Kamke differential equations. Mathematica 11.3 and Maple 2018.0

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Contents

1 Introduction and summary of results

This report gives the result of solving the 1,940 differential equations from Kamke book in Mathematica 11.3 and Maple 2018.0 on windows 7, 64 bit OS. The PC used is an Intel i7-3930k running at 3.20 GHz with 16 GB memory.

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 s
Mathematica	75.93	5.29	2808.65	129.75	4137148
Maple	91.96	0.6	206.92	17.73	369152

Table 1: Summary of final results

Table 2 summarizes the Kamke equations used

The following summarizes which equations are solved by each system

Not solved by Mathematica 16, 22, 47, 48, 49, 50, 55, 56, 63, 66, 74, 79, 80, 81, 82, 83, 86, 87, 110, 121, 127, 188, 192, 202, 203, 205, 206, 219, 234, 237, 250, 253, 265, 266, 269, 331, 340, 365, 366, 367, 368, 370, 383, 385, 394, 395, 402, 404, 413, 414, 416, 428, 429, 451, 452, 460, 461, 465, 467, 468, 479, 480, 482, 485, 489, 494, 503, 504, 506, 508, 509, 510, 513, 515, 523, 524, 527, 528, 530, 531, 532, 533, 534, 535, 537, 538, 541, 542, 543, 544, 546, 550, 555, 561, 562, 566, 567, 570, 572, 575, 576, 592, 607, 608, 613, 620, 638, 639, 640, 672, 696, 701, 702, 703, 704, 706, 707, 710, 714, 730, 733, 735, 743, 745, 746, 747, 752, 759, 765, 766, 769, 776, 782, 783, 784, 785, 786, 788, 789, 790, 791, 792, 807, 835, 837, 854, 855, 862, 865, 885, 889, 892, 894, 909, 913, 915, 916, 917, 918, 919, 922, 923, 925, 929, 932, 942, 953, 961, 993, 996, 1000, 1015, 1019, 1026, 1027, 1028, 1029, 1030, 1031, 1032, 1038, 1072,

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

1073, 1074, 1075, 1076, 1077, 1080, 1081, 1082, 1083, 1084, 1085, 1099, 1126, 1128, 1156, 1157, 1177, 1205, 1212, 1216, 1219, 1232, 1233, 1236, 1248, 1261, 1263, 1268, 1270, 1278, 1303, 1306, 1323, 1329, 1330, 1341, 1343, 1348, 1362, 1367, 1372, 1373, 1398, 1402, 1403, 1406, 1407, 1408, 1413, 1418, 1419, 1427, 1439, 1440, 1441, 1442, 1443, 1444, 1445, 1450, 1457, 1458, 1459, 1460, 1461, 1462, 1463, 1470, 1471, 1472, 1473, 1474, 1476, 1482, 1484, 1487, 1489, 1500, 1505, 1506, 1507, 1510, 1515, 1516, 1520, 1526, 1527, 1529, 1530, 1531, 1540, 1541, 1542, 1543, 1544, 1547, 1552, 1569, 1572, 1573, 1574, 1575, 1576, 1578, 1581, 1583, 1586, 1590, 1593, 1595, 1596, 1598, 1599, 1601, 1603, 1605, 1606, 1608, 1609, 1610, 1611, 1612, 1613, 1614, 1615, 1616, 1617, 1618, 1619, 1620, 1621, 1622, 1623, 1624, 1625, 1626, 1627, 1628, 1629, 1631, 1633, 1634, 1635, 1636, 1637, 1638, 1639, 1640, 1642, 1643, 1644, 1645, 1648, 1649, 1652, 1656, 1658, 1659, 1660, 1662, 1663, 1664, 1665, 1666, 1667, 1672, 1673, 1675, 1677, 1678, 1680, 1681, 1682, 1684, 1685, 1686, 1688, 1690, 1691, 1692, 1693, 1695, 1696, 1702, 1704, 1705, 1706, 1708, 1709, 1710, 1711, 1713, 1719, 1720, 1721, 1729, 1732, 1734, 1735, 1737, 1738, 1739, 1742, 1746, 1751, 1755, 1756, 1757, 1760, 1761, 1762, 1776, 1777, 1779, 1780, 1787, 1788, 1789, 1797, 1798, 1801, 1802, 1806, 1807, 1809, 1811, 1813, 1815, 1816, 1817, 1818, 1819, 1820, 1821, 1823, 1825, 1827, 1831, 1832, 1833, 1834, 1836, 1837, 1838, 1839, 1840, 1841, 1844, 1845, 1848, 1850, 1851, 1853, 1854, 1855, 1875, 1880, 1885, 1890, 1893, 1894, 1905, 1911, 1912, 1915, 1916, 1917, 1918, 1919, 1920, 1921, 1922, 1925, 1926, 1927, 1928, 1929, 1932, 1933, 1934, 1935, 1936, 1937, 1939, 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, 17, 18, 19, 20, 21, 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, 64, 65, 67, 68, 69, 70, 71, 72, 73, 75, 76, 77, 78, 84, 85, 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, 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, 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, 231, 232, 233, 235, 236, 238, 239, 240, 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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 solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1	✓	1.015	1117	✓	0.881	1089	Linear first order, To Do
Kamke 2	✓	0.031	33	✓	0.122	25	Linear first order, integrating factor $y'(x) + ay(x) = f(x)$
Kamke 3	✓	0.039	40	✓	0.194	37	Linear first order, integrating factor $y'(x) + ay(x) = f(x)$
Kamke 4	✓	0.009	24	✓	0.007	18	Linear first order, integrating factor $y'(x) + g(x)y(x) = f(x)$
Kamke 5	✓	4.147	31	✓	1.088	21	Linear first order, integrating factor $y'(x) + g(x)y(x) = f(x)$
Kamke 6	✓	0.027	18	✓	0.034	15	Linear first order, integrating factor $y'(x) + g(x)y(x) = f(x)$
Kamke 7	✓	0.025	16	✓	0.007	13	Linear first order, integrating factor $y'(x) + g(x)y(x) = f(x)$
Kamke 8	✓	0.035	15	✓	0.047	13	Linear first order, integrating factor $y'(x) + g(x)y(x) = f(x)$

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 9	✓	0.019	17	✓	0.04	14	Linear first order, integrating factor $y'(x)+g(x)y(x)=f(x)$
Kamke 10	✓	0.009	18	✓	0.014	15	Linear first order, integrating factor $y'(x)+g(x)y(x)=f(x)$
Kamke 11	✓	0.474	48	✓	0.063	24	Linear first order, integrating factor $y'(x)+g(x)y(x)=f(x)$
Kamke 12	✓	0.064	34	✓	0.253	8	Non-linear first order, Riccati, separable $y'(x)+y^2(x)=1$
Kamke 13	✓	0.065	69	✓	1.352	79	Non-linear first order, Riccati, transform to second order Airy ODE using $y=-\frac{u'(x)}{uR(x)}$
Kamke 14	✓	0.029	253	✓	0.338	187	Non-linear first order, Riccati, transform to second order Airy ODE using $y=-\frac{u'(x)}{uR(x)}$
Kamke 15	✓	0.019	25	✓	0.875	33	Non-linear first order, Riccati, transform to separable first order
Kamke 16	✗	0	0	✓	0.256	49	Non-linear first order, Riccati, transform to first order separable using $y=y_p+\frac{1}{u}$

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 17	✓	0.024	30	✓	0.164	24	Non-linear first order, Riccati, transform to second order standard ODE using $y = -\frac{u'(x)}{uR(x)}$
Kamke 18	✓	0.025	49	✓	0.11	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	✓	0.01	30	✓	0.072	16	Non-linear first order, Riccati, transform to first order separable
Kamke 20	✓	0.845	48	✓	0.139	34	Non-linear first order, Riccati, transform to Bernoulli first order non-linear first order then solve Bernoulli
Kamke 21	✓	7.932	57	✓	0.201	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	0	✓	1.539	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	✓	0.93	32	✓	0.055	23	Non-linear first order, Riccati, Separable

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#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 24	✓	0.079	276	✓	0.253	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	✓	3.951	516	✓	0.473	348	Non-linear first order, Riccati. To do
Kamke 26	✓	0.294	56	✓	0.1	45	Non-Linear first order, Riccati, transform to second order standard ODE using $y = -\frac{u'(x)}{uR(x)}$
Kamke 27	✓	2.646	88	✓	0.418	72	Non-linear first order, Riccati, transform to Bernoulli first order non-linear first order then solve Bernoulli
Kamke 28	✓	0.163	63	✓	0.387	51	Non-linear first order, Riccati, transform to Bernoulli first order non-linear first order then solve Bernoulli
Kamke 29	✓	0.037	39	✓	0.089	19	Non-linear first order, Bernoulli
Kamke 30	✓	0.333	197	✓	0.1	54	Non-Linear first order, Riccati, transform to second order Bessel like ODE using $y = -\frac{u'(x)}{uR(x)}$, solution uses Bessel functions

