaf count = 166

$$\left\{\left\{y(x) \to \frac{c_1 e^{x-\frac{l}{2x}}}{\sqrt{x}} - \frac{\sqrt{\frac{\pi}{2}} c_2 e^{-\frac{l}{2x}-\sqrt{2}\sqrt{-l}+x}\left(\operatorname{erf}\left(\frac{\sqrt{-l}}{\sqrt{2}\sqrt{x}}-\sqrt{x}\right)+e^{2\sqrt{2}\sqrt{-l}}\operatorname{erf}\left(\frac{\sqrt{-l}}{\sqrt{2}\sqrt{x}}+\sqrt{x}\right)-e^{2\sqrt{2}\sqrt{-l}}+1\right)}{\sqrt{-l}\sqrt{x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.134 (sec), leaf count = 41

$$\left\{y(x) = \frac{\left(c_1\left(\int \frac{e^{-x} e^{\frac{l}{2x}}}{2x^{\frac{3}{2}}} dx\right) + c_2\right) e^{x} e^{-\frac{l}{2x}}}{\sqrt{x}}\right\}$$

2.1268 ODE No. 1268

$$y(x)(ax+b) + 2(x-1)xy''(x) + (2x-1)y'(x) = 0$$

✓ **Mathematica** : cpu = 0.112443 (sec), leaf count = 50

$$\left\{\left\{y(x) \to c_1 \text{MathieuC}\left[-a-2b, \frac{a}{2}, \cos^{-1}\left(\sqrt{x}\right)\right] + c_2 \text{MathieuS}\left[-a-2b, \frac{a}{2}, \cos^{-1}\left(\sqrt{x}\right)\right]\right\}\right\}$$

✓ **Maple** : cpu = 0.248 (sec), leaf count = 39

$$\left\{y(x) = c_1 \,\text{MathieuC}\left(-a-2b, \frac{a}{2}, \arccos\left(\sqrt{x}\right)\right) + c_2 \,\text{MathieuS}\left(-a-2b, \frac{a}{2}, \arccos\left(\sqrt{x}\right)\right)\right\}$$

2.1269 ODE No. 1269

$$((2v+5)x-2v-3)y'(x)+(v+1)y(x)+2(x-1)xy''(x)=0$$

✓ **Mathematica** : cpu = 0.0736393 (sec), leaf count = 60

$$\left\{\left\{y(x)\to c_2 i^{-2v-1}x^{\frac{1}{2}(-2v-1)}\,{}_2F_1\left(\frac{1}{2},-v;\frac{1}{2}-v;x\right)+c_1\,{}_2F_1\left(\frac{1}{2},v+1;v+\frac{3}{2};x\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.221 (sec), leaf count = 40

$$\left\{y(x)=c_2x^{-v-\frac{1}{2}}\operatorname{hypergeom}\left(\left[\frac{1}{2},-v\right],\left[-v+\frac{1}{2}\right],x\right)+c_1\operatorname{hypergeom}\left(\left[\frac{1}{2},v+1\right],\left[v+\frac{3}{2}\right],x\right)\right\}$$

2.1270 ODE No. 1270

$$(2x^2+6x+4)\,y''(x)+(10x^2+21x+8)\,y'(x)+(12x^2+17x+8)\,y(x)=0$$

✓ **Mathematica** : cpu = 2.04565 (sec), leaf count = 58

$$\left\{\left\{y(x)\to c_2e^{-3x}(x+2)^4\int_1^x\frac{e^{K[1]}(K[1]+1)^{3/2}}{(K[1]+2)^5}dK[1]+c_1e^{-3x}(x+2)^4\right\}\right\}$$

✓ **Maple** : cpu = 0.243 (sec), leaf count = 46

$$\left\{y(x)=(x+2)^4\left(c_1\operatorname{HeunC}\left(-1,-\frac{5}{2},4,-\frac{7}{4},\frac{7}{2},-x-1\right)+c_2(x+1)^{\frac{5}{2}}\operatorname{HeunC}\left(-1,\frac{5}{2},4,-\frac{7}{4},\frac{7}{2},-x-1\right)\right)\mathrm{e}^{-2x}$$

2.1271 ODE No. 1271

$$4x^2y''(x)+y(x)=0$$

✓ **Mathematica** : cpu = 0.0099623 (sec), leaf count = 27

$$\left\{\left\{y(x)\to c_1\sqrt{x}+\frac{1}{2}c_2\sqrt{x}\log(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.007 (sec), leaf count = 14

$$\{y(x)=(c_2\ln(x)+c_1)\sqrt{x}\}$$

2.1272 ODE No. 1272

$$\left(4a^2x^2+1\right)y(x)+4x^2y''(x)=0$$

✓ **Mathematica** : cpu = 0.0109969 (sec), leaf count = 32

$$\left\{\left\{y(x)\to c_1\sqrt{x}J_0(ax)+c_2\sqrt{x}Y_0(ax)\right\}\right\}$$

✓ **Maple** : cpu = 0.038 (sec), leaf count = 23

$$\left\{y(x)=\left(c_1\,\mathrm{BesselJ}\left(0,ax\right)+c_2\,\mathrm{BesselY}\left(0,ax\right)\right)\sqrt{x}\right\}$$

2.1273 ODE No. 1273

$$y(x)\left(4kx-4m^2-x^2+1\right)+4x^2y''(x)=0$$

✓ **Mathematica** : cpu = 0.0158697 (sec), leaf count = 20

$$\{\{y(x)\to c_1M_{k,m}(x)+c_2W_{k,m}(x)\}\}$$

✓ **Maple** : cpu = 0.151 (sec), leaf count = 17

$$\{y(x)=c_1\,\mathrm{WhittakerM}\left(k,m,x\right)+c_2\,\mathrm{WhittakerW}\left(k,m,x\right)\}$$

2.1274 ODE No. 1274

$$\left(x-v^2\right)y(x)+4x^2y''(x)+4xy'(x)=0$$

✓ **Mathematica** : cpu = 0.0426757 (sec), leaf count = 38

$$\left\{\left\{y(x)\to c_1\Gamma(1-v)J_{-v}\left(\sqrt{x}\right)+c_2\Gamma(v+1)J_v\left(\sqrt{x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.01 (sec), leaf count = 19

$$\left\{y(x)=c_1\,\mathrm{BesselJ}\left(v,\sqrt{x}\right)+c_2\,\mathrm{BesselY}\left(v,\sqrt{x}\right)\right\}$$

2.1275 ODE No. 1275

$$y(x)\left(2x(2l-m+1)-m^2-x^2+1\right)+4x^2y''(x)+4xy'(x)=0$$

✓ **Mathematica** : cpu = 0.0282949 (sec), leaf count = 120

$$\left\{\left\{y(x)\to c_1e^{\frac{1}{2}\left(\sqrt{m^2-1}\log(x)-x\right)}U\left(\frac{1}{2}\left(-2l+m+\sqrt{m^2-1}\right),\sqrt{m^2-1}+1,x\right)+c_2e^{\frac{1}{2}\left(\sqrt{m^2-1}\log(x)-x\right)}L_{\frac{1}{2}\left(2l-m-\right.}^{\sqrt{m^2-1}}\right.\right.$$

✓ **Maple** : cpu = 0.262 (sec), leaf count = 53

$$\left\{y(x)=\frac{c_1\operatorname{WhittakerM}\left(l-\frac{m}{2}+\frac{1}{2},\frac{\sqrt{m-1}\sqrt{m+1}}{2},x\right)+c_2\operatorname{WhittakerW}\left(l-\frac{m}{2}+\frac{1}{2},\frac{\sqrt{m-1}\sqrt{m+1}}{2},x\right)}{\sqrt{x}}\right\}$$

2.1276 ODE No. 1276

$$-4e^x\sqrt{x^3}+4x^2y''(x)-\left(4x^2+1\right)y(x)+4xy'(x)=0$$

✓ **Mathematica** : cpu = 0.0333451 (sec), leaf count = 55

$$\left\{\left\{y(x)\to\frac{e^x\sqrt{x^3}(2x-1)}{4x^2}+\frac{c_1e^{-x}}{\sqrt{x}}+\frac{c_2e^x}{2\sqrt{x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.181 (sec), leaf count = 31

$$\left\{y(x)=\frac{c_1\cosh(x)}{\sqrt{x}}+\frac{c_2\sinh(x)}{\sqrt{x}}+\frac{\sqrt{x^3}\,e^x}{2x}\right\}$$

2.1277 ODE No. 1277

$$\left(-ax^2-1\right)y(x)+4x^2y''(x)+4xy'(x)=0$$

✓ **Mathematica** : cpu = 0.0235184 (sec), leaf count = 51

$$\left\{\left\{y(x)\to\frac{c_1e^{-\frac{\sqrt{a}x}{2}}}{\sqrt{x}}+\frac{c_2e^{\frac{\sqrt{a}x}{2}}}{\sqrt{a}\sqrt{x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.168 (sec), leaf count = 27

$$\left\{y(x)=\frac{c_1\sinh\left(\frac{\sqrt{a}\,x}{2}\right)+c_2\cosh\left(\frac{\sqrt{a}\,x}{2}\right)}{\sqrt{x}}\right\}$$

2.1278 ODE No. 1278

$$f(x)y(x) + 4x^2y''(x) + 4xy'(x) = 0$$

✗ **Mathematica** : cpu = 0.405725 (sec), leaf count = 0 , could not solve

```
DSolve[f[x]*y[x] + 4*x*Derivative[1][y][x] + 4*x^2*Derivative[2][y][x] == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x) = DESol\left(\left\{\frac{d^2}{dx^2}\_Y(x) + \frac{\frac{d}{dx}\_Y(x)}{x} + \frac{\_Y(x)\,f(x)}{4x^2}\right\}, \{\_Y(x)\}\right)\right\}$$

2.1279 ODE No. 1279

$$4x^2y''(x) + 5xy'(x) - y(x) - \log(x) = 0$$

✓ **Mathematica** : cpu = 0.116402 (sec), leaf count = 74

$$\left\{\left\{y(x) \to c_2 x^{\frac{1}{2}\left(\frac{\sqrt{17}}{4}-\frac{1}{4}\right)} + c_1 x^{\frac{1}{2}\left(-\frac{1}{4}-\frac{\sqrt{17}}{4}\right)} - \frac{256(\log(x)+1)}{\left(\sqrt{17}-1\right)^2\left(1+\sqrt{17}\right)^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.169 (sec), leaf count = 32

$$\left\{y(x) = c_1 x^{-\frac{1}{8}-\frac{\sqrt{17}}{8}} + c_2 x^{-\frac{1}{8}+\frac{\sqrt{17}}{8}} - \ln(x) - 1\right\}$$

2.1280 ODE No. 1280

$$4x^2y''(x) + \left(-4x^2 - 12x - 3\right)y(x) + 8xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.0483529 (sec), leaf count = 52

$$\left\{\left\{y(x) \to \frac{c_2 e^{-x}\left(4e^{2x}x^2\text{Ei}(-2x) + 2x - 1\right)}{2x^{3/2}} + c_1 e^x\sqrt{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.148 (sec), leaf count = 40

$$\left\{y(x) = \frac{-4c_2x^2\,\text{expIntegral}\,(1,2x)\,\mathrm{e}^{x} + c_1x^2\mathrm{e}^{x} + c_2(2x-1)\,\mathrm{e}^{-x}}{x^{\frac{3}{2}}}\right\}$$

2.1281 ODE No. 1281

$$4x^2y''(x) + \left(4x^2 - 4x - 1\right)y(x) - 4(2x-1)xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.015682 (sec), leaf count = 28

$$\left\{\left\{y(x) \to \frac{c_1e^x}{\sqrt{x}} + c_2e^x\sqrt{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.066 (sec), leaf count = 15

$$\left\{y(x) = \frac{(c_2x + c_1)\,\mathrm{e}^x}{\sqrt{x}}\right\}$$

2.1282 ODE No. 1282

$$4x^3y'(x) + 4x^2y''(x) + \left(x^2 - 4\right)\left(x^2 + 6\right)y(x) = 0$$

✓ **Mathematica** : cpu = 0.0182571 (sec), leaf count = 39

$$\left\{\left\{y(x) \to \frac{c_1e^{-\frac{x^2}{4}}}{x^2} + \frac{1}{5}c_2e^{-\frac{x^2}{4}}x^3\right\}\right\}$$

✓ **Maple** : cpu = 0.034 (sec), leaf count = 21

$$\left\{y(x) = \frac{(c_2x^5 + c_1)\,\mathrm{e}^{-\frac{x^2}{4}}}{x^2}\right\}$$

2.1283 ODE No. 1283

$$4x^2y''(x) + 4x^2\log(x)y'(x) + y(x)\left(x^2\log^2(x) + 2x - 8\right) - 4\sqrt{e^xx^{-x}}x^2 = 0$$

✓ **Mathematica** : cpu = 0.0687054 (sec), leaf count = 90

$$\left\{\left\{y(x) \to c_1e^{x/2}x^{-\frac{x}{2}-1} + \frac{1}{3}c_2e^{x/2}x^{2-\frac{x}{2}} + \frac{1}{9}\left(3x^2\sqrt{e^xx^{-x}}\log(x) - x^2\sqrt{e^xx^{-x}}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.141 (sec), leaf count = 48

$$\left\{y(x) = \frac{\left(\ln(x) - \frac{1}{3}\right)\sqrt{x^{-x}\mathrm{e}^x}\,x^2}{3} + \left(c_1x^{-\frac{x}{2}+2} + c_2x^{-\frac{x}{2}-1}\right)\mathrm{e}^{\frac{x}{2}}\right\}$$

2.1284 ODE No. 1284

$$(2x+1)^2y''(x) - 2(2x+1)y'(x) - 12y(x) - 3x - 1 = 0$$

✓ **Mathematica** : cpu = 0.0320147 (sec), leaf count = 47

$$\left\{\left\{y(x) \to \frac{-72x^2-56x-7}{192(2x+1)} + c_1(2x+1)^3 + \frac{c_2}{2x+1}\right\}\right\}$$

✓ **Maple** : cpu = 0.019 (sec), leaf count = 41

$$\left\{y(x) = \frac{c_1}{2x+1} + c_2(2x+1)^3 + \frac{-72x^2-56x-7}{384x+192}\right\}$$

2.1285 ODE No. 1285

$$((4a+2)x-a)y'(x) + (a-1)ay(x) + x(4x-1)y''(x) = 0$$

✓ **Mathematica** : cpu = 1.23168 (sec), leaf count = 269

$$\left\{\left\{y(x) \to c_2x^{-a/2}\left(\sqrt{4x-1}+i\right)^{\frac{1}{2}+\frac{1}{2}i\sqrt{-(a-1)^2}}\left(-\sqrt{4x-1}+i\right)^{\frac{1}{2}-\frac{1}{2}i\sqrt{-(a-1)^2}}\int_1^x -\frac{\left(i-\sqrt{4K[1]-1}\right)^{i\sqrt{-(a-1)^2}}}{\sqrt{1-4K[1]}\,(\right.}\right.\right.$$

✓ **Maple** : cpu = 0.11 (sec), leaf count = 52

$$\left\{y(x) = c_2x^{-a+1}\,\mathrm{hypergeom}\left(\left[-\frac{a}{2}+1, -\frac{a}{2}+\frac{1}{2}\right], [-a+2], 4x\right) + c_1\,\mathrm{hypergeom}\left(\left[\frac{a}{2}, \frac{a}{2}-\frac{1}{2}\right], [a], 4x\right)\right\}$$

2.1286 ODE No. 1286

$$(3x-1)^2y''(x) + 3(3x-1)y'(x) - 9y(x) - \log^2(3x-1) = 0$$

✓ **Mathematica** : cpu = 0.106933 (sec), leaf count = 101

$$\left\{\left\{y(x) \to \frac{-6x-3x\log^2(3x-1)+\log^2(3x-1)+\log(3x-1)-\log(1-3x)+1}{9(3x-1)} + \frac{c_1\left((1-3x)^2+1\right)}{2(1-3x)} + \frac{ic_2\left((1\right.}{2(}\right.\right.$$

✓ **Maple** : cpu = 0.02 (sec), leaf count = 32

$$\left\{y(x) = -\frac{\ln(3x-1)^2}{9} + \frac{c_1}{3x-1} + c_2(3x-1) - \frac{2}{9}\right\}$$

2.1287 ODE No. 1287

$$9(x-1)xy''(x)+3(2x-1)y'(x)-20y(x)=0$$

✓ **Mathematica** : cpu = 0.014701 (sec), leaf count = 83

$$\left\{\left\{y(x)\to c_2\sqrt[3]{1-x}\sqrt[3]{x}Q_1^{\frac{2}{3}}(2x-1)-\frac{c_1(2-2x)^{2/3}\sqrt[3]{1-x}x^{2/3}(6x-5)}{3\ 2^{2/3}(x-1)\Gamma\left(\frac{4}{3}\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.033 (sec), leaf count = 27

$$\left\{y(x)=c_1(6x-5)\,x^{\frac{2}{3}}+c_2(6x-1)\,(x-1)^{\frac{2}{3}}\right\}$$

2.1288 ODE No. 1288

$$16x^2y''(x)+(4x+3)y(x)=0$$

✓ **Mathematica** : cpu = 0.0283907 (sec), leaf count = 47

$$\left\{\left\{y(x)\to c_1e^{i\sqrt{x}}\sqrt[4]{x}+ic_2e^{-i\sqrt{x}}\sqrt[4]{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.023 (sec), leaf count = 21

$$\left\{y(x)=\left(c_1\sin\left(\sqrt{x}\right)+c_2\cos\left(\sqrt{x}\right)\right)x^{\frac{1}{4}}\right\}$$

2.1289 ODE No. 1289

$$16x^2y''(x)+32xy'(x)+(-4x-5)y(x)=0$$

✓ **Mathematica** : cpu = 0.125415 (sec), leaf count = 53

$$\left\{\left\{y(x)\to\frac{c_2e^{-\sqrt{x}}\left(\sqrt{x}+1\right)}{x^{5/4}}-\frac{c_1e^{\sqrt{x}}\left(\sqrt{x}-1\right)}{x^{5/4}}\right\}\right\}$$

✓ **Maple** : cpu = 0.111 (sec), leaf count = 33

$$\left\{y(x)=\frac{c_1\left(\sqrt{x}-1\right)\mathrm{e}^{\sqrt{x}}+c_2\left(\sqrt{x}+1\right)\mathrm{e}^{-\sqrt{x}}}{x^{\frac{5}{4}}}\right\}$$

2.1290 ODE No. 1290

$$(27x^2+4)\,y''(x)+27xy'(x)-3y(x)=0$$

✓ **Mathematica** : cpu = 0.12496 (sec), leaf count = 103

$$\left\{\left\{y(x)\to c_1\cosh\left(\frac{\sqrt{-27x^2-4}\tan^{-1}\left(\frac{3x}{\sqrt{-9x^2-\frac{4}{3}}}\right)}{3\sqrt{27x^2+4}}\right)+ic_2\sinh\left(\frac{\sqrt{-27x^2-4}\tan^{-1}\left(\frac{3x}{\sqrt{-9x^2-\frac{4}{3}}}\right)}{3\sqrt{27x^2+4}}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.033 (sec), leaf count = 29

$$\left\{y(x)=c_1\sinh\left(\frac{\operatorname{arcsinh}\left(\frac{3\sqrt{3}\,x}{2}\right)}{3}\right)+c_2\cosh\left(\frac{\operatorname{arcsinh}\left(\frac{3\sqrt{3}\,x}{2}\right)}{3}\right)\right\}$$

2.1291 ODE No. 1291

$$48(x-1)xy''(x)+(152x-40)y'(x)+53y(x)=0$$

✓ **Mathematica** : cpu = 0.0700549 (sec), leaf count = 92

$$\left\{\left\{y(x)\to c_1\,{}_2F_1\left(\frac{13}{12}-\frac{\sqrt{\frac{5}{2}}}{6},\frac{13}{12}+\frac{\sqrt{\frac{5}{2}}}{6};\frac{5}{6};x\right)+\sqrt[6]{-1}c_2\sqrt[6]{x}\,{}_2F_1\left(\frac{5}{4}-\frac{\sqrt{\frac{5}{2}}}{6},\frac{5}{4}+\frac{\sqrt{\frac{5}{2}}}{6};\frac{7}{6};x\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.123 (sec), leaf count = 50

$$\left\{y(x)=c_2x^{\frac{1}{6}}\operatorname{hypergeom}\left(\left[\frac{5}{4}-\frac{\sqrt{10}}{12},\frac{5}{4}+\frac{\sqrt{10}}{12}\right],\left[\frac{7}{6}\right],x\right)+c_1\operatorname{hypergeom}\left(\left[\frac{13}{12}-\frac{\sqrt{10}}{12},\frac{13}{12}+\frac{\sqrt{10}}{12}\right],\left[\frac{5}{6}\right],x\right.$$

2.1292 ODE No. 1292

$$50(x-1)xy''(x)+25(2x-1)y'(x)-2y(x)=0$$

✓ **Mathematica** : cpu = 0.0365894 (sec), leaf count = 42

$$\left\{\left\{y(x)\to c_2\sin\left(\frac{2}{5}\sin^{-1}\left(\sqrt{1-x}\right)\right)+c_1\cos\left(\frac{2}{5}\sin^{-1}\left(\sqrt{1-x}\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.049 (sec), leaf count = 31

$$\left\{y(x)=\frac{c_1\left(\sqrt{x}+\sqrt{x-1}\right)^{\frac{4}{5}}+c_2}{\left(\sqrt{x}+\sqrt{x-1}\right)^{\frac{2}{5}}}\right\}$$

2.1293 ODE No. 1293

$$144(x-1)xy''(x)+(120x-48)y'(x)+y(x)=0$$

✓ **Mathematica** : cpu = 0.288875 (sec), leaf count = 44

$$\left\{\left\{y(x)\to(-1)^{2/3}c_2x^{2/3}\,{}_2F_1\left(\frac{7}{12},\frac{7}{12};\frac{5}{3};x\right)+c_1\,{}_2F_1\left(-\frac{1}{12},-\frac{1}{12};\frac{1}{3};x\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.108 (sec), leaf count = 33

$$\left\{y(x)=\left(c_1\,\mathrm{LegendreP}\left(-\frac{1}{2},\frac{2}{3},\sqrt{-x+1}\right)+c_2\,\mathrm{LegendreQ}\left(-\frac{1}{2},\frac{2}{3},\sqrt{-x+1}\right)\right)x^{\frac{1}{3}}\right\}$$

2.1294 ODE No. 1294

$$144(x-1)xy''(x)+(168x-96)y'(x)+y(x)=0$$

✓ **Mathematica** : cpu = 0.0648836 (sec), leaf count = 44

$$\left\{\left\{y(x)\to c_1\,{}_2F_1\left(\frac{1}{12},\frac{1}{12};\frac{2}{3};x\right)+\sqrt[3]{-1}c_2\sqrt[3]{x}\,{}_2F_1\left(\frac{5}{12},\frac{5}{12};\frac{4}{3};x\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.108 (sec), leaf count = 33

$$\left\{y(x)=\left(c_1\,\mathrm{LegendreP}\left(-\frac{1}{2},\frac{1}{3},\sqrt{-x+1}\right)+c_2\,\mathrm{LegendreQ}\left(-\frac{1}{2},\frac{1}{3},\sqrt{-x+1}\right)\right)x^{\frac{1}{6}}\right\}$$

2.1295 ODE No. 1295

$$ax^2y''(x)+bxy'(x)+y(x)\left(cx^2+dx+f\right)=0$$

✓ **Mathematica** : cpu = 0.195363 (sec), leaf count = 310

$$\left\{\left\{y(x)\to c_1U\left(-\frac{-\sqrt{c}a-id\sqrt{a}-\sqrt{c}\sqrt{a^2-2ba-4fa+b^2}}{2a\sqrt{c}},\frac{\sqrt{a^2-2ba-4fa+b^2}}{a}+1,\frac{2i\sqrt{c}x}{\sqrt{a}}\right)\exp\left(\frac{\log(x)}{\right.\right.\right.$$

✓ **Maple** : cpu = 0.279 (sec), leaf count = 106

$$\left\{y(x)=\left(c_1\,\mathrm{WhittakerM}\left(-\frac{id}{2\sqrt{a}\sqrt{c}},\frac{\sqrt{a^2+b^2+(-2b-4f)\,a}}{2a},\frac{2i\sqrt{c}\,x}{\sqrt{a}}\right)+c_2\,\mathrm{WhittakerW}\left(-\frac{id}{2\sqrt{a}\sqrt{c}},\frac{\sqrt{a^2}\right.\right.\right.$$

2.1296 ODE No. 1296

$$y(x)\left(\mathrm{a0}x^2+\mathrm{b0}x+\mathrm{c0}\right)+\left(\mathrm{a1}x^2+\mathrm{b1}x\right)y'(x)+\mathrm{a2}x^2y''(x)=0$$

✓ **Mathematica** : cpu = 0.371816 (sec), leaf count = 356

$$\left\{\left\{y(x)\to c_1U\left(-\frac{2\mathrm{b0a2}-\sqrt{\mathrm{a1}^2-4\mathrm{a0a2}}\mathrm{a2}-\mathrm{a1b1}-\sqrt{\mathrm{a1}^2-4\mathrm{a0a2}}\sqrt{\mathrm{a2}^2-2\mathrm{b1a2}-4\mathrm{c0a2}+\mathrm{b1}^2}}{2\mathrm{a2}\sqrt{\mathrm{a1}^2-4\mathrm{a0a2}}},\frac{\sqrt{\mathrm{a2}^2-2\mathrm{b1}}}{}\right.\right.\right.$$

✓ **Maple** : cpu = 0.446 (sec), leaf count = 150

$$\left\{y(x)=\left(c_1\,\mathrm{WhittakerM}\left(-\frac{a1\,b1-2a2\,b0}{2\sqrt{-4a0\,a2+a1^2}\,a2},\frac{\sqrt{a2^2+b1^2+(-2b1-4c0)\,a2}}{2a2},\frac{\sqrt{-4a0\,a2+a1^2}\,x}{a2}\right)+c\right.\right.$$

2.1297 ODE No. 1297

$$\left(ax^2+1\right)y''(x)+axy'(x)+by(x)=0$$

✓ **Mathematica** : cpu = 0.028371 (sec), leaf count = 52

$$\left\{\left\{y(x)\to c_1\cos\left(\frac{\sqrt{b}\sinh^{-1}\left(\sqrt{a}x\right)}{\sqrt{a}}\right)+c_2\sin\left(\frac{\sqrt{b}\sinh^{-1}\left(\sqrt{a}x\right)}{\sqrt{a}}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.044 (sec), leaf count = 63

$$\left\{y(x)=\left(c_1\left(\sqrt{a}\,x+\sqrt{a\,x^2+1}\right)^{\frac{2i\sqrt{b}}{\sqrt{a}}}+c_2\right)\left(\sqrt{a}\,x+\sqrt{a\,x^2+1}\right)^{-\frac{i\sqrt{b}}{\sqrt{a}}}\right\}$$

2.1298 ODE No. 1298

$$\left(ax^2+1\right)y''(x)+bxy'(x)+cy(x)=0$$

✓ **Mathematica** : cpu = 0.0669474 (sec), leaf count = 162

$$\left\{\left\{y(x)\to c_1\left(ax^2+1\right)^{\frac{2a-b}{4a}}P_{\frac{\sqrt{a^2-2ba-4ca+b^2}-a}{2a}}^{\frac{b-2a}{2a}}\left(i\sqrt{a}x\right)+c_2\left(ax^2+1\right)^{\frac{2a-b}{4a}}Q_{\frac{\sqrt{a^2-2ba-4ca+b^2}-a}{2a}}^{\frac{b-2a}{2a}}\left(i\sqrt{a}x\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.138 (sec), leaf count = 124

$$\left\{y(x)=\left(c_1\,\mathrm{LegendreP}\left(\frac{-a+\sqrt{a^2+b^2+(-2b-4c)\,a}}{2a},\frac{2a-b}{2a},\sqrt{-a}\,x\right)+c_2\,\mathrm{LegendreQ}\left(\frac{-a+\sqrt{a^2+b^2+}}{2a}\right.\right.\right.$$

2.1299 ODE No. 1299

$$\left(a^2x^2-1\right)y''(x)+2a^2xy'(x)=0$$

✓ **Mathematica** : cpu = 0.0283265 (sec), leaf count = 19

$$\left\{\left\{y(x)\to c_2-\frac{c_1\tanh^{-1}(ax)}{a}\right\}\right\}$$

✓ **Maple** : cpu = 0.013 (sec), leaf count = 27

$$\left\{y(x)=c_1-\frac{c_2(-\ln(ax-1)+\ln(ax+1))}{2a}\right\}$$

2.1300 ODE No. 1300

$$\left(a^2x^2-1\right)y''(x)+2a^2xy'(x)-2a^2y(x)=0$$

✓ **Mathematica** : cpu = 0.0166793 (sec), leaf count = 41

$$\left\{\left\{y(x)\to ac_1x+c_2\left(ax\left(\frac{1}{2}\log(ax+1)-\frac{1}{2}\log(1-ax)\right)-1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.031 (sec), leaf count = 31

$$\left\{y(x)=\frac{c_2ax\ln(ax-1)}{2}-\frac{c_2ax\ln(ax+1)}{2}+c_1x+c_2\right\}$$

2.1301 ODE No. 1301

$$\left(ax^2+bx\right)y''(x)-2ay(x)+2by'(x)=0$$

✓ **Mathematica** : cpu = 0.0258393 (sec), leaf count = 31

$$\left\{\left\{y(x)\to\frac{c_2(ax+b)^3}{3ax}+\frac{c_1}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.02 (sec), leaf count = 19

$$\left\{y(x)=\frac{c_1+c_2(ax+b)^3}{x}\right\}$$

2.1302 ODE No. 1302

$$\text{A0}y(x)(ax+b)+\text{A1}(ax+b)y'(x)+\text{A2}(ax+b)^2y''(x)=0$$

✓ **Mathematica** : cpu = 0.0654025 (sec), leaf count = 243

$$\left\{\left\{y(x)\to c_1\left(\frac{2b}{a}+2x\right)^{\frac{\text{A1}}{2a\text{A2}}}(2a\text{A2}x+2\text{A2}b)^{-\frac{\text{A1}}{2a\text{A2}}}\left(-\frac{\text{A0}\left(\frac{b}{a}+x\right)}{a\text{A2}}\right)^{\frac{1}{2}-\frac{\text{A1}}{2a\text{A2}}}I_{\frac{\text{A1}}{a\text{A2}}-1}\left(2\sqrt{-\frac{\text{A0}\left(\frac{b}{a}+x\right)}{a\text{A2}}}\right)+c_2(-$$

✓ **Maple** : cpu = 0.083 (sec), leaf count = 98

$$\left\{y(x)=\left(c_1\,\mathrm{BesselJ}\left(\frac{aA2-A1}{A2a},2\sqrt{\frac{ax+b}{A2\,a^2}}\sqrt{A0}\right)+c_2\,\mathrm{BesselY}\left(\frac{aA2-A1}{A2a},2\sqrt{\frac{ax+b}{A2\,a^2}}\sqrt{A0}\right)\right)(ax+b)^{-}$$

2.1303 ODE No. 1303

$$y''(x)\left(ax^2+bx+c\right)+(dx+f)y'(x)+gy(x)=0$$

✓ **Mathematica** : cpu = 5.12741 (sec), leaf count = 498

$$\left\{\left\{y(x)\to c_1\,{}_2F_1\left(-\frac{a-d+\sqrt{(a-d)^2-4ag}}{2a},\frac{-a+d+\sqrt{(a-d)^2-4ag}}{2a};\frac{\left(b+\sqrt{b^2-4ac}\right)d-2af}{2a\sqrt{b^2-4ac}};\frac{b+2ax}{2\sqrt{b}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.215 (sec), leaf count = 501

$$\left\{y(x)=c_2\left(2\sqrt{\frac{-4ac+b^2}{a^2}}\,a^2x+\sqrt{\frac{-4ac+b^2}{a^2}}\,ab-4ac+b^2\right)^{\frac{af-\frac{bd}{2}+\left(a-\frac{d}{2}\right)\sqrt{\frac{-4ac+b^2}{a^2}}\,a}{\sqrt{\frac{-4ac+b^2}{a^2}}\,a^2}}\mathrm{hypergeom}\left(\left[\frac{2af-bd+}{}\right.\right.\right.$$

2.1304 ODE No. 1304

$$x^3y''(x)+xy'(x)+(-2x-3)y(x)=0$$

✓ **Mathematica** : cpu = 0.0573433 (sec), leaf count = 50

$$\left\{\left\{y(x)\to\frac{c_2\left(e^{\frac{1}{x}}\mathrm{Ei}\left(-\frac{1}{x}\right)+2x^3-x^2+x\right)}{6x}+\frac{c_1e^{\frac{1}{x}}}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.039 (sec), leaf count = 38

$$\left\{y(x)=\frac{c_2\,\text{expIntegral}\left(1,\frac{1}{x}\right)\mathrm{e}^{\frac{1}{x}}+c_1\mathrm{e}^{\frac{1}{x}}-2c_2\left(x^2-\frac{1}{2}x+\frac{1}{2}\right)x}{x}\right\}$$

2.1305 ODE No. 1305

$$x^3y''(x)+2xy'(x)-y(x)=0$$

✓ **Mathematica** : cpu = 0.0801454 (sec), leaf count = 47

$$\left\{\left\{y(x)\to c_2G_{1,2}^{2,0}\left(-\frac{2}{x}\middle|\begin{array}{c}\frac{1}{2}\\-1,0\end{array}\right)+c_1e^{\frac{1}{x}}\left(I_0\left(\frac{1}{x}\right)-I_1\left(\frac{1}{x}\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.09 (sec), leaf count = 44

$$\left\{y(x)=\left(c_2\,\text{BesselK}\left(0,-\frac{1}{x}\right)-c_2\,\text{BesselK}\left(1,-\frac{1}{x}\right)+c_1\left(\text{BesselI}\left(0,\frac{1}{x}\right)-\text{BesselI}\left(1,\frac{1}{x}\right)\right)\right)\mathrm{e}^{\frac{1}{x}}\right\}$$

2.1306 ODE No. 1306

$$y(x)\left(ax^2+a+bx\right)+x^3y''(x)+x^2y'(x)=0$$

✗ **Mathematica** : cpu = 1.05699 (sec), leaf count = 0 , DifferentialRoot result

$$\{\{y(x)\to(x)\}\}$$

✓ **Maple** : cpu = 0.223 (sec), leaf count = 69

$$\left\{y(x)=\left(c_2\left(\int\frac{1}{xHD\left(0,8a+4b,0,8a-4b,\frac{x+1}{x-1}\right)^2}dx\right)+c_1\right)HD\left(0,8a+4b,0,8a-4b,\frac{x+1}{x-1}\right)\right\}$$

2.1307 ODE No. 1307

$$x^3y''(x) + (x+1)xy'(x) - 2y(x) = 0$$

✓ **Mathematica** : cpu = 0.116997 (sec), leaf count = 54

$$\left\{\left\{y(x) \to \frac{c_1 e^{\frac{1}{x}}(x+1)}{x} - \frac{c_2\left(e^{\frac{1}{x}}x\text{Ei}\left(-\frac{1}{x}\right) + e^{\frac{1}{x}}\text{Ei}\left(-\frac{1}{x}\right) + x\right)}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.055 (sec), leaf count = 36

$$\left\{y(x) = \frac{c_2(x+1)\,\text{expIntegral}\left(1, \frac{1}{x}\right)\mathrm{e}^{\frac{1}{x}} + c_1(x+1)\,\mathrm{e}^{\frac{1}{x}} - c_2x}{x}\right\}$$

2.1308 ODE No. 1308

$$x^3y''(x) - x^2y'(x) + xy(x) - \log^3(x) = 0$$

✓ **Mathematica** : cpu = 0.0144222 (sec), leaf count = 41

$$\left\{\left\{y(x) \to \frac{2\log^3(x) + 6\log^2(x) + 9\log(x) + 6}{8x} + c_1x + c_2x\log(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.017 (sec), leaf count = 40

$$\left\{y(x) = \frac{8c_2x^2 + 2\ln(x)^3 + 6\ln(x)^2 + \left(8c_1x^2 + 9\right)\ln(x) + 6}{8x}\right\}$$

2.1309 ODE No. 1309

$$x^3y''(x) - \left(x^2 - 1\right)y'(x) + xy(x) = 0$$

✓ **Mathematica** : cpu = 0.0999429 (sec), leaf count = 84

$$\left\{\left\{y(x) \to c_2G_{1,2}^{2,0}\left(-\frac{1}{2x^2}\middle| \begin{array}{c} 1 \\ -\frac{1}{2}, -\frac{1}{2} \end{array}\right) + \sqrt{2}c_1e^{\frac{1}{4x^2}}x\left(\left(1 - \frac{1}{2x^2}\right)I_0\left(\frac{1}{4x^2}\right) + \frac{I_1\left(\frac{1}{4x^2}\right)}{2x^2}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.148 (sec), leaf count = 85

$$\left\{y(x) = \frac{c_1\left(2x^2\,\text{BesselI}\left(0, \frac{1}{4x^2}\right) - \text{BesselI}\left(0, \frac{1}{4x^2}\right) + \text{BesselI}\left(1, \frac{1}{4x^2}\right)\right)\mathrm{e}^{\frac{1}{4x^2}}}{x} + \frac{c_2\left(2x^2\,\text{BesselK}\left(0, -\frac{1}{4x^2}\right) - \text{BesselK}\right.}{}\right.$$

2.1310 ODE No. 1310

$$x^3y''(x)+3x^2y'(x)+xy(x)-1=0$$

✓ **Mathematica** : cpu = 0.0094741 (sec), leaf count = 31

$$\left\{\left\{y(x)\to \frac{\log^2(x)}{2x}+\frac{c_1}{x}+\frac{c_2\log(x)}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.013 (sec), leaf count = 20

$$\left\{y(x)=\frac{c_1\ln(x)+\frac{\ln(x)^2}{2}+c_2}{x}\right\}$$

2.1311 ODE No. 1311

$$-v(v+1)xy(x)+x\left(x^2+1\right)y''(x)+\left(2x^2+1\right)y'(x)=0$$

✓ **Mathematica** : cpu = 0.109689 (sec), leaf count = 63

$$\left\{\left\{y(x)\to c_2G_{2,2}^{2,0}\left(-x^2\middle|\begin{array}{c}\frac{1-v}{2},\frac{v+2}{2}\\0,0\end{array}\right)+c_1\,{}_2F_1\left(\frac{v}{2}+\frac{1}{2},-\frac{v}{2};1;-x^2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.201 (sec), leaf count = 52

$$\left\{y(x)=c_1\,\mathrm{hypergeom}\left(\left[-\frac{v}{2},\frac{v}{2}+\frac{1}{2}\right],\left[\frac{1}{2}\right],x^2+1\right)+c_2\sqrt{x^2+1}\,\mathrm{hypergeom}\left(\left[\frac{v}{2}+1,-\frac{v}{2}+\frac{1}{2}\right],\left[\frac{3}{2}\right],x^2+1\right)\right.$$

2.1312 ODE No. 1312

$$x\left(x^2+1\right)y''(x)+2\left(x^2-1\right)y'(x)-2xy(x)=0$$

✓ **Mathematica** : cpu = 0.0188203 (sec), leaf count = 32

$$\left\{\left\{y(x)\to \frac{c_1}{x^2+1}+\frac{c_2x^3}{3\left(x^2+1\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.017 (sec), leaf count = 19

$$\left\{y(x)=\frac{c_2x^3+c_1}{x^2+1}\right\}$$

2.1313 ODE No. 1313

$$x(n-v)(n+v+1)y(x)+\left(2(n+1)x^2+2n+1\right)y'(x)+x\left(x^2+1\right)y''(x)=0$$

✓ **Mathematica** : cpu = 0.175435 (sec), leaf count = 87

$$\left\{\left\{y(x)\to c_1\,{}_2F_1\left(\frac{n}{2}-\frac{v}{2},\frac{n}{2}+\frac{v}{2}+\frac{1}{2};n+1;-x^2\right)+c_2x^{-2n}\,{}_2F_1\left(-\frac{n}{2}-\frac{v}{2},-\frac{n}{2}+\frac{v}{2}+\frac{1}{2};1-n;-x^2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.135 (sec), leaf count = 35

$$\left\{y(x)=\left(c_1\,\mathrm{LegendreP}\left(v,n,\sqrt{x^2+1}\right)+c_2\,\mathrm{LegendreQ}\left(v,n,\sqrt{x^2+1}\right)\right)x^{-n}\right\}$$

2.1314 ODE No. 1314

$$x(n-v-1)(n+v)y(x)-\left(2(n-1)x^2+2n-1\right)y'(x)+x\left(x^2+1\right)y''(x)=0$$

✓ **Mathematica** : cpu = 0.163228 (sec), leaf count = 87

$$\left\{\left\{y(x)\to c_1\,{}_2F_1\left(-\frac{n}{2}-\frac{v}{2},-\frac{n}{2}+\frac{v}{2}+\frac{1}{2};1-n;-x^2\right)+c_2x^{2n}\,{}_2F_1\left(\frac{n}{2}-\frac{v}{2},\frac{n}{2}+\frac{v}{2}+\frac{1}{2};n+1;-x^2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.105 (sec), leaf count = 33

$$\left\{y(x)=\left(c_1\,\mathrm{LegendreP}\left(v,n,\sqrt{x^2+1}\right)+c_2\,\mathrm{LegendreQ}\left(v,n,\sqrt{x^2+1}\right)\right)x^{n}\right\}$$

2.1315 ODE No. 1315

$$ax^3y(x)+\left(x^2-1\right)xy''(x)+y'(x)=0$$

✓ **Mathematica** : cpu = 0.025699 (sec), leaf count = 44

$$\left\{\left\{y(x)\to c_1\cos\left(\sqrt{a}\sqrt{x^2-1}\right)+c_2\sin\left(\sqrt{a}\sqrt{x^2-1}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.019 (sec), leaf count = 45

$$\left\{y(x)=c_1\sin\left(\frac{(x-1)\,(x+1)\,\sqrt{a}}{\sqrt{x^2-1}}\right)+c_2\cos\left(\frac{(x-1)\,(x+1)\,\sqrt{a}}{\sqrt{x^2-1}}\right)\right\}$$

2.1316 ODE No. 1316

$$x(x^2-1)y''(x)+(x^2-1)y'(x)-xy(x)=0$$

✓ **Mathematica** : cpu = 0.0748948 (sec), leaf count = 38

$$\left\{\left\{y(x)\to c_2 G_{2,2}^{2,0}\left(x^2\middle|\begin{array}{c}\frac{1}{2},\frac{3}{2}\\0,0\end{array}\right)+\frac{2c_1E(x^2)}{\pi}\right\}\right\}$$

✓ **Maple** : cpu = 0.074 (sec), leaf count = 18

$$\{y(x)=c_1\,\mathrm{EllipticE}\,(x)+c_2(\mathrm{EllipticCE}\,(x)-\mathrm{EllipticCK}\,(x))\}$$

2.1317 ODE No. 1317

$$x(x^2-1)y''(x)+(3x^2-1)y'(x)+xy(x)=0$$

✓ **Mathematica** : cpu = 0.0846937 (sec), leaf count = 38

$$\left\{\left\{y(x)\to c_2 G_{2,2}^{2,0}\left(x^2\middle|\begin{array}{c}\frac{1}{2},\frac{1}{2}\\0,0\end{array}\right)+\frac{2c_1K(x^2)}{\pi}\right\}\right\}$$

✓ **Maple** : cpu = 0.086 (sec), leaf count = 13

$$\{y(x)=c_1\,\mathrm{EllipticK}\,(x)+c_2\,\mathrm{EllipticCK}\,(x)\}$$

2.1318 ODE No. 1318

$$(ax^2+b)y'(x)+cxy(x)+x(x^2-1)y''(x)=0$$

✓ **Mathematica** : cpu = 0.229986 (sec), leaf count = 172

$$\left\{\left\{y(x)\to c_1\,{}_2F_1\left(\frac{a}{4}-\frac{1}{4}\sqrt{a^2-2a-4c+1}-\frac{1}{4},\frac{a}{4}+\frac{1}{4}\sqrt{a^2-2a-4c+1}-\frac{1}{4};\frac{1}{2}-\frac{b}{2};x^2\right)+i^{b+1}c_2x^{b+1}\,{}_2F_1\left(\frac{a}{4}\right.\right.\right.$$

✓ **Maple** : cpu = 0.182 (sec), leaf count = 122

$$\left\{y(x)=c_2x^{b+1}\,\mathrm{hypergeom}\left(\left[\frac{a}{4}+\frac{b}{2}+\frac{1}{4}+\frac{\sqrt{a^2-2a-4c+1}}{4},\frac{a}{4}+\frac{b}{2}+\frac{1}{4}-\frac{\sqrt{a^2-2a-4c+1}}{4}\right],\left[\frac{b}{2}+\frac{3}{2}\right],x^2\right.\right.$$

2.1319 ODE No. 1319

$$x(x^2+2)\,y''(x) - y'(x) - 6xy(x) = 0$$

✓ **Mathematica** : cpu = 0.0624675 (sec), leaf count = 60

$$\left\{\left\{y(x) \to c_1 x^{3/2}(x^2+2)^{3/4} - \frac{c_2 (x^2+2)^{3/4}\, {}_2F_1\left(-\frac{3}{4}, \frac{7}{4}; \frac{1}{4}; -\frac{x^2}{2}\right)}{3\, 2^{3/4}}\right\}\right\}$$

✓ **Maple** : cpu = 0.131 (sec), leaf count = 31

$$\left\{y(x) = (x^2+2)^{\frac{3}{4}}\left(c_1 x^{\frac{3}{2}} + c_2 \,\mathrm{hypergeom}\left(\left[-\frac{3}{4}, \frac{7}{4}\right], \left[\frac{1}{4}\right], -\frac{x^2}{2}\right)\right)\right\}$$

2.1320 ODE No. 1320

$$x(x^2-2)\,y''(x) + (x^2+4x+2)\,y(x) - (x^3+3x^2-2x-2)\,y'(x) = 0$$

✓ **Mathematica** : cpu = 0.0741298 (sec), leaf count = 21

$$\{\{y(x) \to c_1 e^x x^2 + c_2(x-1)\}\}$$

✓ **Maple** : cpu = 0.039 (sec), leaf count = 17

$$\{y(x) = c_2 x^2 \mathrm{e}^x + c_1(x-1)\}$$

2.1321 ODE No. 1321

$$(x+1)x^2 y''(x) - (2x+1)xy'(x) + (2x+1)y(x) = 0$$

✓ **Mathematica** : cpu = 0.0207762 (sec), leaf count = 18

$$\{\{y(x) \to c_1 x + c_2 x(x + \log(x))\}\}$$

✓ **Maple** : cpu = 0.023 (sec), leaf count = 15

$$\{y(x) = (c_2 x + c_2 \ln(x) + c_1)\, x\}$$

2.1322 ODE No. 1322

$$(x+1)x^2y''(x)+2(3x+2)xy'(x)=0$$

✓ **Mathematica** : cpu = 0.0522572 (sec), leaf count = 44

$$\left\{\left\{y(x)\to c_1\left(-\frac{1}{3x^3}+\frac{1}{x^2}-\frac{3}{x}-\frac{1}{x+1}-4\log(x)+4\log(x+1)\right)+c_2\right\}\right\}$$

✓ **Maple** : cpu = 0.022 (sec), leaf count = 44

$$\left\{y(x)=c_1+c_2\left(-4\ln(x)+4\ln(x+1)-\frac{12x^3+6x^2-2x+1}{3(x+1)x^3}\right)\right\}$$

2.1323 ODE No. 1323

$$y''(x)=\frac{2(x+1)y(x)}{(x-1)x}-\frac{2(x-2)y'(x)}{(x-1)x}$$

✗ **Mathematica** : cpu = 0.826801 (sec), leaf count = 0 , DifferentialRoot result

$$\{\{y(x)\to(x)\}\}$$

✓ **Maple** : cpu = 0.014 (sec), leaf count = 17

$$\left\{y(x)=\frac{c_1+c_2(x-1)^3}{x^2}\right\}$$

2.1324 ODE No. 1324

$$y''(x)=\frac{(5x-4)y'(x)}{(x-1)x}-\frac{(9x-6)y(x)}{(x-1)x^2}$$

✓ **Mathematica** : cpu = 0.0245233 (sec), leaf count = 25

$$\left\{\left\{y(x)\to c_1x^3-c_2x^2(x\log(x)+1)\right\}\right\}$$

✓ **Maple** : cpu = 0.023 (sec), leaf count = 18

$$\{y(x)=(c_2x\ln(x)+c_1x+c_2)x^2\}$$

2.1325 ODE No. 1325

$$y''(x) = -\frac{y(x)(abx - \alpha\beta)}{(x-1)x^2} - \frac{y'(x)(x(a+b+1)+\alpha+\beta-1)}{(x-1)x}$$

✓ **Mathematica** : cpu = 0.211231 (sec), leaf count = 52

$$\left\{\left\{y(x)\to(-1)^{\alpha}c_1x^{\alpha}\,{}_2F_1(a+\alpha,\alpha+b;\alpha-\beta+1;x)+(-1)^{\beta}c_2x^{\beta}\,{}_2F_1(a+\beta,b+\beta;-\alpha+\beta+1;x)\right\}\right\}$$

✓ **Maple** : cpu = 0.139 (sec), leaf count = 86

$$\{y(x) = \left(c_1x^{\alpha}\operatorname{hypergeom}\left([-b-\beta+1,-a-\beta+1],[\alpha-\beta+1],x\right)+c_2x^{\beta}\operatorname{hypergeom}\left([-a-\alpha+1,-\alpha-b+1$$

2.1326 ODE No. 1326

$$y''(x) = -\frac{y'(x)}{x+1} - \frac{y(x)}{x(x+1)^2}$$

✓ **Mathematica** : cpu = 0.0200498 (sec), leaf count = 29

$$\left\{\left\{y(x)\to\frac{c_1x}{x+1}+\frac{c_2(x\log(x)-1)}{x+1}\right\}\right\}$$

✓ **Maple** : cpu = 0.027 (sec), leaf count = 22

$$\left\{y(x)=\frac{c_2x\ln(x)+c_1x-c_2}{x+1}\right\}$$

2.1327 ODE No. 1327

$$y''(x) = \frac{2y'(x)}{(x-2)x} - \frac{y(x)}{(x-2)x^2}$$

✓ **Mathematica** : cpu = 0.145842 (sec), leaf count = 104

$$\left\{\left\{y(x)\to\left(-\frac{1}{2}\right)^{-\frac{1}{\sqrt{2}}}c_1x^{-\frac{1}{\sqrt{2}}}\,{}_2F_1\left(-\frac{1}{\sqrt{2}},-1-\frac{1}{\sqrt{2}};1-\sqrt{2};\frac{x}{2}\right)+\left(-\frac{1}{2}\right)^{\frac{1}{\sqrt{2}}}c_2x^{\frac{1}{\sqrt{2}}}\,{}_2F_1\left(\frac{1}{\sqrt{2}},-1+\frac{1}{\sqrt{2}};1+\sqrt{2};\right.\right.\right.$$

✓ **Maple** : cpu = 0.811 (sec), leaf count = 81

$$\left\{y(x)=(x-2)^2\left(c_1x^{-\frac{\sqrt{2}}{2}}\operatorname{hypergeom}\left(\left[2-\frac{\sqrt{2}}{2},1-\frac{\sqrt{2}}{2}\right],\left[1-\sqrt{2}\right],\frac{x}{2}\right)+c_2x^{\frac{\sqrt{2}}{2}}\operatorname{hypergeom}\left(\left[2+\frac{\sqrt{2}}{2},1+\right.\right.\right.\right.$$

2.1328 ODE No. 1328

$$y''(x) = \frac{2y(x)}{(x-1)^2 x}$$

✓ **Mathematica** : cpu = 0.01756 (sec), leaf count = 36

$$\left\{\left\{y(x) \to \frac{c_2\left(-x^2 + 2x\log(x) + 1\right)}{x-1} - \frac{c_1 x}{x-1}\right\}\right\}$$

✓ **Maple** : cpu = 0.025 (sec), leaf count = 27

$$\left\{y(x) = \frac{-c_2 x^2 + 2c_2 x \ln(x) + c_1 x + c_2}{x-1}\right\}$$

2.1329 ODE No. 1329

$$y''(x) = -\frac{y'(x)\left(-x(a(\delta + \text{gamma1}) + \alpha + \beta - \delta + 1) + a\text{gamma1} + x^2(\alpha + \beta + 1)\right)}{(x-1)x(x-a)} - \frac{y(x)(\alpha\beta x - q)}{(x-1)x(x-a)}$$

✓ **Mathematica** : cpu = 0.723138 (sec), leaf count = 67

$$\{\{y(x) \to c_2 x^{1-\text{gamma1}} \text{HeunG}[a, q - (\text{gamma1} - 1)((a-1)\delta + \alpha + \beta - \text{gamma1} + 1), \beta - \text{gamma1} + 1, \alpha - \text{gam}$$

✓ **Maple** : cpu = 0.328 (sec), leaf count = 64

$$\{y(x) = c_2 x^{-\gamma 1 + 1} HG(a, q - (\gamma 1 - 1)\left(\alpha + \beta + (a-1)\,\delta - \gamma 1 + 1\right), \beta - \gamma 1 + 1, \alpha - \gamma 1 + 1, -\gamma 1 + 2, \delta, x) + c_1 HG($$

2.1330 ODE No. 1330

$$y''(x) = -\frac{y'(x)\left(Ax^2 + Bx + C\right)}{(x-a)(x-b)(x-c)} - \frac{(\text{DD}x + e)y(x)}{(x-a)(x-b)(x-c)}$$

✓ **Mathematica** : cpu = 4.17085 (sec), leaf count = 1176

$$\left\{\left\{y(x) \to c_2\text{HeunG}\left[\frac{a-c}{a-b}, \frac{A^2ba^4 + B^2a^3 + A\left(b^2 - ab + (a+b)B + 2C\right)a^3 + (a-b)^2(a\text{DD} + e)a^2 - 2(a-b)}{}\right.\right.\right.$$

✓ **Maple** : cpu = 0.917 (sec), leaf count = 1147

$$\left\{y(x) = c_2(-a+x)^{\frac{(-A+1)a^2 + bc - C + (-B-b-c)a}{(a-c)(a-b)}} HG\left(\frac{a-c}{a-b}, \frac{A^2a^4b + B^2a^3 + \left(-ab + b^2 + (a+b)\,B + 2C\right)A\,a^3 + (2a}{}\right.\right.$$

2.1331 ODE No. 1331

$$y''(x) = \frac{(x-4)y'(x)}{2(x-2)x} - \frac{(x-3)y(x)}{2(x-2)x^2}$$

✓ **Mathematica** : cpu = 0.0334524 (sec), leaf count = 55

$$\left\{\left\{y(x) \to \frac{c_1 \sqrt[4]{x-2}\sqrt{x}}{\sqrt[4]{2-x}} + \frac{2c_2(x-2)^{3/4}\sqrt{x}}{\sqrt[4]{2-x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.021 (sec), leaf count = 19

$$\left\{y(x) = c_1\sqrt{x} + c_2\sqrt{(x-2)\,x}\right\}$$

2.1332 ODE No. 1332

$$y''(x) = \frac{y'(x)}{x+1} - \frac{(3x+1)y(x)}{4x^2(x+1)}$$

✓ **Mathematica** : cpu = 0.0210591 (sec), leaf count = 26

$$\left\{\left\{y(x) \to c_1\sqrt{x} + c_2\sqrt{x}(x+\log(x))\right\}\right\}$$

✓ **Maple** : cpu = 0.014 (sec), leaf count = 17

$$\left\{y(x) = (c_2x + c_2\ln(x) + c_1)\sqrt{x}\right\}$$

2.1333 ODE No. 1333

$$y''(x) = \frac{v(v+1)y(x)}{4x^2} - \frac{(3x-1)y'(x)}{2(x-1)x}$$

✓ **Mathematica** : cpu = 0.0939401 (sec), leaf count = 70

$$\left\{\left\{y(x) \to c_1 i^{-v}x^{-v/2}\,{}_2F_1\left(\frac{1}{2}, -v; \frac{1}{2}-v; x\right) + c_2 i^{v+1}x^{\frac{v+1}{2}}\,{}_2F_1\left(\frac{1}{2}, v+1; v+\frac{3}{2}; x\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.122 (sec), leaf count = 45

$$\left\{y(x) = c_1x^{-\frac{v}{2}}\operatorname{hypergeom}\left(\left[\frac{1}{2}, -v\right], \left[-v+\frac{1}{2}\right], x\right) + c_2x^{\frac{v}{2}+\frac{1}{2}}\operatorname{hypergeom}\left(\left[\frac{1}{2}, v+1\right], \left[v+\frac{3}{2}\right], x\right)\right\}$$

2.1334 ODE No. 1334

$$y''(x) = -\frac{y(x)\left(x\left(a^2-b^2\right)+c^2\right)}{4(x-1)x^2} - \frac{((a+1)x-1)y'(x)}{(x-1)x}$$

✓ **Mathematica** : cpu = 0.16994 (sec), leaf count = 114

$$\left\{\left\{y(x)\to i^{-c}c_1x^{-c/2}\,{}_2F_1\left(\frac{a}{2}-\frac{b}{2}-\frac{c}{2},\frac{a}{2}+\frac{b}{2}-\frac{c}{2};1-c;x\right)+i^cc_2x^{c/2}\,{}_2F_1\left(\frac{a}{2}-\frac{b}{2}+\frac{c}{2},\frac{a}{2}+\frac{b}{2}+\frac{c}{2};c+1;x\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.124 (sec), leaf count = 89

$$\left\{y(x)=\left(c_1x^{\frac{c}{2}}\operatorname{hypergeom}\left(\left[-\frac{a}{2}+\frac{b}{2}+\frac{c}{2}+1,-\frac{a}{2}-\frac{b}{2}+\frac{c}{2}+1\right],[c+1],x\right)+c_2x^{-\frac{c}{2}}\operatorname{hypergeom}\left(\left[-\frac{a}{2}-\frac{b}{2}-\right.\right.\right.\right.$$

2.1335 ODE No. 1335

$$y''(x) = -\frac{y(x)(ax+b)}{4(x-1)^2x} - \frac{(3x-1)y'(x)}{2(x-1)x}$$

✓ **Mathematica** : cpu = 0.259016 (sec), leaf count = 893

$$\left\{\left\{y(x)\to e^{\frac{1}{4}(-2\log(1-x)-\log(x))}\sqrt[4]{x}c_1\,{}_2F_1\left(\frac{1}{4}\left(\sqrt{-8a-4b-4\sqrt{4a^2+4ba-a-b}+1}+1\right),\frac{\left(-8a-4b-4\sqrt{4a\right.}}{}\right.\right.\right.$$

✓ **Maple** : cpu = 0.102 (sec), leaf count = 57

$$\left\{y(x)=c_1\operatorname{LegendreP}\left(\frac{\sqrt{-4a+1}}{2}-\frac{1}{2},\sqrt{-a-b},\sqrt{x}\right)+c_2\operatorname{LegendreQ}\left(\frac{\sqrt{-4a+1}}{2}-\frac{1}{2},\sqrt{-a-b},\sqrt{x}\right)\right\}$$

2.1336 ODE No. 1336

$$y''(x) = -\frac{(1-3x)y(x)}{(x-1)(2x-1)^2}$$

✓ **Mathematica** : cpu = 0.0428465 (sec), leaf count = 70

$$\{\{y(x)\to c_2\sqrt{1-2x}(2x\log(2(x-1)+1)-2\log(2(x-1)+1)-2x\log(x-1)+2\log(x-1)-1)-c_1\sqrt{1-2x}$$

✓ **Maple** : cpu = 0.039 (sec), leaf count = 44

$$\left\{y(x)=\left(c_1x-2c_2(x-1)\ln(x-1)+2c_2(x-1)\ln(2x-1)-c_1-c_2\right)\sqrt{2x-1}\right\}$$

2.1337 ODE No. 1337

$$y''(x) = -\frac{(a+2b+3x)y'(x)}{2(a+x)(b+x)} - \frac{(a-b)y(x)}{4(a+x)^2(b+x)}$$

✓ **Mathematica** : cpu = 0.0617827 (sec), leaf count = 62

$$\left\{\left\{y(x) \to \frac{c_1}{\sqrt{\frac{b+x}{a-b}+1}} + \frac{c_2\sqrt{b+x}}{\sqrt{a-b}\sqrt{\frac{b+x}{a-b}+1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.038 (sec), leaf count = 27

$$\left\{y(x) = \frac{c_1\sqrt{b+x}+c_2}{\sqrt{\frac{a+x}{a-b}}}\right\}$$

2.1338 ODE No. 1338

$$y''(x) = \frac{y(x)}{3(x-2)x^2} + \frac{(6x-1)y'(x)}{3(x-2)x}$$

✓ **Mathematica** : cpu = 0.0454459 (sec), leaf count = 40

$$\left\{\left\{y(x) \to \frac{3}{935}c_2x\left(18x^2-102x+187\right) + c_1\sqrt[6]{x}(2-x)^{17/6}\right\}\right\}$$

✓ **Maple** : cpu = 0.023 (sec), leaf count = 27

$$\left\{y(x) = 18c_1\left(x^2-\frac{17}{3}x+\frac{187}{18}\right)x + c_2(x-2)^{\frac{17}{6}}x^{\frac{1}{6}}\right\}$$

2.1339 ODE No. 1339

$$y''(x) = -\frac{y'(x)\left(a(b+2)x^2+x(c-d+1)\right)}{x^2(ax+1)} - \frac{y(x)(abx-cd)}{x^2(ax+1)}$$

✓ **Mathematica** : cpu = 0.211073 (sec), leaf count = 66

$$\left\{\left\{y(x) \to c_1a^{-c}x^{-c}\,{}_2F_1(1-c,b-c;-c-d+1;-ax) + c_2a^dx^d\,{}_2F_1(d+1,b+d;c+d+1;-ax)\right\}\right\}$$

✓ **Maple** : cpu = 0.167 (sec), leaf count = 76

$$\{y(x) = \left(c_1x^d \operatorname{hypergeom}\left([c,-b+c+1],[c+d+1],-ax\right) + c_2x^{-c}\operatorname{hypergeom}\left([-d,-b-d+1],[-c-d+1],\right.\right.$$

2.1340 ODE No. 1340

$$y''(x) = \frac{2(ax+2b)y'(x)}{x(ax+b)} - \frac{y(x)(2ax+6b)}{x^2(ax+b)}$$

✓ **Mathematica** : cpu = 0.0288691 (sec), leaf count = 32

$$\left\{\left\{y(x) \to \frac{c_2 x^3}{ax+b} + \frac{c_1 x^2}{ax+b}\right\}\right\}$$

✓ **Maple** : cpu = 0.022 (sec), leaf count = 20

$$\left\{y(x) = \frac{(c_2 x + c_1)\, x^2}{ax+b}\right\}$$

2.1341 ODE No. 1341

$$y''(x) = -\frac{y(x)(avx-b)}{x^2(ax+b)} - \frac{(2ax+b)y'(x)}{x(ax+b)} + Ax$$

✓ **Mathematica** : cpu = 61.9786 (sec), leaf count = 2924

$$\left\{\left\{y(x) \to \frac{axc_1\, {}_2F_1\left(\frac{3}{2} - \frac{1}{2}\sqrt{1-4v}, \frac{1}{2}\sqrt{1-4v} + \frac{3}{2}; 3; -\frac{ax}{b}\right)}{b} + c_2 G_{2,2}^{2,0}\left(-\frac{ax}{b} \middle| \begin{matrix} \frac{1}{2}\left(1-\sqrt{1-4v}\right), \frac{1}{2}\left(\sqrt{1-4v}+1\right) \\ -1, 1 \end{matrix}\right)\right.\right.$$

✓ **Maple** : cpu = 0.2 (sec), leaf count = 201

$$\left\{y(x) = \frac{c_1 (v+6)(v+2)(v+12)\, a^2 x^{-\frac{1}{2} - \frac{\sqrt{-4v+1}}{2}} \operatorname{hypergeom}\left(\left[-\frac{1}{2} + \frac{\sqrt{-4v+1}}{2}, \frac{3}{2} + \frac{\sqrt{-4v+1}}{2}\right], \left[1 + \sqrt{-4v+1}\right], -\right.}{}\right.$$

2.1342 ODE No. 1342

$$y''(x) = -\frac{ay(x)}{x^4}$$

✓ **Mathematica** : cpu = 0.084269 (sec), leaf count = 52

$$\left\{\left\{y(x)\to c_1xe^{\frac{i\sqrt{a}}{x}}-\frac{ic_2xe^{-\frac{i\sqrt{a}}{x}}}{2\sqrt{a}}\right\}\right\}$$

✓ **Maple** : cpu = 0.027 (sec), leaf count = 31

$$\left\{y(x) = \left(c_1\sinh\left(\frac{\sqrt{-a}}{x}\right)+c_2\cosh\left(\frac{\sqrt{-a}}{x}\right)\right)x\right\}$$

2.1343 ODE No. 1343

$$y''(x) = -\frac{y(x)\left((1-a)ax^2-b(b+x)\right)}{x^4}$$

✓ **Mathematica** : cpu = 0.188589 (sec), leaf count = 73

$$\left\{\left\{y(x)\to c_1\left(2\left(ax+\frac{b}{2}\right)I_a\left(\frac{b}{x}\right)+bI_{a+1}\left(\frac{b}{x}\right)\right)+c_2\left(2\left(ax+\frac{b}{2}\right)K_a\left(\frac{b}{x}\right)-bK_{a+1}\left(\frac{b}{x}\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.132 (sec), leaf count = 58

$$\left\{y(x) = c_1b\operatorname{BesselI}\left(a+1,\frac{b}{x}\right)-c_2b\operatorname{BesselK}\left(a+1,\frac{b}{x}\right)+2\left(c_1\operatorname{BesselI}\left(a,\frac{b}{x}\right)+c_2\operatorname{BesselK}\left(a,\frac{b}{x}\right)\right)\left(ax+\frac{b}{2}\right.\right.$$

2.1344 ODE No. 1344

$$y''(x) = -\frac{\left(e^{2/x}-v^2\right)y(x)}{x^4}$$

✓ **Mathematica** : cpu = 0.509737 (sec), leaf count = 173

$$\left\{\left\{y(x)\to\frac{c_12^{v+\frac{v+1}{2}}\left(e^{2/x}\right)^{\frac{v+1}{2}-\frac{1}{2}}\left(-e^{2/x}\right)^{\frac{1}{2}(-v-1)+\frac{1}{2}}I_v\left(\sqrt{-e^{2/x}}\right)}{\log\left(e^{2/x}\right)}+\frac{c_2(-1)^{-v}2^{v+\frac{v+1}{2}}\left(e^{2/x}\right)^{\frac{v+1}{2}-\frac{1}{2}}\left(-e^{2/x}\right)^{\frac{1}{2}(-v-1}}{\log\left(e^{2/x}\right)}\right.\right.$$

✓ **Maple** : cpu = 0.089 (sec), leaf count = 23

$$\left\{y(x) = \left(c_1\operatorname{BesselJ}\left(v,e^{\frac{1}{x}}\right)+c_2\operatorname{BesselY}\left(v,e^{\frac{1}{x}}\right)\right)x\right\}$$

2.1345 ODE No. 1345

$$y''(x) = \frac{2y(x)}{x^4} - \frac{y'(x)}{x^3}$$

✓ **Mathematica** : cpu = 0.0589396 (sec), leaf count = 52

$$\left\{\left\{y(x) \to c_1 e^{\frac{1}{2x^2}} x - \sqrt{\frac{\pi}{2}} c_2 e^{\frac{1}{2x^2}} x \operatorname{erf}\left(\frac{1}{\sqrt{2}x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.05 (sec), leaf count = 25

$$\left\{y(x) = \left(c_2 \operatorname{erf}\left(\frac{\sqrt{2}}{2x}\right) + c_1\right) x \operatorname{e}^{\frac{1}{2x^2}}\right\}$$

2.1346 ODE No. 1346

$$y''(x) = \frac{(a+b)y'(x)}{x^2} - \frac{y(x)(x(a+b)+ab)}{x^4}$$

✓ **Mathematica** : cpu = 0.0931848 (sec), leaf count = 37

$$\left\{\left\{y(x) \to \frac{c_2 x e^{-\frac{a}{x}}}{a-b} + c_1 x e^{-\frac{b}{x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.046 (sec), leaf count = 25

$$\left\{y(x) = \left(c_1 \operatorname{e}^{-\frac{a}{x}} + c_2 \operatorname{e}^{-\frac{b}{x}}\right) x\right\}$$

2.1347 ODE No. 1347

$$y''(x) = -\frac{y(x)}{x^4} - \frac{y'(x)}{x}$$

✓ **Mathematica** : cpu = 0.0886726 (sec), leaf count = 31

$$\left\{\left\{y(x) \to c_2 J_0\left(\frac{1}{x}\right) + \frac{c_1 K_0\left(\frac{i}{x}\right)}{\sqrt{\pi}}\right\}\right\}$$

✓ **Maple** : cpu = 0.071 (sec), leaf count = 19

$$\left\{y(x) = c_1 \operatorname{BesselJ}\left(0, \frac{1}{x}\right) + c_2 \operatorname{BesselY}\left(0, \frac{1}{x}\right)\right\}$$

2.1348 ODE No. 1348

$$y''(x) = -\frac{y(x)\left(a\left(x^4+1\right)+bx^2\right)}{x^4} - \frac{y'(x)}{x}$$

✓ **Mathematica** : cpu = 0.380489 (sec), leaf count = 34

$$\{\{y(x) \to c_1\text{MathieuC}[-b, a, i\log(x)] + c_2\text{MathieuS}[-b, a, i\log(x)]\}\}$$

✓ **Maple** : cpu = 0.253 (sec), leaf count = 73

$$\left\{y(x) = \left(c_2\left(\int \frac{1}{x HD\left(0, 2a+b, 0, 2a-b, \frac{x^2+1}{x^2-1}\right)^2} dx\right) + c_1\right) HD\left(0, 2a+b, 0, 2a-b, \frac{x^2+1}{x^2-1}\right)\right\}$$

2.1349 ODE No. 1349

$$y''(x) = -\frac{y(x)}{x^4} - \frac{\left(x^2+1\right)y'(x)}{x^3}$$

✓ **Mathematica** : cpu = 0.10466 (sec), leaf count = 76

$$\left\{\left\{y(x) \to c_2 G_{1,2}^{2,0}\left(-\frac{1}{2x^2}\middle| \begin{array}{c} \frac{3}{2} \\ 0,0 \end{array}\right) + c_1 e^{\frac{1}{4x^2}}\left(\left(1-\frac{1}{2x^2}\right) I_0\left(\frac{1}{4x^2}\right) + \frac{I_1\left(\frac{1}{4x^2}\right)}{2x^2}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.118 (sec), leaf count = 85

$$\left\{y(x) = \frac{c_1\left(2x^2\,\text{BesselI}\left(0, \frac{1}{4x^2}\right) - \text{BesselI}\left(0, \frac{1}{4x^2}\right) + \text{BesselI}\left(1, \frac{1}{4x^2}\right)\right) e^{\frac{1}{4x^2}}}{x^2} + \frac{c_2\left(2x^2\,\text{BesselK}\left(0, -\frac{1}{4x^2}\right) - \text{BesselK}\right.}{x}\right.$$

2.1350 ODE No. 1350

$$y''(x) = -\frac{a^2 y(x)}{x^4} - \frac{2y'(x)}{x}$$

✓ **Mathematica** : cpu = 0.0082499 (sec), leaf count = 25

$$\left\{\left\{y(x) \to c_1\cos\left(\frac{a}{x}\right) - c_2\sin\left(\frac{a}{x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.009 (sec), leaf count = 21

$$\left\{y(x) = c_1\sin\left(\frac{a}{x}\right) + c_2\cos\left(\frac{a}{x}\right)\right\}$$

2.1351 ODE No. 1351

$$y''(x) = \frac{y(x)}{x^4} - \frac{(2x^2+1)\,y'(x)}{x^3}$$

✓ **Mathematica** : cpu = 0.0187305 (sec), leaf count = 50

$$\left\{\left\{y(x) \to c_1 e^{\frac{1}{2x^2}} - \sqrt{\frac{\pi}{2}} c_2 e^{\frac{1}{2x^2}} \operatorname{erf}\left(\frac{1}{\sqrt{2}x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.026 (sec), leaf count = 24

$$\left\{y(x) = \left(c_2 \operatorname{erf}\left(\frac{\sqrt{2}}{2x}\right) + c_1\right) \mathrm{e}^{\frac{1}{2x^2}}\right\}$$

2.1352 ODE No. 1352

$$y''(x) = -\frac{2(a+x)y'(x)}{x^2} - \frac{by(x)}{x^4}$$

✓ **Mathematica** : cpu = 0.0123503 (sec), leaf count = 89

$$\left\{\left\{y(x) \to c_1 e^{-\frac{\sqrt{b}\left(-\frac{\sqrt{a^2-b}}{\sqrt{b}} - \frac{a}{\sqrt{b}}\right)}{x}} + c_2 e^{-\frac{\sqrt{b}\left(\frac{\sqrt{a^2-b}}{\sqrt{b}} - \frac{a}{\sqrt{b}}\right)}{x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.046 (sec), leaf count = 43

$$\left\{y(x) = c_1 \mathrm{e}^{\frac{a-\sqrt{a^2-b}}{x}} + c_2 \mathrm{e}^{\frac{a+\sqrt{a^2-b}}{x}}\right\}$$

2.1353 ODE No. 1353

$$y''(x) = \frac{(2x^2-1)\,y'(x)}{x^3} - \frac{y(x)}{x^4}$$

✓ **Mathematica** : cpu = 0.8391 (sec), leaf count = 119

$$\left\{\left\{y(x) \to c_1\left(x^3 + 2x - \frac{1}{x}\right) - \frac{c_2\left(\sqrt{2\pi}x^4 \operatorname{erfi}\left(\frac{1}{\sqrt{2}x}\right) + 2\sqrt{2\pi}x^2 \operatorname{erfi}\left(\frac{1}{\sqrt{2}x}\right) - \sqrt{2\pi}\operatorname{erfi}\left(\frac{1}{\sqrt{2}x}\right) + 2e^{\frac{1}{2x^2}}x - 2e^{\frac{1}{2x^2}}x^3\right)}{16x}$$

✓ **Maple** : cpu = 0.249 (sec), leaf count = 66

$$\left\{y(x) = \frac{c_1\sqrt{2}\,\sqrt{\pi}\,(x^4+2x^2-1)\operatorname{erfi}\left(\frac{\sqrt{2}}{2x}\right) + c_2(x^4+2x^2-1) + (-2c_1x^3 + 2c_1x)\,\mathrm{e}^{\frac{1}{2x^2}}}{x}\right\}$$

2.1354 ODE No. 1354

$$y''(x) = \frac{(2x^2-1)\,y'(x)}{x^3} - \frac{2y(x)}{x^4}$$

✓ **Mathematica** : cpu = 0.24373 (sec), leaf count = 108

$$\left\{\left\{y(x)\to \frac{c_2\left(-5\sqrt{2\pi}x^2\text{erfi}\left(\frac{1}{\sqrt{2}x}\right)+\sqrt{2\pi}\text{erfi}\left(\frac{1}{\sqrt{2}x}\right)-2e^{\frac{1}{2x^2}}x+4e^{\frac{1}{2x^2}}x^5+8e^{\frac{1}{2x^2}}x^3\right)}{12x^2}+c_1\left(1-\frac{1}{5x^2}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.298 (sec), leaf count = 33

$$\left\{y(x) = \frac{c_2x^5\,\text{hypergeom}\left(\left[-\frac{5}{2}\right],\left[-\frac{1}{2}\right],\frac{1}{2x^2}\right)+5c_1x^2-c_1}{x^2}\right\}$$

2.1355 ODE No. 1355

$$y''(x) = \frac{xy(x)}{x^3+1} - \frac{(x^3-1)\,y'(x)}{x\,(x^3+1)}$$

✓ **Mathematica** : cpu = 0.289484 (sec), leaf count = 51

$$\left\{\left\{y(x)\to \frac{1}{2}c_2\sqrt[3]{x^3+1}x^2\,{}_2F_1\left(\frac{2}{3},\frac{4}{3};\frac{5}{3};-x^3\right)+c_1\sqrt[3]{x^3+1}\right\}\right\}$$

✓ **Maple** : cpu = 0.13 (sec), leaf count = 30

$$\left\{y(x) = (x^3+1)^{\frac{1}{3}}\left(c_1x^2\,\text{hypergeom}\left(\left[\frac{2}{3},\frac{4}{3}\right],\left[\frac{5}{3}\right],-x^3\right)+c_2\right)\right\}$$

2.1356 ODE No. 1356

$$y''(x) = -\frac{y(x)\,(-n^2-v(v+1)x^2)}{x^2\,(x^2+1)} - \frac{(2x^2+1)\,y'(x)}{x\,(x^2+1)}$$

✓ **Mathematica** : cpu = 0.24644 (sec), leaf count = 90

$$\left\{\left\{y(x)\to c_1x^{-n}\,{}_2F_1\left(-\frac{n}{2}-\frac{v}{2},-\frac{n}{2}+\frac{v}{2}+\frac{1}{2};1-n;-x^2\right)+c_2x^n\,{}_2F_1\left(\frac{n}{2}-\frac{v}{2},\frac{n}{2}+\frac{v}{2}+\frac{1}{2};n+1;-x^2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.116 (sec), leaf count = 29

$$\left\{y(x) = c_1\,\text{LegendreP}\left(v,n,\sqrt{x^2+1}\right)+c_2\,\text{LegendreQ}\left(v,n,\sqrt{x^2+1}\right)\right\}$$

2.1357 ODE No. 1357

$$y''(x) = -\frac{(ax^2 + a - 1)\, y'(x)}{x\,(x^2+1)} - \frac{y(x)\,(bx^2+c)}{x^2\,(x^2+1)}$$

✓ **Mathematica** : cpu = 0.578118 (sec), leaf count = 288

$$\left\{\left\{y(x) \to c_1 x^{\frac{1}{2}\left(-\sqrt{a^2-4a-4c+4}-a+2\right)}\, {}_2F_1\left(-\frac{1}{4}\sqrt{a^2-2a-4b+1} - \frac{1}{4}\sqrt{a^2-4a-4c+4} + \frac{1}{4}, \frac{1}{4}\sqrt{a^2-2a-4b+\right.\right.\right.$$

✓ **Maple** : cpu = 0.145 (sec), leaf count = 97

$$\left\{y(x) = \left(c_1 \operatorname{LegendreP}\left(-\frac{1}{2} + \frac{\sqrt{a^2-2a-4b+1}}{2}, \frac{\sqrt{a^2-4a-4c+4}}{2}, \sqrt{x^2+1}\right) + c_2 \operatorname{LegendreQ}\left(-\frac{1}{2} + \frac{\sqrt{a^2}}{}\right.\right.\right.$$

2.1358 ODE No. 1358

$$y''(x) = \frac{(x^2-2)\, y'(x)}{x\,(x^2-1)} - \frac{(x^2-2)\, y(x)}{x^2\,(x^2-1)}$$

✓ **Mathematica** : cpu = 0.0492311 (sec), leaf count = 89

$$\left\{\left\{y(x) \to \frac{c_1 x \sqrt[4]{x^2-1}}{\sqrt[4]{1-x^2}} - \frac{c_2 x \sqrt[4]{x^2-1}\left(\log\left(1-\frac{x}{\sqrt{x^2-1}}\right) - \log\left(\frac{x}{\sqrt{x^2-1}}+1\right)\right)}{2\sqrt[4]{1-x^2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.044 (sec), leaf count = 20

$$\left\{y(x) = \left(c_2 \ln\left(x + \sqrt{x^2-1}\right) + c_1\right) x\right\}$$

2.1359 ODE No. 1359

$$y''(x) = -\frac{v(v+1)y(x)}{x^2\,(x^2-1)} - \frac{2xy'(x)}{x^2-1}$$

✓ **Mathematica** : cpu = 0.0883112 (sec), leaf count = 86

$$\left\{\left\{y(x) \to c_1 i^{-v} x^{-v}\, {}_2F_1\left(\frac{1}{2} - \frac{v}{2}, -\frac{v}{2}; \frac{1}{2} - v; x^2\right) + c_2 i^{v+1} x^{v+1}\, {}_2F_1\left(\frac{v}{2} + \frac{1}{2}, \frac{v}{2} + 1; v + \frac{3}{2}; x^2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.148 (sec), leaf count = 57

$$\left\{y(x) = c_1 x^{-v} \operatorname{hypergeom}\left(\left[-\frac{v}{2}, -\frac{v}{2} + \frac{1}{2}\right], \left[-v + \frac{1}{2}\right], x^2\right) + c_2 x^{v+1} \operatorname{hypergeom}\left(\left[\frac{v}{2} + 1, \frac{v}{2} + \frac{1}{2}\right], \left[v + \frac{3}{2}\right], x^2\right.\right.$$

2.1360 ODE No. 1360

$$y''(x) = \frac{v(v+1)y(x)}{x^2} - \frac{2xy'(x)}{x^2-1}$$

✓ **Mathematica** : cpu = 0.0791025 (sec), leaf count = 68

$$\left\{\left\{y(x) \to c_1 i^{-v} x^{-v} {}_2F_1\left(\frac{1}{2}, -v; \frac{1}{2} - v; x^2\right) + c_2 i^{v+1} x^{v+1} {}_2F_1\left(\frac{1}{2}, v+1; v+\frac{3}{2}; x^2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.124 (sec), leaf count = 47

$$\left\{y(x) = c_1 x^{-v} \operatorname{hypergeom}\left(\left[\frac{1}{2}, -v\right], \left[-v + \frac{1}{2}\right], x^2\right) + c_2 x^{v+1} \operatorname{hypergeom}\left(\left[\frac{1}{2}, v+1\right], \left[v + \frac{3}{2}\right], x^2\right)\right\}$$

2.1361 ODE No. 1361

$$y''(x) = \frac{2xy'(x)}{x^2-1} - \frac{(a(a+1) - a(a+3)x^2)\,y(x)}{x^2(x^2-1)}$$

✓ **Mathematica** : cpu = 0.480315 (sec), leaf count = 38

$$\{\{y(x) \to c_1 x^{-a} + c_2\left(-2ax^2 + 2a - x^2 + 3\right) x^{a+1}\}\}$$

✓ **Maple** : cpu = 0.036 (sec), leaf count = 33

$$\{y(x) = c_1 x^{-a} + c_2\left(2a\,x^2 + x^2 - 2a - 3\right) x^{a+1}\}$$

2.1362 ODE No. 1362

$$y''(x) = \frac{2xy'(x)}{x^2-1} - \frac{y(x)\left(\left(x^2-1\right)x^2(a-n)(a+n+1) + 2ax^2 + n(n+1)\left(x^2-1\right)\right)}{x^2(x^2-1)}$$

✗ **Mathematica** : cpu = 10.2771 (sec), leaf count = 0 , DifferentialRoot result

$$\{\{y(x) \to (x)\}\}$$

✓ **Maple** : cpu = 0.231 (sec), leaf count = 109

$$\left\{y(x) = c_1 x^{-n} \operatorname{HeunC}\left(0, -n - \frac{1}{2}, -2, -\frac{1}{4}a^2 + \frac{1}{4}n^2 - \frac{1}{4}a + \frac{1}{4}n, \frac{1}{4}a^2 - \frac{1}{4}n^2 - \frac{1}{4}a - \frac{1}{4}n + \frac{3}{4}, x^2\right) + c_2 x^{n+1} \operatorname{Heur}\right.$$

2.1363 ODE No. 1363

$$y''(x) = -\frac{(ax^2 + a - 2)\, y'(x)}{x\,(x^2 - 1)} - \frac{by(x)}{x^2}$$

✓ **Mathematica** : cpu = 0.601191 (sec), leaf count = 236

$$\left\{\left\{y(x) \to c_1(-1)^{\frac{1}{4}\left(-\sqrt{a^2-2a-4b+1}+a-1\right)} x^{\frac{1}{2}\left(-\sqrt{a^2-2a-4b+1}+a-1\right)} {}_2F_1\left(\frac{a}{2} - \frac{1}{2}, \frac{a}{2} - \frac{1}{2}\sqrt{a^2 - 2a - 4b + 1} - \frac{1}{2}; 1 - \frac{1}{2}\right.\right.\right.$$

✓ **Maple** : cpu = 0.171 (sec), leaf count = 161

$$\left\{y(x) = \left(c_1 x^{\frac{a}{2} - \frac{1}{2} + \frac{\sqrt{a^2-2a-4b+1}}{2}} \text{hypergeom}\left(\left[-\frac{a}{2} + \frac{3}{2}, -\frac{a}{2} + \frac{3}{2} + \frac{\sqrt{a^2 - 2a - 4b + 1}}{2}\right], \left[1 + \frac{\sqrt{a^2 - 2a - 4b + 1}}{2}\right.\right.\right.\right.$$

2.1364 ODE No. 1364

$$y''(x) = \frac{y'(x)\,(2(a-1)x^2 - 2a + 2bc(x^2 - 1)\,x^c)}{x\,(x^2 - 1)} - \frac{y(x)\,(bc(2a - c - 1)x^{c+2} - bc(2a - c + 1)x^c + x^2((a-1)a - }{x^2\,(x^2 - 1)}$$

✓ **Mathematica** : cpu = 0.123224 (sec), leaf count = 42

$$\left\{\left\{y(x) \to c_1 P_v(x) e^{a\log(x) + bx^c} + c_2 Q_v(x) e^{a\log(x) + bx^c}\right\}\right\}$$

✓ **Maple** : cpu = 0.115 (sec), leaf count = 25

$$\{y(x) = (c_1 \operatorname{LegendreP}(v, x) + c_2 \operatorname{LegendreQ}(v, x))\, x^a \mathrm{e}^{b\,x^c}\}$$

2.1365 ODE No. 1365

$$y''(x) = -\frac{ay(x)}{(x^2 + 1)^2}$$

✓ **Mathematica** : cpu = 0.0808674 (sec), leaf count = 104

$$\left\{\left\{y(x) \to \frac{ic_2\sqrt{x^2+1}(1 - ix)^{\sqrt{a+1}}(1 + ix)^{-\sqrt{a+1}} e^{i\sqrt{a+1}\tan^{-1}(x)}}{2\sqrt{a+1}} + c_1\sqrt{x^2 + 1} e^{i\sqrt{a+1}\tan^{-1}(x)}\right\}\right\}$$

✓ **Maple** : cpu = 0.062 (sec), leaf count = 59

$$\left\{y(x) = \sqrt{x^2 + 1}\left(c_1\left(\frac{x + i}{-x + i}\right)^{\frac{\sqrt{a+1}}{2}} + c_2\left(\frac{x + i}{-x + i}\right)^{-\frac{\sqrt{a+1}}{2}}\right)\right\}$$

2.1366 ODE No. 1366

$$y''(x) = -\frac{2xy'(x)}{x^2+1} - \frac{y(x)}{(x^2+1)^2}$$

✓ **Mathematica** : cpu = 0.018508 (sec), leaf count = 31

$$\left\{\left\{y(x) \to \frac{c_1}{\sqrt{x^2+1}} + \frac{c_2 x}{\sqrt{x^2+1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.011 (sec), leaf count = 17

$$\left\{y(x) = \frac{c_1 x + c_2}{\sqrt{x^2+1}}\right\}$$

2.1367 ODE No. 1367

$$y''(x) = -\frac{y(x)\left(a^2(x^2+1)^2 + m^2 - n(n+1)(x^2+1)\right)}{(x^2+1)^2} - \frac{2xy'(x)}{x^2+1}$$

✓ **Mathematica** : cpu = 0.235702 (sec), leaf count = 229

$$\left\{\left\{y(x) \to c_1 (x^2+1)^{\frac{\sqrt{m^2}}{2}} \text{HeunC}\left[\frac{1}{4}\left(-a^2 - \sqrt{m^2}\left(\sqrt{m^2}+1\right) + \frac{1}{4}\left(\sqrt{(2n+1)^2}-1\right)^2 + \frac{1}{2}\left(\sqrt{(2n+1)^2}-1\right)\right),\right.\right.$$

✓ **Maple** : cpu = 0.23 (sec), leaf count = 88

$$\left\{y(x) = \left(c_2 x \,\text{HeunC}\left(0, \frac{1}{2}, m, -\frac{a^2}{4}, \frac{1}{4}a^2 + \frac{1}{4}m^2 - \frac{1}{4}n^2 - \frac{1}{4}n + \frac{1}{4}, -x^2\right) + c_1 \text{HeunC}\left(0, -\frac{1}{2}, m, -\frac{a^2}{4}, \frac{1}{4}a^2 + \frac{1}{4}\right.\right.\right.$$

2.1368 ODE No. 1368

$$y''(x) = -\frac{axy'(x)}{x^2+1} - \frac{by(x)}{(x^2+1)^2}$$

✓ **Mathematica** : cpu = 0.0208805 (sec), leaf count = 106

$$\left\{\left\{y(x) \to c_1 (x^2+1)^{\frac{2-a}{4}} P_{\frac{a-2}{2}}^{\frac{1}{2}\sqrt{a^2-4a+4b+4}}(ix) + c_2 (x^2+1)^{\frac{2-a}{4}} Q_{\frac{a-2}{2}}^{\frac{1}{2}\sqrt{a^2-4a+4b+4}}(ix)\right\}\right\}$$

✓ **Maple** : cpu = 0.115 (sec), leaf count = 71

$$\left\{y(x) = \left(c_1 \text{LegendreP}\left(\frac{a}{2}-1, \frac{\sqrt{a^2-4a+4b+4}}{2}, ix\right) + c_2 \text{LegendreQ}\left(\frac{a}{2}-1, \frac{\sqrt{a^2-4a+4b+4}}{2}, ix\right)\right)(x^2\right.$$

2.1369 ODE No. 1369

$$y''(x) = -\frac{ay(x)}{(x^2-1)^2}$$

✓ **Mathematica** : cpu = 0.0937368 (sec), leaf count = 106

$$\left\{\left\{y(x)\to \frac{c_2\sqrt{1-x^2}(x+1)^{\sqrt{1-a}}(1-x)^{-\sqrt{1-a}}e^{-\sqrt{1-a}\tanh^{-1}(x)}}{2\sqrt{1-a}}+c_1\sqrt{1-x^2}e^{-\sqrt{1-a}\tanh^{-1}(x)}\right\}\right\}$$

✓ **Maple** : cpu = 0.053 (sec), leaf count = 55

$$\left\{y(x) = \sqrt{x^2-1}\left(c_1\left(\frac{x-1}{x+1}\right)^{\frac{\sqrt{-a+1}}{2}}+c_2\left(\frac{x-1}{x+1}\right)^{-\frac{\sqrt{-a+1}}{2}}\right)\right\}$$

2.1370 ODE No. 1370

$$y''(x) = \frac{a^2y(x)}{(x^2-1)^2}-\frac{2xy'(x)}{x^2-1}$$

✓ **Mathematica** : cpu = 0.0212122 (sec), leaf count = 53

$$\left\{\left\{y(x)\to c_1\cosh\left(\frac{1}{2}a(\log(1-x)-\log(x+1))\right)+ic_2\sinh\left(\frac{1}{2}a(\log(1-x)-\log(x+1))\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.013 (sec), leaf count = 19

$$\{y(x) = c_1\sinh(a\,\mathrm{arctanh}\,(x))+c_2\cosh(a\,\mathrm{arctanh}\,(x))\}$$

2.1371 ODE No. 1371

$$y''(x) = -\frac{y(x)\left(-a^2-\lambda(x^2-1)\right)}{(x^2-1)^2}-\frac{2xy'(x)}{x^2-1}$$

✓ **Mathematica** : cpu = 0.0234926 (sec), leaf count = 48

$$\left\{\left\{y(x)\to c_1P^{a}_{\frac{1}{2}\left(\sqrt{4\lambda+1}-1\right)}(x)+c_2Q^{a}_{\frac{1}{2}\left(\sqrt{4\lambda+1}-1\right)}(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.106 (sec), leaf count = 37

$$\left\{y(x) = c_1\,\mathrm{LegendreP}\left(\frac{\sqrt{4\lambda+1}}{2}-\frac{1}{2},a,x\right)+c_2\,\mathrm{LegendreQ}\left(\frac{\sqrt{4\lambda+1}}{2}-\frac{1}{2},a,x\right)\right\}$$

2.1372 ODE No. 1372

$$y''(x) = -\frac{y(x)\left(\left(x^2-1\right)\left(ax^2+bx+c\right)-k^2\right)}{\left(x^2-1\right)^2} - \frac{2xy'(x)}{x^2-1}$$

✓ **Mathematica** : cpu = 0.305321 (sec), leaf count = 202

$$\left\{\left\{y(x)\to c_1 e^{\sqrt{-a}x}\left(x^2-1\right)^{k/2}\text{HeunC}\left[(k+1)\left(2\sqrt{-a}-k\right)-a+b-c,2\left(2\sqrt{-a}(k+1)+b\right),k+1,k+1,4\sqrt{-a}\right.\right.\right.$$

✓ **Maple** : cpu = 0.286 (sec), leaf count = 110

$$\left\{y(x)=\left(c_2\sqrt{2x-2}\,(x+1)^{-\frac{k}{2}}\,(x-1)^{\frac{k}{2}-\frac{1}{2}}\,\text{HeunC}\left(4\sqrt{-a},-k,k,2b,\frac{k^2}{2}+a-b+c,\frac{x}{2}+\frac{1}{2}\right)+c_1\left(x^2-1\right)^{\frac{k}{2}}\text{Heu}\right.\right.$$

2.1373 ODE No. 1373

$$y''(x) = -\frac{y(x)\left(-a^2\left(x^2-1\right)^2-m^2-n(n+1)\left(x^2-1\right)\right)}{\left(x^2-1\right)^2} - \frac{2xy'(x)}{x^2-1}$$

✓ **Mathematica** : cpu = 0.23455 (sec), leaf count = 113

$$\left\{\left\{y(x)\to c_1\left(x^2-1\right)^{m/2}\text{HeunC}\left[\frac{1}{4}\left(-a^2-m(m+1)+n^2+n\right),-\frac{a^2}{4},\frac{1}{2},m+1,0,x^2\right]+c_2x\left(x^2-1\right)^{m/2}\text{HeunC}\right.\right.$$

✓ **Maple** : cpu = 0.253 (sec), leaf count = 84

$$\left\{y(x)=\left(c_2x\,\text{HeunC}\left(0,\frac{1}{2},m,-\frac{a^2}{4},\frac{1}{4}a^2+\frac{1}{4}m^2-\frac{1}{4}n^2-\frac{1}{4}n+\frac{1}{4},x^2\right)+c_1\,\text{HeunC}\left(0,-\frac{1}{2},m,-\frac{a^2}{4},\frac{1}{4}a^2+\frac{1}{4}m^2\right.\right.\right.$$

2.1374 ODE No. 1374

$$y''(x) = \frac{2(2a-1)xy'(x)}{x^2-1} - \frac{y(x)\left(x^2(2a(2a-1)-v(v+1))+2a+v(v+1)\right)}{\left(x^2-1\right)^2}$$

✓ **Mathematica** : cpu = 0.0325278 (sec), leaf count = 32

$$\left\{\left\{y(x)\to c_1\left(x^2-1\right)^a P_v(x)+c_2\left(x^2-1\right)^a Q_v(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.099 (sec), leaf count = 23

$$\left\{y(x)=\left(c_1\,\text{LegendreP}\left(v,x\right)+c_2\,\text{LegendreQ}\left(v,x\right)\right)\left(x^2-1\right)^a\right\}$$

2.1375 ODE No. 1375

$$y''(x) = -\frac{y(x)\left(4ax^2(a-n) - (x^2-1)(2a+(v-n)(n+v+1))\right)}{(x^2-1)^2} - \frac{2x(-2a+n+1)y'(x)}{x^2-1}$$

✓ **Mathematica** : cpu = 0.0378384 (sec), leaf count = 54

$$\left\{\left\{y(x) \to c_1 (x^2-1)^{\frac{1}{2}(2a-n)} P_v^n(x) + c_2 (x^2-1)^{\frac{1}{2}(2a-n)} Q_v^n(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.109 (sec), leaf count = 29

$$\left\{y(x) = (c_1 \operatorname{LegendreP}(v,n,x) + c_2 \operatorname{LegendreQ}(v,n,x))(x^2-1)^{a-\frac{n}{2}}\right\}$$

2.1376 ODE No. 1376

$$y''(x) = -\frac{by(x)}{x^2(a+x^2)} - \frac{(a+2x^2)\,y'(x)}{x(a+x^2)}$$

✓ **Mathematica** : cpu = 0.0336135 (sec), leaf count = 69

$$\left\{\left\{y(x) \to c_1 \cos\left(\frac{\sqrt{b}\tanh^{-1}\left(\frac{\sqrt{a+x^2}}{\sqrt{a}}\right)}{\sqrt{a}}\right) - c_2 \sin\left(\frac{\sqrt{b}\tanh^{-1}\left(\frac{\sqrt{a+x^2}}{\sqrt{a}}\right)}{\sqrt{a}}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.06 (sec), leaf count = 73

$$\left\{y(x) = \left(c_2\left(\frac{2a+2\sqrt{x^2+a}\,\sqrt{a}}{x}\right)^{\frac{2i\sqrt{b}}{\sqrt{a}}} + c_1\right)\left(\frac{2a+2\sqrt{x^2+a}\,\sqrt{a}}{x}\right)^{-\frac{i\sqrt{b}}{\sqrt{a}}}\right\}$$

2.1377 ODE No. 1377

$$y''(x) = -\frac{b^2 y(x)}{(a^2+x^2)^2}$$

✓ **Mathematica** : cpu = 0.187499 (sec), leaf count = 163

$$\left\{\left\{y(x) \to \frac{ic_2\sqrt{a^2+x^2}\left(1-\frac{ix}{a}\right)^{\sqrt{\frac{a^2+b^2}{a^2}}}\left(1+\frac{ix}{a}\right)^{-\sqrt{\frac{a^2+b^2}{a^2}}} e^{i\sqrt{\frac{a^2+b^2}{a^2}}\tan^{-1}\left(\frac{x}{a}\right)}}{2a\sqrt{\frac{a^2+b^2}{a^2}}} + c_1\sqrt{a^2+x^2}e^{i\sqrt{\frac{b^2}{a^2}+1}\tan^{-1}\left(\frac{x}{a}\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.128 (sec), leaf count = 83

$$\left\{y(x)=\sqrt{a^2+x^2}\left(c_1\left(\frac{ix-a}{ix+a}\right)^{\frac{\sqrt{a^2+b^2}}{2a}}+c_2\left(\frac{ix-a}{ix+a}\right)^{-\frac{\sqrt{a^2+b^2}}{2a}}\right)\right\}$$

2.1378 ODE No. 1378

$$y''(x)=-\frac{2(x^2-1)\,y'(x)}{(x-1)^2x}-\frac{(-2x^2+2x+2)\,y(x)}{(x-1)^2x^2}$$

✓ **Mathematica** : cpu = 0.0393729 (sec), leaf count = 65

$$\left\{\left\{y(x)\to\frac{c_1x^2}{1-x}+\frac{c_2x(2x^2\log(1-x)-2x^2\log(x)+2x-2x\log(1-x)+2x\log(x)-1)}{(x-1)^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.039 (sec), leaf count = 48

$$\left\{y(x)=\frac{\left(c_1x^2+c_2(x-1)\,x\ln(x)-c_2(x-1)\,x\ln(x-1)+\frac{c_2}{2}+(-c_1-c_2)\,x\right)x}{(x-1)^2}\right\}$$

2.1379 ODE No. 1379

$$y''(x)=\frac{12y(x)}{(x+1)^2\,(x^2+2x+3)}$$

✓ **Mathematica** : cpu = 0.057164 (sec), leaf count = 99

$$\left\{\left\{y(x)\to\frac{c_2\left(2x^3+4x^2-3\sqrt{2}x^2\tan^{-1}\left(\frac{x+1}{\sqrt{2}}\right)+8x-6\sqrt{2}x\tan^{-1}\left(\frac{x+1}{\sqrt{2}}\right)-9\sqrt{2}\tan^{-1}\left(\frac{x+1}{\sqrt{2}}\right)+2\right)}{2(x+1)^2}+c_1\left(\frac{2}{(x+}\right.\right.\right.$$

✓ **Maple** : cpu = 0.059 (sec), leaf count = 60

$$\left\{y(x)=\frac{3c_2\left(x^2+2x+3\right)\arctan\left(\frac{(x+1)\sqrt{2}}{2}\right)+c_1\left(x^2+2x+3\right)-c_2\left(x^3+2x^2+4x+1\right)\sqrt{2}}{(x+1)^2}\right\}$$

2.1380 ODE No. 1380

$$y''(x) = -\frac{by(x)}{x^2(x-a)^2}$$

✓ **Mathematica** : cpu = 0.20333 (sec), leaf count = 132

$$\left\{\left\{y(x)\to \frac{c_2(x-a)^{\frac{1}{2}\sqrt{\frac{a^2-4b}{a^2}}+\frac{1}{2}}x^{\frac{1}{2}-\frac{1}{2}\sqrt{\frac{a^2-4b}{a^2}}}}{a\sqrt{\frac{a^2-4b}{a^2}}}+c_1(x-a)^{\frac{1}{2}-\frac{1}{2}\sqrt{1-\frac{4b}{a^2}}}x^{\frac{1}{2}\sqrt{1-\frac{4b}{a^2}}+\frac{1}{2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.089 (sec), leaf count = 67

$$\left\{y(x) = \sqrt{(a-x)\,x}\left(c_1\left(\frac{a-x}{x}\right)^{\frac{\sqrt{a^2-4b}}{2a}}+c_2\left(\frac{x}{a-x}\right)^{\frac{\sqrt{a^2-4b}}{2a}}\right)\right\}$$

2.1381 ODE No. 1381

$$y''(x) = c-\frac{by(x)}{x^2(x-a)^2}$$

✓ **Mathematica** : cpu = 0.252297 (sec), leaf count = 589

$$\left\{\left\{y(x)\to -\frac{2cx^2(a-x)\left(1-\frac{x}{a}\right)^{-\frac{1}{2}\sqrt{\frac{a^2-4b}{a^2}}}\left(\sqrt{\frac{a^2-4b}{a^2}}\left(1-\frac{x}{a}\right)^{\sqrt{\frac{a^2-4b}{a^2}}}\,{}_2F_1\left(\frac{1}{2}\sqrt{1-\frac{4b}{a^2}}-\frac{1}{2},\frac{1}{2}\sqrt{1-\frac{4b}{a^2}}+\frac{3}{2};\frac{1}{2}\sqrt{1-\right.\right.\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.192 (sec), leaf count = 175

$$\left\{y(x) = \frac{\left(\left(-c\left(\int\sqrt{(a-x)\,x}\left(\frac{a-x}{x}\right)^{-\frac{\sqrt{a^2-4b}}{2a}}dx\right)+c_2\sqrt{a^2-4b}\right)\left(\frac{a-x}{x}\right)^{\frac{\sqrt{a^2-4b}}{2a}}+\left(c\left(\int\sqrt{(a-x)\,x}\left(\frac{x}{a-x}\right)^{-\frac{\sqrt{a^2-}}{2a}}\right.\right.\right.}{\sqrt{a^2-4b}}\right.$$

2.1382 ODE No. 1382

$$y''(x) = \frac{cy(x)}{(x-a)^2(x-b)^2}$$

✓ **Mathematica** : cpu = 0.467723 (sec), leaf count = 154

$$\left\{\left\{y(x)\to c_1(x-a)^{\frac{1}{2}\left(\sqrt{\frac{4c}{(a-b)^2}+1}+1\right)}(x-b)^{\frac{1}{2}\left(1-\sqrt{\frac{4c}{(a-b)^2}+1}\right)}-\frac{c_2(x-a)^{\frac{1}{2}-\frac{1}{2}\sqrt{\frac{4c}{(a-b)^2}+1}}(x-b)^{\frac{1}{2}\sqrt{\frac{4c}{(a-b)^2}+1}+\frac{1}{2}}}{(a-b)\sqrt{\frac{4c}{(a-b)^2}+1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.13 (sec), leaf count = 104

$$\left\{y(x)=\sqrt{(a-x)(b-x)}\left(c_1\left(\frac{a-x}{b-x}\right)^{\frac{\sqrt{a^2-2ab+b^2+4c}}{2a-2b}}+c_2\left(\frac{a-x}{b-x}\right)^{-\frac{\sqrt{a^2-2ab+b^2+4c}}{2a-2b}}\right)\right\}$$

2.1383 ODE No. 1383

$$y''(x) = -\frac{y'(x)\left((x-a)^2(\alpha+\beta+1)(x-b)+(x-a)(-\alpha-\beta+1)(x-b)^2\right)}{(x-a)^2(x-b)^2}-\frac{\alpha\beta(a-b)^2y(x)}{(x-a)^2(x-b)^2}$$

✓ **Mathematica** : cpu = 0.119147 (sec), leaf count = 50

$$\left\{\left\{y(x)\to c_1e^{\alpha(\log(x-a)-\log(x-b))}+c_2e^{\beta(\log(x-a)-\log(x-b))}\right\}\right\}$$

✓ **Maple** : cpu = 0.056 (sec), leaf count = 39

$$\left\{y(x)=c_1\left(\frac{a-x}{b-x}\right)^{\beta}+c_2\left(\frac{a-x}{b-x}\right)^{\alpha}\right\}$$

2.1384 ODE No. 1384

$$y''(x) = -\frac{y(x)\left(-\left(a^2-1\right)x^2+2(a+3)bx-b^2\right)}{4x^2}$$

✓ **Mathematica** : cpu = 0.022379 (sec), leaf count = 110

$$\left\{\left\{y(x)\to c_1M_{\frac{(a+3)b}{2\sqrt{a^2-1}},\frac{\sqrt{b\left(b^2+1\right)}}{2\sqrt{b}}}\left(\sqrt{a^2-1}x\right)+c_2W_{\frac{(a+3)b}{2\sqrt{a^2-1}},\frac{\sqrt{b\left(b^2+1\right)}}{2\sqrt{b}}}\left(\sqrt{a^2-1}x\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.26 (sec), leaf count = 73

$$\left\{y(x)=c_1\,\mathrm{WhittakerM}\left(\frac{(a+3)\,b}{2\sqrt{a^2-1}},\frac{\sqrt{b^2+1}}{2},\sqrt{a^2-1}\,x\right)+c_2\,\mathrm{WhittakerW}\left(\frac{(a+3)\,b}{2\sqrt{a^2-1}},\frac{\sqrt{b^2+1}}{2},\sqrt{a^2-1}\,x\right)\right.$$

2.1385 ODE No. 1385

$$y''(x) = -\frac{(ax^2 + a - 3)\, y(x)}{4\,(x^2+1)^2}$$

✓ **Mathematica** : cpu = 0.0140124 (sec), leaf count = 78

$$\left\{\left\{y(x) \to c_1\sqrt{x^2+1}P_{\frac{1}{2}(\sqrt{1-a}-1)}^{\frac{1}{2}}(ix) + c_2\sqrt{x^2+1}Q_{\frac{1}{2}(\sqrt{1-a}-1)}^{\frac{1}{2}}(ix)\right\}\right\}$$

✓ **Maple** : cpu = 0.064 (sec), leaf count = 55

$$\left\{y(x) = (x^2+1)^{\frac{1}{4}}\left(c_1\left(x+\sqrt{x^2+1}\right)^{\frac{\sqrt{-a+1}}{2}} + c_2\left(x+\sqrt{x^2+1}\right)^{-\frac{\sqrt{-a+1}}{2}}\right)\right\}$$

2.1386 ODE No. 1386

$$y''(x) = \frac{18y(x)}{(2x+1)^2\,(x^2+x+1)}$$

✓ **Mathematica** : cpu = 0.064793 (sec), leaf count = 108

$$\left\{\left\{y(x) \to \frac{c_1\,(x^2+x+1)}{(2x+1)^2} + \frac{c_2\left(16x^3+24x^2-12\sqrt{3}x^2\tan^{-1}\left(\frac{2x+1}{\sqrt{3}}\right)+30x-12\sqrt{3}x\tan^{-1}\left(\frac{2x+1}{\sqrt{3}}\right)-12\sqrt{3}\tan\right.}{(2x+1)^2}\right.\right.$$

✓ **Maple** : cpu = 0.054 (sec), leaf count = 58

$$\left\{y(x) = \frac{-36c_2\,(x^2+x+1)\arctan\left(\frac{(2x+1)\sqrt{3}}{3}\right) + c_1\,(x^2+x+1) + 16c_2\,(x^3+x^2+\frac{11}{8}x+\frac{3}{16})\,\sqrt{3}}{(2x+1)^2}\right\}$$

2.1387 ODE No. 1387

$$y''(x) = \frac{3y(x)}{4\,(x^2+x+1)^2}$$

✓ **Mathematica** : cpu = 0.0290872 (sec), leaf count = 50

$$\left\{\left\{y(x) \to c_1\sqrt{x^2+x+1} + \frac{2c_2\sqrt{x^2+x+1}\tan^{-1}\left(\frac{2x+1}{\sqrt{3}}\right)}{\sqrt{3}}\right\}\right\}$$

✓ **Maple** : cpu = 0.026 (sec), leaf count = 28

$$\left\{y(x) = \sqrt{x^2+x+1}\left(c_2\arctan\left(\frac{(2x+1)\sqrt{3}}{3}\right)+c_1\right)\right\}$$

2.1388 ODE No. 1388

$$y''(x) = -\frac{y(x)\left(v(v+1)(x-1)-a^2x\right)}{4(x-1)^2x^2} - \frac{(3x-1)y'(x)}{2(x-1)x}$$

✓ **Mathematica** : cpu = 0.262985 (sec), leaf count = 235

$$\left\{\left\{y(x) \to c_2(-1)^{\frac{1}{2}(-2v-3)+1}x^{\frac{1}{4}(-2v-3)+1}e^{\frac{1}{4}(-2\log(1-x)-\log(x))}(x-1)^{\frac{1}{2}\left(\frac{1}{2}(a+v+1)+\frac{1}{2}(a+v+2)+\frac{1}{2}(-2v-3)+1\right)}\,{}_2F_1\left(\frac{1}{2}(-2\right.\right.\right.$$

✓ **Maple** : cpu = 0.112 (sec), leaf count = 76

$$\left\{y(x) = \left(c_1x^{-\frac{v}{2}}\,\mathrm{hypergeom}\left(\left[-\frac{a}{2}-\frac{v}{2}, -\frac{a}{2}-\frac{v}{2}+\frac{1}{2}\right], \left[-v+\frac{1}{2}\right], x\right) + c_2x^{\frac{v}{2}+\frac{1}{2}}\,\mathrm{hypergeom}\left(\left[-\frac{a}{2}+\frac{v}{2}+1, -\frac{a}{2}\right.\right.\right.\right.$$

2.1389 ODE No. 1389

$$y''(x) = -\frac{y(x)\left(-4n^2x-v(v+1)(x-1)^2\right)}{4(x-1)^2x^2} - \frac{(3x-1)y'(x)}{2(x-1)x}$$

✓ **Mathematica** : cpu = 0.330181 (sec), leaf count = 217

$$\left\{\left\{y(x) \to c_2(-1)^{\frac{1}{2}(-2v-3)+1}x^{\frac{1}{4}(-2v-3)+1}e^{\frac{1}{4}(-2\log(1-x)-\log(x))}(x-1)^{\frac{1}{2}\left(n+\frac{1}{2}(2n+1)+\frac{1}{2}(-2v-3)+v+2\right)}\,{}_2F_1\left(\frac{1}{2}(2n+1)+\right.\right.\right.$$

✓ **Maple** : cpu = 0.124 (sec), leaf count = 68

$$\left\{y(x) = \left(c_1x^{-\frac{v}{2}}\,\mathrm{hypergeom}\left(\left[-n-v, -n+\frac{1}{2}\right], \left[-v+\frac{1}{2}\right], x\right) + c_2x^{\frac{v}{2}+\frac{1}{2}}\,\mathrm{hypergeom}\left(\left[-n+v+1, -n+\frac{1}{2}\right]\right.\right.\right.$$

2.1390 ODE No. 1390

$$y''(x) = -\frac{3y(x)}{16(x-1)^2x^2}$$

✓ **Mathematica** : cpu = 0.025122 (sec), leaf count = 41

$$\left\{\left\{y(x) \to 2c_2\sqrt[4]{1-x}x^{3/4} + c_1(1-x)^{3/4}\sqrt[4]{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.026 (sec), leaf count = 25

$$\left\{y(x) = c_1(x-1)^{\frac{1}{4}}x^{\frac{3}{4}} + c_2(x-1)^{\frac{3}{4}}x^{\frac{1}{4}}\right\}$$

2.1391 ODE No. 1391

$$y''(x) = \frac{(7ax^2 + 5)\,y'(x)}{x\,(ax^2 + 1)} - \frac{(15ax^2 + 5)\,y(x)}{x^2\,(ax^2 + 1)}$$

✓ **Mathematica** : cpu = 0.0406693 (sec), leaf count = 27

$$\left\{\left\{y(x) \to c_1x^5 - \frac{1}{4}c_2x\left(2ax^2 + 1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.031 (sec), leaf count = 20

$$\{y(x) = c_1x^5 + 2c_2a\,x^3 + c_2x\}$$

2.1392 ODE No. 1392

$$y''(x) = -\frac{bxy'(x)}{a\,(x^2 - 1)} - \frac{y(x)\,(cx^2 + dx + e)}{a\,(x^2 - 1)^2}$$

✓ **Mathematica** : cpu = 64.8077 (sec), leaf count = 1763961

Too large to display

✓ **Maple** : cpu = 0.233 (sec), leaf count = 561

$$\left\{y(x) = \left(c_1\left(\frac{x}{2} + \frac{1}{2}\right)^{\frac{2a-\sqrt{4a^2+b^2+(-4b-4c+4d-4e)a}}{4a}} \text{hypergeom}\left(\left[\frac{2a + \sqrt{4a^2 + b^2 + (-4b - 4c - 4d - 4e)\,a} + 2\sqrt{a}\right.\right.\right.\right.$$

2.1393 ODE No. 1393

$$y''(x) = -\frac{y(x)\,(bx^2 + cx + d)}{a(x - 1)^2x^2}$$

✓ **Mathematica** : cpu = 15.271 (sec), leaf count = 413606

Too large to display

✓ **Maple** : cpu = 0.162 (sec), leaf count = 299

$$\left\{y(x) = c_1x^{\frac{\sqrt{a}+\sqrt{a-4d}}{2\sqrt{a}}}(x - 1)^{\frac{\sqrt{a}-\sqrt{a-4b-4c-4d}}{2\sqrt{a}}} \text{hypergeom}\left(\left[-\frac{-\sqrt{a} + \sqrt{a - 4b - 4c - 4d} - \sqrt{a - 4d} + \sqrt{a - 4b}}{2\sqrt{a}}, \right.\right.\right.$$

2.1394 ODE No. 1394

$$y''(x) = -\frac{cy(x)}{x^2(ax+b)^2} - \frac{2y'(x)}{x}$$

✓ **Mathematica** : cpu = 0.0391042 (sec), leaf count = 115

$$\left\{\left\{y(x) \to c_1 \exp\left(\frac{\sqrt{c}\left(-\frac{\sqrt{b^2-4c}}{\sqrt{c}} - \frac{b}{\sqrt{c}}\right)(\log(x) - \log(ax+b))}{2b}\right) + c_2 \exp\left(\frac{\sqrt{c}\left(\frac{\sqrt{b^2-4c}}{\sqrt{c}} - \frac{b}{\sqrt{c}}\right)(\log(x) - \log(ax\right.\right.\right.$$

✓ **Maple** : cpu = 0.108 (sec), leaf count = 79

$$\left\{y(x) = \sqrt{\frac{ax+b}{x}}\left(c_1\left(\frac{x}{ax+b}\right)^{\frac{\sqrt{\frac{b^2-4c}{a^2}}\,a}{2b}} + c_2\left(\frac{x}{ax+b}\right)^{-\frac{\sqrt{\frac{b^2-4c}{a^2}}\,a}{2b}}\right)\right\}$$

2.1395 ODE No. 1395

$$y''(x) = -\frac{y(x)}{(ax+b)^4}$$

✓ **Mathematica** : cpu = 0.0721561 (sec), leaf count = 59

$$\left\{\left\{y(x) \to c_1 e^{\frac{i}{a(ax+b)}}(ax+b) - \frac{1}{2} i c_2 e^{-\frac{i}{a(ax+b)}}(ax+b)\right\}\right\}$$

✓ **Maple** : cpu = 0.075 (sec), leaf count = 39

$$\left\{y(x) = (ax+b)\left(c_1 \sin\left(\frac{1}{(ax+b)\,a}\right) + c_2 \cos\left(\frac{1}{(ax+b)\,a}\right)\right)\right\}$$

2.1396 ODE No. 1396

$$y''(x) = -\frac{Ay(x)}{(ax^2+bx+c)^2}$$

✓ **Mathematica** : cpu = 0.963092 (sec), leaf count = 211

$$\left\{\left\{y(x) \to \frac{c_2\sqrt{ax^2+bx+c}\exp\left(-\frac{\sqrt{4ac-b^2}\sqrt{1-\frac{4A}{b^2-4ac}}\tan^{-1}\left(\frac{2ax+b}{\sqrt{4ac-b^2}}\right)}{\sqrt{b^2-4ac}}\right)}{\sqrt{b^2-4ac}\sqrt{1-\frac{4A}{b^2-4ac}}} + c_1\sqrt{x(ax+b)+c}\exp\left(\frac{\sqrt{4ac-b^2}\sqrt{1\right.\right.\right.$$

✓ **Maple** : cpu = 0.218 (sec), leaf count = 178

$$\left\{y(x) = \sqrt{a\,x^2+bx+c}\left(c_1\left(\frac{-2ax-b+i\sqrt{4ac-b^2}}{2ax+b+i\sqrt{4ac-b^2}}\right)^{\frac{\sqrt{\frac{-4ac+b^2-4A}{a^2}}\,a}{2\sqrt{-4ac+b^2}}} + c_2\left(\frac{-2ax-b+i\sqrt{4ac-b^2}}{2ax+b+i\sqrt{4ac-b^2}}\right)^{-\frac{\sqrt{\frac{-4ac+b^2}{a^2}}}{2\sqrt{-4ac}}}\right.\right.$$

2.1397 ODE No. 1397

$$y''(x) = \frac{y(x)}{x^5} - \frac{y'(x)}{x^4}$$

✓ **Mathematica** : cpu = 0.0519583 (sec), leaf count = 38

$$\left\{\left\{y(x)\to \frac{c_2\Gamma\left(\frac{1}{3},-\frac{1}{3x^3}\right)}{3^{2/3}\sqrt[3]{-\frac{1}{x^3}}}+c_1x\right\}\right\}$$

✓ **Maple** : cpu = 0.111 (sec), leaf count = 27

$$\left\{y(x) = \left(-c_2\sqrt{3}\,\Gamma\left(\frac{2}{3}\right)\Gamma\left(\frac{1}{3},-\frac{1}{3x^3}\right)+c_1+2c_2\pi\right)x\right\}$$

2.1398 ODE No. 1398

$$y''(x) = -\frac{\left(-(2v+1)^2+x^2-1\right)y(x)}{\left(x^2-1\right)^2} - \frac{\left(3x^2-1\right)y'(x)}{x\left(x^2-1\right)}$$

✓ **Mathematica** : cpu = 0.15119 (sec), leaf count = 72

$$\left\{\left\{y(x)\to c_1\left(x^2-1\right)^{-v-\frac{1}{2}}\,{}_2F_1\left(-v,-v;-2v;1-x^2\right)+c_2\left(x^2-1\right)^{v+\frac{1}{2}}\,{}_2F_1\left(v+1,v+1;2v+2;1-x^2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.217 (sec), leaf count = 69

$$\left\{y(x) = c_1\left(x^2-1\right)^{-v-\frac{1}{2}}\text{hypergeom}\left(\left[-v,-v\right],\left[-2v\right],-x^2+1\right)+c_2\left(x^2-1\right)^{v+\frac{1}{2}}\text{hypergeom}\left(\left[v+1,v+1\right],\left[2v\right.\right.\right.$$

2.1399 ODE No. 1399

$$y''(x) = \frac{(3x+1)y'(x)}{(x-1)(x+1)} - \frac{36(x+1)^2y(x)}{(x-1)^2(3x+5)^2}$$

✓ **Mathematica** : cpu = 0.0358289 (sec), leaf count = 72

$$\left\{\left\{y(x)\to c_1e^{\frac{1}{2}(3\log(1-x)+\log(3x+5))}+\frac{1}{2}c_2e^{\frac{1}{2}(3\log(1-x)+\log(3x+5))}(3\log(1-x)+\log(3x+5))\right\}\right\}$$

✓ **Maple** : cpu = 0.046 (sec), leaf count = 34

$$\left\{y(x)=\sqrt{3x+5}\,(x-1)^{\frac{3}{2}}\,(3c_2\ln(x-1)+c_2\ln(3x+5)+c_1)\right\}$$

2.1400 ODE No. 1400

$$y''(x) = \frac{y'(x)}{x} - \frac{ay(x)}{x^6}$$

✓ **Mathematica** : cpu = 0.0992482 (sec), leaf count = 60

$$\left\{\left\{y(x)\to c_1x^2e^{\frac{i\sqrt{a}}{2x^2}}-\frac{ic_2x^2e^{-\frac{i\sqrt{a}}{2x^2}}}{2\sqrt{a}}\right\}\right\}$$

✓ **Maple** : cpu = 0.054 (sec), leaf count = 35

$$\left\{y(x)=\left(c_1\sinh\left(\frac{\sqrt{-a}}{2x^2}\right)+c_2\cosh\left(\frac{\sqrt{-a}}{2x^2}\right)\right)x^2\right\}$$

2.1401 ODE No. 1401

$$y''(x) = -\frac{(a+3x^2)\,y'(x)}{x^3} - \frac{by(x)}{x^6}$$

✓ **Mathematica** : cpu = 0.0104377 (sec), leaf count = 93

$$\left\{\left\{y(x)\to c_1e^{-\frac{\sqrt{b}\left(-\frac{\sqrt{a^2-4b}}{\sqrt{b}}-\frac{a}{\sqrt{b}}\right)}{4x^2}}+c_2e^{-\frac{\sqrt{b}\left(\frac{\sqrt{a^2-4b}}{\sqrt{b}}-\frac{a}{\sqrt{b}}\right)}{4x^2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.068 (sec), leaf count = 45

$$\left\{y(x)=c_1\mathrm{e}^{-\frac{-a+\sqrt{a^2-4b}}{4x^2}}+c_2\mathrm{e}^{\frac{a+\sqrt{a^2-4b}}{4x^2}}\right\}$$

2.1402 ODE No. 1402

$$y''(x) = -\frac{y(x)\left(4a(a+1)x^4 - 2a\left(x^2-1\right)x^2 + \left(x^2-1\right)^2\left(x^2-v^2\right)\right)}{x^2\left(x^2-1\right)^2} - \frac{\left((1-4a)x^2-1\right)y'(x)}{x\left(x^2-1\right)}$$

✓ **Mathematica** : cpu = 0.955371 (sec), leaf count = 86

$$\left\{\left\{y(x) \to c_2\left(x^2-1\right)^{a+1}x^{-v}\text{HeunC}\left[-\frac{a}{2}+v-\frac{3}{4},\frac{1}{4},1-v,2,0,x^2\right] + c_1\left(x^2-1\right)^{a+1}x^{v}\text{HeunC}\left[\frac{1}{4}(-2a-4v-3\right.\right.\right.$$

✓ **Maple** : cpu = 0.319 (sec), leaf count = 58

$$\left\{y(x) = \left(x^2-1\right)\left(c_1x^v\,\text{HeunC}\left(0,v,1,\frac{1}{4},\frac{a}{2}+\frac{1}{4},x^2\right) + c_2x^{-v}\,\text{HeunC}\left(0,-v,1,\frac{1}{4},\frac{a}{2}+\frac{1}{4},x^2\right)\right)\left(x^2-1\right)^a\right\}$$

2.1403 ODE No. 1403

$$y''(x) = -y'(x)\left(\frac{-\text{a1}-\text{b1}+1}{x-\text{c1}} + \frac{-\text{a2}-\text{b2}+1}{x-\text{c2}} + \frac{-\text{a3}-\text{b3}+1}{x-\text{c3}}\right) - \frac{y(x)\left(\frac{\text{a1b1(c1-c2)(c1-c3)}}{x-\text{c1}} + \frac{\text{a2b2(c2-c1)(c2-c3)}}{x-\text{c2}}\right.}{(x-\text{c1})(x-\text{c2})(x-\text{c3})}$$

✓ **Mathematica** : cpu = 18.4876 (sec), leaf count = 316

$$\left\{\left\{y(x) \to c_1(x-\text{c1})^{\text{a1}}(x-\text{c2})^{\text{a2}}(x-\text{c3})^{\text{b3}}\text{HeunG}\left[\frac{\text{c1}-\text{c3}}{\text{c1}-\text{c2}}, \frac{\text{a1}(\text{c1}(-\text{a3}-2\text{b1}-\text{b2}+2)+\text{c2}(\text{a3}+\text{b1}-1)+\text{c3}}{}\right.\right.\right.$$

✓ **Maple** : cpu = 0.892 (sec), leaf count = 298

$$\left\{y(x) = \left(c_1(-\mathit{c1}+x)^{\mathit{a1}}\,HG\left(\frac{\mathit{c1}-\mathit{c3}}{\mathit{c1}-\mathit{c2}}, \frac{((-\mathit{a3}-2\mathit{b1}-\mathit{b2}+2)\,\mathit{c1}+(\mathit{a3}+\mathit{b1}-1)\,\mathit{c2}+(\mathit{b1}+\mathit{b2}-1)\,\mathit{c3})\,\mathit{a1}-}{}\right.\right.\right.$$

2.1404 ODE No. 1404

$$y''(x) = -\frac{\left(1-2x^2\right)y(x)}{4x^6} - \frac{\left(2x^2+1\right)y'(x)}{x^3}$$

✓ **Mathematica** : cpu = 0.0196547 (sec), leaf count = 33

$$\left\{\left\{y(x) \to \frac{c_1e^{\frac{1}{4x^2}}}{x} + c_2e^{\frac{1}{4x^2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.053 (sec), leaf count = 19

$$\left\{y(x) = \frac{\left(c_1x+c_2\right)e^{\frac{1}{4x^2}}}{x}\right\}$$

2.1405 ODE No. 1405

$$y''(x) = \frac{(2x^2+1)\,y'(x)}{x^3} - \frac{(ax^4+10x^2+1)\,y(x)}{4x^6}$$

✓ **Mathematica** : cpu = 0.0541893 (sec), leaf count = 77

$$\left\{\left\{y(x) \to c_1 e^{-\frac{1}{4x^2}} x^{\frac{3}{2}-\frac{\sqrt{9-a}}{2}} + \frac{c_2 e^{-\frac{1}{4x^2}} x^{\frac{\sqrt{9-a}}{2}+\frac{3}{2}}}{\sqrt{9-a}}\right\}\right\}$$

✓ **Maple** : cpu = 0.069 (sec), leaf count = 42

$$\left\{y(x) = \left(c_1 x^{\frac{3}{2}+\frac{\sqrt{-a+9}}{2}} + c_2 x^{\frac{3}{2}-\frac{\sqrt{-a+9}}{2}}\right) \mathrm{e}^{-\frac{1}{4x^2}}\right\}$$

2.1406 ODE No. 1406

$$y''(x) = -\frac{27xy(x)}{16\,(x^3-1)^2}$$

✓ **Mathematica** : cpu = 1.68214 (sec), leaf count = 258

$$\left\{\left\{y(x) \to \frac{\sqrt{2}c_2(1-x)^{3/4}\sqrt[4]{x^2+x+1}\int_1^x \frac{\sqrt{\sqrt{3}K[1]+\sqrt{2K[1]-i\sqrt{3}+1}\sqrt{2K[1]+i\sqrt{3}+1}+\sqrt{3}}}{2(1-K[1])^{3/2}\sqrt{K[1]^2+K[1]+1}}dK[1]}{\sqrt[4]{\sqrt{3}x+\sqrt{2x-i\sqrt{3}+1}\sqrt{2x+i\sqrt{3}+1}+\sqrt{3}}} + \frac{\sqrt{2}c_1(1-}{\sqrt[4]{\sqrt{3}x+\sqrt{2x-i\sqrt{}}}}\right.\right.$$

✓ **Maple** : cpu = 0.163 (sec), leaf count = 44

$$\left\{y(x) = (x^3-1)^{\frac{1}{4}}\left(c_1 \operatorname{LegendreP}\left(-\frac{1}{6}, \frac{1}{3}, \sqrt{-x^3+1}\right) + c_2 \operatorname{LegendreQ}\left(-\frac{1}{6}, \frac{1}{3}, \sqrt{-x^3+1}\right)\right)\sqrt{x}\right\}$$

2.1407 ODE No. 1407

$$y''(x) = -y'(x)\left(\frac{\mathrm{b1}(-\mathrm{al1}-\mathrm{bl1}+1)}{\mathrm{b1}x-\mathrm{a1}} + \frac{\mathrm{b2}(-\mathrm{al2}-\mathrm{bl2}+1)}{\mathrm{b2}x-\mathrm{a2}} + \frac{\mathrm{b3}(-\mathrm{al3}-\mathrm{bl3}+1)}{\mathrm{b3}x-\mathrm{a3}}\right) - \frac{y(x)\left(\frac{\mathrm{al1bl1(a1b2-a2b1)(a3b1-}}{\mathrm{b1}x-\mathrm{a1}}\right.}{}$$

✓ **Mathematica** : cpu = 88.7641 (sec), leaf count = 2002

$$\left\{\left\{y(x) \to \left(x-\frac{\mathrm{a2}}{\mathrm{b2}}\right)^{\frac{1}{2}\left(\mathrm{al2}+\mathrm{bl2}-\sqrt{\mathrm{al2}^2+6\mathrm{bl2al2}+\mathrm{bl2}^2}\right)} \left(x-\frac{\mathrm{a3}}{\mathrm{b3}}\right)^{\frac{1}{2}\left(\mathrm{al3}+\mathrm{bl3}+\sqrt{\mathrm{al3}^2+6\mathrm{bl3al3}+\mathrm{bl3}^2}\right)} c_1 \operatorname{HeunG}\left[\frac{\frac{\mathrm{a1}}{\mathrm{b1}}-\frac{\mathrm{a3}}{\mathrm{b3}}}{\frac{\mathrm{a1}}{\mathrm{b1}}-\frac{\mathrm{a2}}{\mathrm{b2}}}, \frac{\mathrm{a1}}{}\right.\right.\right.$$

✓ **Maple** : cpu = 1.664 (sec), leaf count = 2607

Expression too large to display

2.1408 ODE No. 1408

$$y''(x) = -\frac{y(x)\left(Ax^2+B\right)}{x\left(x^2-\mathrm{a1}\right)\left(x^2-\mathrm{a2}\right)\left(x^2-\mathrm{a3}\right)} - \frac{y'(x)\left(x^2\left(\left(x^2-\mathrm{a1}\right)\left(x^2-\mathrm{a2}\right)+\left(x^2-\mathrm{a1}\right)\left(x^2-\mathrm{a3}\right)+\left(x^2-\mathrm{a2}\right)\left(x^2\right.\right.\right.}{x\left(x^2-\mathrm{a1}\right)\left(x^2-\mathrm{a2}\right)\left(x^2-\mathrm{a3}\right.}$$

✗ **Mathematica** : cpu = 50.8363 (sec), leaf count = 0 , DifferentialRoot result

$$\{\{y(x) \to (x)\}\}$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x) = DESol\left(\left\{\frac{d^2}{dx^2}\_Y(x) + \frac{\left(A\,x^2+B\right)\_Y(x)}{\left(x^2-a1\right)\left(x^2-a2\right)\left(x^2-a3\right)x} + \frac{\left(\left(\left(x^2-a1\right)\left(x^2-a2\right)+\left(x^2-a2\right)\left(x^2-a3\right.\right.\right.}{}\right.\right.\right.$$

2.1409 ODE No. 1409

$$y''(x) = -b^2x^{-2a}y(x) - \frac{ay'(x)}{x}$$

✓ **Mathematica** : cpu = 0.0189317 (sec), leaf count = 43

$$\left\{\left\{y(x) \to c_1 \cos\left(\frac{bx^{1-a}}{a-1}\right) - c_2 \sin\left(\frac{bx^{1-a}}{a-1}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.018 (sec), leaf count = 39

$$\left\{y(x) = c_1 \sin\left(\frac{b\,x^{-a+1}}{a-1}\right) + c_2 \cos\left(\frac{b\,x^{-a+1}}{a-1}\right)\right\}$$

2.1410 ODE No. 1410

$$y''(x) = -\frac{y'(x)\left(apx^b + q\right)}{x\left(ax^b - 1\right)} - \frac{y(x)\left(arx^b + s\right)}{x^2\left(ax^b - 1\right)}$$

✓ **Mathematica** : cpu = 0.0934547 (sec), leaf count = 481

$$\left\{\left\{y(x) \to c_1 i^{\frac{-\sqrt{q^2+2q+4s+1}+q+1}{b}} a^{\frac{-\sqrt{q^2+2q+4s+1}+q+1}{2b}} \left(x^b\right)^{\frac{-\sqrt{q^2+2q+4s+1}+q+1}{2b}} {}_2F_1\left(\frac{p}{2b} + \frac{q}{2b} - \frac{\sqrt{p^2-2p-4r+1}}{2b} - \frac{\sqrt{}}{}\right.\right.\right.$$

✓ **Maple** : cpu = 0.319 (sec), leaf count = 253

$$\left\{y(x) = c_1 x^{\frac{q}{2}+\frac{\sqrt{q^2+2q+4s+1}}{2}+\frac{1}{2}} \operatorname{hypergeom}\left(\left[\frac{p+q+\sqrt{q^2+2q+4s+1}+\sqrt{p^2-2p-4r+1}}{2b}, \frac{p+q+\sqrt{q^2+2q}}{}\right.\right.\right.$$

2.1411 ODE No. 1411

$$y''(x) = \frac{y(x)}{e^x + 1}$$

✓ **Mathematica** : cpu = 0.312218 (sec), leaf count = 42

$$\left\{\left\{y(x) \to c_1\left(e^{-x} + 1\right) + c_2 e^{-x}\left(e^x \log\left(e^x + 1\right) + \log\left(e^x + 1\right) + 1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.023 (sec), leaf count = 27

$$\left\{y(x) = \left(c_1\left(\mathrm{e}^x + 1\right)\ln\left(\mathrm{e}^x + 1\right) + c_2\mathrm{e}^x + c_1 + c_2\right)\mathrm{e}^{-x}\right\}$$

2.1412 ODE No. 1412

$$y''(x) = \frac{y'(x)}{x\log(x)} + y(x)\log^2(x)$$

✓ **Mathematica** : cpu = 0.0133224 (sec), leaf count = 29

$$\{\{y(x) \to c_1\cosh(x(\log(x) - 1)) + ic_2\sinh(x(\log(x) - 1))\}\}$$

✓ **Maple** : cpu = 0.011 (sec), leaf count = 23

$$\{y(x) = c_1\sinh\left(\left(\ln(x) - 1\right)x\right) + c_2\cosh\left(\left(\ln(x) - 1\right)x\right)\}$$

2.1413 ODE No. 1413

$$y''(x) = \frac{y'(x)}{x(\log(x)-1)} - \frac{y(x)}{x^2(\log(x)-1)}$$

✓ **Mathematica** : cpu = 0.0481655 (sec), leaf count = 16

$$\{\{y(x) \to c_1 x - c_2 \log(x)\}\}$$

✓ **Maple** : cpu = 0.099 (sec), leaf count = 12

$$\{y(x) = c_1 x + c_2 \ln(x)\}$$

2.1414 ODE No. 1414

$$y''(x) = y(x)\left(-\operatorname{csch}^2(x)\right)\left((1-n)n - a^2\sinh^2(x)\right)$$

✓ **Mathematica** : cpu = 0.872822 (sec), leaf count = 231

$$\left\{\left\{y(x) \to \frac{c_2(-1)^{\frac{1}{2}(-2n-1)+1}\tanh^2(x)^{\frac{1}{4}(-2n-1)+1}\left(\tanh^2(x)-1\right)^{\frac{1}{2}\left(\frac{a+n}{2}+\frac{1}{2}(a+n+1)+\frac{1}{2}(-2n-1)+1\right)-\frac{1}{2}}\ {}_2F_1\left(\frac{1}{2}(-2n-1\right.}{\sqrt{\tanh(x)}}\right.\right.$$

✓ **Maple** : cpu = 0.28 (sec), leaf count = 97

$$\left\{y(x) = c_1(\sinh^n(x))\operatorname{hypergeom}\left(\left[-\frac{a}{2}+\frac{n}{2}, \frac{a}{2}+\frac{n}{2}\right], \left[\frac{1}{2}\right], \frac{\cosh(2x)}{2}+\frac{1}{2}\right) + \frac{c_2(2\cosh(2x)+2)^{\frac{3}{4}}(2\cosh(2x)}{}\right.$$

2.1415 ODE No. 1415

$$y''(x) = \left(a^2-n^2\right)y(x) - 2n\coth(x)y'(x)$$

✓ **Mathematica** : cpu = 0.758103 (sec), leaf count = 273

$$\left\{\left\{y(x) \to \frac{c_2(-1)^{\frac{1}{2}(-2n-1)+1}\tanh^2(x)^{\frac{1}{4}(-2n-1)+1}\left(\tanh^2(x)-1\right)^{\frac{1}{2}\left(\frac{a+n}{2}+\frac{1}{2}(a+n+1)+\frac{1}{2}(-2n-1)+1\right)}\ {}_2F_1\left(\frac{1}{2}(-2n-1)\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.154 (sec), leaf count = 36

$$\left\{y(x) = \left(c_1 \operatorname{LegendreP}\left(a-\frac{1}{2}, n-\frac{1}{2}, \cosh(x)\right) + c_2 \operatorname{LegendreQ}\left(a-\frac{1}{2}, n-\frac{1}{2}, \cosh(x)\right)\right)\left(\sinh^{-n+\frac{1}{2}}(x)\right)\right\}$$

2.1416 ODE No. 1416

$$y''(x) = (n - v)(n + v + 1)y(x) - (2n + 1)\cot(x)y'(x)$$

✓ **Mathematica** : cpu = 0.181214 (sec), leaf count = 46

$$\left\{\left\{y(x) \to c_1\left(\cos^2(x) - 1\right)^{-n/2} P_v^n(\cos(x)) + c_2\left(\cos^2(x) - 1\right)^{-n/2} Q_v^n(\cos(x))\right\}\right\}$$

✓ **Maple** : cpu = 0.19 (sec), leaf count = 26

$$\{y(x) = (c_1 \operatorname{LegendreP}(v, n, \cos(x)) + c_2 \operatorname{LegendreQ}(v, n, \cos(x)))\left(\sin^{-n}(x)\right)\}$$

2.1417 ODE No. 1417

$$y''(x) = -\csc(x)y'(x)\left(\sin^2(x) - \cos(x)\right) - y(x)\sin^2(x)$$

✓ **Mathematica** : cpu = 0.141609 (sec), leaf count = 52

$$\left\{\left\{y(x) \to c_1 e^{\frac{\cos(x)}{2}} \cos\left(\frac{1}{2}\sqrt{3}\cos(x)\right) + c_2 e^{\frac{\cos(x)}{2}} \sin\left(\frac{1}{2}\sqrt{3}\cos(x)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.153 (sec), leaf count = 31

$$\left\{y(x) = \left(c_1 \sin\left(\frac{\sqrt{3}\cos(x)}{2}\right) + c_2 \cos\left(\frac{\sqrt{3}\cos(x)}{2}\right)\right) e^{\frac{\cos(x)}{2}}\right\}$$

2.1418 ODE No. 1418

$$y''(x) = \frac{y(x)\sin(x)}{x\cos(x) - \sin(x)} - \frac{x\sin(x)y'(x)}{x\cos(x) - \sin(x)}$$

✓ **Mathematica** : cpu = 0.129966 (sec), leaf count = 15

$$\{\{y(x) \to c_1 x + c_2 \sin(x)\}\}$$

✓ **Maple** : cpu = 3.614 (sec), leaf count = 59

$$\left\{y(x) = \left(c_2\left(\int \cos(x)\, e^{\int \frac{-2x\left(\cos^3(x)\right) + 3\left(\cos^2(x)\right)\sin(x) - \sin(x)}{(x\cos(x) - \sin(x))\cos(x)\sin(x)}dx} dx\right) + c_1\right)\sin(x)\right\}$$

2.1419 ODE No. 1419

$$y''(x) = -\frac{\sec(x)y'(x)\left(x^2\sin(x) - 2x\cos(x)\right)}{x^2} - \frac{y(x)\sec(x)(2x\cos(x) - x\sin(x))}{x^2}$$

✗ **Mathematica** : cpu = 1.21778 (sec), leaf count = 0 , could not solve