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#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 31	✓	0.131	21	✓	0.06	23	Non-Linear first order, Riccati, separable
Kamke 32	✓	0.445	26	✓	0.503	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	✓	37.6	114	✓	0.734	58	Non-Linear first order, Riccati. Complicated algebra, will do later
Kamke 34	✓	0.595	51	✓	0.037	28	Non-Linear first order, Bernoulli. Standard method.
Kamke 35	✓	0.058	48	✓	0.08	35	Non-Linear first order, Riccati. Transform to second order ODE using $y(x) = -\frac{u'(x)}{u(x)R(x)}$
Kamke 36	✓	0.814	171	✓	0.326	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	✓	1.409	73	✓	0.122	50	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 38	✓	0.161	99	✓	0.068	34	Non-Linear first order. smart transformation makes it proper Abel first kind
Kamke 39	✓	0.064	54	✓	0.016	30	To Do
Kamke 40	✓	0.499	161	✓	0.078	48	To Do
Kamke 41	✓	0.183	98	✓	0.44	103	To Do
Kamke 42	✓	1.488	136	✓	0.04	40	To Do
Kamke 43	✓	11.201	352	✓	2.155	373	To Do
Kamke 44	✓	0.019	65	✓	0.029	53	Non-Linear first order Bernoulli. Solved using standard method of solving Bernoulli.
Kamke 45	✓	1.106	120	✓	0.261	123	To Do
Kamke 46	✓	0.427	254	✓	0.119	956	To Do
Kamke 47	✗	0	0	✗	0	0	To Do
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	✓	0.849	322	✓	0.207	237	To Do
Kamke 52	✓	173.836	109	✓	0.264	61	To Do
Kamke 53	✓	104.142	95	✓	0.072	281	To Do
Kamke 54	✓	0.157	74	✓	0.24	38	To Do
Kamke 55	✗	0	0	✗	0	0	To Do
Kamke 56	✗	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 57	✓	170.178	263	✓	0.124	31	To Do
Kamke 58	✓	0.227	114	✓	0.095	68	To Do
Kamke 59	✓	0.189	96	✓	0.09	26	To Do
Kamke 60	✓	0.057	143	✓	0.021	29	Non-Linear first order, separable.
Kamke 61	✓	0.19	75	✓	0.018	50	To Do
Kamke 62	✓	3.925	36	✓	0.424	34	Non-Linear first order, special transformation makes it exact differential.
Kamke 63	✗	0	0	✓	7.432	35	To Do
Kamke 64	✓	0.187	90	✓	0.105	124	To Do
Kamke 65	✓	1.603	312	✓	0.059	47	To Do
Kamke 66	✗	0	0	✓	0.16	40	To Do
Kamke 67	✓	0.219	14	✓	0.017	51	To Do
Kamke 68	✓	0.911	373	✓	0.068	77	To Do
Kamke 69	✓	96.919	12750	✓	0.213	111	To Do
Kamke 70	✓	287.031	23353	✓	0.172	113	To Do
Kamke 71	✓	4.072	2237	✓	0.135	113	To Do
Kamke 72	✓	1.082	84	✓	0.013	64	To Do
Kamke 73	✓	1.719	733	✓	0.365	91	To Do
Kamke 74	✗	0	0	✗	0	0	To Do
Kamke 75	✓	0.02	18	✓	0.18	20	Non-Linear first order, Separable

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#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 76	✓	0.119	51	✓	0.057	41	Non-Linear first order, Separable, integral requires the tangent half-angle substitution (Weierstrass substitution)
Kamke 77	✓	0.318	58	✓	0.08	54	Non-Linear first order, transform to Separable, becomes same as problem 76 above. Transform back after soluion.
Kamke 78	✓	0.896	86	✓	2.156	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	0	✓	1.331	41	To Do
Kamke 81	✗	0	0	✓	1.237	78	To Do
Kamke 82	✗	0	0	✗	0	0	To Do
Kamke 83	✗	0	0	✓	0.45	44	To Do
Kamke 84	✓	10.995	108	✓	0.138	37	To Do
Kamke 85	✓	199.305	160	✓	0.507	153	To Do
Kamke 86	✗	0	0	✓	0.647	52	To Do
Kamke 87	✗	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 88	✓	0.311	2479	✓	0.267	256	Non-Linear first order, Riccati, Solved using $y = -\frac{u'}{uR(x)}$ substitution. Convert to second order Bessel ODE
Kamke 89	✓	0.034	46	✓	0.022	56	Linear first order, separable. Integration tricky. requires tangent half-angle substitution
Kamke 90	✓	0.016	19	✓	0.019	17	Linear first order, separable. integrating factor
Kamke 91	✓	0.007	13	✓	0.008	11	To Do
Kamke 92	✓	0.013	14	✓	0.007	12	Linear first order, separable. integrating factor
Kamke 93	✓	0.02	14	✓	0.019	12	To Do
Kamke 94	✓	0.016	25	✓	0.01	23	Linear first order, separable. integrating factor
Kamke 95	✓	0.015	30	✓	0.09	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	✓	0.024	33	✓	0.073	11	Non-Linear first order, Riccati, but it is separable, so easy to solve by direct integration

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#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 97	✓	0.027	36	✓	0.049	25	Non-Linear first order, Riccati, smart substitution transfer it to separable first order, so easy to solve by direct integration
Kamke 98	✓	0.025	123	✓	0.069	38	To Do
Kamke 99	✓	0.018	243	✓	0.124	171	To Do
Kamke 100	✓	0.009	133	✓	0.084	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	✓	0.009	18	✓	0.016	16	Non-Linear first order, Bernoulli, standard method of solving Bernoulli
Kamke 102	✓	0.02	30	✓	0.056	22	Non-Linear first order, Riccati, but transformed using smart substitution $y = xv$ to separable first order which is easily solved

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#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 103	✓	0.135	72	✓	0.084	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	✓	0.017	43	✓	0.088	63	Non-Linear first order, Riccati, conversion using smart transformation to separable first order
Kamke 105	✓	0.177	301	✓	0.333	844	To Do
Kamke 106	✓	0.042	40	✓	0.072	41	To Do
Kamke 107	✓	0.269	1286	✓	0.284	174	To Do
Kamke 108	✓	0.011	15	✓	0.04	13	Non-Linear first order, Bernoulli, standard method of solving Bernoulli, leads to first order separable
Kamke 109	✓	0.012	17	✓	0.017	15	Non-Linear first order, Bernoulli, standard method of solving Bernoulli, leads to first order separable

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
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	✓	0.487	55	✓	0.173	54	To Do
Kamke 112	✓	0.022	13	✓	0.06	27	Non-Linear first order, smart transformation $y(x) = xv(x)$ makes it separable
Kamke 113	✓	0.023	16	✓	0.032	33	Non-Linear first order, very similar to 112. Smart transformation $y(x) = xv(x)$ makes it separable
Kamke 114	✓	0.021	12	✓	2.618	28	Non-Linear first order, very similar to 113. Smart transformation $y(x) = xv(x)$ makes it separable
Kamke 115	✓	0.142	81	✓	0.243	49	Non-Linear first order, Smart transformation $y(x) = xv(x)$ makes it separable
Kamke 116	✓	0.563	142	✓	0.263	86	To Do
Kamke 117	✓	0.028	21	✓	0.131	20	To Do
Kamke 118	✓	0.012	13	✓	0.066	8	To Do
Kamke 119	✓	0.031	17	✓	0.075	14	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 120	✓	0.055	20	✓	0.199	17	To Do
Kamke 121	✗	0	0	✗	0	0	To Do
Kamke 122	✓	0.089	19	✓	0.425	16	To Do
Kamke 123	✓	0.066	19	✓	0.089	44	To Do
Kamke 124	✓	0.031	16	✓	0.037	12	To Do
Kamke 125	✓	0.04	16	✓	0.075	14	To Do
Kamke 126	✓	19.679	84	✓	0.028	29	To Do
Kamke 127	✗	0	0	✓	0.128	39	To Do
Kamke 128	✓	4.368	39	✓	0.305	33	To Do
Kamke 129	✓	0.031	37	✓	0.036	33	To Do
Kamke 130	✓	0.007	21	✓	0.011	15	To Do
Kamke 131	✓	0.018	20	✓	0.22	31	To Do
Kamke 132	✓	0.012	115	✓	0.039	153	To Do
Kamke 133	✓	0.007	22	✓	0.012	16	To Do
Kamke 134	✓	0.012	21	✓	0.01	17	To Do
Kamke 135	✓	0.007	14	✓	0.007	11	To Do
Kamke 136	✓	0.014	24	✓	0.022	18	To Do
Kamke 137	✓	0.009	16	✓	0.02	14	To Do
Kamke 138	✓	0.014	13	✓	0.042	11	To Do
Kamke 139	✓	0.134	397	✓	0.154	219	To Do
Kamke 140	✓	0.01	17	✓	0.067	20	To Do
Kamke 141	✓	0.027	61	✓	0.072	51	To Do
Kamke 142	✓	0.118	71	✓	0.103	52	To Do