```
DSolve[Derivative[2][y][x] == -((Sec[x]*(2*x*Cos[x] - x*Sin[x])*y[x])/x^2) - (Sec[x]*(-
2*x*Cos[x] + x^2*Sin[x])*Derivative[1][y][x])/x^2, y[x], x]
```

✓ **Maple** : cpu = 0.227 (sec), leaf count = 12

$$\{y(x) = (c_2\sin(x) + c_1)\,x\}$$

2.1420 ODE No. 1420

$$y(x)\left(-a\cos^2(x) - (n-1)n\right) + \cos^2(x)y''(x) = 0$$

✓ **Mathematica** : cpu = 0.411958 (sec), leaf count = 134

$$\left\{\left\{y(x) \to c_1 i^{1-n}\cos^{1-n}(x)\,{}_2F_1\left(-\frac{n}{2} - \frac{i\sqrt{a}}{2} + \frac{1}{2}, -\frac{n}{2} + \frac{i\sqrt{a}}{2} + \frac{1}{2}; \frac{3}{2} - n; \cos^2(x)\right) + c_2 i^n\cos^n(x)\,{}_2F_1\left(\frac{n}{2} - \frac{i\sqrt{a}}{2}\right.\right.\right.$$

✓ **Maple** : cpu = 0.369 (sec), leaf count = 123

$$\left\{y(x) = c_1\left(\cos^{-n}(x)\right)\text{hypergeom}\left(\left[-\frac{n}{2} + \frac{i\sqrt{a}}{2} + 1, -\frac{n}{2} - \frac{i\sqrt{a}}{2} + 1\right], \left[-n + \frac{3}{2}\right], \frac{\cos(2x)}{2} + \frac{1}{2}\right)\sin(2x) + \frac{c_2(\cdot}{}\right.$$

2.1421 ODE No. 1421

$$y''(x) = -a^2ny(x)\sec^2(ax)\left((n-1)\sin^2(ax) + \cos^2(ax)\right) - a(n-1)\sin(2ax)\sec^2(ax)y'(x)$$

✓ **Mathematica** : cpu = 0.162152 (sec), leaf count = 81

$$\left\{\left\{y(x) \to c_1 e^{-iax}\cos^{n-1}(ax) - \frac{ic_2 e^{2iax}\left(\frac{1}{2}e^{-iax} + \frac{1}{2}e^{iax}\right)^n}{a\left(1 + e^{2iax}\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.127 (sec), leaf count = 27

$$\{y(x) = c_2\left(\cos^{n-1}(ax)\right)\sin(ax) + c_1\left(\cos^n(ax)\right)\}$$

2.1422 ODE No. 1422

$$y''(x) = 2y(x)\csc^2(x)$$

✓ **Mathematica** : cpu = 0.0805171 (sec), leaf count = 58

$$\left\{\left\{y(x)\to \frac{c_1\cos(x)}{\sqrt{\cos^2(x)-1}}+\frac{c_2\left(\cos(x)\left(-\sin^{-1}(\cos(x))\right)-\sqrt{1-\cos^2(x)}\right)}{\sqrt{1-\cos^2(x)}}\right\}\right\}$$

✓ **Maple** : cpu = 0.242 (sec), leaf count = 50

$$\left\{y(x)=\frac{-ic_2\ln\left(\cos(2x)+i\sin(2x)\right)\sin(2x)+c_1\sin(2x)+2c_2(\cos(2x)-1)}{\cos(2x)-1}\right\}$$

2.1423 ODE No. 1423

$$y''(x) = -ay(x)\csc^2(x)$$

✓ **Mathematica** : cpu = 0.0624715 (sec), leaf count = 70

$$\left\{\left\{y(x)\to c_1\sqrt[4]{\cos^2(x)-1}P_{-\frac{1}{2}}^{\frac{1}{2}\sqrt{1-4a}}(\cos(x))+c_2\sqrt[4]{\cos^2(x)-1}Q_{-\frac{1}{2}}^{\frac{1}{2}\sqrt{1-4a}}(\cos(x))\right\}\right\}$$

✓ **Maple** : cpu = 0.325 (sec), leaf count = 132

$$\left\{y(x)=\frac{(2\cos(2x)+2)^{\frac{1}{4}}\sqrt{-2\cos(2x)+2}\left(c_1\,\mathrm{hypergeom}\left(\left[\frac{\sqrt{-4a+1}}{4}+\frac{1}{4},\frac{\sqrt{-4a+1}}{4}+\frac{1}{4}\right],\left[\frac{1}{2}\right],\frac{\cos(2x)}{2}+\frac{1}{2}\right)+c_2\sqrt{\ }\right.}{\sqrt{\sin(2x}}\right.$$

2.1424 ODE No. 1424

$$y(x)\left(-a\sin^2(x)-(n-1)n\right)+\sin^2(x)y''(x)=0$$

✓ **Mathematica** : cpu = 0.213276 (sec), leaf count = 90

$$\left\{\left\{y(x)\to c_1\sqrt[4]{\cos^2(x)-1}P_{\frac{1}{2}i(2\sqrt{a}+i)}^{\frac{1}{2}(2n-1)}(\cos(x))+c_2\sqrt[4]{\cos^2(x)-1}Q_{\frac{1}{2}i(2\sqrt{a}+i)}^{\frac{1}{2}(2n-1)}(\cos(x))\right\}\right\}$$

✓ **Maple** : cpu = 0.322 (sec), leaf count = 120

$$\left\{y(x)=\frac{\left(c_1\,\mathrm{hypergeom}\left(\left[\frac{n}{2}+\frac{i\sqrt{a}}{2},\frac{n}{2}-\frac{i\sqrt{a}}{2}\right],\left[\frac{1}{2}\right],\frac{\cos(2x)}{2}+\frac{1}{2}\right)\left(\sqrt{\sin}(2x)\right)+c_2(2\cos(2x)+2)^{\frac{3}{4}}(-2\cos(2x)+\right.}{\sqrt{\sin(2x)}}\right.$$

2.1425 ODE No. 1425

$$y''(x) = y(x)\csc^2(x)\left(a^2\cos^2(x) + (3-2a)\cos(x) - 3a + 3\right)$$

✓ **Mathematica** : cpu = 0.899361 (sec), leaf count = 236

$$\left\{\left\{y(x) \to \frac{c_2\sqrt{1-\cos(x)}\left(-\frac{(2a-1)(\cos(x)+1)}{-2a\cos(x)+\cos(x)+2}\right)^{a+\frac{1}{2}}(-2a\cos(x)+\cos(x)+2)\left(1-\cos^2(x)\right)^{-a}\left(\frac{(2a-1)(\cos(x)-1)}{(2a-1)\cos(x)-2}\right.}{2}\right.\right.$$

✓ **Maple** : cpu = 0.484 (sec), leaf count = 91

$$\left\{y(x) = \frac{\left(c_2\sqrt{2\cos(x)+2}\,(\cos(x)-1)^{\frac{a}{2}-\frac{1}{4}}(\cos(x)+1)^{-\frac{a}{2}-\frac{1}{4}}\text{hypergeom}\left(\left[a-\frac{1}{2},-a-\frac{1}{2}\right],\left[-a+\frac{3}{2}\right],\frac{\cos(x)}{2}+\right.\right.}{(-2\cos(x)+2)^{\frac{3}{4}}}\right.$$

2.1426 ODE No. 1426

$$y(x)\left(-a^2\cos^2(x) - \frac{b^2}{(2a-3)^2} - 3a - b\cos(x) - 2\right) + \sin^2(x)y''(x) = 0$$

✓ **Mathematica** : cpu = 5.04427 (sec), leaf count = 4128

$$\left\{\left\{y(x) \to \frac{c_1(\cos(x)+1)^{\frac{1}{2}\left(-\frac{8a^2}{-16a^2+48a-36}+\frac{24a}{-16a^2+48a-36}+a-\frac{-32a^2+96a+\sqrt{\left(32a^2-96a+72\right)^2-4\left(-16a^2+48a-36\right)\left(16a^4+16ba^2-88a^2-\right.}}{2\left(-16a^2+48a-36\right)}\right.}}{}\right.\right.$$

✓ **Maple** : cpu = 0.624 (sec), leaf count = 549

$$\left\{y(x) = \frac{\left(c_1(2\cos(x)+2)^{\frac{4a-6-\sqrt{16a^4-72a^2+4b^2-16\left(a-\frac{3}{2}\right)^2b+81}}{8a-12}}\text{hypergeom}\left(\left[\frac{8a^2-8a-\sqrt{16a^4-72a^2+4b^2-16\left(a-\frac{3}{2}\right)^2b+81}+\sqrt{}}{8a-12}\right.\right.\right.}{}\right.$$

2.1427 ODE No. 1427

$$y''(x) = y(x)\left(-\csc^2(x)\right)\left(-\left(\left(a^2b^2-(a+1)^2\right)\sin^2(x)\right)-a(a+1)b\sin(2x)+(1-a)a\right)$$

✓ **Mathematica** : cpu = 0.860577 (sec), leaf count = 129

$$\left\{\left\{y(x)\to c_2\left(e^{-abx}\sin^{-a-1}(x)+\frac{(2a+1)\left(-1+e^{2ix}\right)e^{-abx}\sin^{a-2(a+1)}(x)\,{}_2F_1\left(1,ia(b+i);iba+a+2;e^{2ix}\right)(b}{2(a(b-i)-i)}\right.\right.\right.$$

✓ **Maple** : cpu = 1.349 (sec), leaf count = 203

$$\left\{y(x)=\frac{\left(c_2\left(\int -2\,\mathrm{e}^{-2\left(\int \frac{-a\,b^2+(-2a-1)b\sin(2x)+\left(a\,b^2-a-2\right)\left(\cos^2(2x)\right)-a+(-2(a+1)b\sin(2x)-2a-1)\cos(2x)+1}{(\cos(2x)+1)(b\cos(2x)-b-\sin(2x))}dx\right)}\sin(2x)\,dx\right)+c_1}{\sqrt{\sin(2x)}}\right.$$

2.1428 ODE No. 1428

$$y''(x) = y(x)\left(-\csc^2(x)\right)\left(a\cos^2(x)+b\sin^2(x)+c\right)$$

✓ **Mathematica** : cpu = 0.407911 (sec), leaf count = 104

$$\left\{\left\{y(x)\to c_1\sqrt[4]{\cos^2(x)-1}P_{\frac{1}{2}\left(2\sqrt{b-a}-1\right)}^{\frac{1}{2}\sqrt{-4a-4c+1}}(\cos(x))+c_2\sqrt[4]{\cos^2(x)-1}Q_{\frac{1}{2}\left(2\sqrt{b-a}-1\right)}^{\frac{1}{2}\sqrt{-4a-4c+1}}(\cos(x))\right\}\right\}$$

✓ **Maple** : cpu = 0.341 (sec), leaf count = 183

$$\left\{y(x)=\frac{\sqrt{-2\cos(2x)+2}\,(2\cos(2x)+2)^{\frac{1}{4}}\left(c_1\,\mathrm{hypergeom}\left(\left[\frac{\sqrt{-4a-4c+1}}{4}+\frac{\sqrt{-a+b}}{2}+\frac{1}{4},\frac{\sqrt{-4a-4c+1}}{4}-\frac{\sqrt{-a+b}}{2}+\frac{1}{4}\right.\right.\right.}{}\right.$$

2.1429 ODE No. 1429

$$y''(x) = y(x)\csc^2(x) - \cot(x)y'(x)$$

✓ **Mathematica** : cpu = 0.0424076 (sec), leaf count = 51

$$\left\{\left\{y(x)\to c_1\cosh\left(\log\left(\cos\left(\frac{x}{2}\right)\right)-\log\left(\sin\left(\frac{x}{2}\right)\right)\right)-ic_2\sinh\left(\log\left(\cos\left(\frac{x}{2}\right)\right)-\log\left(\sin\left(\frac{x}{2}\right)\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.048 (sec), leaf count = 25

$$\left\{y(x)=\frac{c_1\sin(x)}{\cos(x)-1}+\frac{c_2(\cos(x)-1)}{\sin(x)}\right\}$$

2.1430 ODE No. 1430

$$y''(x) = -\left(y(x)\csc^2(x)\left(v(v+1)\sin^2(x)-n^2\right)\right)-\cot(x)y'(x)$$

✓ **Mathematica** : cpu = 0.415428 (sec), leaf count = 22

$$\{\{y(x)\to c_1P_v^n(\cos(x))+c_2Q_v^n(\cos(x))\}\}$$

✓ **Maple** : cpu = 0.344 (sec), leaf count = 85

$$\left\{y(x)=\left(c_1\,\mathrm{hypergeom}\left(\left[\frac{n}{2}-\frac{v}{2},\frac{n}{2}+\frac{v}{2}+\frac{1}{2}\right],\left[\frac{1}{2}\right],\frac{\cos(2x)}{2}+\frac{1}{2}\right)+c_2\sqrt{\cos(2x)+1}\,\mathrm{hypergeom}\left(\left[\frac{n}{2}+\frac{v}{2}+\right.\right.\right.$$

2.1431 ODE No. 1431

$$y''(x) = \cot(2x)y'(x) - 2y(x)$$

✓ **Mathematica** : cpu = 0.162883 (sec), leaf count = 80

$$\left\{\left\{y(x)\to c_1\left(\cos^2(x)-\frac{1}{2}\right)-\frac{2}{3}c_2\cos^{\frac{3}{2}}(x)\left(2\cos^2(x)\,{}_2F_1\left(\frac{1}{4},\frac{3}{4};\frac{7}{4};\cos^2(x)\right)-{}_2F_1\left(\frac{1}{4},\frac{3}{4};\frac{7}{4};\cos^2(x)\right)+3(1-\right.\right.\right.$$

✓ **Maple** : cpu = 0.22 (sec), leaf count = 30

$$\left\{y(x)=\left(c_1\,\mathrm{LegendreP}\left(\frac{1}{4},\frac{3}{4},\cos(2x)\right)+c_2\,\mathrm{LegendreQ}\left(\frac{1}{4},\frac{3}{4},\cos(2x)\right)\right)\left(\sin^{\frac{3}{4}}(2x)\right)\right\}$$

2.1432 ODE No. 1432

$$y''(x) = -\cot(x)y'(x) - \frac{1}{4}y(x)\left(-17\sin^2(x) - 1\right)\csc^2(x)$$

✓ **Mathematica** : cpu = 0.0702225 (sec), leaf count = 37

$$\left\{\left\{y(x) \to \frac{c_1 e^{-2x}}{\sqrt{\sin(x)}} + \frac{c_2 e^{2x}}{4\sqrt{\sin(x)}}\right\}\right\}$$

✓ **Maple** : cpu = 0.046 (sec), leaf count = 22

$$\left\{y(x) = \frac{c_1 \sinh(2x) + c_2 \cosh(2x)}{\sqrt{\sin(x)}}\right\}$$

2.1433 ODE No. 1433

$$y''(x) = -\frac{y(x)\sec^2(x)\left(2x^2 + x^2\sin^2(x) - 24\cos^2(x)\right)}{4x^2} - \tan(x)y'(x) + \sqrt{\cos(x)}$$

✓ **Mathematica** : cpu = 0.16091 (sec), leaf count = 46

$$\left\{\left\{y(x) \to \frac{1}{5}c_2 x^3\sqrt{\cos(x)} - \frac{1}{4}x^2\sqrt{\cos(x)} + \frac{c_1\sqrt{\cos(x)}}{x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.109 (sec), leaf count = 28

$$\left\{y(x) = \frac{\left(4c_1x^5 - x^4 + 4c_2\right)\left(\sqrt{\cos}(x)\right)}{4x^2}\right\}$$

2.1434 ODE No. 1434

$$y''(x) = -\frac{b\cot(x)y'(x)}{a} - \frac{y(x)\csc^2(x)\left(c\cos^2(x) + d\cos(x) + e\right)}{a}$$

✓ **Mathematica** : cpu = 71.9133 (sec), leaf count = 1596424

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✓ **Maple** : cpu = 0.656 (sec), leaf count = 517

$$\left\{y(x) = \left(c_1(2\cos(x) + 2)^{-\frac{-2a+\sqrt{a^2+b^2+(-2b-4c+4d-4e)a}}{4a}} \text{hypergeom}\left(\left[-\frac{-2a + 2i\sqrt{4ac - b^2} - \sqrt{a^2 + b^2 + (-2b -}{}\right.\right.\right.\right.$$

2.1435 ODE No. 1435

$$y''(x) = -4y(x)\sin(3x)\csc^3(x)$$

✓ **Mathematica** : cpu = 0.151365 (sec), leaf count = 70

$$\left\{\left\{y(x)\to c_1\sqrt[4]{\cos^2(x)-1}P_{-\frac{1}{2}+4i}^{\frac{i\sqrt{47}}{2}}(\cos(x))+c_2\sqrt[4]{\cos^2(x)-1}Q_{-\frac{1}{2}+4i}^{\frac{i\sqrt{47}}{2}}(\cos(x))\right\}\right\}$$

✓ **Maple** : cpu = 0.159 (sec), leaf count = 38

$$\left\{y(x)=\left(c_1\,\mathrm{LegendreP}\left(-\frac{1}{2}+4i,\frac{i\sqrt{47}}{2},\cos(x)\right)+c_2\,\mathrm{LegendreQ}\left(-\frac{1}{2}+4i,\frac{i\sqrt{47}}{2},\cos(x)\right)\right)\left(\sqrt{\sin}(x)\right)\right\}$$

2.1436 ODE No. 1436

$$y''(x) = -\frac{1}{4}y(x)\csc^2(x)\left(-4n^2+4v(v+1)\sin^2(x)-\cos^2(x)+2\right)$$

✓ **Mathematica** : cpu = 0.58564 (sec), leaf count = 42

$$\left\{\left\{y(x)\to c_1\sqrt[4]{\cos^2(x)-1}P_v^n(\cos(x))+c_2\sqrt[4]{\cos^2(x)-1}Q_v^n(\cos(x))\right\}\right\}$$

✓ **Maple** : cpu = 0.299 (sec), leaf count = 113

$$\left\{y(x)=\frac{\sqrt{-2\cos(2x)+2}\,(2\cos(2x)+2)^{\frac{1}{4}}\left(c_1\,\mathrm{hypergeom}\left(\left[\frac{n}{2}-\frac{v}{2},\frac{n}{2}+\frac{v}{2}+\frac{1}{2}\right],\left[\frac{1}{2}\right],\frac{\cos(2x)}{2}+\frac{1}{2}\right)+c_2\sqrt{2\cos(2\right.}{\sqrt{\sin(2x)}}\right.$$

2.1437 ODE No. 1437

$$y''(x) = \left(3\sin^2(x)+1\right)\csc(x)\sec(x)y'(x)+y(x)\tan^2(x)$$

✓ **Mathematica** : cpu = 0.316576 (sec), leaf count = 42

$$\left\{\left\{y(x)\to c_2\cos^{\frac{1}{2}\left(\sqrt{13}-3\right)}(x)+c_1\cos^{\frac{1}{2}\left(-3-\sqrt{13}\right)}(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.272 (sec), leaf count = 29

$$\left\{y(x)=c_1\left(\cos^{-\frac{3}{2}+\frac{\sqrt{13}}{2}}(x)\right)+c_2\left(\cos^{-\frac{3}{2}-\frac{\sqrt{13}}{2}}(x)\right)\right\}$$

2.1438 ODE No. 1438

$$y''(x) = y(x)\left(-\csc^2(x)\right)\sec^2(x)\left(-a\sin^2(x)\cos^2(x) - (m-1)m\sin^2(x) + (1-n)n\cos^2(x)\right)$$

✓ **Mathematica** : cpu = 1.32953 (sec), leaf count = 615

$$\left\{\left\{y(x) \to \frac{c_2(-1)^{\frac{1}{2}(-2m-1)+1}\cos^2(x)^{\frac{1}{4}(-2m-1)+1}\left(\cos^2(x)-1\right)^{\frac{1}{2}\left(\frac{4am+4\sqrt{-a}n^2+4an-4\sqrt{-a}n+4(-a)^{3/2}+8\sqrt{-a}a+\sqrt{-a}+4mn^2-4}{8a+8n^2-8n+2}\right.}}{}\right.\right.$$

✓ **Maple** : cpu = 0.23 (sec), leaf count = 102

$$\left\{y(x) = \left(c_1(\cos^m(x))\,\text{hypergeom}\left(\left[\frac{m}{2}+\frac{n}{2}+\frac{i\sqrt{a}}{2}, \frac{m}{2}+\frac{n}{2}-\frac{i\sqrt{a}}{2}\right], \left[m+\frac{1}{2}\right], \cos^2(x)\right) + c_2(\cos^{-m+1}(x))\,\text{hy}\right.\right.$$

2.1439 ODE No. 1439

$$y''(x) = \frac{\phi'(x)y'(x)}{\phi(x)-\phi(a)} - \frac{y(x)\left(\phi''(a) - n(n+1)(\phi(x)-\phi(a))^2\right)}{\phi(x)-\phi(a)}$$

✗ **Mathematica** : cpu = 0.862216 (sec), leaf count = 0 , could not solve

```
DSolve[Derivative[2][y][x] == (Derivative[1][phi][x]*Derivative[1][y][x])/(-phi[a] + phi[x])
(n*(1 + n)*(-phi[a] + phi[x])^2) + Derivative[2][phi][a]))/(-phi[a] + phi[x]), y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x) = DESol\left(\left\{-\frac{\left(\frac{d}{dx}\_Y(x)\right)\left(\frac{d}{dx}\phi(x)\right)}{-\phi(a)+\phi(x)} + \frac{\left(-(n+1)\left(-\phi(a)+\phi(x)\right)^2 n + \frac{d^2}{da^2}\phi(a)\right)\_Y(x)}{-\phi(a)+\phi(x)} + \frac{d^2}{dx^2}\_Y(x)\right\}, \right.\right.$$

2.1440 ODE No. 1440

$$y''(x) = -\frac{y'(x)\left(-\phi''(x) - \phi(x)\phi'(x) + \phi(x^3)\right)}{\phi'(x)+\phi(x)^2} - \frac{y(x)\left(-\phi(x)\phi''(x) + \phi(x)^2\left(-\phi'(x)\right) + \phi'(x)^2\right)}{\phi'(x)+\phi(x)^2}$$

✗ **Mathematica** : cpu = 0.827814 (sec), leaf count = 0 , could not solve

```
DSolve[Derivative[2][y][x] == -((Derivative[1][y][x]*(phi[x^3] - phi[x]*Derivative[1][phi][x
(phi[x]^2*Derivative[1][phi][x]) + Derivative[1][phi][x]^2 - phi[x]*Derivative[2][phi][x]))/
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x) = DESol\left(\left\{\frac{\left(-\left(\frac{d}{dx}\phi(x)\right)\phi(x)^2 - \left(\frac{d^2}{dx^2}\phi(x)\right)\phi(x) + \left(\frac{d}{dx}\phi(x)\right)^2\right)\_Y(x)}{\phi(x)^2+\frac{d}{dx}\phi(x)} + \frac{\left(-\left(\frac{d}{dx}\phi(x)\right)\phi(x) - \frac{d^2}{dx^2}\phi(x) + \right.}{\phi(x)^2+\frac{d}{dx}\phi(}\right.\right.\right.$$

2.1441 ODE No. 1441

$$y''(x) = -\frac{y'(x)(-\text{cn}(x|k)\text{dn}(x|k) - 2\text{sn}(x|k))}{\text{sn}(x|k)^2 - \text{sn}(a|k)^2} - \frac{y(x)\left(6k^2\text{sn}(a|k)^4 - 4\left(k^2+1\right)\text{sn}(a|k)^2 + 2\right)}{\text{sn}(x|k)^2 - \text{sn}(a|k)^2} - \frac{1}{\text{sn}(x|k)^2 - \text{sn}(a|k)}$$

✗ **Mathematica** : cpu = 1.76096 (sec), leaf count = 0 , could not solve

```
DSolve[Derivative[2][y][x] == -(-JacobiSN[a, k]^2 + JacobiSN[x, k]^2)^(-1) - ((2 - 4*(1 + k^
JacobiSN[a, k]^2 + JacobiSN[x, k]^2) - ((-(JacobiCN[x, k]*JacobiDN[x, k]) - 2*JacobiSN[x, k]
JacobiSN[a, k]^2 + JacobiSN[x, k]^2), y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x) = DESol\left(\left\{-\frac{2\left(\frac{d}{dx}\_Y(x)\right)\text{cn}(x|k)\,\text{dn}(x|k)\,\text{sn}(x|k)}{\text{sn}\,(x|k)^2 - \text{sn}\,(a|k)} - \frac{\left(-6k^2\text{sn}(a|k)^4 + 4\left(k^2+1\right)\text{sn}(a|k)^2 - 2\right)\_Y(x)}{\text{sn}\,(x|k)^2 - \text{sn}\,(a|k)} + \right.\right.\right.$$

2.1442 ODE No. 1442

$$y''(x) = \frac{y(x)}{f(x)} - \frac{xy'(x)}{f(x)}$$

✓ **Mathematica** : cpu = 0.0775299 (sec), leaf count = 46

$$\left\{\left\{y(x) \to c_2 x \int_1^x \frac{\exp\left(-\int_1^{K[2]} \frac{K[1]}{f(K[1])} dK[1]\right)}{K[2]^2} dK[2] + c_1 x\right\}\right\}$$

✓ **Maple** : cpu = 0.075 (sec), leaf count = 30

$$\left\{y(x) = \left(c_1\left(\int e^{\int \frac{-\frac{x^2}{f(x)}-2}{x}dx} dx\right) + c_2\right) x\right\}$$

2.1443 ODE No. 1443

$$y''(x) = -\frac{f'(x)y'(x)}{2f(x)} - \frac{g(x)y(x)}{f(x)}$$

✗ **Mathematica** : cpu = 0.385637 (sec), leaf count = 0 , could not solve

```
DSolve[Derivative[2][y][x] == -((g[x]*y[x])/f[x]) - (Derivative[1][f][x]*Derivative[1][y][x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x) = DESol\left(\left\{\frac{\_Y(x)\,g(x)}{f\,(x)} + \frac{\left(\frac{d}{dx}\_Y(x)\right)\left(\frac{d}{dx}f(x)\right)}{2f\,(x)} + \frac{d^2}{dx^2}\_Y(x)\right\}, \{\_Y(x)\}\right)\right\}$$

2.1444 ODE No. 1444

$$y''(x) = -by(x)f(x)^{2a} - \frac{af'(x)y'(x)}{f(x)}$$

✗ **Mathematica** : cpu = 1.60517 (sec), leaf count = 0 , could not solve

```
DSolve[Derivative[2][y][x] == -(b*f[x]^(2*a)*y[x]) - (a*Derivative[1][f][x]*Derivative[1][y]
```

✓ **Maple** : cpu = 0.021 (sec), leaf count = 37

$$\left\{y(x) = c_1 \mathrm{e}^{\int i\sqrt{b}\, f(x)^a dx} + c_2 \mathrm{e}^{-\left(\int i\sqrt{b}\, f(x)^a dx\right)}\right\}$$

2.1445 ODE No. 1445

$$y''(x) = -\frac{y'(x)\left(2f(x)g(x)g'(x)^2 - \left(g(x)^2-1\right)\left(2f'(x)g'(x) + f(x)g''(x)\right)\right)}{f(x)\left(g(x)^2-1\right)g'(x)} - \frac{y(x)\left(\left(g(x)^2-1\right)\left(f'(x)\left(2f'(x)g'(x\right.\right.\right.}{}$$

✓ **Mathematica** : cpu = 0.272891 (sec), leaf count = 24

$$\{\{y(x) \to c_1 f(x) P_v(g(x)) + c_2 f(x) Q_v(g(x))\}\}$$

✓ **Maple** : cpu = 0.221 (sec), leaf count = 20

$$\{y(x) = (c_1 \operatorname{LegendreP}(v, g(x)) + c_2 \operatorname{LegendreQ}(v, g(x)))\, f(x)\}$$

2.1446 ODE No. 1446

$$y''(x) = -\frac{(x-1)y(x)}{x^4} - \frac{y'(x)}{x}$$

✓ **Mathematica** : cpu = 0.049076 (sec), leaf count = 33

$$\left\{\left\{y(x) \to c_1 e^{-1/x} - c_2 e^{-1/x} \operatorname{Ei}\left(\frac{2}{x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.058 (sec), leaf count = 22

$$\left\{y(x) = \left(c_2 \operatorname{expIntegral}\left(1, -\frac{2}{x}\right) + c_1\right) \mathrm{e}^{-\frac{1}{x}}\right\}$$

2.1447 ODE No. 1447

$$y''(x) = -\frac{(-x-1)y(x)}{x^4} - \frac{y'(x)}{x}$$

✓ **Mathematica** : cpu = 0.0451344 (sec), leaf count = 29

$$\left\{\left\{y(x) \to c_1 e^{\frac{1}{x}} - c_2 e^{\frac{1}{x}} \text{Ei}\left(-\frac{2}{x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.056 (sec), leaf count = 20

$$\left\{y(x) = \left(c_2 \operatorname{expIntegral}\left(1, \frac{2}{x}\right) + c_1\right) e^{\frac{1}{x}}\right\}$$

2.1448 ODE No. 1448

$$y''(x) = -\frac{b^2 y(x)}{(x^2-a^2)^2}$$

✓ **Mathematica** : cpu = 0.270402 (sec), leaf count = 149

$$\left\{\left\{y(x) \to c_1 (x-a)^{\frac{1}{2}\sqrt{1-\frac{b^2}{a^2}}+\frac{1}{2}} (a+x)^{\frac{1}{2}-\frac{1}{2}\sqrt{1-\frac{b^2}{a^2}}} - \frac{c_2 (x-a)^{\frac{1}{2}-\frac{1}{2}\sqrt{\frac{a^2-b^2}{a^2}}} (a+x)^{\frac{1}{2}\sqrt{\frac{a^2-b^2}{a^2}}+\frac{1}{2}}}{2a\sqrt{\frac{a^2-b^2}{a^2}}}\right\}\right\}$$

✓ **Maple** : cpu = 0.118 (sec), leaf count = 77

$$\left\{y(x) = \sqrt{(a-x)(a+x)}\left(c_1 \left(\frac{a-x}{a+x}\right)^{\frac{\sqrt{a^2-b^2}}{2a}} + c_2 \left(\frac{a-x}{a+x}\right)^{-\frac{\sqrt{a^2-b^2}}{2a}}\right)\right\}$$

2.1449 ODE No. 1449

$$y^{(3)}(x) - \lambda y(x) = 0$$

✓ **Mathematica** : cpu = 0.0414995 (sec), leaf count = 53

$$\left\{\left\{y(x) \to c_1 e^{(-1)^{2/3}\sqrt[3]{\lambda}x} + c_2 e^{-\sqrt[3]{-1}\sqrt[3]{\lambda}x} + c_3 e^{\sqrt[3]{\lambda}x}\right\}\right\}$$

✓ **Maple** : cpu = 0.022 (sec), leaf count = 47

$$\left\{y(x) = c_1 e^{-\frac{(1+i\sqrt{3})\lambda^{\frac{1}{3}}x}{2}} + c_2 e^{\frac{(i\sqrt{3}-1)\lambda^{\frac{1}{3}}x}{2}} + c_3 e^{\lambda^{\frac{1}{3}}x}\right\}$$

2.1450 ODE No. 1450

$$ax^3y(x) - bx + y^{(3)}(x) = 0$$

✓ **Mathematica** : cpu = 7.12367 (sec), leaf count = 3595

$$\left\{\left\{y(x) \to \frac{1}{6}\sqrt[3]{a}c_3\,{}_0F_2\left(;\frac{7}{6},\frac{4}{3};-\frac{ax^6}{216}\right)x^2 + \frac{\sqrt[6]{a}c_2\,{}_0F_2\left(;\frac{5}{6},\frac{7}{6};-\frac{ax^6}{216}\right)x}{\sqrt{6}} + c_1\,{}_0F_2\left(;\frac{2}{3},\frac{5}{6};-\frac{ax^6}{216}\right) + \frac{1}{6}\left(\sqrt[3]{a}\,{}_0F_2\left(;\frac{7}{6}\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.255 (sec), leaf count = 1616

Expression too large to display

2.1451 ODE No. 1451

$$y^{(3)}(x) - ax^by(x) = 0$$

✓ **Mathematica** : cpu = 0.0153159 (sec), leaf count = 168

$$\left\{\left\{y(x) \to (-1)^{\frac{1}{b+3}}(b+3)^{-\frac{3}{b+3}}c_2xa^{\frac{1}{b+3}}\,{}_0F_2\left(;1-\frac{1}{b+3},1+\frac{1}{b+3};\frac{ax^{b+3}}{(b+3)^3}\right) + (-1)^{\frac{2}{b+3}}(b+3)^{-\frac{6}{b+3}}c_3x^2a^{\frac{2}{b+3}}\,{}_0F_2\right.\right.$$

✓ **Maple** : cpu = 0.155 (sec), leaf count = 114

$$\left\{y(x) = c_3x^2\,\mathrm{hypergeom}\left([\,],\left[\frac{b+4}{b+3},\frac{b+5}{b+3}\right],\frac{a\,x^{b+3}}{(b+3)^3}\right) + c_2x\,\mathrm{hypergeom}\left([\,],\left[\frac{b+2}{b+3},\frac{b+4}{b+3}\right],\frac{a\,x^{b+3}}{(b+3)^3}\right) + c_1\,\mathrm{hy}\right.$$

2.1452 ODE No. 1452

$$y^{(3)}(x) + 3y'(x) - 4y(x) = 0$$

✓ **Mathematica** : cpu = 0.0065108 (sec), leaf count = 54

$$\left\{\left\{y(x) \to c_3e^x + c_2e^{-x/2}\cos\left(\frac{\sqrt{15}x}{2}\right) + c_1e^{-x/2}\sin\left(\frac{\sqrt{15}x}{2}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.01 (sec), leaf count = 35

$$\left\{y(x) = c_2\mathrm{e}^{-\frac{x}{2}}\sin\left(\frac{\sqrt{15}\,x}{2}\right) + c_3\cos\left(\frac{\sqrt{15}\,x}{2}\right)\mathrm{e}^{-\frac{x}{2}} + c_1\mathrm{e}^{x}\right\}$$

2.1453 ODE No. 1453

$$a^2(-y'(x)) - e^{2ax}\sin^2(x) + y^{(3)}(x) = 0$$

✓ **Mathematica** : cpu = 1.57547 (sec), leaf count = 128

$$\left\{\left\{y(x) \to \frac{e^{-ax}\left(-9\left(a^2-4\right)a^4e^{3ax}\cos(2x) - 3\left(11a^2-4\right)a^3e^{3ax}\sin(2x) + \left(9a^6+49a^4+56a^2+16\right)\left(12a^2c_1e^{2a\cdots}\right.\right.}{12a^3\left(9a^6+49a^4+56a^2+16\right)}\right.\right.$$

✓ **Maple** : cpu = 0.15 (sec), leaf count = 122

$$\left\{y(x) = \frac{108\left(a^2+4\right)\left(a^2+1\right)\left(-c_1e^{-ax}+c_2e^{ax}+c_3a\right)\left(a^2+\frac{4}{9}\right)a^2 + \left(9a^6+49a^4+56a^2+\left(-9a^6+36a^4\right)\cos\left(2\cdots\right.\right.}{108a^9+588a^7+672a^5+192a^3}\right.$$

2.1454 ODE No. 1454

$$2axy'(x) + ay(x) + y^{(3)}(x) = 0$$

✓ **Mathematica** : cpu = 0.0102548 (sec), leaf count = 79

$$\left\{\left\{y(x) \to c_1\text{Ai}\left(\sqrt[3]{-\frac{1}{2}}\sqrt[3]{a}x\right)^2 + c_3\text{Bi}\left(\sqrt[3]{-\frac{1}{2}}\sqrt[3]{a}x\right)^2 + c_2\text{Ai}\left(\sqrt[3]{-\frac{1}{2}}\sqrt[3]{a}x\right)\text{Bi}\left(\sqrt[3]{-\frac{1}{2}}\sqrt[3]{a}x\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.058 (sec), leaf count = 55

$$\left\{y(x) = c_1\,\text{AiryAi}\left(-\frac{2^{\frac{2}{3}}a^{\frac{1}{3}}x}{2}\right)^2 + c_2\,\text{AiryBi}\left(-\frac{2^{\frac{2}{3}}a^{\frac{1}{3}}x}{2}\right)^2 + c_3\,\text{AiryAi}\left(-\frac{2^{\frac{2}{3}}a^{\frac{1}{3}}x}{2}\right)\text{AiryBi}\left(-\frac{2^{\frac{2}{3}}a^{\frac{1}{3}}x}{2}\right)\right\}$$

2.1455 ODE No. 1455

$$x(a+b-1)y'(x) - aby(x) + x^2(-y''(x)) + y^{(3)}(x) = 0$$

✓ **Mathematica** : cpu = 0.0291283 (sec), leaf count = 127

$$\left\{\left\{y(x) \to \sqrt[3]{-\frac{1}{3}}c_2x\,{}_2F_2\left(\frac{1}{3}-\frac{a}{3},\frac{1}{3}-\frac{b}{3};\frac{2}{3},\frac{4}{3};\frac{x^3}{3}\right) + c_1\,{}_2F_2\left(-\frac{a}{3},-\frac{b}{3};\frac{1}{3},\frac{2}{3};\frac{x^3}{3}\right) + \left(-\frac{1}{3}\right)^{2/3}c_3x^2\,{}_2F_2\left(\frac{2}{3}-\frac{a}{3},\frac{2}{3}\cdots\right.\right.\right.$$

✓ **Maple** : cpu = 0.148 (sec), leaf count = 71

$$\left\{y(x) = c_2x^2\,\text{hypergeom}\left(\left[-\frac{b}{3}+\frac{2}{3},-\frac{a}{3}+\frac{2}{3}\right],\left[\frac{4}{3},\frac{5}{3}\right],\frac{x^3}{3}\right) + c_3x\,\text{hypergeom}\left(\left[-\frac{a}{3}+\frac{1}{3},-\frac{b}{3}+\frac{1}{3}\right],\left[\frac{2}{3},\frac{4}{3}\right],\frac{x^3}{3}\cdots\right.\right.$$

2.1456 ODE No. 1456

$$x^{2c-2}y'(x) + (c-1)x^{2c-3}y(x) + y^{(3)}(x) = 0$$

✓ **Mathematica** : cpu = 0.0304634 (sec), leaf count = 183

$$\left\{\left\{y(x) \to c_1\, {}_1F_2\left(\frac{1}{2} - \frac{1}{2c}; 1 - \frac{1}{c}, 1 - \frac{1}{2c}; -\frac{x^{2c}}{4c^2}\right) + 4^{-1/c}c^{-2/c}c_3\left(x^{2c}\right)^{\frac{1}{c}}\, {}_1F_2\left(\frac{1}{2} + \frac{1}{2c}; 1 + \frac{1}{2c}, 1 + \frac{1}{c}; -\frac{x^{2c}}{4c^2}\right) + 2^{-}\right.\right.$$

✓ **Maple** : cpu = 0.131 (sec), leaf count = 73

$$\left\{y(x) = \left(c_1 \operatorname{BesselJ}\left(\frac{1}{2c}, \frac{x^c}{2c}\right)^2 + c_2 \operatorname{BesselY}\left(\frac{1}{2c}, \frac{x^c}{2c}\right)^2 + c_3 \operatorname{BesselJ}\left(\frac{1}{2c}, \frac{x^c}{2c}\right) \operatorname{BesselY}\left(\frac{1}{2c}, \frac{x^c}{2c}\right)\right) x\right\}$$

2.1457 ODE No. 1457

$$-3y'(x)(a + 2\wp(x; \mathrm{g2}, \mathrm{g3})) + by(x) + y^{(3)}(x) = 0$$

✗ **Mathematica** : cpu = 0.0484378 (sec), leaf count = 0 , could not solve

```
DSolve[b*y[x] - 3*(a + 2*WeierstrassP[x, {g2, g3}])*Derivative[1][y][x] + Derivative[3][y][x
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\{y(x) = DESol\left(\left\{b\_Y(x) + (-3a - 6 \operatorname{WeierstrassP}(x, g2, g3))\left(\frac{d}{dx}\_Y(x)\right) + \frac{d^3}{dx^3}\_Y(x)\right\}, \{\_Y(x)\}\right)\}$$

2.1458 ODE No. 1458

$$\frac{1}{2}y(x)\left(\left(1-n^2\right)\wp'(x; \mathrm{g2}, \mathrm{g3}) - a\right) + \left(1-n^2\right)y'(x)\wp(x; \mathrm{g2}, \mathrm{g3}) + y^{(3)}(x) = 0$$

✗ **Mathematica** : cpu = 0.0209227 (sec), leaf count = 0 , could not solve

```
DSolve[((-a + (1 - n^2)*WeierstrassPPrime[x, {g2, g3}])*y[x])/2 + (1 - n^2)*WeierstrassP[x,
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x) = DESol\left(\left\{\left(-\frac{n^2\mathcal{P}'(x; g2, g3)}{2} - \frac{a}{2} + \frac{\mathcal{P}'(x; g2, g3)}{2}\right)\_Y(x) + \left(-n^2 \operatorname{WeierstrassP}(x, g2, g3) + \text{Weierstra}\right.\right.\right.$$

2.1459 ODE No. 1459

$$-y'(x)(a+4n(n+1)\wp(x;\mathrm{g2},\mathrm{g3}))-2n(n+1)y(x)\wp'(x;\mathrm{g2},\mathrm{g3})+y^{(3)}(x)=0$$

✗ **Mathematica** : cpu = 0.0175501 (sec), leaf count = 0 , could not solve

```
DSolve[-2*n*(1 + n)*WeierstrassPPrime[x, {g2, g3}]*y[x] - (a + 4*n*(1 + n)*WeierstrassP[x, {
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x)=DESol\left(\left\{\left(-n^2\operatorname{WeierstrassP}(x,g2,g3)-n\operatorname{WeierstrassP}(x,g2,g3)-\frac{a}{4}\right)\_Y(x)+\frac{d^2}{dx^2}\_Y(x)\right\},\{\_Y\right.\right.$$

2.1460 ODE No. 1460

$$y'(x)(a+A\wp(x;\mathrm{g2},\mathrm{g3}))+By(x)\wp'(x;\mathrm{g2},\mathrm{g3})+y^{(3)}(x)=0$$

✗ **Mathematica** : cpu = 0.0132418 (sec), leaf count = 0 , could not solve

```
DSolve[B*WeierstrassPPrime[x, {g2, g3}]*y[x] + (a + A*WeierstrassP[x, {g2, g3}])*Derivative[
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x)=DESol\left(\left\{B\_Y(x)\,\mathcal{P}'(x;g2,g3)+(A\operatorname{WeierstrassP}(x,g2,g3)+a)\left(\frac{d}{dx}\_Y(x)\right)+\frac{d^3}{dx^3}\_Y(x)\right\},\{\_Y(x\right.\right.$$

2.1461 ODE No. 1461

$$-y'(x)\left(a+3k^2\mathrm{sn}(z|x)^2\right)+y(x)\left(b+c\,\mathrm{sn}(z|x)^2-3k^2\mathrm{cn}(z|x)\mathrm{dn}(z|x)\mathrm{sn}(z|x)\right)+y^{(3)}(x)=0$$

✗ **Mathematica** : cpu = 0.0390423 (sec), leaf count = 0 , could not solve

```
DSolve[(b - 3*k^2*JacobiCN[z, x]*JacobiDN[z, x]*JacobiSN[z, x] + c*JacobiSN[z, x]^2)*y[x] -
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x)=DESol\left(\left\{\left(-3k^2\mathrm{cn}(z|x)\,\mathrm{dn}(z|x)\,\mathrm{sn}(z|x)+c\,\mathrm{sn}(z|x)^2+b\right)\_Y(x)+\left(-3k^2\mathrm{sn}(z|x)^2-a\right)\left(\frac{d}{dx}\_Y(x)\right)+\right.\right.\right.$$

2.1462 ODE No. 1462

$$-y'(x)\left(a+6k^2\sin^2(x)\right)+by(x)+y^{(3)}(x)=0$$

✗ **Mathematica** : cpu = 0.0483607 (sec), leaf count = 0 , could not solve

```
DSolve[b*y[x] - (a + 6*k^2*Sin[x]^2)*Derivative[1][y][x] + Derivative[3][y][x] == 0, y[x], x
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x)=DESol\left(\left\{b\_Y(x)+\left(-6k^2\left(\sin^2(x)\right)-a\right)\left(\frac{d}{dx}\_Y(x)\right)+\frac{d^3}{dx^3}\_Y(x)\right\},\{\_Y(x)\}\right)\right\}$$

2.1463 ODE No. 1463

$$y(x)f'(x)+2f(x)y'(x)+y^{(3)}(x)=0$$

✗ **Mathematica** : cpu = 0.0483734 (sec), leaf count = 0 , could not solve

```
DSolve[y[x]*Derivative[1][f][x] + 2*f[x]*Derivative[1][y][x] + Derivative[3][y][x] == 0, y[x
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x)=DESol\left(\left\{\frac{\_Y(x)\,f(x)}{2}+\frac{d^2}{dx^2}\_Y(x)\right\},\{\_Y(x)\}\right)^2\right\}$$

2.1464 ODE No. 1464

$$y^{(3)}(x)-2y''(x)-3y'(x)+10y(x)=0$$

✓ **Mathematica** : cpu = 0.0074825 (sec), leaf count = 34

$$\left\{\left\{y(x)\to c_3e^{-2x}+c_2e^{2x}\cos(x)+c_1e^{2x}\sin(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.012 (sec), leaf count = 27

$$\left\{y(x)=c_2e^{2x}\sin(x)+c_3\cos(x)\,e^{2x}+c_1e^{-2x}\right\}$$

2.1465 ODE No. 1465

$$-a^2y'(x) + 2a^2y(x) + y^{(3)}(x) - 2y''(x) - \sinh(x) = 0$$

✓ **Mathematica** : cpu = 0.108254 (sec), leaf count = 95

$$\left\{\left\{y(x) \to \frac{e^{-x}\left(3a^2e^{2x} - a^2 - 3e^{2x} - 12e^x\sinh(x) - 6e^x\cosh(x) + 1\right)}{6(a-2)(a+2)\left(a^2-1\right)} + c_1e^{-ax} + c_3e^{ax} + c_2e^{2x}\right\}\right\}$$

✓ **Maple** : cpu = 0.112 (sec), leaf count = 113

$$\left\{y(x) = \frac{3a^2\mathrm{e}^x - 12\,\mathrm{e}^x + \left(6c_2a^4 - 30c_2a^2 + 24c_2\right)\mathrm{e}^{ax} + 3\,\mathrm{e}^{-x} + 6(a-1)\left(c_1a^2 - 4c_1 - \frac{\cosh(3x)}{6} + \frac{\sinh(3x)}{6}\right)(a+1}{6a^4 - 30a^2 + 24}\right.$$

2.1466 ODE No. 1466

$$a^3(-y(x)) + 3a^2y'(x) - 3ay''(x) - e^{ax} + y^{(3)}(x) = 0$$

✓ **Mathematica** : cpu = 0.010086 (sec), leaf count = 46

$$\left\{\left\{y(x) \to \frac{1}{6}x^3e^{ax} + c_3x^2e^{ax} + c_2xe^{ax} + c_1e^{ax}\right\}\right\}$$

✓ **Maple** : cpu = 0.026 (sec), leaf count = 27

$$\left\{y(x) = \frac{\left(x^3 + 6c_3x^2 + 6c_2x + 6c_1\right)\mathrm{e}^{ax}}{6}\right\}$$

2.1467 ODE No. 1467

$$\mathrm{a0}y(x) + \mathrm{a1}y'(x) + \mathrm{a2}y''(x) + y^{(3)}(x) = 0$$

✓ **Mathematica** : cpu = 0.0054836 (sec), leaf count = 84

$$\left\{\left\{y(x) \to c_1e^{x\mathrm{Root}\left[\#1^3+\#1^2\mathrm{a2}+\#1\mathrm{a1}+\mathrm{a0}\&,1\right]} + c_2e^{x\mathrm{Root}\left[\#1^3+\#1^2\mathrm{a2}+\#1\mathrm{a1}+\mathrm{a0}\&,2\right]} + c_3e^{x\mathrm{Root}\left[\#1^3+\#1^2\mathrm{a2}+\#1\mathrm{a1}+\mathrm{a0}\&,3\right]}\right\}\right.$$

✓ **Maple** : cpu = 0.03 (sec), leaf count = 590

$$\left\{y(x) = c_1\mathrm{e}^{-\frac{\left(\frac{\left(-8a2^3+36a1\,a2-108a0+12\sqrt{12a0\,a2^3-3a1^2a2^2-54a1\,a2\,a0+12a1^3+81a0^2}\right)^{\frac{1}{3}}a2}{3}+\left(\frac{i\sqrt{3}}{12}+\frac{1}{12}\right)\left(-8a2^3+36a1\,a2-108a0+12\sqrt{12a0\,a2^3-3}\right.\right.}{\left(-8a2^3+36a1\,a2-108a0+12\sqrt{12a0\,a2^3-3a1^2a2^2-54a1\,a2\,a0+12a1^3+81a0^2}\right)}}\right.$$

2.1468 ODE No. 1468

$$2\left(2a+4x^2-1\right)y'(x)-8axy(x)+y^{(3)}(x)-6xy''(x)=0$$

✓ **Mathematica** : cpu = 0.0750119 (sec), leaf count = 57

$$\left\{\left\{y(x)\to c_2H_{\frac{a}{2}}(x)\,{}_1F_1\left(-\frac{a}{4};\frac{1}{2};x^2\right)+c_1H_{\frac{a}{2}}(x)^2+c_3\,{}_1F_1\left(-\frac{a}{4};\frac{1}{2};x^2\right)^2\right\}\right\}$$

✓ **Maple** : cpu = 0.117 (sec), leaf count = 59

$$\left\{y(x)=\left(c_1\,\mathrm{KummerM}\left(-\frac{a}{4}+\frac{1}{2},\frac{3}{2},x^2\right)^2+c_2\,\mathrm{KummerU}\left(-\frac{a}{4}+\frac{1}{2},\frac{3}{2},x^2\right)^2+c_3\,\mathrm{KummerM}\left(-\frac{a}{4}+\frac{1}{2},\frac{3}{2},x^2\right)\right.\right.$$

2.1469 ODE No. 1469

$$a^3x^3y(x)+3a^2x^2y'(x)+3axy''(x)+y^{(3)}(x)=0$$

✓ **Mathematica** : cpu = 0.0140404 (sec), leaf count = 72

$$\left\{\left\{y(x)\to c_1e^{-\frac{ax^2}{2}}+c_2e^{-\frac{ax^2}{2}-\sqrt{3}\sqrt{a}x}+c_3e^{\sqrt{3}\sqrt{a}x-\frac{ax^2}{2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.036 (sec), leaf count = 37

$$\left\{y(x)=\left(c_2\mathrm{e}^{\sqrt{3}\sqrt{a}\,x}+c_3\mathrm{e}^{-\sqrt{3}\sqrt{a}\,x}+c_1\right)\mathrm{e}^{-\frac{a\,x^2}{2}}\right\}$$

2.1470 ODE No. 1470

$$y^{(3)}(x)-\sin(x)y''(x)-2\cos(x)y'(x)+y(x)\sin(x)-\log(x)=0$$

✓ **Mathematica** : cpu = 3.90851 (sec), leaf count = 64

$$\left\{\left\{y(x)\to e^{-\cos(x)}\int_1^x\frac{1}{4}e^{\cos(K[1])}\left(2\log(K[1])K[1]^2-3K[1]^2+4c_1K[1]+4c_2\right)dK[1]+c_3e^{-\cos(x)}\right\}\right\}$$

✓ **Maple** : cpu = 0.094 (sec), leaf count = 36

$$\left\{y(x)=\left(c_3+\int\left(\frac{x^2\ln(x)}{2}+2c_1x-\frac{3x^2}{4}+c_2\right)\mathrm{e}^{\cos(x)}dx\right)\mathrm{e}^{-\cos(x)}\right\}$$

2.1471 ODE No. 1471

$$f(x)y''(x) + f(x)y(x) + y^{(3)}(x) + y'(x) = 0$$

✓ **Mathematica** : cpu = 0.112313 (sec), leaf count = 84

$$\left\{\left\{y(x) \to c_3 e^{ix} \int_1^x e^{-2iK[3]} \int_1^{K[3]} \exp\left(\int_1^{K[2]} (i - f(K[1]))dK[1]\right) dK[2]dK[3] + c_1 e^{ix} + \frac{1}{2} i c_2 e^{-ix}\right\}\right\}$$

✓ **Maple** : cpu = 0.157 (sec), leaf count = 36

$$\{y(x) = \left(c_1 + \int \left(c_2 + \int c_3 e^{\int(-f(x)+i)dx} dx\right) e^{-2ix} dx\right) e^{ix}\}$$

2.1472 ODE No. 1472

$$f(x)\left(x^2 y''(x) - 2xy'(x) + 2y(x)\right) + y^{(3)}(x) = 0$$

✓ **Mathematica** : cpu = 0.135757 (sec), leaf count = 88

$$\left\{\left\{y(x) \to c_3 x \left(\int_1^x \frac{\exp\left(-\int_1^{K[2]} f(K[1])K[1]^2 dK[1]\right)}{K[2]^2} dK[2] - x \int_1^x \frac{\exp\left(-\int_1^{K[3]} f(K[1])K[1]^2 dK[1]\right)}{K[3]^3} dK[3]\right)\right.\right.$$

✓ **Maple** : cpu = 0.159 (sec), leaf count = 33

$$\left\{y(x) = \left(c_3 + \int \left(c_2 \left(\int e^{-\left(\int \left(x^2 f(x) + \frac{3}{x}\right) dx\right)} dx\right) + c_1\right) dx\right) x\right\}$$

2.1473 ODE No. 1473

$$y(x)\left(f(x)g(x) + g'(x)\right) + f(x)y''(x) + g(x)y'(x) + y^{(3)}(x) = 0$$

✗ **Mathematica** : cpu = 0.0117768 (sec), leaf count = 0 , could not solve

```
DSolve[y[x]*(f[x]*g[x] + Derivative[1][g][x]) + g[x]*Derivative[1][y][x] + f[x]*Derivative[2
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\{y(x) = DESol\left(\left\{\left(\frac{d}{dx}\_Y(x)\right) g(x) + \left(\frac{d^2}{dx^2}\_Y(x)\right) f(x) + \left(f(x)\, g(x) + \frac{d}{dx} g(x)\right) \_Y(x) + \frac{d^3}{dx^3}\_Y(x)\right\}, \{\_Y$$

2.1474 ODE No. 1474

$$y'(x)\left(f'(x)+2f(x)^2+4g(x)\right)+y(x)\left(4f(x)g(x)+2g'(x)\right)+3f(x)y''(x)+y^{(3)}(x)=0$$

✗ **Mathematica** : cpu = 0.0145226 (sec), leaf count = 0 , could not solve

```
DSolve[y[x]*(4*f[x]*g[x] + 2*Derivative[1][g][x]) + (2*f[x]^2 + 4*g[x] + Derivative[1][f][x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x)=DESol\left(\left\{\_Y(x)\,g(x)+\left(\frac{d}{dx}\_Y(x)\right)f(x)+\frac{d^2}{dx^2}\_Y(x)\right\},\{\_Y(x)\}\right)^2\right\}$$

2.1475 ODE No. 1475

$$4y^{(3)}(x)-8y''(x)-11y'(x)-3y(x)+18e^x=0$$

✓ **Mathematica** : cpu = 0.0708775 (sec), leaf count = 38

$$\left\{\left\{y(x)\to e^x+c_1e^{-x/2}+c_2e^{-x/2}x+c_3e^{3x}\right\}\right\}$$

✓ **Maple** : cpu = 0.025 (sec), leaf count = 23

$$\left\{y(x)=c_1\mathrm{e}^{3x}+\mathrm{e}^x+(c_3x+c_2)\,\mathrm{e}^{-\frac{x}{2}}\right\}$$

2.1476 ODE No. 1476

$$-36n^2y'(x)\wp(x;\mathrm{g2},\mathrm{g3})-2(n+3)(4n-3)ny(x)\phi'(x)+27y^{(3)}(x)=0$$

✗ **Mathematica** : cpu = 0.166206 (sec), leaf count = 0 , could not solve

```
DSolve[-2*n*(3 + n)*(-3 + 4*n)*y[x]*Derivative[1][phi][x] - 36*n^2*WeierstrassP[x, {g2, g3}]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x)=DESol\left(\left\{-36n^2\,\mathrm{WeierstrassP}\left(x,g2,g3\right)\left(\frac{d}{dx}\_Y(x)\right)+\left(-8n^3\mathcal{P}'(x;g2,g3)-18n^2\mathcal{P}'(x;g2,g3)+18n\right.\right.\right.$$

2.1477 ODE No. 1477

$$xy^{(3)}(x) + 3y''(x) + xy(x) = 0$$

✓ **Mathematica** : cpu = 0.182079 (sec), leaf count = 48

$$\left\{\left\{y(x) \to \frac{c_1 e^{-x}}{x} + \frac{c_2 e^{\sqrt[3]{-1}x}}{x} + \frac{c_3 e^{-(-1)^{2/3}x}}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.027 (sec), leaf count = 41

$$\left\{y(x) = \frac{c_2 e^{\frac{x}{2}} \sin\left(\frac{\sqrt{3}\,x}{2}\right) + c_3 \cos\left(\frac{\sqrt{3}\,x}{2}\right) e^{\frac{x}{2}} + c_1 e^{-x}}{x}\right\}$$

2.1478 ODE No. 1478

$$-ax^2y(x) + xy^{(3)}(x) + 3y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0445613 (sec), leaf count = 104

$$\left\{\left\{y(x) \to -\frac{2(-1)^{3/4}\sqrt{2}c_1\,{}_0F_2\left(;\frac{1}{2},\frac{3}{4};\frac{ax^4}{64}\right)}{\sqrt[4]{a}x} + c_2\,{}_0F_2\left(;\frac{3}{4},\frac{5}{4};\frac{ax^4}{64}\right) + \frac{\sqrt[4]{-1}\sqrt[4]{a}c_3x\,{}_0F_2\left(;\frac{5}{4},\frac{3}{2};\frac{ax^4}{64}\right)}{2\sqrt{2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.102 (sec), leaf count = 48

$$\left\{y(x) = c_3 x \,\mathrm{hypergeom}\left([\,], \left[\frac{5}{4}, \frac{3}{2}\right], \frac{a\,x^4}{64}\right) + c_1 \,\mathrm{hypergeom}\left([\,], \left[\frac{3}{4}, \frac{5}{4}\right], \frac{a\,x^4}{64}\right) + \frac{c_2 \,\mathrm{hypergeom}\left([\,], \left[\frac{1}{2}, \frac{3}{4}\right], \frac{a\,x^4}{64}\right)}{x}\right.$$

2.1479 ODE No. 1479

$$(a+b)y''(x) - ay(x) + xy^{(3)}(x) - xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.150543 (sec), leaf count = 153

$$\left\{\left\{y(x) \to \frac{1}{2}ic_2x\,{}_1F_2\left(\frac{a}{2}+\frac{1}{2};\frac{3}{2},\frac{a}{2}+\frac{b}{2}+\frac{1}{2};\frac{x^2}{4}\right) + c_1\,{}_1F_2\left(\frac{a}{2};\frac{1}{2},\frac{a}{2}+\frac{b}{2};\frac{x^2}{4}\right) + c_3\left(\frac{i}{2}\right)^{-a-b+2} x^{-a-b+2}\,{}_1F_2\left(1-\right.\right.\right.$$

✓ **Maple** : cpu = 0.201 (sec), leaf count = 92

$$\left\{y(x) = c_2 x \,\mathrm{hypergeom}\left(\left[\frac{a}{2}+\frac{1}{2}\right], \left[\frac{3}{2}, \frac{a}{2}+\frac{b}{2}+\frac{1}{2}\right], \frac{x^2}{4}\right) + c_3 x^{-a-b+2} \,\mathrm{hypergeom}\left(\left[-\frac{b}{2}+1\right], \left[-\frac{a}{2}-\frac{b}{2}+2, -\right.\right.\right.$$

2.1480 ODE No. 1480

$$-(2v+x)y''(x)-(-2v+x-1)y'(x)+xy^{(3)}(x)+(x-1)y(x)=0$$

✓ **Mathematica** : cpu = 0.27502 (sec), leaf count = 93

$$\left\{\left\{y(x)\to \frac{c_3e^x x^{2v+2}\Gamma\left(v+\frac{3}{2}\right)\,{}_1\tilde{F}_1\left(v+\frac{3}{2};2v+3;-2x\right)}{\Gamma\left(\frac{1}{2}-v\right)}+c_2 2^{-2v-2}e^x G_{2,3}^{2,1}\left(2x\middle|\begin{array}{c}1,v+\frac{3}{2}\\1,2(v+1),0\end{array}\right)+c_1e^x\right\}\right\}$$

✓ **Maple** : cpu = 0.217 (sec), leaf count = 35

$$\left\{y(x)=c_2x^{v+1}\operatorname{BesselI}(-v-1,x)+c_3x^{v+1}\operatorname{BesselK}(v+1,x)+c_1e^x\right\}$$

2.1481 ODE No. 1481

$$-f(x)+\left(x^2-3\right)y''(x)+xy^{(3)}(x)+4xy'(x)+2y(x)=0$$

✓ **Mathematica** : cpu = 0.548543 (sec), leaf count = 432

$$\left\{\left\{y(x)\to -\frac{1}{240}e^{-\frac{x^2}{2}}\left(-240x^5\int_1^x\left(-\frac{1}{240}\left(15\operatorname{Ei}\left(\frac{K[1]^2}{2}\right)+16e^{\frac{K[1]^2}{2}}\right)f(K[1])+\frac{1}{15}\sqrt{\frac{\pi}{2}}\operatorname{erfi}\left(\frac{K[1]}{\sqrt{2}}\right)K[1]f(K\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.067 (sec), leaf count = 44

$$\left\{y(x)=\left(c_3+\int\frac{\left(2c_1x+c_2-\left(\int\int -f(x)\,dxdx\right)\right)e^{\frac{x^2}{2}}}{x^6}dx\right)x^5e^{-\frac{x^2}{2}}\right\}$$

2.1482 ODE No. 1482

$$axy(x)-b+2xy^{(3)}(x)+3y''(x)=0$$

✓ **Mathematica** : cpu = 12.0268 (sec), leaf count = 3629

$$\left\{\left\{y(x)\to c_1\,{}_0F_2\left(;\frac{2}{3},\frac{5}{6};-\frac{ax^3}{54}\right)+\frac{\sqrt[6]{a}\sqrt{x}c_2\,{}_0F_2\left(;\frac{5}{6},\frac{7}{6};-\frac{ax^3}{54}\right)}{\sqrt[6]{2}\sqrt{3}}+\frac{\sqrt[3]{a}xc_3\,{}_0F_2\left(;\frac{7}{6},\frac{4}{3};-\frac{ax^3}{54}\right)}{3\sqrt[3]{2}}+\frac{1}{6}\left(6\,{}_0F_2\left(;\frac{2}{3},\frac{5}{6};-\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.298 (sec), leaf count = 1616

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2.1483 ODE No. 1483

$$-4(\nu+x-1)y''(x)+(6\nu+2x-5)y'(x)+(1-2\nu)y(x)+2xy^{(3)}(x)=0$$

✓ **Mathematica** : cpu = 0.14485 (sec), leaf count = 112

$$\left\{\left\{y(x)\to\frac{c_3e^x x\Gamma\left(\frac{5}{2}-3\nu\right)\left(\frac{2\,{}_1\tilde{F}_1\left(\frac{3}{2}-3\nu;1-2\nu;-x\right)}{3(2\nu-1)x}+\frac{2}{3x\Gamma(2-2\nu)}\right)}{\Gamma\left(\frac{3}{2}-\nu\right)}+c_2e^xG_{2,3}^{2,1}\left(x\left|\begin{array}{c}1,3\nu-\frac{1}{2}\\1,2\nu,0\end{array}\right.\right)+c_1e^x\right\}\right\}$$

✓ **Maple** : cpu = 0.233 (sec), leaf count = 37

$$\left\{y(x)=c_2x^\nu\,\mathrm{BesselI}\left(\nu,\frac{x}{2}\right)\mathrm{e}^{\frac{x}{2}}+c_3x^\nu\,\mathrm{BesselK}\left(\nu,\frac{x}{2}\right)\mathrm{e}^{\frac{x}{2}}+c_1\mathrm{e}^x\right\}$$

2.1484 ODE No. 1484

$$6y'(x)(ak+bx)+3(2ax+k)y''(x)+y(x)(3bk+2cx)+2xy^{(3)}(x)=0$$

✗ **Mathematica** : cpu = 62.495 (sec), leaf count = 0 , DifferentialRoot result

$$\{\{y(x)\to(x)\}\}$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\{y(x)=DESol\left(\left\{2x\left(\frac{d^3}{dx^3}\_Y(x)\right)+(3bk+2cx)\_Y(x)+(6ak+6bx)\left(\frac{d}{dx}\_Y(x)\right)+(6ax+3k)\left(\frac{d^2}{dx^2}\_Y(x)\right.\right.\right.$$

2.1485 ODE No. 1485

$$(x-2)xy^{(3)}(x)-(x-2)xy''(x)-2y'(x)+2y(x)=0$$

✓ **Mathematica** : cpu = 0.239767 (sec), leaf count = 64

$$\left\{\left\{y(x)\to\frac{1}{4}c_3x^2\left(-\frac{4e^{x-2}\mathrm{Ei}(2-x)}{x^2}+\frac{2}{x^2}+\frac{2}{x}+\log(2-x)-\log(x)\right)+c_1x^2+c_2e^x\right\}\right\}$$

✓ **Maple** : cpu = 0.3 (sec), leaf count = 51

$$\left\{y(x)=-\frac{c_3x^2\ln(x)}{4}+\frac{c_3x^2\ln(x-2)}{4}+c_1x^2+c_3\,\mathrm{expIntegral}\,(1,x-2)\,\mathrm{e}^{x-2}+c_2\mathrm{e}^x+\frac{c_3(2x+2)}{4}\right\}$$

2.1486 ODE No. 1486

$$(2x-1)y^{(3)}(x) - 8xy'(x) + 8y(x) = 0$$

✓ **Mathematica** : cpu = 0.331237 (sec), leaf count = 65

$$\left\{\left\{y(x) \to \frac{1}{4}c_3x\left(\frac{e^{2x-2}\text{Ei}(2-4x)}{x} - \frac{2\text{Ei}(1-2x)}{e} - \frac{e^{-2x}}{x}\right) + c_1x - c_2e^{2x}\right\}\right\}$$

✓ **Maple** : cpu = 0.208 (sec), leaf count = 51

$$\left\{y(x) = c_1x + c_2\mathrm{e}^{2x} - \frac{c_3\left(2\,\mathrm{e}^{-1}x\,\mathrm{expIntegral}\left(1, 2x-1\right) - \mathrm{expIntegral}\left(1, 4x-2\right)\mathrm{e}^{2x-2} - \mathrm{e}^{-2x}\right)}{4}\right\}$$

2.1487 ODE No. 1487

$$(2x-1)y^{(3)}(x) + (x+4)y''(x) + 2y'(x) = 0$$

✓ **Mathematica** : cpu = 0.974209 (sec), leaf count = 87

$$\left\{\left\{y(x) \to \int_1^x \left(\frac{e^{-\frac{K[1]}{2}}c_1\left(1 + \frac{1}{4\left(\frac{K[1]}{2} - \frac{1}{4}\right)}\right)}{\sqrt[4]{\frac{K[1]}{2} - \frac{1}{4}}} + e^{-\frac{K[1]}{2}}c_2L_{-\frac{1}{4}}^{\frac{5}{4}}\left(\frac{K[1]}{2} - \frac{1}{4}\right)\right)dK[1] + c_3\right\}\right\}$$

✓ **Maple** : cpu = 0.141 (sec), leaf count = 38

$$\left\{y(x) = \frac{\left(c_3 + \int \frac{(2c_1x+c_2)\mathrm{e}^{\frac{x}{2}}}{(2x-1)^{\frac{3}{4}}}dx\right)\mathrm{e}^{-\frac{x}{2}}}{(2x-1)^{\frac{1}{4}}}\right\}$$

2.1488 ODE No. 1488

$$ax^2y(x) + x^2y^{(3)}(x) - 6y'(x) = 0$$

✓ **Mathematica** : cpu = 0.61823 (sec), leaf count = 102

$$\left\{\left\{y(x) \to \frac{c_1e^{-\sqrt[3]{a}x}\left(\sqrt[3]{a}x+2\right)}{x} + \frac{c_2e^{\sqrt[3]{-1}\sqrt[3]{a}x}\left(\sqrt[3]{a}x + 2(-1)^{2/3}\right)}{x} + \frac{c_3e^{-(-1)^{2/3}\sqrt[3]{a}x}\left(\sqrt[3]{a}x - 2\sqrt[3]{-1}\right)}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.5 (sec), leaf count = 135

$$\left\{y(x) = \frac{c_1\left(a^3x + 2(-a^4)^{\frac{2}{3}}\right)e^{\frac{(-a^4)^{\frac{1}{3}}x}{a}} - c_2\left(ia^3x + (-i+\sqrt{3})(-a^4)^{\frac{2}{3}}\right)e^{\frac{i(\sqrt{3}+i)(-a^4)^{\frac{1}{3}}x}{2a}} - c_3\left(ia^3x + (-i-\sqrt{3})\right.}{x}\right.$$

2.1489 ODE No. 1489

$$x^2y^{(3)}(x) + (x+1)y''(x) - y(x) = 0$$

✗ **Mathematica** : cpu = 0.831859 (sec), leaf count = 0 , DifferentialRoot result

$$\{\{y(x) \to (x)\}\}$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x) = DESol\left(\left\{x^2\left(\frac{d^3}{dx^3}\_Y(x)\right) - \_Y(x) + (x+1)\left(\frac{d^2}{dx^2}\_Y(x)\right)\right\}, \{\_Y(x)\}\right)\right\}$$

2.1490 ODE No. 1490

$$x^2y^{(3)}(x) + \left(x^2+1\right)y'(x) - xy''(x) = 0$$

✓ **Mathematica** : cpu = 0.0519733 (sec), leaf count = 33

$$\left\{\left\{y(x) \to \frac{1}{2}c_1x^2\,{}_0\tilde{F}_1\left(;2;-\frac{x^2}{4}\right) + c_2xY_1(x) + c_3\right\}\right\}$$

✓ **Maple** : cpu = 0.074 (sec), leaf count = 18

$$\{y(x) = c_2x\,\mathrm{BesselJ}\,(1,x) + c_3x\,\mathrm{BesselY}\,(1,x) + c_1\}$$

2.1491 ODE No. 1491

$$\left(-4a^2\nu^2 + 4a^2x^{2a} + 1\right)y'(x) + x^2y^{(3)}(x) + 3xy''(x) = 4a^3x^{2a-1}y(x)$$

✓ **Mathematica** : cpu = 0.03516 (sec), leaf count = 102

$$\left\{\left\{y(x) \to c_2\left(x^{2a}\right)^{-\nu}\,{}_1F_2\left(-\nu-\frac{1}{2};1-2\nu,1-\nu;-x^{2a}\right) + c_3\left(x^{2a}\right)^{\nu}\,{}_1F_2\left(\nu-\frac{1}{2};\nu+1,2\nu+1;-x^{2a}\right) + c_1\,{}_1F_2\left(\right.\right.\right.$$

✓ **Maple** : cpu = 0.099 (sec), leaf count = 88

$$\left\{y(x) = c_2x^{-2a\nu}\,\mathrm{hypergeom}\left(\left[-\nu-\frac{1}{2}\right], [-2\nu+1, -\nu+1], -x^{2a}\right) + c_3x^{2a\nu}\,\mathrm{hypergeom}\left(\left[\nu-\frac{1}{2}\right], [\nu+1, 2\nu+\right.\right.$$

2.1492 ODE No. 1492

$$\left(4x(n-m)+m(2m-1)+2x^2\right)y'(x)-2n(-2m+2x+1)y(x)-3x(x-m)y''(x)+x^2y^{(3)}(x)=0$$

✓ **Mathematica** : cpu = 0.391762 (sec), leaf count = 43

$$\left\{\left\{y(x)\to c_2U(-n,m,x)L_n^{m-1}(x)+c_1U(-n,m,x)^2+c_3L_n^{m-1}(x)^2\right\}\right\}$$

✓ **Maple** : cpu = 0.141 (sec), leaf count = 39

$$\left\{y(x)=c_1\operatorname{KummerM}(-n,m,x)^2+c_2\operatorname{KummerU}(-n,m,x)^2+c_3\operatorname{KummerM}(-n,m,x)\operatorname{KummerU}(-n,m,x)\right\}$$

2.1493 ODE No. 1493

$$-f(x)+x^2y^{(3)}(x)+\left(x^2+2\right)y'(x)+4xy''(x)+3xy(x)=0$$

✓ **Mathematica** : cpu = 1.60243 (sec), leaf count = 2585

$$\left\{\left\{y(x)\to J_0(x)c_1+2Y_0(x)c_2+\frac{2c_3\,{}_1F_2\left(1;\frac{1}{2},\frac{1}{2};-\frac{x^2}{4}\right)}{x}+\frac{xJ_0(x)\int_1^x\left(\frac{-16J_1(K[1])Y_0(K[1])^2f(K[1])\,{}_1F_2\left(3;\frac{5}{2},\frac{5}{2};-\frac{1}{4}K[1]^2\right)}{}\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.326 (sec), leaf count = 1033

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2.1494 ODE No. 1494

$$x^2y^{(3)}(x)+5xy''(x)+4y'(x)-\log(x)=0$$

✓ **Mathematica** : cpu = 0.0211999 (sec), leaf count = 43

$$\left\{\left\{y(x)\to-\frac{x}{2}+\frac{1}{4}x\log(x)-\frac{c_1}{x}-\frac{2c_2}{x}-\frac{2c_2\log(x)}{x}+c_3\right\}\right\}$$

✓ **Maple** : cpu = 0.029 (sec), leaf count = 32

$$\left\{y(x)=\frac{4c_1x-2x^2+4c_3+\left(x^2+4c_2\right)\ln(x)}{4x}\right\}$$

2.1495 ODE No. 1495

$$x^2 y^{(3)}(x) + 6xy''(x) + 6y'(x) = 0$$

✓ **Mathematica** : cpu = 0.0074537 (sec), leaf count = 24

$$\left\{\left\{y(x) \to -\frac{c_1}{2x^2} - \frac{c_2}{x} + c_3\right\}\right\}$$

✓ **Maple** : cpu = 0.013 (sec), leaf count = 16

$$\left\{y(x) = c_1 + \frac{c_2}{x} + \frac{c_3}{x^2}\right\}$$

2.1496 ODE No. 1496

$$ax^2 y(x) + x^2 y^{(3)}(x) + 6xy''(x) + 6y'(x) = 0$$

✓ **Mathematica** : cpu = 0.258026 (sec), leaf count = 63

$$\left\{\left\{y(x) \to \frac{c_1 e^{-\sqrt[3]{a}x}}{x^2} + \frac{c_2 e^{\sqrt[3]{-1}\sqrt[3]{a}x}}{x^2} + \frac{c_3 e^{-(-1)^{2/3}\sqrt[3]{a}x}}{x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.03 (sec), leaf count = 57

$$\left\{y(x) = \frac{c_1 e^{\frac{(-a)^{\frac{1}{3}}\left(i\sqrt{3}-1\right)x}{2}} + c_2 e^{-\frac{(-a)^{\frac{1}{3}}\left(1+i\sqrt{3}\right)x}{2}} + c_3 e^{(-a)^{\frac{1}{3}}x}}{x^2}\right\}$$

2.1497 ODE No. 1497

$$-3x(p+q)y''(x) + 3p(3q+1)y'(x) + x^2 y^{(3)}(x) + x^2(-y(x)) = 0$$

✓ **Mathematica** : cpu = 0.538492 (sec), leaf count = 135

$$\left\{\left\{y(x) \to c_1\, {}_0F_2\left(;\frac{2}{3}-p,\frac{1}{3}-q;\frac{x^3}{27}\right) + c_2(-1)^{\frac{1}{3}(3p+1)}3^{-3p-1}x^{3p+1}\, {}_0F_2\left(;p+\frac{4}{3},p-q+\frac{2}{3};\frac{x^3}{27}\right) + c_3(-1)^{\frac{1}{3}(3q+2)}\right.\right.$$

✓ **Maple** : cpu = 0.227 (sec), leaf count = 77

$$\left\{y(x) = c_2 x^{3p+1}\,\mathrm{hypergeom}\left([\,],\left[p+\frac{4}{3},p-q+\frac{2}{3}\right],\frac{x^3}{27}\right) + c_3 x^{3q+2}\,\mathrm{hypergeom}\left([\,],\left[q+\frac{5}{3},-p+q+\frac{4}{3}\right],\frac{x^3}{27}\right)\right.$$

2.1498 ODE No. 1498

$$(ax^2 + 6n)\, y'(x) - 2axy(x) - 2(n+1)xy''(x) + x^2y^{(3)}(x) = 0$$

✓ **Mathematica** : cpu = 13.6002 (sec), leaf count = 584

$$\left\{\left\{y(x) \to -\frac{\pi c_3 2^{-n-\frac{3}{2}} x \left(\sqrt{a}x\right)^{-n-\frac{1}{2}} \left(-a^{3/2} 2^{2n} x^3 \sec(\pi n) \Gamma\left(\frac{3}{2}-n\right) \Gamma\left(n+\frac{3}{2}\right) J_{\frac{1}{2}(2n+1)}\left(\sqrt{a}x\right) \, {}_1\tilde{F}_2\left(\frac{3}{2}-n; \frac{1}{2}-n,\right.\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.222 (sec), leaf count = 53

$$\left\{y(x) = c_1 x^{n+\frac{1}{2}} \operatorname{BesselJ}\left(-n-\frac{1}{2}, \sqrt{a}\,x\right) + c_2 x^{n+\frac{1}{2}} \operatorname{BesselY}\left(-n-\frac{1}{2}, \sqrt{a}\,x\right) + c_3\left(a\,x^2 + 4n - 2\right)\right\}$$

2.1499 ODE No. 1499

$$-\left(\nu^2 + x^2 - \frac{1}{4}\right) y'(x) + \left(\nu^2 + x^2 - 2x - \frac{1}{4}\right) y(x) + x^2 y^{(3)}(x) - \left(x^2 - 2x\right) y''(x) = 0$$

✓ **Mathematica** : cpu = 0.316308 (sec), leaf count = 97

$$\left\{\left\{y(x) \to \frac{c_3 e^x x^{\nu+\frac{1}{2}} \Gamma\left(\nu+\frac{1}{2}\right) \, {}_1\tilde{F}_1\left(\nu+\frac{1}{2}; 2\nu+1; -2x\right)}{\Gamma\left(\frac{3}{2}-\nu\right)} + c_2 2^{-\nu-\frac{1}{2}} e^x G_{2,3}^{2,1}\left(2x \middle| \begin{array}{c} 1, 0 \\ \frac{1}{2}-\nu, \nu+\frac{1}{2}, 0 \end{array}\right) + c_1 e^x\right\}\right\}$$

✓ **Maple** : cpu = 0.218 (sec), leaf count = 25

$$\left\{y(x) = c_2\sqrt{x} \operatorname{BesselI}(\nu, x) + c_3\sqrt{x} \operatorname{BesselK}(\nu, x) + c_1 e^x\right\}$$

2.1500 ODE No. 1500

$$\nu(2x+1)y'(x) - \nu(x+1)y(x) - x(v+x)y''(x) + x^2y^{(3)}(x) = 0$$

✗ **Mathematica** : cpu = 45.9694 (sec), leaf count = 0 , DifferentialRoot result

$$\{\{y(x) \to (x)\}\}$$

✓ **Maple** : cpu = 0.189 (sec), leaf count = 55

$$\left\{y(x) = c_2 x^{\frac{\nu}{2}+\frac{1}{2}} \operatorname{BesselJ}\left(-\nu-1, 2\sqrt{\nu}\,\sqrt{x}\right) + c_3 x^{\frac{\nu}{2}+\frac{1}{2}} \operatorname{BesselY}\left(-\nu-1, 2\sqrt{\nu}\,\sqrt{x}\right) + c_1 e^x\right\}$$

2.1501 ODE No. 1501

$$\left(-\nu^2+x^2-2x+\frac{1}{4}\right)y'(x)+\left(\nu^2-\frac{1}{4}\right)y(x)+x^2y^{(3)}(x)-2\left(x^2-x\right)y''(x)=0$$

✓ **Mathematica** : cpu = 0.200746 (sec), leaf count = 86

$$\left\{\left\{y(x)\to\frac{c_3e^xx^{\nu+\frac{1}{2}}\Gamma\left(\nu+\frac{1}{2}\right)\,{}_1\tilde{F}_1\left(\nu+\frac{1}{2};2\nu+1;-x\right)}{\Gamma\left(\frac{3}{2}-\nu\right)}+c_2e^xG_{2,3}^{2,1}\left(x\middle|\begin{array}{c}1,0\\ \frac{1}{2}-\nu,\nu+\frac{1}{2},0\end{array}\right)+c_1e^x\right\}\right\}$$

✓ **Maple** : cpu = 0.194 (sec), leaf count = 37

$$\left\{y(x)=c_2\sqrt{x}\,\mathrm{BesselI}\left(\nu,\frac{x}{2}\right)e^{\frac{x}{2}}+c_3\sqrt{x}\,\mathrm{BesselK}\left(\nu,\frac{x}{2}\right)e^{\frac{x}{2}}+c_1e^x\right\}$$

2.1502 ODE No. 1502

$$-\left(x^4-6x\right)y''(x)-\left(2x^3-6\right)y'(x)+x^2y^{(3)}(x)+2x^2y(x)=0$$

✓ **Mathematica** : cpu = 0.104637 (sec), leaf count = 98

$$\left\{\left\{y(x)\to\frac{c_2\Gamma\left(\frac{1}{3}\right)\,{}_2F_2\left(-\frac{2}{3},\frac{1}{3};\frac{2}{3},\frac{4}{3};\frac{x^3}{3}\right)}{3x\Gamma\left(\frac{4}{3}\right)}+\frac{\sqrt[3]{-\frac{1}{3}}c_3\Gamma\left(\frac{2}{3}\right)\,{}_2F_2\left(-\frac{1}{3},\frac{2}{3};\frac{4}{3},\frac{5}{3};\frac{x^3}{3}\right)}{3\Gamma\left(\frac{5}{3}\right)}+\frac{c_1}{x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.409 (sec), leaf count = 104

$$\left\{y(x)=\frac{c_2\left(\int\left(x^3\,\mathrm{BesselI}\left(-\frac{5}{6},-\frac{x^3}{6}\right)+x^3\,\mathrm{BesselI}\left(\frac{1}{6},-\frac{x^3}{6}\right)-2\,\mathrm{BesselI}\left(\frac{1}{6},-\frac{x^3}{6}\right)\right)\sqrt{x}\,e^{\frac{x^3}{6}}dx\right)+c_3\left(\int-\left(x^3\,\mathrm{Be}\right.\right.}{x^2}$$

2.1503 ODE No. 1503

$$\left(x^2+1\right)y^{(3)}(x)+\frac{1}{x^2}+8xy''(x)+10y'(x)-2\log(x)-3=0$$

✓ **Mathematica** : cpu = 0.645988 (sec), leaf count = 258

$$\left\{\left\{y(x)\to\frac{1}{225}\left(-\frac{51x}{x^2+1}-\frac{34x}{\left(x^2+1\right)^2}-\frac{225c_2x}{x^2+1}-\frac{150c_2x}{\left(x^2+1\right)^2}-\frac{225c_1}{4\left(x^2+1\right)^2}-9x+\frac{47}{x-i}+\frac{47}{x+i}+45x\log(x)+\right.\right.\right.$$

✓ **Maple** : cpu = 0.033 (sec), leaf count = 67

$$\left\{y(x)=\frac{225c_1x^4-9x^5+450c_1x^2+\left(225c_2-50\right)x^3+225c_3+\left(675c_2-225\right)x+\left(45x^5+150x^3+225x\right)\ln(x)}{225\left(x^2+1\right)^2}\right\}$$

2.1504 ODE No. 1504

$$(x^2+2)\,y^{(3)}(x)+(x^2+2)\,y'(x)-2xy''(x)-2xy(x)=0$$

✓ **Mathematica** : cpu = 0.138555 (sec), leaf count = 43

$$\left\{\left\{y(x)\to \frac{c_1x^2}{2}+\frac{1}{2}ic_2e^{-ix}-\frac{1}{4}c_3e^{ix}\right\}\right\}$$

✓ **Maple** : cpu = 0.175 (sec), leaf count = 18

$$\{y(x)=c_1x^2+c_2\cos(x)+c_3\sin(x)\}$$

2.1505 ODE No. 1505

$$(2ax+b)y'(x)+ay(x)+2(x-1)xy^{(3)}(x)+3(2x-1)y''(x)=0$$

✓ **Mathematica** : cpu = 60.4134 (sec), leaf count = 115

$$\left\{\left\{y(x)\to c_3\text{MathieuC}\left[-\frac{a}{2}-\frac{b}{2}+1,\frac{a}{4},\cos^{-1}\left(\sqrt{x}\right)\right]\text{MathieuS}\left[-\frac{a}{2}-\frac{b}{2}+1,\frac{a}{4},\cos^{-1}\left(\sqrt{x}\right)\right]+c_1\text{MathieuC}\left[-\frac{a}{2}\right.\right.\right.$$

✓ **Maple** : cpu = 0.202 (sec), leaf count = 79

$$\left\{y(x)=c_1\,\text{MathieuC}\left(-\frac{a}{2}-\frac{b}{2}+1,\frac{a}{4},\arccos\left(\sqrt{x}\right)\right)^2+c_2\,\text{MathieuS}\left(-\frac{a}{2}-\frac{b}{2}+1,\frac{a}{4},\arccos\left(\sqrt{x}\right)\right)^2+c_3\,\text{Mat}\right.$$

2.1506 ODE No. 1506

$$4x^2y^{(3)}(x)+(x^2+14x-1)\,y''(x)+4(x+1)y'(x)+2y(x)=0$$

✓ **Mathematica** : cpu = 0.437132 (sec), leaf count = 150

$$\left\{\left\{y(x)\to c_2e^{\frac{1}{4}\left(-x-\frac{1}{x}+2\log(x)\right)}\int_1^x e^{\frac{K[1]^2-10\log(K[1])K[1]+1}{4K[1]}}dK[1]-\sqrt{\pi}c_3\left(e\text{erfi}\left(\frac{1-x}{2\sqrt{x}}\right)+\text{erfi}\left(\frac{x+1}{2\sqrt{x}}\right)-i(e-1)\right)\right.\right.$$

✓ **Maple** : cpu = 0.187 (sec), leaf count = 43

$$\left\{y(x)=\left(c_3+\int\frac{(2c_1x+c_2)\,\mathrm{e}^{\frac{x}{4}}\mathrm{e}^{\frac{1}{4x}}}{4x^{\frac{5}{2}}}dx\right)\sqrt{x}\,\mathrm{e}^{-\frac{x}{4}}\mathrm{e}^{-\frac{1}{4x}}\right\}$$

2.1507 ODE No. 1507

$$xy^{(3)}(x)(ax+b)+(\alpha x+\beta)y''(x)-f(x)+xy'(x)+y(x)=0$$

✓ **Mathematica** : cpu = 5.8388 (sec), leaf count = 70099

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✓ **Maple** : cpu = 0.747 (sec), leaf count = 1210

$$\left\{y(x)=\left(\left(\left(b\left(\int-\frac{}{ax\,\mathrm{HeunC}\left(0,\frac{-2b+\beta}{b},\frac{-\alpha b+(2b+\beta)a}{ab},-\frac{b}{a^2},\frac{a\,\beta^2-\alpha b\beta+(4a-\alpha)b^2}{2a\,b^2},-\frac{ax}{b}\right)\mathrm{HeunCPrime}\left(0,\frac{2b-\beta}{b},\frac{-\alpha b+\right.\right.}\right.\right.\right.\right.\right.$$

2.1508 ODE No. 1508

$$y(x)\left(ax^3+\nu^2-1\right)+\left(1-\nu^2\right)xy'(x)+x^3y^{(3)}(x)=0$$

✓ **Mathematica** : cpu = 0.893541 (sec), leaf count = 143

$$\left\{\left\{y(x)\to c_2 3^{\nu-1}a^{\frac{1-\nu}{3}}x^{1-\nu}\,{}_0F_2\left(;1-\frac{2\nu}{3},1-\frac{\nu}{3};-\frac{ax^3}{27}\right)+c_3 3^{-\nu-1}a^{\frac{\nu+1}{3}}x^{\nu+1}\,{}_0F_2\left(;\frac{\nu}{3}+1,\frac{2\nu}{3}+1;-\frac{ax^3}{27}\right)+\frac{1}{3}\sqrt[3]{\right.\right.$$

✓ **Maple** : cpu = 0.138 (sec), leaf count = 81

$$\left\{y(x)=c_1x\,\mathrm{hypergeom}\left([\,],\left[\frac{\nu}{3}+1,-\frac{\nu}{3}+1\right],-\frac{a\,x^3}{27}\right)+c_2x^{-\nu+1}\,\mathrm{hypergeom}\left([\,],\left[-\frac{2\nu}{3}+1,-\frac{\nu}{3}+1\right],-\frac{a\,x^3}{27}\right)\right.$$

2.1509 ODE No. 1509

$$\left(\left(1-4\nu^2\right)x+4x^3\right)y'(x)+\left(4\nu^2-1\right)y(x)+x^3y^{(3)}(x)=0$$

✓ **Mathematica** : cpu = 0.0198809 (sec), leaf count = 34

$$\left\{\left\{y(x)\to c_1xJ_\nu(x)^2+c_3xY_\nu(x)^2+c_2xJ_\nu(x)Y_\nu(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.063 (sec), leaf count = 29

$$\left\{y(x)=\left(c_1\,\mathrm{BesselJ}(\nu,x)^2+c_2\,\mathrm{BesselY}(\nu,x)^2+c_3\,\mathrm{BesselJ}(\nu,x)\,\mathrm{BesselY}(\nu,x)\right)x\right\}$$

2.1510 ODE No. 1510

$$y(x)\left(a(\nu-1)x^{2\nu}+bx^{3\nu}+\nu^2-1\right)+x\left(ax^{2\nu}-\nu^2+1\right)y'(x)+x^3y^{(3)}(x)=0$$

✓ **Mathematica** : cpu = 0.0498376 (sec), leaf count = 102

$$\left\{\left\{y(x)\to c_1x^{1-\nu}e^{\frac{x^\nu \text{Root}\left[\#1^3+\#1a+b\&,1\right]}{\nu}}+c_2x^{1-\nu}e^{\frac{x^\nu \text{Root}\left[\#1^3+\#1a+b\&,2\right]}{\nu}}+c_3x^{1-\nu}e^{\frac{x^\nu \text{Root}\left[\#1^3+\#1a+b\&,3\right]}{\nu}}\right\}\right\}$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\{y(x)=DESol\left(\left\{x^3\left(\frac{d^3}{dx^3}\_Y(x)\right)+\left(a\nu\, x^{2\nu}-a\, x^{2\nu}+b\, x^{3\nu}+\nu^2-1\right)\_Y(x)+\left(ax\, x^{2\nu}-\nu^2x+x\right)\left(\frac{d}{dx}\_Y(x)\right.\right.\right.$$

2.1511 ODE No. 1511

$$x^3y^{(3)}(x)+(x+8)x^3-6(x-1)x^3\log(x)+3x^2y''(x)-2xy'(x)+2y(x)=0$$

✓ **Mathematica** : cpu = 0.0572187 (sec), leaf count = 51

$$\left\{\left\{y(x)\to\frac{c_1}{x^2}+\frac{1}{450}\left(-50x^4+50x^4\log(x)-18x^3-135x^3\log(x)\right)+c_2x+c_3x\log(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.033 (sec), leaf count = 49

$$\left\{y(x)=\frac{-50x^6-18x^5+450c_1x^3+450c_2+\left(50x^6-135x^5+450c_3x^3\right)\ln(x)}{450x^2}\right\}$$

2.1512 ODE No. 1512

$$\left(1-a^2\right)xy'(x)+x^3y^{(3)}(x)+3x^2y''(x)=0$$

✓ **Mathematica** : cpu = 0.0460289 (sec), leaf count = 29

$$\left\{\left\{y(x)\to-\frac{c_1x^{-a}}{a}+\frac{c_2x^a}{a}+c_3\right\}\right\}$$

✓ **Maple** : cpu = 0.013 (sec), leaf count = 18

$$\{y(x)=c_2x^a+c_3x^{-a}+c_1\}$$

2.1513 ODE No. 1513

$$x^3y^{(3)}(x) - 4x^2y''(x) + (x^2+8)\,xy'(x) - 2(x^2+4)\,y(x) = 0$$

✓ **Mathematica** : cpu = 0.0910696 (sec), leaf count = 25

$$\{\{y(x) \to c_1x^2 + c_3x\cos(x) - c_2x\sin(x)\}\}$$

✓ **Maple** : cpu = 0.168 (sec), leaf count = 18

$$\{y(x) = (c_1x + c_2\sin(x) + c_3\cos(x))\,x\}$$

2.1514 ODE No. 1514

$$(ax^3-12)\,y(x) + x^3y^{(3)}(x) + 6x^2y''(x) = 0$$

✓ **Mathematica** : cpu = 0.68781 (sec), leaf count = 102

$$\left\{\left\{y(x) \to \frac{c_1e^{-\sqrt[3]{a}x}\left(\sqrt[3]{a}x+2\right)}{x^3} + \frac{c_2e^{\sqrt[3]{-1}\sqrt[3]{a}x}\left(\sqrt[3]{a}x+2(-1)^{2/3}\right)}{x^3} + \frac{c_3e^{-(-1)^{2/3}\sqrt[3]{a}x}\left(\sqrt[3]{a}x-2\sqrt[3]{-1}\right)}{x^3}\right\}\right\}$$

✓ **Maple** : cpu = 0.478 (sec), leaf count = 135

$$\left\{y(x) = \frac{c_1\left(a^3x+2(-a^4)^{\frac{2}{3}}\right)e^{\frac{(-a^4)^{\frac{1}{3}}x}{a}} - c_2\left(ia^3x+(-i+\sqrt{3})\,(-a^4)^{\frac{2}{3}}\right)e^{\frac{i(\sqrt{3}+i)(-a^4)^{\frac{1}{3}}x}{2a}} - c_3\left(ia^3x+(-i-\sqrt{3})\right.}{x^3}\right.$$

2.1515 ODE No. 1515

$$y(x)\left(a(4c^2\nu^2-a^2)+4b^2c^2(c-a)x^{2c}\right)+y'(x)\left(3(a-1)ax+4b^2c^2x^{2c+1}-4c^2\nu^2+1\right)+3(1-a)x^2y''(x)+x^3y^{(3)}(x)$$

✗ **Mathematica** : cpu = 0.191315 (sec), leaf count = 0 , could not solve

```
DSolve[(a*(-a^2 + 4*c^2*nu^2) + 4*b^2*c^2*(-a + c)*x^(2*c))*y[x] + (1 - 4*c^2*nu^2 + 3*(-
1 + a)*a*x + 4*b^2*c^2*x^(1 + 2*c))*Derivative[1][y][x] + 3*(1 - a)*x^2*Derivative[2][y][x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , exception

```
cannot mix numeric and boolean arguments to max
```

2.1516 ODE No. 1516

$$x^3y^{(3)}(x) + (x+3)x^2y''(x) + 5(x-6)xy'(x) + (4x+30)y(x) = 0$$

✓ **Mathematica** : cpu = 260.122 (sec), leaf count = 15142

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✓ **Maple** : cpu = 0.405 (sec), leaf count = 188

$$\left\{y(x) = \frac{c_3x^7 + 29c_3x^6 + 480c_3x^5 + (c_1 + 5612c_3)\,x^4 + c_3\left(x^8 + 28x^7 + 450x^6 + 5100x^5 + 42900x^4 + 267120x^3 + \right.}{}\right.$$

2.1517 ODE No. 1517

$$x^3y^{(3)}(x) - 2x^3 + x^2y''(x) + 2xy'(x) - y(x) + \log(x) = 0$$

✓ **Mathematica** : cpu = 0.288283 (sec), leaf count = 30686

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✓ **Maple** : cpu = 0.454 (sec), leaf count = 866

$$\left\{ y(x) = c_1 x^{\frac{\left(-11+3\sqrt{69}\right)\left(44+12\sqrt{69}\right)^{\frac{2}{3}}}{600} - \frac{\left(44+12\sqrt{69}\right)^{\frac{1}{3}}}{6} + \frac{2}{3}} - x^{\frac{\left(-11+3\sqrt{69}\right)\left(44+12\sqrt{69}\right)^{\frac{2}{3}}}{600} - \frac{\left(44+12\sqrt{69}\right)^{\frac{1}{3}}}{6} + \frac{2}{3}} \left(\int -\frac{\left(2x^3 - \ln(x)\right)\left(3\right.}{} \right.\right.$$

2.1518 ODE No. 1518

$$x\left(x^2+1\right)y^{(3)}(x) + 3\left(2x^2+1\right)y''(x) - 12y(x) = 0$$

✓ **Mathematica** : cpu = 0.272014 (sec), leaf count = 104

$$\left\{\left\{y(x) \to \frac{1}{3}c_1\left(2x^2+1\right) + \frac{1}{3}c_2x\sqrt{x^2+1} - \frac{c_3\left(2x^2+1\right)\left(3\left(x^4+x^2\right)\tanh^{-1}\left(\sqrt{x^2+1}\right) - \sqrt{x^2+1}\left(3x^2+1\right)\right)}{6\sqrt{x^2+1}\left(2x^3+x\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.372 (sec), leaf count = 60

$$\left\{y(x)=\frac{3c_2\sqrt{x^2+1}\,x^2\operatorname{arctanh}\left(\frac{1}{\sqrt{x^2+1}}\right)+2c_3x^3+c_1\sqrt{x^2+1}\,x^2-3c_2x^2+c_3x-c_2}{x}\right\}$$

2.1519 ODE No. 1519

$$(x+3)x^2y^{(3)}(x)-3(x+2)xy''(x)+6(x+1)y'(x)-6y(x)=0$$

✓ **Mathematica** : cpu = 0.0239866 (sec), leaf count = 65

$$\left\{\left\{y(x)\to\frac{1}{4}c_1\left(x^3-3x^2+3x+3\right)+\frac{1}{2}c_2\left(-x^3+3x^2-x-1\right)+\frac{1}{8}c_3\left(3x^3-5x^2+x+1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.131 (sec), leaf count = 19

$$\{y(x)=c_2x^3+c_1x^2+c_3x+c_3\}$$

2.1520 ODE No. 1520

$$y''(x)\left(-6x(\mathrm{a1}+\mathrm{a2}+\mathrm{a3})+3\mathrm{a1a2}+3\mathrm{a1a3}+3\mathrm{a2a3}+9x^2\right)+2(x-\mathrm{a1})(x-\mathrm{a2})(x-\mathrm{a3})y^{(3)}(x)-2\left(b+\left(n^2+n-3\right)\right.$$

✓ **Mathematica** : cpu = 4.92295 (sec), leaf count = 534

$$\left\{\left\{y(x)\to c_1\mathrm{HeunG}\left[\frac{\mathrm{a3}-\mathrm{a1}}{\mathrm{a2}-\mathrm{a1}},\frac{\frac{1}{4}(\mathrm{a1}+\mathrm{a2}+\mathrm{a3}-b)+\frac{1}{4}\mathrm{a1}\left(-n^2-n\right)}{\mathrm{a1}-\mathrm{a2}},\frac{1}{2}\left(\frac{1}{2}-\sqrt{n^2+n+\frac{1}{4}}\right),\frac{1}{2}\left(\sqrt{n^2+n+\frac{1}{4}}\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.424 (sec), leaf count = 288

$$\left\{y(x)=c_1HG\left(\frac{a1-a3}{a1-a2},\frac{\left(-n^2-n+1\right)a1+a2+a3-b}{4a1-4a2},-\frac{n}{2},\frac{n}{2}+\frac{1}{2},\frac{1}{2},\frac{1}{2},\frac{a1-x}{a1-a2}\right)^2-c_2(-a1+x)HG\left(\right.\right.$$

2.1521 ODE No. 1521

$$(x+1)x^3y^{(3)}(x)-(4x+2)x^2y''(x)+(10x+4)xy'(x)-4(3x+1)y(x)=0$$

✓ **Mathematica** : cpu = 0.0564617 (sec), leaf count = 35

$$\left\{\left\{y(x)\to c_1x^2+c_3x^2\left(x+\frac{1}{x}+\log^2(x)\right)+c_2x^2\log(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.349 (sec), leaf count = 28

$$\left\{y(x)=\left(c_3x\ln(x)^2+c_2x\ln(x)+c_3x^2+c_1x+c_3\right)x\right\}$$

2.1522 ODE No. 1522

$$4x^4y^{(3)}(x)-4x^3y''(x)+4x^2y'(x)-1=0$$

✓ **Mathematica** : cpu = 0.0149679 (sec), leaf count = 44

$$\left\{\left\{y(x)\to\frac{c_1x^2}{2}-\frac{c_2x^2}{4}+\frac{1}{2}c_2x^2\log(x)-\frac{1}{36x}+c_3\right\}\right\}$$

✓ **Maple** : cpu = 0.06 (sec), leaf count = 34

$$\left\{y(x)=\frac{18c_1x^3\ln(x)+(-9c_1+18c_2)x^3+36c_3x-1}{36x}\right\}$$

2.1523 ODE No. 1523

$$-\left(4x^2+2\right)x^2y''(x)+\left(10x^2+4\right)xy'(x)-4\left(3x^2+1\right)y(x)+\left(x^2+1\right)x^3y^{(3)}(x)=0$$