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#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 143	✓	0.009	51	✓	0.063	41	To Do
Kamke 144	✓	0.178	1588	✓	0.123	219	To Do
Kamke 145	✓	0.695	239	✓	0.125	117	To Do
Kamke 146	✓	0.95	73	✓	0.174	84	To Do
Kamke 147	✓	0.946	279	✓	0.477	178	To Do
Kamke 148	✓	0.014	20	✓	0.011	16	To Do
Kamke 149	✓	0.012	27	✓	0.012	20	To Do
Kamke 150	✓	0.008	25	✓	0.007	23	To Do
Kamke 151	✓	0.568	161	✓	0.059	85	To Do
Kamke 152	✓	0.247	39	✓	0.905	25	To Do
Kamke 153	✓	0.017	21	✓	0.016	20	To Do
Kamke 154	✓	0.016	18	✓	0.013	16	To Do
Kamke 155	✓	0.019	47	✓	0.111	14	To Do
Kamke 156	✓	0.018	21	✓	0.02	20	To Do
Kamke 157	✓	0.093	32	✓	0.276	231	To Do
Kamke 158	✓	0.037	31	✓	0.022	22	To Do
Kamke 159	✓	0.018	17	✓	0.151	13	To Do
Kamke 160	✓	0.021	27	✓	0.036	21	To Do
Kamke 161	✓	0.015	34	✓	0.016	27	To Do
Kamke 162	✓	0.273	99	✓	0.201	58	To Do
Kamke 163	✓	0.014	43	✓	0.062	26	To Do
Kamke 164	✓	0.083	76	✓	0.222	102	To Do
Kamke 165	✓	0.017	22	✓	0.027	17	To Do

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#	Mathematica			Maple			note on solution
	solved	cpu	leaf	solved	cpu	leaf	
Kamke 166	✓	0.153	63	✓	0.194	97	To Do
Kamke 167	✓	0.028	29	✓	0.042	20	To Do
Kamke 168	✓	0.096	99	✓	0.187	140	To Do
Kamke 169	✓	2.839	110	✓	0.167	153	To Do
Kamke 170	✓	0.022	22	✓	0.02	23	To Do
Kamke 171	✓	0.01	17	✓	0.016	15	To Do
Kamke 172	✓	0.043	27	✓	0.518	26	To Do
Kamke 173	✓	0.017	25	✓	0.052	27	To Do
Kamke 174	✓	0.007	17	✓	0.004	13	To Do
Kamke 175	✓	0.022	23	✓	0.022	20	To Do
Kamke 176	✓	0.126	73	✓	0.128	30	To Do
Kamke 177	✓	0.017	20	✓	0.028	17	To Do
Kamke 178	✓	0.072	52	✓	0.208	63	To Do
Kamke 179	✓	1.658	1619	✓	0.187	112	To Do
Kamke 180	✓	0.132	104	✓	0.097	58	To Do
Kamke 181	✓	0.013	100	✓	0.084	28	To Do
Kamke 182	✓	0.182	24	✓	0.174	18	To Do
Kamke 183	✓	0.015	22	✓	0.015	18	To Do
Kamke 184	✓	1.621	612	✓	0.456	493	To Do
Kamke 185	✓	0.472	106	✓	0.049	63	To Do
Kamke 186	✓	0.03	19	✓	0.051	17	To Do
Kamke 187	✓	0.072	154	✓	0.103	60	To Do
Kamke 188	✗	0	0	✓	0.032	32	To Do

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#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 189	✓	107.912	90	✓	0.319	60	To Do
Kamke 190	✓	0.058	143	✓	0.009	29	To Do
Kamke 191	✓	0.03	48	✓	0.021	16	To Do
Kamke 192	✗	0	0	✓	0.018	36	To Do
Kamke 193	✓	0.009	16	✓	0.008	14	To Do
Kamke 194	✓	0.077	30	✓	0.028	23	To Do
Kamke 195	✓	0.062	24	✓	0.137	28	To Do
Kamke 196	✓	0.071	40	✓	0.147	29	To Do
Kamke 197	✓	0.054	98	✓	0.115	237	To Do
Kamke 198	✓	0.029	15	✓	0.016	13	To Do
Kamke 199	✓	0.196	15	✓	0.23	102	To Do
Kamke 200	✓	0.052	59	✓	0.062	53	To Do
Kamke 201	✓	0.076	38	✓	0.052	23	To Do
Kamke 202	✗	0	0	✗	0	0	To Do
Kamke 203	✗	0	0	✗	0	0	To Do
Kamke 204	✓	0.111	67	✓	0.335	92	To Do
Kamke 205	✗	0	0	✗	0	0	To Do
Kamke 206	✗	0	0	✗	0	0	To Do
Kamke 207	✓	0.012	47	✓	0.029	37	To Do
Kamke 208	✓	0.083	120	✓	0.079	106	To Do
Kamke 209	✓	0.022	58	✓	0.013	21	To Do
Kamke 210	✓	0.017	47	✓	0.036	33	To Do
Kamke 211	✓	54.488	38	✓	0.04	31	To Do

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#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 212	✓	28.515	92	✓	0.152	30	To Do
Kamke 213	✓	0.15	71	✓	0.805	66	To Do
Kamke 214	✓	0.162	78	✓	0.212	48	To Do
Kamke 215	✓	0.169	80	✓	0.239	51	To Do
Kamke 216	✓	0.143	82	✓	0.212	51	To Do
Kamke 217	✓	0.019	29	✓	0.063	23	To Do
Kamke 218	✓	0.104	232	✓	0.227	57	To Do
Kamke 219	✗	0	0	✗	0	0	To Do
Kamke 220	✓	0.014	57	✓	0.029	43	To Do
Kamke 221	✓	0.02	30	✓	0.087	21	To Do
Kamke 222	✓	0.074	65	✓	0.088	32	To Do
Kamke 223	✓	0.026	55	✓	0.194	51	To Do
Kamke 224	✓	0.018	29	✓	0.068	35	To Do
Kamke 225	✓	0.016	26	✓	0.058	20	To Do
Kamke 226	✓	0.016	28	✓	0.056	21	To Do
Kamke 227	✓	0.013	71	✓	0.213	33	To Do
Kamke 228	✓	0.404	1677	✓	0.451	271	To Do
Kamke 229	✓	0.013	77	✓	0.223	32	To Do
Kamke 230	✓	0.12	96	✓	0.05	100	To Do
Kamke 231	✓	3.103	252	✓	0.272	178	To Do
Kamke 232	✓	0.009	46	✓	0.023	39	To Do
Kamke 233	✓	0.024	38	✓	0.03	30	To Do
Kamke 234	✗	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 235	✓	0.073	33	✓	0.059	30	To Do
Kamke 236	✓	0.017	84	✓	0.074	141	To Do
Kamke 237	✗	0	0	✗	0	0	To Do
Kamke 238	✓	0.047	176	✓	0.082	93	To Do
Kamke 239	✓	0.029	54	✓	0.208	59	To Do
Kamke 240	✓	0.01	39	✓	0.031	34	To Do
Kamke 241	✓	0.01	37	✓	0.02	33	To Do
Kamke 242	✓	0.015	60	✓	0.022	39	To Do
Kamke 243	✓	14.885	451	✓	0.16	391	To Do
Kamke 244	✓	14.804	457	✓	0.135	391	To Do
Kamke 245	✓	0.49	1453	✓	0.345	31	To Do
Kamke 246	✓	0.031	71	✓	0.077	63	To Do
Kamke 247	✓	14.815	590	✓	0.285	517	To Do
Kamke 248	✓	0.014	83	✓	0.027	75	To Do
Kamke 249	✓	5.813	103	✓	0.235	202	To Do
Kamke 250	✗	0	0	✗	0	0	To Do
Kamke 251	✓	0.013	57	✓	0.025	51	To Do
Kamke 252	✓	14.882	501	✓	0.913	1338	To Do
Kamke 253	✗	0	0	✗	0	0	To Do
Kamke 254	✓	0.016	81	✓	0.036	59	To Do
Kamke 255	✓	5.472	30	✓	0.264	74	To Do
Kamke 256	✓	0.022	21	✓	0.061	31	To Do
Kamke 257	✓	0.402	39	✓	0.13	98	To Do

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#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 258	✓	0.014	43	✓	0.028	33	To Do
Kamke 259	✓	0.02	50	✓	0.033	51	To Do
Kamke 260	✓	0.015	74	✓	0.037	59	To Do
Kamke 261	✓	1.11	32	✓	0.16	18	To Do
Kamke 262	✓	0.068	101	✓	0.357	65	To Do
Kamke 263	✓	0.044	120	✓	0.354	173	To Do
Kamke 264	✓	0.443	680	✓	0.59	574	To Do
Kamke 265	✗	0	0	✗	0	0	To Do
Kamke 266	✗	0	0	✓	1.595	55	To Do
Kamke 267	✓	0.037	36	✓	0.032	32	To Do
Kamke 268	✓	0.986	140	✓	0.077	118	To Do
Kamke 269	✗	0	0	✗	0	0	To Do
Kamke 270	✓	0.021	326	✓	0.032	319	To Do
Kamke 271	✓	0.14	372	✓	0.229	352	To Do
Kamke 272	✓	0.073	39	✓	0.181	43	To Do
Kamke 273	✓	0.02	294	✓	0.029	401	To Do
Kamke 274	✓	0.032	396	✓	0.042	657	To Do
Kamke 275	✓	0.032	16	✓	0.112	30	To Do
Kamke 276	✓	0.038	61	✓	0.072	47	To Do
Kamke 277	✓	0.016	53	✓	0.391	41	To Do
Kamke 278	✓	0.104	32	✓	0.062	28	To Do
Kamke 279	✓	0.72	106	✓	0.186	116	To Do
Kamke 280	✓	0.044	20	✓	0.068	24	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 281	✓	0.063	75	✓	0.074	55	To Do
Kamke 282	✓	0.154	1089	✓	0.326	71	To Do
Kamke 283	✓	0.058	497	✓	0.079	407	To Do
Kamke 284	✓	0.036	59	✓	0.159	21	To Do
Kamke 285	✓	0.036	382	✓	0.086	432	To Do
Kamke 286	✓	0.209	3501	✓	1.145	1337	To Do
Kamke 287	✓	2.324	69	✓	0.082	56	To Do
Kamke 288	✓	0.023	518	✓	0.041	579	To Do
Kamke 289	✓	0.016	115	✓	0.041	115	To Do
Kamke 290	✓	0.087	744	✓	0.11	1388	To Do
Kamke 291	✓	0.803	39	✓	0.18	50	To Do
Kamke 292	✓	59.717	760	✓	0.047	115	To Do
Kamke 293	✓	0.104	661	✓	0.395	35	To Do
Kamke 294	✓	0.042	65	✓	0.093	112	To Do
Kamke 295	✓	0.062	30	✓	0.219	29	To Do
Kamke 296	✓	0.594	88	✓	0.786	135	To Do
Kamke 297	✓	0.059	216	✓	0.402	29	To Do
Kamke 298	✓	0.011	72	✓	0.025	73	To Do
Kamke 299	✓	0.021	328	✓	0.233	276	To Do
Kamke 300	✓	0.01	99	✓	0.026	83	To Do
Kamke 301	✓	0.042	64	✓	0.263	25	To Do
Kamke 302	✓	0.02	60	✓	0.173	133	To Do
Kamke 303	✓	0.071	24	✓	0.208	34	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 304	✓	45.227	45	✓	0.311	44	To Do
Kamke 305	✓	0.101	1211	✓	0.027	21	To Do
Kamke 306	✓	0.052	201	✓	0.405	231	To Do
Kamke 307	✓	0.023	149	✓	0.056	125	To Do
Kamke 308	✓	0.008	48	✓	0.036	37	To Do
Kamke 309	✓	0.013	151	✓	0.049	113	To Do
Kamke 310	✓	0.048	159	✓	0.132	125	To Do
Kamke 311	✓	0.187	2201	✓	0.102	50	To Do
Kamke 312	✓	0.266	190	✓	1.551	240	To Do
Kamke 313	✓	0.085	520	✓	0.223	748	To Do
Kamke 314	✓	0.047	164	✓	0.058	158	To Do
Kamke 315	✓	0.111	331	✓	0.106	376	To Do
Kamke 316	✓	0.067	41	✓	0.06	53	To Do
Kamke 317	✓	0.361	23	✓	0.148	29	To Do
Kamke 318	✓	0.152	2353	✓	0.022	28	To Do
Kamke 319	✓	0.026	302	✓	0.039	35	To Do
Kamke 320	✓	0.058	76	✓	0.11	78	To Do
Kamke 321	✓	0.303	42	✓	0.195	42	To Do
Kamke 322	✓	0.205	2097	✓	0.033	29	To Do
Kamke 323	✓	0.046	484	✓	0.134	630	To Do
Kamke 324	✓	0.034	672	✓	0.14	815	To Do
Kamke 325	✓	0.059	133	✓	0.632	124	To Do
Kamke 326	✓	4.954	13289	✓	0.515	160	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 327	✓	0.397	575	✓	0.21	583	To Do
Kamke 328	✓	0.126	35	✓	0.218	33	To Do
Kamke 329	✓	0.414	97	✓	0.388	71	To Do
Kamke 330	✓	55.496	49	✓	0.039	22	To Do
Kamke 331	✗	0	0	✗	0	0	To Do
Kamke 332	✓	0.12	23	✓	0.02	33	To Do
Kamke 333	✓	0.273	53	✓	0.112	32	To Do
Kamke 334	✓	0.036	39	✓	0.038	19	To Do
Kamke 335	✓	0.192	75	✓	0.018	50	To Do
Kamke 336	✓	0.075	43	✓	0.039	41	To Do
Kamke 337	✓	0.06	52	✓	0.085	28	To Do
Kamke 338	✓	100.78	17681	✓	0.835	129	To Do
Kamke 339	✓	0.125	27	✓	0.227	27	To Do
Kamke 340	✗	0	0	✗	0	0	To Do
Kamke 341	✓	0.054	33	✓	0.079	33	To Do
Kamke 342	✓	0.292	163	✓	0.051	17	To Do
Kamke 343	✓	0.066	22	✓	0.11	27	To Do
Kamke 344	✓	0.021	23	✓	0.04	19	To Do
Kamke 345	✓	0.074	23	✓	0.082	36	To Do
Kamke 346	✓	0.087	20	✓	0.307	19	To Do
Kamke 347	✓	0.142	32	✓	0.201	16	To Do
Kamke 348	✓	0.055	17	✓	0.127	15	To Do
Kamke 349	✓	0.049	15	✓	0.062	17	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 350	✓	0.633	53	✓	0.998	226	To Do
Kamke 351	✓	0.406	61	✓	0.497	55	To Do
Kamke 352	✓	0.16	32	✓	0.465	33	To Do
Kamke 353	✓	0.021	14	✓	0.1	12	To Do
Kamke 354	✓	0.07	145	✓	0.06	108	To Do
Kamke 355	✓	0.054	17	✓	0.109	15	To Do
Kamke 356	✓	0.072	21	✓	0.127	19	To Do
Kamke 357	✓	0.328	35	✓	0.563	13	To Do
Kamke 358	✓	0.047	29	✓	0.119	11	To Do
Kamke 359	✓	0.063	42	✓	0.069	28	To Do
Kamke 360	✓	5.607	369	✓	0.361	48	To Do
Kamke 361	✓	0.368	23	✓	0.249	22	To Do
Kamke 362	✓	0.102	20	✓	0.299	23	To Do
Kamke 363	✓	0.048	28	✓	0.082	35	To Do
Kamke 364	✓	0.085	27	✓	0.128	23	To Do
Kamke 365	✗	0	0	✓	0.41	42	To Do
Kamke 366	✗	0	0	✓	0.113	45	To Do
Kamke 367	✗	0	0	✗	0	0	To Do
Kamke 368	✗	0	0	✗	0	0	To Do
Kamke 369	✓	0.04	99	✓	0.167	68	To Do
Kamke 370	✗	0	0	✗	0	0	To Do
Kamke 371	✓	0.027	35	✓	0.097	20	To Do
Kamke 372	✓	0.02	27	✓	0.081	232	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 373	✓	0.234	185	✓	0.596	49	To Do
Kamke 374	✓	0.067	73	✓	0.04	85	To Do
Kamke 375	✓	0.045	68	✓	0.04	49	To Do
Kamke 376	✓	0.34	110	✓	0.749	219	To Do
Kamke 377	✓	0.004	17	✓	0.022	24	To Do
Kamke 378	✓	0.005	13	✓	0.023	20	To Do
Kamke 379	✓	0.004	15	✓	0.022	22	To Do
Kamke 380	✓	0.493	1445	✓	0.046	619	To Do
Kamke 381	✓	0.506	1445	✓	0.04	579	To Do
Kamke 382	✓	0.289	186	✓	0.04	146	To Do
Kamke 383	✗	0	0	✗	0	0	To Do
Kamke 384	✓	2.166	133	✓	0.028	50	To Do
Kamke 385	✗	0	0	✓	0.535	169	To Do
Kamke 386	✓	0.232	98	✓	0.781	27	To Do
Kamke 387	✓	0.909	133	✓	1.367	115	To Do
Kamke 388	✓	0.769	41	✓	0.175	223	To Do
Kamke 389	✓	0.048	55	✓	2.236	71	To Do
Kamke 390	✓	2.263	82	✓	1.085	281	To Do
Kamke 391	✓	0.006	29	✓	0.039	22	To Do
Kamke 392	✓	0.255	25	✓	1.853	50	To Do
Kamke 393	✓	0.035	31	✓	0.265	77	To Do
Kamke 394	✗	0	0	✓	7.263	109	To Do
Kamke 395	✗	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 396	✓	0.011	29	✓	0.047	20	To Do
Kamke 397	✓	0.662	136	✓	0.765	128	To Do
Kamke 398	✓	1.05	169	✓	2.563	138	To Do
Kamke 399	✓	0.005	15	✓	0.021	22	To Do
Kamke 400	✓	0.482	183	✓	0.361	74	To Do
Kamke 401	✓	0.354	1093	✓	0.099	580	To Do
Kamke 402	✗	0	0	✓	0.245	101	To Do
Kamke 403	✓	0.33	116	✓	3.199	197	To Do
Kamke 404	✗	0	0	✓	0.48	389	To Do
Kamke 405	✓	1.329	40	✓	0.47	378	To Do
Kamke 406	✓	0.99	38	✓	0.189	262	To Do
Kamke 407	✓	0.017	41	✓	0.074	39	To Do
Kamke 408	✓	1.131	163	✓	0.106	73	To Do
Kamke 409	✓	30.8	39	✓	0.174	63	To Do
Kamke 410	✓	31.514	40	✓	0.2	64	To Do
Kamke 411	✓	1.311	180	✓	0.109	65	To Do
Kamke 412	✓	27.865	16145	✓	0.142	146	To Do
Kamke 413	✗	0	0	✓	0.326	269	To Do
Kamke 414	✗	0	0	✓	0.329	269	To Do
Kamke 415	✓	0.223	133	✓	0.459	95	To Do
Kamke 416	✗	0	0	✓	0.131	136	To Do
Kamke 417	✓	0.411	183	✓	0.056	35	To Do
Kamke 418	✓	0.929	158	✓	0.079	42	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 419	✓	1.729	6977	✓	0.075	109	To Do
Kamke 420	✓	1.907	9391	✓	0.145	689	To Do
Kamke 421	✓	0.032	27	✓	0.057	32	To Do
Kamke 422	✓	0.049	29	✓	0.061	30	To Do
Kamke 423	✓	0.08	51	✓	0.066	44	To Do
Kamke 424	✓	0.643	223	✓	0.283	193	To Do
Kamke 425	✓	0.277	57	✓	0.06	45	To Do
Kamke 426	✓	0.423	150	✓	0.061	51	To Do
Kamke 427	✓	0.658	300	✓	0.06	60	To Do
Kamke 428	✗	0	0	✓	0.091	66	To Do
Kamke 429	✗	0	0	✓	0.102	72	To Do
Kamke 430	✓	265.685	296	✓	1.954	1602	To Do
Kamke 431	✓	0.038	103	✓	0.372	62	To Do
Kamke 432	✓	1.833	49	✓	9.984	242	To Do
Kamke 433	✓	0.524	22	✓	0.401	34	To Do
Kamke 434	✓	0.034	27	✓	0.02	7	To Do
Kamke 435	✓	0.037	55	✓	0.554	22	To Do
Kamke 436	✓	0.035	26	✓	4.388	61	To Do
Kamke 437	✓	0.3	47	✓	0.095	36	To Do
Kamke 438	✓	0.007	21	✓	0.026	17	To Do
Kamke 439	✓	0.014	49	✓	0.115	33	To Do
Kamke 440	✓	0.007	19	✓	0.028	15	To Do
Kamke 441	✓	0.096	59	✓	4.48	137	To Do