✓ **Mathematica** : cpu = 0.320586 (sec), leaf count = 74

$$\left\{\left\{y(x)\to c_1\left(-x^3+3x^2-x\right)+\frac{1}{2}c_2\left(x^3-2x^2+x\right)-\frac{c_3x\left(-x^3+3x^2-x\right)(\log(x)+1)}{2\left(x^2-3x+1\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.351 (sec), leaf count = 23

$$\left\{y(x)=\left(c_2x\ln(x)+c_3x^2+c_3+(c_1+c_2)x\right)x\right\}$$

2.1524 ODE No. 1524

$$x^6 y^{(3)}(x) + x^2 y''(x) - 2y(x) = 0$$

✓ **Mathematica** : cpu = 0.167444 (sec), leaf count = 96

$$\left\{\left\{y(x) \to -\frac{\left(-\frac{1}{3}\right)^{2/3} c_2 x \Gamma\left(\frac{1}{3}\right)\ {}_2F_2\left(-\frac{2}{3}, \frac{1}{3}; \frac{2}{3}, \frac{4}{3}; \frac{1}{3x^3}\right)}{3\Gamma\left(\frac{4}{3}\right)} + \frac{c_3 \Gamma\left(\frac{2}{3}\right)\ {}_2F_2\left(-\frac{1}{3}, \frac{2}{3}; \frac{4}{3}, \frac{5}{3}; \frac{1}{3x^3}\right)}{9\Gamma\left(\frac{5}{3}\right)} + c_1 x^2\right\}\right\}$$

✓ **Maple** : cpu = 0.439 (sec), leaf count = 98

$$\left\{y(x) = \left(c_2\left(\int \frac{\left(2x^3 \operatorname{BesselK}\left(\frac{1}{6}, -\frac{1}{6x^3}\right) - \operatorname{BesselK}\left(\frac{1}{6}, -\frac{1}{6x^3}\right) + \operatorname{BesselK}\left(\frac{5}{6}, -\frac{1}{6x^3}\right)\right) \mathrm{e}^{\frac{1}{6x^3}}}{x^{\frac{11}{2}}} dx\right) + c_3\left(\int \frac{(2x^3 \operatorname{Bess}}{}\right.\right.\right.$$

2.1525 ODE No. 1525

$$ay(x) + x^6 y^{(3)}(x) + 6x^5 y''(x) = 0$$

✓ **Mathematica** : cpu = 0.3804 (sec), leaf count = 102

$$\left\{\left\{y(x) \to c_1 e^{\frac{\sqrt[3]{a}}{x}}\left(2x - \sqrt[3]{a}\right) + c_2 e^{\frac{(-1)^{2/3}\sqrt[3]{a}}{x}}\left(x - \frac{1}{2}(-1)^{2/3}\sqrt[3]{a}\right) + c_3 e^{-\frac{\sqrt[3]{-1}\sqrt[3]{a}}{x}}\left(\frac{1}{2}\sqrt[3]{-1}\sqrt[3]{a} + x\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.633 (sec), leaf count = 291

$$\left\{y(x) = \frac{c_1\left(-8x^3 + a\right)^4 \mathrm{e}^{-\frac{\left(-a^4\right)^{\frac{1}{3}}}{ax}}}{\left(2ax + \left(-a^4\right)^{\frac{1}{3}}\right)^3\left(4a^2x^2 - 2\left(-a^4\right)^{\frac{1}{3}} ax + \left(-a^4\right)^{\frac{2}{3}}\right)^4} + \frac{c_2\left(-8x^3 + a\right)^4 \mathrm{e}^{-}}{\left(-4iax + i\left(-a^4\right)^{\frac{1}{3}} - \left(-a^4\right)^{\frac{1}{3}}\sqrt{3}\right)^3\left(-4iax + (\right.}\right.$$

2.1526 ODE No. 1526

$$\left(x^4 + 2x^2 + 2x + 1\right) x^2 y^{(3)}(x) - \left(2x^6 + 3x^4 - 6x^2 - 6x - 1\right) y''(x) + \left(x^6 - 6x^3 - 15x^2 - 12x - 2\right) y'(x) + \left(x^4 + 4x^3\right.$$

✓ **Mathematica** : cpu = 130.195 (sec), leaf count = 27

$$\left\{\left\{y(x) \to c_1 e^x + c_2 e^x x + c_3 e^{\frac{1}{x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.21 (sec), leaf count = 19

$$\left\{y(x) = c_2 \mathrm{e}^{\frac{1}{x}} + (c_3 x + c_1)\, \mathrm{e}^x\right\}$$

2.1527 ODE No. 1527

$$(x-a)^3(x-b)^3y^{(3)}(x)-cy(x)=0$$

✓ **Mathematica** : cpu = 130.128 (sec), leaf count = 165

$$\left\{\left\{y(x)\to c_1(x-b)^2\left(\frac{x-a}{x-b}\right)^{\text{Root}\left[-\#1^3+3\#1^2-2\#1+\frac{c}{(a-b)^3}\&,1\right]}+c_2(x-b)^2\left(\frac{x-a}{x-b}\right)^{\text{Root}\left[-\#1^3+3\#1^2-2\#1+\frac{c}{(a-b)^3}\&\right.}\right.\right.$$

✓ **Maple** : cpu = 0.611 (sec), leaf count = 437

$$\left\{y(x)=\left(c_1(a-x)^{\frac{\text{RootOf}\left(\_Z^3-4a^2b-4a\,b^2+(-3a-3b)\_Z^2+\left(2a^2+8ab+2b^2\right)\_Z-c,index=1\right)}{a-b}}(b-x)^{-\frac{\text{RootOf}\left(\_Z^3-4a^2b-4a\,b^2+(-3a-3b)\_Z^2+\right.}{a-b}}\right.\right.$$

2.1528 ODE No. 1528

$$y^{(3)}(x)\sin(x)+(2\cos(x)+1)y''(x)-\sin(x)y'(x)-\cos(x)=0$$

✓ **Mathematica** : cpu = 0.996563 (sec), leaf count = 72

$$\left\{\left\{y(x)\to\frac{\sin\left(\frac{x}{2}\right)\left(-2\cos\left(\frac{x}{2}\right)\sin^{-1}(\cos(x))+\sqrt{2}\left(c_2x\sin\left(\frac{x}{2}\right)+\cos\left(\frac{x}{2}\right)\left(c_2\log(2(\cos(x)+1))+2c_1\right)\right)\right)}{\cos(x)-1}+c_3\right\}\right\}$$

✓ **Maple** : cpu = 0.227 (sec), leaf count = 71

$$\left\{y(x)=\frac{c_1\ln\left(\frac{-\cos(x)+1}{\sin(x)}\right)\left(\sin^2(x)\right)-c_1\ln\left(\sin(x)\right)\left(\sin^2(x)\right)+c_3\left(\sin^2(x)\right)-x\left(\cos^2(x)\right)+x+\left(\cos(x)-1\right)(c}{\left(\cos(x)-1\right)\sin(x)}\right.$$

2.1529 ODE No. 1529

$$y^{(3)}(x)(x+\sin(x))+3(\cos(x)+1)y''(x)-3\sin(x)y'(x)-y(x)\cos(x)+\sin(x)=0$$

✓ **Mathematica** : cpu = 0.0941548 (sec), leaf count = 47

$$\left\{\left\{y(x)\to\frac{c_3x^2}{x+\sin(x)}-\frac{\cos(x)}{x+\sin(x)}+\frac{c_2x}{x+\sin(x)}+\frac{c_1}{x+\sin(x)}\right\}\right\}$$

✓ **Maple** : cpu = 0.106 (sec), leaf count = 25

$$\left\{y(x)=\frac{c_1x^2+c_2x+c_3-\cos(x)}{x+\sin(x)}\right\}$$

2.1530 ODE No. 1530

$y'(x)\left(4\nu(\nu+1)\sin^2(x)+\cos(2x)\right)+2\nu(\nu+1)y(x)\sin(2x)+y^{(3)}(x)\sin^2(x)+3\sin(x)\cos(x)y''(x)=0$

✓ **Mathematica** : cpu = 0.0876347 (sec), leaf count = 35

$$\left\{\left\{y(x)\to c_3P_\nu(\cos(x))Q_\nu(\cos(x))+c_1P_\nu(\cos(x))^2+c_2Q_\nu(\cos(x))^2\right\}\right\}$$

✓ **Maple** : cpu = 0.257 (sec), leaf count = 113

$$\left\{y(x)=c_1\operatorname{hypergeom}\left(\left[-\frac{\nu}{2},\frac{\nu}{2}+\frac{1}{2}\right],\left[\frac{1}{2}\right],\frac{\cos(2x)}{2}+\frac{1}{2}\right)^2+c_2(\cos(2x)+1)\operatorname{hypergeom}\left(\left[\frac{\nu}{2}+1,-\frac{\nu}{2}+\frac{1}{2}\right],\right.\right.$$

2.1531 ODE No. 1531

$A(x)\left(f(x)y''(x)+g(x)y'(x)+h(x)y(x)\right)+f'(x)y''(x)+f(x)y^{(3)}(x)+g'(x)y'(x)+g(x)y''(x)+y(x)h'(x)+h(x)y'(x)$

✗ **Mathematica** : cpu = 0.0253404 (sec), leaf count = 0 , could not solve

```
DSolve[y[x]*Derivative[1][h][x] + h[x]*Derivative[1][y][x] + Derivative[1][g][x]*Derivative[
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x)=DESol\left(\left\{\left(\frac{d^3}{dx^3}\_Y(x)\right)f(x)+\left(A(x)\,h(x)+\frac{d}{dx}h(x)\right)\_Y(x)+\left(A(x)\,g(x)+\frac{d}{dx}g(x)+h(x)\right)\left(\frac{d}{dx}\_\right.\right.\right.$$

2.1532 ODE No. 1532

$$ny(x)+y^{(3)}(x)+xy'(x)=0$$

✓ **Mathematica** : cpu = 0.0157829 (sec), leaf count = 103

$$\left\{\left\{y(x)\to\frac{c_2x\,{}_1F_2\left(\frac{n}{3}+\frac{1}{3};\frac{2}{3},\frac{4}{3};-\frac{x^3}{9}\right)}{3^{2/3}}+c_1\,{}_1F_2\left(\frac{n}{3};\frac{1}{3},\frac{2}{3};-\frac{x^3}{9}\right)+\frac{c_3x^2\,{}_1F_2\left(\frac{n}{3}+\frac{2}{3};\frac{4}{3},\frac{5}{3};-\frac{x^3}{9}\right)}{3\sqrt[3]{3}}\right\}\right\}$$

✓ **Maple** : cpu = 0.101 (sec), leaf count = 58

$$\left\{y(x)=c_3x^2\operatorname{hypergeom}\left(\left[\frac{n}{3}+\frac{2}{3}\right],\left[\frac{4}{3},\frac{5}{3}\right],-\frac{x^3}{9}\right)+c_2x\operatorname{hypergeom}\left(\left[\frac{n}{3}+\frac{1}{3}\right],\left[\frac{2}{3},\frac{4}{3}\right],-\frac{x^3}{9}\right)+c_1\operatorname{hypergeon}\right.$$

2.1533 ODE No. 1533

$$-ny(x) + y^{(3)}(x) - xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.0158216 (sec), leaf count = 113

$$\left\{\left\{y(x) \to \frac{\sqrt[3]{-1}c_2 x\, {}_1F_2\left(\frac{n}{3}+\frac{1}{3};\frac{2}{3},\frac{4}{3};\frac{x^3}{9}\right)}{3^{2/3}} + c_1\, {}_1F_2\left(\frac{n}{3};\frac{1}{3},\frac{2}{3};\frac{x^3}{9}\right) + \frac{(-1)^{2/3}c_3 x^2\, {}_1F_2\left(\frac{n}{3}+\frac{2}{3};\frac{4}{3},\frac{5}{3};\frac{x^3}{9}\right)}{3\sqrt[3]{3}}\right\}\right\}$$

✓ **Maple** : cpu = 0.106 (sec), leaf count = 58

$$\left\{y(x) = c_3 x^2 \operatorname{hypergeom}\left(\left[\frac{n}{3}+\frac{2}{3}\right], \left[\frac{4}{3},\frac{5}{3}\right], \frac{x^3}{9}\right) + c_2 x \operatorname{hypergeom}\left(\left[\frac{n}{3}+\frac{1}{3}\right], \left[\frac{2}{3},\frac{4}{3}\right], \frac{x^3}{9}\right) + c_1 \operatorname{hypergeom}\left(\right.\right.$$

2.1534 ODE No. 1534

$$y^{(4)}(x) = 0$$

✓ **Mathematica** : cpu = 0.003467 (sec), leaf count = 24

$$\{\{y(x) \to c_4 x^3 + c_3 x^2 + c_2 x + c_1\}\}$$

✓ **Maple** : cpu = 0.018 (sec), leaf count = 21

$$\left\{y(x) = \frac{1}{6}c_1 x^3 + \frac{1}{2}c_2 x^2 + c_3 x + c_4\right\}$$

2.1535 ODE No. 1535

$$-f(x) + y^{(4)}(x) + 4y(x) = 0$$

✓ **Mathematica** : cpu = 0.406166 (sec), leaf count = 223

$$\left\{\left\{y(x) \to e^{-x}\left(\cos(x)\int_1^x \frac{1}{8}e^{K[1]}f(K[1])(\cos(K[1]) - \sin(K[1]))\left(\cos^2(K[1]) + \sin^2(K[1])\right)dK[1] + \sin(x)\int_1^x \frac{1}{8}\right.\right.\right.$$

✓ **Maple** : cpu = 0.043 (sec), leaf count = 36

$$\left\{y(x) = c_1 \cos(x)\,\mathrm{e}^{x} + c_2\mathrm{e}^{x}\sin(x) + c_3\cos(x)\,\mathrm{e}^{-x} + c_4\mathrm{e}^{-x}\sin(x) + \frac{f}{4}\right\}$$

2.1536 ODE No. 1536

$$\lambda y(x) + y^{(4)}(x) = 0$$

✓ **Mathematica** : cpu = 0.0046415 (sec), leaf count = 76

$$\left\{\left\{y(x) \to c_1 e^{(-1)^{3/4}\sqrt[4]{\lambda}x} + c_2 e^{-\sqrt[4]{-1}\sqrt[4]{\lambda}x} + c_3 e^{-(-1)^{3/4}\sqrt[4]{\lambda}x} + c_4 e^{\sqrt[4]{-1}\sqrt[4]{\lambda}x}\right\}\right\}$$

✓ **Maple** : cpu = 0.02 (sec), leaf count = 50

$$\left\{y(x) = c_1 \mathrm{e}^{-i(-\lambda)^{\frac{1}{4}}x} + c_2 \mathrm{e}^{i(-\lambda)^{\frac{1}{4}}x} + c_3 \mathrm{e}^{-(-\lambda)^{\frac{1}{4}}x} + c_4 \mathrm{e}^{(-\lambda)^{\frac{1}{4}}x}\right\}$$

2.1537 ODE No. 1537

$$-16e^{x^2}x^4 + y^{(4)}(x) - 12y''(x) + 12y(x) = 0$$

✓ **Mathematica** : cpu = 1.04673 (sec), leaf count = 1722

$$\left\{\left\{y(x) \to \frac{1}{12} e^{-\left(\left(\left(\sqrt{2\left(3-\sqrt{6}\right)}-x\right)x\right)-\sqrt{2\left(3+\sqrt{6}\right)}x-\sqrt{2\left(3-\sqrt{6}\right)}x\right.} \left(-2\sqrt{3+\sqrt{6}}e^{\sqrt{2\left(3+\sqrt{6}\right)}x+2\sqrt{2\left(3-\sqrt{6}\right)}x}x^3 + 2\sqrt{3+\right.\right.\right.$$

✓ **Maple** : cpu = 0.16 (sec), leaf count = 67

$$\left\{y(x) = c_1 \mathrm{e}^{\sqrt{6-2\sqrt{6}}\,x} + c_2 \mathrm{e}^{\sqrt{6+2\sqrt{6}}\,x} + c_3 \mathrm{e}^{-\sqrt{6-2\sqrt{6}}\,x} + c_4 \mathrm{e}^{-\sqrt{6+2\sqrt{6}}\,x} + \mathrm{e}^{x^2}\right\}$$

2.1538 ODE No. 1538

$$a^4 y(x) + 2a^2 y''(x) - \cosh(ax) + y^{(4)}(x) = 0$$

✓ **Mathematica** : cpu = 0.181197 (sec), leaf count = 66

$$\left\{\left\{y(x) \to \frac{\cos^2(ax)\cosh(ax) + \sin^2(ax)\cosh(ax)}{4a^4} + c_1\cos(ax) + c_2 x\cos(ax) + c_3\sin(ax) + c_4 x\sin(ax)\right\}\right\}$$

✓ **Maple** : cpu = 0.725 (sec), leaf count = 49

$$\left\{y(x) = \frac{8((c_3 x + c_1)\cos(ax) + (c_4 x + c_2)\sin(ax))\,a^4 + \left(\mathrm{e}^{2ax}+1\right)\mathrm{e}^{-ax}}{8a^4}\right\}$$

2.1539 ODE No. 1539

$$a^4\lambda y(x) + a^2(\lambda+1)y''(x) + y^{(4)}(x) = 0$$

✓ **Mathematica** : cpu = 0.0070489 (sec), leaf count = 44

$$\left\{\left\{y(x)\to c_1\cos\left(a\sqrt{\lambda}x\right)+c_2\sin\left(a\sqrt{\lambda}x\right)+c_3\cos(ax)+c_4\sin(ax)\right\}\right\}$$

✓ **Maple** : cpu = 0.033 (sec), leaf count = 35

$$\left\{y(x)=c_1\sin(ax)+c_2\cos(ax)+c_3\sin\left(a\sqrt{\lambda}\,x\right)+c_4\cos\left(a\sqrt{\lambda}\,x\right)\right\}$$

2.1540 ODE No. 1540

$$a(bx-1)y''(x)+aby'(x)+\lambda y(x)+y^{(4)}(x)=0$$

✗ **Mathematica** : cpu = 0.33144 (sec), leaf count = 0 , DifferentialRoot result

$$\{\{y(x)\to (x)\}\}$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\{y(x)=DESol\left(\left\{ab\left(\frac{d}{dx}\_Y(x)\right)+(bx-1)\,a\left(\frac{d^2}{dx^2}\_Y(x)\right)+\lambda\_Y(x)+\frac{d^4}{dx^4}\_Y(x)\right\},\{\_Y(x)\}\right)\}$$

2.1541 ODE No. 1541

$$y''(x)\left(ax^2+b\lambda+c\right)+y(x)\left(ax^2+\beta\lambda+\gamma\right)+y^{(4)}(x)=0$$

✗ **Mathematica** : cpu = 80.1946 (sec), leaf count = 0 , DifferentialRoot result

$$\{\{y(x)\to (x)\}\}$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\{y(x)=DESol\left(\left\{\left(a\,x^2+\beta\lambda+\gamma\right)\_Y(x)+\left(a\,x^2+b\lambda+c\right)\left(\frac{d^2}{dx^2}\_Y(x)\right)+\frac{d^4}{dx^4}\_Y(x)\right\},\{\_Y(x)\}\right)\}$$

2.1542 ODE No. 1542

$$ay''(x)\wp(x;\mathrm{g2},\mathrm{g3}) + by'(x)\wp'(x;\mathrm{g2},\mathrm{g3}) + y(x)\left(c\left(6\wp(x;\mathrm{g2},\mathrm{g3})^2 - \frac{\mathrm{g2}}{2}\right) + d\right) + y^{(4)}(x) = 0$$

✗ **Mathematica** : cpu = 0.0254998 (sec), leaf count = 0 , could not solve

```
DSolve[(d + c*(-1/2*g2 + 6*WeierstrassP[x, {g2, g3}]^2))*y[x] + b*WeierstrassPPrime[x, {g2,
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x) = DESol\left(\left\{a\,\mathrm{WeierstrassP}\left(x, g2, g3\right)\left(\frac{d^2}{dx^2}\_Y(x)\right) + b\left(\frac{d}{dx}\_Y(x)\right)\mathcal{P}'(x; g2, g3) + \left(6c\,\mathrm{WeierstrassP}\left(x\right.\right.\right.\right.$$

2.1543 ODE No. 1543

$$-y''(x)\left(a + 12k^2\mathrm{sn}(z|x)^2\right) + y(x)\left(\alpha\mathrm{sn}(z|x)^2 + \beta\right) + by'(x) + y^{(4)}(x) = 0$$

✗ **Mathematica** : cpu = 0.0814704 (sec), leaf count = 0 , could not solve

```
DSolve[(beta + alpha*JacobiSN[z, x]^2)*y[x] + b*Derivative[1][y][x] - (a + 12*k^2*JacobiSN[z
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\{y(x) = DESol\left(\left\{b\left(\frac{d}{dx}\_Y(x)\right) + \left(\alpha\mathrm{sn}(z|x)^2 + \beta\right)\_Y(x) + \left(-12k^2\mathrm{sn}(z|x)^2 - a\right)\left(\frac{d^2}{dx^2}\_Y(x)\right) + \frac{d^4}{dx^4}\_Y(x)\right.\right.$$

2.1544 ODE No. 1544

$$y(x)\left(3f''(x) + 3f(x)^2\right) + 10f'(x)y'(x) + 10f(x)y''(x) + y^{(4)}(x) = 0$$

✗ **Mathematica** : cpu = 0.0169331 (sec), leaf count = 0 , could not solve

```
DSolve[10*Derivative[1][f][x]*Derivative[1][y][x] + y[x]*(3*f[x]^2 + 3*Derivative[2][f][x])
```

✓ **Maple** : cpu = 0.017 (sec), leaf count = 41

$$\{y(x) = \sum_{\_a=1}^{4} \_C\_a \mathrm{e}^{x\,\mathrm{RootOf}\left(\_Z^4+10f\_Z^2+10df\_Z+3f^2+3ddf, index=\_a\right)}\}$$

2.1545 ODE No. 1545

$$y^{(4)}(x) + 2y^{(3)}(x) - 3y''(x) - 4y'(x) + 4y(x) - 32\sin(2x) + 24\cos(2x) = 0$$

✓ **Mathematica** : cpu = 0.679589 (sec), leaf count = 40

$$\left\{\left\{y(x) \to \sin(2x) + c_1 e^{-2x} + c_2 e^{-2x} x + c_3 e^x + c_4 e^x x\right\}\right\}$$

✓ **Maple** : cpu = 0.124 (sec), leaf count = 27

$$\{y(x) = (c_3 x + c_1)\,\mathrm{e}^x + (c_4 x + c_2)\,\mathrm{e}^{-2x} + \sin(2x)\}$$

2.1546 ODE No. 1546

$$a^4 x^4 y(x) + 4a^3 x^3 y'(x) + 6a^2 x^2 y''(x) + 4axy^{(3)}(x) + y^{(4)}(x) = 0$$

✓ **Mathematica** : cpu = 0.543225 (sec), leaf count = 300

$$\left\{\left\{y(x) \to \frac{2\left(\sqrt{6}-3\right)\sqrt{-\left(\left(\sqrt{6}-3\right)a\right)}c_3 \exp\left(-\frac{ax^2}{2} - \sqrt{-\left(\left(\sqrt{6}-3\right)a\right)}x - \frac{\left(-3+\sqrt{3}+\sqrt{6}\right)ax}{\sqrt{-\left(\left(\sqrt{6}-3\right)a\right)}}\right)}{\left(-3-\sqrt{3}+\sqrt{6}\right)\left(-3+\sqrt{3}+\sqrt{6}\right)a} - \frac{2\left(\sqrt{6}-3\right)\sqrt{\cdots}}{\cdots}\right.\right.$$

✓ **Maple** : cpu = 0.063 (sec), leaf count = 73

$$\left\{y(x) = \left(c_1 \mathrm{e}^{-\sqrt{-\left(\sqrt{6}-3\right)a}\,x} + c_2 \mathrm{e}^{\sqrt{-\left(\sqrt{6}-3\right)a}\,x} + c_3 \mathrm{e}^{-\sqrt{\left(3+\sqrt{6}\right)a}\,x} + c_4 \mathrm{e}^{\sqrt{\left(3+\sqrt{6}\right)a}\,x}\right)\mathrm{e}^{-\frac{a x^2}{2}}\right\}$$

2.1547 ODE No. 1547

$3y(x)\left(2g(x)f'(x) + 5f(x)g'(x) + 6f(x)^2 g(x) + g''(x) + 3g(x)^2\right) + y''(x)\left(4f'(x) + 11f(x)^2 + 10g(x)\right) + y'(x)\left(f''(x\right.$

✗ **Mathematica** : cpu = 0.27168 (sec), leaf count = 0 , could not solve

```
DSolve[Derivative[1][y][x]*(6*f[x]^3 + 30*f[x]*g[x] + 7*f[x]*Derivative[1][f][x] + 10*Deriva
```

✓ **Maple** : cpu = 0.02 (sec), leaf count = 87

$$\left\{y(x) = \sum_{\_a=1}^{4} \_C\_a \mathrm{e}^{x\,\mathrm{RootOf}\left(\_Z^4 + 6\_Z^3 f + 18f^2 g + \left(11f^2 + 4df + 10g\right)\_Z^2 + 6dfg + 15dgf + 9g^2 + \left(6f^3 + 7dff + 30fg + ddf + 10dg\right)\_Z + 3ddg,\right.}\right.$$

2.1548 ODE No. 1548

$$4y^{(4)}(x) - 12y^{(3)}(x) + 11y''(x) - 3y'(x) - 4\cos(x) = 0$$

✓ **Mathematica** : cpu = 0.0811143 (sec), leaf count = 50

$$\left\{\left\{y(x) \to \frac{18\sin(x)}{65} - \frac{14\cos(x)}{65} + 2c_1e^{x/2} + \frac{2}{3}c_2e^{3x/2} + c_3e^x + c_4\right\}\right\}$$

✓ **Maple** : cpu = 0.086 (sec), leaf count = 32

$$\left\{y(x) = c_1\mathrm{e}^x + 2c_2\mathrm{e}^{\frac{x}{2}} + \frac{2c_3\mathrm{e}^{\frac{3x}{2}}}{3} + c_4 - \frac{14\cos(x)}{65} + \frac{18\sin(x)}{65}\right\}$$

2.1549 ODE No. 1549

$$xy^{(4)}(x) + 5y^{(3)}(x) - 24 = 0$$

✓ **Mathematica** : cpu = 0.0320473 (sec), leaf count = 34

$$\left\{\left\{y(x) \to \frac{4x^3}{5} + c_4x^2 - \frac{c_1}{24x^2} + c_3x + c_2\right\}\right\}$$

✓ **Maple** : cpu = 0.034 (sec), leaf count = 26

$$\left\{y(x) = \frac{c_2x^2}{2} + \frac{4x^3}{5} + c_3x + c_4 - \frac{c_1}{24x^2}\right\}$$

2.1550 ODE No. 1550

$$12x^3y''(x) - (6x^2+1)\,y^{(3)}(x) - (9x^2-7)\,x^2y'(x) + 2(x^2-3)\,x^3y(x) + xy^{(4)}(x) = 0$$

✓ **Mathematica** : cpu = 3.30725 (sec), leaf count = 270

$$\left\{\left\{y(x) \to c_3e^{\frac{x^2}{2}}\int_1^x \frac{e^{\frac{K[1]^2}{2}}\left(\int \frac{\exp\left(\frac{1}{4}\sqrt{5}K[1]^2+\frac{1}{2}\left(-\frac{1}{2}K[1]^2-2\log(K[1])\right)\right)U\left(-\frac{-9+\sqrt{5}}{4\sqrt{5}},-\frac{1}{2},-\frac{1}{2}\sqrt{5}K[1]^2\right)}{\sqrt{K[1]}\sqrt[4]{K[1]^2}}\,dK[1]\right)K[1]}{\sqrt[4]{2}}dK[1] + \right.\right.$$

✓ **Maple** : cpu = 2.871 (sec), leaf count = 157

$$\left\{y(x) = -c_3\left(\int \frac{\text{WhittakerM}\left(\frac{9\sqrt{5}}{20}, \frac{3}{4}, \frac{\sqrt{5}\,x^2}{2}\right) e^{-\frac{x^2}{4}}}{x^{\frac{3}{2}}} dx\right) e^{x^2} + c_3\left(\int \frac{\text{WhittakerM}\left(\frac{9\sqrt{5}}{20}, \frac{3}{4}, \frac{\sqrt{5}\,x^2}{2}\right) e^{\frac{x^2}{4}}}{x^{\frac{3}{2}}} dx\right) e^{\frac{x^2}{2}} -\right.$$

2.1551 ODE No. 1551

$$-2(\nu^2x^2+6)\,y''(x)+\nu^2(\nu^2x^2+4)\,y(x)+x^2y^{(4)}(x)=0$$

✓ **Mathematica** : cpu = 0.366973 (sec), leaf count = 110

$$\left\{\left\{y(x)\to \frac{c_3(1-x)e^{-\nu x}(\nu^2x^2+\nu^2x+\nu^2+6\nu x+6\nu+15)}{x}+\frac{c_4(1-x)e^{\nu x}(\nu^2x^2+\nu^2x+\nu^2-6\nu x-6\nu+15)}{x}\right.\right.$$

✓ **Maple** : cpu = 0.231 (sec), leaf count = 62

$$\left\{y(x)=\frac{(c_3\nu^2x^3-6c_3\nu\,x^2+15c_3x+c_1)\,e^{\nu x}+(c_4\nu^2x^3+6c_4\nu\,x^2+15c_4x+c_2)\,e^{-\nu x}}{x}\right\}$$

2.1552 ODE No. 1552

$$ay(x)-bx^2+x^2y^{(4)}(x)+2xy^{(3)}(x)=0$$

✗ **Mathematica** : cpu = 300.003 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.08 (sec), leaf count = 89

$$\left\{y(x)=c_1\sqrt{x}\,\text{BesselJ}\left(1,2(-a)^{\frac{1}{4}}\sqrt{x}\right)+c_2\sqrt{x}\,\text{BesselY}\left(1,2(-a)^{\frac{1}{4}}\sqrt{x}\right)+c_3\sqrt{x}\,\text{BesselJ}\left(1,2\sqrt{-\sqrt{-a}}\,\sqrt{x}\right)+c\right.$$

2.1553 ODE No. 1553

$$x^2y^{(4)}(x)+4xy^{(3)}(x)+2y''(x)=0$$

✓ **Mathematica** : cpu = 0.0092985 (sec), leaf count = 29

$$\{\{y(x)\to c_2(-x)+c_4x+c_2x\log(x)-c_1\log(x)+c_3\}\}$$

✓ **Maple** : cpu = 0.011 (sec), leaf count = 17

$$\{y(x)=c_3x+c_1+(c_4x+c_2)\ln(x)\}$$

2.1554 ODE No. 1554

$$x^2y^{(4)}(x) + 6xy^{(3)}(x) + 6y''(x) = 0$$

✓ **Mathematica** : cpu = 0.009573 (sec), leaf count = 29

$$\left\{\left\{y(x)\to c_4x+\frac{1}{2}\left(\frac{c_1}{x}-2c_2\log(x)\right)+c_3\right\}\right\}$$

✓ **Maple** : cpu = 0.013 (sec), leaf count = 18

$$\left\{y(x)=c_2\ln(x)+c_4x+c_1+\frac{c_3}{x}\right\}$$

2.1555 ODE No. 1555

$$\lambda^2(-y(x)) + x^2y^{(4)}(x) + 6xy^{(3)}(x) + 6y''(x) = 0$$

✓ **Mathematica** : cpu = 0.052573 (sec), leaf count = 156

$$\left\{\left\{y(x)\to c_4G_{0,4}^{2,0}\left(\frac{\lambda^2x^2}{16}|\ -\tfrac{1}{2},\tfrac{1}{2},0,0\right)+c_2G_{0,4}^{2,0}\left(\frac{\lambda^2x^2}{16}|\ 0,0,-\tfrac{1}{2},\tfrac{1}{2}\right)+\frac{c_1\left(J_1\left(2\sqrt{\lambda}\sqrt{x}\right)+I_1\left(2\sqrt{\lambda}\sqrt{x}\right)\right)}{2\sqrt{\lambda}\sqrt{x}}-\frac{ic_3}{}\right.\right.$$

✓ **Maple** : cpu = 0.168 (sec), leaf count = 61

$$\left\{y(x)=\frac{c_1\operatorname{BesselJ}\left(1,2\sqrt{\lambda}\sqrt{x}\right)+c_2\operatorname{BesselY}\left(1,2\sqrt{\lambda}\sqrt{x}\right)+c_3\operatorname{BesselJ}\left(1,2\sqrt{-\lambda}\sqrt{x}\right)+c_4\operatorname{BesselY}\left(1,2\sqrt{-\lambda}\sqrt{}\right.}{\sqrt{x}}\right.$$

2.1556 ODE No. 1556

$$x^2y^{(4)}(x) + 8xy^{(3)}(x) + 12y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0107328 (sec), leaf count = 30

$$\left\{\left\{y(x)\to\frac{1}{6}\left(\frac{c_1}{x^2}+\frac{3c_2}{x}\right)+c_4x+c_3\right\}\right\}$$

✓ **Maple** : cpu = 0.015 (sec), leaf count = 19

$$\left\{y(x)=c_4x+c_1+\frac{c_2}{x}+\frac{c_3}{x^2}\right\}$$

2.1557 ODE No. 1557

$$\lambda^2(-y(x)) + x^2 y^{(4)}(x) + 8xy^{(3)}(x) + 12y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0572299 (sec), leaf count = 146

$$\left\{\left\{y(x) \to c_4 G_{0,4}^{2,0}\left(\frac{\lambda^2 x^2}{16}\middle|\ -1, 0, -\tfrac{1}{2}, \tfrac{1}{2}\right) + c_2 G_{0,4}^{2,0}\left(\frac{\lambda^2 x^2}{16}\middle|\ -\tfrac{1}{2}, \tfrac{1}{2}, -1, 0\right) - \frac{3ic_1\left(I_2\left(2\sqrt{\lambda}\sqrt{x}\right) - J_2\left(2\sqrt{\lambda}\sqrt{x}\right)\right)}{4\lambda x}\right.\right.$$

✓ **Maple** : cpu = 0.112 (sec), leaf count = 61

$$\left\{y(x) = \frac{c_1 \operatorname{BesselJ}\left(2, 2\sqrt{\lambda}\sqrt{x}\right) + c_2 \operatorname{BesselY}\left(2, 2\sqrt{\lambda}\sqrt{x}\right) + c_3 \operatorname{BesselJ}\left(2, 2\sqrt{-\lambda}\sqrt{x}\right) + c_4 \operatorname{BesselY}\left(2, 2\sqrt{-\lambda}\sqrt{\right.}}{x}\right.$$

2.1558 ODE No. 1558

$$-\frac{1}{16}b^4 y(x) + x(2n - 2\nu + 4)y^{(3)}(x) + (n - \nu + 1)(n - \nu + 2)y''(x) + x^2 y^{(4)}(x) = 0$$

✓ **Mathematica** : cpu = 0.123714 (sec), leaf count = 319

$$\left\{\left\{y(x) \to c_4 i^{-n+\nu+1} 2^{3n-3\nu-3} b^{2(-n+\nu+1)+n-\nu-2} x^{\frac{1}{2}(n-\nu-2)-n+\nu+1} \Gamma(-n+\nu+2)\left(I_{\nu-n}(b\sqrt{x}) - J_{\nu-n}(b\sqrt{x})\right) + c_3\right.\right.$$

✓ **Maple** : cpu = 0.167 (sec), leaf count = 67

$$\left\{y(x) = \left(c_1 \operatorname{BesselI}\left(n - \nu, b\sqrt{x}\right) + c_2 \operatorname{BesselJ}\left(n - \nu, b\sqrt{x}\right) + c_3 \operatorname{BesselK}\left(n - \nu, b\sqrt{x}\right) + c_4 \operatorname{BesselY}\left(n - \nu, b\sqrt{x}\right)\right)\right.$$

2.1559 ODE No. 1559

$$a^4\left(-x^3\right) y(x) + x^3 y^{(4)}(x) + 2x^2 y^{(3)}(x) - xy''(x) + y'(x) = 0$$

✓ **Mathematica** : cpu = 0.224862 (sec), leaf count = 100

$$\left\{\left\{y(x) \to c_4 G_{0,4}^{2,0}\left(\frac{a^4 x^4}{256}\middle|\ 0, 0, \tfrac{1}{2}, \tfrac{1}{2}\right) + c_2 G_{0,4}^{2,0}\left(\frac{a^4 x^4}{256}\middle|\ \tfrac{1}{2}, \tfrac{1}{2}, 0, 0\right) + \frac{1}{8} i c_1 (I_0(ax) - J_0(ax)) + \frac{1}{2} c_3 (J_0(ax) + I_0(a\right.\right.$$

✓ **Maple** : cpu = 0.161 (sec), leaf count = 33

$$\{y(x) = c_1 \operatorname{BesselI}(0, ax) + c_2 \operatorname{BesselJ}(0, ax) + c_3 \operatorname{BesselK}(0, ax) + c_4 \operatorname{BesselY}(0, ax)\}$$

2.1560 ODE No. 1560

$$x^3y^{(4)}(x) + 6x^2y^{(3)}(x) + 6xy''(x) = 0$$

✓ **Mathematica** : cpu = 0.0079386 (sec), leaf count = 29

$$\left\{\left\{y(x) \to c_4x + \frac{1}{2}\left(\frac{c_1}{x} - 2c_2\log(x)\right) + c_3\right\}\right\}$$

✓ **Maple** : cpu = 0.013 (sec), leaf count = 18

$$\left\{y(x) = c_2\ln(x) + c_4x + c_1 + \frac{c_3}{x}\right\}$$

2.1561 ODE No. 1561

$$y(x)\left(ax^4 + (n-2)n(n+1)(n+3)\right) - 2n(n+1)x^2y''(x) + 4n(n+1)xy'(x) + x^4y^{(4)}(x) = 0$$

✓ **Mathematica** : cpu = 3.21729 (sec), leaf count = 400

$$\left\{\left\{y(x) \to c_1\left(-2^{n-\frac{5}{2}}\right)\sqrt{x}a^{\frac{2-n}{4}+\frac{1}{4}\left(n-\frac{3}{2}\right)}\Gamma\left(\frac{3}{2}-n\right)\left(\cos\left(\frac{3}{4}\pi\left(\frac{3}{2}-n\right)\right)\operatorname{ber}_{-n-\frac{1}{2}}(\sqrt[4]{a}x) + \sin\left(\frac{3}{4}\pi\left(\frac{3}{2}-n\right)\right)\operatorname{be}\right.\right.\right.$$

✓ **Maple** : cpu = 0.305 (sec), leaf count = 69

$$\left\{y(x) = \left(c_1\operatorname{BesselJ}\left(n+\frac{1}{2},(-a)^{\frac{1}{4}}x\right) + c_2\operatorname{BesselY}\left(n+\frac{1}{2},(-a)^{\frac{1}{4}}x\right) + c_3\operatorname{BesselJ}\left(n+\frac{1}{2},\sqrt{-\sqrt{-a}}\,x\right) + c_4\operatorname{B}\right.\right.$$

2.1562 ODE No. 1562

$$-\left(4n^2-1\right)x^2y''(x) + \left(4n^2-1\right)xy'(x) + x^4y^{(4)}(x) - 4x^4y(x) + 4x^3y^{(3)}(x) = 0$$

✓ **Mathematica** : cpu = 0.920553 (sec), leaf count = 140

$$\left\{\left\{y(x) \to c_1\,{}_0F_3\left(;\frac{1}{2},1-\frac{n}{2},\frac{n}{2}+1;\frac{x^4}{64}\right) + \frac{1}{8}ic_2x^2\,{}_0F_3\left(;\frac{3}{2},\frac{3}{2}-\frac{n}{2},\frac{n}{2}+\frac{3}{2};\frac{x^4}{64}\right) + c_3\left(\frac{i}{2}\right)^{-n}\Gamma(1-n)^2\left(\operatorname{ber}_{-n}(x\right.\right.\right.$$

✓ **Maple** : cpu = 0.359 (sec), leaf count = 77

$$\left\{y(x) = \left(c_1\operatorname{BesselJ}\left(n,\left(\frac{1}{2}-\frac{i}{2}\right)\sqrt{2}\,x\right) + c_3\operatorname{BesselY}\left(n,\left(\frac{1}{2}-\frac{i}{2}\right)\sqrt{2}\,x\right)\right)\operatorname{BesselJ}\left(n,\left(\frac{1}{2}+\frac{i}{2}\right)\sqrt{2}\,x\right) + \left(c\right.\right.$$

2.1563 ODE No. 1563

$$(4n^2 - 4x^4 - 1)\, y(x) - (4n^2 - 1)\, x^2 y''(x) - (4n^2 - 1)\, x y'(x) + x^4 y^{(4)}(x) + 4x^3 y^{(3)}(x) = 0$$

✓ **Mathematica** : cpu = 1.6412 (sec), leaf count = 232

$$\left\{\left\{y(x) \to \frac{\sqrt[4]{-1} c_2 x\, {}_0F_3\left(;\frac{3}{2}, 1-\frac{n}{2}, \frac{n}{2}+1; \frac{x^4}{64}\right)}{2\sqrt{2}} - \frac{2(-1)^{3/4}\sqrt{2} c_1\, {}_0F_3\left(;\frac{1}{2}, \frac{1}{2}-\frac{n}{2}, \frac{n}{2}+\frac{1}{2}; \frac{x^4}{64}\right)}{x} + c_3(-1)^{\frac{1}{4}(1-2n)} 2^{2n+}\right.\right.$$

✓ **Maple** : cpu = 0.251 (sec), leaf count = 87

$$\left\{y(x) = \frac{c_4 \operatorname{hypergeom}\left([\,], \left[\frac{1}{2}, \frac{n}{2}+\frac{1}{2}, -\frac{n}{2}+\frac{1}{2}\right], \frac{x^4}{64}\right) + \left(c_2 \mathit{bei}_{-n}(x)^2 + c_2 \mathit{ber}_{-n}(x)^2 + c_3 \operatorname{hypergeom}\left([\,], \left[\frac{3}{2}, -\frac{n}{2}+\right.\right.\right.}{x}\right.$$

2.1564 ODE No. 1564

$$(-12n^2 - 4x^4 + 3)\, y(x) - (4n^2 + 3)\, x^2 y''(x) + (12n^2 - 3)\, x y'(x) + x^4 y^{(4)}(x) + 4x^3 y^{(3)}(x) = 0$$

✓ **Mathematica** : cpu = 1.13023 (sec), leaf count = 230

$$\left\{\left\{y(x) \to \frac{\sqrt[4]{-1} c_1 x\, {}_0F_3\left(;\frac{1}{2}, \frac{3}{2}-\frac{n}{2}, \frac{n}{2}+\frac{3}{2}; \frac{x^4}{64}\right)}{2\sqrt{2}} + c_3(-1)^{\frac{1}{4}(-2n-1)} 2^{2n+\frac{1}{2}(2n+1)+1} x^{-2n-1}\, {}_0F_3\left(;1-n, \frac{1}{2}-\frac{n}{2}, -\frac{n}{2};\right.\right.\right.$$

✓ **Maple** : cpu = 0.24 (sec), leaf count = 88

$$\left\{y(x) = \frac{c_3 x^4 \operatorname{hypergeom}\left([\,], \left[\frac{3}{2}, \frac{n}{2}+2, -\frac{n}{2}+2\right], \frac{x^4}{64}\right) + c_4 x^2 \operatorname{hypergeom}\left([\,], \left[\frac{1}{2}, -\frac{n}{2}+\frac{3}{2}, \frac{n}{2}+\frac{3}{2}\right], \frac{x^4}{64}\right) + c_2 \mathit{bei}_{-n}(}{x}\right.$$

2.1565 ODE No. 1565

$$(x(-\rho^2 - \sigma^2 + 1) + 16x^3)\, y'(x) + y(x)\,(\rho^2\sigma^2 + 8x^2) + (x^2(-\rho^2 - \sigma^2 + 7) + 4x^4)\, y''(x) + x^4 y^{(4)}(x) + 6x^3 y^{(3)}(x) = 0$$

✓ **Mathematica** : cpu = 0.4196 (sec), leaf count = 242

$$\left\{\left\{y(x) \to c_1 x^{-\rho}\, {}_2F_3\left(\frac{1}{2}-\frac{\rho}{2}, 1-\frac{\rho}{2}; 1-\rho, -\frac{\rho}{2}-\frac{\sigma}{2}+1, -\frac{\rho}{2}+\frac{\sigma}{2}+1; -x^2\right) + c_3 x^{-\sigma}\, {}_2F_3\left(\frac{1}{2}-\frac{\sigma}{2}, 1-\frac{\sigma}{2}; 1-\sigma, -\right.\right.\right.$$

✓ **Maple** : cpu = 0.353 (sec), leaf count = 71

$$\left\{y(x) = \left(c_1 \operatorname{BesselJ}\left(\frac{\rho}{2}-\frac{\sigma}{2}, x\right) + c_2 \operatorname{BesselY}\left(\frac{\rho}{2}-\frac{\sigma}{2}, x\right)\right) \operatorname{BesselJ}\left(\frac{\rho}{2}+\frac{\sigma}{2}, x\right) + \left(c_3 \operatorname{BesselJ}\left(\frac{\rho}{2}-\frac{\sigma}{2}, x\right) + c_4 \operatorname{Be}\right.\right.$$

2.1566 ODE No. 1566

$$(x(-2\mu^2 - 2\nu^2 + 1) + 16x^3)\, y'(x) + y(x)\left(\left(\mu^2 - \nu^2\right)^2 + 8x^2\right) + (x^2(-2\mu^2 - 2\nu^2 + 7) + 4x^4)\, y''(x) + x^4 y^{(4)}(x) + 6x$$

✓ **Mathematica** : cpu = 0.495727 (sec), leaf count = 238

$$\left\{\left\{y(x) \to c_1 x^{-\mu-\nu}\, {}_2F_3\left(-\frac{\mu}{2} - \frac{\nu}{2} + \frac{1}{2}, -\frac{\mu}{2} - \frac{\nu}{2} + 1; 1 - \mu, 1 - \nu, -\mu - \nu + 1; -x^2\right) + c_2 x^{\mu-\nu}\, {}_2F_3\left(\frac{\mu}{2} - \frac{\nu}{2} + \frac{1}{2}, \right.\right.\right.$$

✓ **Maple** : cpu = 0.309 (sec), leaf count = 35

$$\{y(x) = (c_1 \operatorname{BesselJ}(\mu, x) + c_2 \operatorname{BesselY}(\mu, x)) \operatorname{BesselJ}(\nu, x) + (c_3 \operatorname{BesselJ}(\mu, x) + c_4 \operatorname{BesselY}(\mu, x)) \operatorname{BesselY}(\nu, x)\}$$

2.1567 ODE No. 1567

$$x^4 y^{(4)}(x) + 8x^3 y^{(3)}(x) + 12x^2 y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0084236 (sec), leaf count = 30

$$\left\{\left\{y(x) \to \frac{1}{6}\left(\frac{c_1}{x^2} + \frac{3c_2}{x}\right) + c_4 x + c_3\right\}\right\}$$

✓ **Maple** : cpu = 0.015 (sec), leaf count = 19

$$\left\{y(x) = c_4 x + c_1 + \frac{c_2}{x} + \frac{c_3}{x^2}\right\}$$

2.1568 ODE No. 1568

$$ay(x) + x^4 y^{(4)}(x) + 8x^3 y^{(3)}(x) + 12x^2 y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0100379 (sec), leaf count = 122

$$\left\{\left\{y(x) \to c_1 x^{\frac{1}{2}\left(-\sqrt{5-4\sqrt{1-a}}-1\right)} + c_2 x^{\frac{1}{2}\left(\sqrt{5-4\sqrt{1-a}}-1\right)} + c_3 x^{\frac{1}{2}\left(-\sqrt{4\sqrt{1-a}+5}-1\right)} + c_4 x^{\frac{1}{2}\left(\sqrt{4\sqrt{1-a}+5}-1\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.036 (sec), leaf count = 89

$$\left\{y(x) = c_1 x^{-\frac{1}{2} - \frac{\sqrt{5-4\sqrt{-a+1}}}{2}} + c_2 x^{-\frac{1}{2} + \frac{\sqrt{5-4\sqrt{-a+1}}}{2}} + c_3 x^{-\frac{1}{2} - \frac{\sqrt{5+4\sqrt{-a+1}}}{2}} + c_4 x^{-\frac{1}{2} + \frac{\sqrt{5+4\sqrt{-a+1}}}{2}}\right\}$$

2.1569 ODE No. 1569

$xy'(x)\left((2a-1)\mathrm{C0}+4b^2\mathrm{B0}c^2x^{2c}\right)+(6-4a)x^3y^{(3)}(x)+x^2y''(x)\left(\mathrm{A0}+4b^2c^2x^{2c}\right)+y(x)\left(4b^2c^2\mathrm{D0}x^{2c}+\mathrm{E0}\right)+x^4y^{(4)}($

✗ **Mathematica** : cpu = 300.004 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.423 (sec), leaf count = 63

$$\{y(x)=((c_2\,\mathrm{BesselJ}\,(\mu,b\,x^c)+c_3\,\mathrm{BesselY}\,(\mu,b\,x^c))\,\mathrm{BesselJ}\,(\nu,b\,x^c)+(c_1\,\mathrm{BesselJ}\,(\mu,b\,x^c)+c_4\,\mathrm{BesselY}\,(\mu,b\,x^c))\,\mathrm{B}$$

2.1570 ODE No. 1570

$y(x)\left(\left(a^2-c^2\nu^2\right)\left(a^2+4ac-c^2\nu^2+4c^2\right)-b^4c^4x^{4c}\right)+x^2\left(2a^2+4(a+c-1)^2+4(a-1)(c-1)-2c^2\nu^2-1\right)y''($

✓ **Mathematica** : cpu = 0.110918 (sec), leaf count = 470

$$\left\{\left\{y(x)\to c_1\Gamma(1-\nu)(-1)^{\frac{a-c\nu}{4c}}2^{-\frac{2(a-c\nu)}{c}-\nu-1}b^{\frac{a-c\nu}{c}+\nu}\left(x^{4c}\right)^{\frac{a-c\nu}{4c}+\frac{\nu}{4}}\left(J_{-\nu}\left(b\sqrt[4]{x^{4c}}\right)+I_{-\nu}\left(b\sqrt[4]{x^{4c}}\right)\right)+c_2\Gamma(2-\nu)(-\right.\right.$$

✓ **Maple** : cpu = 0.107 (sec), leaf count = 49

$$\{y(x)=(c_1\,\mathrm{BesselJ}\,(\nu,b\,x^c)+c_2\,\mathrm{BesselY}\,(\nu,b\,x^c)+c_3\,\mathrm{BesselJ}\,(\nu,ib\,x^c)+c_4\,\mathrm{BesselY}\,(\nu,ib\,x^c))\,x^a\}$$

2.1571 ODE No. 1571

$$-\frac{1}{16}b^4x^{2/v}y(x)+\nu^4x^4y^{(4)}(x)+\nu^3(4\nu-2)x^3y^{(3)}(x)+(\nu-1)\nu^2(2\nu-1)x^2y''(x)=0$$

✓ **Mathematica** : cpu = 0.0695408 (sec), leaf count = 390

$$\left\{\left\{y(x)\to c_1\,{}_0F_3\left(;1-\frac{v}{2},1-\frac{v}{2\nu},-\frac{v}{2\nu}-\frac{v}{2}+1;\frac{b^4v^4x^{2/v}}{256\nu^4}\right)+c_2\left(\frac{i}{16}\right)^v v^{2v}b^{2v}\nu^{-2v}\left(x^{2/v}\right)^{v/2}\,{}_0F_3\left(;\frac{v}{2}+1,1-\right.\right.\right.$$

✓ **Maple** : cpu = 0.312 (sec), leaf count = 143

$$\left\{y(x)=\left(c_1\,\mathrm{BesselJ}\left(\frac{1}{\lfloor\frac{1}{\nu}\rfloor},\frac{\sqrt{\frac{b^2}{\nu^2}}\,x^{\frac{\lfloor\frac{1}{\nu}\rfloor}{2}}}{\lfloor\frac{1}{\nu}\rfloor}\right)+c_2\,\mathrm{BesselY}\left(\frac{1}{\lfloor\frac{1}{\nu}\rfloor},\frac{\sqrt{\frac{b^2}{\nu^2}}\,x^{\frac{\lfloor\frac{1}{\nu}\rfloor}{2}}}{\lfloor\frac{1}{\nu}\rfloor}\right)+c_3\,\mathrm{BesselJ}\left(\frac{1}{\lfloor\frac{1}{\nu}\rfloor},\frac{\sqrt{-\frac{b^2}{\nu^2}}\,x^{\frac{\lfloor\frac{1}{\nu}\rfloor}{2}}}{\lfloor\frac{1}{\nu}\rfloor}\right)+\right.\right.$$

2.1572 ODE No. 1572

$(-2(x^2-1)(\mu(\mu+1)+\nu(\nu+1))+24x^3-8)\,y''(x)-6x(\mu(\mu+1)+\nu(\nu+1)-2)y'(x)+((\mu(\mu+1)-\nu(\nu+1))^2-$

✗ **Mathematica** : cpu = 87.5806 (sec), leaf count = 0 , DifferentialRoot result

$$\{\{y(x)\to(x)\}\}$$

✓ **Maple** : cpu = 0.396 (sec), leaf count = 35

$\{y(x)=(c_1\,\mathrm{LegendreP}\,(\mu,x)+c_2\,\mathrm{LegendreQ}\,(\mu,x))\,\mathrm{LegendreP}\,(\nu,x)+(c_3\,\mathrm{LegendreP}\,(\mu,x)+c_4\,\mathrm{LegendreQ}\,(\mu,x$

2.1573 ODE No. 1573

$$-\frac{1}{x^5}+(2x+e^x)\,y^{(4)}(x)+4(e^x+2)\,y^{(3)}(x)+6e^xy''(x)+4e^xy'(x)+e^xy(x)=0$$

✓ **Mathematica** : cpu = 0.173271 (sec), leaf count = 77

$$\left\{\left\{y(x)\to\frac{c_4x^3}{2x+e^x}+\frac{c_3x^2}{2x+e^x}+\frac{1}{24\,(2x+e^x)\,x}+\frac{c_2x}{2x+e^x}+\frac{c_1}{2x+e^x}\right\}\right\}$$

✓ **Maple** : cpu = 0.056 (sec), leaf count = 41

$$\left\{y(x)=\frac{24c_1x^4+24c_2x^3+24c_3x^2+24c_4x+1}{24\,(2x+\mathrm{e}^x)\,x}\right\}$$

2.1574 ODE No. 1574

$y(x)\,(a^4\sin^4(x)-3)+y^{(4)}(x)\sin^4(x)+2y^{(3)}(x)\sin^3(x)\cos(x)+(\sin^2(x)-3)\sin^2(x)y''(x)+(2\sin^2(x)+3)\sin(x)$

✓ **Mathematica** : cpu = 0.20003 (sec), leaf count = 270

$\left\{\left\{y(x)\to c_1\sin(x)\,{}_2F_1\left(\frac{1}{4}\left(3-\sqrt{5-4\sqrt{1-a^4}}\right),\frac{1}{4}\left(\sqrt{5-4\sqrt{1-a^4}}+3\right);\frac{1}{2};\cos^2(x)\right)+c_3\sin(x)\cos(x)\,{}_2F_1\right.\right.$

✓ **Maple** : cpu = 0.812 (sec), leaf count = 252

$\left\{y(x)=\left(c_1\,\mathrm{hypergeom}\left(\left[\frac{3}{4}-\frac{\sqrt{-4\sqrt{-(a-1)(a+1)(a^2+1)}+5}}{4},\frac{3}{4}+\frac{\sqrt{-4\sqrt{-(a-1)(a+1)(a^2+1)}+}}{4}\right.\right.\right.\right.$

2.1575 ODE No. 1575

$$-f(x)+y^{(4)}(x)\sin^6(x)+4y^{(3)}(x)\sin^5(x)\cos(x)-6\sin^6(x)y''(x)-4\sin^5(x)\cos(x)y'(x)+y(x)\sin^6(x)=0$$

✓ **Mathematica** : cpu = 8.53073 (sec), leaf count = 138

$$\left\{\left\{y(x)\to x^3\csc(x)\int_1^x\frac{1}{6}\csc^5(K[4])f(K[4])dK[4]+x^2\csc(x)\int_1^x-\frac{1}{2}\csc^5(K[3])f(K[3])K[3]dK[3]+x\csc(x)\int_1\right.\right.$$

✓ **Maple** : cpu = 0.622 (sec), leaf count = 638

$$\left\{y(x)=\frac{-2\left(\csc^2(x)+\frac{3}{2}\right)f\,x^3\cot(x)\csc(x)-12\left(e^{2ix}-\frac{3\,e^{4ix}}{2}+e^{6ix}-\frac{e^{8ix}}{4}-\frac{1}{4}\right)f\,x^3\ln(-\cot(x)+\csc(x))+}{}\right.$$

2.1576 ODE No. 1576

$$2f'(x)\left(y^{(3)}(x)-a^2y'(x)\right)+f(x)\left(a^4y(x)-2a^2y''(x)+y^{(4)}(x)\right)=0$$

✗ **Mathematica** : cpu = 0.192138 (sec), leaf count = 0 , could not solve

```
DSolve[2*Derivative[1][f][x]*(-(a^2*Derivative[1][y][x]) + Derivative[3][y][x]) + f[x]*(a^4*
```

✓ **Maple** : cpu = 0.022 (sec), leaf count = 67

$$\left\{y(x)=c_1e^{-ax}+c_2e^{ax}+c_3e^{\frac{\left(-df+\sqrt{a^2f^2+df^2}\right)x}{f}}+c_4e^{-\frac{\left(df+\sqrt{a^2f^2+df^2}\right)x}{f}}\right\}$$

2.1577 ODE No. 1577

$$f''(x)y''(x)+2y^{(3)}(x)f'(x)+f(x)y^{(4)}(x)=0$$

✓ **Mathematica** : cpu = 0.0774019 (sec), leaf count = 46

$$\left\{\left\{y(x)\to\int_1^x\int_1^{K[2]}\left(\frac{c_1}{f(K[1])}+\frac{c_2K[1]}{f(K[1])}\right)dK[1]dK[2]+c_4x+c_3\right\}\right\}$$

✓ **Maple** : cpu = 0.016 (sec), leaf count = 21

$$\left\{y(x)=\frac{1}{6}c_1x^3+\frac{1}{2}c_2x^2+c_3x+c_4\right\}$$

2.1578 ODE No. 1578

$$a^4y(x) - \lambda(ax-b)\left(y''(x) - a^2y(x)\right) - 2a^2y''(x) + y^{(4)}(x) = 0$$

✓ **Mathematica** : cpu = 48.8374 (sec), leaf count = 141

$$\left\{\left\{y(x) \to c_3e^{-ax}\int_1^x 2ae^{2aK[1]}\int e^{-aK[1]}\text{Ai}\left(\frac{a^2+\lambda K[1]a-b\lambda}{(a\lambda)^{2/3}}\right)dK[1]dK[1] + c_4e^{-ax}\int_1^x 2ae^{2aK[2]}\int e^{-aK[2]}\text{B}\right.\right.$$

✓ **Maple** : cpu = 0.482 (sec), leaf count = 89

$$\left\{y(x) = \left(c_1 + \int\left(c_2 + \int\left(c_3\,\text{AiryAi}\left(-\frac{(-a\lambda)^{\frac{1}{3}}\left(a^2+(ax-b)\lambda\right)}{a\lambda}\right) + c_4\,\text{AiryBi}\left(-\frac{(-a\lambda)^{\frac{1}{3}}\left(a^2+(ax-b)\lambda\right)}{a\lambda}\right.\right.\right.\right.\right.$$

2.1579 ODE No. 1579

$$-ax - b\sin(x) - c\cos(x) + y^{(n)}(x) + 2y^{(3)}(x) + y'(x) = 0$$

✓ **Mathematica** : cpu = 0.937588 (sec), leaf count = 80

$$\left\{\left\{y(x) \to \frac{1}{16}\left(8ax^2 + \cos(x)\left(b\left(2x^2-9\right) - 2(5cx + 8(c_4x - c_2 + c_3))\right) + \sin(x)\left(-6bx + c\left(13-2x^2\right) + 16(c_2x + \right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.467 (sec), leaf count = 69

$$\left\{y(x) = \frac{a\,x^2}{2} + c_5 + \frac{\left(b\,x^2 - 8c_2 + 8c_3 - 6b + (-8c_4 - 4c)\,x\right)\cos(x)}{8} + \frac{\left(-c\,x^2 + 8c_1 + 8c_4 + 6c + (8c_3 - 4b)\,x\right)\text{s}}{8}\right.$$

2.1580 ODE No. 1580

$$y^{(6)}(x) + y(x) - \sin\left(\frac{x}{2}\right)\sin\left(\frac{3x}{2}\right) = 0$$

✓ **Mathematica** : cpu = 2.44291 (sec), leaf count = 234

$$\left\{\left\{y(x) \to \frac{1}{504}\left(-42\sin^2\left(\frac{x}{2}\right) - 42\sin^2(x) + 42x\sin(x) + 42\sin\left(\frac{x}{2}\right)\sin\left(\frac{3x}{2}\right) + 21\sin(x)\sin(2x) - 24\sin\left(\frac{x}{2}\right)\right.\right.\right.$$

✓ **Maple** : cpu = 1.247 (sec), leaf count = 79

$$\left\{y(x) = \frac{(504c_1+105)\cos(x)}{504} + \frac{\cos(2x)}{126} + \frac{\left(504c_3\cos\left(\frac{x}{2}\right) + 504c_4\sin\left(\frac{x}{2}\right)\right)e^{-\frac{\sqrt{3}\,x}{2}}}{504} + \frac{\left(504c_5\cos\left(\frac{x}{2}\right) + 504c_6\sin\right.}{504}\right.$$

2.1581 ODE No. 1581

$$-axy(x) - b + y^{(5)}(x) = 0$$

✗ **Mathematica** : cpu = 0.181005 (sec), leaf count = 0 , DifferentialRoot result

$$\{\{y(x) \to (x)\}\}$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(diff(diff(diff(diff(y(x),x),x),x),x),x)-a*x*y(x)-b=0,y(x))
```

2.1582 ODE No. 1582

$$a\nu x^{\nu-1}y(x) + ax^{\nu}y'(x) + y^{(5)}(x) = 0$$

✓ **Mathematica** : cpu = 0.122735 (sec), leaf count = 787

$$\left\{\left\{y(x) \to c_5\left(\frac{4}{\nu}+1\right)^{-\frac{16}{\nu+4}} \nu^{-\frac{16}{\nu+4}} a^{\frac{4}{\nu+4}} (x^{\nu})^{\frac{4\left(\frac{4}{\nu}+1\right)}{\nu+4}} \,{}_1F_4\left(\frac{4}{\nu\left(1+\frac{4}{\nu}\right)} + \frac{1}{1+\frac{4}{\nu}}; 1 + \frac{1}{\left(1+\frac{4}{\nu}\right)\nu}, 1 + \frac{2}{\left(1+\frac{4}{\nu}\right)\nu}, 1 + \frac{}{(1}\right.\right.\right.$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x) = DESol\left(\left\{a\nu\, x^{\nu-1} \_Y(x) + a\, x^{\nu}\left(\frac{d}{dx}\_Y(x)\right) + \frac{d^5}{dx^5}\_Y(x)\right\}, \{\_Y(x)\}\right)\right\}$$

2.1583 ODE No. 1583

$$ay^{(4)}(x) - f(x) + y^{(5)}(x) = 0$$

✓ **Mathematica** : cpu = 0.120663 (sec), leaf count = 92

$$\left\{\left\{y(x) \to \int_1^x \int_1^{K[5]} \int_1^{K[4]} \int_1^{K[3]} \left(e^{-aK[2]}c_1 + e^{-aK[2]} \int_1^{K[2]} e^{aK[1]} f(K[1]) dK[1]\right) dK[2] dK[3] dK[4] dK[5] + c_5\right.\right.$$

✓ **Maple** : cpu = 0.067 (sec), leaf count = 40

$$\left\{y(x) = \frac{c_2 x^3}{6} + \frac{f\, x^4}{24a} + \frac{c_3 x^2}{2} + c_4 x + c_5 + \frac{c_1 e^{-ax}}{a^4}\right\}$$

2.1584 ODE No. 1584

$$axy(x) - 5my^{(4)}(x) + xy^{(5)}(x) = 0$$

✓ **Mathematica** : cpu = 2.47595 (sec), leaf count = 216

$$\left\{\left\{y(x) \to c_5 5^{-5m-4} a^{\frac{1}{5}(5m+4)} x^{5m+4} {}_0F_4\left(;m+\frac{6}{5},m+\frac{7}{5},m+\frac{8}{5},m+\frac{9}{5};-\frac{ax^5}{3125}\right) + \frac{1}{125} a^{3/5} c_4 x^3 {}_0F_4\left(;\frac{6}{5},\frac{7}{5},\frac{8}{5},\right.\right.\right.$$

✓ **Maple** : cpu = 0.246 (sec), leaf count = 118

$$\left\{y(x) = c_4 x^3 \,\text{hypergeom}\left([], \left[\frac{6}{5},\frac{7}{5},\frac{8}{5},-m+\frac{4}{5}\right], -\frac{a\,x^5}{3125}\right) + c_3 x^2 \,\text{hypergeom}\left([], \left[\frac{4}{5},\frac{6}{5},\frac{7}{5},-m+\frac{3}{5}\right], -\frac{a\,x^5}{3125}\right)\right.$$

2.1585 ODE No. 1585

$$xy(x)\left(ay'(x) + by''(x) + cy^{(3)}(x) + ey^{(4)}(x)\right) = 0$$

✓ **Mathematica** : cpu = 0.181056 (sec), leaf count = 214

$$\left\{\{y(x) \to 0\}, \left\{y(x) \to \frac{c_1 e^{x\text{Root}\left[\#1^3+\frac{\#1^2c}{e}+\frac{\#1b}{e}+\frac{a}{e}\&,1\right]}}{\text{Root}\left[\#1^3+\frac{\#1^2c}{e}+\frac{\#1b}{e}+\frac{a}{e}\&,1\right]} + \frac{c_2 e^{x\text{Root}\left[\#1^3+\frac{\#1^2c}{e}+\frac{\#1b}{e}+\frac{a}{e}\&,2\right]}}{\text{Root}\left[\#1^3+\frac{\#1^2c}{e}+\frac{\#1b}{e}+\frac{a}{e}\&,2\right]} + \frac{c_3 e^{x\text{Root}\left[\#\right.}}{\text{Root}\left[\#1^3+\right.}\right.\right.$$

✓ **Maple** : cpu = 0.042 (sec), leaf count = 679

$$\left\{y(x) = 0, y(x) = c_2 \mathrm{e}^{-\frac{\left(-12be+\left(12ibe-4ic^2+i\left(-108a\,e^2+36bce-8c^3+12\sqrt{3}\,\sqrt{27a^2e^2+4a\,c^3-b^2c^2+\left(-18abc+4b^3\right)e\,e}\right)^{\frac{2}{3}}\right)\sqrt{3}+\left(2c+\left(-108a\,e^2+36\right.\right.\right.}{12\left(-108a\,e^2+36bce-8c^3+12\sqrt{3}\,\sqrt{27a^2e^2+4a\,c^3-b^2c^2+\left(-18abc+4b\right.}\right.}}\right.$$

2.1586 ODE No. 1586

$-y^{(4)}(x)(x(aA(5)-A(4))+A(5))-y^{(3)}(x)(x(aA(4)-A(3))+A(4))-(x(aA(3)-A(2))+A(3))y''(x)-(x(aA(2)-A($

✗ **Mathematica** : cpu = 83.181 (sec), leaf count = 0 , DifferentialRoot result

$$\{\{y(x) \to (x)\}\}$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{ y(x) = c_1 + \int DESol\left(\left\{ \frac{d^4}{dx^4}\_Y(x) - \frac{(axA_2 - xA_1 + A_2)\_Y(x)}{x} - \frac{(axA_3 - xA_2 + A_3)\left(\frac{d}{dx}\_Y(x)\right)}{x} - \frac{(axA_4}{} \right.\right.\right.$$

2.1587 ODE No. 1587

$$x^5y^{(10)}(x) - ay(x) = 0$$

✓ **Mathematica** : cpu = 0.324153 (sec), leaf count = 492

$$\left\{\left\{ y(x) \to \frac{(-1)^{4/5}a^{9/5}c_1x^9\,{}_0F_9\left(;\frac{6}{5},\frac{7}{5},\frac{8}{5},\frac{9}{5},2,\frac{11}{5},\frac{12}{5},\frac{13}{5},\frac{14}{5};\frac{ax^5}{9765625}\right)}{3814697265625} + \frac{(-1)^{3/5}a^{8/5}c_3x^8\,{}_0F_9\left(;\frac{4}{5},\frac{6}{5},\frac{7}{5},\frac{8}{5},\frac{9}{5},2,\frac{11}{5},\right.}{152587890625}\right.\right.$$

✓ **Maple** : cpu = 0.467 (sec), leaf count = 154

$$\left\{ y(x) = \left(c_1 \operatorname{BesselI}\left(5, 2a^{\frac{1}{10}}\sqrt{x}\right) + c_{10} \operatorname{BesselY}\left(5, 2(-1)^{\frac{9}{10}}a^{\frac{1}{10}}\sqrt{x}\right) + c_2 \operatorname{BesselY}\left(5, 2ia^{\frac{1}{10}}\sqrt{x}\right) + c_3 \operatorname{BesselJ}\left(5, 2\right.\right.\right.$$

2.1588 ODE No. 1588

$$x^{10}y^{(5)}(x) - ay(x) = 0$$

✓ **Mathematica** : cpu = 12.1395 (sec), leaf count = 114

$$\left\{\left\{ y(x) \to c_1x^4e^{-\frac{\sqrt[5]{a}}{x}} + c_2x^4e^{\frac{\sqrt[5]{-1}\sqrt[5]{a}}{x}} + c_3x^4e^{-\frac{(-1)^{2/5}\sqrt[5]{a}}{x}} + c_4x^4e^{\frac{(-1)^{3/5}\sqrt[5]{a}}{x}} + c_5x^4e^{-\frac{(-1)^{4/5}\sqrt[5]{a}}{x}} \right\}\right\}$$

✓ **Maple** : cpu = 0.147 (sec), leaf count = 90

$$\left\{ y(x) = c_5x^4 \operatorname{hypergeom}\left([\,], \left[\frac{1}{5}, \frac{2}{5}, \frac{3}{5}, \frac{4}{5}\right], -\frac{a}{3125x^5}\right) + c_4x^3 \operatorname{hypergeom}\left([\,], \left[\frac{2}{5}, \frac{3}{5}, \frac{4}{5}, \frac{6}{5}\right], -\frac{a}{3125x^5}\right) + c_3x^2 \operatorname{hy}\right.$$

2.1589 ODE No. 1589

$$x^{11/2}y^{(11)}(x) - ay(x) = 0$$

✓ **Mathematica** : cpu = 0.0395231 (sec), leaf count = 670

$$\left\{\left\{y(x) \to \frac{4}{121}(-1)^{2/11}a^{2/11}c_2x\,{}_0F_{10}\left(;-\frac{7}{11},-\frac{5}{11},-\frac{3}{11},-\frac{1}{11},\frac{1}{11},\frac{3}{11},\frac{5}{11},\frac{7}{11},\frac{9}{11},\frac{13}{11};\frac{2048ax^{11/2}}{285311670611}\right) - \frac{10485}{}\right.\right.$$

✓ **Maple** : cpu = 8.053 (sec), leaf count = 4018

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2.1590 ODE No. 1590

$$(x-a)^5(x-b)^5y^{(5)}(x) - cy(x) = 0$$

✓ **Mathematica** : cpu = 271.105 (sec), leaf count = 331

$$\left\{\left\{y(x) \to c_1(x-b)^4\left(\frac{x-a}{x-b}\right)^{\text{Root}\left[-\#1^5+10\#1^4-35\#1^3+50\#1^2-24\#1+\frac{c}{(a-b)^5}\&,1\right]} + c_2(x-b)^4\left(\frac{x-a}{x-b}\right)^{\text{Root}\left[-\#1^5+10\right.}\right.\right.$$

✓ **Maple** : cpu = 1.732 (sec), leaf count = 553

$$\left\{y(x) = ODESolStruc\left(\mathrm{e}^{c_2+\int -\frac{4\left(\frac{\_f}{4}+a+\left(-\frac{\_f}{4}-b\right)\mathrm{e}^{(c_1+\int \_g(\_f)d\_f)(a-b)}\right)\_g(\_f)}{\mathrm{e}^{(c_1+\int \_g(\_f)d\_f)(a-b)}-1}d\_f}, \left[\left\{\frac{-96\left(\left(\frac{\_f^5}{96}+a^4b+\frac{13a^3b^2}{3}+\frac{13a^2b^3}{3}\right.\right.}{}\right.\right.\right.\right.$$

2.1591 ODE No. 1591

$$y''(x) - y(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.0491518 (sec), leaf count = 26

$$\left\{\left\{y(x) \to \sqrt[3]{6}\wp\left(\frac{x+c_1}{\sqrt[3]{6}};0,c_2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.857 (sec), leaf count = 12

$$\{y(x) = 6\,\mathrm{WeierstrassP}\,(c_1+x,0,c_2)\}$$

2.1592 ODE No. 1592

$$y''(x) - 6y(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.0975503 (sec), leaf count = 14

$$\{\{y(x) \to \wp(x + c_1; 0, c_2)\}\}$$

✓ **Maple** : cpu = 0.852 (sec), leaf count = 10

$$\{y(x) = \text{WeierstrassP}\,(c_1 + x, 0, c_2)\}$$

2.1593 ODE No. 1593

$$y''(x) - 6y(x)^2 - x = 0$$

✗ **Mathematica** : cpu = 20.0785 (sec), leaf count = 0 , could not solve

```
DSolve[-x - 6*y[x]^2 + Derivative[2][y][x] == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(diff(y(x),x),x)-6*y(x)^2-x=0,y(x))
```

2.1594 ODE No. 1594

$$y''(x) - 6y(x)^2 + 4y(x) = 0$$

✓ **Mathematica** : cpu = 0.505858 (sec), leaf count = 373

$$\text{Solve}\left[\frac{4\left(\text{Root}\left[4\#1^3 - 4\#1^2 + c_1\&, 2\right] - \text{Root}\left[4\#1^3 - 4\#1^2 + c_1\&, 3\right]\right)\left(y(x) - \text{Root}\left[4\#1^3 - 4\#1^2 + c_1\&, 1\right]\right)\left(\right.}{\left(4y(x)^3 - 4y(x)^2 + c_1\right)\left(\text{Root}\left[4\#1^3\right.\right.}\right.$$

✓ **Maple** : cpu = 0.941 (sec), leaf count = 59

$$\left\{-c_2 - x + \int^{y(x)} \frac{1}{\sqrt{4\_a^3 - 4\_a^2 + c_1}} d\_a = 0, -c_2 - x + \int^{y(x)} -\frac{1}{\sqrt{4\_a^3 - 4\_a^2 + c_1}} d\_a = 0\right\}$$

2.1595 ODE No. 1595

$$ay(x)^2 + bx + c + y''(x) = 0$$

✗ **Mathematica** : cpu = 20.142 (sec), leaf count = 0 , could not solve

```
DSolve[c + b*x + a*y[x]^2 + Derivative[2][y][x] == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(diff(y(x),x),x)+a*y(x)^2+b*x+c=0,y(x))
```

2.1596 ODE No. 1596

$$a + y''(x) - 2y(x)^3 - xy(x) = 0$$

✗ **Mathematica** : cpu = 20.5128 (sec), leaf count = 0 , could not solve

```
DSolve[a - x*y[x] - 2*y[x]^3 + Derivative[2][y][x] == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(diff(y(x),x),x)-2*y(x)^3-x*y(x)+a=0,y(x))
```

2.1597 ODE No. 1597

$$y''(x) - ay(x)^3 = 0$$

✓ **Mathematica** : cpu = 2.52144 (sec), leaf count = 242

$$\left\{\left\{y(x) \to -\frac{\sqrt[4]{2}\sqrt{c_1}\sqrt{\frac{i\sqrt{a}}{\sqrt{c_1}}}\operatorname{sn}\left(\frac{(-1)^{3/4}\sqrt{\sqrt{2}\sqrt{a}\sqrt{c_1}x^2+2\sqrt{2}\sqrt{a}\sqrt{c_1}c_2x+\sqrt{2}\sqrt{a}\sqrt{c_1}c_2{}^2}}{\sqrt{2}}\middle| -1\right)}{\sqrt{a}}\right\}, \left\{y(x) \to \frac{\sqrt[4]{2}\sqrt{c_1}\sqrt{\frac{i\sqrt{a}}{\sqrt{c_1}}}\operatorname{sn}\left(\ldots\right.}{\ldots}\right.\right.$$

✓ **Maple** : cpu = 1.019 (sec), leaf count = 21

$$\left\{y(x) = c_2 \operatorname{sn}\left(c_2\left(c_1 + \frac{\sqrt{-2a}\,x}{2}\right) \middle| i\right)\right\}$$

2.1598 ODE No. 1598

$$-2a^2y(x)^3 + 2abxy(x) - b + y''(x) = 0$$

✗ **Mathematica** : cpu = 22.5214 (sec), leaf count = 0 , could not solve

```
DSolve[-b + 2*a*b*x*y[x] - 2*a^2*y[x]^3 + Derivative[2][y][x] == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(diff(y(x),x),x)-2*a^2*y(x)^3+2*a*b*x*y(x)-b=0,y(x))
```

2.1599 ODE No. 1599

$$ay(x)^3 + bxy(x) + cy(x) + d + y''(x) = 0$$

✗ **Mathematica** : cpu = 20.7826 (sec), leaf count = 0 , could not solve

```
DSolve[d + c*y[x] + b*x*y[x] + a*y[x]^3 + Derivative[2][y][x] == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(diff(y(x),x),x)+d+b*x*y(x)+c*y(x)+a*y(x)^3=0,y(x))
```

2.1600 ODE No. 1600

$$ay(x)^3 + by(x)^2 + cy(x) + d + y''(x) = 0$$

✓ **Mathematica** : cpu = 2.37264 (sec), leaf count = 1017

$$\text{Solve}\left[\frac{4F\left(\sin^{-1}\left(\sqrt{\frac{(\text{Root}[3a\#1^4+4b\#1^3+6c\#1^2+12d\#1-6c_1\&,2]-\text{Root}[3a\#1^4+4b\#1^3+6c\#1^2+12d\#1-6c_1\&,4])(y(x)-\text{Root}[3a\#}{(\text{Root}[3a\#1^4+4b\#1^3+6c\#1^2+12d\#1-6c_1\&,1]-\text{Root}[3a\#1^4+4b\#1^3+6c\#1^2+12d\#1-6c_1\&,4])(y(x)-\text{Root}[3a\#}}\right.\right.}{}\right.$$

✓ **Maple** : cpu = 0.916 (sec), leaf count = 89

$$\left\{-c_2 - x + \int^{y(x)} -\frac{6}{\sqrt{-18\_a^4a - 24b\_a^3 - 36c\_a^2 - 72d\_a + 36c_1}}d\_a = 0, -c_2 - x + \int^{y(x)} \frac{}{\sqrt{-18\_a^4a - 2}}\right.$$

2.1601 ODE No. 1601

$$a x^r y(x)^n + y''(x) = 0$$

✗ **Mathematica** : cpu = 0.0407634 (sec), leaf count = 0 , could not solve

```
DSolve[a*x^r*y[x]^n + Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 4.318 (sec), leaf count = 151

$$\left\{ y(x) = ODESolStruc\left(\_a\, e^{c_1 + \int \_b(\_a) d\_a}, \left[\left\{ \frac{d}{d\_a}\_b(\_a) = \frac{\left((n-1)^2 a\_a^n\_b(\_a) + ((n+r+1)\_a\_b(\_a)}{(r+2)^2} \right.\right.\right.\right.$$

2.1602 ODE No. 1602

$$(n+1)a^{2n} y(x)^{2n+1} + y''(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 0.148189 (sec), leaf count = 47

$$\text{Solve}\left[\int_1^{y(x)} \frac{1}{\sqrt{c_1 - K[1]^2 \left(a^{2n} K[1]^{2n} - 1\right)}} dK[1]^2 = (x + c_2)^2, y(x)\right]$$

✓ **Maple** : cpu = 0.243 (sec), leaf count = 73

$$\left\{ -c_2 - x + \int^{y(x)} \frac{1}{\sqrt{\_a^2 - \_a^{2n+2} a^{2n} + c_1}} d\_a = 0, -c_2 - x + \int^{y(x)} -\frac{1}{\sqrt{\_a^2 - \_a^{2n+2} a^{2n} + c_1}} d\_a = 0 \right\}$$

2.1603 ODE No. 1603

$$y''(x) - \frac{1}{\left(a y(x)^2 + b x y(x) + c x^2 + d y(x) + e x + k\right)^{3/2}} = 0$$

✗ **Mathematica** : cpu = 60.4184 (sec), leaf count = 0 , could not solve