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#	Mathematica			Maple			note on solution
	solved	cpu	leaf	solved	cpu	leaf	
Kamke 442	✓	0.009	26	✓	0.03	21	To Do
Kamke 443	✓	0.572	1921	✓	6.944	221	To Do
Kamke 444	✓	0.155	73	✓	4.137	120	To Do
Kamke 445	✓	0.01	49	✓	0.051	35	To Do
Kamke 446	✓	0.508	167	✓	0.104	57	To Do
Kamke 447	✓	0.014	89	✓	0.079	33	To Do
Kamke 448	✓	0.101	287	✓	99.797	166	To Do
Kamke 449	✓	0.01	27	✓	0.029	23	To Do
Kamke 450	✓	0.456	26	✓	0.738	51	To Do
Kamke 451	✗	0	0	✓	0.16	78	To Do
Kamke 452	✗	0	0	✓	1.787	37	To Do
Kamke 453	✓	0.771	369	✓	2.388	229	To Do
Kamke 454	✓	0.341	241	✓	0.283	106	To Do
Kamke 455	✓	0.405	123	✓	0.556	66	To Do
Kamke 456	✓	0.122	61	✓	0.753	33	To Do
Kamke 457	✓	1.207	406	✓	0.97	45	To Do
Kamke 458	✓	0.067	139	✓	0.06	90	To Do
Kamke 459	✓	3.274	241	✓	0.711	65	To Do
Kamke 460	✗	0	0	✗	0	0	To Do
Kamke 461	✗	0	0	✗	0	0	To Do
Kamke 462	✓	0.015	43	✓	0.034	27	To Do
Kamke 463	✓	0.018	47	✓	0.091	50	To Do
Kamke 464	✓	0.064	52	✓	0.45	70	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 465	✗	0	0	✓	0.079	210	To Do
Kamke 466	✓	0.265	119	✓	0.392	71	To Do
Kamke 467	✗	0	0	✓	0.074	148	To Do
Kamke 468	✗	0	0	✓	0.082	181	To Do
Kamke 469	✓	0.51	245	✓	0.112	264	To Do
Kamke 470	✓	0.426	197	✓	0.352	87	To Do
Kamke 471	✓	0.007	47	✓	0.023	33	To Do
Kamke 472	✓	0.202	121	✓	0.445	121	To Do
Kamke 473	✓	0.389	137	✓	0.594	71	To Do
Kamke 474	✓	0.241	135	✓	1.243	152	To Do
Kamke 475	✓	0.071	57	✓	0.447	67	To Do
Kamke 476	✓	0.43	197	✓	0.299	87	To Do
Kamke 477	✓	0.312	136	✓	0.495	622	To Do
Kamke 478	✓	0.173	141	✓	0.094	88	To Do
Kamke 479	✗	0	0	✓	0.3	929	To Do
Kamke 480	✗	0	0	✗	0	0	To Do
Kamke 481	✓	0.009	49	✓	0.023	35	To Do
Kamke 482	✗	0	0	✗	0	0	To Do
Kamke 483	✓	0.189	69	✓	0.079	103	To Do
Kamke 484	✓	0.175	79	✓	0.079	115	To Do
Kamke 485	✗	0	0	✗	0	0	To Do
Kamke 486	✓	0.026	89	✓	0.113	54	To Do
Kamke 487	✓	0.49	215	✓	0.421	100	To Do

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#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 488	✓	0.397	85	✓	0.415	111	To Do
Kamke 489	✗	0	0	✓	2.219	551	To Do
Kamke 490	✓	0.614	63	✓	0.421	145	To Do
Kamke 491	✓	1.03	65	✓	0.721	195	To Do
Kamke 492	✓	0.292	111	✓	0.399	122	To Do
Kamke 493	✓	9.332	393	✓	1.034	111	To Do
Kamke 494	✗	0	0	✓	0.18	161	To Do
Kamke 495	✓	0.147	79	✓	0.421	61	To Do
Kamke 496	✓	97.223	53	✓	0.247	130	To Do
Kamke 497	✓	0.183	203	✓	0.534	203	To Do
Kamke 498	✓	0.109	107	✓	0.296	99	To Do
Kamke 499	✓	0.305	126	✓	0.203	189	To Do
Kamke 500	✓	1.337	86	✓	0.881	220	To Do
Kamke 501	✓	32.36	613	✓	4.406	215	To Do
Kamke 502	✓	1.743	71	✓	0.367	195	To Do
Kamke 503	✗	0	0	✗	0	0	To Do
Kamke 504	✗	0	0	✓	0.799	247	To Do
Kamke 505	✓	0.015	73	✓	0.035	52	To Do
Kamke 506	✗	0	0	✗	0	0	To Do
Kamke 507	✓	30.961	408	✗	0	0	To Do
Kamke 508	✗	0	0	✓	1.865	60	To Do
Kamke 509	✗	0	0	✓	1.319	212	To Do
Kamke 510	✗	0	0	✗	0	0	To Do

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#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 511	✓	1.778	225	✓	4.663	199	To Do
Kamke 512	✓	6.055	713	✓	7.115	137	To Do
Kamke 513	✗	0	0	✓	4.607	1134	To Do
Kamke 514	✓	15.45	605	✓	0.343	87	To Do
Kamke 515	✗	0	0	✓	2.48	113	To Do
Kamke 516	✓	3.907	229	✓	1.222	70	To Do
Kamke 517	✓	4.171	253	✓	1.252	155	To Do
Kamke 518	✓	0.798	236	✓	0.772	126	To Do
Kamke 519	✓	1.951	473	✓	0.505	197	To Do
Kamke 520	✓	233.727	3323	✓	0.699	245	To Do
Kamke 521	✓	0.004	14	✓	0.57	33	To Do
Kamke 522	✓	0.004	17	✓	0.585	44	To Do
Kamke 523	✗	0	0	✓	0.597	231	To Do
Kamke 524	✗	0	0	✓	0.6	261	To Do
Kamke 525	✓	5.954	121	✓	0.625	122	To Do
Kamke 526	✓	0.186	43	✓	0.022	32	To Do
Kamke 527	✗	0	0	✓	1.239	43	To Do
Kamke 528	✗	0	0	✓	0.644	86	To Do
Kamke 529	✓	64.755	1484	✓	0.597	1251	To Do
Kamke 530	✗	0	0	✓	0.666	432	To Do
Kamke 531	✗	0	0	✗	0	0	To Do
Kamke 532	✗	0	0	✓	0.697	848	To Do
Kamke 533	✗	0	0	✓	0.576	76	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 534	✗	0	0	✓	0.638	84	To Do
Kamke 535	✗	0	0	✓	0.594	51	To Do
Kamke 536	✓	0.017	64	✓	0.589	52	To Do
Kamke 537	✗	0	0	✗	0	0	To Do
Kamke 538	✗	0	0	✓	1.496	1532	To Do
Kamke 539	✓	0.036	45	✓	1.182	32	To Do
Kamke 540	✓	0.021	61	✓	0.634	109	To Do
Kamke 541	✗	0	0	✓	1.118	103	To Do
Kamke 542	✗	0	0	✓	1.089	107	To Do
Kamke 543	✗	0	0	✓	1.931	277	To Do
Kamke 544	✗	0	0	✓	1.584	4201	To Do
Kamke 545	✓	0.82	383	✓	0.737	144	To Do
Kamke 546	✗	0	0	✓	0.682	171	To Do
Kamke 547	✓	1.805	321	✓	0.809	118	To Do
Kamke 548	✓	1.109	569	✓	0.898	246	To Do
Kamke 549	✓	0.494	360	✓	1.07	545	To Do
Kamke 550	✗	0	0	✓	0.319	60	To Do
Kamke 551	✓	0.941	79	✓	0.446	55	To Do
Kamke 552	✓	0.178	39	✓	0.094	43	To Do
Kamke 553	✓	0.184	51	✓	0.061	36	To Do
Kamke 554	✓	0.125	44	✓	0.438	32	To Do
Kamke 555	✗	0	0	✓	1.141	15	To Do
Kamke 556	✓	7.068	50	✓	1.318	581	To Do

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#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 557	✓	0.017	37	✓	1.251	74	To Do
Kamke 558	✓	0.801	369	✓	1.29	223	To Do
Kamke 559	✓	0.334	126	✓	1.421	215	To Do
Kamke 560	✓	22.082	86	✓	2.122	1120	To Do
Kamke 561	✗	0	0	✓	2.066	50	To Do
Kamke 562	✗	0	0	✓	1.29	3306	To Do
Kamke 563	✓	0.159	52	✓	0.181	66	To Do
Kamke 564	✓	0.043	21	✓	0.029	32	To Do
Kamke 565	✓	0.012	24	✓	0.18	17	To Do
Kamke 566	✗	0	0	✓	0.038	16	To Do
Kamke 567	✗	0	0	✓	0.042	18	To Do
Kamke 568	✓	0.055	27	✓	0.071	32	To Do
Kamke 569	✓	0.043	59	✓	0.562	147	To Do
Kamke 570	✗	0	0	✓	0.064	30	To Do
Kamke 571	✓	0.113	67	✓	0.286	169	To Do
Kamke 572	✗	0	0	✗	0	0	To Do
Kamke 573	✓	0.013	42	✓	0.163	16	To Do
Kamke 574	✓	0.016	62	✓	0.148	41	To Do
Kamke 575	✗	0	0	✗	0	0	To Do
Kamke 576	✗	0	0	✗	0	0	To Do
Kamke 577	✓	15.865	141	✓	0.042	28	To Do
Kamke 578	✓	20.512	88	✓	0.053	22	To Do
Kamke 579	✓	16.549	162	✓	0.058	35	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 580	✓	33.526	161	✓	0.074	31	To Do
Kamke 581	✓	48.893	107	✓	0.107	32	To Do
Kamke 582	✓	21.091	103	✓	0.228	30	To Do
Kamke 583	✓	51.467	111	✓	0.152	31	To Do
Kamke 584	✓	24.274	107	✓	0.082	35	To Do
Kamke 585	✓	157.691	141	✓	0.669	120	To Do
Kamke 586	✓	200.045	395	✓	0.279	39	To Do
Kamke 587	✓	261.979	109	✓	0.144	29	To Do
Kamke 588	✓	40.858	99	✓	0.144	53	To Do
Kamke 589	✓	25.594	118	✓	0.168	38	To Do
Kamke 590	✓	39.114	91	✓	0.156	28	To Do
Kamke 591	✓	26.345	160	✓	0.217	108	To Do
Kamke 592	✗	0	0	✓	0.206	33	To Do
Kamke 593	✓	35.973	149	✓	0.363	35	To Do
Kamke 594	✓	23.89	188	✓	0.168	67	To Do
Kamke 595	✓	24.792	127	✓	0.158	72	To Do
Kamke 596	✓	243.588	103	✓	0.109	26	To Do
Kamke 597	✓	33.757	112	✓	0.413	37	To Do
Kamke 598	✓	0.102	35	✓	0.031	29	To Do
Kamke 599	✓	28.118	92	✓	0.115	57	To Do
Kamke 600	✓	26.215	119	✓	0.174	38	To Do
Kamke 601	✓	41.787	116	✓	0.152	61	To Do
Kamke 602	✓	239.346	111	✓	0.152	33	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 603	✓	20.956	102	✓	0.157	27	To Do
Kamke 604	✓	29.325	97	✓	0.163	30	To Do
Kamke 605	✓	215.819	103	✓	0.148	29	To Do
Kamke 606	✓	78.785	180	✓	0.88	34	To Do
Kamke 607	✗	0	0	✓	0.109	22	To Do
Kamke 608	✗	0	0	✓	0.174	40	To Do
Kamke 609	✓	62.783	107	✓	0.179	22	To Do
Kamke 610	✓	0.078	24	✓	0.022	20	To Do
Kamke 611	✓	47.198	116	✓	0.098	28	To Do
Kamke 612	✓	60.227	169	✓	0.155	27	To Do
Kamke 613	✗	0	0	✓	0.114	23	To Do
Kamke 614	✓	90.106	144	✓	0.439	60	To Do
Kamke 615	✓	19.881	74	✓	0.145	26	To Do
Kamke 616	✓	58.319	126	✓	0.101	26	To Do
Kamke 617	✓	279.88	302	✓	0.31	47	To Do
Kamke 618	✓	0.097	25	✓	0.496	34	To Do
Kamke 619	✓	263.339	195	✓	0.444	81	To Do
Kamke 620	✗	0	0	✓	0.224	37	To Do
Kamke 621	✓	0.089	445	✓	0.366	59	To Do
Kamke 622	✓	0.444	140	✓	0.243	77	To Do
Kamke 623	✓	0.218	77	✓	0.278	49	To Do
Kamke 624	✓	50.499	9837	✓	1.454	46	To Do
Kamke 625	✓	0.295	67	✓	0.232	55	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 626	✓	0.239	88	✓	0.403	115	To Do
Kamke 627	✓	1.009	25	✓	0.268	35	To Do
Kamke 628	✓	0.079	32	✓	0.242	23	To Do
Kamke 629	✓	0.782	38	✓	0.22	62	To Do
Kamke 630	✓	0.631	101	✓	0.359	98	To Do
Kamke 631	✓	0.09	31	✓	0.226	23	To Do
Kamke 632	✓	0.227	65	✓	0.276	54	To Do
Kamke 633	✓	0.259	85	✓	1.015	52	To Do
Kamke 634	✓	0.175	31	✓	0.264	26	To Do
Kamke 635	✓	0.121	33	✓	0.218	22	To Do
Kamke 636	✓	0.052	24	✓	0.244	19	To Do
Kamke 637	✓	16.027	53	✓	0.478	84	To Do
Kamke 638	✗	0	0	✓	0.237	35	To Do
Kamke 639	✗	0	0	✓	0.355	50	To Do
Kamke 640	✗	0	0	✓	0.515	47	To Do
Kamke 641	✓	0.175	33	✓	0.251	26	To Do
Kamke 642	✓	0.135	95	✓	0.283	286	To Do
Kamke 643	✓	0.122	31	✓	0.219	22	To Do
Kamke 644	✓	0.271	34	✓	0.388	27	To Do
Kamke 645	✓	0.036	20	✓	0.171	14	To Do
Kamke 646	✓	0.175	35	✓	0.294	23	To Do
Kamke 647	✓	0.389	117	✓	0.321	460	To Do
Kamke 648	✓	0.343	96	✓	0.693	41	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 649	✓	0.175	36	✓	0.247	27	To Do
Kamke 650	✓	0.236	39	✓	0.271	28	To Do
Kamke 651	✓	0.033	15	✓	0.079	13	To Do
Kamke 652	✓	1.89	103	✓	0.187	27	To Do
Kamke 653	✓	0.176	31	✓	0.222	24	To Do
Kamke 654	✓	0.16	37	✓	0.292	23	To Do
Kamke 655	✓	20.226	79	✓	0.706	66	To Do
Kamke 656	✓	0.039	20	✓	0.089	15	To Do
Kamke 657	✓	0.183	37	✓	0.239	26	To Do
Kamke 658	✓	0.243	46	✓	0.331	28	To Do
Kamke 659	✓	0.434	51	✓	0.271	41	To Do
Kamke 660	✓	0.259	42	✓	0.26	29	To Do
Kamke 661	✓	0.429	54	✓	0.255	39	To Do
Kamke 662	✓	0.187	37	✓	0.251	26	To Do
Kamke 663	✓	2.176	103	✓	0.182	27	To Do
Kamke 664	✓	0.186	34	✓	0.221	25	To Do
Kamke 665	✓	0.259	39	✓	0.524	28	To Do
Kamke 666	✓	0.07	29	✓	0.255	24	To Do
Kamke 667	✓	1.191	84	✓	0.236	82	To Do
Kamke 668	✓	0.668	59	✓	0.78	58	To Do
Kamke 669	✓	0.842	222	✓	0.219	72	To Do
Kamke 670	✓	0.489	83	✓	0.361	70	To Do
Kamke 671	✓	0.412	162	✓	0.237	237	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 672	✗	0	0	✓	0.213	36	To Do
Kamke 673	✓	0.083	23	✓	0.447	17	To Do
Kamke 674	✓	0.224	32	✓	0.325	27	To Do
Kamke 675	✓	0.052	45	✓	0.076	37	To Do
Kamke 676	✓	0.331	120	✓	0.585	43	To Do
Kamke 677	✓	0.036	51	✓	0.077	48	To Do
Kamke 678	✓	0.241	90	✓	0.357	37	To Do
Kamke 679	✓	0.033	44	✓	0.065	37	To Do
Kamke 680	✓	0.226	39	✓	0.336	28	To Do
Kamke 681	✓	0.041	54	✓	0.083	45	To Do
Kamke 682	✓	0.116	33	✓	0.294	28	To Do
Kamke 683	✓	0.389	72	✓	0.203	152	To Do
Kamke 684	✓	0.024	18	✓	3.462	30	To Do
Kamke 685	✓	0.037	62	✓	0.098	48	To Do
Kamke 686	✓	15.622	49	✓	0.433	85	To Do
Kamke 687	✓	0.063	111	✓	0.127	39	To Do
Kamke 688	✓	0.111	45	✓	0.109	42	To Do
Kamke 689	✓	0.071	55	✓	0.066	25	To Do
Kamke 690	✓	0.31	106	✓	0.389	40	To Do
Kamke 691	✓	0.078	21	✓	0.674	17	To Do
Kamke 692	✓	0.024	18	✓	3.109	30	To Do
Kamke 693	✓	0.245	143	✓	0.118	40	To Do
Kamke 694	✓	0.284	43	✓	0.359	30	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 695	✓	0.074	34	✓	0.066	39	To Do
Kamke 696	✗	0	0	✓	0.076	32	To Do
Kamke 697	✓	0.204	112	✓	0.118	40	To Do
Kamke 698	✓	0.206	104	✓	0.102	34	To Do
Kamke 699	✓	0.246	90	✓	0.359	36	To Do
Kamke 700	✓	0.066	72	✓	0.134	62	To Do
Kamke 701	✗	0	0	✓	5.999	71	To Do
Kamke 702	✗	0	0	✓	0.097	35	To Do
Kamke 703	✗	0	0	✓	0.342	44	To Do
Kamke 704	✗	0	0	✓	0.074	38	To Do
Kamke 705	✓	0.067	30	✓	0.237	24	To Do
Kamke 706	✗	0	0	✓	0.69	65	To Do
Kamke 707	✗	0	0	✓	0.628	105	To Do
Kamke 708	✓	0.317	82	✓	15.668	229	To Do
Kamke 709	✓	5.483	143	✓	0.287	39	To Do
Kamke 710	✗	0	0	✓	2.484	31	To Do
Kamke 711	✓	0.082	24	✓	0.15	31	To Do
Kamke 712	✓	0.285	102	✓	0.386	38	To Do
Kamke 713	✓	0.131	607	✓	0.403	86	To Do
Kamke 714	✗	0	0	✓	0.207	96	To Do
Kamke 715	✓	0.302	89	✓	0.348	39	To Do
Kamke 716	✓	5.671	133	✓	0.341	37	To Do
Kamke 717	✓	0.338	44	✓	0.414	33	To Do