```
DSolve[-(k + e*x + c*x^2 + d*y[x] + b*x*y[x] + a*y[x]^2)^(-3/2) + Derivative[2][y][x] == 0,
```

✓ **Maple** : cpu = 43.954 (sec), leaf count = 8413

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2.1604 ODE No. 1604

$$y''(x) - e^{y(x)} = 0$$

✓ **Mathematica** : cpu = 0.0427803 (sec), leaf count = 34

$$\left\{\left\{y(x) \to \log\left(\frac{1}{2}c_1\left(-1 + \tanh^2\left(\frac{1}{2}\sqrt{c_1(x+c_2)^2}\right)\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.269 (sec), leaf count = 23

$$\left\{y(x) = \ln\left(\frac{\tan^2\left(\frac{c_2+x}{2c_1}\right)+1}{2c_1^2}\right)\right\}$$

2.1605 ODE No. 1605

$$ae^x\sqrt{y(x)} + y''(x) = 0$$

✗ **Mathematica** : cpu = 20.1682 (sec), leaf count = 0 , could not solve

```
DSolve[a*E^x*Sqrt[y[x]] + Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 1.266 (sec), leaf count = 104

$$\left\{y(x) = ODESolStruc\left(\_a\, \mathrm{e}^{2c_1+\int 2\_b(\_a)d\_a}, \left[\left\{\frac{d}{d\_a}\_\mathrm{b}(\_a) = (\sqrt{\_a}\,a\_b(\_a) + 4\_a\_b(\_a) + 4)\_b(\_a)^2\right\}, \left\{\right.\right.\right.$$

2.1606 ODE No. 1606

$$y''(x) + e^x\sin(y(x)) = 0$$

✗ **Mathematica** : cpu = 20.6398 (sec), leaf count = 0 , could not solve

```
DSolve[E^x*Sin[y[x]] + Derivative[2][y][x] == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(diff(y(x),x),x)+exp(x)*sin(y(x))=0,y(x))
```

2.1607 ODE No. 1607

$$a \sin(y(x)) + y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0862574 (sec), leaf count = 79

$$\left\{\left\{y(x) \to -2\text{am}\left(\frac{1}{2}\sqrt{(2a+c_1)(x+c_2)^2}|\frac{4a}{2a+c_1}\right)\right\}, \left\{y(x) \to 2\text{am}\left(\frac{1}{2}\sqrt{(2a+c_1)(x+c_2)^2}|\frac{4a}{2a+c_1}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.165 (sec), leaf count = 49

$$\left\{-c_2 - x + \int^{y(x)} \frac{1}{\sqrt{2a\cos(\_a) + c_1}} d\_a = 0, -c_2 - x + \int^{y(x)} -\frac{1}{\sqrt{2a\cos(\_a) + c_1}} d\_a = 0\right\}$$

2.1608 ODE No. 1608

$$a^2 \sin(y(x)) - b\sin(x) + y''(x) = 0$$

✗ **Mathematica** : cpu = 0.0406499 (sec), leaf count = 0 , could not solve

```
DSolve[-(b*Sin[x]) + a^2*Sin[y[x]] + Derivative[2][y][x] == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(diff(y(x),x),x)+a^2*sin(y(x))-b*sin(x)=0,y(x))
```

2.1609 ODE No. 1609

$$a^2 \sin(y(x)) - bf(x) + y''(x) = 0$$

✗ **Mathematica** : cpu = 0.0306451 (sec), leaf count = 0 , could not solve

```
DSolve[-(b*f[x]) + a^2*Sin[y[x]] + Derivative[2][y][x] == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(diff(y(x),x),x)+a^2*sin(y(x))-b*f(x)=0,y(x))
```

2.1610 ODE No. 1610

$$y''(x) - \frac{h\left(\frac{y(x)}{\sqrt{x}}\right)}{x^{3/2}} = 0$$

✓ **Mathematica** : cpu = 4.06073 (sec), leaf count = 754

$$\left\{ \text{Solve}\left[\int_1^{y(x)} \frac{2}{\sqrt{x}\sqrt{\frac{K[3]^2+4xc_1+8x\int_1^{\frac{K[3]}{\sqrt{x}}} h(K[2])dK[2]}{x}}} dK[3] - \int_1^x \left(\frac{2\left(\frac{y(x)}{2\sqrt{K[4]}} - \frac{\sqrt{\frac{y(x)^2}{2K[4]}+2c_1+4\int_1^{\frac{y(x)}{\sqrt{K[4]}}} h(K[2])dK[2]}}{\sqrt{2}}\right)}{K[4]\sqrt{\frac{y(x)^2+4c_1K[4]+8K[4]\int_1^{\frac{y(x)}{\sqrt{K[4]}}} h(K[2])dK[2]}{K[4]}}} - \right.\right.\right.$$

✓ **Maple** : cpu = 0.255 (sec), leaf count = 92

$$\left\{ y(x) = \sqrt{x}\ \text{RootOf}\left(2c_2 - 2\left(\int^{\_Z} \frac{1}{\sqrt{\_g^2 + c_1 + 8\left(\int h(\_g)\, d\_g\right)}} d\_g\right) - \ln(x)\right), y(x) = \sqrt{x}\ \text{RootOf}\left(2c_2\right.\right.$$

2.1611 ODE No. 1611

$$y''(x) - 3y'(x) - y(x)^2 - 2y(x) = 0$$

✗ **Mathematica** : cpu = 3.58753 (sec), leaf count = 0 , could not solve

```
DSolve[-2*y[x] - y[x]^2 - 3*Derivative[1][y][x] + Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 1.618 (sec), leaf count = 57

$$\left\{ y(x) = ODESolStruc\left(\_a, \left[\left\{-\_a^2 + \_b(\_a)\left(\frac{d}{d\_a}\_\mathrm{b}(\_a)\right) - 2\_a - 3\_b(\_a) = 0\right\}, \left\{\_a = y(x), \_b(\_a) =\right.\right.\right.\right.$$

2.1612 ODE No. 1612

$$y''(x) - 7y'(x) - y(x)^{3/2} + 12y(x) = 0$$

✗ **Mathematica** : cpu = 21.4189 (sec), leaf count = 0 , could not solve

```
DSolve[12*y[x] - y[x]^(3/2) - 7*Derivative[1][y][x] + Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 2.113 (sec), leaf count = 57

$$\left\{ y(x) = ODESolStruc\left(\_a, \left[\left\{\_b(\_a)\left(\frac{d}{d\_a}\_\mathrm{b}(\_a)\right) - \_a^{\frac{3}{2}} + 12\_a - 7\_b(\_a) = 0\right\}, \left\{\_a = y(x), \_b(\_a) =\right.\right.\right.\right.$$

2.1613 ODE No. 1613

$$6a^2y(x) + 5ay'(x) + y''(x) - 6y(x)^2 = 0$$

✓ **Mathematica** : cpu = 1.34106 (sec), leaf count = 35

$$\left\{\left\{y(x) \to a^2{c_1}^2e^{-2ax}\wp\left(e^{-ax}c_1 + c_2; 0, -1\right)\right\}\right\}$$

✓ **Maple** : cpu = 1.03 (sec), leaf count = 27

$$\left\{y(x) = \mathrm{WeierstrassP}\left(c_1 - \frac{\mathrm{e}^{-ax}}{a}, 0, c_2\right)\mathrm{e}^{-2ax}\right\}$$

2.1614 ODE No. 1614

$$2a^2y(x) + 3ay'(x) + y''(x) - 2y(x)^3 = 0$$

✓ **Mathematica** : cpu = 0.964542 (sec), leaf count = 32

$$\left\{\left\{y(x) \to -iac_1e^{-ax}\mathrm{sn}\left(e^{-ax}c_1 + c_2\middle| -1\right)\right\}\right\}$$

✓ **Maple** : cpu = 1.122 (sec), leaf count = 33

$$\left\{y(x) = c_2\mathrm{e}^{-ax}\mathrm{sn}\left(c_2\left(c_1 - \frac{\sqrt{-\mathrm{e}^{-2ax}}}{a}\right)|i\right)\right\}$$

2.1615 ODE No. 1615

$$-\frac{2(n+1)(n+2)y(x)\left(y(x)^{\frac{n}{n+1}} - 1\right)}{n^2} - \frac{(3n+4)y'(x)}{n} + y''(x) = 0$$

✗ **Mathematica** : cpu = 60.1484 (sec), leaf count = 0 , could not solve

```
DSolve[(-2*(1 + n)*(2 + n)*y[x]*(-1 + y[x]^(n/(1 + n))))/n^2 - ((4 + 3*n)*Derivative[1][y][x
```

✓ **Maple** : cpu = 4.202 (sec), leaf count = 91

$$\left\{y(x) = ODESolStruc\left(\_a, \left[\left\{\frac{n^2\_b(\_a)\left(\frac{d}{d\_a}\_b(\_a)\right) - 2(n+2)(n+1)\_a\_a^{\frac{n}{n+1}} + 2(n+1)(n+2)\_a + (}{n^2}\right.\right.\right.$$

2.1616 ODE No. 1616

$$\frac{1}{4}\left(a^2-1\right)y(x)+ay'(x)+by(x)^n+y''(x)=0$$

✗ **Mathematica** : cpu = 16.7411 (sec), leaf count = 0 , could not solve

```
DSolve[((-1 + a^2)*y[x])/4 + b*y[x]^n + a*Derivative[1][y][x] + Derivative[2][y][x] == 0, y[
```

✓ **Maple** : cpu = 1.225 (sec), leaf count = 63

$$\left\{y(x)=ODESolStruc\left(\_a,\left[\left\{\frac{\_a\,a^2}{4}+a\_b(\_a)+b\_a^n+\_b(\_a)\left(\frac{d}{d\_a}\_b(\_a)\right)-\frac{\_a}{4}=0\right\},\left\{\_a=y(x),\_\right.\right.\right.$$

2.1617 ODE No. 1617

$$ay'(x)+bx^ry(x)^n+y''(x)=0$$

✗ **Mathematica** : cpu = 0.0386178 (sec), leaf count = 0 , could not solve

```
DSolve[b*x^r*y[x]^n + a*Derivative[1][y][x] + Derivative[2][y][x] == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(diff(y(x),x),x)+a*diff(y(x),x)+b*x^r*y(x)^n=0,y(x))
```

2.1618 ODE No. 1618

$$ay'(x)-2a+be^{y(x)}+y''(x)=0$$

✗ **Mathematica** : cpu = 27.5652 (sec), leaf count = 0 , could not solve

```
DSolve[-2*a + b*E^y[x] + a*Derivative[1][y][x] + Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 1.568 (sec), leaf count = 56

$$\left\{y(x)=ODESolStruc\left(\_a,\left[\left\{a\_b(\_a)+b\,e^{\_a}+\_b(\_a)\left(\frac{d}{d\_a}\_b(\_a)\right)-2a=0\right\},\left\{\_a=y(x),\_b(\_a)=\right.\right.\right.$$

2.1619 ODE No. 1619

$$ay'(x) + f(x)\sin(y(x)) + y''(x) = 0$$

✗ **Mathematica** : cpu = 0.0513776 (sec), leaf count = 0 , could not solve

```
DSolve[f[x]*Sin[y[x]] + a*Derivative[1][y][x] + Derivative[2][y][x] == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(diff(y(x),x),x)+a*diff(y(x),x)+f(x)*sin(y(x))=0,y(x))
```

2.1620 ODE No. 1620

$$y''(x) + y(x)y'(x) - y(x)^3 = 0$$

✓ **Mathematica** : cpu = 3.44741 (sec), leaf count = 492

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[\int_1^{\#1} \frac{2}{\frac{e^{6c_1}K[1]^4}{\sqrt[3]{e^{18c_1}K[1]^6-2e^{12c_1}+2\sqrt{e^{24c_1}-e^{30c_1}K[1]^6}}} - K[1]^2 + e^{-6c_1}\sqrt[3]{e^{18c_1}K[1]^6 - 2e^{12c_1} + 2}\right.\right.\right.$$

✓ **Maple** : cpu = 1.297 (sec), leaf count = 291

$$\left\{-c_2 - x + \int^{y(x)} \frac{2}{\frac{\_a^4}{\left(\_a^6+2c_1+2\sqrt{c_1\_a^6+c_1^2}\right)^{\frac{1}{3}}} - \_a^2 + \left(\_a^6 + 2c_1 + 2\sqrt{c_1\_a^6 + c_1^2}\right)^{\frac{1}{3}}} d\_a = 0, -c_2 - x + \int^{y(x)} -\right.$$

2.1621 ODE No. 1621

$$ay(x) + y''(x) + y(x)y'(x) - y(x)^3 = 0$$

✓ **Mathematica** : cpu = 9.74658 (sec), leaf count = 990

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[\int_1^{\#1} \frac{}{\frac{e^{6c_1}(a-K[1]^2)^2}{2\sqrt[3]{e^{18c_1}K[1]^6-3ae^{18c_1}K[1]^4+3a^2e^{18c_1}K[1]^2-2e^{12c_1}-a^3e^{18c_1}+2\sqrt{-e^{30c_1}K[1]^6+3ae^{30c_1}K[1]^4-}}}}\right.\right.\right.$$

✓ **Maple** : cpu = 2.558 (sec), leaf count = 108

$$\left\{-c_2 - x + \int^{y(x)} \frac{4\,\text{RootOf}\left(\left(-4\_a^6 + 12\_a^4a - 12\_a^2a^2 + 4a^3 + 320c_1\right)\_Z^9 + \left(-189\_a^6 + 567\_a^4a - 567\_\right.\right.}{-63\_a^2 + 63a}\right.$$

2.1622 ODE No. 1622

$$2a^2y(x) + (3a + y(x))y'(x) + ay(x)^2 + y''(x) - y(x)^3 = 0$$

✓ **Mathematica** : cpu = 24.3607 (sec), leaf count = 88

$$\left\{\left\{y(x) \to \left\{ \begin{array}{cc} \frac{c_1\wp'(xc_1+c_2;0,1)}{\wp(xc_1+c_2;0,1)} & a=0 \\ -\frac{e^{-ax}c_1\wp'\left(\frac{e^{-ax}c_1}{a}+c_2;0,1\right)}{\wp\left(\frac{e^{-ax}c_1}{a}+c_2;0,1\right)} & \text{True} \end{array}\right.\right\}\right\}$$

✓ **Maple** : cpu = 1.829 (sec), leaf count = 817

$$\left\{y(x) = \mathrm{RootOf}\left(c_2a + a\left(\int^{\_Z} \frac{-\left(-\frac{-c_1\_f^{12}+2c_1^3\_f^6-c_1^5+(-\_f^6+c_1^2)^{\frac{5}{2}}}{(-\_f^6+c_1^2)^{\frac{7}{2}}}\right)^{\frac{2}{3}}\_f^6 + \left(-\frac{-c_1\_f^{12}+2c_1^3\_f^6-c_1^5+(-\_f^6+c_1^2)^{\frac{5}{2}}}{(-\_f^6+c_1^2)^{\frac{7}{2}}}\right)}{(-\_f^6+c_1^2)\left(-\frac{-c_1\_f^{12}+2c_1^3\_f^6-c_1^5+(-\_f^6+c_1^2)^{\frac{5}{2}}}{(-\_f^6+c_1^2)^{\frac{7}{2}}}\right)^{\frac{1}{3}}}\right.\right.\right.$$

2.1623 ODE No. 1623

$$y(x)\left(f'(x) + 2f(x)^2\right) + (3f(x) + y(x))y'(x) + f(x)y(x)^2 + y''(x) - y(x)^3 = 0$$

✗ **Mathematica** : cpu = 0.170772 (sec), leaf count = 0 , could not solve

```
DSolve[f[x]*y[x]^2 - y[x]^3 + y[x]*(2*f[x]^2 + Derivative[1][f][x]) + (3*f[x] + y[x])*Deriva
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(diff(y(x),x),x)+(y(x)+3*f(x))*diff(y(x),x)-y(x)^3+f(x)*y(x)^2+y(x)*(diff(f(x),x)
```

2.1624 ODE No. 1624

$$y(x)\left(af(x)^2 - \frac{f''(x)}{f(x)} + 3f'(x) + \frac{3f'(x)^2}{f(x)^2}\right) + bf(x)^3 - \left(\frac{f'(x)}{f(x)} + f(x)\right)\left(3y'(x) + y(x)^2\right) + y''(x) + y(x)y'(x) - y(x)^3$$

✗ **Mathematica** : cpu = 0.839201 (sec), leaf count = 0 , could not solve

```
DSolve[b*f[x]^3 - y[x]^3 + y[x]*Derivative[1][y][x] - (f[x] + Derivative[1][f][x]/f[x])*(y[x
```

✓ **Maple** : cpu = 1.931 (sec), leaf count = 131

$$\left\{y(x) = ODESolStruc\left(\_af\left(\mathrm{RootOf}\left(c_1 + \int \_b(\_a)\,d\_a - \left(\int^{\_Z} f(\_f)\,d\_f\right)\right)\right), \left[\left\{\frac{d}{d\_a}\_b(\_a) = (\_a +\right.\right.\right.\right.$$

2.1625 ODE No. 1625

$$y'(x)\left(y(x)-\frac{3f'(x)}{2f(x)}\right)-\frac{y(x)^2f'(x)}{2f(x)}+y(x)\left(-\frac{f''(x)}{2f(x)}+\frac{f'(x)^2}{f(x)^2}+f(x)\right)+y''(x)-y(x)^3=0$$

✗ **Mathematica** : cpu = 0.460093 (sec), leaf count = 0 , could not solve

```
DSolve[-y[x]^3 - (y[x]^2*Derivative[1][f][x])/(2*f[x]) + (y[x] - (3*Derivative[1][f][x])/(2*
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(diff(y(x),x),x)+(y(x)-3/2*diff(f(x),x)/f(x))*diff(y(x),x)-y(x)^3-1/2*diff(f(x),x
diff(diff(f(x),x),x))/f(x)*y(x)=0,y(x))
```

2.1626 ODE No. 1626

$$y(x)f'(x)+f(x)y'(x)+y''(x)+2y(x)y'(x)=0$$

✗ **Mathematica** : cpu = 34.0795 (sec), leaf count = 0 , could not solve

```
DSolve[y[x]*Derivative[1][f][x] + f[x]*Derivative[1][y][x] + 2*y[x]*Derivative[1][y][x] + De
```

✓ **Maple** : cpu = 0.283 (sec), leaf count = 48

$$\{y(x)=ODESolStruc\left(\_b(\_a),\left[\left\{\frac{d}{d\_a}\_\mathrm{b}(\_a)=-\_b(\_a)^2-\_b(\_a)\,f(\_a)-c_1\right\},\{\_a=x,\_b(\_a)=y(x)\}\right.\right.$$

2.1627 ODE No. 1627

$$f(x)\left(y'(x)+y(x)^2\right)-g(x)+y''(x)+2y(x)y'(x)=0$$

✗ **Mathematica** : cpu = 0.159211 (sec), leaf count = 0 , could not solve

```
DSolve[-g[x] + 2*y[x]*Derivative[1][y][x] + f[x]*(y[x]^2 + Derivative[1][y][x]) + Derivative
```

✓ **Maple** : cpu = 0.889 (sec), leaf count = 58

$$\{y(x)=ODESolStruc\left(\_b(\_a),\left[\left\{c_1-\left(\int e^{\int f(\_a)d\_a}g(\_a)\,d\_a\right)+\left(\_b(\_a)^2+\frac{d}{d\_a}\_\mathrm{b}(\_a)\right)e^{\int f(\_a)d\_a}=\right.\right.\right.$$

2.1628 ODE No. 1628

$$f(x)y(x) - g(x) + y''(x) + 3y(x)y'(x) + y(x)^3 = 0$$

✗ **Mathematica** : cpu = 2.96916 (sec), leaf count = 0 , could not solve

```
DSolve[-g[x] + f[x]*y[x] + y[x]^3 + 3*y[x]*Derivative[1][y][x] + Derivative[2][y][x] == 0, y
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{ y(x) = \frac{\frac{d}{dx} DESol\left(\left\{-\_Y(x)\,g(x) + \left(\frac{d}{dx}\_Y(x)\right) f(x) + \frac{d^3}{dx^3}\_Y(x)\right\}, \{\_Y(x)\}\right)}{DESol\left(\left\{-\_Y(x)\,g(x) + \left(\frac{d}{dx}\_Y(x)\right) f(x) + \frac{d^3}{dx^3}\_Y(x)\right\}, \{\_Y(x)\}\right)} \right\}$$

2.1629 ODE No. 1629

$$(f(x) + 3y(x))y'(x) + f(x)y(x)^2 + y''(x) + y(x)^3 = 0$$

✓ **Mathematica** : cpu = 0.0685738 (sec), leaf count = 75

$$\left\{ \left\{ y(x) \to \frac{\int_1^x \exp\left(-\int_1^{K[2]} f(K[1])dK[1]\right) c_1 dK[2] + c_2}{\int_1^x \int_1^{K[5]} \exp\left(-\int_1^{K[4]} f(K[3])dK[3]\right) c_1 dK[4]dK[5] + c_2 x + 1} \right\} \right\}$$

✓ **Maple** : cpu = 0.054 (sec), leaf count = 38

$$\left\{ y(x) = \frac{c_2 + \int c_1 e^{-\left(\int f(x)dx\right)} dx}{c_2 x + \int \int c_1 e^{-\left(\int f(x)dx\right)} dx dx + 1} \right\}$$

2.1630 ODE No. 1630

$$-4a^2 y(x) - 3ay(x)^2 - b + y''(x) - 3y(x)y'(x) = 0$$

✓ **Mathematica** : cpu = 7.71636 (sec), leaf count = 3227

$$\left\{ \left\{ y(x) \to -\frac{2\left((-1)^{\frac{a^{3/2}\sqrt{4a^3-3b}-2a^3}{4a^3}+1} 2^{-\frac{3\left(a^{3/2}\sqrt{4a^3-3b}-2a^3\right)}{4a^3}+\frac{3\sqrt{4a^6-3a^3b}}{4a^3}+1} 3^{\frac{a^{3/2}\sqrt{4a^3-3b}-2a^3}{4a^3}-\frac{\sqrt{4a^6-3a^3b}}{4a^3}} a^{-\frac{a^{3/2}\sqrt{4a^3-3b-2}}{2a^3}} \right.}{} \right. \right.$$

✓ **Maple** : cpu = 1.75 (sec), leaf count = 783

$$\left\{ -c_2 - x + \int^{y(x)} -\frac{}{-9\_a^2 a^2 - 12\_a\,a^3 - 3ab + \text{RootOf}\left(3c_1\_aa \operatorname{BesselK}\left(\frac{4a^3-3b}{2\sqrt{4a^4-3ab}\,a}, -\frac{\_Z}{2a^2}\right) + 2c_1 a^2 \operatorname{BesselK}\right.} \right.$$

2.1631 ODE No. 1631

$$-(f(x)+3y(x))y'(x)+f(x)y(x)^2+y''(x)+y(x)^3=0$$

✓ **Mathematica** : cpu = 0.0550825 (sec), leaf count = 75

$$\left\{\left\{y(x)\to \frac{-\int_1^x \exp\left(\int_1^{K[2]} f(K[1])dK[1]\right)c_1dK[2]-c_2}{\int_1^x\int_1^{K[5]}\exp\left(\int_1^{K[4]} f(K[3])dK[3]\right)c_1dK[4]dK[5]+c_2x+1}\right\}\right\}$$

✓ **Maple** : cpu = 0.095 (sec), leaf count = 38

$$\left\{y(x)=\frac{-c_2-\left(\int c_1\mathrm{e}^{\int f(x)dx}dx\right)}{c_2x+\int\int c_1\mathrm{e}^{\int f(x)dx}dxdx+1}\right\}$$

2.1632 ODE No. 1632

$$y''(x)-2ay(x)y'(x)=0$$

✓ **Mathematica** : cpu = 0.0661677 (sec), leaf count = 46

$$\left\{\left\{y(x)\to \frac{\sqrt{c_1}\tan\left(\sqrt{a}\sqrt{c_1}x+\sqrt{a}\sqrt{c_1}c_2\right)}{\sqrt{a}}\right\}\right\}$$

✓ **Maple** : cpu = 1.243 (sec), leaf count = 23

$$\left\{y(x)=\frac{\sqrt{c_1a}\,\tan\left(\sqrt{c_1a}\,(c_2+x)\right)}{a}\right\}$$

2.1633 ODE No. 1633

$$ay(x)y'(x)+by(x)^3+y''(x)=0$$

✓ **Mathematica** : cpu = 34.0885 (sec), leaf count = 92

$$\text{Solve}\left[\int_1^{y(x)}\frac{1}{K[2]^2\text{InverseFunction}\left[\frac{1}{4}\left(\log(b+\#1(a+2\#1))-\frac{2a\tan^{-1}\left(\frac{a+4\#1}{\sqrt{8b-a^2}}\right)}{\sqrt{8b-a^2}}\right)\&\right][c_1-\log(K[2])]}dK[2]=$$

✓ **Maple** : cpu = 1.438 (sec), leaf count = 97

$$\left\{-c_2 - x + \int^{y(x)} \frac{1}{\mathrm{RootOf}\left(-2\_a^2 a \operatorname{arctanh}\left(\frac{\_a^2 a+4\_Z}{\sqrt{(a^2-8b)\_a^4}}\right) + c_1\sqrt{(a^2-8b)\_a^4} - \sqrt{(a^2-8b)\_a^4}\ \ln\left(\_a^4 b + \_\right.\right.}\right.$$

2.1634 ODE No. 1634

$$y'(x)h(x,y(x)) + j(x,y(x)) + y''(x) = 0$$

✗ **Mathematica** : cpu = 0.148457 (sec), leaf count = 0 , could not solve

```
DSolve[j[x, y[x]] + h[x, y[x]]*Derivative[1][y][x] + Derivative[2][y][x] == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(diff(y(x),x),x)+h(x,y(x))*diff(y(x),x)+j(x,y(x))=0,y(x))
```

2.1635 ODE No. 1635

$$ay'(x)^2 + by(x) + y''(x) = 0$$

✓ **Mathematica** : cpu = 0.591465 (sec), leaf count = 104

$$\left\{\left\{y(x) \to \mathrm{InverseFunction}\left[\int_1^{\#1} -\frac{\sqrt{2}a}{\sqrt{2e^{-2aK[1]}c_1 a^2 - 2bK[1]a + b}}dK[1]\&\right][x+c_2]\right\}, \left\{y(x) \to \mathrm{InverseFunctio}\right.\right.$$

✓ **Maple** : cpu = 1.332 (sec), leaf count = 79

$$\left\{-c_2 - x + \int^{y(x)} -\frac{2a}{\sqrt{4c_1 a^2 e^{-2\_aa} - 4\_aab + 2b}}d\_a = 0, -c_2 - x + \int^{y(x)} \frac{2a}{\sqrt{4c_1 a^2 e^{-2\_aa} - 4\_aab + 2b}}d\_a = \right.$$

2.1636 ODE No. 1636

$$ay'(x)\left|y'(x)\right| + by'(x) + cy(x) + y''(x) = 0$$

✗ **Mathematica** : cpu = 7.58288 (sec), leaf count = 0 , could not solve

```
DSolve[c*y[x] + b*Derivative[1][y][x] + a*Abs[Derivative[1][y][x]]*Derivative[1][y][x] + Der
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , exception

```
numeric exception: division by zero
```

2.1637 ODE No. 1637

$$ay'(x)^2 + by'(x) + cy(x) + y''(x) = 0$$

✗ **Mathematica** : cpu = 19.3716 (sec), leaf count = 0 , could not solve

```
DSolve[c*y[x] + b*Derivative[1][y][x] + a*Derivative[1][y][x]^2 + Derivative[2][y][x] == 0,
```

✓ **Maple** : cpu = 1.709 (sec), leaf count = 58

$$\left\{y(x) = ODESolStruc\left(\_a, \left[\left\{a\_b(\_a)^2 + \_ac + b\_b(\_a) + \_b(\_a)\left(\frac{d}{d\_a}\_b(\_a)\right) = 0\right\}, \left\{\_a = y(x), \_b(\right.\right.\right.$$

2.1638 ODE No. 1638

$$ay'(x)^2 + b\sin(y(x)) + y''(x) = 0$$

✓ **Mathematica** : cpu = 4.77305 (sec), leaf count = 146

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[\int_1^{\#1} -\frac{\sqrt{4a^2+1}}{\sqrt{4e^{-2aK[1]}c_1a^2 - 4b\sin(K[1])a + e^{-2aK[1]}c_1 + 2b\cos(K[1])}}dK[1]\&\right][x + c_2\right.\right.$$

✓ **Maple** : cpu = 0.263 (sec), leaf count = 115

$$\left\{-c_2 - x + \int^{y(x)} \frac{-4a^2-1}{\sqrt{16c_1\left(a^2+\frac{1}{4}\right)^2 \mathrm{e}^{-2\_aa} - 16\left(a\sin\left(\_a\right) - \frac{\cos(\_a)}{2}\right)\left(a^2+\frac{1}{4}\right)b}}d\_a = 0, -c_2 - x + \int^{y(x)} \frac{}{\sqrt{16}}\right.$$

2.1639 ODE No. 1639

$$ay'(x)\left|y'(x)\right| + b\sin(y(x)) + y''(x) = 0$$

✗ **Mathematica** : cpu = 41.0525 (sec), leaf count = 0 , could not solve

```
DSolve[b*Sin[y[x]] + a*Abs[Derivative[1][y][x]]*Derivative[1][y][x] + Derivative[2][y][x] ==
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , exception

```
numeric exception: division by zero
```

2.1640 ODE No. 1640

$$ay(x)y'(x)^2 + by(x) + y''(x) = 0$$

✓ **Mathematica** : cpu = 0.524982 (sec), leaf count = 96

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[\int_1^{\#1} -\frac{\sqrt{a}}{\sqrt{e^{2ac_1 - aK[1]^2} - b}} dK[1]\&\right][x + c_2]\right\}, \left\{y(x) \to \text{InverseFunction}\left[\int_1^{\#1} \frac{}{\sqrt{e^{2a}}}\right.\right.$$

✓ **Maple** : cpu = 1.342 (sec), leaf count = 70

$$\left\{-c_2 - x + \int^{y(x)} \frac{a}{\sqrt{\left(c_1 a\, e^{-\_a^2 a} - b\right) a}} d\_a = 0, -c_2 - x + \int^{y(x)} -\frac{a}{\sqrt{\left(c_1 a\, e^{-\_a^2 a} - b\right) a}} d\_a = 0\right\}$$

2.1641 ODE No. 1641

$$g(x)y'(x) + h(y(x))y'(x)^2 + y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0576651 (sec), leaf count = 61

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[\int_1^{\#1} \exp\left(-\int_1^{K[4]} -h(K[1])dK[1]\right) dK[4]\&\right]\left[\int_1^x -\exp\left(-\int_1^{K[5]} g(K[2])dK[2]\right)\right.\right.\right.$$

✓ **Maple** : cpu = 0.046 (sec), leaf count = 29

$$\left\{-c_1\left(\int e^{-\left(\int g(x)dx\right)} dx\right) - c_2 + \int^{y(x)} e^{\int h(\_b)d\_b} d\_b = 0\right\}$$

2.1642 ODE No. 1642

$$f(x)h(y(x)) + g(x)y'(x) - \frac{j(y(x))y'(x)^2}{h(y(x))} + y''(x) = 0$$

✗ **Mathematica** : cpu = 0.486739 (sec), leaf count = 0 , could not solve

```
DSolve[f[x]*h[y[x]] + g[x]*Derivative[1][y][x] - (j[y[x]]*Derivative[1][y][x]^2)/h[y[x]] + D
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(diff(y(x),x),x)-j(y(x))/h(y(x))*diff(y(x),x)^2+g(x)*diff(y(x),x)+f(x)*h(y(x))=0,
```

2.1643 ODE No. 1643

$$f(x)y'(x) + g(x)j(y(x)) + h(y(x))y'(x)^2 + y''(x) = 0$$

✗ **Mathematica** : cpu = 0.18991 (sec), leaf count = 0 , could not solve

```
DSolve[g[x]*j[y[x]] + f[x]*Derivative[1][y][x] + h[y[x]]*Derivative[1][y][x]^2 + Derivative[
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve((1-D(j)(y(x)))/j(y(x))*diff(y(x),x)^2+diff(y(x),x)*f(x)+diff(diff(y(x),x),x)+g(x)*j(y
```

2.1644 ODE No. 1644

$$h(y(x))y'(x)^2 + j(y(x))y'(x) + k(y(x)) + y''(x) = 0$$

✗ **Mathematica** : cpu = 41.9911 (sec), leaf count = 0 , could not solve

```
DSolve[k[y[x]] + j[y[x]]*Derivative[1][y][x] + h[y[x]]*Derivative[1][y][x]^2 + Derivative[2]
```

✓ **Maple** : cpu = 0.787 (sec), leaf count = 56

$$\left\{y(x) = ODESolStruc\left(\_a, \left[\left\{\_b(\_a)^2\, h(\_a) + \_b(\_a)\left(\frac{d}{d\_a}\_\mathrm{b}(\_a)\right) + \_b(\_a) + k(\_a) = 0\right\}, \left\{\_a = y(x)\right.\right.\right.\right.$$

2.1645 ODE No. 1645

$$\left(y'(x)^2 + 1\right)\left(y'(x)h(x, y(x)) + j(x, y(x))\right) + y''(x) = 0$$

✗ **Mathematica** : cpu = 0.0873754 (sec), leaf count = 0 , could not solve

```
DSolve[(j[x, y[x]] + h[x, y[x]]*Derivative[1][y][x])*(1 + Derivative[1][y][x]^2) + Derivativ
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(diff(y(x),x),x)+(diff(y(x),x)^2+1)*(h(x,y(x))*diff(y(x),x)+j(x,y(x)))=0,y(x))
```

2.1646 ODE No. 1646

$$ay(x)\left(y'(x)^2 + 1\right)^2 + y''(x) = 0$$

✓ **Mathematica** : cpu = 10.8422 (sec), leaf count = 262

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[-\frac{\sqrt{\frac{\#1^2(-a)+1+2c_1}{1+2c_1}}\sqrt{2\#1^2a - 4c_1}E\left(\sin^{-1}\left(\sqrt{\frac{a}{2c_1+1}}\#1\right)|1+\frac{1}{2c_1}\right)}{\sqrt{\frac{a}{1+2c_1}}\sqrt{\#1^2(-a)+1+2c_1}\sqrt{2-\frac{\#1^2a}{c_1}}}\&\right][x+c_2]\right\}, \left\{\right.\right.$$

✓ **Maple** : cpu = 1.322 (sec), leaf count = 94

$$\left\{-c_2 - x + \int^{y(x)} \frac{\left(\_a^2 + 2c_1\right)a}{\sqrt{-\left(\left(\_a^2 + 2c_1\right)a - 1\right)\left(\_a^2 + 2c_1\right)a}}d\_a = 0, -c_2 - x + \int^{y(x)} -\frac{\left(\_a^2 + 2c_1\right)a}{\sqrt{-\left(\left(\_a^2 + 2c_1\right)a - 1\right)\left(\_a^2 + 2c_1\right)a}}\right.$$

2.1647 ODE No. 1647

$$y''(x) - a(xy'(x) - y(x))^r = 0$$

✓ **Mathematica** : cpu = 0.507856 (sec), leaf count = 91

$$\left\{\left\{y(x) \to x\left(c_2 - x\left(2 - \frac{a(r-1)x^2}{c_1}\right)^{\frac{1}{r-1}}\left(x^{2r-2}\left(-a(r-1)x^2 + 2c_1\right)\right)^{\frac{1}{1-r}} {}_2F_1\left(-\frac{1}{2}, \frac{1}{r-1}; \frac{1}{2}; \frac{a(r-1)x^2}{2c_1}\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.69 (sec), leaf count = 60

$$\left\{y(x) = \left(c_2 + \int -\frac{\left((r-1)\,a\,x^2 - c_1\right) 2^{\frac{r}{r-1}} \left(-\frac{1}{(r-1)a\,x^2 - c_1}\right)^{\frac{r}{r-1}}}{2x^2} dx\right) x\right\}$$

2.1648 ODE No. 1648

$$y''(x) - kx^a y(x)^b y'(x)^c = 0$$

✗ **Mathematica** : cpu = 0.0735638 (sec), leaf count = 0 , could not solve

```
DSolve[-(k*x^a*y[x]^b*Derivative[1][y][x]^c) + Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 1.552 (sec), leaf count = 205

$$\left\{y(x) = ODESolStruc\left(\_a\, e^{c_1 + \int \_b(\_a) d\_a}, \left[\left\{\frac{d}{d\_a}\_b(\_a) = \frac{\left(-(b+c-1)^2 k\_a^b \left(-\frac{(a-c+2)(\_a\_b(\_a)+1)}{(b+c-1)\_b(\_a)}\right)^c \_b\right.}{}\right.\right.\right.$$

2.1649 ODE No. 1649

$$h(x, y(x))\left(y'(x) - \frac{y(x)}{x}\right)^a + y''(x) = 0$$

✗ **Mathematica** : cpu = 2.65477 (sec), leaf count = 0 , could not solve

```
DSolve[h[x, y[x]]*(-(y[x]/x) + Derivative[1][y][x])^a + Derivative[2][y][x] == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(diff(y(x),x),x)+(diff(y(x),x)-1/x*y(x))^a*h(x,y(x))=0,y(x))
```

2.1650 ODE No. 1650

$$y''(x) - a\sqrt{y'(x)^2 + 1} = 0$$

✓ **Mathematica** : cpu = 0.119207 (sec), leaf count = 30

$$\left\{\left\{y(x) \to \frac{\cosh(c_1)\cosh(ax)}{a} + \frac{\sinh(c_1)\sinh(ax)}{a} + c_2\right\}\right\}$$

✓ **Maple** : cpu = 2.766 (sec), leaf count = 16

$$\left\{y(x) = c_2 + \frac{\cosh\left((c_1 + x)\,a\right)}{a}\right\}$$

2.1651 ODE No. 1651

$$a\left(-\sqrt{y'(x)^2 + 1}\right) - b + y''(x) = 0$$

✓ **Mathematica** : cpu = 0.369387 (sec), leaf count = 414

$$\left\{\left\{y(x) \to \frac{a\text{InverseFunction}\left[\frac{\frac{b\tan^{-1}\left(\frac{\#1b}{\sqrt{\#1^2+1}\sqrt{a^2-b^2}}\right)}{\sqrt{a^2-b^2}} - \frac{b\tan^{-1}\left(\frac{\#1a}{\sqrt{a^2-b^2}}\right)}{\sqrt{a^2-b^2}} + \sinh^{-1}(\#1)}{a}\&\right][x+c_1]^2 - b\sqrt{1 + \text{InverseFun}}}{a^2\sqrt{1 +}}\right.\right.$$

✓ **Maple** : cpu = 2.411 (sec), leaf count = 31

$$\left\{y(x) = c_2 + \int \text{RootOf}\left(c_1 + x - \left(\int^{\_Z} \frac{1}{\sqrt{\_f^2 + 1}\,a + b} d\_f\right)\right) dx\right\}$$

2.1652 ODE No. 1652

$$y''(x) - a\sqrt{by(x)^2 + y'(x)^2} = 0$$

✓ **Mathematica** : cpu = 0.504302 (sec), leaf count = 76

$$\text{Solve}\left[\int_1^{y(x)} \frac{1}{\text{InverseFunction}\left[\int \frac{\#1}{K[1]\left(\frac{\#1^2}{K[1]^2} - a\sqrt{\frac{\#1^2}{K[1]^2} + b}\right)} d\frac{\#1}{K[1]} \&\right][c_1 - \log(K[1])]} dK[1] = x - c_2, y(x)\right]$$

✓ **Maple** : cpu = 2.596 (sec), leaf count = 36

$$\left\{ y(x) = e^{c_2 + \int \text{RootOf}\left(c_1 + x - \left(\int^{\_Z} \frac{1}{-\_f^2 + \sqrt{\_f^2 + b}\, a} d\_f\right)\right) dx} \right\}$$

2.1653 ODE No. 1653

$$y''(x) - a\left(y'(x)^2 + 1\right)^{3/2} = 0$$

✓ **Mathematica** : cpu = 0.173018 (sec), leaf count = 75

$$\left\{\left\{y(x) \to c_2 - \frac{i\sqrt{a^2x^2 + 2ac_1x - 1 + c_1{}^2}}{a}\right\}, \left\{y(x) \to \frac{i\sqrt{a^2x^2 + 2ac_1x - 1 + c_1{}^2}}{a} + c_2\right\}\right\}$$

✓ **Maple** : cpu = 2.365 (sec), leaf count = 41

$$\left\{ y(x) = \frac{c_2 a + \left((c_1 + x)^2 a^2 - 1\right)\sqrt{-\frac{1}{(c_1 + x)^2 a^2 - 1}}}{a} \right\}$$

2.1654 ODE No. 1654

$$y''(x) - 2ax\left(y'(x)^2 + 1\right)^{3/2} = 0$$

✓ **Mathematica** : cpu = 0.548774 (sec), leaf count = 308

$$\left\{\left\{y(x) \to c_2 - \frac{\sqrt{\frac{ax^2-1+c_1}{-1+c_1}}\sqrt{\frac{ax^2+1+c_1}{1+c_1}}\left(F\left(i\sinh^{-1}\left(x\sqrt{\frac{a}{c_1+1}}\right)|\frac{c_1+1}{c_1-1}\right) + (-1+c_1)E\left(i\sinh^{-1}\left(x\sqrt{\frac{a}{c_1+1}}\right)|\frac{c_1+1}{c_1-1}\right)\right.}{\sqrt{\frac{a}{1+c_1}}\sqrt{a^2x^4 + 2ac_1x^2 - 1 + c_1{}^2}}\right.\right.$$

✓ **Maple** : cpu = 2.41 (sec), leaf count = 38

$$\left\{y(x) = c_2 + \int \sqrt{-\frac{1}{\left(x^2 + 2c_1\right)^2 a^2 - 1}}\left(x^2 + 2c_1\right) a dx\right\}$$

2.1655 ODE No. 1655

$$y''(x) - ay(x)\left(y'(x)^2 + 1\right)^{3/2} = 0$$

✓ **Mathematica** : cpu = 1.07784 (sec), leaf count = 350

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[-\frac{\sqrt{\frac{\#1^2a-2+2c_1}{-1+c_1}}\sqrt{\frac{\#1^2a+2+2c_1}{1+c_1}}\left(F\left(i\sinh^{-1}\left(\sqrt{\frac{a}{2c_1+2}}\#1\right)|\frac{c_1+1}{c_1-1}\right) + (-1+c_1)E\left(i\sinh\right.\right.}{\sqrt{\frac{a}{2+2c_1}}\sqrt{\#1^4a^2 + 4\#1^2ac_1 - 4 + 4c_1{}^2}}\right.\right.\right.$$

✓ **Maple** : cpu = 2.516 (sec), leaf count = 84

$$\left\{-c_2 - x + \int^{y(x)} \frac{\left(\_a^2 + 2c_1\right) a}{\sqrt{-\left(\_a^2 + 2c_1\right)^2 a^2 + 4}} d\_a = 0, -c_2 - x + \int^{y(x)} -\frac{\left(\_a^2 + 2c_1\right) a}{\sqrt{-\left(\_a^2 + 2c_1\right)^2 a^2 + 4}} d\_a = 0\right\}$$

2.1656 ODE No. 1656

$$y''(x) - a\left(y'(x)^2 + 1\right)^{3/2}(bx + c + y(x)) = 0$$

✓ **Mathematica** : cpu = 43.6659 (sec), leaf count = 9706

$$\left\{\text{Solve}\left[\int_1^x \left(\frac{1}{b^2+1} - \frac{b\sqrt{-a^2\left(c^2 + 2bK[1]c + 2y(x)c + b^2K[1]^2 + y(x)^2 - 2c_1 + 2bK[1]y(x)\right)^2\left(a^2c^4 + 4a^2bK[1\right.}}{\left(b^2+1\right)\left(a^2c^4 + 4a^2bK[1]c^3 + 4a^2y(x)c^3 + 6a^2b^2K[1]^2c^2\right.}\right.\right.\right.$$

✓ **Maple** : cpu = 3.269 (sec), leaf count = 771

$$\left\{y(x) = -bx + \mathrm{RootOf}\left(c_2 - x + \int^{\_Z} \frac{\_f^4 a^2 b^2 + 4\_f^3 a^2 b^2 c + 4\_f^2 a^2 b^2 c^2 - 4c_1\_f^2 a^2 b^2 - 8c_1\_f a^2 b^2 c + 4c_1^2 a^2 b}{}\right.\right.$$

2.1657 ODE No. 1657

$$y''(x) + y(x)^3 y'(x) - y(x)y'(x)\sqrt{4y'(x) + y(x)^4} = 0$$

✓ **Mathematica** : cpu = 0.436865 (sec), leaf count = 192

$$\left\{\left\{y(x) \to -\frac{i(\cosh(c_1) + \sinh(c_1))(\cos(2(x + c_2)(\cosh(3c_1) + \sinh(3c_1))) + i\sin(2(x + c_2)(\cosh(3c_1) + \sinh(3c_1)}{\cos(2(x + c_2)(\cosh(3c_1) + \sinh(3c_1))) + i\sin(2(x + c_2)(\cosh(3c_1) + \sinh(3c_1))) + 1}\right.\right.$$

✓ **Maple** : cpu = 2.586 (sec), leaf count = 35

$$\left\{y(x) = \frac{\tan\left(\frac{c_2 + x}{(c_1^2)^{\frac{3}{2}}}\right)}{c_1}, y(x) = \frac{\tanh\left(\frac{c_2 + x}{(c_1^2)^{\frac{3}{2}}}\right)}{c_1}\right\}$$

2.1658 ODE No. 1658

$$y''(x) - h\big(y'(x), ax + by(x)\big) = 0$$

✗ **Mathematica** : cpu = 0.383215 (sec), leaf count = 0 , could not solve

```
DSolve[-h[Derivative[1][y][x], a*x + b*y[x]] + Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 0.232 (sec), leaf count = 115

$$\left\{y(x) = ODESolStruc\left(-\frac{-\_ab + \left(c_1 + \int \_b(\_a)\, d\_a\right) a}{b}, \left[\left\{\frac{d}{d\_a}\_\mathrm{b}(\_a) = -\_b(\_a)^3\, h\left(\frac{-a\_b(\_a) + b}{b\_b(\_a)}, \_ab\right.\right.\right.\right.\right.$$

2.1659 ODE No. 1659

$$y''(x) - y(x)h\left(x, \frac{y'(x)}{y(x)}\right) = 0$$

✗ **Mathematica** : cpu = 7.27977 (sec), leaf count = 0 , could not solve

```
DSolve[-(h[x, Derivative[1][y][x]/y[x]]*y[x]) + Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 0.165 (sec), leaf count = 60

$$\left\{y(x) = ODESolStruc\left(e^{c_1+\int \_b(\_a)d\_a}, \left[\left\{\frac{d}{d\_a}\_\mathrm{b}(\_a) = -\_b(\_a)^2 + h(\_a, \_b(\_a))\right\}, \left\{\_a = x, \_b(\_a) = \right.\right.\right.$$

2.1660 ODE No. 1660

$$y''(x) - x^{n-2}h\left(x^{-n}y(x), x^{1-n}y'(x)\right) = 0$$

✗ **Mathematica** : cpu = 3.13394 (sec), leaf count = 0 , could not solve

```
DSolve[-(x^(-2 + n)*h[y[x]/x^n, x^(1 - n)*Derivative[1][y][x]]) + Derivative[2][y][x] == 0,
```

✓ **Maple** : cpu = 0.821 (sec), leaf count = 125

$$\left\{y(x) = ODESolStruc\left(\_a\,\mathrm{e}^{(c_1+\int \_b(\_a)d\_a)n}, \left[\left\{\frac{d}{d\_a}\_\mathrm{b}(\_a) = \left((n-1)\_an\_b(\_a) - \_b(\_a)\,h\left(\_a, \frac{\_an\_b(}{\_b(}\right.\right.\right.\right.\right.$$

2.1661 ODE No. 1661

$$8y''(x) + 9y'(x)^4 = 0$$

✓ **Mathematica** : cpu = 0.0835306 (sec), leaf count = 92

$$\left\{\left\{y(x) \to c_2 - \frac{1}{3}\sqrt[3]{-\frac{1}{3}}(9x - 8c_1)^{2/3}\right\}, \left\{y(x) \to \frac{(9x - 8c_1)^{2/3}}{3\sqrt[3]{3}} + c_2\right\}, \left\{y(x) \to \frac{(-1)^{2/3}(9x - 8c_1)^{2/3}}{3\sqrt[3]{3}} + c_2\right\}\right\}$$

✓ **Maple** : cpu = 1.227 (sec), leaf count = 51

$$\left\{y(x) = c_2 + (c_1 + x)^{\frac{2}{3}}, y(x) = c_2 - \frac{(c_1 + x)^{\frac{2}{3}}\left(1 + i\sqrt{3}\right)}{2}, y(x) = c_2 + \frac{(c_1 + x)^{\frac{2}{3}}\left(i\sqrt{3} - 1\right)}{2}\right\}$$

2.1662 ODE No. 1662

$$ay''(x) + cy(x) + h(y'(x)) = 0$$

✗ **Mathematica** : cpu = 0.979917 (sec), leaf count = 0 , could not solve

```
DSolve[h[Derivative[1][y][x]] + c*y[x] + a*Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 0.464 (sec), leaf count = 56

$$\left\{y(x) = ODESolStruc\left(\_a, \left[\left\{\_b(\_a)\left(\frac{d}{d\_a}\_b(\_a)\right) + \frac{\_ac + h(\_b(\_a))}{a} = 0\right\}, \left\{\_a = y(x), \_b(\_a) = \frac{d}{dx}y(\right.\right.\right.$$

2.1663 ODE No. 1663

$$-xy(x)^n + xy''(x) + 2y'(x) = 0$$

✗ **Mathematica** : cpu = 0.0306819 (sec), leaf count = 0 , could not solve

```
DSolve[-(x*y[x]^n) + 2*Derivative[1][y][x] + x*Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 1.092 (sec), leaf count = 125

$$\left\{y(x) = ODESolStruc\left(\_a\,e^{c_1 + \int \_b(\_a)d\_a}, \left[\left\{\frac{d}{d\_a}\_b(\_a) = -\frac{\left(2(n-3)\_a\_b(\_a) + (n-1)^2\_a^n\_b(\_a) + \right.}{4}\right.\right.\right.$$

2.1664 ODE No. 1664

$$ax^m y(x)^n + xy''(x) + 2y'(x) = 0$$

✗ **Mathematica** : cpu = 0.202213 (sec), leaf count = 0 , could not solve

```
DSolve[a*x^m*y[x]^n + 2*Derivative[1][y][x] + x*Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 3.128 (sec), leaf count = 155

$$\left\{y(x) = ODESolStruc\left(\_a\,e^{c_1 + \int \_b(\_a)d\_a}, \left[\left\{\frac{d}{d\_a}\_b(\_a) = \frac{\left((n-1)^2 a\_a^n\_b(\_a) + (m+1)\left((m-n+2)\_\right.\right.}{(m+1)^2}\right.\right.\right.$$

2.1665 ODE No. 1665

$$xy''(x) + 2y'(x) + xe^{y(x)} = 0$$

✗ **Mathematica** : cpu = 0.119726 (sec), leaf count = 0 , could not solve

```
DSolve[E^y[x]*x + 2*Derivative[1][y][x] + x*Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 0.552 (sec), leaf count = 84

$$\left\{y(x) = ODESolStruc\left(-2c_1 + \_a - 2\left(\int \_b(\_a)\,d\_a\right), \left[\left\{\frac{d}{d\_a}\_\mathrm{b}(\_a) = (\mathrm{e}^{-\_a} - 2)\_b(\_a)^3 + \_b(\_a)^2\right\}, \left\{\right.\right.\right.\right.$$

2.1666 ODE No. 1666

$$ay'(x) + bxe^{y(x)} + xy''(x) = 0$$

✗ **Mathematica** : cpu = 0.291787 (sec), leaf count = 0 , could not solve

```
DSolve[b*E^y[x]*x + a*Derivative[1][y][x] + x*Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 1.038 (sec), leaf count = 93

$$\left\{y(x) = ODESolStruc\left(-2c_1 + \_a - 2\left(\int \_b(\_a)\,d\_a\right), \left[\left\{\frac{d}{d\_a}\_\mathrm{b}(\_a) = (b\,\mathrm{e}^{-\_a} - 2a + 2)\_b(\_a)^3 + (a-1)\right.\right.\right.\right.$$

2.1667 ODE No. 1667

$$bx^{5-2a}e^{y(x)} + ay'(x) + xy''(x) = 0$$

✗ **Mathematica** : cpu = 0.353484 (sec), leaf count = 0 , could not solve

```
DSolve[b*E^y[x]*x^(5 - 2*a) + a*Derivative[1][y][x] + x*Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 1.448 (sec), leaf count = 121

$$\left\{y(x) = ODESolStruc\left(2c_1a - 6c_1 + \_a + (2a-6)\left(\int \_b(\_a)\,d\_a\right), \left[\left\{\frac{d}{d\_a}\_\mathrm{b}(\_a) = (2a^2 + b\,\mathrm{e}^{-\_a} - 8a + 6\right.\right.\right.\right.$$

2.1668 ODE No. 1668

$$xy''(x) + (y(x) - 1)y'(x) = 0$$

✓ **Mathematica** : cpu = 0.0587082 (sec), leaf count = 60

$$\left\{\left\{y(x) \to 2 + \sqrt{2}\sqrt{2 + c_1}\tanh\left(\frac{1}{2}\left(\sqrt{2}\sqrt{2 + c_1}\log(x) - 2\sqrt{2}\sqrt{2 + c_1}c_2\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 1.286 (sec), leaf count = 24

$$\left\{y(x) = \frac{2c_1 + \tanh\left(\frac{-c_2 + \ln(x)}{2c_1}\right)}{c_1}\right\}$$

2.1669 ODE No. 1669

$$-x^2y'(x)^2 + xy''(x) + 2y'(x) + y(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.501198 (sec), leaf count = 160

$$\text{Solve}\left[\int_1^{y(x)} -\frac{x}{e^{xK[1]}c_1 + 2xK[1] + 1}dK[1] - \int_1^x \left(\int_1^{y(x)} \left(\frac{\left(e^{K[1]K[2]}c_1K[1] + 2K[1]\right)K[2]}{\left(e^{K[1]K[2]}c_1 + 2K[1]K[2] + 1\right)^2} - \frac{1}{e^{K[1]K[2]}c_1 + 2K[1\right.\right.\right.$$

✓ **Maple** : cpu = 1.308 (sec), leaf count = 32

$$\left\{y(x) = \frac{\text{RootOf}\left(c_2 + \int^{\_Z} -\frac{1}{c_1 e^{\_f} - 2\_f - 1}d\_f - \ln(x)\right)}{x}\right\}$$

2.1670 ODE No. 1670

$$a\left(xy'(x) - y(x)\right)^2 - b + xy''(x) = 0$$

✓ **Mathematica** : cpu = 7.64263 (sec), leaf count = 51

$$\left\{\left\{y(x) \to x\left(\int_1^x \frac{\sqrt{-\frac{b}{a}}\tan\left(c_1 - a\sqrt{-\frac{b}{a}}K[2]\right)}{K[2]^2}dK[2] + c_2\right)\right\}\right\}$$

✓ **Maple** : cpu = 1.733 (sec), leaf count = 35

$$\left\{y(x) = \left(c_2 + \int \frac{i\sqrt{b}\tan\left(-i\sqrt{a}\sqrt{b}x + c_1\right)}{\sqrt{a}\,x^2}dx\right)x\right\}$$

2.1671 ODE No. 1671

$$2xy''(x) + y'(x)^3 + y'(x) = 0$$

✓ **Mathematica** : cpu = 0.116508 (sec), leaf count = 59

$$\left\{\left\{y(x) \to c_2 - 2ie^{c_1}\sqrt{-x + e^{2c_1}}\right\}, \left\{y(x) \to 2ie^{c_1}\sqrt{-x + e^{2c_1}} + c_2\right\}\right\}$$

✓ **Maple** : cpu = 1.225 (sec), leaf count = 35

$$\left\{y(x) = c_2 - \frac{2\sqrt{c_1x - 1}}{c_1}, y(x) = c_2 + \frac{2\sqrt{c_1x - 1}}{c_1}\right\}$$

2.1672 ODE No. 1672

$$x^2y''(x) - a(y(x)^n - y(x)) = 0$$

✗ **Mathematica** : cpu = 12.8657 (sec), leaf count = 0 , could not solve

```
DSolve[-(a*(-y[x] + y[x]^n)) + x^2*Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 1.155 (sec), leaf count = 65

$$\left\{y(x) = ODESolStruc\left(\_a, \left[\left\{\frac{d}{d\_a}\_b(\_a) = (\_aa\_b(\_a) - a\_a^n\_b(\_a) - 1)\_b(\_a)^2\right\}, \left\{\_a = y(x), \_b(\_\right.\right.\right.$$

2.1673 ODE No. 1673

$$a\left(e^{y(x)} - 1\right) + x^2y''(x) = 0$$

✗ **Mathematica** : cpu = 26.4981 (sec), leaf count = 0 , could not solve

```
DSolve[a*(-1 + E^y[x]) + x^2*Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 0.797 (sec), leaf count = 60

$$\left\{y(x) = ODESolStruc\left(\_a, \left[\left\{\frac{d}{d\_a}\_b(\_a) = ((e^{\_a} - 1)\,a\_b(\_a) - 1)\_b(\_a)^2\right\}, \left\{\_a = y(x), \_b(\_a) = \frac{}{x\left(\frac{}{d}\right.}\right.\right.\right.$$

2.1674 ODE No. 1674

$$y(x)\left(a(a+b)+b^2c^2x^{2b}\right)-x(2a+b-1)y'(x)+x^2y''(x)=0$$

✓ **Mathematica** : cpu = 0.0460053 (sec), leaf count = 106

$$\left\{\left\{y(x)\to c_1 2^{-\frac{a}{b}}c^{a/b}\left(x^{2b}\right)^{\frac{a}{2b}}\cos\left(c\sqrt{x^{2b}}\right)+c_2 2^{-\frac{a+b}{b}}c^{\frac{a+b}{b}-1}\left(x^{2b}\right)^{\frac{a+b}{2b}-\frac{1}{2}}\sin\left(c\sqrt{x^{2b}}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.146 (sec), leaf count = 25

$$\left\{y(x)=\left(c_1\sin\left(c\,x^b\right)+c_2\cos\left(c\,x^b\right)\right)x^a\right\}$$

2.1675 ODE No. 1675

$$x^k\left(-h\left(x^ky(x),ky(x)+xy'(x)\right)\right)+(a+1)xy'(x)+x^2y''(x)=0$$

✗ **Mathematica** : cpu = 2.35555 (sec), leaf count = 0 , could not solve

```
DSolve[-(x^k*h[x^k*y[x], k*y[x] + x*Derivative[1][y][x]]) + (1 + a)*x*Derivative[1][y][x] +
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(x^2*diff(diff(y(x),x),x)+(a+1)*x*diff(y(x),x)-x^k*h(x^k*y(x),x*diff(y(x),x)+k*y(x))=0
```

2.1676 ODE No. 1676

$$a\left(xy'(x)-y(x)\right)^2-bx^2+x^2y''(x)=0$$

✓ **Mathematica** : cpu = 0.363928 (sec), leaf count = 134

$$\left\{\left\{y(x)\to x\left(\int_1^x\frac{i\sqrt{a}\sqrt{b}Y_1\left(-i\sqrt{a}\sqrt{b}K[2]\right)-i\sqrt{a}\sqrt{b}J_1\left(i\sqrt{a}\sqrt{b}K[2]\right)c_1}{a\left(Y_0\left(-i\sqrt{a}\sqrt{b}K[2]\right)+J_0\left(i\sqrt{a}\sqrt{b}K[2]\right)c_1\right)K[2]}dK[2]+c_2\right)\right\}\right\}$$

✓ **Maple** : cpu = 1.323 (sec), leaf count = 72

$$\left\{y(x)=\left(c_2+\int-\frac{\sqrt{-ab}\left(c_1\,\mathrm{BesselY}\left(1,\sqrt{-ab}\,x\right)+\mathrm{BesselJ}\left(1,\sqrt{-ab}\,x\right)\right)}{\left(c_1\,\mathrm{BesselY}\left(0,\sqrt{-ab}\,x\right)+\mathrm{BesselJ}\left(0,\sqrt{-ab}\,x\right)\right)ax}dx\right)x\right\}$$

2.1677 ODE No. 1677

$$ay(x)y'(x)^2 + bx + x^2y''(x) = 0$$

✗ **Mathematica** : cpu = 39.2725 (sec), leaf count = 0 , could not solve

```
DSolve[b*x + a*y[x]*Derivative[1][y][x]^2 + x^2*Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 2.769 (sec), leaf count = 101

$$\left\{y(x) = \mathit{ODESolStruc}\left(\_a\, \mathrm{e}^{c_1+\int \_b(\_a)d\_a}, \left[\left\{\frac{d}{d\_a}\_\mathrm{b}(\_a) = \_aa\_b(\_a) + \left(\_a^3a + b\right)\_b(\_a)^3 + \left(2\_a^2a + 1\right)\right.\right.\right.\right.$$

2.1678 ODE No. 1678

$$x^2y''(x) - \sqrt{ax^2y'(x)^2 + by(x)^2} = 0$$

✗ **Mathematica** : cpu = 1.01481 (sec), leaf count = 0 , could not solve

```
DSolve[-Sqrt[b*y[x]^2 + a*x^2*Derivative[1][y][x]^2] + x^2*Derivative[2][y][x] == 0, y[x], x
```

✓ **Maple** : cpu = 2.408 (sec), leaf count = 60

$$\left\{-\mathrm{e}^{c_2+\int^{\ln(x)} \mathrm{RootOf}\left(c_1-\_b+\int^{\_Z} -\frac{y(x)}{\_a^2y(x)-\_ay(x)-\sqrt{\left(\_a^2a+b\right)y(x)^2}}d\_a\right)d\_b} + y(x) = 0\right\}$$

2.1679 ODE No. 1679

$$\left(x^2+1\right)y''(x) + y'(x)^2 + 1 = 0$$

✓ **Mathematica** : cpu = 0.201155 (sec), leaf count = 33

$$\left\{\left\{y(x) \to -x\cot(c_1) + \csc^2(c_1)\log(-x\sin(c_1) - \cos(c_1)) + c_2\right\}\right\}$$

✓ **Maple** : cpu = 1.277 (sec), leaf count = 27

$$\left\{y(x) = c_2 + \ln\left(c_1x - 1\right) + \frac{x}{c_1} + \frac{\ln\left(c_1x - 1\right)}{c_1^2}\right\}$$

2.1680 ODE No. 1680

$$x^4\left(-y'(x)^2\right)+4x^2y''(x)+4y(x)=0$$

✗ **Mathematica** : cpu = 7.74229 (sec), leaf count = 0 , could not solve

```
DSolve[4*y[x] - x^4*Derivative[1][y][x]^2 + 4*x^2*Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 1.809 (sec), leaf count = 103

$$\left\{y(x)=ODESolStruc\left(\_a\,\mathrm{e}^{-2c_1+\int -2\_b(\_a)d\_a},\left[\left\{\frac{d}{d\_a}\_\mathrm{b}(\_a)=\left(-\_a^2+7\_a\right)\_b(\_a)^3+\left(\_a-5\right)\_b(\_a)^2\right.\right.\right.\right.$$

2.1681 ODE No. 1681

$$ay(x)^3+9x^2y''(x)+2y(x)=0$$

✓ **Mathematica** : cpu = 2.76213 (sec), leaf count = 41

$$\left\{\left\{y(x)\to c_2\sqrt[3]{x}\mathrm{sn}\left(\left(c_1+\frac{\sqrt{ax^{20/3}}}{\sqrt{2}x^3}\right)c_2\middle|-1\right)\right\}\right\}$$

✓ **Maple** : cpu = 1.154 (sec), leaf count = 31

$$\left\{y(x)=c_2x^{\frac{1}{3}}\mathrm{sn}\left(c_2\left(c_1+\frac{\sqrt{2}\sqrt{a\,x^{\frac{20}{3}}}}{2x^3}\right)|i\right)\right\}$$

2.1682 ODE No. 1682

$$x^3\left(y''(x)+y(x)y'(x)-y(x)^3\right)+12xy(x)+24=0$$

✓ **Mathematica** : cpu = 22.2405 (sec), leaf count = 41

$$\left\{\left\{y(x)\to\frac{2+x^3\wp'(x+c_1;0,c_2)}{x\left(-1+x^2\wp(x+c_1;0,c_2)\right)}\right\}\right\}$$

✓ **Maple** : cpu = 1.964 (sec), leaf count = 94

$$\left\{y(x)=ODESolStruc\left(\_a\,\mathrm{e}^{c_1+\int\_b(\_a)d\_a},\left[\left\{\frac{d}{d\_a}\_\mathrm{b}(\_a)=-\left(\_a+\left(\_a^3+\_a^2-14\_a-24\right)\_b(\_a)-3\right)\_\right.\right.\right.\right.$$

2.1683 ODE No. 1683

$$x^3y''(x) - a(xy'(x) - y(x))^2 = 0$$

✓ **Mathematica** : cpu = 0.0888071 (sec), leaf count = 26

$$\left\{\left\{y(x) \to -\frac{x \log \left(a\left(-\frac{c_1}{x} - c_2\right)\right)}{a}\right\}\right\}$$

✓ **Maple** : cpu = 1.171 (sec), leaf count = 23

$$\left\{y(x) = -\frac{x \ln \left(\frac{(c_1 x - c_2)a}{x}\right)}{a}\right\}$$

2.1684 ODE No. 1684

$$xy(x)\left(a - 2x^2y(x)^2 + 3xy(x)\right) + b + 2x^3y''(x) + x^2(2xy(x) + 9)y'(x) = 0$$

✗ **Mathematica** : cpu = 54.0549 (sec), leaf count = 0 , could not solve

```
DSolve[b + x*y[x]*(a + 3*x*y[x] - 2*x^2*y[x]^2) + x^2*(9 + 2*x*y[x])*Derivative[1][y][x] + 2
```

✓ **Maple** : cpu = 2.791 (sec), leaf count = 100

$$\left\{y(x) = ODESolStruc\left(\_a\, e^{c_1+\int \_b(\_a) d\_a}, \left[\left\{\frac{d}{d\_a}\_b(\_a) = \frac{\left(-2\_a + \left(-2\_a^3 + \_a^2 + (a-5)\_a + b\right)\_b(\_a\right.}{2}\right.\right.\right.$$

2.1685 ODE No. 1685

$$axy(x) + b - \left(kx^{k-1} - 12x^2\right)\left(3y'(x) + y(x)^2\right) + 2\left(4x^3 - x^k\right)\left(y''(x) + y(x)y'(x) - y(x)^3\right) = 0$$

✗ **Mathematica** : cpu = 2.68139 (sec), leaf count = 0 , could not solve

```
DSolve[b + a*x*y[x] - (-12*x^2 + k*x^(-1 + k))*(y[x]^2 + 3*Derivative[1][y][x]) + 2*(4*x^3 -
y[x]^3 + y[x]*Derivative[1][y][x] + Derivative[2][y][x]) == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(2*(-x^k+4*x^3)*(diff(diff(y(x),x),x)+y(x)*diff(y(x),x)-y(x)^3)-(k*x^(k-
1)-12*x^2)*(3*diff(y(x),x)+y(x)^2)+a*x*y(x)+b=0,y(x))
```

2.1686 ODE No. 1686

$$a^2y(x)^n + x^4y''(x) = 0$$

✗ **Mathematica** : cpu = 0.0320163 (sec), leaf count = 0 , could not solve

```
DSolve[a^2*y[x]^n + x^4*Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 1.433 (sec), leaf count = 128

$$\left\{y(x) = ODESolStruc\left(\_a\,e^{c_1+\int \_b(\_a)d\_a}, \left[\left\{\frac{d}{d\_a}\_b(\_a) = \frac{\left((n-1)^2 a^2\_a^n\_b(\_a) - 2(n-3)\_a\_b(\_a) - \right.}{4}\right.\right.\right.\right.$$

2.1687 ODE No. 1687

$$x^4y''(x) - x\left(x^2 + 2y(x)\right)y'(x) + 4y(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.0793184 (sec), leaf count = 262

$$\left\{\left\{y(x) \to -\frac{x^3\left(i\left(\frac{i}{\sqrt{c_1}} - \frac{\sqrt{-1-c_1}}{\sqrt{c_1}}\right)\sqrt{c_1}c_2x^{-1+i\left(\frac{i}{\sqrt{c_1}}-\frac{\sqrt{-1-c_1}}{\sqrt{c_1}}\right)\sqrt{c_1}} + i\left(\frac{\sqrt{-1-c_1}}{\sqrt{c_1}} + \frac{i}{\sqrt{c_1}}\right)\sqrt{c_1}x^{-1+i\left(\frac{\sqrt{-1-c_1}}{\sqrt{c_1}}+\frac{i}{\sqrt{c_1}}\right)\sqrt{c}}\right.}{c_2x^{i\left(\frac{i}{\sqrt{c_1}}-\frac{\sqrt{-1-c_1}}{\sqrt{c_1}}\right)\sqrt{c_1}} + x^{i\left(\frac{\sqrt{-1-c_1}}{\sqrt{c_1}}+\frac{i}{\sqrt{c_1}}\right)\sqrt{c_1}}}\right.\right.$$

✓ **Maple** : cpu = 1.247 (sec), leaf count = 21

$$\left\{y(x) = \left(c_1 \tanh\left(c_1(c_2 - \ln(x))\right) + 1\right)x^2\right\}$$

2.1688 ODE No. 1688

$$x^4y''(x) - x^2y'(x)\left(y'(x) + x\right) + 4y(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.594244 (sec), leaf count = 189

$$\text{Solve}\left[\int_1^{y(x)} \frac{1}{-e^{\frac{K[1]}{x^2}}c_1x^2 + 2x^2 + 4K[1]}dK[1] - \int_1^x \left(\frac{K[2]\left(e^{\frac{y(x)}{K[2]^2}}c_1 + 2\left(-\frac{y(x)}{K[2]^2} - 1\right)\right)}{-e^{\frac{y(x)}{K[2]^2}}c_1K[2]^2 + 2K[2]^2 + 4y(x)} + \int_1^{y(x)} -\frac{\frac{2e^{\frac{K[1]}{K[2]^2}}c_1K[1]}{K[2]}}{\left(-e^{\frac{K[1]}{K[2]^2}}c_1K\right.}\right.\right.$$

✓ **Maple** : cpu = 1.247 (sec), leaf count = 32

$$\left\{y(x) = x^2\,\text{RootOf}\left(c_2 - \left(\int^{\_Z} \frac{1}{c_1e^{\_f} + 4\_f + 2}d\_f\right) - \ln(x)\right)\right\}$$

2.1689 ODE No. 1689

$$x^4y''(x) + (xy'(x) - y(x))^3 = 0$$

✓ **Mathematica** : cpu = 0.30904 (sec), leaf count = 104

$$\left\{\left\{y(x) \to -ix \log\left(\frac{\frac{e^{c_2}}{x} - \frac{\sqrt{e^{2c_2}-8ic_1x^2}}{x}}{4c_1}\right)\right\}, \left\{y(x) \to -ix \log\left(\frac{\frac{\sqrt{e^{2c_2}-8ic_1x^2}}{x} + \frac{e^{c_2}}{x}}{4c_1}\right)\right\}\right\}$$

✓ **Maple** : cpu = 1.296 (sec), leaf count = 37

$$\left\{y(x) = \left(c_2 - \arctan\left(\frac{1}{\sqrt{c_1x^2-1}}\right)\right)x, y(x) = \left(c_2 + \arctan\left(\frac{1}{\sqrt{c_1x^2-1}}\right)\right)x\right\}$$

2.1690 ODE No. 1690

$$\sqrt{x}y''(x) - y(x)^{3/2} = 0$$

✗ **Mathematica** : cpu = 21.7667 (sec), leaf count = 0 , could not solve

```
DSolve[-y[x]^(3/2) + Sqrt[x]*Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 2.916 (sec), leaf count = 99

$$\left\{y(x) = ODESolStruc\left(\_a\, e^{-3c_1+\int -3\_b(\_a)d\_a}, \left[\left\{\frac{d}{d\_a}\_b(\_a) = -\_a^{\frac{3}{2}}\_b(\_a)^3 + 12\_a\_b(\_a)^3 - 7\_b(\_a)^2\right\}\right.\right.\right.$$

2.1691 ODE No. 1691

$$y''(x)\left(ax^2+bx+c\right)^{3/2} - f\left(\frac{y(x)}{\sqrt{ax^2+bx+c}}\right) = 0$$

✓ **Mathematica** : cpu = 61.0355 (sec), leaf count = 251

$$\left\{\text{Solve}\left[2a\tan^{-1}\left(\frac{2ax+b}{\sqrt{4ac-b^2}}\right) + 2\sqrt{4ac-b^2}\int_1^{\frac{y(x)}{\sqrt{c+x(b+ax)}}} \frac{a}{\sqrt{4c_1a^2+(b^2-4ac)K[2]^2+8\int_1^{K[2]} f(K[1])dK[1]}}dI\right.\right.$$

✓ **Maple** : cpu = 0.948 (sec), leaf count = 254

$$\left\{y(x) = \sqrt{a\,x^2+bx+c}\ \text{RootOf}\left(-2a\arctan\left(\frac{2ax+b}{\sqrt{4ac-b^2}}\right) + c_2\sqrt{4ac-b^2} - 2\sqrt{4ac-b^2}\left(\int^{\_Z} \frac{}{\sqrt{-4\_g^2ac+}}\right.\right.\right.$$

2.1692 ODE No. 1692

$$x^{\frac{n}{n+1}}y''(x) - y(x)^{\frac{2n+1}{n+1}} = 0$$

✗ **Mathematica** : cpu = 0.0664395 (sec), leaf count = 0 , could not solve

```
DSolve[-y[x]^((1 + 2*n)/(1 + n)) + x^(n/(1 + n))*Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 4.227 (sec), leaf count = 156

$$\left\{y(x) = ODESolStruc\left(\_a\,\mathrm{e}^{-\frac{(c_1+\int \_b(\_a)d\_a)(n+2)}{n}}, \left[\left\{\frac{d}{d\_a}\_\mathrm{b}(\_a) = \frac{2\left(-\frac{n^2\_a^{\frac{2n+1}{n+1}}\_b(\_a)}{2} + (n+2)\,(n+1)\,\_a\_b\right.}{n^2}\right.\right.\right.$$

2.1693 ODE No. 1693

$$-h(y(x), f(x)y'(x)) + f(x)f'(x)y'(x) + f(x)^2y''(x) = 0$$

✗ **Mathematica** : cpu = 0.829396 (sec), leaf count = 0 , could not solve

```
DSolve[-h[y[x], f[x]*Derivative[1][y][x]] + f[x]*Derivative[1][f][x]*Derivative[1][y][x] + f
```

✓ **Maple** : cpu = 0.326 (sec), leaf count = 68

$$\left\{y(x) = ODESolStruc\left(\_a, \left[\left\{\frac{d}{d\_a}\_\mathrm{b}(\_a) = -\_b(\_a)^3\,h\left(\_a, \frac{1}{\_b\,(\_a)}\right)\right\}, \left\{\_a = y(x)\,, \_b(\_a) = \frac{1}{\left(\frac{d}{dx}y\,(x)\right)}\right.\right.\right.$$

2.1694 ODE No. 1694

$$y(x)y''(x) - a = 0$$

✓ **Mathematica** : cpu = 0.134934 (sec), leaf count = 115

$$\left\{\left\{y(x) \to \exp\left(\frac{-2a\mathrm{erf}^{-1}\left(-i\sqrt{\frac{2}{\pi}}\sqrt{ae^{\frac{c_1}{a}}\,(x+c_2)^2}\right)^2 - c_1}{2a}\right)\right\}, \left\{y(x) \to \exp\left(\frac{-2a\mathrm{erf}^{-1}\left(i\sqrt{\frac{2}{\pi}}\sqrt{ae^{\frac{c_1}{a}}\,(x+c_2)}\right.}{2a}\right.\right.\right.$$

✓ **Maple** : cpu = 1.28 (sec), leaf count = 54

$$\left\{-c_2 - x + \int^{y(x)} \frac{1}{\sqrt{-2c_1a + 2a\ln(\_a)}}d\_a = 0, -c_2 - x + \int^{y(x)} -\frac{1}{\sqrt{-2\,(c_1 - \ln(\_a))\,a}}d\_a = 0\right\}$$

2.1695 ODE No. 1695

$$y(x)y''(x) - ax = 0$$

✗ **Mathematica** : cpu = 20.8141 (sec), leaf count = 0 , could not solve

```
DSolve[-(a*x) + y[x]*Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 1.84 (sec), leaf count = 103

$$\left\{y(x) = ODESolStruc\left(\_a\left(e^{c_1+\int \_b(\_a)d\_a}\right)^{\frac{3}{2}}, \left[\left\{\frac{d}{d\_a}\_b(\_a) = \frac{(3\_a^2 - 4a)\_b(\_a)^3}{4\_a} + 2\_b(\_a)^2\right\}, \left\{\_a =\right.\right.\right.\right.$$

2.1696 ODE No. 1696

$$y(x)y''(x) - ax^2 = 0$$

✗ **Mathematica** : cpu = 19.3692 (sec), leaf count = 0 , could not solve

```
DSolve[-(a*x^2) + y[x]*Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 1.707 (sec), leaf count = 100

$$\left\{y(x) = ODESolStruc\left(\_a\, e^{2c_1+\int 2\_b(\_a)d\_a}, \left[\left\{\frac{d}{d\_a}\_b(\_a) = \frac{(2\_a^2 - a)\_b(\_a)^3}{\_a} + 3\_b(\_a)^2\right\}, \left\{\_a = \frac{y(x}{x^2}\right.\right.\right.\right.$$

2.1697 ODE No. 1697

$$-a + y(x)y''(x) + y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.211297 (sec), leaf count = 94

$$\left\{\left\{y(x) \to -\frac{\sqrt{a^2x^2 + 2a^2c_2x + a^2c_2{}^2 - e^{2c_1}}}{\sqrt{a}}\right\}, \left\{y(x) \to \frac{\sqrt{a^2x^2 + 2a^2c_2x + a^2c_2{}^2 - e^{2c_1}}}{\sqrt{a}}\right\}\right\}$$

✓ **Maple** : cpu = 1.198 (sec), leaf count = 39

$$\left\{y(x) = \sqrt{a\,x^2 - 2c_1x + 2c_2}, y(x) = -\sqrt{a\,x^2 - 2c_1x + 2c_2}\right\}$$

2.1698 ODE No. 1698

$$-ax - b + y(x)y''(x) + y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.0369312 (sec), leaf count = 72

$$\left\{\left\{y(x)\to -\frac{\sqrt{ax^3+3bx^2+3c_2x+6c_1}}{\sqrt{3}}\right\},\left\{y(x)\to \frac{\sqrt{ax^3+3bx^2+3c_2x+6c_1}}{\sqrt{3}}\right\}\right\}$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(diff(y(x),x),x)*y(x)+y(x)^2-a*x-b=0,y(x))
```

2.1699 ODE No. 1699

$$y(x)y''(x) + y'(x)^2 - y'(x) = 0$$

✓ **Mathematica** : cpu = 0.146007 (sec), leaf count = 40

$$\left\{\left\{y(x)\to c_1\left(-W\left(-\frac{e^{-\frac{x}{c_1}-1-\frac{c_2}{c_1}}}{c_1}\right)\right)-c_1\right\}\right\}$$

✓ **Maple** : cpu = 1.378 (sec), leaf count = 33

$$\left\{y(x) = -c_1\left(\mathrm{LambertW}\left(-\frac{\mathrm{e}^{-1}\mathrm{e}^{-\frac{c_2}{c_1}}\mathrm{e}^{-\frac{x}{c_1}}}{c_1}\right)+1\right)\right\}$$

2.1700 ODE No. 1700

$$y(x)y''(x) - y'(x)^2 + 1 = 0$$

✓ **Mathematica** : cpu = 0.200315 (sec), leaf count = 44

$$\left\{\left\{y(x)\to -e^{-c_1}\sinh\left(e^{c_1}(x+c_2)\right)\right\},\left\{y(x)\to e^{-c_1}\sinh\left(e^{c_1}(x+c_2)\right)\right\}\right\}$$

✓ **Maple** : cpu = 1.553 (sec), leaf count = 86

$$\left\{y(x) = \frac{\left(-c_1\mathrm{e}^{\frac{2c_2}{c_1}}\mathrm{e}^{\frac{2x}{c_1}}+c_1\right)\mathrm{e}^{-\frac{c_2}{c_1}}\mathrm{e}^{-\frac{x}{c_1}}}{2}, y(x) = \frac{\left(c_1\mathrm{e}^{\frac{2c_2}{c_1}}\mathrm{e}^{\frac{2x}{c_1}}-c_1\right)\mathrm{e}^{-\frac{c_2}{c_1}}\mathrm{e}^{-\frac{x}{c_1}}}{2}\right\}$$

2.1701 ODE No. 1701

$$y(x)y''(x) - y'(x)^2 - 1 = 0$$

✓ **Mathematica** : cpu = 0.230964 (sec), leaf count = 80

$$\left\{\left\{y(x) \to -\frac{e^{-c_1}\tanh\left(e^{c_1}(x+c_2)\right)}{\sqrt{-1+\tanh^2\left(e^{c_1}(x+c_2)\right)}}\right\}, \left\{y(x) \to \frac{e^{-c_1}\tanh\left(e^{c_1}(x+c_2)\right)}{\sqrt{-1+\tanh^2\left(e^{c_1}(x+c_2)\right)}}\right\}\right\}$$

✓ **Maple** : cpu = 1.475 (sec), leaf count = 42

$$\left\{y(x) = \frac{c_1\left(\mathrm{e}^{\frac{2c_2}{c_1}}\mathrm{e}^{\frac{2x}{c_1}}+1\right)\mathrm{e}^{-\frac{c_2}{c_1}}\mathrm{e}^{-\frac{x}{c_1}}}{2}\right\}$$

2.1702 ODE No. 1702

$$e^{2x}\left(ay(x)^4+b\right)+e^xy(x)\left(cy(x)^2+d\right)+y(x)y''(x)-y'(x)^2 = 0$$

✗ **Mathematica** : cpu = 1.45946 (sec), leaf count = 0 , could not solve