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#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 718	✓	0.194	123	✓	0.073	44	To Do
Kamke 719	✓	0.116	44	✓	0.155	34	To Do
Kamke 720	✓	5.919	272	✓	0.247	48	To Do
Kamke 721	✓	0.022	27	✓	0.085	19	To Do
Kamke 722	✓	84.317	490	✓	0.441	70	To Do
Kamke 723	✓	0.082	672	✓	0.085	856	To Do
Kamke 724	✓	90.981	422	✓	0.065	18	To Do
Kamke 725	✓	0.275	19	✓	0.976	25	To Do
Kamke 726	✓	0.104	607	✓	0.312	83	To Do
Kamke 727	✓	0.529	29	✓	0.42	25	To Do
Kamke 728	✓	0.439	72	✓	0.375	50	To Do
Kamke 729	✓	0.364	315	✓	0.118	404	To Do
Kamke 730	✗	0	0	✓	1.892	41	To Do
Kamke 731	✓	0.332	42	✓	0.204	42	To Do
Kamke 732	✓	0.525	105	✓	0.428	43	To Do
Kamke 733	✗	0	0	✗	0	0	To Do
Kamke 734	✓	0.126	37	✓	0.168	39	To Do
Kamke 735	✗	0	0	✓	0.082	78	To Do
Kamke 736	✓	0.114	30	✓	0.183	43	To Do
Kamke 737	✓	0.037	36	✓	0.107	29	To Do
Kamke 738	✓	0.561	1200	✓	0.816	1054	To Do
Kamke 739	✓	0.247	34	✓	0.199	35	To Do
Kamke 740	✓	0.07	74	✓	0.111	72	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 741	✓	3.676	172	✓	1.049	246	To Do
Kamke 742	✓	5.809	221	✓	1.676	239	To Do
Kamke 743	✗	0	0	✓	0.456	296	To Do
Kamke 744	✓	0.056	534	✓	0.216	621	To Do
Kamke 745	✗	0	0	✓	0.08	78	To Do
Kamke 746	✗	0	0	✓	0.386	232	To Do
Kamke 747	✗	0	0	✓	0.37	75	To Do
Kamke 748	✓	0.366	286	✓	0.117	404	To Do
Kamke 749	✓	0.114	102	✓	0.155	192	To Do
Kamke 750	✓	0.399	68	✓	0.359	49	To Do
Kamke 751	✓	0.086	29	✓	0.117	26	To Do
Kamke 752	✗	0	0	✓	1.475	723	To Do
Kamke 753	✓	0.125	41	✓	0.17	38	To Do
Kamke 754	✓	0.035	47	✓	0.027	26	To Do
Kamke 755	✓	0.214	2213	✓	0.115	44	To Do
Kamke 756	✓	0.127	93	✓	0.042	37	To Do
Kamke 757	✓	0.032	33	✓	0.085	26	To Do
Kamke 758	✓	1.096	459	✓	0.25	41	To Do
Kamke 759	✗	0	0	✓	0.581	305	To Do
Kamke 760	✓	1.573	85	✓	1.796	137	To Do
Kamke 761	✓	0.029	26	✓	0.074	18	To Do
Kamke 762	✓	0.068	26	✓	0.133	22	To Do
Kamke 763	✓	0.066	21	✓	0.12	14	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 764	✓	0.104	46	✓	0.148	36	To Do
Kamke 765	✗	0	0	✓	0.269	106	To Do
Kamke 766	✗	0	0	✓	0.182	89	To Do
Kamke 767	✓	0.031	35	✓	0.085	26	To Do
Kamke 768	✓	1.603	66	✓	0.104	26	To Do
Kamke 769	✗	0	0	✓	0.47	251	To Do
Kamke 770	✓	0.143	687	✓	0.147	1105	To Do
Kamke 771	✓	0.038	48	✓	0.148	84	To Do
Kamke 772	✓	0.075	21	✓	0.132	18	To Do
Kamke 773	✓	0.091	59	✓	0.315	48	To Do
Kamke 774	✓	0.036	46	✓	0.131	51	To Do
Kamke 775	✓	0.113	943	✓	0.105	44	To Do
Kamke 776	✗	0	0	✓	0.228	96	To Do
Kamke 777	✓	0.156	34	✓	0.226	51	To Do
Kamke 778	✓	0.113	95	✓	0.04	37	To Do
Kamke 779	✓	0.053	51	✓	0.122	50	To Do
Kamke 780	✓	0.03	15	✓	0.486	27	To Do
Kamke 781	✓	0.617	82	✓	0.436	61	To Do
Kamke 782	✗	0	0	✓	1.455	96	To Do
Kamke 783	✗	0	0	✓	0.195	75	To Do
Kamke 784	✗	0	0	✓	29.607	24	To Do
Kamke 785	✗	0	0	✓	86.08	24	To Do
Kamke 786	✗	0	0	✓	0.089	33	To Do