```
DSolve[E^x*y[x]*(d + c*y[x]^2) + E^(2*x)*(b + a*y[x]^4) - Derivative[1][y][x]^2 + y[x]*Deriv
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(diff(y(x),x),x)*y(x)-diff(y(x),x)^2+exp(x)*y(x)*(c*y(x)^2+d)+exp(2*x)*(b+a*y(x)^
```

2.1703 ODE No. 1703

$$y(x)y''(x) - y'(x)^2 + y(x)^2(-\log(y(x))) = 0$$

✓ **Mathematica** : cpu = 0.41091 (sec), leaf count = 77

$$\left\{\left\{y(x) \to \exp\left(-\frac{1}{2}\sqrt{c_1}e^{-x-c_2}\left(-1+e^{2x+2c_2}\right)\right)\right\}, \left\{y(x) \to \exp\left(\frac{1}{2}\sqrt{c_1}e^{-x-c_2}\left(-1+e^{2x+2c_2}\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.217 (sec), leaf count = 21

$$\left\{y(x) = \mathrm{e}^{-\frac{c_2\mathrm{e}^x}{2}}\mathrm{e}^{\frac{c_1\mathrm{e}^x\mathrm{e}^{-2x}}{2}}\right\}$$

2.1704 ODE No. 1704

$$y(x)^2\left(\frac{f''(x)}{f(x)}-\frac{f'(x)^2}{f(x)^2}\right)+f(x)y(x)^3+y(x)y''(x)-y'(x)^2-y'(x)=0$$

✗ **Mathematica** : cpu = 14.0572 (sec), leaf count = 0 , could not solve

```
DSolve[f[x]*y[x]^3 - Derivative[1][y][x] - Derivative[1][y][x]^2 + y[x]^2*(-(Derivative[1][f
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(diff(y(x),x),x)*y(x)-diff(y(x),x)^2-diff(y(x),x)+f(x)*y(x)^3+y(x)^2*(diff(diff(f
diff(f(x),x)^2/f(x)^2)=0,y(x))
```

2.1705 ODE No. 1705

$$-y(x)f'(x)+f(x)y'(x)+y(x)y''(x)-y'(x)^2-y(x)^3=0$$

✓ **Mathematica** : cpu = 0.318924 (sec), leaf count = 252

$$\left\{\left\{y(x)\to -\frac{\exp\left(c_2-\int_1^x \frac{y(K[3])^3+c_1{}^2y(K[3])^2+\int_1^{K[3]}\frac{-y(K[1])^3-f'(K[1])y(K[1])+f(K[1])y'(K[1])}{y(K[1])^2}dK[1]^2y(K[3])^2+2c_1\int_1^{K[3]}\frac{-y(K[1])^3}{}}{y(K[3])^2\left(c_1+\int_1^{K[3]}\frac{-y(K[1])^3-f'(K[1])y(K[1])+}{y(K[1])^2}\right.}\right.}{\int_1^x\frac{-y(K[1])^3-f'(K[1])y(K[1])+f(K[1])y'(K[1}{y(K[1])^2}}\right.\right.$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(diff(y(x),x),x)*y(x)-diff(y(x),x)^2+diff(y(x),x)*f(x)-diff(f(x),x)*y(x)-
y(x)^3=0,y(x))
```

2.1706 ODE No. 1706

$$-y(x)f''(x)+f'(x)y'(x)+f(x)y(x)^3+y(x)y''(x)-y'(x)^2-y(x)^4=0$$

✓ **Mathematica** : cpu = 0.585038 (sec), leaf count = 308

$$\left\{\left\{y(x)\to -\frac{\exp\left(c_2-\int_1^x \frac{y(K[3])^4-f(K[3])y(K[3])^3+c_1{}^2y(K[3])^2+\int_1^{K[3]}\frac{-y(K[1])^4+f(K[1])y(K[1])^3-f''(K[1])y(K[1])+f'(K[1])y'(K[1])}{y(K[1])^2}d}{y(K[3])^2\left(c_1+\int_1^{K[3]}\frac{-y(K[1])}{}\right.}\right.}{\int_1^x\frac{-y(K[1])^4+f(K[1])y(K[1])}{}}\right.\right.$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(diff(y(x),x),x)*y(x)-diff(y(x),x)^2+diff(f(x),x)*diff(y(x),x)-diff(diff(f(x),x),
y(x)^4=0,y(x))
```

2.1707 ODE No. 1707

$$ay(x)y'(x) + by(x)^2 + y(x)y''(x) - y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.0761008 (sec), leaf count = 31

$$\left\{\left\{y(x) \to c_2 e^{-\frac{bx}{a} - \frac{c_1 e^{-ax}}{a}}\right\}\right\}$$

✓ **Maple** : cpu = 1.363 (sec), leaf count = 39

$$\left\{y(x) = \mathrm{e}^{\frac{b}{a^2}} \mathrm{e}^{\frac{c_1 \mathrm{e}^{-ax}}{a}} \mathrm{e}^{-\frac{c_2}{a}} \mathrm{e}^{-\frac{bx}{a}}\right\}$$

2.1708 ODE No. 1708

$$ay(x)y'(x) - 2ay(x)^2 + by(x)^3 + y(x)y''(x) - y'(x)^2 = 0$$

✗ **Mathematica** : cpu = 43.574 (sec), leaf count = 0 , could not solve

```
DSolve[-2*a*y[x]^2 + b*y[x]^3 + a*y[x]*Derivative[1][y][x] - Derivative[1][y][x]^2 + y[x]*De
```

✓ **Maple** : cpu = 2.422 (sec), leaf count = 73

$$\left\{y(x) = ODESolStruc\left(\_a, \left[\left\{\_b(\_a)\left(\frac{d}{d\_a}\_b(\_a)\right) - \frac{-\_a^3 b + 2\_a^2 a - \_a a\_b(\_a) + \_b(\_a)^2}{\_a} = 0\right\}, \left\{-\right.\right.\right.$$

2.1709 ODE No. 1709

$$2a^2 y(x)^2 - (ay(x) - 1)y'(x) + ay(x) - 2b^2 y(x)^3 + y(x)y''(x) - y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 56.2842 (sec), leaf count = 543

$$\left\{\left\{y(x) \to -\frac{1}{2a} + e^{2ax}\left(\frac{e^{-2ax}\left(c_1\left(\sqrt{a^3+2b^2} - a^{3/2}\right)\Gamma\left(1 - \frac{\sqrt{a^3+2b^2}}{2a^{3/2}}\right) J_{-\frac{\sqrt{a^3+2b^2}}{2a^{3/2}}}\left(\frac{\sqrt{ab^2 e^{2ax} c_2}}{a^{3/2}}\right) + 2c_1\Gamma\left(1 - \frac{\sqrt{a^3+}}{2a^3}\right.}{4a\left(bc_1\Gamma\left(1 - \right.\right.}\right.\right.\right.$$

✓ **Maple** : cpu = 3.061 (sec), leaf count = 84

$$\left\{y(x) = ODESolStruc\left(\_a, \left[\left\{\_b(\_a)\left(\frac{d}{d\_a}\_b(\_a)\right) - \frac{2\_a^3 b^2 - 2\_a^2 a^2 + \_a a\_b(\_a) - \_a a + \_b(\_a)^2 - \right.}{\_a}\right.\right.\right.$$

2.1710 ODE No. 1710

$$-y(x)(y(x)+1)\left(b^2y(x)^2-a^2\right)+(ay(x)-1)y'(x)+y(x)y''(x)-y'(x)^2=0$$

✗ **Mathematica** : cpu = 62.9165 (sec), leaf count = 0 , could not solve

```
DSolve[-(y[x]*(1 + y[x])*(-a^2 + b^2*y[x]^2)) + (-1 + a*y[x])*Derivative[1][y][x] - Derivati
```

✓ **Maple** : cpu = 4.236 (sec), leaf count = 91

$$\left\{y(x)=ODESolStruc\left(\_a,\left[\left\{\_b(\_a)\left(\frac{d}{d\_a}\_b(\_a)\right)-\frac{\_a^4b^2+\_a^3b^2-\_a^2a^2-\_a\,a^2-\_aa\_b(\_a)+\_b(\right.\right.\right.}{\_a}$$

2.1711 ODE No. 1711

$$y(x)^2\log(y(x))\left(\cos^2(x)-n^2\cot^2(x)\right)+y(x)y''(x)-y'(x)^2+y(x)y'(x)(\tan(x)+\cot(x))=0$$

✓ **Mathematica** : cpu = 98.9686 (sec), leaf count = 916

$$\left\{\left\{y(x)\to e^{e^{c_2+\int_1^x-\frac{\frac{(-1)^{1-n}2^{n+1}\left(\frac{1}{2}(-n-1)+\frac{1}{2}\right)K_n\left(\sqrt{\cos^2(K[3])-1}\right)\cos(K[3])\left(2\cos^2(K[3])-2\right)^{\frac{n+1}{2}}\sin(K[3])\left(\cos^2(K[3])-1\right)^{\frac{1}{2}(-n-1)-\frac{1}{2}}}{\sqrt{1-\cos^2(K[3])}}+\frac{(-1)^{1}}{}}{}}}\right.\right.$$

✓ **Maple** : cpu = 0.709 (sec), leaf count = 81

$$\left\{y(x)=e^{\frac{c_2\,\mathrm{BesselY}(n,\sin(x))}{(\mathrm{BesselJ}(n,\sin(x))\,\mathrm{BesselY}(n+1,\sin(x))-\mathrm{BesselJ}(n+1,\sin(x))\,\mathrm{BesselY}(n,\sin(x)))\sin(x)}}e^{-\frac{c_1\,\mathrm{BesselJ}(n,\sin(x))}{(\mathrm{BesselJ}(n,\sin(x))\,\mathrm{BesselY}(n+1,\sin(x))-\mathrm{BesselJ}(n+1,\sin(}}\right.$$

2.1712 ODE No. 1712

$$-f(x)y(x)y'(x)-g(x)y(x)^2+y(x)y''(x)-y'(x)^2=0$$

✓ **Mathematica** : cpu = 0.101042 (sec), leaf count = 75

$$\left\{\left\{y(x)\to c_2\exp\left(\int_1^x\left(\exp\left(\int_1^{K[3]}f(K[1])dK[1]\right)c_1+\exp\left(\int_1^{K[3]}f(K[1])dK[1]\right)\int_1^{K[3]}\exp\left(-\int_1^{K[2]}f(K\right.\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.266 (sec), leaf count = 61

$$\left\{y(x)=c_2e^{\left(\int e^{\int-f(x)dx}g(x)dx\right)\left(\int e^{\int f(x)dx}dx\right)}e^{\int\left(\int-e^{\int f(x)dx}dx\right)e^{\int-f(x)dx}g(x)dx}e^{\int-c_1e^{\int f(x)dx}dx}\right\}$$

2.1713 ODE No. 1713

$$-y(x)\left(g'(x)-y(x)^2f'(x)\right)+y'(x)\left(f(x)y(x)^2+g(x)\right)+y(x)y''(x)-y'(x)^2=0$$

✗ **Mathematica** : cpu = 21.1553 (sec), leaf count = 0 , could not solve

```
DSolve[-(y[x]*(-(y[x]^2*Derivative[1][f][x]) + Derivative[1][g][x])) + (g[x] + f[x]*y[x]^2)*
```

✓ **Maple** : cpu = 0.352 (sec), leaf count = 54

$$\left\{y(x)=ODESolStruc\left(\_b(\_a),\left[\left\{\frac{\_b(\_a)^2 f(\_a)+c_1\_b(\_a)+\frac{d}{d\_a}\_b(\_a)-g(\_a)}{\_b(\_a)}=0\right\},\{\_a=x,\_b(\_a)$$

2.1714 ODE No. 1714

$$y(x)y''(x)+3y(x)y'(x)-3y'(x)^2-y(x)^2=0$$

✓ **Mathematica** : cpu = 0.196927 (sec), leaf count = 25

$$\left\{\left\{y(x)\to\frac{c_2e^x}{\sqrt{1-2e^{x+c_1}}}\right\}\right\}$$

✓ **Maple** : cpu = 1.282 (sec), leaf count = 68

$$\left\{y(x)=\frac{\sqrt{2}\sqrt{(c_1e^x-c_2)\,e^{2x}}}{2c_1e^x-2c_2},y(x)=-\frac{\sqrt{2}\sqrt{(c_1e^x-c_2)\,e^{2x}}}{2c_1e^x-2c_2}\right\}$$

2.1715 ODE No. 1715

$$y(x)y''(x)-ay'(x)^2=0$$

✓ **Mathematica** : cpu = 0.180024 (sec), leaf count = 26

$$\left\{\left\{y(x)\to c_2(-ax+x-c_1)^{\frac{1}{1-a}}\right\}\right\}$$

✓ **Maple** : cpu = 1.24 (sec), leaf count = 25

$$\left\{y(x)=\left(\frac{1}{(-a+1)\,(c_1x+c_2)}\right)^{\frac{1}{a-1}}\right\}$$

2.1716 ODE No. 1716

$$a(y'(x)^2+1)+y(x)y''(x)=0$$

✓ **Mathematica** : cpu = 0.716898 (sec), leaf count = 172

$$\left\{\left\{y(x)\to \text{InverseFunction}\left[-\frac{\#1\sqrt{1-e^{2c_1}\#1^{-2a}}\,{}_2F_1\left(\frac{1}{2},-\frac{1}{2a};1-\frac{1}{2a};e^{2c_1}\#1^{-2a}\right)}{\sqrt{-1+e^{2c_1}\#1^{-2a}}}\&\right][x+c_2]\right\},\left\{y(x)\to \text{Invers}\right.\right.$$

✓ **Maple** : cpu = 1.478 (sec), leaf count = 68

$$\left\{-c_2-x+\int^{y(x)}\frac{\_a^a}{\sqrt{c_1-\_a^{2a}}}d\_a=0,-c_2-x+\int^{y(x)}-\frac{\_a^a}{\sqrt{c_1-\_a^{2a}}}d\_a=0\right\}$$

2.1717 ODE No. 1717

$$ay'(x)^2+by(x)^3+y(x)y''(x)=0$$

✓ **Mathematica** : cpu = 58.0614 (sec), leaf count = 277

$$\left\{\text{Solve}\left[\frac{y(x)\sqrt{(2a+3)y(x)^{2a}}\sqrt{1-\frac{2by(x)^{2a+3}}{2ac_1+3c_1}}\,{}_2F_1\left(\frac{1}{2},\frac{a+1}{2a+3};\frac{a+1}{2a+3}+1;\frac{2by(x)^{2a+3}}{2ac_1+3c_1}\right)}{(a+1)\sqrt{-2by(x)^{2a+3}+2ac_1+3c_1}}=-x+c_2,y(x)\right],\text{Solve}\left[\frac{y(x)\sqrt{}}{}\right.\right.$$

✓ **Maple** : cpu = 1.49 (sec), leaf count = 107

$$\left\{-c_2-x+\int^{y(x)}\frac{(2a+3)\_a^{2a}}{\sqrt{-(2a+3)(2b\_a^{2a+3}-c_1)\_a^{2a}}}d\_a=0,-c_2-x+\int^{y(x)}\frac{(-2a-3)\_a^{2a}}{\sqrt{-(2a+3)(2b\_a^{2a+3}-c_1)\_}}\right.$$

2.1718 ODE No. 1718

$$dy(x)^{1-a}+ay'(x)^2+by(x)y'(x)+cy(x)^2+y(x)y''(x)=0$$

✓ **Mathematica** : cpu = 2.31064 (sec), leaf count = 744

$$\left\{\left\{y(x)\to\left(-\frac{ad\exp\left(\frac{1}{2}x\left(\sqrt{-4ac+b^2-4c}+b\right)-\frac{x\left(b\sqrt{-4ac+b^2-4c}-4(a+1)c+b^2\right)}{\sqrt{-4ac+b^2-4c}+b}-\frac{2(a+1)cx}{\sqrt{-4ac+b^2-4c}+b}\right)}{(a+1)c}-\frac{d\exp\left(\frac{1}{2}\right.}{}\right.\right.\right.$$

✓ **Maple** : cpu = 0.394 (sec), leaf count = 133

$$\left\{y(x)=\left(\frac{b^2c^2+(-4a-4)\,c^3}{\left(\sqrt{b^2+(-4a-4)\,c}\,d\,\mathrm{e}^{\frac{\left(b+\sqrt{b^2+(-4a-4)c}\right)x}{2}}+\left(c_1\mathrm{e}^{\sqrt{b^2+(-4a-4)c}\,x}-c_2\right)(a+1)\,c\right)^2}\right)^{-\frac{1}{2a+2}}\mathrm{e}^{-\frac{bx}{2a+2}}\mathrm{e}^{-\frac{\sqrt{b^2}}{}}\right.$$

2.1719 ODE No. 1719

$$ay'(x)^2+f(x)y(x)y'(x)+g(x)y(x)^2+y(x)y''(x)=0$$

✗ **Mathematica** : cpu = 42.7746 (sec), leaf count = 0 , could not solve

```
DSolve[g[x]*y[x]^2 + f[x]*y[x]*Derivative[1][y][x] + a*Derivative[1][y][x]^2 + y[x]*Derivati
```

✓ **Maple** : cpu = 0.628 (sec), leaf count = 70

$$\left\{y(x)=ODESolStruc\left(\mathrm{e}^{c_1+\int \_b(\_a)d\_a},\left[\left\{\frac{d}{d\_a}\_\mathrm{b}(\_a)=(-a-1)\_b(\_a)^2-\_b(\_a)\,f(\_a)-g(\_a)\right\},\left\{\_a=\right.\right.\right.\right.$$

2.1720 ODE No. 1720

$$ay'(x)^2+by(x)^2y'(x)+cy(x)^4+y(x)y''(x)=0$$

✓ **Mathematica** : cpu = 88.0957 (sec), leaf count = 105

$$\text{Solve}\left[\int_1^{y(x)}\frac{1}{K[2]^2\text{InverseFunction}\left[\frac{\log(c+\#1(b+(a+2)\#1))-\frac{2b\tan^{-1}\left(\frac{b+2(a+2)\#1}{\sqrt{4(a+2)c-b^2}}\right)}{\sqrt{4(a+2)c-b^2}}}{2(a+2)}\&\right][c_1-\log(K[2])]}dK[2]=x-c_2\right.$$

✓ **Maple** : cpu = 1.628 (sec), leaf count = 173

$$\left\{-c_2-x+\int^{y(x)}\frac{}{-\_a^2b+\sqrt{-\_a^4b^2+(4a+8)\_a^4c}\,\tan\left(\text{RootOf}\left(2\_Z\_a^2b-2\sqrt{4\_a^4ac-\_a^4b^2+8c\_a^4}\right.\right.}\right.$$

2.1721 ODE No. 1721

$$-\frac{ay(x)^3f'(x)}{a+2}+\frac{af(x)^2y(x)^4}{(a+2)^2}-\frac{(a-1)y'(x)^2}{a}-f(x)y(x)^2y'(x)+y(x)y''(x)=0$$

✓ **Mathematica** : cpu = 21.3503 (sec), leaf count = 41

$$\left\{\left\{y(x)\to -\frac{(a+2)(x+c_1)^a}{a\int_1^x f(K[3])(c_1+K[3])^a dK[3]+c_2}\right\}\right\}$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(diff(y(x),x),x)*y(x)-(a-1)/a*diff(y(x),x)^2-f(x)*y(x)^2*diff(y(x),x)+a/(a+2)^2*f
a/(a+2)*diff(f(x),x)*y(x)^3=0,y(x))
```

2.1722 ODE No. 1722

$$-2ay(x)\left(y'(x)^2+1\right)^{3/2}+y(x)y''(x)-y'(x)^2-1=0$$

✓ **Mathematica** : cpu = 2.34071 (sec), leaf count = 697

$$\left\{\left\{y(x)\to \text{InverseFunction}\left[-\frac{\sqrt{1-\frac{2\#1^2a^2}{-2ac_1+\sqrt{1-4ac_1}+1}}\sqrt{1+\frac{2\#1^2a^2}{2ac_1+\sqrt{1-4ac_1}-1}}\left(\left(-2ac_1+\sqrt{1-4ac_1}+1\right)E\left(i\sinh\right.\right.}{2\surd}\right.\right.\right.$$

✓ **Maple** : cpu = 2.931 (sec), leaf count = 98

$$\left\{-c_2-x+\int^{y(x)}\frac{\_a^2a+c_1}{\sqrt{-\_a^4a^2-2c_1\_a^2a+\_a^2-c_1^2}}d\_a=0,-c_2-x+\int^{y(x)}-\frac{\_a^2a+c_1}{\sqrt{-\_a^4a^2-2c_1\_a^2a+\_a^2-}}\right.$$

2.1723 ODE No. 1723

$$(y(x)+x)y''(x)+y'(x)^2-y'(x)=0$$

✓ **Mathematica** : cpu = 0.851372 (sec), leaf count = 130

$$\left\{\left\{y(x)\to\frac{1}{2}\left(2x-\sqrt{2}e^{-2c_1}\sqrt{4e^{3c_1}x+e^{2c_1}+4e^{3c_1}c_2}+e^{-c_1}+4c_2\right)\right\},\left\{y(x)\to\frac{1}{2}\left(2x+\sqrt{2}e^{-2c_1}\sqrt{4e^{3c_1}x+e^{2c_1}\right.\right.\right.$$

✓ **Maple** : cpu = 1.301 (sec), leaf count = 16

$$\left\{y(x)=c_1+c_2\sqrt{c_1+2x}+x\right\}$$

2.1724 ODE No. 1724

$$(x - y(x))y''(x) + 2y'(x)\left(y'(x) + 1\right) = 0$$

✓ **Mathematica** : cpu = 0.500577 (sec), leaf count = 38

$$\left\{\left\{y(x) \to -\frac{e^{-c_1}\left(e^{c_1}c_2x + 1 + e^{c_1}c_2{}^2\right)}{x + c_2}\right\}\right\}$$

✓ **Maple** : cpu = 2.094 (sec), leaf count = 21

$$\left\{y(x) = \frac{-c_2x + c_2^2 + c_1}{c_2 - x}\right\}$$

2.1725 ODE No. 1725

$$(x - y(x))y''(x) + \left(-y'(x) - 1\right)\left(y'(x)^2 + 1\right) = 0$$

✓ **Mathematica** : cpu = 2.2049 (sec), leaf count = 75

$$\left\{\left\{y(x) \to -\sqrt{-x^2 - 2c_2x + e^{2c_1} - c_2{}^2} - c_2\right\}, \left\{y(x) \to \sqrt{-x^2 - 2c_2x + e^{2c_1} - c_2{}^2} - c_2\right\}\right\}$$

✓ **Maple** : cpu = 1.856 (sec), leaf count = 105

$$\left\{y(x) = x + \mathrm{RootOf}\left(c_2 - x + \int^{\_Z} \frac{c_1^2\_f^2 - 1}{-c_1^2\_f^2 + c_1\sqrt{-c_1^2\_f^2 + 2\_f + 2}}d\_f\right), y(x) = x + \mathrm{RootOf}\left(c_2 - x + \int^{-}\right.\right.$$

2.1726 ODE No. 1726

$$(x - y(x))y''(x) - h\left(y'(x)\right) = 0$$

✓ **Mathematica** : cpu = 0.376224 (sec), leaf count = 82

$$\mathrm{Solve}\left[\left\{x = \int \frac{\exp\left(-\int_1^{K[4]} \frac{K[3]-1}{h(K[3])}dK[3] - c_1\right)}{h(K[4])}dK[4] + c_2, y(x) = x - \exp\left(-\int_1^{K[4]} \frac{K[3]-1}{h(K[3])}dK[3] - c_1\right)\right\}, \{\right.$$

✓ **Maple** : cpu = 0.232 (sec), leaf count = 39

$$\left\{y(x) = x + \mathrm{RootOf}\left(c_2 - x + \int^{\_Z} \frac{1}{\mathrm{RootOf}\left(c_1 + \int^{\_Z} \frac{\_a-1}{h(\_a)}d\_a + \ln\left(-\_g\right)\right) - 1}d\_g\right)\right\}$$

2.1727 ODE No. 1727

$$2y(x)y''(x) + y'(x)^2 + 1 = 0$$

✓ **Mathematica** : cpu = 0.449197 (sec), leaf count = 166

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[-\frac{\sqrt{\#1}\left(\#1 - e^{2c_1}\right) + e^{3c_1}\sqrt{1 - \#1e^{-2c_1}}\sin^{-1}\left(\sqrt{\#1}e^{-c_1}\right)}{\sqrt{-\#1 + e^{2c_1}}}\&\right][x + c_2]\right\}, \left\{y(x) \to \text{I}\right.\right.$$

✓ **Maple** : cpu = 1.708 (sec), leaf count = 823

$$\left\{y(x) = \frac{c_1}{2} + \frac{\left(-c_1 \text{RootOf}\left(c_1^2\_Z^2\left(\tan^2\left(\_Z\right)\right) - 4c_1c_2\_Z\left(\tan^2\left(\_Z\right)\right) - 4c_1\_Zx\left(\tan^2\left(\_Z\right)\right) + c_1^2\_Z^2 + 4c_2^2(\tan\right.\right.}{}\right.$$

2.1728 ODE No. 1728

$$a + 2y(x)y''(x) - y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.0053534 (sec), leaf count = 31

$$\left\{\left\{y(x) \to \frac{x^2\left(-a + c_1{}^2\right)}{4c_2} + c_1x + c_2\right\}\right\}$$

✓ **Maple** : cpu = 1.189 (sec), leaf count = 24

$$\left\{y(x) = c_1x + c_2 + \frac{\left(c_1^2 - a\right)x^2}{4c_2}\right\}$$

2.1729 ODE No. 1729

$$a + f(x)y(x)^2 + 2y(x)y''(x) - y'(x)^2 = 0$$

✗ **Mathematica** : cpu = 0.0225485 (sec), leaf count = 0 , could not solve

```
DSolve[a + f[x]*y[x]^2 - Derivative[1][y][x]^2 + 2*y[x]*Derivative[2][y][x] == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(2*diff(diff(y(x),x),x)*y(x)-diff(y(x),x)^2+f(x)*y(x)^2+a=0,y(x))
```

2.1730 ODE No. 1730

$$2y(x)y''(x) - y'(x)^2 - 8y(x)^3 = 0$$

✓ **Mathematica** : cpu = 0.9652 (sec), leaf count = 135

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[-\frac{2\sqrt{\#1}\sqrt{1+\frac{4\#1^2}{c_1}}\,{}_2F_1\left(\frac{1}{4},\frac{1}{2};\frac{5}{4};-\frac{4\#1^2}{c_1}\right)}{\sqrt{4\#1^2+c_1}}\&\right][x+c_2]\right\},\left\{y(x) \to \text{InverseFunction}\left[\right.\right.$$

✓ **Maple** : cpu = 1.29 (sec), leaf count = 53

$$\left\{-c_2 - x + \int^{y(x)} \frac{1}{\sqrt{4\_a^3 + c_1\_a}}d\_a = 0, -c_2 - x + \int^{y(x)} -\frac{1}{\sqrt{4\_a^3 + c_1\_a}}d\_a = 0\right\}$$

2.1731 ODE No. 1731

$$2y(x)y''(x) - y'(x)^2 - 8y(x)^3 - 4y(x)^2 = 0$$

✓ **Mathematica** : cpu = 1.30115 (sec), leaf count = 351

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[-\frac{i\#1\sqrt{4+\frac{2c_1}{\#1-\#1\sqrt{1-c_1}}}\sqrt{2+\frac{c_1}{\#1+\#1\sqrt{1-c_1}}}F\left(i\sinh^{-1}\left(\frac{\sqrt{\frac{c_1}{2\sqrt{1-c_1}+2}}}{\sqrt{\#1}}\right)|\frac{\sqrt{1-c_1}+1}{1-\sqrt{1-c_1}}\right)}{\sqrt{\frac{c_1}{1+\sqrt{1-c_1}}}\sqrt{4\#1^2+4\#1+c_1}}\&\right.\right.\right.$$

✓ **Maple** : cpu = 1.265 (sec), leaf count = 61

$$\left\{-c_2 - x + \int^{y(x)} \frac{1}{\sqrt{4\_a^3 + 4\_a^2 + c_1\_a}}d\_a = 0, -c_2 - x + \int^{y(x)} -\frac{1}{\sqrt{(4\_a^2 + 4\_a + c_1)\_a}}d\_a = 0\right\}$$

2.1732 ODE No. 1732

$$2y(x)y''(x) - y'(x)^2 - 4(2y(x) + x)y(x)^2 = 0$$

✗ **Mathematica** : cpu = 1.09004 (sec), leaf count = 0 , could not solve

```
DSolve[-4*y[x]^2*(x + 2*y[x]) - Derivative[1][y][x]^2 + 2*y[x]*Derivative[2][y][x] == 0, y[x
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(2*diff(diff(y(x),x),x)*y(x)-diff(y(x),x)^2-4*(x+2*y(x))*y(x)^2=0,y(x))
```

2.1733 ODE No. 1733

$$y(x)^2(ay(x)+b)+2y(x)y''(x)-y'(x)^2=0$$

✓ **Mathematica** : cpu = 2.27502 (sec), leaf count = 437

$$\left\{\left\{y(x)\to \text{InverseFunction}\left[-\frac{i\sqrt{2}\#1^{3/2}\sqrt{2+\frac{4c_1}{\#1\left(-b+\sqrt{b^2+2ac_1}\right)}}\sqrt{1-\frac{2c_1}{\#1\left(b+\sqrt{b^2+2ac_1}\right)}}F\left(i\sinh^{-1}\left(\frac{\sqrt{2}\sqrt{\frac{c_1}{\sqrt{b^2+2ac}}}}{\sqrt{\#1}}\right.\right.}{\sqrt{\frac{c_1}{-b+\sqrt{b^2+2ac_1}}}\sqrt{-\#1\left(\#1^2a+2\#1b-2c_1\right)}}\right.\right.\right.$$

✓ **Maple** : cpu = 1.249 (sec), leaf count = 71

$$\left\{-c_2-x+\int^{y(x)}-\frac{2}{\sqrt{-2\_a^3a-4\_a^2b+4c_1\_a}}d\_a=0,-c_2-x+\int^{y(x)}\frac{2}{\sqrt{-2\_a^3a-4\_a^2b+4c_1\_a}}d\_a=0\right.$$

2.1734 ODE No. 1734

$$ay(x)^3+2y(x)y''(x)-y'(x)^2+2xy(x)^2+1=0$$

✗ **Mathematica** : cpu = 1.39787 (sec), leaf count = 0 , could not solve

```
DSolve[1 + 2*x*y[x]^2 + a*y[x]^3 - Derivative[1][y][x]^2 + 2*y[x]*Derivative[2][y][x] == 0,
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(2*diff(diff(y(x),x),x)*y(x)-diff(y(x),x)^2+1+2*x*y(x)^2+a*y(x)^3=0,y(x))
```

2.1735 ODE No. 1735

$$y(x)^2(ay(x)+bx)+2y(x)y''(x)-y'(x)^2=0$$

✗ **Mathematica** : cpu = 0.866066 (sec), leaf count = 0 , could not solve

```
DSolve[y[x]^2*(b*x + a*y[x]) - Derivative[1][y][x]^2 + 2*y[x]*Derivative[2][y][x] == 0, y[x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(2*diff(diff(y(x),x),x)*y(x)-diff(y(x),x)^2+(a*y(x)+b*x)*y(x)^2=0,y(x))
```

2.1736 ODE No. 1736

$$2y(x)y''(x) - y'(x)^2 - 3y(x)^4 = 0$$

✓ **Mathematica** : cpu = 8.55933 (sec), leaf count = 129

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[-\frac{2\sqrt{\#1}\sqrt{1+\frac{\#1^3}{c_1}}\,{}_2F_1\left(\frac{1}{6},\frac{1}{2};\frac{7}{6};-\frac{\#1^3}{c_1}\right)}{\sqrt{\#1^3+c_1}}\&\right][x+c_2]\right\},\left\{y(x) \to \text{InverseFunction}\left[\begin{matrix}2\\-\end{matrix}\right.\right.$$

✓ **Maple** : cpu = 1.409 (sec), leaf count = 49

$$\left\{-c_2 - x + \int^{y(x)} \frac{1}{\sqrt{\_a^4 + c_1\_a}} d\_a = 0, -c_2 - x + \int^{y(x)} -\frac{1}{\sqrt{\_a^4 + c_1\_a}} d\_a = 0\right\}$$

2.1737 ODE No. 1737

$$-4\left(a + x^2\right)y(x)^2 + b + 2y(x)y''(x) - y'(x)^2 - 3y(x)^4 - 8xy(x)^3 = 0$$

✗ **Mathematica** : cpu = 20.8404 (sec), leaf count = 0 , could not solve

```
DSolve[b - 4*(a + x^2)*y[x]^2 - 8*x*y[x]^3 - 3*y[x]^4 - Derivative[1][y][x]^2 + 2*y[x]*Deriv
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(2*diff(diff(y(x),x),x)*y(x)-diff(y(x),x)^2+b-4*(x^2+a)*y(x)^2-8*x*y(x)^3-
3*y(x)^4=0,y(x))
```

2.1738 ODE No. 1738

$$2y(x)^2\left(f'(x) + f(x)^2\right) + 3f(x)y(x)y'(x) + 2y(x)y''(x) - y'(x)^2 - 8y(x)^3 = 0$$

✗ **Mathematica** : cpu = 0.537722 (sec), leaf count = 0 , could not solve

```
DSolve[-8*y[x]^3 + 2*y[x]^2*(f[x]^2 + Derivative[1][f][x]) + 3*f[x]*y[x]*Derivative[1][y][x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(2*diff(diff(y(x),x),x)*y(x)-diff(y(x),x)^2+3*f(x)*y(x)*diff(y(x),x)+2*(f(x)^2+diff(f(
8*y(x)^3=0,y(x))
```

2.1739 ODE No. 1739

$$f(x)y(x)^2 + 2y(x)y''(x) + 4y(x)^2y'(x) - y'(x)^2 + y(x)^4 + 1 = 0$$

✗ **Mathematica** : cpu = 0.0566015 (sec), leaf count = 0 , could not solve

```
DSolve[1 + f[x]*y[x]^2 + y[x]^4 + 4*y[x]^2*Derivative[1][y][x] - Derivative[1][y][x]^2 + 2*y
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(2*diff(diff(y(x),x),x)*y(x)-diff(y(x),x)^2+4*y(x)^2*diff(y(x),x)+1+f(x)*y(x)^2+y(x)^4
```

2.1740 ODE No. 1740

$$2y(x)y''(x) - 3y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.118795 (sec), leaf count = 16

$$\left\{\left\{y(x)\to \frac{c_2}{(x+2c_1)^2}\right\}\right\}$$

✓ **Maple** : cpu = 1.301 (sec), leaf count = 13

$$\left\{y(x) = \frac{4}{(c_1x+c_2)^2}\right\}$$

2.1741 ODE No. 1741

$$2y(x)y''(x) - 3y'(x)^2 - 4y(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.140424 (sec), leaf count = 17

$$\{\{y(x)\to c_2\sec^2(x+2c_1)\}\}$$

✓ **Maple** : cpu = 1.244 (sec), leaf count = 34

$$\left\{y(x) = \frac{4}{-2c_1c_2\cos(x)\sin(x) + c_2^2 + (c_1^2 - c_2^2)(\sin^2(x))}\right\}$$

2.1742 ODE No. 1742

$$f(x)y(x)^2 + 2y(x)y''(x) - 3y'(x)^2 = 0$$

✗ **Mathematica** : cpu = 8.30154 (sec), leaf count = 0 , could not solve

```
DSolve[f[x]*y[x]^2 - 3*Derivative[1][y][x]^2 + 2*y[x]*Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 0.256 (sec), leaf count = 60

$$\left\{y(x) = ODESolStruc\left(e^{c_1+\int \_b(\_a)d\_a}, \left[\left\{\frac{d}{d\_a}\_b(\_a) = \frac{\_b(\_a)^2}{2} - \frac{f(\_a)}{2}\right\}, \left\{\_a = x, \_b(\_a) = \frac{\frac{d}{dx}y(x)}{y(x)}\right\},\right.\right.$$

2.1743 ODE No. 1743

$$y(x)^2 \left(ay(x)^3 + 1\right) + 2y(x)y''(x) - 6y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 23.3535 (sec), leaf count = 2761

$$\left\{\text{Solve}\left[-\frac{4\left(F\left(\sin^{-1}\left(\sqrt{\frac{(\text{Root}[4c_1\#1^4+4a\#1^3+1\&,2]-\text{Root}[4c_1\#1^4+4a\#1^3+1\&,4])(y(x)-\text{Root}[4c_1\#1^4+4a\#1^3+1\&,1])}{(\text{Root}[4c_1\#1^4+4a\#1^3+1\&,1]-\text{Root}[4c_1\#1^4+4a\#1^3+1\&,4])(y(x)-\text{Root}[4c_1\#1^4+4a\#1^3+1\&,2])}}\right)\right|-\right.\right.\right.}{}\right.\right.$$

✓ **Maple** : cpu = 1.312 (sec), leaf count = 71

$$\left\{-c_2 - x + \int^{y(x)} -\frac{2}{\sqrt{4c_1\_a^4 + 4\_a^3a + 1}\_a}d\_a = 0, -c_2 - x + \int^{y(x)} \frac{2}{\sqrt{4c_1\_a^4 + 4\_a^3a + 1}\_a}d\_a = 0\right\}$$

2.1744 ODE No. 1744

$$2y(x)y''(x) - y'(x)^2 \left(y'(x)^2 + 1\right) = 0$$

✓ **Mathematica** : cpu = 0.717294 (sec), leaf count = 155

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[-ie^{-c_1}\sqrt{-1+\#1e^{2c_1}}\left(\sqrt{\#1} + \frac{e^{-c_1}\sin^{-1}\left(\sqrt{\#1}e^{c_1}\right)}{\sqrt{1-\#1e^{2c_1}}}\right)\&\right][x+c_2]\right\}, \left\{y(x) \to \text{Inve}\right.\right.$$

✓ **Maple** : cpu = 1.608 (sec), leaf count = 823

$$\left\{y(x) = \frac{c_1}{2} + \frac{\left(-c_1 \text{RootOf}\left(c_1^2\_Z^2(\tan^2(\_Z)) - 4c_1c_2\_Z(\tan^2(\_Z)) - 4c_1\_Zx(\tan^2(\_Z)) + c_1^2\_Z^2 + 4c_2^2(\tan\right.\right.}{}\right.$$

2.1745 ODE No. 1745

$$2(y(x)-a)y''(x)+y'(x)^2+1=0$$

✓ **Mathematica** : cpu = 0.779245 (sec), leaf count = 251

$$\left\{\left\{y(x)\to \text{InverseFunction}\left[-\frac{2\sqrt{a-\#1}\left(2\#1-2a+e^{2c_1}\right)-\sqrt{2}e^{3c_1}\sqrt{e^{-2c_1}\left(2\#1-2a+e^{2c_1}\right)}\sin^{-1}\left(\sqrt{2}e^{-c_1}\sqrt{\right.}\right.}{2\sqrt{2}\sqrt{2\#1-2a+e^{2c_1}}}\right.\right.\right.$$

✓ **Maple** : cpu = 1.778 (sec), leaf count = 117

$$\left\{-\frac{c_1\arctan\left(\frac{-\frac{c_1}{2}-a+y(x)}{\sqrt{-(a-y(x))(c_1+a-y(x))}}\right)}{2}-c_2-x+\sqrt{-\left(a-y\left(x\right)\right)\left(c_1+a-y\left(x\right)\right)}=0,\frac{c_1\arctan\left(\frac{-\frac{c_1}{2}-a+y(x)}{\sqrt{-(a-y(x))(c_1+a}}\right.}{2}\right.$$

2.1746 ODE No. 1746

$$-ax^2-bx-c+3y(x)y''(x)-2y'(x)^2=0$$

✓ **Mathematica** : cpu = 0.139219 (sec), leaf count = 118

$$\text{Solve}\left[\int\frac{y(x)^{2/3}}{(ax^2+bx+c)\sqrt{-\frac{2(ax^2+bx+c)^3}{y(x)^2}+\frac{c_1(ax^2+bx+c)}{y(x)^{2/3}}+9\left(b^2-4ac\right)}}d\frac{ax^2+bx+c}{y(x)^{2/3}}=-\int\frac{1}{3\left(ax^2+bx+c\right)}dx\right.$$

✓ **Maple** : cpu = 1.656 (sec), leaf count = 207

$$\left\{y(x)=\left(a\,x^2+bx+c\right)^{\frac{3}{2}}\text{RootOf}\left(-2b\arctan\left(\frac{2ax+b}{\sqrt{4ac-b^2}}\right)+c_2\sqrt{4ac-b^2}-2\sqrt{4ac-b^2}\left(\int^{\_Z}\frac{}{\sqrt{4c_1\_f^{\frac{4}{3}}b^2}}\right.\right.\right.$$

2.1747 ODE No. 1747

$$3y(x)y''(x)-5y'(x)^2=0$$

✓ **Mathematica** : cpu = 0.118964 (sec), leaf count = 20

$$\left\{\left\{y(x)\to\frac{c_2}{(2x+3c_1)^{3/2}}\right\}\right\}$$

✓ **Maple** : cpu = 1.225 (sec), leaf count = 17

$$\left\{-c_1x-c_2-\frac{3}{2y\left(x\right)^{\frac{2}{3}}}=0\right\}$$

2.1748 ODE No. 1748

$$4y(x)y''(x) - 3y'(x)^2 + 4y(x) = 0$$

✓ **Mathematica** : cpu = 0.255972 (sec), leaf count = 43

$$\left\{\left\{y(x) \to \frac{\left(c_1{}^2x^2 + 2c_2c_1{}^2x - 64 + c_2{}^2c_1{}^2\right)^2}{256c_1{}^2}\right\}\right\}$$

✓ **Maple** : cpu = 1.247 (sec), leaf count = 67

$$\left\{-c_2 - x - \frac{4\sqrt{c_1 y(x)^{\frac{3}{2}} + 4y(x)}}{c_1\sqrt{y(x)}} = 0, -c_2 - x + \frac{4\sqrt{c_1 y(x)^{\frac{3}{2}} + 4y(x)}}{c_1\sqrt{y(x)}} = 0, y(x) = 0\right\}$$

2.1749 ODE No. 1749

$$4y(x)y''(x) - 3y'(x)^2 - 12y(x)^3 = 0$$

✓ **Mathematica** : cpu = 0.525416 (sec), leaf count = 153

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[-\frac{4\#1\sqrt{1+\frac{4\#1^{3/2}}{c_1}}\,{}_2F_1\left(\frac{1}{6},\frac{1}{2};\frac{7}{6};-\frac{4\#1^{3/2}}{c_1}\right)}{\sqrt{\#1^{3/2}\left(4\#1^{3/2}+c_1\right)}}\&\right][x+c_2]\right\}, \left\{y(x) \to \text{InverseFunction}\right.\right.$$

✓ **Maple** : cpu = 2.003 (sec), leaf count = 57

$$\left\{-c_2 - x + \int^{y(x)} \frac{1}{\sqrt{4\_a^3 + c_1\_a^{\frac{3}{2}}}} d\_a = 0, -c_2 - x + \int^{y(x)} -\frac{1}{\sqrt{4\_a^3 + c_1\_a^{\frac{3}{2}}}} d\_a = 0\right\}$$

2.1750 ODE No. 1750

$$ay(x)^3 + by(x)^2 + cy(x) + 4y(x)y''(x) - 3y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 4.56096 (sec), leaf count = 2281

$$\left\{\text{Solve}\left[-\frac{4F\left(\sin^{-1}\left(\sqrt{\frac{\left(\text{Root}\left[a\#1^4+3b\#1^2-3c_1\#1-3c\&,2\right]-\text{Root}\left[a\#1^4+3b\#1^2-3c_1\#1-3c\&,4\right]\right)\left(\sqrt{y(x)}-\text{Root}\left[a\#1^4+3b\#1^2-3c_1\right.\right.}{\left(\text{Root}\left[a\#1^4+3b\#1^2-3c_1\#1-3c\&,1\right]-\text{Root}\left[a\#1^4+3b\#1^2-3c_1\#1-3c\&,4\right]\right)\left(\sqrt{y(x)}-\text{Root}\left[a\#1^4+3b\#1^2-3c_1\right.\right.}}\right.\right.}{}\right.\right.$$

✓ **Maple** : cpu = 1.772 (sec), leaf count = 87

$$\left\{-c_2 - x + \int^{y(x)} -\frac{3}{\sqrt{-3\_a^3a - 9\_a^2b + 9c_1\_a^{\frac{3}{2}} + 9\_ac}}d\_a = 0, -c_2 - x + \int^{y(x)} \frac{3}{\sqrt{-3\_a^3a - 9\_a^2b + 9c_1\_}}\right.$$

2.1751 ODE No. 1751

$$y'(x)\left(6y(x)^2 - \frac{2y(x)f'(x)}{f(x)}\right) + f(x)y(x) + g(x)y(x)^2 + 4y(x)y''(x) - 2y(x)^2y'(x) - 3y'(x)^2 + y(x)^4 = 0$$

✗ **Mathematica** : cpu = 10.1296 (sec), leaf count = 0 , could not solve

```
DSolve[f[x]*y[x] + g[x]*y[x]^2 + y[x]^4 - 2*y[x]^2*Derivative[1][y][x] + (6*y[x]^2 - (2*y[x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(4*diff(diff(y(x),x),x)*y(x)-3*diff(y(x),x)^2+(6*y(x)^2-2*diff(f(x),x)*y(x)/f(x))*diff
2*y(x)^2*diff(y(x),x)+g(x)*y(x)^2+f(x)*y(x)=0,y(x))
```

2.1752 ODE No. 1752

$$ay(x)^2 + 4y(x)y''(x) - 5y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.191535 (sec), leaf count = 26

$$\left\{\left\{y(x) \to c_2\operatorname{sech}^4\left(\frac{1}{4}\sqrt{a}(x - 4c_1)\right)\right\}\right\}$$

✓ **Maple** : cpu = 1.435 (sec), leaf count = 33

$$\left\{y(x) = \frac{16a^2\mathrm{e}^{\sqrt{a}\,x}}{\left(c_1\mathrm{e}^{\frac{\sqrt{a}\,x}{2}} - c_2\right)^4}\right\}$$

2.1753 ODE No. 1753

$$12y(x)y''(x) - 15y'(x)^2 + 8y(x)^3 = 0$$

✓ **Mathematica** : cpu = 0.560417 (sec), leaf count = 43

$$\left\{\left\{y(x) \to \frac{2304{c_1}^2}{\left(3{c_1}^2x^2 + 6c_2{c_1}^2x + 128 + 3{c_2}^2{c_1}^2\right)^2}\right\}\right\}$$

✓ **Maple** : cpu = 1.294 (sec), leaf count = 147

$$\left\{-c_2 - x - \frac{12\left(-c_1 + 8\sqrt{y(x)}\right)\sqrt{-c_1\sqrt{y(x)} + 8y(x)}\,y(x)}{\sqrt{3c_1 y(x)^{\frac{5}{2}} - 24y(x)^3}\sqrt{\left(-c_1 + 8\sqrt{y(x)}\right)\sqrt{y(x)}\,c_1}} = 0, -c_2 - x + \frac{12\left(-c_1 + 8\sqrt{y(x)}\right)\sqrt{-c_1}}{\sqrt{3c_1 y(x)^{\frac{5}{2}} - 24y(x)^3}\sqrt{\left(-c\right.}}\right.$$

2.1754 ODE No. 1754

$$ny(x)y''(x) + (1-n)y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.151869 (sec), leaf count = 17

$$\{\{y(x) \to c_2(x - c_1 n)^n\}\}$$

✓ **Maple** : cpu = 1.221 (sec), leaf count = 15

$$\left\{y(x) = \left(\frac{c_1 x + c_2}{n}\right)^n\right\}$$

2.1755 ODE No. 1755

$$ay(x)y''(x) + by'(x)^2 + \mathrm{c0} + \mathrm{c1}y(x) + \mathrm{c2}y(x)^2 + \mathrm{c3}y(x)^3 + \mathrm{c4}y(x)^4 = 0$$

✓ **Mathematica** : cpu = 6.0897 (sec), leaf count = 716

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[\int_1^{\#1} -\frac{}{\sqrt{4b^5 c_1 K[1]^{-\frac{2b}{a}} + 20ab^4 c_1 K[1]^{-\frac{2b}{a}} + 35a^2b^3 c_1 K[1]^{-\frac{2b}{a}} + 25a^3b^2 c_1 K[1]^{-\frac{2b}{a}} +}}\right.\right.\right.$$

✓ **Maple** : cpu = 1.46 (sec), leaf count = 418

$$\left\{-c_2 - x + \int^{y(x)} \frac{(3a+2b)}{\sqrt{-36\left(a+\frac{b}{2}\right)(a+b)\left(a+\frac{2b}{3}\right)\left(\frac{2\left(a+\frac{b}{2}\right)(a+b)(a+2b)bc3\_a^{\frac{3a+2b}{a}}}{3} + \left(a+\frac{2b}{3}\right)\left(\left(a+\frac{b}{2}\right)(a+2b)bc\right.\right.}}\right.$$

2.1756 ODE No. 1756

$$ay(x)y''(x) + by'(x)^2 - \frac{y(x)y'(x)}{\sqrt{c^2 + x^2}} = 0$$

✓ **Mathematica** : cpu = 0.717703 (sec), leaf count = 211

$$\left\{\left\{y(x) \to c_2 \exp\left(\int_1^x -\frac{\left(\frac{K[2]}{\sqrt{c^2+K[2]^2}} + 1\right)^{\frac{1}{2}/a}}{\left(1 - \frac{K[2]}{\sqrt{c^2+K[2]^2}}\right)^{\frac{1}{2}/a} \int_1^{K[2]} \frac{\exp\left(\frac{\frac{1}{2}\log\left(\frac{K[1]}{\sqrt{c^2+K[1]^2}}+1\right) - \frac{1}{2}\log\left(1-\frac{K[1]}{\sqrt{c^2+K[1]^2}}\right)}{a}\right)\left(-\sqrt{c^2+K[1]^2}a - b\sqrt{c^2\right.}{a\sqrt{c^2+K[1]^2}}}\right.\right.\right.$$

✓ **Maple** : cpu = 2.506 (sec), leaf count = 75

$$\left\{y(x) = \left(\frac{a}{(a+b)\left(\frac{c_1 a 2^{\frac{1}{a}} x^{\frac{1}{a}+1} \operatorname{hypergeom}\left([-\frac{1}{2a}, -\frac{1}{2a} - \frac{1}{2}], [-\frac{1}{a}+1], -\frac{c^2}{x^2}\right)}{a+1} + c_2\right)}\right)^{-\frac{a}{a+b}}\right\}$$

2.1757 ODE No. 1757

$$(a+2)f(x)y(x)^2y'(x) + ay(x)y''(x) + ay(x)^3y'(x) - (a-1)y'(x)^2 + f(x)^2y(x)^4 = 0$$

✗ **Mathematica** : cpu = 10.3835 (sec), leaf count = 0 , could not solve

```
DSolve[f[x]^2*y[x]^4 + (2 + a)*f[x]*y[x]^2*Derivative[1][y][x] + a*y[x]^3*Derivative[1][y][x
1 + a)*Derivative[1][y][x]^2 + a*y[x]*Derivative[2][y][x] == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(a*y(x)*diff(diff(y(x),x),x)-(a-1)*diff(y(x),x)^2+(a+2)*f(x)*y(x)^2*diff(y(x),x)+f(x)^
```

2.1758 ODE No. 1758

$$y''(x)(ay(x)+b)+cy'(x)^2=0$$

✓ **Mathematica** : cpu = 0.376399 (sec), leaf count = 36

$$\left\{\left\{y(x)\to\frac{-b+(-(c_1(a+c)(-x-c_2)))^{\frac{a}{a+c}}}{a}\right\}\right\}$$

✓ **Maple** : cpu = 1.394 (sec), leaf count = 42

$$\left\{y(x)=\frac{-b+(c_1x+c_2)(a+c)\left(\frac{1}{(a+c)(c_1x+c_2)}\right)^{\frac{c}{a+c}}}{a}\right\}$$

2.1759 ODE No. 1759

$$xy(x)y''(x)+xy'(x)^2-y(x)y'(x)=0$$

✓ **Mathematica** : cpu = 0.161166 (sec), leaf count = 18

$$\left\{\left\{y(x)\to c_2\sqrt{x^2+c_1}\right\}\right\}$$

✓ **Maple** : cpu = 1.181 (sec), leaf count = 31

$$\left\{y(x)=\sqrt{c_1x^2+2c_2},y(x)=-\sqrt{c_1x^2+2c_2}\right\}$$

2.1760 ODE No. 1760

$$ay(x)y'(x)+f(x)+xy(x)y''(x)+xy'(x)^2=0$$

✓ **Mathematica** : cpu = 0.0930389 (sec), leaf count = 108

$$\left\{\left\{y(x)\to-\sqrt{2}\sqrt{\int_1^x -K[2]^{-a}\left(c_1+\int_1^{K[2]} f(K[1])K[1]^{a-1}dK[1]\right)dK[2]+c_2}\right\},\left\{y(x)\to\sqrt{2}\sqrt{\int_1^x -K[2]^{-a}\right.\right.$$

✓ **Maple** : cpu = 0.115 (sec), leaf count = 114

$$\left\{y(x)=\frac{\sqrt{2}\sqrt{(a-1)\left(c_1x^{-a+1}+x^{-a+1}\left(\int\frac{x^af(x)}{x}dx\right)-c_2-\left(\int f(x)\,dx\right)\right)}}{a-1},y(x)=-\frac{\sqrt{2}\sqrt{(a-1)\left(c_1x^{-a+1}+\right.}}{}\right.$$

2.1761 ODE No. 1761

$$x\left(ay(x)^4+d\right)+y(x)\left(by(x)^2+c\right)+xy(x)y''(x)-xy'(x)^2+y(x)y'(x)=0$$

✗ **Mathematica** : cpu = 1.3561 (sec), leaf count = 0 , could not solve

```
DSolve[y[x]*(c + b*y[x]^2) + x*(d + a*y[x]^4) + y[x]*Derivative[1][y][x] - x*Derivative[1][y
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(x*y(x)*diff(diff(y(x),x),x)-x*diff(y(x),x)^2+y(x)*diff(y(x),x)+x*(d+a*y(x)^4)+y(x)*(c
```

2.1762 ODE No. 1762

$$ay(x)y'(x)+bxy(x)^3+xy(x)y''(x)-xy'(x)^2=0$$

✗ **Mathematica** : cpu = 50.1901 (sec), leaf count = 0 , could not solve

```
DSolve[b*x*y[x]^3 + a*y[x]*Derivative[1][y][x] - x*Derivative[1][y][x]^2 + x*y[x]*Derivative
```

✓ **Maple** : cpu = 2.309 (sec), leaf count = 108

$$\left\{y(x)=ODESolStruc\left(\_a\,\mathrm{e}^{-2c_1+\int-2\_b(\_a)d\_a},\left[\left\{\frac{d}{d\_a}\_\mathrm{b}(\_a)=-\frac{2\left(\left(-\frac{\_ab}{2}+a-1\right)\_a^2\_b(\_a)^2-\frac{(a-1)\_a}{2}\right.}{\_a}\right.\right.\right.$$

2.1763 ODE No. 1763

$$ay(x)y'(x)+xy(x)y''(x)+2xy'(x)^2=0$$

✓ **Mathematica** : cpu = 0.254972 (sec), leaf count = 40

$$\left\{\left\{y(x)\to c_2\left(3x^{1-a}-(a-1)c_1\right)^{-\frac{a-1}{3(1-a)}}\right\}\right\}$$

✓ **Maple** : cpu = 1.236 (sec), leaf count = 148

$$\left\{y(x)=\frac{3^{\frac{1}{3}}\left((a-1)^2\left(-c_1x+c_2(a-1)\,x^a\right)x^{2a}\right)^{\frac{1}{3}}x^{-a}}{a-1},y(x)=-\frac{3^{\frac{1}{3}}\left((a-1)^2\left(-c_1x+c_2(a-1)\,x^a\right)x^{2a}\right)^{\frac{1}{3}}\left(1+i\right.}{2\left(a-1\right)}\right.$$

2.1764 ODE No. 1764

$$xy(x)y''(x) - 2xy'(x)^2 + (y(x)+1)y'(x) = 0$$

✓ **Mathematica** : cpu = 0.0707471 (sec), leaf count = 52

$$\left\{\left\{y(x)\to \frac{\tan\left(\frac{1}{2}\left(\sqrt{2}\sqrt{c_1}\log(x)-\sqrt{2}\sqrt{c_1}c_2\right)\right)}{\sqrt{2}\sqrt{c_1}}\right\}\right\}$$

✓ **Maple** : cpu = 1.406 (sec), leaf count = 18

$$\left\{y(x) = c_1 \tanh\left(\frac{-c_2+\ln(x)}{2c_1}\right)\right\}$$

2.1765 ODE No. 1765

$$ay(x)y'(x) + xy(x)y''(x) - 2xy'(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.273819 (sec), leaf count = 34

$$\left\{\left\{y(x)\to c_2\left(x^{1-a}+(a-1)c_1\right)^{\frac{a-1}{1-a}}\right\}\right\}$$

✓ **Maple** : cpu = 1.218 (sec), leaf count = 27

$$\left\{y(x) = -\frac{(a-1)\,x^a}{-c_1x+c_2\,(a-1)\,x^a}\right\}$$

2.1766 ODE No. 1766

$$xy(x)y''(x) - 4xy'(x)^2 + 4y(x)y'(x) = 0$$

✓ **Mathematica** : cpu = 0.179491 (sec), leaf count = 21

$$\left\{\left\{y(x)\to \frac{c_2x}{\sqrt[3]{1+c_1x^3}}\right\}\right\}$$

✓ **Maple** : cpu = 1.242 (sec), leaf count = 64

$$\left\{y(x) = \frac{x}{(-3c_2x^3+c_1)^{\frac{1}{3}}}, y(x) = -\frac{(1+i\sqrt{3})\,x}{2\,(-3c_2x^3+c_1)^{\frac{1}{3}}}, y(x) = \frac{(i\sqrt{3}-1)\,x}{2\,(-3c_2x^3+c_1)^{\frac{1}{3}}}\right\}$$

2.1767 ODE No. 1767

$$\left(\frac{ax}{\sqrt{b^2-x^2}}-x\right)y'(x)^2+xy(x)y''(x)-y(x)y'(x)=0$$

✓ **Mathematica** : cpu = 0.342816 (sec), leaf count = 55

$$\left\{\left\{y(x)\to c_2\exp\left(\frac{\sqrt{b^2-x^2}}{a}+\frac{c_1\log\left(a\sqrt{b^2-x^2}-c_1\right)}{a^2}\right)\right\}\right\}$$

✓ **Maple** : cpu = 2.704 (sec), leaf count = 50

$$\left\{y(x)=c_2\mathrm{e}^{\int-\frac{\sqrt{b^2-x^2}\,x}{c_1\sqrt{b^2-x^2}+\left(b^2-x^2\right)a}dx}\right\}$$

2.1768 ODE No. 1768

$$x(y(x)+x)y''(x)+xy'(x)^2+(x-y(x))y'(x)-y(x)=0$$

✓ **Mathematica** : cpu = 0.04952 (sec), leaf count = 53

$$\left\{\left\{y(x)\to -x-\sqrt{x^2+2c_2x^2+c_1}\right\},\left\{y(x)\to -x+\sqrt{x^2+2c_2x^2+c_1}\right\}\right\}$$

✓ **Maple** : cpu = 1.215 (sec), leaf count = 43

$$\left\{y(x)=-x-\sqrt{(-c_2+1)\,x^2+c_1},y(x)=-x+\sqrt{(-c_2+1)\,x^2+c_1}\right\}$$

2.1769 ODE No. 1769

$$2xy(x)y''(x)-xy'(x)^2+y(x)y'(x)=0$$

✓ **Mathematica** : cpu = 0.168227 (sec), leaf count = 18

$$\left\{\left\{y(x)\to c_2\left(\sqrt{x}+c_1\right)^2\right\}\right\}$$

✓ **Maple** : cpu = 1.314 (sec), leaf count = 21

$$\left\{y(x)=c_1^2x+c_1c_2\sqrt{x}+\frac{c_2^2}{4}\right\}$$

2.1770 ODE No. 1770

$$x^2(y(x)-1)y''(x)-2x^2y'(x)^2-2x(y(x)-1)y'(x)-2(y(x)-1)^2y(x)=0$$

✓ **Mathematica** : cpu = 0.9568 (sec), leaf count = 28

$$\left\{\left\{y(x)\to 1+\frac{1}{x^2\left(-\frac{1}{x^2}-\frac{c_1}{x}+c_2\right)}\right\}\right\}$$

✓ **Maple** : cpu = 1.257 (sec), leaf count = 26

$$\left\{y(x)=\frac{(c_1x-c_2)\,x}{c_1x^2-c_2x-1}\right\}$$

2.1771 ODE No. 1771

$$x^2(y(x)+x)y''(x)-\left(xy'(x)-y(x)\right)^2=0$$

✓ **Mathematica** : cpu = 0.122441 (sec), leaf count = 21

$$\left\{\left\{y(x)\to -x+c_2xe^{\frac{c_1}{x}}\right\}\right\}$$

✓ **Maple** : cpu = 1.365 (sec), leaf count = 22

$$\left\{y(x)=-\frac{\left(c_1-\mathrm{e}^{-1}\mathrm{e}^{\frac{c_2}{x}}\right)x}{c_1}\right\}$$

2.1772 ODE No. 1772

$$a\left(xy'(x)-y(x)\right)^2+x^2(x-y(x))y''(x)=0$$

✓ **Mathematica** : cpu = 0.691695 (sec), leaf count = 37

$$\left\{\left\{y(x)\to x\left(1+\left((a-1)\left(\frac{(-1)^{a+1}c_1}{x}-c_2\right)\right)^{\frac{1}{1-a}}\right)\right\}\right\}$$

✓ **Maple** : cpu = 1.298 (sec), leaf count = 42

$$\{y(x)=x-\mathrm{RootOf}\left(-c_2ax\_Z^a+c_1a\_Z^a+c_2x\_Z^a-c_1\_Z^a-\_Zx^a\right)\}$$

2.1773 ODE No. 1773

$$2x^2y(x)y''(x) - (x^2(y'(x)^2 + 1)) + y(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.441898 (sec), leaf count = 44

$$\left\{\left\{y(x) \to \frac{x(c_1{}^2\log^2(x) - 2c_2c_1{}^2\log(x) + 4 + c_2{}^2c_1{}^2)}{4c_1}\right\}\right\}$$

✓ **Maple** : cpu = 1.185 (sec), leaf count = 30

$$\left\{y(x) = \frac{\left(4c_2^2\ln(x)^2 + 4c_1c_2\ln(x) + c_1^2 + 1\right)x}{4c_2}\right\}$$

2.1774 ODE No. 1774

$$ax^2y(x)y''(x) + bx^2y'(x)^2 + cxy(x)y'(x) + dy(x)^2 = 0$$

✓ **Mathematica** : cpu = 1.35511 (sec), leaf count = 92

$$\left\{\left\{y(x) \to c_2\exp\left(-\frac{\log(x)\left(a\left(\sqrt{\frac{a^2-2a(c+2d)-4bd+c^2}{a^2}} - 1\right) + c\right) - 2a\log\left(x^{\sqrt{\frac{a^2-2a(c+2d)-4bd+c^2}{a^2}}} + c_1\right)}{2(a+b)}\right)\right\}\right\}$$

✓ **Maple** : cpu = 1.5 (sec), leaf count = 136

$$\left\{y(x) = x^{\frac{a}{2a+2b}}x^{-\frac{c}{2a+2b}}x^{-\frac{\sqrt{(-4a-4b)d+(a-c)^2}}{2a+2b}}\left(\frac{a^2 - 4bd + c^2 + (-2c-4d)a}{\left(c_1x^{\frac{\sqrt{(-4a-4b)d+(a-c)^2}}{a}} - c_2\right)^2(a+b)^2}\right)^{-\frac{a}{2a+2b}}\right\}$$

2.1775 ODE No. 1775

$$-a(x+2)y(x)^2 + x(x+1)^2 y(x)y''(x) - x(x+1)^2 y'(x)^2 + 2(x+1)^2 y(x)y'(x) = 0$$

✓ **Mathematica** : cpu = 0.185213 (sec), leaf count = 29

$$\left\{\left\{y(x) \to c_2 e^{a\log(x+1)+\frac{-a-c_1}{x}}\right\}\right\}$$

✓ **Maple** : cpu = 1.5 (sec), leaf count = 31

$$\left\{y(x) = \frac{(x+1)^a\, \mathrm{e}^{\frac{c_2}{x}}\, \mathrm{e}^{-a} \mathrm{e}^{-\frac{a}{x}}}{c_1}\right\}$$

2.1776 ODE No. 1776

$$8\left(1-x^3\right) y(x)y''(x) - 4\left(1-x^3\right) y'(x)^2 - 12x^2 y(x)y'(x) + 3xy(x)^2 = 0$$

✓ **Mathematica** : cpu = 7.59826 (sec), leaf count = 1743

$$\left\{\left\{y(x) \to e^{\int_1^x -\frac{2\left(-\frac{3(1-K[2])^{3/4}\sqrt[4]{K[2]^2+K[2]+1}\int_1^{K[2]}\frac{\sqrt{\sqrt{3}K[1]+\sqrt{2K[1]-i\sqrt{3}+1}\sqrt{2K[1]+i\sqrt{3}+1}+\sqrt{3}}}{2(1-K[1])^{3/2}\sqrt{K[1]^2+K[1]+1}}dK[1]K[2]^2}{2\sqrt{2}\left(K[2]^3-1\right)^{5/4}\sqrt[4]{\sqrt{3}K[2]+\sqrt{2K[2]-i\sqrt{3}+1}\sqrt{2K[2]+i\sqrt{3}+1}+\sqrt{3}}}+c_1\left(-\frac{3(1-K[2])}{2\sqrt{2}\left(K[2]^3-1\right)^{5/4}\sqrt[4]{\sqrt{3}K}}\right.\right.}{}}\right.\right.$$

✓ **Maple** : cpu = 1.55 (sec), leaf count = 49

$$\left\{y(x) = \frac{\left(c_1 \operatorname{LegendreQ}\left(-\frac{1}{6}, \frac{1}{3}, \sqrt{-(x-1)(x^2+x+1)}\right) + \frac{c_2 \operatorname{LegendreP}\left(-\frac{1}{6}, \frac{1}{3}, \sqrt{-(x-1)(x^2+x+1)}\right)}{2}\right)^2 x}{c_1}\right\}$$

2.1777 ODE No. 1777

$$\mathrm{f0}(x)y(x)y''(x)+\mathrm{f1}(x)y'(x)^2+\mathrm{f2}(x)y(x)y'(x)+\mathrm{f3}(x)y(x)^2=0$$

✗ **Mathematica** : cpu = 46.0268 (sec), leaf count = 0 , could not solve

```
DSolve[f3[x]*y[x]^2 + f2[x]*y[x]*Derivative[1][y][x] + f1[x]*Derivative[1][y][x]^2 + f0[x]*y
```

✓ **Maple** : cpu = 0.704 (sec), leaf count = 79

$$\left\{y(x)=ODESolStruc\left(\mathrm{e}^{c_1+\int \_b(\_a)d\_a},\left[\left\{\frac{d}{d\_a}\_b(\_a)=\frac{(-f0(\_a)-f1(\_a))\_b(\_a)^2-\_b(\_a)\,f2(\_a)-f3(\right.\right.\right.\right.}{f0(\_a)}$$

2.1778 ODE No. 1778

$$y(x)^2y''(x)-a=0$$

✓ **Mathematica** : cpu = 0.266365 (sec), leaf count = 65

$$\mathrm{Solve}\left[\left(\frac{y(x)\sqrt{-\frac{2a}{y(x)}+c_1}}{c_1}+\frac{2a\tanh^{-1}\left(\frac{\sqrt{-\frac{2a}{y(x)}+c_1}}{\sqrt{c_1}}\right)}{c_1{}^{3/2}}\right)^2=(x+c_2)^2,y(x)\right]$$

✓ **Maple** : cpu = 2.039 (sec), leaf count = 245

$$\left\{y(x)=\frac{c_1\left(c_1a+\mathrm{e}^{\mathrm{RootOf}\left(c_1^4a^2\mathrm{csgn}\left(\frac{1}{c_1}\right)-2c_1^3\_Za\,\mathrm{e}^{\_Z}-c_1^2\mathrm{csgn}\left(\frac{1}{c_1}\right)\mathrm{e}^{2\_Z}-2c_2\mathrm{csgn}\left(\frac{1}{c_1}\right)\mathrm{e}^{\_Z}-2x\,\mathrm{csgn}\left(\frac{1}{c_1}\right)\mathrm{e}^{\_Z}\right)}\right)^2\mathrm{e}^{-\mathrm{RootOf}\left(c_1^4a^2\mathrm{cs}\right.}}{2}\right.$$

2.1779 ODE No. 1779

$$ax+y(x)^2y''(x)+y(x)y'(x)^2=0$$

✗ **Mathematica** : cpu = 22.866 (sec), leaf count = 0 , could not solve

```
DSolve[a*x + y[x]*Derivative[1][y][x]^2 + y[x]^2*Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 2.007 (sec), leaf count = 117

$$\left\{-c_2 - \frac{\sqrt{3}\left(\int^{\frac{y(x)}{x}} \frac{3\left(\frac{a}{\_g^3}\right)^{\frac{1}{3}} \_g^2 \tan\left(\mathrm{RootOf}\left(6c_1 - 2\sqrt{3}\,\_Z + 6\left(\int \frac{\left(\frac{a}{\_g^3}\right)^{\frac{2}{3}} \_g^2}{\_g^3 + a} d\_g\right) + \ln\left(\frac{\tan^2(\_Z)+1}{\tan^2(\_Z)+2\sqrt{3}\,\tan(\_Z)+3}\right)\right)\right) + \sqrt{3}\left(\left(\frac{a}{\_g^3}\right)\right.}{\_g^3 + a}\right.}{6}\right.$$

2.1780 ODE No. 1780

$$-ax - b + y(x)^2 y''(x) + y(x)y'(x)^2 = 0$$

✗ **Mathematica** : cpu = 20.3733 (sec), leaf count = 0 , could not solve

```
DSolve[-b - a*x + y[x]*Derivative[1][y][x]^2 + y[x]^2*Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 2.125 (sec), leaf count = 156

$$\left\{-c_2 + \frac{b\ln(ax+b)}{a} - \frac{\sqrt{3}\left(\int^{\frac{y(x)}{ax+b}} - \frac{2\left(-\frac{3\left(-\frac{a}{\_g^3 b^3}\right)^{\frac{1}{3}} b \tan\left(\mathrm{RootOf}\left(6b^2\left(\int \frac{\left(-\frac{a}{\_g^3 b^3}\right)^{\frac{2}{3}} \_g^2}{\_g^3 a^2 - 1} d\_g\right) + 6c_1 - 2\sqrt{3}\,\_Z + \ln\left(\frac{\tan^2(\_Z)+1}{\tan^2(\_Z)+2\sqrt{3}\,\tan\right.\right.\right.\right)}{2}\right.\right)}{\_g^3 a^2 - 1}\right.}{6}\right.$$

2.1781 ODE No. 1781

$$(y(x)^2+1)\,y''(x)+(1-2y(x))y'(x)^2=0$$

✓ **Mathematica** : cpu = 0.237546 (sec), leaf count = 46

$$\left\{\left\{y(x)\to\frac{i\left(1-c_1{}^{2i}(x+c_2)^{2i}\right)}{1+c_1{}^{2i}(x+c_2)^{2i}}\right\}\right\}$$

✓ **Maple** : cpu = 1.253 (sec), leaf count = 11

$$\{y(x)=\tan\left(\ln\left(c_1x+c_2\right)\right)\}$$

2.1782 ODE No. 1782

$$(y(x)^2+1)\,y''(x)-3y(x)y'(x)^2=0$$

✓ **Mathematica** : cpu = 0.205672 (sec), leaf count = 93

$$\left\{\left\{y(x)\to-\frac{ic_1(x+c_2)}{\sqrt{c_1{}^2x^2+2c_2c_1{}^2x-1+c_2{}^2c_1{}^2}}\right\},\left\{y(x)\to\frac{ic_1(x+c_2)}{\sqrt{c_1{}^2x^2+2c_2c_1{}^2x-1+c_2{}^2c_1{}^2}}\right\}\right\}$$

✓ **Maple** : cpu = 1.271 (sec), leaf count = 33

$$\left\{y(x)=\sqrt{-\frac{1}{c_1^2x^2+2xc_2c_1+c_2^2-1}}\,(c_1x+c_2)\right\}$$

2.1783 ODE No. 1783

$$(y(x)^2+x)\,y''(x)-2\left(x-y(x)^2\right)y'(x)^3+\left(4y(x)y'(x)+1\right)y'(x)=0$$

✓ **Mathematica** : cpu = 1.38911 (sec), leaf count = 26

$$\text{Solve}\left[x=-y(x)^2+c_2e^{e^{-c_1y(x)}},y(x)\right]$$

✓ **Maple** : cpu = 1.331 (sec), leaf count = 23

$$\left\{\frac{-c_1y(x)+c_2+\ln\left(y(x)^2+x\right)+2}{y\left(x\right)}=0\right\}$$

2.1784 ODE No. 1784

$$\left(x^2+y(x)^2\right)y''(x)+\left(y(x)-xy'(x)\right)\left(y'(x)^2+1\right)=0$$

✓ **Mathematica** : cpu = 0.325658 (sec), leaf count = 74

$$\text{Solve}\left[\frac{1}{2}\left(\log\left(1-\frac{iy(x)}{x}\right)+\log\left(1+\frac{iy(x)}{x}\right)+i\cot(c_1)\left(\log\left(1-\frac{iy(x)}{x}\right)-\log\left(1+\frac{iy(x)}{x}\right)\right)\right)=-\log(x)+\right.$$

✓ **Maple** : cpu = 1.961 (sec), leaf count = 82

$$\left\{y(x)=x\tan\left(\text{RootOf}\left(x^{\frac{2}{c_1-1}}\left(\cos^2\left(\_Z\right)\right)\mathrm{e}^{\frac{2c_2}{c_1-1}}-x^{\frac{2c_1}{c_1-1}}\mathrm{e}^{\frac{2i\_Z}{c_1-1}}\mathrm{e}^{\frac{2ic_1\_Z}{c_1-1}}\mathrm{e}^{\frac{2c_1c_2}{c_1-1}}\right)\right)\right\}$$

2.1785 ODE No. 1785

$$\left(x^2+y(x)^2\right)y''(x)-2\left(xy'(x)-y(x)\right)\left(y'(x)^2+1\right)=0$$

✓ **Mathematica** : cpu = 0.443759 (sec), leaf count = 95

$$\left\{\left\{y(x)\to\frac{1}{2}\left(-\sqrt{4x\left(-x+e^{c_2}\right)+e^{2c_2}\cot^2(c_1)}-e^{c_2}\cot(c_1)\right)\right\},\left\{y(x)\to\frac{1}{2}\left(\sqrt{4x\left(-x+e^{c_2}\right)+e^{2c_2}\cot^2(c_1)}-\right.\right.\right.$$

✓ **Maple** : cpu = 1.649 (sec), leaf count = 83

$$\left\{y(x)=\frac{c_1+1-\sqrt{-4c_2^2x^2+c_1^2-4ic_2x+c_1\left(4ic_2x+2\right)+1}}{2c_2},y(x)=\frac{c_1+1+\sqrt{-4c_2^2x^2+c_1^2-4ic_2x+c_1\left(4ic_2\right.}}{2c_2}\right.$$

2.1786 ODE No. 1786

$$f(x)(1-y(x))y(x)y'(x)+2(1-y(x))y(x)y''(x)-\left((1-2y(x))y'(x)^2\right)=0$$

✓ **Mathematica** : cpu = 0.067692 (sec), leaf count = 53

$$\left\{\left\{y(x)\to 1-\sin^2\left(\frac{1}{2}\left(-\int_1^x-\exp\left(-\int_1^{K[3]}\frac{1}{2}f(K[1])dK[1]\right)c_1dK[3]-c_2\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.247 (sec), leaf count = 42

$$\left\{y(x)=\frac{\left(2c_2\mathrm{e}^{c_1\left(\int\mathrm{e}^{-\frac{\left(\int f(x)dx\right)}{2}}dx\right)}+1\right)^2\mathrm{e}^{\int-c_1\mathrm{e}^{\int-\frac{f(x)}{2}dx}dx}}{8c_2}\right\}$$

2.1787 ODE No. 1787

$$h(y(x)) + 2(1 - y(x))y(x)y''(x) - ((1 - 3y(x))y'(x)^2) = 0$$

✓ **Mathematica** : cpu = 1.00351 (sec), leaf count = 170

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[\int_1^{\#1} -\frac{1}{(K[2]-1)\sqrt{K[2]}\sqrt{c_1 + 2\int_1^{K[2]} \frac{e^{-2\left(\log(1-K[1])+\frac{1}{2}\log(K[1])\right)}h(K[1])}{2(K[1]-1)K[1]}dK[1]}}dK[2]\&\right]\right.\right.$$

✓ **Maple** : cpu = 0.34 (sec), leaf count = 80

$$\left\{-c_2 - x + \int^{y(x)} \frac{1}{\sqrt{\left(c_1 + \int \frac{h(\_b)}{(\_b-1)^3 \_b^2}d\_b\right)\_b\,(\_b-1)}}d\_b = 0, -c_2 - x + \int^{y(x)} -\frac{1}{\sqrt{\left(c_1 + \int \frac{h(\_b)}{(\_b-1)^3 \_b^2}d\_b\right.}}\right.$$

2.1788 ODE No. 1788

$$-4(1-y(x))y(x)^2\left(-f'(x) - f(x)^2 - g'(x) + g(x)^2\right)+4y(x)y'(x)(f(x)y(x)+g(x))-2(1-y(x))y(x)y''(x)+(1-3y(x$$

✗ **Mathematica** : cpu = 1.41703 (sec), leaf count = 0 , could not solve

```
DSolve[-4*(1 - y[x])*y[x]^2*(-f[x]^2 + g[x]^2 - Derivative[1][f][x] - Derivative[1][g][x]) +
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{\sqrt{y(x)} - \frac{2\left(\frac{d}{dx}DESol\left(\left\{-\frac{c_1^2\_Y(x)e^{-2(\int f(x)dx)+2(\int g(x)dx)}}{4} - 2\left(\frac{d}{dx}\_Y(x)\right)g(x) + \frac{d^2}{dx^2}\_Y(x)\right\}, \{\_Y(x)\}\right)\right)e^{\int(f(x)-g(}}{c_1 DESol\left(\left\{-\frac{c_1^2\_Y(x)e^{-2(\int f(x)dx)+2(\int g(x)dx)}}{4} - 2\left(\frac{d}{dx}\_Y(x)\right)g(x) + \frac{d^2}{dx^2}\_Y(x)\right\}, \{\_Y(x)\}\right)}\right.$$

2.1789 ODE No. 1789

$$4y(x)^2(1-y(x))\left(-f'(x) + f(x)^2 - g'(x) - g(x)^2\right)-4y(x)y'(x)(f(x)y(x)+g(x))+(1-y(x))^3\left(\mathrm{f0}(x)^2y(x)^2 - \mathrm{f1}(x)^2\right.$$

✗ **Mathematica** : cpu = 3.65125 (sec), leaf count = 0 , could not solve

```
DSolve[(1 - y[x])^3*(-f1[x]^2 + f0[x]^2*y[x]^2) + 4*(1 - y[x])*y[x]^2*(f[x]^2 - g[x]^2 - Der
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(-2*y(x)*(1-y(x))*diff(diff(y(x),x),x)+(1-3*y(x))*diff(y(x),x)^2-4*y(x)*diff(y(x),x)*(
y(x))^3*(f0(x)^2*y(x)^2-f1(x)^2)+4*y(x)^2*(1-y(x))*(f(x)^2-g(x)^2-diff(g(x),x)-
diff(f(x),x))=0,y(x))
```

2.1790 ODE No. 1790

$$-h(y(x))+3(1-y(x))y(x)y''(x)-2(1-2y(x))y'(x)^2=0$$

✓ **Mathematica** : cpu = 0.708304 (sec), leaf count = 186

$$\left\{\left\{y(x)\to \text{InverseFunction}\left[\int_1^{\#1}-\frac{1}{(1-K[2])^{2/3}K[2]^{2/3}\sqrt{c_1+2\int_1^{K[2]}-\frac{\exp\left(-2\left(\frac{2}{3}\log(1-K[1])+\frac{2}{3}\log(K[1])\right)\right)h(K[1])}{3(K[1]-1)K[1]}dK\right.$$

✓ **Maple** : cpu = 0.333 (sec), leaf count = 119

$$\left\{-c_2-x+\int^{y(x)}-\frac{\sqrt{9}}{3\sqrt{(\_b-1)\left(c_1-\frac{2\left(\int\frac{h(\_b)}{(\_b^2-\_b)^{\frac{4}{3}}(\_b-1)\_b}d\_b\right)}{3}\right)((\_b-1)\_b)^{\frac{1}{3}}\_b}}d\_b=0,-c_2-x+\int^{y(x}\right.$$

2.1791 ODE No. 1791

$$-h(y(x))+(1-y(x))y''(x)-3(1-2y(x))y'(x)^2=0$$

✓ **Mathematica** : cpu = 0.779092 (sec), leaf count = 168

$$\left\{\left\{y(x)\to \text{InverseFunction}\left[\int_1^{\#1}-\frac{e^{\frac{1}{2}(12-12K[2])}}{(K[2]-1)^3\sqrt{c_1+2\int_1^{K[2]}-\frac{\exp(-2(6(K[1]-1)+3\log(K[1]-1)))h(K[1])}{K[1]-1}dK[1]}}dK[2]\&\right.$$

✓ **Maple** : cpu = 0.367 (sec), leaf count = 90

$$\left\{-c_2-x+\int^{y(x)}\frac{e^{-6\_b}}{\sqrt{c_1-2\left(\int\frac{e^{-12\_b}h(\_b)}{(\_b-1)^7}d\_b\right)}(\_b-1)^3}d\_b=0,-c_2-x+\int^{y(x)}-\frac{e^{-6\_b}}{\sqrt{c_1-2\left(\int\frac{e^{-12\_b}h(\_b)}{(\_b-1)^7}d\_\right.}}\right.$$

2.1792 ODE No. 1792

$$a(y(x)-1)y(x)y''(x)+y'(x)^2(by(x)+c)+h(y(x))=0$$

✓ **Mathematica** : cpu = 1.14366 (sec), leaf count = 226

$$\left\{\left\{y(x)\to \text{InverseFunction}\left[\int_1^{\#1}-\frac{(1-K[2])^{\frac{1}{2}\left(\frac{2b}{a}+\frac{2c}{a}\right)}K[2]^{-\frac{c}{a}}}{\sqrt{c_1+2\int_1^{K[2]}-\frac{\exp\left(-\frac{2(c\log(K[1])-(b+c)\log(1-K[1]))}{a}\right)h(K[1])}{a(K[1]-1)K[1]}dK[1]}}dK[2]\&\right][x+c_2$$

✓ **Maple** : cpu = 0.531 (sec), leaf count = 194

$$\left\{-c_2-x+\int^{y(x)}\frac{a\_b^{-\frac{c}{a}}(\_b-1)^{-\frac{-b-c}{a}}}{\sqrt{\left(c_1a-2\left(\int\frac{\_b^{-\frac{2c}{a}}(\_b-1)^{\frac{2b}{a}}(\_b-1)^{\frac{2c}{a}}h(\_b)}{(\_b-1)\_b}d\_b\right)\right)a}}d\_b=0,-c_2-x+\int^{y(x)}-\frac{}{\sqrt{\left(c_1a-2\right(}}$$

2.1793 ODE No. 1793

$$a(y(x)-1)y(x)y''(x)-\left((a-1)(2y(x)-1)y'(x)^2\right)+f(x)(y(x)-1)y(x)y'(x)=0$$

✓ **Mathematica** : cpu = 0.140583 (sec), leaf count = 83

$$\left\{\left\{y(x)\to \text{InverseFunction}\left[a\#1^{-1/a}(-((\#1-1)\#1))^{\frac{1}{a}}\,{}_2F_1\left(\frac{1}{a},\frac{a-1}{a};1+\frac{1}{a};1-\#1\right)\&\right]\left[\int_1^x\exp\left(-\int_1^{K[3]}f\right.\right.\right.\right.$$

✓ **Maple** : cpu = 1.296 (sec), leaf count = 40

$$\left\{c_1\mathrm{e}^{-\frac{fx}{a}}-c_2+\int^{y(x)}\frac{((\_a-1)\_a)^{\frac{1}{a}}}{(\_a-1)\_a}d\_a=0\right\}$$

2.1794 ODE No. 1794

$$ab(y(x)-1)y(x)y''(x)-\left(y'(x)^2((2ab-a-b)y(x)+(1-a)b)\right)+f(x)(y(x)-1)y(x)y'(x)=0$$

✓ **Mathematica** : cpu = 0.157967 (sec), leaf count = 69

$$\left\{\left\{y(x)\to \text{InverseFunction}\left[-a\#1^{\frac{1}{a}}\,{}_2F_1\left(\frac{1}{a},1-\frac{1}{b};1+\frac{1}{a};\#1\right)\&\right]\left[\int_1^x\exp\left(-\int_1^{K[3]}\frac{f(K[1])}{ab}dK[1]\right)c_1dK[3]\right.\right.\right.$$

✓ **Maple** : cpu = 1.322 (sec), leaf count = 46

$$\left\{c_1 \mathrm{e}^{-\frac{fx}{ab}} - c_2 + \int^{y(x)} \frac{\_a^{\frac{1}{a}}(\_a-1)^{\frac{1}{b}}}{(\_a-1)\_a} d\_a = 0\right\}$$

2.1795 ODE No. 1795

$$xy(x)^2 y''(x) - a = 0$$

✓ **Mathematica** : cpu = 0.351018 (sec), leaf count = 116

$$\text{Solve}\left[-\frac{\sqrt{-\frac{2ay(x)}{x}-\frac{2c_1y(x)^2}{x^2}}}{2c_1} - \frac{a\tan^{-1}\left(\frac{\sqrt{2}\sqrt{c_1}\left(\frac{y(x)}{x}+\frac{a}{2c_1}\right)}{\sqrt{-\frac{2ay(x)}{x}-\frac{2c_1y(x)^2}{x^2}}}\right)}{2\sqrt{2}c_1{}^{3/2}} - \frac{1}{x} - c_2 = 0, y(x)\right]$$

✓ **Maple** : cpu = 3.092 (sec), leaf count = 529

$$\left\{y(x) = \frac{c_1\left(9c_1a + \mathrm{e}^{\mathrm{RootOf}\left(243c_1^4a^2x\,\mathrm{csgn}\left(\frac{1}{c_1}\right)-54c_1^3\_Zax\,\mathrm{e}^{\_Z}-3c_1^2x\,\mathrm{csgn}\left(\frac{1}{c_1}\right)\mathrm{e}^{2\_Z}-6c_2x\,\mathrm{csgn}\left(\frac{1}{c_1}\right)\mathrm{e}^{\_Z}-2\,\mathrm{csgn}\left(\frac{1}{c_1}\right)\mathrm{e}^{\_Z}\right)}\right)^2 x\,\mathrm{e}^{-\mathrm{R}}}{2}\right.$$

2.1796 ODE No. 1796

$$(a^2-x^2)(a^2-y(x)^2)y''(x) + (a^2-x^2)y(x)y'(x)^2 - x(a^2-y(x)^2)y'(x) = 0$$

✓ **Mathematica** : cpu = 0.309609 (sec), leaf count = 363

$$\left\{\left\{y(x) \to -\frac{1}{2}e^{-c_2}\left(1-\frac{x}{\sqrt{x^2-a^2}}\right)^{-\frac{c_1}{2}}\left(\frac{x}{\sqrt{x^2-a^2}}+1\right)^{-\frac{c_1}{2}}\sqrt{2a^2e^{2c_2}\left(1-\frac{x}{\sqrt{x^2-a^2}}\right)^{c_1}\left(\frac{x}{\sqrt{x^2-a^2}}+1\right)^{c_1}\right.\right.\right.$$

✓ **Maple** : cpu = 1.62 (sec), leaf count = 51

$$\left\{y(x) = \frac{\left(c_2^2\left(x+\sqrt{-a^2+x^2}\right)^{2c_1}+a^2\right)\left(x+\sqrt{-a^2+x^2}\right)^{-c_1}}{2c_2}\right\}$$

2.1797 ODE No. 1797

$(y(x)-1)^3\left(ay(x)^2+b\right)+cxy(x)^2(y(x)-1)+dx^2y(x)^2(y(x)+1)+2x^2y(x)(y(x)-1)y''(x)-x^2(3y(x)-1)y'(x)^2+2xy$

✗ **Mathematica** : cpu = 11.4967 (sec), leaf count = 0 , could not solve

```
DSolve[c*x*(-1 + y[x])*y[x]^2 + d*x^2*y[x]^2*(1 + y[x]) + (-1 + y[x])^3*(b + a*y[x]^2) + 2*x
1 + y[x])*y[x]*Derivative[1][y][x] - x^2*(-1 + 3*y[x])*Derivative[1][y][x]^2 + 2*x^2*(-
1 + y[x])*y[x]*Derivative[2][y][x] == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(2*x^2*y(x)*(-1+y(x))*diff(diff(y(x),x),x)-x^2*(3*y(x)-1)*diff(y(x),x)^2+2*x*y(x)*(-
1+y(x))*diff(y(x),x)+(a*y(x)^2+b)*(-1+y(x))^3+c*x*y(x)^2*(-1+y(x))+d*x^2*y(x)^2*(1+y(x))=0,y
```

2.1798 ODE No. 1798

$$x^3y(x)^2y''(x)+(y(x)+x)\left(xy'(x)-y(x)\right)^3=0$$

✓ **Mathematica** : cpu = 36.6769 (sec), leaf count = 248

$$\text{Solve}\left[-\int_1^{\frac{y(x)}{x}}\frac{i\sqrt{3}\sqrt{K[2]}J_{i\sqrt{3}}\left(2\sqrt{K[2]}\right)+\sqrt{K[2]}J_{i\sqrt{3}}\left(2\sqrt{K[2]}\right)-2J_{1+i\sqrt{3}}\left(2\sqrt{K[2]}\right)K[2]-2Y_{1+i\sqrt{3}}\left(2\sqrt{K[\right.}{\left(J_{i\sqrt{3}}\left(2\sqrt{K[2]}\right)+Y_{i\sqrt{3}}\left(2\sqrt{K[2]}\right)c\right.}\right.$$

✓ **Maple** : cpu = 1.401 (sec), leaf count = 166

$$\left\{y(x)=x\,\text{RootOf}\left(2c_2-\left(\left(\int^{\_Z}\frac{-2c_1\_f\text{BesselY}\left(1+i\sqrt{3},2\sqrt{\_f}\right)+ic_1\sqrt{3}\sqrt{\_f}\,\text{BesselY}\left(i\sqrt{3},2\sqrt{\_f}\right)+c_1\sqrt{\_f}}{(c_1\,\text{Besse}}\right.\right.\right.\right.$$

2.1799 ODE No. 1799

$$y(x)^3y''(x)-a=0$$

✓ **Mathematica** : cpu = 2.1481 (sec), leaf count = 88

$$\left\{\left\{y(x)\to-\frac{\sqrt{a+c_1{}^2x^2+2c_2c_1{}^2x+c_2{}^2c_1{}^2}}{\sqrt{c_1}}\right\},\left\{y(x)\to\frac{\sqrt{a+c_1{}^2x^2+2c_2c_1{}^2x+c_2{}^2c_1{}^2}}{\sqrt{c_1}}\right\}\right\}$$

✓ **Maple** : cpu = 1.566 (sec), leaf count = 46

$$\left\{y(x)=\frac{\sqrt{c_1\left((c_2+x)^2c_1^2+a\right)}}{c_1},y(x)=-\frac{\sqrt{c_1\left((c_2+x)^2c_1^2+a\right)}}{c_1}\right\}$$

2.1800 ODE No. 1800

$$y(x)\left(y(x)^2+1\right)y''(x)+\left(1-3y(x)^2\right)y'(x)^2=0$$

✓ **Mathematica** : cpu = 0.651118 (sec), leaf count = 84

$$\left\{\left\{y(x)\to -\frac{\sqrt{-2c_1x-1-2c_2c_1}}{\sqrt{2}\sqrt{c_1x+c_2c_1}}\right\},\left\{y(x)\to \frac{\sqrt{-2c_1x-1-2c_2c_1}}{\sqrt{2}\sqrt{c_1x+c_2c_1}}\right\}\right\}$$

✓ **Maple** : cpu = 1.413 (sec), leaf count = 60

$$\left\{y(x)=\frac{\sqrt{-4\left(c_1x+c_2\right)\left(c_1x+c_2+\frac{1}{2}\right)}}{2c_1x+2c_2},y(x)=-\frac{\sqrt{-4\left(c_1x+c_2\right)\left(c_1x+c_2+\frac{1}{2}\right)}}{2c_1x+2c_2}\right\}$$

2.1801 ODE No. 1801

$$-a^2xy(x)^2+2y(x)^3y''(x)+y(x)^4-1=0$$

✗ **Mathematica** : cpu = 7.19496 (sec), leaf count = 0 , could not solve

```
DSolve[-1 - a^2*x*y[x]^2 + y[x]^4 + 2*y[x]^3*Derivative[2][y][x] == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(2*y(x)^3*diff(diff(y(x),x),x)+y(x)^4-a^2*x*y(x)^2-1=0,y(x))
```

2.1802 ODE No. 1802

$$-ax^2-bx-c+2y(x)^3y''(x)+y(x)^2y'(x)^2=0$$

✗ **Mathematica** : cpu = 0.309693 (sec), leaf count = 0 , could not solve

```
DSolve[-c - b*x - a*x^2 + y[x]^2*Derivative[1][y][x]^2 + 2*y[x]^3*Derivative[2][y][x] == 0,
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(2*y(x)^3*diff(diff(y(x),x),x)+y(x)^2*diff(y(x),x)^2-a*x^2-b*x-c=0,y(x))
```

2.1803 ODE No. 1803

$$-\mathrm{a0}(a-y(x))^2(b-y(x))^2(c-y(x))^2-\mathrm{a2}(a-y(x))^2(c-y(x))^2-\mathrm{a3}(a-y(x))^2(b-y(x))^2+2(a-y(x))(b-y(x))(c-y(x)$$

✓ **Mathematica** : cpu = 23.6236 (sec), leaf count = 10387

$$\left\{\text{Solve}\left[-\frac{2F\left(\sin^{-1}\left(\sqrt{\frac{(\text{Root}[\mathrm{a0}\#1^4+(-a\mathrm{a0}-b\mathrm{a0}-c\mathrm{a0}-c_1)\#1^3+(-\mathrm{a1}-\mathrm{a2}-\mathrm{a3}+a\mathrm{a0}b+a\mathrm{a0}c+\mathrm{a0}bc+ac_1+bc_1+cc_1)\#1^2+(a\mathrm{a2}+c\mathrm{a2}+a\mathrm{a3}}{(\text{Root}[\mathrm{a0}\#1^4+(-a\mathrm{a0}-b\mathrm{a0}-c\mathrm{a0}-c_1)\#1^3+(-\mathrm{a1}-\mathrm{a2}-\mathrm{a3}+a\mathrm{a0}b+a\mathrm{a0}c+\mathrm{a0}bc+ac_1+bc_1+cc_1)\#1^2+(a\mathrm{a2}+c\mathrm{a2}+a\mathrm{a3}}}\right.\right.}{}\right.\right.$$

✓ **Maple** : cpu = 3.684 (sec), leaf count = 115620

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2.1804 ODE No. 1804

$$y''(x)\left(-ay(x)-b+4y(x)^3\right)+\left(\frac{a}{2}-6y(x)^2\right)y'(x)^2=0$$

✓ **Mathematica** : cpu = 3.37907 (sec), leaf count = 415

$$\text{Solve}\left[\frac{2\sqrt{\frac{y(x)-\text{Root}[4\#1^3-\#1a-b\&,1]}{\text{Root}[4\#1^3-\#1a-b\&,3]-\text{Root}[4\#1^3-\#1a-b\&,1]}}\sqrt{\frac{y(x)-\text{Root}[4\#1^3-\#1a-b\&,2]}{\text{Root}[4\#1^3-\#1a-b\&,3]-\text{Root}[4\#1^3-\#1a-b\&,2]}}(y(x)-\text{Root}[4\#1}{c_1\sqrt{2ay(x)+2b-8y(x)^3}\sqrt{}}\right.$$

✓ **Maple** : cpu = 1.208 (sec), leaf count = 31

$$\left\{-c_1x-c_2+\int^{y(x)}\frac{1}{\sqrt{4\_a^3-\_aa-b}}d\_a=0\right\}$$

2.1805 ODE No. 1805

$$\left(-ay(x)-b+4y(x)^3\right)\left(f(x)y'(x)+y''(x)\right)+\left(\frac{a}{2}-6y(x)^2\right)y'(x)^2=0$$

✓ **Mathematica** : cpu = 0.461913 (sec), leaf count = 438

$$\text{Solve}\left[\frac{2\sqrt{\frac{y(x)-\text{Root}[4\#1^3-\#1a-b\&,1]}{\text{Root}[4\#1^3-\#1a-b\&,3]-\text{Root}[4\#1^3-\#1a-b\&,1]}}\sqrt{\frac{y(x)-\text{Root}[4\#1^3-\#1a-b\&,2]}{\text{Root}[4\#1^3-\#1a-b\&,3]-\text{Root}[4\#1^3-\#1a-b\&,2]}}(y(x)-\text{Root}[4\#1}{\sqrt{ay(x)+b-4y(x)^3}\sqrt{\text{Ro}}}\right.$$

✓ **Maple** : cpu = 1.066 (sec), leaf count = 34

$$\left\{c_1 e^{-fx} - c_2 + \int^{y(x)} \frac{1}{\sqrt{4\_a^3 - \_aa - b}} d\_a = 0\right\}$$

2.1806 ODE No. 1806

$-f(x)((y(x)-1)y(x)(y(x)-x))^{3/2}+2(1-y(x))\left(x^2-2xy(x)+y(x)\right)y(x)y'(x)-2(1-x)x(1-y(x))(x-y(x))y(x)y'$

✗ **Mathematica** : cpu = 18.7043 (sec), leaf count = 0 , could not solve

```
DSolve[-((1 - y[x])^2*y[x]^2) - f[x]*((-1 + y[x])*y[x]*(-x + y[x]))^(3/2) + 2*(1 - y[x])*y[x
```

✓ **Maple** : cpu = 6.389 (sec), leaf count = 733

Too large to display

2.1807 ODE No. 1807

$a(1-y(x))^2(x-y(x))^2y(x)^2+bx(1-y(x))^2(x-y(x))^2-c(1-x)(x-y(x))^2y(x)^2-d(1-x)x(1-y(x))^2y(x)^2+2(1-x)^2$

✗ **Mathematica** : cpu = 25.0158 (sec), leaf count = 0 , could not solve

```
DSolve[b*x*(1 - y[x])^2*(x - y[x])^2 - d*(1 - x)*x*(1 - y[x])^2*y[x]^2 - c*(1 - x)*(x - y[x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(2*x^2*y(x)*(-x+1)^2*(1-y(x))*(x-y(x))*diff(diff(y(x),x),x)-x^2*(-x+1)^2*(x-
2*x*y(x)-2*y(x)+3*y(x)^2)*diff(y(x),x)^2-2*x*y(x)*(-x+1)*(1-y(x))*(x^2+y(x)-2*x*y(x))*diff(y
y(x))^2*(x-y(x))^2-c*(-x+1)*y(x)^2*(x-y(x))^2-d*x*y(x)^2*(-x+1)*(1-y(x))^2+a*y(x)^2*(x-
y(x))^2*(1-y(x))^2=0,y(x))
```

2.1808 ODE No. 1808

$b\sqrt{(1-y(x)^2)\left(1-a^2y(x)^2\right)}y'(x)^2+\left(y(x)^2-1\right)\left(a^2y(x)^2-1\right)y''(x)+y(x)\left(-2a^2y(x)^2+a^2+1\right)y'(x)^2=0$

✓ **Mathematica** : cpu = 1.24606 (sec), leaf count = 124

$$\left\{\left\{y(x)\to \text{InverseFunction}\left[\int_1^{\#1}\frac{\exp\left(\frac{b\sqrt{1-K[1]^2}\sqrt{1-a^2K[1]^2}F\left(\sin^{-1}(K[1])|a^2\right)}{\sqrt{(K[1]^2-1)(a^2K[1]^2-1)}}+\frac{1}{2}(-\log(1-K[1])-\log(K[1]+1\right.}{c_1}\right.\right.\right.$$

✓ **Maple** : cpu = 0.204 (sec), leaf count = 72

$$\left\{-c_1x-c_2+\int^{y(x)} e^{\int \frac{-2\_b^3a^2+\_b\,a^2+\_b+\sqrt{\left(\_b^2-1\right)\left(\_b^2a^2-1\right)}\,b}{\left(\_b^2-1\right)\left(\_b^2a^2-1\right)}d\_b} d\_b=0\right\}$$

2.1809 ODE No. 1809

$$y''(x)\left(ax^2+2bx+c+y(x)^2\right)^2+dy(x)=0$$

✓ **Mathematica** : cpu = 26.4941 (sec), leaf count = 260

$$\left\{\text{Solve}\left[a\tan^{-1}\left(\frac{ax+b}{\sqrt{ac-b^2}}\right)+\sqrt{ac-b^2}\int_1^{\frac{y(x)}{\sqrt{c+x(2b+ax)}}}\frac{a\left(K[2]^2+1\right)}{\sqrt{\left(K[2]^2+1\right)\left(d+\left(K[2]^2+1\right)\left(c_1a^2+\left(b^2-ac\right)K[2]^2\right)\right)}}a\right.\right.$$

✓ **Maple** : cpu = 0.65 (sec), leaf count = 336

$$\left\{y(x)=\sqrt{a\,x^2+2bx+c}\ \text{RootOf}\left(-a\arctan\left(\frac{ax+b}{\sqrt{ac-b^2}}\right)+c_2\sqrt{ac-b^2}-\sqrt{ac-b^2}\left(\int^{\_Z}\frac{\sqrt{\left(\_f^2+1\right)\left(-\_f\right.}}{-\_f^4ac+}\right.\right.\right.$$

2.1810 ODE No. 1810

$$\sqrt{y(x)}y''(x)-a=0$$

✓ **Mathematica** : cpu = 0.0876275 (sec), leaf count = 1677

$$\left\{\left\{y(x)\to\frac{3c_1{}^2}{16a^2}+\frac{\sqrt[3]{\sqrt{-\frac{221184c_1{}^6}{a^6}+\frac{159252480x^2c_1{}^3}{a^2}+\frac{159252480c_2{}^2c_1{}^3}{a^2}+\frac{318504960xc_2c_1{}^3}{a^2}+2293235712a^2x^4+2293235}}}{}\right.\right.$$

✓ **Maple** : cpu = 0.167 (sec), leaf count = 91

$$\left\{-c_2-x+\frac{-3c_1\sqrt{4a\sqrt{y(x)}-c_1}-\left(4a\sqrt{y(x)}-c_1\right)^{\frac{3}{2}}}{12a^2}=0,-c_2-x+\frac{3c_1\sqrt{4a\sqrt{y(x)}-c_1}+\left(4a\sqrt{y(x)}-c_1\right)}{12a^2}\right.$$

2.1811 ODE No. 1811

$$\sqrt{x^2+y(x)^2}y''(x)-a\left(y'(x)^2+1\right)^{3/2}=0$$

✗ **Mathematica** : cpu = 300.033 (sec), leaf count = 0 , timed out

```
$Aborted
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve((x^2+y(x)^2)^(1/2)*diff(diff(y(x),x),x)-a*(diff(y(x),x)^2+1)^(3/2)=0,y(x))
```

2.1812 ODE No. 1812

$$y(x)y''(x)(1-\log(y(x)))+y'(x)^2(\log(y(x))+1)=0$$

✓ **Mathematica** : cpu = 0.342689 (sec), leaf count = 29

$$\left\{\left\{y(x)\to e^{\frac{c_1x-1+c_2c_1}{c_1(x+c_2)}}\right\}\right\}$$

✓ **Maple** : cpu = 0.181 (sec), leaf count = 19

$$\left\{y(x)=\mathrm{e}^{\frac{c_1x+c_2-1}{c_1x+c_2}}\right\}$$

2.1813 ODE No. 1813

$$Ay(x)\left(a\sin^2(y(x))+c\right)+y''(x)\left(a\sin^2(y(x))+b\right)+ay'(x)^2\sin(y(x))\cos(y(x))=0$$

✓ **Mathematica** : cpu = 29.0284 (sec), leaf count = 176

$$\left\{\left\{y(x)\to \text{InverseFunction}\left[\int_1^{\#1}-\frac{\sqrt{2}\sqrt{\cos(2K[1])a-a-2b}}{\sqrt{2aAK[1]^2+4AcK[1]^2-2aA\sin(2K[1])K[1]+2c_1-aA\cos(2K[1])}}dK[1]\right.\right.\right.$$

✓ **Maple** : cpu = 0.463 (sec), leaf count = 138

$$\left\{-c_2-x+\int^{y(x)}\frac{\sqrt{2}\left(a\left(\sin^2\left(\_a\right)\right)+b\right)}{\sqrt{-\left(-2A\_aa\cos\left(\_a\right)\sin\left(\_a\right)+Aa\left(\sin^2\left(\_a\right)\right)+(a+2c)A\_a^2-2c_1\right)\left(a\left(\sin^2\left(\_a\right)\right)+b\right)}}\right.$$

2.1814 ODE No. 1814

$$ah(y(x))y'(x)^2 + h(y(x))y''(x) + j(y(x)) = 0$$

✓ **Mathematica** : cpu = 0.413204 (sec), leaf count = 120

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[\int_1^{\#1} -\frac{e^{aK[2]}}{\sqrt{c_1 + 2\int_1^{K[2]} -\frac{e^{2aK[1]}j(K[1])}{h(K[1])}dK[1]}}dK[2]\&\right][x+c_2]\right\}, \left\{y(x) \to \text{InverseFun}\right.\right.$$

✓ **Maple** : cpu = 0.209 (sec), leaf count = 87

$$\left\{-c_2 - x + \int^{y(x)} \frac{h(\_b)^a}{\sqrt{c_1 - 2\left(\int \frac{h(\_b)^{2a}}{h(\_b)}d\_b\right)}}d\_b = 0, -c_2 - x + \int^{y(x)} -\frac{h(\_b)^a}{\sqrt{c_1 - 2\left(\int \frac{2h(\_b)^{2a}}{h(\_b)}d\_b\right)}}d\_b = 0\right\}$$

2.1815 ODE No. 1815

$$h(y(x))^2\left(-j\left(x, \frac{y'(x)}{h(y(x))}\right)\right) + h(y(x))y''(x) - h(y(x))y'(x)^2 = 0$$

✗ **Mathematica** : cpu = 1.39196 (sec), leaf count = 0 , could not solve

```
DSolve[-(h[y[x]]^2*j[x, Derivative[1][y][x]/h[y[x]]]) - h[y[x]]*Derivative[1][y][x]^2 + h[y[
```

✓ **Maple** : cpu = 0.951 (sec), leaf count = 71

$$\left\{y(x) = ODESolStruc\left(\text{RootOf}\left(c_1 + \int \_b(\_a)\,d\_a - \left(\int^{\_Z} \frac{1}{h(\_f)}d\_f\right)\right), \left[\left\{\frac{d}{d\_a}\_b(\_a) = 1\right\}, \left\{\_a = x,\right.\right.\right.\right.$$

2.1816 ODE No. 1816

$$x^2(-y(x))y'(x) + y'(x)y''(x) - xy(x)^2 = 0$$

✗ **Mathematica** : cpu = 55.8202 (sec), leaf count = 0 , could not solve

```
DSolve[-(x*y[x]^2) - x^2*y[x]*Derivative[1][y][x] + Derivative[1][y][x]*Derivative[2][y][x]
```

✓ **Maple** : cpu = 1.562 (sec), leaf count = 46

$$\left\{y(x) = ODESolStruc\left(\_b(\_a), \left[\left\{-\_a^2\_b(\_a)^2 + \left(\frac{d}{d\_a}\_b(\_a)\right)^2 + c_1 = 0\right\}, \{\_a = x, \_b(\_a) = y(x)\}, \{x\right.\right.\right.$$

2.1817 ODE No. 1817

$$4y'(x)^2 + (xy'(x) - y(x))\, y''(x) = 0$$

✓ **Mathematica** : cpu = 20.8358 (sec), leaf count = 41

$$\left\{\left\{y(x) \to \frac{1}{2} c_2 e^{-2-W\left(\frac{2x}{e^2 c_1}\right)} \left(2 + W\left(\frac{2x}{e^2 c_1}\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.349 (sec), leaf count = 40

$$\left\{y(x) = \mathrm{e}^{c_2 + \int^{\ln(x)} \left(\mathrm{e}^{\mathrm{RootOf}\left(c_1 \mathrm{e}^{\_Z} - \_Z \mathrm{e}^{\_Z} - \_b\, \mathrm{e}^{\_Z} + \mathrm{e}^{\_Z} \ln\left(\mathrm{e}^{\_Z} - 1\right) + 2\right)} - 1\right) d\_b}\right\}$$

2.1818 ODE No. 1818

$$(xy'(x) - y(x))\, y''(x) - \left(y'(x)^2 + 1\right)^2 = 0$$

✗ **Mathematica** : cpu = 1.41835 (sec), leaf count = 0 , could not solve

```
DSolve[-(1 + Derivative[1][y][x]^2)^2 + (-y[x] + x*Derivative[1][y][x])*Derivative[2][y][x]
```

✓ **Maple** : cpu = 0.474 (sec), leaf count = 66

$$\left\{y(x) = x\, \mathrm{RootOf}\left(c_2 + \int^{\_Z} \frac{-\_f + \mathrm{RootOf}\left(c_1 \_Z \_f - c_1 \_Z \tan\left(\frac{1}{\_Z}\right) + c_1 \_f \tan\left(\frac{1}{\_Z}\right) + \_Z \_f \tan\left(\frac{1}{\_Z}\right) + \right.}{\_f^2 + 1}\right.\right.$$

2.1819 ODE No. 1819

$$ax^3 y'(x) y''(x) + by(x)^2 = 0$$

✗ **Mathematica** : cpu = 1.99553 (sec), leaf count = 0 , could not solve

```
DSolve[b*y[x]^2 + a*x^3*Derivative[1][y][x]*Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 0.117 (sec), leaf count = 42

$$\left\{y(x) = \mathrm{e}^{c_2 + \int^{\ln(x)} \mathrm{RootOf}\left(c_1 - \_b - \left(\int^{\_Z} \frac{\_aa}{\_a^3 a - \_a^2 a + b} d\_a\right)\right) d\_b}\right\}$$

2.1820 ODE No. 1820

$$y''(x)\left(\mathrm{f1}(x)y'(x)+\mathrm{f2}(x)y(x)\right)+\mathrm{f3}(x)y'(x)^2+\mathrm{f4}(x)y(x)y'(x)+\mathrm{f5}(x)y(x)^2=0$$

✗ **Mathematica** : cpu = 303.679 (sec), leaf count = 0 , timed out

```
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```

✓ **Maple** : cpu = 1.169 (sec), leaf count = 88

$$\left\{y(x)=ODESolStruc\left(\mathrm{e}^{c_1+\int \_b(\_a)d\_a},\left[\left\{\frac{d}{d\_a}\_\mathrm{b}(\_a)=\frac{-f1\_b(\_a)^3+(-f2-f3)\_b(\_a)^2-\_b(\_a)\,f4\,(\_a)}{f1\_b\,(\_a)+f2}\right.\right.\right.$$

2.1821 ODE No. 1821

$$\left(x^2+2y(x)^2y'(x)\right)y''(x)+2y(x)y'(x)^3+3xy'(x)+y(x)=0$$

✗ **Mathematica** : cpu = 42.3157 (sec), leaf count = 0 , could not solve

```
DSolve[y[x] + 3*x*Derivative[1][y][x] + 2*y[x]*Derivative[1][y][x]^3 + (x^2 + 2*y[x]^2*Deriv
```

✓ **Maple** : cpu = 3.185 (sec), leaf count = 54

$$\left\{y(x)=ODESolStruc\left(\_b(\_a),\left[\left\{\_b(\_a)^2\left(\frac{d}{d\_a}\_\mathrm{b}(\_a)\right)^2+\_a^2\left(\frac{d}{d\_a}\_\mathrm{b}(\_a)\right)+\_a\_b(\_a)+c_1=0\right\},\{\_\right.\right.\right.$$

2.1822 ODE No. 1822

$$\left(y'(x)^2+y(x)^2\right)y''(x)+y(x)^3=0$$

✓ **Mathematica** : cpu = 1.11182 (sec), leaf count = 371

$$\left\{\left\{y(x)\to c_2\exp\left(\frac{1}{12}\left(-2\sqrt{3}\tan^{-1}\left(\frac{1+2\mathrm{InverseFunction}\left[\frac{\left(\sqrt{3}-i\right)\tan^{-1}\left(\frac{\#1}{\sqrt{\frac{1}{2}\left(1-i\sqrt{3}\right)}}\right)}{\sqrt{6\left(1-i\sqrt{3}\right)}}+\frac{\left(\sqrt{3}+i\right)\tan^{-1}\left(\frac{\#1}{\sqrt{\frac{1}{2}\left(1+i\sqrt{\right.}\right.}}\right.}{\sqrt{6\left(1+i\sqrt{3}\right)}}\right.}{\sqrt{3}}\right.\right.\right.\right.\right.\right.$$

✓ **Maple** : cpu = 1.948 (sec), leaf count = 293

$$\left\{y(x)=c_2\left(\tan^2\left(\sqrt{3}\,x\right)+1\right)^{-\frac{1}{4c_1^2+4}}\left(\tan^2\left(\sqrt{3}\,x\right)+1\right)^{-\frac{c_1^2}{4c_1^2+4}}\left(c_1+\tan\left(\sqrt{3}\,x\right)\right)^{\frac{1}{2c_1^2+2}}\left(c_1+\tan\left(\sqrt{3}\,x\right)\right)^{\frac{c_1^2}{2c_1^2+2}}\right.$$

2.1823 ODE No. 1823

$$y''(x)\left(a\left(xy'(x)-y(x)\right)+y'(x)^2\right)-b=0$$

✓ **Mathematica** : cpu = 0.401265 (sec), leaf count = 281

$$\left\{\text{Solve}\left[-\int\frac{a\left(\frac{ax^2}{4}+y(x)\right)+\sqrt{4b\left(\frac{ax^2}{4}+y(x)\right)-2c_1}}{\sqrt{\left(a^2\left(\frac{ax^2}{4}+y(x)\right)^2-4b\left(\frac{ax^2}{4}+y(x)\right)+2c_1\right)\left(a\left(\frac{ax^2}{4}+y(x)\right)+\sqrt{4b\left(\frac{ax^2}{4}+y(x)\right)-2c_1}\right)}}d\left(\frac{a\right.$$

✓ **Maple** : cpu = 0.55 (sec), leaf count = 289

$$\left\{y(x)=-\frac{a\,x^2}{4}+\text{RootOf}\left(c_2-x-\left(\int^{\_Z}\frac{\sqrt{\left(\_f^2a^2-4\_fb+2c_1\right)\left(\_fa+\sqrt{4\_fb-2c_1}\right)}}{\_f^2a^2-4\_fb+2c_1}d\_f\right)\right),y(x)=-\frac{a\,x}{4}\right.$$

2.1824 ODE No. 1824

$$y''(x)\left(a\sqrt{y'(x)^2+1}-xy'(x)\right)-y'(x)^2-1=0$$

✓ **Mathematica** : cpu = 0.956735 (sec), leaf count = 347

$$\left\{\left\{y(x)\to\frac{-2\sqrt{x^2\left(a^2-x^2+c_1{}^2\right)}+c_1x\log\left(-c_1\left(\sqrt{x^2\left(a^2-x^2+c_1{}^2\right)}+c_1x\right)+a^2(-x)+ax^2\right)+c_1x\log\left(c_1\left(\right.\right.}{}\right.\right.$$

✓ **Maple** : cpu = 1.288 (sec), leaf count = 96

$$\left\{y(x)=c_2+\int\frac{-c_1a^2-\sqrt{\left(a^2-x^2+c_1^2\right)a^2}\,x}{a^3-a\,x^2}dx,y(x)=c_2+\int\frac{-c_1a^2+\sqrt{\left(a^2-x^2+c_1^2\right)a^2}\,x}{a^3-a\,x^2}dx\right\}$$

2.1825 ODE No. 1825

$$f(x) + y''(x)h(y'(x)) + j(y(x))y'(x) = 0$$

✗ **Mathematica** : cpu = 0.0367427 (sec), leaf count = 0 , could not solve

```
DSolve[f[x] + j[y[x]]*Derivative[1][y][x] + h[Derivative[1][y][x]]*Derivative[2][y][x] == 0,
```

✓ **Maple** : cpu = 1.306 (sec), leaf count = 49

$$\{y(x) = ODESolStruc\left(\_f(\_b), \left[\left\{\_bf + c_1 + \int^{\_f(\_b)} 1 d\_a + \int^{\frac{d}{d\_b}\_f(\_b)} h(\_a)\, d\_a = 0\right\}, \{\_b = x, \_f(\_b) =$$

2.1826 ODE No. 1826

$$-ay(x) - b + y''(x)^2 = 0$$

✓ **Mathematica** : cpu = 1.14372 (sec), leaf count = 201

$$\left\{\text{Solve}\left[\frac{(ay(x)+b)^2\left(1-\frac{4(ay(x)+b)^{3/2}}{3ac_1}\right)\, {}_2F_1\left(\frac{1}{2},\frac{2}{3};\frac{5}{3};\frac{4(b+ay(x))^{3/2}}{3ac_1}\right)^2}{a^2\left(-\frac{4(ay(x)+b)^{3/2}}{3a}+c_1\right)} = (x+c_2)^2, y(x)\right], \text{Solve}\left[\frac{(ay(x)+b)^2\left(1-\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.799 (sec), leaf count = 173

$$\left\{-c_2 - x + \int^{y(x)} \frac{\sqrt{3}\,a}{\sqrt{\left(4\sqrt{\_aa+b}\,\_aa - c_1 + 4\sqrt{\_aa+b}\,b\right)a}} d\_a = 0, -c_2 - x + \int^{y(x)} -\frac{3a}{\sqrt{-12\left(-\frac{c_1}{4} + (\_aa +\right.}}\right.$$

2.1827 ODE No. 1827

$$a^2y''(x)^2 - 2axy''(x) + y'(x) = 0$$

✗ **Mathematica** : cpu = 1.48238 (sec), leaf count = 0 , could not solve

```
DSolve[Derivative[1][y][x] - 2*a*x*Derivative[2][y][x] + a^2*Derivative[2][y][x]^2 == 0, y[x
```

✓ **Maple** : cpu = 3.5 (sec), leaf count = 81

$$\left\{y(x) = c_2 + \int \text{RootOf}\left(c_1 - \left(\int_{\_g}^{\_Z} \frac{1}{2\_fa - x^2 + \sqrt{x^2 - \_fx}} d\_f\right)\right) dx, y(x) = c_2 + \int \text{RootOf}\left(c_1 - \left(\int_{\_g}^{\_Z}\right.\right.\right.$$

2.1828 ODE No. 1828

$$2(x^2+1)\,y''(x)^2+2y'(x)\,(y'(x)+x)-x(4y'(x)+x)\,y''(x)-2y(x)=0$$

✓ **Mathematica** : cpu = 0.0104344 (sec), leaf count = 32

$$\left\{\left\{y(x)\to -\frac{1}{2}\sqrt{c_2-c_1{}^2}x^2+c_1x+c_2\right\}\right\}$$

✓ **Maple** : cpu = 1.3 (sec), leaf count = 59

$$\left\{y(x)=\frac{1}{2}c_1x^2+c_1^2+c_2^2+c_2x, y(x)=c_1^2+\frac{c_1\operatorname{arcsinh}(x)}{2}-\frac{3x^2}{16}+\frac{\operatorname{arcsinh}(x)^2}{16}+\frac{\left(c_1+\frac{\operatorname{arcsinh}(x)}{4}\right)\sqrt{x^2+1}\,x}{2}\right\}$$

2.1829 ODE No. 1829

$$3x^2y''(x)^2+4y'(x)^2-2(3xy'(x)+y(x))\,y''(x)=0$$

✓ **Mathematica** : cpu = 0.0060491 (sec), leaf count = 24

$$\left\{\left\{y(x)\to \frac{c_1{}^2x^2}{c_2}+c_1x+c_2\right\}\right\}$$

✓ **Maple** : cpu = 0.782 (sec), leaf count = 36

$$\left\{y(x)=0, y(x)=c_1x\,x^{\frac{2\sqrt{3}}{3}}, y(x)=\frac{c_1^2x^2}{c_2}+c_1x+c_2\right\}$$

2.1830 ODE No. 1830

$$(2-9x)x^2y''(x)^2+6y(x)y''(x)-36xy'(x)^2-6(1-6x)xy'(x)y''(x)=0$$

✓ **Mathematica** : cpu = 0.0276236 (sec), leaf count = 24

$$\left\{\left\{y(x)\to \frac{c_1{}^2x^3}{c_2}+c_1x+c_2\right\}\right\}$$

✓ **Maple** : cpu = 0.987 (sec), leaf count = 308

$$\left\{y(x)=0, y(x)=\frac{c_1\sqrt{5}\,\sqrt{4}\,\sqrt{4x-1}\,x\left((9x-1)\sqrt{9}+9\sqrt{9x^2-2x}\right)^{\frac{2\sqrt{9}}{9}}\left((9x-1)\sqrt{9}+9\sqrt{9x^2-2x}\right)^{\frac{5\sqrt{9}}{18}}\mathrm{e}^{\sqrt{9x^2-2\cdots}}}{135\sqrt{\frac{\frac{4}{5}+\frac{\sqrt{16}\left(x-\frac{1}{5}\right)}{\sqrt{9x^2-2x}}}{\sqrt{-\frac{(4x-1)^2}{9x^2-2x}}}}}\right.$$

2.1831 ODE No. 1831

$y(x)(xF(0,2)+xF(2,0))y''(x)+xF(2,2)y''(x)^2+xF(1,1)y''(x)+y'(x)\left((xF(1,2)+xF(2,1))y''(x)+y(x)(xF(0,1\right.$

✗ **Mathematica** : cpu = 78.6372 (sec), leaf count = 0 , could not solve

```
DSolve[x*F[0, 0]*y[x]^2 + x*F[1, 1]*Derivative[2][y][x] + (x*F[0, 2] + x*F[2, 0])*y[x]*Deriv
```

✓ **Maple** : cpu = 1.721 (sec), leaf count = 163

$$\left\{y(x) = ODESolStruc\left(\mathrm{e}^{c_1+\int \_b(\_a)d\_a}, \left[\left\{\frac{d}{d\_a}\_\mathrm{b}(\_a) = \frac{-2\_b(\_a)^2 F_{2,2}(\_a) + (-F_{1,2}(\_a) - F_{2,1}(\_a))\_b(\right.\right.\right.\right.$$

2.1832 ODE No. 1832

$$y(x)y''(x)^2 - ae^{2x} = 0$$

✗ **Mathematica** : cpu = 20.4935 (sec), leaf count = 0 , could not solve

```
DSolve[-(a*E^(2*x)) + y[x]*Derivative[2][y][x]^2 == 0, y[x], x]
```

✓ **Maple** : cpu = 1.201 (sec), leaf count = 117

$$\left\{y(x) = ODESolStruc\left(\_a\,\mathrm{e}^{\frac{2c_1}{3}+\int \frac{2\_b(\_a)}{3}d\_a}, \left[\left\{\frac{d}{d\_a}\_\mathrm{b}(\_a) = -\frac{\left(-4\_a^2+9\sqrt{\_aa}\right)\_b(\_a)^3}{9\_a} + \frac{4\_b(\_a)^2}{3}\right\}, \left\{\right.\right.\right.\right.$$

2.1833 ODE No. 1833

$$y''(x)^2\left(a^2y(x)^2-b^2\right)+y'(x)^2\left(a^2y'(x)^2-1\right)-2a^2y(x)y'(x)^2y''(x)=0$$

✓ **Mathematica** : cpu = 121.475 (sec), leaf count = 81

$$\left\{\left\{y(x) \to \frac{b\left(e^{\frac{\sqrt{-1+a^2c_1{}^2}(x+c_2)}{b}}-c_1\right)}{\sqrt{-1+a^2c_1{}^2}}\right\}, \left\{y(x) \to c_1e^{c_2x} - \frac{\sqrt{b^2+\frac{1}{c_2{}^2}}}{a}\right\}\right\}$$

✓ **Maple** : cpu = 6.829 (sec), leaf count = 162

$$\left\{y(x) = c_1, y(x) = \frac{b}{a}, y(x) = \frac{\left(-c_1+\mathrm{e}^{\frac{\sqrt{c_1^2a^2-1}\,(c_2+x)}{b}}\right)b}{\sqrt{c_1^2a^2-1}}, y(x) = \frac{b\tan\left(\frac{\sqrt{a^2}\,(c_1-x)}{ab}\right)}{\sqrt{\tan^2\left(\frac{\sqrt{a^2}\,(c_1-x)}{ab}\right)+1}\,a}, y(x) = -\frac{b}{a}, y(x) = -\right.$$

2.1834 ODE No. 1834

$$\left(x^2y(x)y''(x)+x^2\left(-y'(x)^2\right)+y(x)^2\right)^2-4xy(x)\left(xy'(x)-y(x)\right)^3=0$$

✓ **Mathematica** : cpu = 22.6742 (sec), leaf count = 19

$$\left\{\left\{y(x)\to c_1xe^{\frac{1}{-x+c_2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.652 (sec), leaf count = 92

$$\left\{y(x)=0,y(x)=c_1x,y(x)=ODESolStruc\left(\mathrm{e}^{c_1+\int \_b(\_a)d\_a},\left[\left\{\frac{d}{d\_a}\_\mathrm{b}(\_a)=\frac{2\sqrt{(\_a\_b\left(\_a\right)-1)\_a}\_a\_b(\_\right.\right.\right.\right.$$

2.1835 ODE No. 1835

$$32y''(x)\left(xy''(x)-y'(x)\right)^3+\left(2y(x)y''(x)-y'(x)^2\right)^3=0$$

✓ **Mathematica** : cpu = 0.0844814 (sec), leaf count = 143

$$\left\{\left\{y(x)\to\frac{1}{4}\left(-\frac{8c_1{}^3}{\sqrt[3]{3}\sqrt[3]{\sqrt{3}\sqrt{27c_1{}^{10}c_2{}^{10}-64c_1{}^9c_2{}^9}-9c_1{}^5c_2{}^5}}+\frac{c_1{}^2}{c_2}-\frac{2\sqrt[3]{\sqrt{3}\sqrt{27c_1{}^{10}c_2{}^{10}-64c_1{}^9c_2{}^9}-9c_1{}^5c_2{}^5}}{3^{2/3}c_2{}^3}\right)\right.\right.$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve((2*diff(diff(y(x),x),x)*y(x)-diff(y(x),x)^2)^3+32*diff(diff(y(x),x),x)*(x*diff(diff(y
diff(y(x),x))^3=0,y(x))
```

2.1836 ODE No. 1836

$$\sqrt{ay''(x)^2+by'(x)^2}+cy(x)y''(x)+dy'(x)^2=0$$

✗ **Mathematica** : cpu = 10.3769 (sec), leaf count = 0 , could not solve

```
DSolve[d*Derivative[1][y][x]^2 + c*y[x]*Derivative[2][y][x] + Sqrt[b*Derivative[1][y][x]^2 +
```

✓ **Maple** : cpu = 1.172 (sec), leaf count = 116

$$\left\{y(x)=0,y(x)=c_1,y(x)=c_1x+c_2,y(x)=ODESolStruc\left(\_a,\left[\left\{\frac{\left(-\_acd\_b(\_a)+\left(-c^2\_a^2+a\right)\left(\frac{d}{d\_a}\_\mathrm{b}(\right.\right.}{}\right.\right.\right.\right.$$

2.1837 ODE No. 1837

$$y^{(3)}(x) - a^2 \left(y'(x)^5 + 2y'(x)^3 + y'(x)\right) = 0$$

✓ **Mathematica** : cpu = 10.2173 (sec), leaf count = 145

$$\left\{\left\{y(x) \to \int_1^x \text{InverseFunction}\left[-3 \int \frac{1}{\sqrt{3\left(a^2\right)^2 \#1^6 + 9\left(a^2\right)^2 \#1^4 + 9\left(a^2\right)^2 \#1^2 + 9c_1}} d\#1\&\right] [c_2 - K[1]] dK[1]$$

✓ **Maple** : cpu = 0.547 (sec), leaf count = 95

$$\left\{y(x) = c_3 + \int \text{RootOf}\left(c_2 + x - 3\left(\int^{\_Z} \frac{1}{\sqrt{3a^2\_f^6 + 9\_f^4a^2 + 9\_f^2a^2 + 9c_1}} d\_f\right)\right) dx, y(x) = c_3 + \int \text{RootO}$$

2.1838 ODE No. 1838

$$y^{(3)}(x) + y(x)y''(x) - y'(x)^2 + 1 = 0$$

✗ **Mathematica** : cpu = 0.034647 (sec), leaf count = 0 , could not solve

```
DSolve[1 - Derivative[1][y][x]^2 + y[x]*Derivative[2][y][x] + Derivative[3][y][x] == 0, y[x]
```

✓ **Maple** : cpu = 0.816 (sec), leaf count = 73

$$\left\{y(x) = ODESolStruc\left(\_a, \left[\left\{\_a\_b(\_a)\left(\frac{d}{d\_a}\_b(\_a)\right) + \_b(\_a)^2\left(\frac{d^2}{d\_a^2}\_b(\_a)\right) + \_b(\_a)\left(\frac{d}{d\_a}\_b(\_a)\right.\right.\right.\right.$$

2.1839 ODE No. 1839

$$y^{(3)}(x) - y(x)y''(x) + y'(x)^2 = 0$$

✗ **Mathematica** : cpu = 0.0336891 (sec), leaf count = 0 , could not solve

```
DSolve[Derivative[1][y][x]^2 - y[x]*Derivative[2][y][x] + Derivative[3][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 1.057 (sec), leaf count = 116

$$\left\{y(x) = ODESolStruc\left(e^{c_2 + \int \_g(\_f) d\_f}, \left[\left\{\frac{d}{d\_f}\_g(\_f) = \frac{6\left(\left(\_f - \frac{1}{6}\right)\_g(\_f) + \frac{1}{6}\right)\left(\_f\_g(\_f) + 1\right)\_g(\_f)}{\_f}\right\}, \left\{-\right.\right.\right.\right.$$

2.1840 ODE No. 1840

$$ay(x)y''(x) + y^{(3)}(x) = 0$$

✗ **Mathematica** : cpu = 0.037189 (sec), leaf count = 0 , could not solve

```
DSolve[a*y[x]*Derivative[2][y][x] + Derivative[3][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 1.15 (sec), leaf count = 129

$$\left\{y(x) = ODESolStruc\left(e^{c_2+\int \_g(\_f)d\_f}, \left[\left\{\frac{d}{d\_f}\_g(\_f) = \frac{\left(6\_f^2\_g(\_f)^2 + 2\_fa\_g(\_f)^2 + 7\_f\_g(\_f) + a\_g(\_f\right.}{\_f}\right.\right.\right.$$

2.1841 ODE No. 1841

$$-f(x) + x^2y^{(3)}(x) + xy''(x) + (2xy(x) - 1)y'(x) + y(x)^2 = 0$$

✗ **Mathematica** : cpu = 0.128177 (sec), leaf count = 0 , could not solve

```
DSolve[-f[x] + y[x]^2 + (-1 + 2*x*y[x])*Derivative[1][y][x] + x*Derivative[2][y][x] + x^2*De
```

✓ **Maple** : cpu = 0.73 (sec), leaf count = 60

$$\left\{y(x) = ODESolStruc\left(\_b(\_a), \left[\left\{\_a^2\left(\frac{d^2}{d\_a^2}\_b(\_a)\right) + \_a\_b(\_a)^2 - \_a\left(\frac{d}{d\_a}\_b(\_a)\right) + c_1 - \left(\int f(\_a)\, d\right.\right.\right.\right.$$

2.1842 ODE No. 1842

$$x^2y^{(3)}(x) + x(y(x) - 1)y''(x) + xy'(x)^2 + (1 - y(x))y'(x) = 0$$

✓ **Mathematica** : cpu = 0.208281 (sec), leaf count = 286

$$\left\{\left\{y(x) \to \frac{2x\left(c_3\left(J_{\frac{\sqrt{c_2+2}}{\sqrt{2}}}\left(-\frac{1}{2}ix\sqrt{c_1}\right) - \frac{1}{4}i\sqrt{c_1}x\left(J_{\frac{\sqrt{c_2+2}}{\sqrt{2}}-1}\left(-\frac{1}{2}ix\sqrt{c_1}\right) - J_{\frac{\sqrt{c_2+2}}{\sqrt{2}}+1}\left(-\frac{1}{2}ix\sqrt{c_1}\right)\right)\right) + Y_{\frac{\sqrt{c_2+2}}{\sqrt{2}}}\left(-\frac{1}{2}\right.\right.}{c_3xJ_{\frac{\sqrt{c_2+2}}{\sqrt{2}}}\left(-\frac{1}{2}ix\sqrt{c_1}\right) + xY_{\frac{\sqrt{c_2+2}}{\sqrt{2}}}\left(-\frac{1}{2}i\right.}\right.\right.$$

✓ **Maple** : cpu = 0.821 (sec), leaf count = 190

$$\left\{-c_3 + 2\left(\int^{y(x)} \frac{}{\_h^2 + 2\,\mathrm{RootOf}\left(2c_2\sqrt{2}\_Z\mathrm{BesselY}\left(\frac{\sqrt{c_1+4}}{2}+1, \frac{\sqrt{2}\_Z}{2}\right) + 2c_2\_h\mathrm{BesselY}\left(\frac{\sqrt{c_1+4}}{2}, \frac{\sqrt{2}\_Z}{2}\right) - 2c\right.}\right.\right.$$

2.1843 ODE No. 1843

$$y^{(3)}(x)y(x) + y(x)^3 y'(x) - y'(x)y''(x) = 0$$

✓ **Mathematica** : cpu = 2.92628 (sec), leaf count = 409

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[-\frac{2i\sqrt{1+\frac{\#1^2}{2\left(\sqrt{c_2{}^2-c_1}-c_2\right)}}\sqrt{1-\frac{\#1^2}{2\left(c_2+\sqrt{c_2{}^2-c_1}\right)}}F\left(i\sinh^{-1}\left(\frac{\sqrt{\frac{1}{\sqrt{c_2{}^2-c_1}-c_2}}\#1}{\sqrt{2}}\right)|\frac{c_2-\sqrt{c}}{c_2+\sqrt{c}}\right.}{\sqrt{\frac{1}{\sqrt{c_2{}^2-c_1}-c_2}}\sqrt{-\frac{\#1^4}{2}+2\#1^2 c_2-2c_1}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.518 (sec), leaf count = 77

$$\left\{-c_3 - x + \int^{y(x)} -\frac{2}{\sqrt{-\_a^4 + 4c_2\_a^2 - 4c_2^2 + 4c_1}} d\_a = 0, -c_3 - x + \int^{y(x)} \frac{2}{\sqrt{-\_a^4 + 4c_2\_a^2 - 4c_2^2 + 4c_1}} d\_a\right.$$

2.1844 ODE No. 1844

$$4y(x)^2 y^{(3)}(x) + 15y'(x)^3 - 18y(x)y'(x)y''(x) = 0$$

✓ **Mathematica** : cpu = 0.115466 (sec), leaf count = 20

$$\left\{\left\{y(x) \to \frac{1}{(c_3x^2 + c_2x + c_1)^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.833 (sec), leaf count = 17

$$\left\{y(x) = \frac{c_3}{\left(c_1(c_2 + x)^2 - 4\right)^2}\right\}$$

2.1845 ODE No. 1845

$$9y(x)^2 y^{(3)}(x) + 40y'(x)^3 - 45y(x)y'(x)y''(x) = 0$$

✓ **Mathematica** : cpu = 0.112587 (sec), leaf count = 22

$$\left\{\left\{y(x) \to \frac{1}{(c_3x^2 + c_2x + c_1)^{3/2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.652 (sec), leaf count = 22

$$\left\{y(x) = \frac{c_3}{(x^2 + 2c_2x + c_2^2 - 9c_1)^{\frac{3}{2}}}\right\}$$

2.1846 ODE No. 1846

$$2y^{(3)}(x)y'(x) - 3y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.0363249 (sec), leaf count = 51

$$\left\{\{y(x)\to c_1\},\left\{y(x)\to \sqrt{\frac{2}{3}}e^{-\sqrt{\frac{3}{2}}x}\left(c_1e^{\sqrt{6}x}-c_2\right)+c_3\right\}\right\}$$

✓ **Maple** : cpu = 0.018 (sec), leaf count = 28

$$\left\{y(x)=c_1, y(x)=c_2e^{\frac{\sqrt{6}\,x}{2}}+c_3e^{-\frac{\sqrt{6}\,x}{2}}+c_1\right\}$$

2.1847 ODE No. 1847

$$y^{(3)}(x)\left(y'(x)^2+1\right) - 3y'(x)y''(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.246633 (sec), leaf count = 95

$$\left\{\left\{y(x)\to c_3-\frac{i\sqrt{c_1{}^2x^2+2c_2c_1{}^2x-1+c_2{}^2c_1{}^2}}{c_1}\right\},\left\{y(x)\to \frac{i\sqrt{c_1{}^2x^2+2c_2c_1{}^2x-1+c_2{}^2c_1{}^2}}{c_1}+c_3\right\}\right\}$$

✓ **Maple** : cpu = 0.424 (sec), leaf count = 49

$$\left\{y(x)=c_3-\sqrt{-x^2-2c_2x-c_2^2+c_1}, y(x)=c_3+\sqrt{-x^2-2c_2x-c_2^2+c_1}\right\}$$

2.1848 ODE No. 1848

$$y''(x)^2\left(-a-3y'(x)\right)+y^{(3)}(x)\left(y'(x)^2+1\right)=0$$

✓ **Mathematica** : cpu = 0.492681 (sec), leaf count = 187

$$\left\{\left\{y(x)\to c_3-\frac{\left(1-i\text{InverseFunction}\left[\frac{(\#1-a)e^{-a\tan^{-1}(\#1)}}{\sqrt{\#1^2+1}(a^2+1)c_1}\&\right][x+c_2]\right)^{-\frac{1}{2}-\frac{ia}{2}}\left(1+i\text{InverseFunction}\left[\frac{(\#1-a)e^{-a\,t}}{\sqrt{\#1^2+1}(a}\right.\right.}{(a^2+1)\,c_1}\right.\right.$$

✓ **Maple** : cpu = 1.487 (sec), leaf count = 789

$$\left\{y(x)=c_3+\int\frac{\sin\left(\text{RootOf}\left(c_1^2c_2^2a^4e^{2\_Za}+2c_2c_1^2a^4x\,e^{2\_Za}+c_1^2a^4x^2e^{2\_Za}+2c_1^2c_2^2a^2e^{2\_Za}+4c_2c_1^2a^2x\,e^{2\_Za}+2\right.\right.}{\cos\left(\text{RootOf}\left(c_1^2c_2^2a^4e^{2\_Za}+2c_2c_1^2a^4x\,e^{2\_Za}+c_1^2a^4x^2e^{2\_Za}+2c_1^2c_2^2a^2e^{2\_Za}+4c_2c_1^2a^2x\,e^{2\_Za}+2\right.\right.}\right.$$

2.1849 ODE No. 1849

$$y^{(3)}(x)y''(x) - a\sqrt{b^2y''(x)^2 + 1} = 0$$

✓ **Mathematica** : cpu = 0.645312 (sec), leaf count = 426

$$\left\{\left\{y(x) \to \frac{\frac{(a^2b^4x^2+2ab^4c_1x+b^4c_1{}^2-1)^{3/2}}{3ab^2} + \frac{\sqrt{a^2b^4x^2+2ab^4c_1x+b^4c_1{}^2-1}}{ab^2} - \frac{c_1 \log\left(\sqrt{a^2b^4x^2+2ab^4c_1x+b^4c_1{}^2-1}+ab^2x+b^2c_1\right)}{a} - x \text{lo}}{2ab^3}\right.\right.$$

✓ **Maple** : cpu = 0.388 (sec), leaf count = 197

$$\left\{y(x) = c_2x + c_3 + \int \frac{-\frac{\ln\left(\frac{(c_1+x)a^2b^4}{\sqrt{a^2b^4}}+\sqrt{((c_1+x)a\,b^2+1)((c_1+x)a\,b^2-1)}\right)}{\sqrt{a^2b^4}} + \sqrt{((c_1+x)\,a\,b^2+1)\,((c_1+x)\,a\,b^2-1)}\,(c_1 -}{2b}\right.$$

2.1850 ODE No. 1850

$$y^{(4)}(x)y'(x) - y^{(3)}(x)y''(x) + y^{(3)}(x)y'(x)^3 = 0$$

✗ **Mathematica** : cpu = 0.147269 (sec), leaf count = 0 , could not solve

```
DSolve[Derivative[1][y][x]^3*Derivative[3][y][x] - Derivative[2][y][x]*Derivative[3][y][x] +
```

✓ **Maple** : cpu = 1.645 (sec), leaf count = 164

$$\left\{y(x) = ODESolStruc\left(c_3 + \int \frac{\_j(\_h)\,\mathrm{e}^{-c_2+\int -\_j(\_h)d\_h}}{\_h}d\_h, \left[\left\{\frac{d}{d\_h}\_j(\_h) = \frac{\left(12\_h^2\_j(\_h)^2 + 3\_h\_j(\_h)\right.}{}\right.\right.\right.\right.$$

2.1851 ODE No. 1851

$$y'(x)^3\left(f'(x)y'(x) + f(x)y''(x)\right) - y''(x)\left(f''(x)y'(x) + 2f'(x)y''(x) + f(x)y^{(3)}(x)\right) + y'(x)\left(f^{(3)}(x)y'(x) + 3f''(x)y\right.$$

✗ **Mathematica** : cpu = 0.704677 (sec), leaf count = 0 , could not solve

```
DSolve[2*q[x]*Sin[y[x]]*Derivative[1][y][x]^2 + Derivative[1][y][x]^3*(Derivative[1][f][x]*D
(Derivative[1][q][x]*Derivative[1][y][x]) + q[x]*Derivative[2][y][x]) - Derivative[2][y][x]*
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(y(x),x)*(diff(diff(diff(f(x),x),x),x)*diff(y(x),x)+3*diff(diff(f(x),x),x)*diff(d
diff(diff(y(x),x),x)*f*diff(diff(diff(y(x),x),x),x)+diff(y(x),x)^3*(diff(f(x),x)*diff(y(x),x
diff(q(x),x)*diff(y(x),x))*cos(y(x))=0,y(x))
```

2.1852 ODE No. 1852

$$3y^{(4)}(x)y''(x) - 5y^{(3)}(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.130194 (sec), leaf count = 28

$$\left\{\left\{y(x) \to c_2\left(-\sqrt{2x+3c_1}\right) + c_4x + c_3\right\}\right\}$$

✓ **Maple** : cpu = 0.416 (sec), leaf count = 28

$$\left\{y(x) = c_3x + 3c_1(c_2+x)\sqrt{6}\sqrt{-\frac{c_1}{c_2+x}} + c_4\right\}$$

2.1853 ODE No. 1853

$$40y^{(3)}(x)^3 + 9y^{(5)}(x)y''(x)^2 - 45y^{(4)}(x)y^{(3)}(x)y''(x) = 0$$

✓ **Mathematica** : cpu = 0.141571 (sec), leaf count = 43

$$\left\{\left\{y(x) \to c_5x - \frac{4\sqrt{x(c_3x+c_2)+c_1}}{c_2{}^2 - 4c_1c_3} + c_4\right\}\right\}$$

✓ **Maple** : cpu = 1.053 (sec), leaf count = 110

$$\left\{y(x) = c_4x + c_5 + \int\int \text{RootOf}\left(c_3 + x - \left(\int^{\_Z} \frac{10}{\text{RootOf}\left(20c_2 + \int^{\_Z}\left(e^{\text{RootOf}(81\_k^2 e^{\_Z} + 162c_1 e^{\_Z} - 20\_Z e^{\_Z} + 218}\right.\right.}\right.\right.\right.$$

2.1854 ODE No. 1854

$$y^{(n)}(x) - f\left(\frac{\partial^{n-1}y(x)}{\partial x^{n-1}}\right) = 0$$

✗ **Mathematica** : cpu = 0.0413331 (sec), leaf count = 0 , could not solve

```
DSolve[-f[D[y[x], {x, -1 + n}]] + Derivative[n][y][x] == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , exception

```
unable to handle ODEs of undefined differential order
```

2.1855 ODE No. 1855

$$y^{(n)}(x) - f\left(\frac{\partial^{n-2}y(x)}{\partial x^{n-2}}\right) = 0$$

✗ **Mathematica** : cpu = 0.0032559 (sec), leaf count = 0 , could not solve

```
DSolve[-f[D[y[x], {x, -2 + n}]] + Derivative[n][y][x] == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , exception

```
unable to handle ODEs of undefined differential order
```

2.1856 ODE No. 1856

$$\{x'(t) = ax(t), y'(t) = b\}$$

✓ **Mathematica** : cpu = 0.0180445 (sec), leaf count = 22

$$\{\{x(t) \to c_1 e^{at}, y(t) \to bt + c_2\}\}$$

✓ **Maple** : cpu = 0.055 (sec), leaf count = 19

$$\{\{x(t) = c_1 e^{at}, y(t) = bt + c_2\}\}$$

2.1857 ODE No. 1857

$$\{x'(t) = ay(t), y'(t) = -ax(t)\}$$

✓ **Mathematica** : cpu = 0.0095632 (sec), leaf count = 39

$$\{\{x(t) \to c_1 \cos(at) + c_2 \sin(at), y(t) \to c_2 \cos(at) - c_1 \sin(at)\}\}$$

✓ **Maple** : cpu = 0.067 (sec), leaf count = 35

$$\{\{x(t) = c_1 \sin(at) + c_2 \cos(at), y(t) = c_1 \cos(at) - c_2 \sin(at)\}\}$$

2.1858 ODE No. 1858

$$\{x'(t) = ay(t), y'(t) = bx(t)\}$$

✓ **Mathematica** : cpu = 0.0093449 (sec), leaf count = 182

$$\left\{\left\{x(t) \to \frac{1}{2}c_1e^{-\sqrt{a}\sqrt{b}t}\left(e^{2\sqrt{a}\sqrt{b}t}+1\right) + \frac{\sqrt{a}c_2e^{-\sqrt{a}\sqrt{b}t}\left(e^{2\sqrt{a}\sqrt{b}t}-1\right)}{2\sqrt{b}}, y(t) \to \frac{\sqrt{b}c_1e^{-\sqrt{a}\sqrt{b}t}\left(e^{2\sqrt{a}\sqrt{b}t}-1\right)}{2\sqrt{a}} + \frac{1}{2}c_2e\right.\right.$$

✓ **Maple** : cpu = 0.073 (sec), leaf count = 64

$$\left\{\left\{x(t) = c_1\mathrm{e}^{\sqrt{a}\sqrt{b}t} + c_2\mathrm{e}^{-\sqrt{a}\sqrt{b}t}, y(t) = \frac{\left(c_1\mathrm{e}^{\sqrt{a}\sqrt{b}t} - c_2\mathrm{e}^{-\sqrt{a}\sqrt{b}t}\right)\sqrt{b}}{\sqrt{a}}\right\}\right\}$$

2.1859 ODE No. 1859

$$\{x'(t) = ax(t) - y(t), y'(t) = ay(t) + x(t)\}$$

✓ **Mathematica** : cpu = 0.0047282 (sec), leaf count = 51

$$\{\{x(t) \to c_1e^{at}\cos(t) - c_2e^{at}\sin(t), y(t) \to c_2e^{at}\cos(t) + c_1e^{at}\sin(t)\}\}$$

✓ **Maple** : cpu = 0.054 (sec), leaf count = 37

$$\{\{x(t) = (c_1\sin(t) + c_2\cos(t))\,\mathrm{e}^{at}, y(t) = (-c_1\cos(t) + c_2\sin(t))\,\mathrm{e}^{at}\}\}$$

2.1860 ODE No. 1860

$$\{x'(t) = ax(t) + by(t), y'(t) = by(t) + cx(t)\}$$

✓ **Mathematica** : cpu = 0.0348163 (sec), leaf count = 696

$$\left\{\left\{x(t) \to \frac{c_1\left(a\left(-e^{\frac{1}{2}t\left(-\sqrt{a^2-2ab+b^2+4bc}+a+b\right)}\right) + ae^{\frac{1}{2}t\left(\sqrt{a^2-2ab+b^2+4bc}+a+b\right)} + be^{\frac{1}{2}t\left(-\sqrt{a^2-2ab+b^2+4bc}+a+b\right)} + \sqrt{a^2}\right.}{2}\right.\right.$$

✓ **Maple** : cpu = 0.102 (sec), leaf count = 177

$$\left\{\left\{x(t) = c_1\mathrm{e}^{\frac{\left(a+b+\sqrt{a^2+b^2+(-2a+4c)b}\right)t}{2}} + c_2\mathrm{e}^{\frac{\left(a+b-\sqrt{a^2+b^2+(-2a+4c)b}\right)t}{2}}, y(t) = \frac{-c_1\left(a-b-\sqrt{a^2+b^2+(-2a+4c)\,b}\right)\mathrm{e}}{}\right.\right.$$

2.1861 ODE No. 1861

$$\{ax'(t) + by'(t) = \alpha x(t) + \beta y(t), bx'(t) - ay'(t) = \beta x(t) - \alpha y(t)\}$$

✓ **Mathematica** : cpu = 0.0105553 (sec), leaf count = 183

$$\left\{\left\{x(t) \to c_1 e^{\frac{t(a\alpha+b\beta)}{a^2+b^2}} \cos\left(\frac{t(a\beta - \alpha b)}{a^2+b^2}\right) + c_2 e^{\frac{t(a\alpha+b\beta)}{a^2+b^2}} \sin\left(\frac{t(a\beta - \alpha b)}{a^2+b^2}\right), y(t) \to c_2 e^{\frac{t(a\alpha+b\beta)}{a^2+b^2}} \cos\left(\frac{t(a\beta - \alpha b)}{a^2+b^2}\right) - c\right.\right.$$

✓ **Maple** : cpu = 0.113 (sec), leaf count = 152

$$\left\{\left\{x(t) = c_1 \mathrm{e}^{\frac{((i\beta+\alpha)a-(i\alpha-\beta)b)t}{a^2+b^2}} + c_2 \mathrm{e}^{-\frac{((i\beta-\alpha)a-(i\alpha+\beta)b)t}{a^2+b^2}}, y(t) = i\left(c_1 \mathrm{e}^{\frac{((i\beta+\alpha)a-(i\alpha-\beta)b)t}{a^2+b^2}} - c_2 \mathrm{e}^{-\frac{((i\beta-\alpha)a-(i\alpha+\beta)b)t}{a^2+b^2}}\right)\right\}\right\}$$

2.1862 ODE No. 1862

$$\{x'(t) = -y(t), y'(t) = 2x(t) + 2y(t)\}$$

✓ **Mathematica** : cpu = 0.0126009 (sec), leaf count = 52

$$\{\{x(t) \to c_1 e^t(\cos(t) - \sin(t)) - c_2 e^t \sin(t), y(t) \to 2c_1 e^t \sin(t) + c_2 e^t(\sin(t) + \cos(t))\}\}$$

✓ **Maple** : cpu = 0.05 (sec), leaf count = 39

$$\{\{x(t) = (c_1 \sin(t) + c_2 \cos(t))\, \mathrm{e}^t, y(t) = -((c_1 + c_2)\cos(t) + (c_1 - c_2)\sin(t))\, \mathrm{e}^t\}\}$$

2.1863 ODE No. 1863

$$\{x'(t) + 3x(t) + 4y(t) = 0, 2x(t) + y'(t) + 5y(t) = 0\}$$

✓ **Mathematica** : cpu = 0.0068441 (sec), leaf count = 84

$$\left\{\left\{x(t) \to \frac{1}{3}c_1 e^{-7t}\left(2e^{6t} + 1\right) - \frac{2}{3}c_2 e^{-7t}\left(e^{6t} - 1\right), y(t) \to \frac{1}{3}c_2 e^{-7t}\left(e^{6t} + 2\right) - \frac{1}{3}c_1 e^{-7t}\left(e^{6t} - 1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.054 (sec), leaf count = 35

$$\left\{\left\{x(t) = c_1 \mathrm{e}^{-t} + c_2 \mathrm{e}^{-7t}, y(t) = -\frac{c_1 \mathrm{e}^{-t}}{2} + c_2 \mathrm{e}^{-7t}\right\}\right\}$$

2.1864 ODE No. 1864

$$\{x'(t) = -5x(t) - 2y(t), y'(t) = x(t) - 7y(t)\}$$

✓ **Mathematica** : cpu = 0.0102639 (sec), leaf count = 59

$$\{\{x(t) \to c_1 e^{-6t}(\sin(t) + \cos(t)) - 2c_2 e^{-6t}\sin(t), y(t) \to c_1 e^{-6t}\sin(t) + c_2 e^{-6t}(\cos(t) - \sin(t))\}\}$$

✓ **Maple** : cpu = 0.051 (sec), leaf count = 44

$$\left\{\left\{x(t) = (c_1 \sin(t) + c_2 \cos(t))\,\mathrm{e}^{-6t}, y(t) = -\frac{((c_1 - c_2)\cos(t) - (c_1 + c_2)\sin(t))\,\mathrm{e}^{-6t}}{2}\right\}\right\}$$

2.1865 ODE No. 1865

$$\{x'(t) = \mathrm{a1}x(t) + \mathrm{b1}y(t) + \mathrm{c1}, y'(t) = \mathrm{a2}x(t) + \mathrm{b2}y(t) + \mathrm{c2}\}$$

✓ **Mathematica** : cpu = 0.837384 (sec), leaf count = 2062

$$\left\{\left\{x(t) \to -\frac{\mathrm{b1}e^{-\frac{1}{2}\left(\mathrm{a1}+\mathrm{b2}+\sqrt{\mathrm{a1}^2-2\mathrm{b2}\mathrm{a1}+\mathrm{b2}^2+4\mathrm{a2}\mathrm{b1}}\right)t}\left(\frac{2\left(\left(\mathrm{a1}-\mathrm{b2}+\sqrt{\mathrm{a1}^2-2\mathrm{b2}\mathrm{a1}+\mathrm{b2}^2+4\mathrm{a2}\mathrm{b1}}\right)\mathrm{c2}-2\mathrm{a2}\mathrm{c1}\right)e^{\sqrt{\mathrm{a1}^2-2\mathrm{b2}\mathrm{a1}+\mathrm{b2}^2+4\mathrm{a2}\mathrm{b1}}t}}{-\mathrm{a1}-\mathrm{b2}+\sqrt{\mathrm{a1}^2-2\mathrm{b2}\mathrm{a1}+\mathrm{b2}^2+4\mathrm{a2}\mathrm{b1}}}\right.}{2\left(\mathrm{a1}^2\right.}\right.\right.$$

✓ **Maple** : cpu = 0.144 (sec), leaf count = 224

$$\left\{\left\{x(t) = c_1 \mathrm{e}^{\frac{\left(a1+b2-\sqrt{a1^2-2a1\,b2+4a2\,b1+b2^2}\right)t}{2}} + c_2 \mathrm{e}^{\frac{\left(a1+b2+\sqrt{a1^2-2a1\,b2+4a2\,b1+b2^2}\right)t}{2}} + \frac{c2\,b1 - b2\,c1}{a1\,b2 - a2\,b1}, y(t) = \frac{-c_1(a1\,b2 -}{}\right.\right.$$

2.1866 ODE No. 1866

$$\{x'(t) + 2y(t) = 3t, y'(t) - 2x(t) = 4\}$$

✓ **Mathematica** : cpu = 0.0415217 (sec), leaf count = 132

$$\left\{\left\{x(t) \to \cos(2t)\left(\frac{3}{2}t\sin(2t) - \frac{5}{4}\cos(2t)\right) - \sin(2t)\left(\frac{5}{4}\sin(2t) + \frac{3}{2}t\cos(2t)\right) + c_1\cos(2t) - c_2\sin(2t), y(t) \to \mathrm{co}\right.\right.$$

✓ **Maple** : cpu = 0.047 (sec), leaf count = 39

$$\left\{\left\{x(t) = c_1\cos(2t) + c_2\sin(2t) - \frac{5}{4}, y(t) = c_1\sin(2t) - c_2\cos(2t) + \frac{3t}{2}\right\}\right\}$$

2.1867 ODE No. 1867

$$\{-t^2 + x'(t) + y(t) + 6t + 1 = 0, y'(t) - x(t) = -3t^2 + 3t + 1\}$$

✓ **Mathematica** : cpu = 0.0998978 (sec), leaf count = 124

$$\{\{x(t) \to \cos(t)\left(\left(3t^2 - t - 13\right)\cos(t) + (t-12)t\sin(t)\right) - \sin(t)\left(\left(-3t^2 + t + 13\right)\sin(t) + (t-12)t\cos(t)\right) + c_1 c$$

✓ **Maple** : cpu = 0.047 (sec), leaf count = 42

$$\{\{x(t) = c_1 \cos(t) + c_2 \sin(t) + 3t^2 - t - 13, y(t) = c_1 \sin(t) - c_2 \cos(t) + t^2 - 12t\}\}$$

2.1868 ODE No. 1868

$$\{x'(t) + 3x(t) - y(t) = e^{2t}, x(t) + y'(t) + 5y(t) = e^t\}$$

✓ **Mathematica** : cpu = 0.0900776 (sec), leaf count = 162

$$\left\{\left\{x(t) \to -e^t(t+1)\left(\frac{t}{5} + \frac{1}{36}e^t(6t-7) - \frac{1}{25}\right) + e^t t\left(\frac{t}{5} + \frac{1}{36}e^t(6t-1) + \frac{4}{25}\right) + c_1 e^{-4t}(t+1) + c_2 e^{-4t}t, y(t) -\right.\right.$$

✓ **Maple** : cpu = 0.095 (sec), leaf count = 64

$$\left\{\left\{x(t) = c_1 t\,\mathrm{e}^{-4t} + c_2 \mathrm{e}^{-4t} + \frac{\mathrm{e}^t}{25} + \frac{7\,\mathrm{e}^{2t}}{36}, y(t) = -c_1 t\,\mathrm{e}^{-4t} + c_1 \mathrm{e}^{-4t} - c_2 \mathrm{e}^{-4t} + \frac{4\,\mathrm{e}^t}{25} - \frac{\mathrm{e}^{2t}}{36}\right\}\right\}$$

2.1869 ODE No. 1869

$$\{x'(t) + 2x(t) + y'(t) + y(t) = t + e^{2t}, x'(t) - x(t) + y'(t) + 3y(t) = e^t - 1\}$$

✓ **Mathematica** : cpu = 0.108001 (sec), leaf count = 118

$$\left\{\left\{x(t) \to \frac{1}{5}\left(t - e^t + e^{2t} + 1\right) + \frac{5}{72}\left(\frac{12\left(5712t + 833e^t + 2352e^{2t} - 5508\right)}{20825} + c_1 e^{-7t/5}\right), y(t) \to \frac{1}{5}\left(-t + e^t - e^{2t}\right.\right.\right.$$

✓ **Maple** : cpu = 0.082 (sec), leaf count = 51

$$\left\{\left\{x(t) = c_1 \mathrm{e}^{-\frac{7t}{5}} + \frac{3t}{7} - \frac{\mathrm{e}^t}{6} + \frac{5\,\mathrm{e}^{2t}}{17} - \frac{1}{49}, y(t) = \frac{3c_1 \mathrm{e}^{-\frac{7t}{5}}}{2} + \frac{t}{7} + \frac{\mathrm{e}^t}{4} - \frac{\mathrm{e}^{2t}}{17} - \frac{26}{49}\right\}\right\}$$

2.1870 ODE No. 1870

$$\{x'(t)+y'(t)-y(t)=e^t, 2x'(t)+y'(t)+2y(t)=\cos(t)\}$$

✓ **Mathematica** : cpu = 0.155578 (sec), leaf count = 122

$$\left\{\left\{x(t)\to -\frac{3}{4}c_2\left(e^{4t}-1\right)+\frac{1}{68}e^{-4t}\left(e^{4t}-1\right)\left(34e^t+3\sin(t)-12\cos(t)\right)+\frac{1}{4}\left(2e^{-3t}+2e^t+\frac{3}{17}e^{-4t}\sin(t)+\sin(\right.\right.\right.$$

✓ **Maple** : cpu = 0.152 (sec), leaf count = 47

$$\left\{\left\{x(t)=\frac{c_1\mathrm{e}^{4t}}{4}+c_2-\frac{3\cos(t)}{17}+\mathrm{e}^t+\frac{5\sin(t)}{17}, y(t)=-\frac{c_1\mathrm{e}^{4t}}{3}+\frac{4\cos(t)}{17}-\frac{2\,\mathrm{e}^t}{3}-\frac{\sin(t)}{17}\right\}\right\}$$

2.1871 ODE No. 1871

$$\{4x'(t)+2x(t)+9y'(t)+31y(t)=e^t, 3x'(t)+x(t)+7y'(t)+24y(t)=3\}$$

✓ **Mathematica** : cpu = 0.351832 (sec), leaf count = 180

$$\left\{\left\{x(t)\to \frac{1}{442}\left(3\left(153e^t-754\right)\sin(t)+31\left(17e^t-78\right)\cos(t)\right)\left(\cos(t)-\sin(t)\right)+\frac{1}{221}\sin(t)\left(\left(493e^t-2340\right)\sin(t)\right.\right.\right.$$

✓ **Maple** : cpu = 0.132 (sec), leaf count = 62

$$\left\{\left\{x(t)=c_1\cos(t)\,\mathrm{e}^{-4t}+c_2\mathrm{e}^{-4t}\sin(t)+\frac{31\,\mathrm{e}^t}{26}-\frac{93}{17}, y(t)=-\frac{2\,\mathrm{e}^t}{13}+\frac{\left((-221c_1-221c_2)\cos(t)+221(c_1-c_2)\sin\right.}{221}\right.\right.$$

2.1872 ODE No. 1872

$$\{4x'(t)+11x(t)+9y'(t)+31y(t)=e^t, 3x'(t)+8x(t)+7y'(t)+24y(t)=e^{2t}\}$$

✓ **Mathematica** : cpu = 0.129799 (sec), leaf count = 162

$$\left\{\left\{x(t)\to -e^t t\left(-\frac{4t}{5}+\frac{1}{36}e^t(30t+19)-\frac{11}{25}\right)-e^t(t-1)\left(\frac{4t}{5}-\frac{1}{36}e^t(30t+49)+\frac{31}{25}\right)-c_1e^{-4t}(t-1)-c_2e^{-4t}\right.\right.$$

✓ **Maple** : cpu = 0.102 (sec), leaf count = 65

$$\left\{\left\{x(t)=c_1t\,\mathrm{e}^{-4t}+c_2\mathrm{e}^{-4t}+\frac{31\,\mathrm{e}^t}{25}-\frac{49\,\mathrm{e}^{2t}}{36}, y(t)=-c_1t\,\mathrm{e}^{-4t}-c_1\mathrm{e}^{-4t}-c_2\mathrm{e}^{-4t}-\frac{11\,\mathrm{e}^t}{25}+\frac{19\,\mathrm{e}^{2t}}{36}\right\}\right\}$$

2.1873 ODE No. 1873

$$\{4x'(t)+44x(t)+9y'(t)+49y(t)=t,3x'(t)+34x(t)+7y'(t)+38y(t)=e^t\}$$

✓ **Mathematica** : cpu = 0.104857 (sec), leaf count = 322

$$\left\{\left\{x(t)\to -\frac{1}{5}e^{-6t}\left(e^{5t}-1\right)\left(\frac{16}{5}e^{6t}\left(\frac{t}{6}-\frac{1}{36}\right)+4e^{2t}-\frac{4e^{7t}}{7}-\frac{31}{5}e^{t}(t-1)\right)+\frac{1}{25}e^{-6t}\left(4e^{5t}+1\right)\left(e^{6t}\left(\frac{2t}{3}-\frac{1}{9}\right)\right.\right.\right.$$

✓ **Maple** : cpu = 0.079 (sec), leaf count = 52

$$\left\{\left\{x(t)=c_1\mathrm{e}^{-6t}+c_2\mathrm{e}^{-t}+\frac{19t}{3}-\frac{29\,\mathrm{e}^{t}}{7}-\frac{56}{9},y(t)=4c_1\mathrm{e}^{-6t}-c_2\mathrm{e}^{-t}-\frac{17t}{3}+\frac{24\,\mathrm{e}^{t}}{7}+\frac{55}{9}\right\}\right\}$$

2.1874 ODE No. 1874

$$\{x'(t)=f(t)x(t)+g(t)y(t),y'(t)=f(t)y(t)-g(t)x(t)\}$$

✓ **Mathematica** : cpu = 0.010728 (sec), leaf count = 115

$$\left\{\left\{x(t)\to c_1\exp\left(\int_1^t f(K[2])dK[2]\right)\cos\left(\int_1^t g(K[1])dK[1]\right)+c_2\exp\left(\int_1^t f(K[2])dK[2]\right)\sin\left(\int_1^t g(K[1])dK\right.\right.\right.$$

✓ **Maple** : cpu = 0.556 (sec), leaf count = 57

$$\{\{x(t)=c_2\mathrm{e}^{\int(g(t)\tan(c_1-(\int g(t)dt))+f(t))dt},y(t)=c_2\mathrm{e}^{\int(g(t)\tan(c_1-(\int g(t)dt))+f(t))dt}\tan\left(c_1-\left(\int g(t)\,dt\right)\right)\}\}$$

2.1875 ODE No. 1875

$$\{f(t)(ax(t)+by(t))+x'(t)=g(t),f(t)(cx(t)+dy(t))+y'(t)=h(t)\}$$

✓ **Mathematica** : cpu = 1.8693 (sec), leaf count = 3181

$$\left\{\left\{\left\{x(t)\to\frac{\left(-a+d+\sqrt{a^2-2da+d^2+4bc}\right)e^{\int_1^t-\frac{1}{2}\left(a+d-\sqrt{a^2-2da+d^2+4bc}\right)f(K[1])dK[1]}c_1}{2\sqrt{a^2-2da+d^2+4bc}}+\frac{\left(a-d+\sqrt{a^2-2da+\right.}{\right.\right.\right.$$

✓ **Maple** : cpu = 3.296 (sec), leaf count = 2602

Expression too large to display

2.1876 ODE No. 1876

$$\left\{x'(t) = x(t)\cos(t), y'(t) = x(t)e^{-\sin(t)}\right\}$$

✓ **Mathematica** : cpu = 0.0234421 (sec), leaf count = 39

$$\left\{\left\{x(t) \to c_1 e^{\sin(t)}, y(t) \to c_1 \int_1^t e^{\sin(K[1])-\sin(K[1])} dK[1] + c_2\right\}\right\}$$

✓ **Maple** : cpu = 0.207 (sec), leaf count = 18

$$\{\{x(t) = c_2 \mathrm{e}^{\sin(t)}, y(t) = c_2 t + c_1\}\}$$

2.1877 ODE No. 1877

$$\{tx'(t) + y(t) = 0, x(t) + ty'(t) = 0\}$$

✓ **Mathematica** : cpu = 0.0048264 (sec), leaf count = 31

$$\left\{\left\{x(t) \to c_1 t + \frac{c_2}{t}, y(t) \to \frac{c_2}{t} - c_1 t\right\}\right\}$$

✓ **Maple** : cpu = 0.046 (sec), leaf count = 31

$$\left\{\left\{x(t) = \frac{c_2 t^2 + c_1}{t}, y(t) = \frac{-c_2 t^2 + c_1}{t}\right\}\right\}$$

2.1878 ODE No. 1878

$$\{tx'(t) + 2x(t) = t, -((t+2)x(t)) + ty'(t) - ty(t) = -t\}$$

✓ **Mathematica** : cpu = 0.0130872 (sec), leaf count = 39

$$\left\{\left\{x(t) \to \frac{t}{3} + \frac{c_1}{t^2}, y(t) \to -\frac{c_1}{t^2} - \frac{t}{3} + c_2 e^t\right\}\right\}$$

✓ **Maple** : cpu = 0.091 (sec), leaf count = 39

$$\left\{\left\{x(t) = \frac{t}{3} + \frac{c_2}{t^2}, y(t) = \frac{3c_1 t^2 \mathrm{e}^t - t^3 - 3c_2}{3t^2}\right\}\right\}$$

2.1879 ODE No. 1879

$$\{tx'(t) + 2(x(t) - y(t)) = t, x(t) + ty'(t) + 5y(t) = t^2\}$$

✓ **Mathematica** : cpu = 0.0229742 (sec), leaf count = 58

$$\left\{\left\{x(t) \to \frac{c_1}{t^4} + \frac{c_2}{t^3} + \frac{1}{30}t(2t+9), y(t) \to -\frac{c_1}{t^4} - \frac{c_2}{2t^3} + \frac{1}{60}t(8t-3)\right\}\right\}$$

✓ **Maple** : cpu = 0.088 (sec), leaf count = 54

$$\left\{\left\{x(t) = \frac{2t^6 + 9t^5 + 30c_1t + 30c_2}{30t^4}, y(t) = \frac{8t^6 - 3t^5 - 30c_1t - 60c_2}{60t^4}\right\}\right\}$$

2.1880 ODE No. 1880

$$\{t^2(1 - \sin(t))x'(t) = t^2y(t) + tx(t)(1 - 2\sin(t)), t^2(1 - \sin(t))y'(t) = x(t)(t\cos(t) - \sin(t)) + ty(t)(1 - t\cos(t))$$

✓ **Mathematica** : cpu = 0.0214935 (sec), leaf count = 29

$$\{\{x(t) \to c_1t^2 + c_2t, y(t) \to c_1t + c_2\sin(t)\}\}$$

✓ **Maple** : cpu = 0.1 (sec), leaf count = 23

$$\{\{x(t) = (c_1t + c_2)\,t, y(t) = c_1t + c_2\sin(t)\}\}$$

2.1881 ODE No. 1881

$$\{x'(t) + y'(t) + y(t) = f(t), x''(t) + x(t) + y''(t) + y'(t) + y(t) = g(t)\}$$

✓ **Mathematica** : cpu = 0.0129763 (sec), leaf count = 44

$$\{\{x(t) \to -f''(t) - f'(t) - f(t) + g'(t) + g(t), y(t) \to f''(t) + f(t) - g'(t)\}\}$$

✓ **Maple** : cpu = 0.057 (sec), leaf count = 48

$$\left\{\left\{x(t) = -\frac{d^2}{dt^2}f(t) - \frac{d}{dt}f(t) + \frac{d}{dt}g(t) - f(t) + g(t), y(t) = \frac{d^2}{dt^2}f(t) - \frac{d}{dt}g(t) + f(t)\right\}\right\}$$

2.1882 ODE No. 1882

$$\{2x'(t) - 3x(t) + y'(t) = 0, x''(t) + y'(t) - 2y(t) = e^{2t}\}$$

✓ **Mathematica** : cpu = 1.73687 (sec), leaf count = 928

$$\left\{\left\{x(t) \to \frac{1}{46}e^{t/2}c_1\left(23\cos\left(\frac{\sqrt{23}t}{2}\right) + 23e^{t/2} - 3\sqrt{23}\sin\left(\frac{\sqrt{23}t}{2}\right)\right) + \frac{e^{3t/2}\left(23e^{t/2}\cos\left(\frac{\sqrt{23}t}{2}\right) - 7\sqrt{23}e^{t/2}\sin\left(\right.\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.235 (sec), leaf count = 99

$$\left\{\left\{x(t) = c_2\cos\left(\frac{\sqrt{23}\,t}{2}\right)e^{\frac{t}{2}} + c_3e^{\frac{t}{2}}\sin\left(\frac{\sqrt{23}\,t}{2}\right) + c_1e^t + \frac{e^{2t}}{4}, y(t) = c_1e^t - \frac{7\left(c_2 + \frac{c_3\sqrt{23}}{7}\right)\cos\left(\frac{\sqrt{23}\,t}{2}\right)e^{\frac{t}{2}}}{4} + \frac{(c}{}\right.\right.$$

2.1883 ODE No. 1883

$$\{x'(t) + x(t) - y'(t) = 2t, x''(t) - 9x(t) + y'(t) + 3y(t) = \sin(2t)\}$$

✓ **Mathematica** : cpu = 1.05945 (sec), leaf count = 602

$$\left\{\left\{x(t) \to \frac{e^{-4t}\left(20e^{4t}t + 7e^{4t} + 9\right)\left(10400\left(t^2 + 2t + 2\right) + \left(260t - 225e^{4t} - 351\right)\sin(2t) + 2\left(260t + 75e^{4t} - 91\right)\mathrm{co}\right.}{83200}\right.\right.$$

✓ **Maple** : cpu = 0.135 (sec), leaf count = 80

$$\left\{\left\{x(t) = c_3t\,e^t + c_1e^t + c_2e^{-3t} + 2t - \frac{2\cos(2t)}{325} - \frac{36\sin(2t)}{325} + 4, y(t) = 2c_3t\,e^t + 2c_1e^t + \frac{2c_2e^{-3t}}{3} - c_3e^t + 6t + \right.\right.$$

2.1884 ODE No. 1884

$$\{x'(t) - x(t) + 2y(t) = 0, x''(t) - 2y'(t) = 2t - \cos(2t)\}$$

✓ **Mathematica** : cpu = 0.446788 (sec), leaf count = 224

$$\left\{\left\{x(t) \to 7\left(t^2 - \frac{1}{2}\sin(2t) + c_2\right) + 8\left(\frac{1}{136}e^{-t/2}\left(2e^{t/2}\cos(2t) - 4\left(34e^{t/2}t^2 + 17e^{t/2}(t+2) - 15e^{t/2}\sin(2t)\right)\right) + \right.\right.$$

✓ **Maple** : cpu = 0.185 (sec), leaf count = 69

$$\left\{\left\{x(t) = 2c_1e^{\frac{t}{2}} - t^2 + c_2 - 4t + \frac{2\cos(2t)}{17} + \frac{\sin(2t)}{34}, y(t) = \frac{c_1e^{\frac{t}{2}}}{2} - \frac{t^2}{2} + \frac{c_2}{2} - t + \frac{\cos(2t)}{34} + \frac{9\sin(2t)}{68} + 2\right\}\right\}$$

2.1885 ODE No. 1885

$$\{tx'(t) - ty'(t) - 2y(t) = 0, tx''(t) + 2x'(t) + tx(t) = 0\}$$

✓ **Mathematica** : cpu = 0.0195699 (sec), leaf count = 66

$$\left\{\left\{x(t) \to \frac{c_2 \cos(t)}{t} + \frac{c_3 \sin(t)}{t}, y(t) \to \frac{c_1}{t^2} + c_2\left(\frac{\cos(t)}{t} - \frac{2\sin(t)}{t^2}\right) + c_3\left(\frac{2\cos(t)}{t^2} + \frac{\sin(t)}{t}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.175 (sec), leaf count = 47

$$\left\{\left\{x(t) = \frac{c_2 \sin(t) + c_3 \cos(t)}{t}, y(t) = \frac{c_1 + (c_3 t + 2c_2)\cos(t) + (c_2 t - 2c_3)\sin(t)}{t^2}\right\}\right\}$$

2.1886 ODE No. 1886

$$\{ay(t) + x''(t) = 0, y''(t) - a^2 y(t) = 0\}$$

✓ **Mathematica** : cpu = 0.0160085 (sec), leaf count = 115

$$\left\{\left\{x(t) \to -\frac{c_4 e^{-at}\left(-2ate^{at} + e^{2at} - 1\right)}{2a^2} - \frac{c_3 e^{-at}\left(e^{at} - 1\right)^2}{2a} + c_2 t + c_1, y(t) \to \frac{1}{2}c_3 e^{-at}\left(e^{2at} + 1\right) + \frac{c_4 e^{-at}\left(e^{2at} -\right.}{2a}\right.\right.$$

✓ **Maple** : cpu = 0.086 (sec), leaf count = 49

$$\left\{\left\{x(t) = \frac{-c_3 e^{at} - c_4 e^{-at} + (c_1 t + c_2)a}{a}, y(t) = c_3 e^{at} + c_4 e^{-at}\right\}\right\}$$

2.1887 ODE No. 1887

$$\{x''(t) = ax(t) + by(t), y''(t) = cx(t) + dy(t)\}$$

✓ **Mathematica** : cpu = 0.368032 (sec), leaf count = 5748

$$\left\{\left\{x(t) \to \frac{e^{-\frac{\sqrt{a+d-\sqrt{a^2-2da+d^2+4bc}t}}{\sqrt{2}} - \frac{\sqrt{a+d+\sqrt{a^2-2da+d^2+4bc}t}}{\sqrt{2}}}\left(e^{\frac{\sqrt{a+d-\sqrt{a^2-2da+d^2+4bc}t}}{\sqrt{2}}}a - e^{\frac{\sqrt{a+d+\sqrt{a^2-2da+d^2+4bc}t}}{\sqrt{2}}}a - e^{\sqrt{2}\sqrt{}}\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.155 (sec), leaf count = 360

$$\left\{\left\{x(t) = c_1 \mathrm{e}^{-\frac{\sqrt{2a+2d-2\sqrt{a^2-2da+4bc+d^2}}\,t}{2}} + c_2 \mathrm{e}^{\frac{\sqrt{2a+2d-2\sqrt{a^2-2da+4bc+d^2}}\,t}{2}} + c_3 \mathrm{e}^{-\frac{\sqrt{2a+2d+2\sqrt{a^2-2da+4bc+d^2}}\,t}{2}} + c_4 \mathrm{e}^{\frac{\sqrt{2a+2d+2\sqrt{\cdots}}}{}}\right.\right.$$

2.1888 ODE No. 1888

$$\{x''(t) = \mathrm{a1}x(t) + \mathrm{b1}y(t) + \mathrm{c1}, y''(t) = \mathrm{a2}x(t) + \mathrm{b2}y(t) + \mathrm{c2}\}$$

✓ **Mathematica** : cpu = 13.5511 (sec), leaf count = 17774

Too large to display

✓ **Maple** : cpu = 0.256 (sec), leaf count = 457

$$\left\{\left\{x(t) = c_1 \mathrm{e}^{-\frac{\sqrt{2a1+2b2-2\sqrt{a1^2-2a1\,b2+4a2\,b1+b2^2}}\,t}{2}} + c_2 \mathrm{e}^{\frac{\sqrt{2a1+2b2-2\sqrt{a1^2-2a1\,b2+4a2\,b1+b2^2}}\,t}{2}} + c_3 \mathrm{e}^{-\frac{\sqrt{2a1+2b2+2\sqrt{a1^2-2a1\,b2+4a2\,b1}}}{2}}\right.\right.$$

2.1889 ODE No. 1889

$$\{x''(t) + x(t) + y(t) = -5, -4x(t) + y''(t) - 3y(t) = -3\}$$

✓ **Mathematica** : cpu = 0.233183 (sec), leaf count = 554

$$\left\{\left\{x(t) \to -\frac{1}{8}e^{-t}\left(e^{-t}(-13t-10) + e^t(10-13t)\right)\left(e^{2t}t + t - e^{2t} + 1\right) - \frac{1}{8}e^{-t}\left(e^{2t}-1\right)t\left(e^{-t}(-13t-23) + e^t(13t\right.\right.\right.$$

✓ **Maple** : cpu = 0.065 (sec), leaf count = 60

$$\{\{x(t) = (c_3t + c_1)\,\mathrm{e}^t + (c_4t + c_2)\,\mathrm{e}^{-t} + 18, y(t) = (-2c_1 + c_3(-2t-2))\,\mathrm{e}^t + (-2c_2 + c_4(-2t+2))\,\mathrm{e}^{-t} - 23\}\}$$

2.1890 ODE No. 1890

$$\left\{x''(t) = c^2x(t)\left(3\cos^2(at+b)-1\right)+\frac{3}{2}c^2y(t)\sin(2abt), y''(t) = \frac{3}{2}c^2x(t)\sin(2abt)+c^2y(t)\left(3\sin^2(at+b)-1\right)\right\}$$

✗ **Mathematica** : cpu = 2.05366 (sec), leaf count = 0 , could not solve

```
DSolve[{Derivative[2][x][t] == c^2*(-1 + 3*Cos[b + a*t]^2)*x[t] + (3*c^2*Sin[2*a*b*t]*y[t])/
1 + 3*Sin[b + a*t]^2)*y[t]}, {x[t], y[t]}, t]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{\left\{x(t) = DESol\left(\left\{\left(-36c^4\left(\cos^2(b)\right)\left(\cos^2(at)\right)\left(\sin^2(b)\right)\left(\sin^2(at)\right)-18c^4\cos(b)\left(\cos^3(at)\right)\left(\sin^3(b)\right)\sin(at)\right.\right.\right.\right.\right.$$

2.1891 ODE No. 1891

$$\left\{x''(t)+6x(t)+7y(t)=0, 3x(t)+y''(t)+2y(t)=2t\right\}$$

✓ **Mathematica** : cpu = 1.05973 (sec), leaf count = 742

$$\left\{\left\{x(t)\to -\frac{7}{200}e^{-t}\left(e^{2t}-2e^t\cos(3t)+1\right)\left(-7e^{-t}\left(e^{2t}(t-1)+t+1\right)-\frac{2}{9}\sin(3t)+\frac{2}{3}t\cos(3t)\right)+\frac{7}{600}e^{-t}\left(3e^{2t}\right.\right.\right.$$

✓ **Maple** : cpu = 0.084 (sec), leaf count = 64

$$\left\{\left\{x(t) = c_1e^t+c_2\cos(3t)+c_3e^{-t}+c_4\sin(3t)+\frac{14t}{9}, y(t) = -c_1e^t+\frac{3c_2\cos(3t)}{7}-c_3e^{-t}+\frac{3c_4\sin(3t)}{7}-\frac{4t}{3}\right\}\right\}$$

2.1892 ODE No. 1892

$$\left\{-ay'(t)+bx(t)+x''(t)=0, ax'(t)+by(t)+y''(t)=0\right\}$$

✓ **Mathematica** : cpu = 0.279632 (sec), leaf count = 4815

$$\left\{\left\{x(t)\to \frac{e^{-\frac{\sqrt{-a^2-2b-\sqrt{a^2(a^2+4b)}}\,t}{\sqrt{2}}-\frac{\sqrt{-a^2-2b+\sqrt{a^2(a^2+4b)}}\,t}{\sqrt{2}}}\left(e^{\frac{\sqrt{-a^2-2b-\sqrt{a^2(a^2+4b)}}\,t}{\sqrt{2}}}a^2-e^{\frac{\sqrt{-a^2-2b+\sqrt{a^2(a^2+4b)}}\,t}{\sqrt{2}}}a^2-e^{\sqrt{2}\sqrt{-\cdots}}\right.}{\cdots}\right.\right.$$

✓ **Maple** : cpu = 0.167 (sec), leaf count = 463

$$\left\{\left\{x(t) = c_1 \mathrm{e}^{-\frac{\sqrt{-2a^2-4b-2\sqrt{(a^2+4b)a^2}}\,t}{2}} + c_2 \mathrm{e}^{\frac{\sqrt{-2a^2-4b-2\sqrt{(a^2+4b)a^2}}\,t}{2}} + c_3 \mathrm{e}^{-\frac{\sqrt{-2a^2-4b+2\sqrt{(a^2+4b)a^2}}\,t}{2}} + c_4 \mathrm{e}^{\frac{\sqrt{-2a^2-4b+2\sqrt{(a^2+}}}{2}}\right.\right.$$

2.1893 ODE No. 1893

$$\{-\mathrm{A0}y'(t) + \mathrm{a1}x''(t) + \mathrm{b1}x'(t) + \mathrm{c1}x(t) = \mathrm{B0}e^{i\omega t}, \mathrm{A0}x'(t) + \mathrm{a2}y''(t) + \mathrm{b2}y'(t) + \mathrm{c2}y(t) = 0\}$$

✓ **Mathematica** : cpu = 0.484848 (sec), leaf count = 5546

$$\left\{\left\{x(t) \to -\mathrm{A0a1}^2\mathrm{c2}c_3\mathrm{RootSum}\left[\#1^4 + \mathrm{a2b1}\#1^3 + \mathrm{a1b2}\#1^3 + \mathrm{A0}^2\mathrm{a1a2}\#1^2 + \mathrm{a1a2b1b2}\#1^2 + \mathrm{a1a2}^2\mathrm{c1}\#1^2 +\right.\right.\right.$$

✓ **Maple** : cpu = 0.954 (sec), leaf count = 1579

Expression too large to display

2.1894 ODE No. 1894

$$\{a(x'(t) - y'(t)) + \mathrm{b1}x(t) + x''(t) = \mathrm{c1}e^{i\omega t}, a(y'(t) - x'(t)) + \mathrm{b2}y(t) + y''(t) = \mathrm{c2}e^{i\omega t}\}$$

✓ **Mathematica** : cpu = 0.527298 (sec), leaf count = 3386

$$\left\{\left\{x(t) \to -a\mathrm{b2}c_3\mathrm{RootSum}\left[\#1^4 + 2a\#1^3 + \mathrm{b1}\#1^2 + \mathrm{b2}\#1^2 + a\mathrm{b1}\#1 + a\mathrm{b2}\#1 + \mathrm{b1b2}\&, \frac{}{4\#1^3 + 6a\#1^2 + 2\mathrm{b}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.916 (sec), leaf count = 1056

$$\left\{\left\{x(t) = c_1 \mathrm{e}^{t\,\mathrm{RootOf}(\_Z^4+2\_Z^3a+(b1+b2)\_Z^2+b1\,b2+(ab1+ab2)\_Z, index=1)} + c_2 \mathrm{e}^{t\,\mathrm{RootOf}(\_Z^4+2\_Z^3a+(b1+b2)\_Z^2+b1\,b2+(}\right.\right.$$

2.1895 ODE No. 1895

$\{\mathrm{a11}x''(t) + \mathrm{a12}y''(t) + \mathrm{b11}x'(t) + \mathrm{b12}y'(t) + \mathrm{c11}x(t) + \mathrm{c12}y(t) = 0, \mathrm{a21}x''(t) + \mathrm{a22}y''(t) + \mathrm{b21}x'(t) + \mathrm{b22}y'(t) +$

✓ **Mathematica** : cpu = 0.248366 (sec), leaf count = 7517

✓ **Maple** : cpu = 0.227 (sec), leaf count = 1008

$$\left\{\left\{x(t) = \sum_{\_a=1}^{4} \_C\_a \mathrm{e}^{t\,\mathrm{RootOf}((a22\,a11 - a21\,a12)\_Z^4 + (a11\,b22 - b21\,a12 - a21\,b12 + a22\,b11)\_Z^3 + (a11\,c22 - c21\,a12 - a21\,c12 + a22\,c1}\right.\right.$$

2.1896 ODE No. 1896

$$\left\{x''(t) - 2x'(t) - y'(t) + y(t) = 0, 2x'(t) - x(t) + y^{(3)}(t) - y''(t) = t\right\}$$

✓ **Mathematica** : cpu = 0.570529 (sec), leaf count = 1132

$$\left\{\left\{x(t) \to \frac{1}{64}e^{-t}\left(2e^{2t}t^2 - 6e^{2t}t + 7e^{2t} + 1\right)\left(e^t(1-t) + e^{-t}\left(-2t^3 - 8t^2 - 17t - 17\right)\right) + \frac{1}{64}e^{-t}\left(2e^{2t}t^2 + 6e^{2t}t + e\right.\right.$$

✓ **Maple** : cpu = 0.084 (sec), leaf count = 67

$$\left\{\left\{x(t) = -\frac{2c_2\mathrm{e}^{-t}}{3} - t + \frac{\left(-9c_5t^2 - 6c_4t - 3c_3 - 18c_5\right)\mathrm{e}^t}{3} - 2, y(t) = c_2\mathrm{e}^{-t} + \left(c_5t^3 + c_4t^2 + c_3t + c_1\right)\mathrm{e}^t - 2\right\}\right\}$$

2.1897 ODE No. 1897

$$\left\{x''(t) + y''(t) + y'(t) = \sinh(2t), 2x''(t) + y''(t) = 2t\right\}$$

✓ **Mathematica** : cpu = 0.240627 (sec), leaf count = 280

$$\left\{\left\{x(t) \to t\left(\frac{t^2}{2} + \frac{t}{2} - \frac{e^{4t}}{8} + e^{2t}\left(\frac{t}{2} - \frac{1}{4}\right)\right) + \frac{1}{48}\left(-4\left(4t^2 - 3t + 3\right)t - 12e^{2t}t - 6e^{-2t} + 3e^{4t}\right) + \frac{1}{4}e^{-2t}\left(-2e^{2t}\left(\frac{t}{2}\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.329 (sec), leaf count = 90

$$\left\{\left\{x(t) = \frac{t^3}{6} + c_3t + \frac{t^2}{4} + c_4 + \frac{(6c_2 - 6t - 9)\cosh(2t)}{24} + \frac{(-6c_2 + 6t + 6)\sinh(2t)}{24}, y(t) = -\frac{t^2}{2} + c_1 + c_3 + \frac{t}{2} +\right.\right.$$

2.1898 ODE No. 1898

$$\{x''(t) - x'(t) + y'(t) = 0, x''(t) - x(t) + y''(t) = 0\}$$

✓ **Mathematica** : cpu = 0.0320885 (sec), leaf count = 420

$$\left\{\left\{x(t) \to -\frac{1}{5}c_1 e^{\frac{t}{2}-\frac{\sqrt{5}t}{2}}\left(\sqrt{5}e^{\sqrt{5}t} - 5e^{\frac{\sqrt{5}t}{2}+\frac{t}{2}} - \sqrt{5}\right) + \frac{c_2 e^{\frac{t}{2}-\frac{\sqrt{5}t}{2}}\left(e^{\sqrt{5}t} - 1\right)}{\sqrt{5}} - \frac{1}{10}c_4 e^{\frac{t}{2}-\frac{\sqrt{5}t}{2}}\left(5e^{\sqrt{5}t} + \sqrt{5}e^{\sqrt{5}t} - 10e\right.\right.\right.$$

✓ **Maple** : cpu = 0.092 (sec), leaf count = 71

$$\left\{\left\{x(t) = c_1 e^t - \frac{c_3\left(\sqrt{5}+1\right)e^{\frac{\left(\sqrt{5}+1\right)t}{2}}}{2} + \frac{c_4\left(\sqrt{5}-1\right)e^{-\frac{\left(\sqrt{5}-1\right)t}{2}}}{2}, y(t) = c_3 e^{\frac{\left(\sqrt{5}+1\right)t}{2}} + c_4 e^{-\frac{\left(\sqrt{5}-1\right)t}{2}} + c_2\right\}\right\}$$

2.1899 ODE No. 1899

$$\{x'(t) = 2x(t), y'(t) = 3x(t) - 2y(t), z'(t) = 2y(t) + 3z(t)\}$$

✓ **Mathematica** : cpu = 0.0096933 (sec), leaf count = 112

$$\left\{\left\{x(t) \to c_1 e^{2t}, y(t) \to \frac{3}{4}c_1 e^{-2t}\left(e^{4t} - 1\right) + c_2 e^{-2t}, z(t) \to \frac{3}{10}c_1 e^{-2t}\left(2e^t + 3e^{2t} + 4e^{3t} + 1\right)\left(e^t - 1\right)^2 + \frac{2}{5}c_2 e^{-2t}\left(e\right.\right.\right.$$

✓ **Maple** : cpu = 0.113 (sec), leaf count = 52

$$\left\{\left\{x(t) = c_3 e^{2t}, y(t) = c_2 e^{-2t} + \frac{3c_3 e^{2t}}{4}, z(t) = c_1 e^{3t} - \frac{2c_2 e^{-2t}}{5} - \frac{3c_3 e^{2t}}{2}\right\}\right\}$$

2.1900 ODE No. 1900

$$\{x'(t) = 4x(t), y'(t) = x(t) - 2y(t), z'(t) = x(t) - 4y(t) + z(t)\}$$

✓ **Mathematica** : cpu = 0.0088893 (sec), leaf count = 94

$$\left\{\left\{x(t) \to c_1 e^{4t}, y(t) \to \frac{1}{6}c_1 e^{-2t}\left(e^{6t} - 1\right) + c_2 e^{-2t}, z(t) \to \frac{1}{9}c_1 e^{-2t}\left(e^{3t} + e^{6t} - 2\right) - \frac{4}{3}c_2 e^{-2t}\left(e^{3t} - 1\right) + c_3 e^t\right\}\right\}$$

✓ **Maple** : cpu = 0.116 (sec), leaf count = 50

$$\left\{\left\{x(t) = c_3 e^{4t}, y(t) = c_2 e^{-2t} + \frac{c_3 e^{4t}}{6}, z(t) = c_1 e^t + \frac{4c_2 e^{-2t}}{3} + \frac{c_3 e^{4t}}{9}\right\}\right\}$$

2.1901 ODE No. 1901

$$\{x'(t) = y(t) - z(t), y'(t) = x(t) + y(t), z'(t) = x(t) + z(t)\}$$

✓ **Mathematica** : cpu = 0.0088684 (sec), leaf count = 105

$$\{\{x(t) \to c_2(e^t - 1) + c_3(1 - e^t) + c_1, y(t) \to c_1(e^t - 1) + c_2(e^t t + 1) + c_3(-e^t t + e^t - 1), z(t) \to c_1(e^t - 1) +$$

✓ **Maple** : cpu = 0.092 (sec), leaf count = 43

$$\{\{x(t) = c_2 e^t + c_3, y(t) = -c_3 + (c_2 t + c_1) e^t, z(t) = -c_3 + (c_1 + c_2(t - 1)) e^t\}\}$$

2.1902 ODE No. 1902

$$\{x'(t) - y(t) + z(t) = 0, -x(t) + y'(t) - y(t) = t, -x(t) + z'(t) - z(t) = t\}$$

✓ **Mathematica** : cpu = 0.0199899 (sec), leaf count = 226

$$\{\{x(t) \to e^{-t}(1 - e^t)(-t - 1) + e^{-t}(e^t - 1)(-t - 1) + c_2(e^t - 1) + c_3(1 - e^t) + c_1, y(t) \to e^{-t}(-t - 1)(-e^t t +$$

✓ **Maple** : cpu = 0.099 (sec), leaf count = 51

$$\{\{x(t) = c_2 e^t + c_3, y(t) = -c_3 - t + (c_2 t + c_1) e^t - 1, z(t) = -c_3 - t + (c_1 + c_2(t - 1)) e^t - 1\}\}$$

2.1903 ODE No. 1903

$$\{ax'(t) = bc(y(t) - z(t)), by'(t) = ac(z(t) - x(t)), cz'(t) = ab(x(t) - y(t))\}$$

✓ **Mathematica** : cpu = 0.0882043 (sec), leaf count = 1304

$$\left\{\left\{x(t) \to \frac{e^{-i\sqrt{a^2+b^2+c^2}t}\left(2e^{i\sqrt{a^2+b^2+c^2}t}a^2 + b^2 e^{2i\sqrt{a^2+b^2+c^2}t} + c^2 e^{2i\sqrt{a^2+b^2+c^2}t} + b^2 + c^2\right)c_1}{2(a^2 + b^2 + c^2)} - \frac{be^{-i\sqrt{a^2+b^2+c^2}t}\left(-\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.17 (sec), leaf count = 299

$$\left\{\left\{x(t) = c_2 \sin\left(\sqrt{a^2 + b^2 + c^2}\, t\right) + c_3 \cos\left(\sqrt{a^2 + b^2 + c^2}\, t\right) + c_1, y(t) = \frac{c_1 b^3 - \left(-c_2 \cos\left(\sqrt{a^2 + b^2 + c^2}\, t\right) + \right.}{}\right.\right.$$

2.1904 ODE No. 1904

$$\{x'(t) = cy(t) - bz(t), y'(t) = az(t) - cx(t), z'(t) = bx(t) - ay(t)\}$$

✓ **Mathematica** : cpu = 0.0510571 (sec), leaf count = 1445

$$\left\{\left\{x(t) \to \frac{e^{-\sqrt{-a^2-b^2-c^2}t}\left(2e^{\sqrt{-a^2-b^2-c^2}t}a^2 + b^2e^{2\sqrt{-a^2-b^2-c^2}t} + c^2e^{2\sqrt{-a^2-b^2-c^2}t} + b^2 + c^2\right)c_1}{2(a^2+b^2+c^2)} - \frac{e^{-\sqrt{-a^2-b^2-c^2}t}(\right.\right.$$

✓ **Maple** : cpu = 0.11 (sec), leaf count = 257

$$\left\{\left\{x(t) = c_2 \sin\left(\sqrt{a^2+b^2+c^2}\,t\right) + c_3 \cos\left(\sqrt{a^2+b^2+c^2}\,t\right) + c_1, y(t) = \frac{c_1(b^2+c^2)b + \left(-c_3a^2b + c_2\sqrt{a^2+b^2}\right.}{}\right.\right.$$

2.1905 ODE No. 1905

$$\{x'(t) = h(t)y(t) - g(t)z(t), y'(t) = f(t)z(t) - h(t)x(t), z'(t) = g(t)x(t) - f(t)y(t)\}$$

✗ **Mathematica** : cpu = 0.151997 (sec), leaf count = 0 , could not solve

```
DSolve[{Derivative[1][x][t] == h[t]*y[t] - g[t]*z[t], Derivative[1][y][t] == -
(h[t]*x[t]) + f[t]*z[t], Derivative[1][z][t] == g[t]*x[t] - f[t]*y[t]}, {x[t], y[t], z[t]},
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

Expression too large to display

2.1906 ODE No. 1906

$$\{x'(t) = x(t) + y(t) - z(t), y'(t) = -x(t) + y(t) + z(t), z'(t) = x(t) - y(t) + z(t)\}$$

✓ **Mathematica** : cpu = 0.0447676 (sec), leaf count = 278

$$\left\{\left\{x(t) \to \frac{1}{3}c_1e^t\left(2\cos\left(\sqrt{3}t\right)+1\right) - \frac{1}{3}c_2e^t\left(-\sqrt{3}\sin\left(\sqrt{3}t\right)+\cos\left(\sqrt{3}t\right)-1\right) - \frac{1}{3}c_3e^t\left(\sqrt{3}\sin\left(\sqrt{3}t\right)+\cos\left(\sqrt{3}\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.098 (sec), leaf count = 120

$$\left\{\left\{x(t) = \left(c_2\sin\left(\sqrt{3}\,t\right) + c_3\cos\left(\sqrt{3}\,t\right) + c_1\right)e^t, y(t) = c_1e^t + \frac{\left(c_2\sqrt{3}-c_3\right)\cos\left(\sqrt{3}\,t\right)e^t}{2} + \frac{\left(-c_2-c_3\sqrt{3}\right)e^t\sin}{2}\right.\right.$$

2.1907 ODE No. 1907

$\{x'(t) = -3x(t) + 48y(t) - 28z(t), y'(t) = -4x(t) + 40y(t) - 22z(t), z'(t) = -6x(t) + 57y(t) - 31z(t)\}$

✓ **Mathematica** : cpu = 0.0111799 (sec), leaf count = 179

$$\{\{x(t) \to c_1(-e^t)(2e^{2t} - 3) + 6c_2e^t(2e^t + 3e^{2t} - 5) - 2c_3e^t(4e^t + 5e^{2t} - 9), y(t) \to -2c_1e^t(e^{2t} - 1) + c_2e^t(3e^t$$

✓ **Maple** : cpu = 0.094 (sec), leaf count = 66

$$\left\{\left\{x(t) = c_1e^{3t} + c_2e^{2t} + c_3e^t, y(t) = c_1e^{3t} + \frac{c_2e^{2t}}{4} + \frac{2c_3e^t}{3}, z(t) = \frac{3c_1e^{3t}}{2} + \frac{c_2e^{2t}}{4} + c_3e^t\right\}\right\}$$

2.1908 ODE No. 1908

$\{x'(t) = 6x(t) - 72y(t) + 44z(t), y'(t) = 4x(t) - 4y(t) + 26z(t), z'(t) = 6x(t) - 63y(t) + 38z(t)\}$

✓ **Mathematica** : cpu = 0.040415 (sec), leaf count = 551

$$\left\{\left\{x(t) \to -36c_2\text{RootSum}\left[\#1^3 - 40\#1^2 + 1714\#1 + 1404\&, \frac{2\#1e^{\#1t} + e^{\#1t}}{3\#1^2 - 80\#1 + 1714}\&\right] + 4c_3\text{RootSum}\left[\#1^3 - 40\right.\right.$$

✓ **Maple** : cpu = 0.388 (sec), leaf count = 1285

Expression too large to display

2.1909 ODE No. 1909

$\{x'(t) = ax(t) + \beta z(t) + gy(t), y'(t) = \alpha z(t) + by(t) + gx(t), z'(t) = \alpha y(t) + \beta x(t) + cz(t)\}$

✓ **Mathematica** : cpu = 0.0567227 (sec), leaf count = 1630

$$\left\{\left\{x(t) \to -c_2\text{RootSum}\left[\#1^3 - a\#1^2 - b\#1^2 - c\#1^2 - \alpha^2\#1 - \beta^2\#1 - g^2\#1 + ab\#1 + ac\#1 + bc\#1 + a\alpha^2 +\right.\right.$$

✓ **Maple** : cpu = 16.364 (sec), leaf count = 33085

Too large to display

2.1910 ODE No. 1910

$$\{tx'(t) = 2x(t) - t, t^3y'(t) = t^2y(t) - x(t) + t, t^4z'(t) = t^3z(t) - t^2y(t) - x(t) + t\}$$

✓ **Mathematica** : cpu = 0.0087237 (sec), leaf count = 39

$$\left\{\left\{x(t) \to t + c_3t^2, y(t) \to c_2t + c_3, z(t) \to c_1t + \frac{c_3}{t} + c_2\right\}\right\}$$

✓ **Maple** : cpu = 0.133 (sec), leaf count = 37

$$\left\{\left\{x(t) = c_3t^2 + t, y(t) = c_2t + c_3, z(t) = \frac{c_1t^2 + c_2t + c_3}{t}\right\}\right\}$$

2.1911 ODE No. 1911

$$\{atx'(t) = bc(y(t) - z(t)), bty'(t) = ac(z(t) - x(t)), ctz'(t) = ab(x(t) - y(t))\}$$

✓ **Mathematica** : cpu = 0.0306786 (sec), leaf count = 1148

$$\left\{\left\{x(t) \to \frac{\left(2a^2t^{i\sqrt{a^2+b^2+c^2}} + b^2\left(t^{2i\sqrt{a^2+b^2+c^2}} + 1\right) + c^2\left(t^{2i\sqrt{a^2+b^2+c^2}} + 1\right)\right)c_1t^{-i\sqrt{a^2+b^2+c^2}}}{2\left(a^2 + b^2 + c^2\right)} - \frac{b\left(t^{i\sqrt{a^2+b^2+c^2}} - 1\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.162 (sec), leaf count = 309

$$\left\{\left\{x(t) = c_2\sin\left(\sqrt{a^2+b^2+c^2}\ln(t)\right) + c_3\cos\left(\sqrt{a^2+b^2+c^2}\ln(t)\right) + c_1, y(t) = \frac{c_1b^3 - \sqrt{a^2+b^2+c^2}\left(-c_2 c\right.}{}\right.\right.$$

2.1912 ODE No. 1912

$$\{\mathrm{x1}'(t) = a\mathrm{x2}(t) + b\mathrm{x3}(t)\cos(ct) + b\mathrm{x4}(t)\sin(ct), \mathrm{x2}'(t) = -a\mathrm{x1}(t) + b\mathrm{x3}(t)\sin(ct) - b\mathrm{x4}(t)\cos(ct), \mathrm{x3}'(t) = a\mathrm{x4}($$

✓ **Mathematica** : cpu = 0.0109934 (sec), leaf count = 798

$$\left\{\left\{\mathrm{x1}(t) \to c_3\cos\left(\left(\frac{c}{2} - \frac{1}{2}\sqrt{4b^2 + (2a+c)^2}\right)t\right) + c_1\cos\left(\left(\frac{c}{2} + \frac{1}{2}\sqrt{4b^2 + (2a+c)^2}\right)t\right) + c_4\sin\left(\left(\frac{c}{2} - \frac{1}{2}\sqrt{4\right.\right.\right.\right.\right.$$

✓ **Maple** : cpu = 1.156 (sec), leaf count = 2788

$$\left\{\left\{x1(t)=c_3\sin(ct)+c_4\cos(ct)+c_2, x2(t)=-c_3\cos(ct)+c_4\sin(ct)+c_1, x3(t)=\frac{(c_1a\cos(ct)-c_2a\sin(ct)\cdots}{(a+c)a}\right.\right.$$

2.1913 ODE No. 1913

$$\{x'(t)=-x(t)(x(t)+y(t)), y'(t)=y(t)(x(t)+y(t))\}$$

✓ **Mathematica** : cpu = 0.0339279 (sec), leaf count = 64

$$\left\{\left\{y(t)\to-\sqrt{c_1}\cot\left(\sqrt{c_1}t-\sqrt{c_1}c_2\right), x(t)\to-\sqrt{c_1}\tan\left(\sqrt{c_1}t-\sqrt{c_1}c_2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.185 (sec), leaf count = 57

$$\left\{\left[\{x(t)=0\}, \left\{y(t)=\frac{1}{c_1-t}\right\}\right], \left[\left\{x(t)=\frac{\tanh\left(\frac{c_2+t}{c_1}\right)}{c_1}\right\}, \left\{y(t)=\frac{-x(t)^2-\frac{d}{dt}x(t)}{x(t)}\right\}\right]\right\}$$

2.1914 ODE No. 1914

$$\left\{x'(t) = x(t)(ay(t) + b), y'(t) = y(t)(cx(t) + d)\right\}$$

✓ **Mathematica** : cpu = 0.324561 (sec), leaf count = 204

$$\left\{\left\{y(t) \to \frac{bW\left(\frac{a\text{InverseFunction}\left[\int_1^{\#1} \frac{1}{K[1]\left(W\left(\frac{ae^{\frac{c_1}{b}+\frac{cK[1]}{b}}K[1]^{\frac{d}{b}}}{b}\right)+1\right)}dK[1]\&\right][bt+c_2]^{\frac{d}{b}}\exp\left(\frac{c\text{InverseFunction}\left[\int_1^{\#1} \frac{1}{K[1]\left(W\left(\frac{ae^{\frac{c_1}{b}+\frac{cK}{}}}{}\right.\right.}\right.}{b}\right.}{b}\right.}{a}\right.\right.$$

✓ **Maple** : cpu = 0.582 (sec), leaf count = 92

$$\left\{[\{x(t) = 0\}, \{y(t) = c_1 e^{dt}\}], \left[\left\{x(t) = \text{RootOf}\left(c_2 + t - \left(\int^{\_Z} \frac{1}{\left(\text{LambertW}\left(\frac{e^{-1}\_a^{\frac{d}{b}} e^{\frac{c_1}{b}} e^{\frac{-\_ac}{b}}}{b}\right) + 1\right)\_ab} d\_a\right.\right.\right.\right.\right.$$

2.1915 ODE No. 1915

$$\{x'(t) = x(t)(a(px(t) + qy(t)) + \alpha), y'(t) = y(t)(b(px(t) + qy(t)) + \beta)\}$$

✗ **Mathematica** : cpu = 300.077 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 4.182 (sec), leaf count = 147

$$\left\{\left[\{x(t) = 0\}, \left\{y(t) = \frac{\beta}{c_1\beta\,\mathrm{e}^{-\beta t} - bq}\right\}\right], \left[\left\{x(t) = ODESolStruc\left(\_b(\_a), \left[\left\{c_1 + \left(\_b(\_a)^{\frac{-a-b}{a}}\left(\frac{d}{d\_a}\_b(\_a)\right.\right.\right.\right.\right.\right.\right.$$

2.1916 ODE No. 1916

$$\{x'(t) = h(a - x(t))(c - x(t) - y(t)), y'(t) = k(b - y(t))(c - x(t) - y(t))\}$$

✓ **Mathematica** : cpu = 0.399006 (sec), leaf count = 557

$$\left\{\left\{y(t) \to b\left(ah - h\text{InverseFunction}\left[\int_1^{\#1}\frac{(h(a-K[1]))^{\frac{k}{h}}}{(a-K[1])\left(c_1(ah-hK[1])^{\frac{k}{h}}(h(a-K[1]))^{\frac{k}{h}} - c(h(a-K[1]))^{\frac{k}{h}} + K\right.}\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.655 (sec), leaf count = 180

$$\left\{\left[\{x(t) = a\}, \left\{y(t) = \frac{-b + (-a+c)\,\mathrm{e}^{(c_1+t)(a+b-c)k}}{\mathrm{e}^{(c_1+t)(a+b-c)k} - 1}\right\}\right], \left[\left\{x(t) = \text{RootOf}\left(c_2 + t - \left(\int^{\_Z}\frac{}{\left(\_ah\,(\_a-a)^{-\frac{k}{h}}\right.}\right.\right.\right.\right.\right.$$

2.1917 ODE No. 1917

$$\{x'(t) = y(t)^2 - \cos(x(t)), y'(t) = y(t)(-\sin(x(t)))\}$$

✓ **Mathematica** : cpu = 216.129 (sec), leaf count = 3406

$$\left\{\left\{y(t) \to \frac{3\sqrt[3]{2}\cos\left(\text{InverseFunction}\left[\int_1^{\#1}\frac{\left(3c_1+\sqrt{9c\right.}{2\,2^{2/3}\cos^2(K[1])+2\left(3c_1+\sqrt{9c_1{}^2-4\cos^3(K[1])}\right)^{2/3}\cos(K[1])+3\sqrt[3]{2}c_1}\right.\right.}{\sqrt[3]{81c_1+\sqrt{6561c_1{}^2-2916\cos^3\left(\text{InverseFunction}\left[\int_1^{\#1}\frac{}{2\,2^{2/3}\cos^2(K[1])+2\left(3c_1+\sqrt{9c_1{}^2-4\cos^3(K[1])}\right)^{2/3}\cos\right.\right.}}}\right.\right.$$

✓ **Maple** : cpu = 1.252 (sec), leaf count = 108

$$\left\{\left[\left\{x(t) = \mathrm{RootOf}\left(c_2 + t - 2\left(\int^{\_Z} \frac{1}{\cos(\_f) - \sqrt{-(\cos^2(\_f)) - 4\cos(2\_f) - 4}\ \tan\left(\mathrm{RootOf}\left(2\_Z\cos(\_f)\right.\right.}\right.\right.\right.\right.\right.$$

2.1918 ODE No. 1918

$$\{x'(t) = -x(t)y(t)^2 + x(t) + y(t), y'(t) = x(t)^2y(t) - x(t) - y(t)\}$$

✗ **Mathematica** : cpu = 0.425184 (sec), leaf count = 0 , could not solve

```
DSolve[{Derivative[1][x][t] == x[t] + y[t] - x[t]*y[t]^2, Derivative[1][y][t] == -
x[t] - y[t] + x[t]^2*y[t]}, {x[t], y[t]}, t]
```

✓ **Maple** : cpu = 2.908 (sec), leaf count = 184

$$\left\{[\{x(t)=0\},\{y(t)=0\}], \left[\left\{x(t) = \mathit{ODESolStruc}\left(\_a, \left[\left\{\frac{4\_a^5 + 2\_a^2\_b(\_a)\left(\frac{d}{d\_a}\_\mathrm{b}(\_a)\right) - 3\_a^3 - 2\_a\right.}{}\right.\right.\right.\right.\right.$$

2.1919 ODE No. 1919

$$\{x'(t) = -(x(t)(x(t)^2 + y(t)^2)) + x(t) + y(t), y'(t) = -y(t)(x(t)^2 + y(t)^2) - x(t) + y(t)\}$$

✗ **Mathematica** : cpu = 0.438796 (sec), leaf count = 0 , could not solve

```
DSolve[{Derivative[1][x][t] == x[t] + y[t] - x[t]*(x[t]^2 + y[t]^2), Derivative[1][y][t] ==
x[t] + y[t] - y[t]*(x[t]^2 + y[t]^2)}, {x[t], y[t]}, t]
```

✓ **Maple** : cpu = 4.266 (sec), leaf count = 200

$$\left\{[\{x(t)=0\},\{y(t)=0\}], \left[\left\{x(t) = \mathit{ODESolStruc}\left(\_a, \left[\left\{\_b(\_a)\left(\frac{d}{d\_a}\_\mathrm{b}(\_a)\right) - \frac{-4\_a^4 - 4\_a^3\_b(\_a) +}{}\right.\right.\right.\right.\right.$$

2.1920 ODE No. 1920

$$\{x'(t) = x(t)\left(x(t)^2 + y(t)^2 - 1\right) - y(t), y'(t) = y(t)\left(x(t)^2 + y(t)^2 - 1\right) + x(t)\}$$

✗ **Mathematica** : cpu = 0.236862 (sec), leaf count = 0 , could not solve

```
DSolve[{Derivative[1][x][t] == -y[t] + x[t]*(-1 + x[t]^2 + y[t]^2), Derivative[1][y][t] == x
1 + x[t]^2 + y[t]^2)}, {x[t], y[t]}, t]
```

✓ **Maple** : cpu = 3.939 (sec), leaf count = 202

$$\left\{[\{x(t) = 0\}, \{y(t) = 0\}], \left[\left\{x(t) = ODESolStruc\left(\_a, \left[\left\{\_b(\_a)\left(\frac{d}{d\_a}\_b(\_a)\right) + \frac{4\_a^4 - 4\_a^3\_b(\_a) - 6\_\right.\right.\right.\right.\right.$$

2.1921 ODE No. 1921

$$\left\{x'(t) = -y(t)\left(x(t)^2 + y(t)^2\right), y'(t) = \left(\begin{cases} x(t)^2 + y(t)^2 & x(t)^2 + y(t)^2 \geq 2x(t) \\ \left(x(t)^2 + y(t)^2\right)\left(\frac{x(t)}{2} - \frac{y(t)^2}{2x(t)}\right) & \text{True} \end{cases} \right)\right\}$$

✗ **Mathematica** : cpu = 2.23123 (sec), leaf count = 0 , could not solve

```
DSolve[{Derivative[1][x][t] == -(y[t]*(x[t]^2 + y[t]^2)), Derivative[1][y][t] == Piecewise[{
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve({diff(x(t),t) = -y(t)*(x(t)^2+y(t)^2), diff(y(t),t) = piecewise(2*x(t) <= x(t)^2+y(t)
1/2*y(t)^2/x(t))*(x(t)^2+y(t)^2))})
```

2.1922 ODE No. 1922

$$\left\{x'(t) = \left(\begin{cases} \sin\left(\frac{1}{x(t)^2+y(t)^2}\right)x(t)\left(x(t)^2 + y(t)^2 - 1\right) & x(t)^2 + y(t)^2 \neq 1 \\ 0 & \text{True} \end{cases} \right) - y(t), y'(t) = \left(\begin{cases} \sin\left(\frac{1}{x(t)^2\right.\right.\right.\right.$$

✗ **Mathematica** : cpu = 9.85611 (sec), leaf count = 0 , could not solve

```
DSolve[{Derivative[1][x][t] == Piecewise[{{Sin[(x[t]^2 + y[t]^2)^(-1)]*x[t]*(-
1 + x[t]^2 + y[t]^2), x[t]^2 + y[t]^2 != 1}}, 0] - y[t], Derivative[1][y][t] == Piecewise[{{
1)]*y[t]*(-1 + x[t]^2 + y[t]^2), x[t]^2 + y[t]^2 != 1}}, 0] + x[t]}, {x[t], y[t]}, t]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve({diff(x(t),t) = -y(t)+piecewise(x(t)^2+y(t)^2 <> 1,x(t)*(x(t)^2+y(t)^2-
1)*sin(1/(x(t)^2+y(t)^2))), diff(y(t),t) = x(t)+piecewise(x(t)^2+y(t)^2 <> 1,y(t)*(x(t)^2+y(
1)*sin(1/(x(t)^2+y(t)^2)))})
```

2.1923 ODE No. 1923

$$\{(t^2+1)\,x'(t)=y(t)-tx(t),(t^2+1)\,y'(t)=-x(t)-ty(t)\}$$

✓ **Mathematica** : cpu = 0.0105972 (sec), leaf count = 53

$$\left\{\left\{x(t)\to\frac{c_1}{t^2+1}+\frac{c_2t}{t^2+1},y(t)\to\frac{c_2}{t^2+1}-\frac{c_1t}{t^2+1}\right\}\right\}$$

✓ **Maple** : cpu = 0.055 (sec), leaf count = 35

$$\left\{\left\{x(t)=\frac{c_1t+c_2}{t^2+1},y(t)=\frac{-c_2t+c_1}{t^2+1}\right\}\right\}$$

2.1924 ODE No. 1924

$$\{(-t^2+x(t)^2+y(t)^2)\,x'(t)=-2tx(t),(-t^2+x(t)^2+y(t)^2)\,y'(t)=-2ty(t)\}$$

✓ **Mathematica** : cpu = 0.0720984 (sec), leaf count = 191

$$\left\{\left\{y(t)\to\frac{c_1\left(e^{c_2}-\sqrt{-4t^2-4c_1{}^2t^2+e^{2c_2}}\right)}{2\left(1+c_1{}^2\right)},x(t)\to\frac{e^{c_2}-\sqrt{-4t^2-4c_1{}^2t^2+e^{2c_2}}}{2\left(1+c_1{}^2\right)}\right\},\left\{y(t)\to\frac{c_1\left(\sqrt{-4t^2-4c_1{}^2t^2\right.}}{2\left(1+c\right.}\right.\right.$$

✓ **Maple** : cpu = 0.391 (sec), leaf count = 180

$$\left\{\left[\{x(t)=0\},\left\{y(t)=\frac{1-\sqrt{-4c_1^2t^2+1}}{2c_1},y(t)=\frac{1+\sqrt{-4c_1^2t^2+1}}{2c_1}\right\}\right],\left[\left\{x(t)=\frac{c_1-\sqrt{-2c_2t^2+c_1^2}}{2c_2},x(t)=\frac{c_1}{}\right.\right.\right.$$

2.1925 ODE No. 1925

$$\{ay'(t)+tx'(t)-x(t)+y'(t)^2=0,x'(t)y'(t)+ty'(t)-y(t)=0\}$$

✓ **Mathematica** : cpu = 0.0189121 (sec), leaf count = 31

$$\{\{x(t)\to ac_2+c_1t+c_2{}^2,y(t)\to c_2t+c_1c_2\}\}$$

✓ **Maple** : cpu = 0.354 (sec), leaf count = 194

$$\left\{\left[\left\{x(t)=-\frac{t^2}{3}\right\},\left\{y(t)=-\frac{t^3}{27a}\right\}\right],\left[\{x(t)=c_1t+c_2\},\left\{y(t)=-\frac{\left(t+\frac{d}{dt}x(t)\right)\left(t\left(\frac{d}{dt}x(t)\right)+\left(\frac{d}{dt}x(t)\right)^2-x(t)\right)}{a}\right.\right.\right.$$

2.1926 ODE No. 1926

$$\{x(t) = f(x'(t), y'(t)) + tx'(t), y(t) = g(x'(t), y'(t)) + ty'(t)\}$$

✓ **Mathematica** : cpu = 0.0059445 (sec), leaf count = 28

$$\{\{x(t) \to f(c_1, c_2) + c_1 t, y(t) \to g(c_1, c_2) + c_2 t\}\}$$

✓ **Maple** : cpu = 0.273 (sec), leaf count = 96

$$\{[\{c_1 + \int \mathrm{RootOf}\left(t\left(\frac{d}{dt}y(t)\right) + g\left(\_Z, \frac{d}{dt}y(t)\right) - y(t)\right) dt = t\,\mathrm{RootOf}\left(t\left(\frac{d}{dt}y(t)\right) + g\left(\_Z, \frac{d}{dt}y(t)\right) - y(t)\right) +$$

2.1927 ODE No. 1927

$$\left\{x''(t) = ae^{2x(t)} + e^{-2x(t)}\cos^2(y(t)) - e^{-x(t)}, y''(t) = e^{-2x(t)}\sin(y(t))\cos(y(t)) - \tan(y(t))\sec^2(y(t))\right\}$$

✗ **Mathematica** : cpu = 0.0076564 (sec), leaf count = 0 , could not solve

```
DSolve[{Derivative[2][x][t] == -E^(-x[t]) + a*E^(2*x[t]) + Cos[y[t]]^2/E^(2*x[t]), Derivativ
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve({diff(diff(x(t),t),t) = a*exp(2*x(t))-exp(-x(t))+exp(-2*x(t))*cos(y(t))^2, diff(diff(
2*x(t))*sin(y(t))*cos(y(t))-sin(y(t))/cos(y(t))^3})
```

2.1928 ODE No. 1928

$$\left\{x''(t) = \frac{kx(t)}{(x(t)^2 + y(t)^2)^{3/2}}, y''(t) = \frac{ky(t)}{(x(t)^2 + y(t)^2)^{3/2}}\right\}$$

✗ **Mathematica** : cpu = 0.0065055 (sec), leaf count = 0 , could not solve

```
DSolve[{Derivative[2][x][t] == (k*x[t])/(x[t]^2 + y[t]^2)^(3/2), Derivative[2][y][t] == (k*y
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve({diff(diff(x(t),t),t) = k*x(t)/(x(t)^2+y(t)^2)^(3/2), diff(diff(y(t),t),t) = k*y(t)/(
```

2.1929 ODE No. 1929

$$\left\{x''(t) = -\frac{cy(t)x'(t)f\left(\sqrt{x'(t)^2+y'(t)^2}\right)}{\sqrt{x'(t)^2+y'(t)^2}}, y''(t) = -\frac{cy(t)y'(t)f\left(\sqrt{x'(t)^2+y'(t)^2}\right)}{\sqrt{x'(t)^2+y'(t)^2}} - g\right\}$$

✗ **Mathematica** : cpu = 0.0072309 (sec), leaf count = 0 , could not solve

```
DSolve[{Derivative[2][x][t] == -((c*f[Sqrt[Derivative[1][x][t]^2 + Derivative[1][y][t]^2]]*y
g - (c*f[Sqrt[Derivative[1][x][t]^2 + Derivative[1][y][t]^2]]*y[t]*Derivative[1][y][t])/Sqrt
```

✓ **Maple** : cpu = 4.415 (sec), leaf count = 116

$$\left\{\left[\left\{y(t) = ODESolStruc\left(\_a, \left[\left\{\_b(\_a)\left(\frac{d}{d\_a}\_\mathrm{b}(\_a)\right) + \frac{C(\_a)\_b(\_a)\,f\left(\sqrt{\_b\,(\_a)^2}\right) + \sqrt{\_b\,(\_a)^2}\,g}{\sqrt{\_b\,(\_a)^2}} = \right.\right.\right.\right.\right.\right.$$

2.1930 ODE No. 1930

$$\{x'(t) = y(t) - z(t), y'(t) = x(t)^2 + y(t), z'(t) = x(t)^2 + z(t)\}$$

✓ **Mathematica** : cpu = 0.0337943 (sec), leaf count = 308

$$\left\{\left\{x(t) \to e^{-c_3}\left(e^t + e^{c_3}c_1\right), y(t) \to c_2\left(e^{-c_3}\left(e^t + e^{c_3}c_1\right) - c_1\right) + \left(e^{-c_3}\left(e^t + e^{c_3}c_1\right) - c_1\right)\left(-\frac{{c_1}^2}{e^{-c_3}\left(e^t + e^{c_3}c_1\right) - c_1}\right.\right.\right.$$

✓ **Maple** : cpu = 0.092 (sec), leaf count = 45

$$\{[\{x(t) = c_2\mathrm{e}^t + c_3\}, \{y(t) = \left(c_1 + \int \mathrm{e}^{-t}x(t)^2\,dt\right)\mathrm{e}^t\}, \{z(t) = -\frac{d}{dt}x(t) + y(t)\}]\}$$

2.1931 ODE No. 1931

$$\{ax'(t) = (b-c)y(t)z(t), by'(t) = (c-a)x(t)z(t), cz'(t) = (a-b)x(t)y(t)\}$$

✓ **Mathematica** : cpu = 4.13771 (sec), leaf count = 10101

$$\left\{\left\{x(t) \rightarrow \frac{\frac{\sqrt{2}b^2\sqrt{a(a-c)}c_1\operatorname{sn}\left(\frac{\frac{\sqrt{2}\sqrt{a}\sqrt{a-c}c\sqrt{c_2}t}{\sqrt{b}\sqrt{b-c}} - \frac{\sqrt{2}\sqrt{a}\sqrt{b}\sqrt{a-c}\sqrt{c_2}t}{\sqrt{b-c}} - \frac{\sqrt{2}\sqrt{a}\sqrt{a-c}c\sqrt{c_2}c_3}{\sqrt{b}\sqrt{b-c}} + \frac{\sqrt{2}\sqrt{a}\sqrt{b}\sqrt{a-c}\sqrt{c_2}c_3}{\sqrt{b-c}}}{a} \middle| -\frac{(a-b)bc_1}{(a-c)cc_2}\right)}{(a-c)\sqrt{b(b-c)c_1}} - \frac{\sqrt{2}b\sqrt{a(a-}}{}}{a}\right.\right.$$

✓ **Maple** : cpu = 1.4 (sec), leaf count = 1117

$$\left\{[\{x(t) = 0\}, \{y(t) = 0\}, \{z(t) = c_1\}], [\{x(t) = 0\}, \{y(t) = c_1\}, \{z(t) = 0\}], [\{x(t) = c_1\}, \{y(t) = 0\}, \{z(t) = 0\}],\right.$$

2.1932 ODE No. 1932

$$\{x'(t) = x(t)(y(t) - z(t)), y'(t) = y(t)(z(t) - x(t)), z'(t) = z(t)(x(t) - y(t))\}$$

✗ **Mathematica** : cpu = 2.74736 (sec), leaf count = 0 , could not solve

```
DSolve[{Derivative[1][x][t] == x[t]*(y[t] - z[t]), Derivative[1][y][t] == y[t]*(-
x[t] + z[t]), Derivative[1][z][t] == (x[t] - y[t])*z[t]}, {x[t], y[t], z[t]}, t]
```

✓ **Maple** : cpu = 1.242 (sec), leaf count = 383

$$\left\{[\{x(t) = 0\}, \{y(t) = 0\}, \{z(t) = c_1\}], \left[\{x(t) = 0\}, \left\{y(t) = \frac{c_1 e^{c_1 c_2} e^{c_1 t}}{e^{c_1 c_2} e^{c_1 t} - 1}\right\}, \left\{z(t) = \frac{\frac{d}{dt}y(t)}{y(t)}\right\}\right], [\{x(t) = c_1\}, \{y(\right.$$

2.1933 ODE No. 1933

$$\{x'(t)+y'(t)=x(t)y(t),y'(t)+z'(t)=y(t)z(t),x'(t)+z'(t)=x(t)z(t)\}$$

✗ **Mathematica** : cpu = 125.725 (sec), leaf count = 0 , could not solve

```
DSolve[{Derivative[1][x][t] + Derivative[1][y][t] == x[t]*y[t], Derivative[1][y][t] + Deriva
```

✓ **Maple** : cpu = 1.618 (sec), leaf count = 4258

Expression too large to display

2.1934 ODE No. 1934

$$\left\{x'(t)=\frac{x(t)^2}{2}-\frac{y(t)}{24},y'(t)=2x(t)y(t)-3z(t),z'(t)=3x(t)z(t)-\frac{y(t)^2}{6}\right\}$$

✗ **Mathematica** : cpu = 67.4084 (sec), leaf count = 0 , could not solve

```
DSolve[{Derivative[1][x][t] == x[t]^2/2 - y[t]/24, Derivative[1][y][t] == 2*x[t]*y[t] - 3*z[
1/6*y[t]^2 + 3*x[t]*z[t]}, {x[t], y[t], z[t]}, t]
```

✓ **Maple** : cpu = 1.512 (sec), leaf count = 377

$$\left\{\left[\{y(t)=0\},\left\{x(t)=-\frac{2}{-2c_1+t}\right\},\{z(t)=0\}\right],\left[\left\{y(t)=\frac{256}{(c_1t+c_2)^4}\right\},\left\{x(t)=\frac{-\sqrt{3}\,y(t)^{\frac{3}{2}}+3\frac{d}{dt}y(t)}{6y\,(t)},x(t)=\right.\right.\right.$$

2.1935 ODE No. 1935

$$\left\{x'(t)=x(t)\left(y(t)^2-z(t)^2\right),y'(t)=y(t)\left(z(t)^2-x(t)^2\right),z'(t)=z(t)\left(x(t)^2-y(t)^2\right)\right\}$$

✗ **Mathematica** : cpu = 0.0432276 (sec), leaf count = 0 , could not solve

```
DSolve[{Derivative[1][x][t] == x[t]*(y[t]^2 - z[t]^2), Derivative[1][y][t] == y[t]*(-
x[t]^2 + z[t]^2), Derivative[1][z][t] == (x[t]^2 - y[t]^2)*z[t]}, {x[t], y[t], z[t]}, t]
```

✓ **Maple** : cpu = 2.276 (sec), leaf count = 741

$$\left\{[\{x(t)=0\},\{y(t)=0\},\{z(t)=c_1\}],\left[\{x(t)=0\},\left\{y(t)=\frac{\sqrt{c_1\,(\mathrm{e}^{2c_1c_2}\mathrm{e}^{2c_1t}-1)\,\mathrm{e}^{2c_1c_2}\mathrm{e}^{2c_1t}}}{\mathrm{e}^{2c_1c_2}\mathrm{e}^{2c_1t}-1},y(t)=-\frac{\sqrt{c_1\,(\mathrm{e}^{2c_1c}}}{\mathrm{e}^{2}}\right.\right.\right.$$

2.1936 ODE No. 1936

$$\{x'(t) = x(t)\left(y(t)^2 - z(t)^2\right), y'(t) = -y(t)\left(x(t)^2 + z(t)^2\right), z'(t) = z(t)\left(x(t)^2 + y(t)^2\right)\}$$

✗ **Mathematica** : cpu = 0.0439705 (sec), leaf count = 0 , could not solve

```
DSolve[{Derivative[1][x][t] == x[t]*(y[t]^2 - z[t]^2), Derivative[1][y][t] == -
(y[t]*(x[t]^2 + z[t]^2)), Derivative[1][z][t] == (x[t]^2 + y[t]^2)*z[t]}, {x[t], y[t], z[t]}
```

✓ **Maple** : cpu = 1.076 (sec), leaf count = 704

$$\left\{[\{x(t)=0\},\{y(t)=0\},\{z(t)=c_1\}], \left[\{x(t)=0\}, \left\{y(t)=\frac{\sqrt{c_1 e^{2c_1c_2}e^{2c_1t} - c_1e^{4c_1c_2}e^{4c_1t}}}{e^{2c_1c_2}e^{2c_1t}-1}, y(t) = -\frac{\sqrt{c_1e^{2c_1c_2}e^{2c_1}}}{e^{2c_1c_2}}\right.\right.\right.$$

2.1937 ODE No. 1937

$$\{x'(t) = -x(t)y(t)^2 + x(t) + y(t), y'(t) = x(t)^2y(t) - x(t) - y(t), z'(t) = y(t)^2 - x(t)^2\}$$

✗ **Mathematica** : cpu = 0.757668 (sec), leaf count = 0 , could not solve

```
DSolve[{Derivative[1][x][t] == x[t] + y[t] - x[t]*y[t]^2, Derivative[1][y][t] == -
x[t] - y[t] + x[t]^2*y[t], Derivative[1][z][t] == -x[t]^2 + y[t]^2}, {x[t], y[t], z[t]}, t]
```

✓ **Maple** : cpu = 1.039 (sec), leaf count = 242

$$\left\{[\{x(t)=0\},\{y(t)=0\},\{z(t)=c_1\}], \left[\left\{x(t) = \mathit{ODESolStruc}\left(\_a, \left[\left\{\frac{4\_a^5 + 2\_a^2\_b(\_a)\left(\frac{d}{d\_a}\_b(\_a)\right) - 3}{}\right.\right.\right.\right.\right.\right.$$

2.1938 ODE No. 1938

$$\left\{x''(t) = \frac{x(t)f'(r)}{r}, y''(t) = \frac{y(t)f'(r)}{r}, z''(t) = \frac{z(t)f'(r)}{r}\right\}$$

✓ **Mathematica** : cpu = 0.0075697 (sec), leaf count = 137

$$\left\{\left\{x(t) \to c_1 e^{-\frac{t\sqrt{f'(r)}}{\sqrt{r}}} + c_2 e^{\frac{t\sqrt{f'(r)}}{\sqrt{r}}}, y(t) \to c_3 e^{-\frac{t\sqrt{f'(r)}}{\sqrt{r}}} + c_4 e^{\frac{t\sqrt{f'(r)}}{\sqrt{r}}}, z(t) \to c_5 e^{-\frac{t\sqrt{f'(r)}}{\sqrt{r}}} + c_6 e^{\frac{t\sqrt{f'(r)}}{\sqrt{r}}}\right\}\right\}$$

✓ **Maple** : cpu = 0.211 (sec), leaf count = 101

$$\left\{\left\{x(t) = c_5 e^{\frac{t\sqrt{\frac{d}{dr}F(r)}}{\sqrt{r}}} + c_6 e^{-\frac{t\sqrt{\frac{d}{dr}F(r)}}{\sqrt{r}}}, y(t) = c_3 e^{\frac{t\sqrt{\frac{d}{dr}F(r)}}{\sqrt{r}}} + c_4 e^{-\frac{t\sqrt{\frac{d}{dr}F(r)}}{\sqrt{r}}}, z(t) = c_1 e^{\frac{t\sqrt{\frac{d}{dr}F(r)}}{\sqrt{r}}} + c_2 e^{-\frac{t\sqrt{\frac{d}{dr}F(r)}}{\sqrt{r}}}\right\}\right\}$$

2.1939 ODE No. 1939

$\{(x(t)-y(t))(x(t)-z(t))x'(t)=f(t),(y(t)-x(t))(y(t)-z(t))y'(t)=f(t),(z(t)-x(t))(z(t)-y(t))z'(t)=f(t$

✓ **Mathematica** : cpu = 0.290648 (sec), leaf count = 2168

$$\left\{\left\{x(t)\to \frac{c_1}{3}+\frac{\sqrt[3]{2c_1{}^3-9c_2c_1+27c_3+27\int_1^t f(K[1])dK[1]+\sqrt{4\left(3c_2-c_1{}^2\right)^3+\left(2c_1{}^3-9c_2c_1+27c_3+27\int_1^t\right.}}}{3\sqrt[3]{2}}\right.\right.$$

✓ **Maple** : cpu = 1.798 (sec), leaf count = 899

$$\left\{\left[\left\{x(t)=c_3+\int-\frac{3\left(c_1\left(c_1^3+11664c_2^2-23328c_2\left(\int f(t)\,dt\right)+11664\left(\int f(t)\,dt\right)^2\right)\left(1+i\sqrt{3}\right)+\left(1-i\sqrt{3}\right)\left(\left(\left(1\right.\right.\right.\right.}{\left(\left(1+108\sqrt{\frac{\left(-c_2+\int f(t)dt\right)^2}{c_1^3+11664c_2^2-23328c_2\left(\int f(t)dt\right)+11664\left(\int f(t)dt\right)^2}}\right)\left(c_1^3+11664c_2^2-23\right.\right.}\right.\right.\right.$$

2.1940 ODE No. 1940

$\{\mathrm{x1}'(t)\sin(\mathrm{x2}(t))=\mathrm{x4}(t)\sin(\mathrm{x3}(t))+\mathrm{x5}(t)\cos(\mathrm{x3}(t)),\mathrm{x2}'(t)=\mathrm{x4}(t)\cos(\mathrm{x3}(t))-\mathrm{x5}(t)\sin(\mathrm{x3}(t)),\mathrm{x1}'(t)\cos(\mathrm{x2}(t$

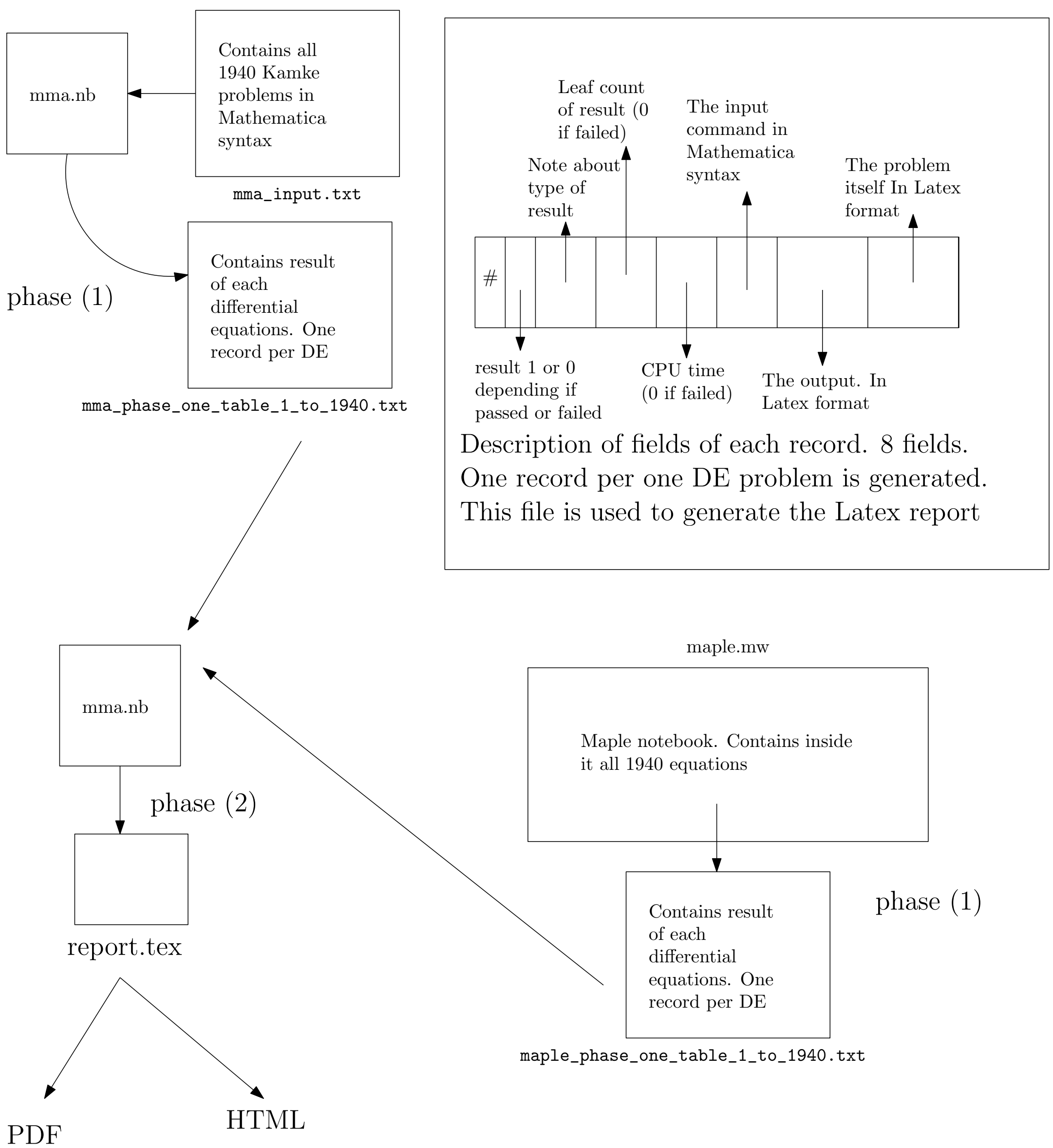
✗ **Mathematica** : cpu = 0.0080374 (sec), leaf count = 0 , could not solve

```
DSolve[{Sin[x2[t]]*Derivative[1][x1][t] == Sin[x3[t]]*x4[t] + Cos[x3[t]]*x5[t], Derivative[1
(a*(1 - lambda)*x5[t]) + Derivative[1][x4][t] == -(m*Cos[x3[t]]*Sin[x2[t]]), a*(1 - lambda)*
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve({diff(x1(t),t)*sin(x2(t)) = x4(t)*sin(x3(t))+x5(t)*cos(x3(t)), diff(x3(t),t)+diff(x1(
(1-lambda)*a*x5(t) = -m*sin(x2(t))*cos(x3(t)), diff(x5(t),t)+(1-lambda)*a*x4(t) = m*sin(x2(t
x5(t)*sin(x3(t))})
```

3 Appendix



Kamke Differential equations build process