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#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 787	✓	44.47	488	✓	0.472	191	To Do
Kamke 788	✗	0	0	✓	0.279	108	To Do
Kamke 789	✗	0	0	✗	0	0	To Do
Kamke 790	✗	0	0	✗	0	0	To Do
Kamke 791	✗	0	0	✓	18.084	306	To Do
Kamke 792	✗	0	0	✓	0.407	112	To Do
Kamke 793	✓	25.081	399	✓	0.142	32	To Do
Kamke 794	✓	0.115	66	✓	0.442	32	To Do
Kamke 795	✓	0.298	106	✓	0.037	37	To Do
Kamke 796	✓	17.764	103	✓	1.475	143	To Do
Kamke 797	✓	2.697	146	✓	0.421	168	To Do
Kamke 798	✓	0.767	25	✓	0.173	30	To Do
Kamke 799	✓	0.51	50	✓	0.362	147	To Do
Kamke 800	✓	0.29	118	✓	0.038	41	To Do
Kamke 801	✓	0.181	124	✓	0.073	63	To Do
Kamke 802	✓	0.093	88	✓	0.122	27	To Do
Kamke 803	✓	0.108	234	✓	0.491	65	To Do
Kamke 804	✓	0.512	43	✓	1.154	38	To Do
Kamke 805	✓	0.041	35	✓	0.688	42	To Do
Kamke 806	✓	0.258	22	✓	0.674	22	To Do
Kamke 807	✗	0	0	✓	0.687	43	To Do
Kamke 808	✓	2.311	149	✓	0.102	45	To Do
Kamke 809	✓	0.26	118	✓	0.035	41	To Do

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#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 810	✓	0.02	18	✓	0.05	16	To Do
Kamke 811	✓	2.618	29	✓	2.295	32	To Do
Kamke 812	✓	0.374	76	✓	0.289	30	To Do
Kamke 813	✓	0.557	64	✓	0.568	40	To Do
Kamke 814	✓	0.02	70	✓	0.047	38	To Do
Kamke 815	✓	19.202	100	✓	1.016	168	To Do
Kamke 816	✓	0.181	72	✓	0.711	190	To Do
Kamke 817	✓	0.431	59	✓	0.723	27	To Do
Kamke 818	✓	0.086	34	✓	0.208	34	To Do
Kamke 819	✓	0.256	63	✓	0.287	30	To Do
Kamke 820	✓	0.381	59	✓	0.706	27	To Do
Kamke 821	✓	0.175	1993	✓	0.165	27	To Do
Kamke 822	✓	0.051	32	✓	0.129	25	To Do
Kamke 823	✓	0.515	35	✓	0.202	38	To Do
Kamke 824	✓	0.103	66	✓	0.591	61	To Do
Kamke 825	✓	0.319	144	✓	0.115	48	To Do
Kamke 826	✓	0.743	70	✓	0.513	51	To Do
Kamke 827	✓	0.152	93	✓	0.259	49	To Do
Kamke 828	✓	0.414	46	✓	0.399	54	To Do
Kamke 829	✓	0.44	81	✓	0.348	34	To Do
Kamke 830	✓	0.577	34	✓	0.179	38	To Do
Kamke 831	✓	5.049	79	✓	0.339	35	To Do
Kamke 832	✓	3.699	2405	✓	0.199	31	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 833	✓	0.157	87	✓	0.209	49	To Do
Kamke 834	✓	0.926	90	✓	0.644	60	To Do
Kamke 835	✗	0	0	✗	0	0	To Do
Kamke 836	✓	21.275	379	✓	0.345	73	To Do
Kamke 837	✗	0	0	✗	0	0	To Do
Kamke 838	✓	0.033	29	✓	0.118	25	To Do
Kamke 839	✓	0.088	28	✓	0.085	19	To Do
Kamke 840	✓	0.106	28	✓	0.08	19	To Do
Kamke 841	✓	1.505	208	✓	0.337	97	To Do
Kamke 842	✓	0.134	44	✓	0.036	43	To Do
Kamke 843	✓	0.141	44	✓	0.04	43	To Do
Kamke 844	✓	26.765	386	✓	0.332	97	To Do
Kamke 845	✓	6.58	218	✓	0.264	44	To Do
Kamke 846	✓	1.606	174	✓	0.22	40	To Do
Kamke 847	✓	0.403	69	✓	0.326	34	To Do
Kamke 848	✓	0.133	91	✓	0.609	27	To Do
Kamke 849	✓	0.365	73	✓	0.337	33	To Do
Kamke 850	✓	0.246	114	✓	1.155	32	To Do
Kamke 851	✓	0.257	136	✓	0.079	42	To Do
Kamke 852	✓	0.248	136	✓	0.082	42	To Do
Kamke 853	✓	0.023	75	✓	0.047	63	To Do
Kamke 854	✗	0	0	✓	0.342	51	To Do
Kamke 855	✗	0	0	✓	0.354	51	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 856	✓	1.052	100	✓	0.372	65	To Do
Kamke 857	✓	0.383	77	✓	0.326	32	To Do
Kamke 858	✓	0.258	136	✓	0.081	42	To Do
Kamke 859	✓	1.52	102	✓	0.32	63	To Do
Kamke 860	✓	0.172	35	✓	2.081	29	To Do
Kamke 861	✓	2.134	137	✓	0.197	26	To Do
Kamke 862	✗	0	0	✓	0.249	27	To Do
Kamke 863	✓	0.04	26	✓	6.411	38	To Do
Kamke 864	✓	0.05	98	✓	0.105	162	To Do
Kamke 865	✗	0	0	✓	0.352	23	To Do
Kamke 866	✓	0.545	85	✓	0.368	37	To Do
Kamke 867	✓	0.105	75	✓	0.079	30	To Do
Kamke 868	✓	0.07	77	✓	0.074	28	To Do
Kamke 869	✓	0.042	42	✓	0.111	37	To Do
Kamke 870	✓	2.01	32	✓	1.033	30	To Do
Kamke 871	✓	0.028	22	✓	0.091	26	To Do
Kamke 872	✓	0.052	92	✓	0.073	49	To Do
Kamke 873	✓	0.703	48	✓	0.309	50	To Do
Kamke 874	✓	0.108	95	✓	0.061	40	To Do
Kamke 875	✓	0.398	213	✓	0.295	73	To Do
Kamke 876	✓	0.023	89	✓	0.059	41	To Do
Kamke 877	✓	0.021	47	✓	0.056	73	To Do
Kamke 878	✓	0.326	128	✗	0	0	To Do

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Table 3 – continued from previous page

#	Mathematica			Maple			note on solution
	solved	cpu	leaf	solved	cpu	leaf	
Kamke 879	✓	0.198	109	✓	0.26	55	To Do
Kamke 880	✓	0.174	126	✓	0.079	41	To Do
Kamke 881	✓	0.021	57	✓	0.059	77	To Do
Kamke 882	✓	0.12	106	✓	0.073	41	To Do
Kamke 883	✓	1.736	159	✓	0.742	352	To Do
Kamke 884	✓	0.63	71	✓	0.503	107	To Do
Kamke 885	✗	0	0	✗	0	0	To Do
Kamke 886	✓	0.1	79	✓	0.049	42	To Do
Kamke 887	✓	0.03	91	✓	0.06	72	To Do
Kamke 888	✓	0.024	67	✓	0.071	79	To Do
Kamke 889	✗	0	0	✓	1.217	49	To Do
Kamke 890	✓	0.175	103	✓	0.806	34	To Do
Kamke 891	✓	0.03	86	✓	0.07	56	To Do
Kamke 892	✗	0	0	✓	0.607	40	To Do
Kamke 893	✓	0.102	77	✓	0.044	41	To Do
Kamke 894	✗	0	0	✗	0	0	To Do
Kamke 895	✓	0.029	63	✓	0.064	79	To Do
Kamke 896	✓	0.273	102	✓	0.619	63	To Do
Kamke 897	✓	0.031	65	✓	0.085	87	To Do
Kamke 898	✓	0.027	95	✓	0.058	87	To Do
Kamke 899	✓	0.12	101	✓	0.049	47	To Do
Kamke 900	✓	0.107	381	✓	0.086	48	To Do
Kamke 901	✓	0.17	29	✓	0.631	30	To Do

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#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 902	✓	0.12	195	✓	0.269	183	To Do
Kamke 903	✓	0.069	19	✓	0.09	48	To Do
Kamke 904	✓	0.059	23	✓	0.071	64	To Do
Kamke 905	✓	0.088	83	✓	0.057	46	To Do
Kamke 906	✓	0.063	326	✓	0.346	37	To Do
Kamke 907	✓	0.061	21	✓	0.169	20	To Do
Kamke 908	✓	1.886	1003	✓	0.422	1742	To Do
Kamke 909	✗	0	0	✗	0	0	To Do
Kamke 910	✓	0.106	95	✓	0.047	42	To Do
Kamke 911	✓	3.797	53	✓	0.607	30	To Do
Kamke 912	✓	1.93	199	✗	0	0	To Do
Kamke 913	✗	0	0	✓	0.079	43	To Do
Kamke 914	✓	2.051	401	✓	3.152	71	To Do
Kamke 915	✗	0	0	✓	0.099	43	To Do
Kamke 916	✗	0	0	✓	0.469	73	To Do
Kamke 917	✗	0	0	✓	0.378	38	To Do
Kamke 918	✗	0	0	✓	1.384	41	To Do
Kamke 919	✗	0	0	✓	0.179	61	To Do
Kamke 920	✓	0.276	301	✗	0	0	To Do
Kamke 921	✓	3.237	47	✓	0.188	30	To Do
Kamke 922	✗	0	0	✓	0.188	47	To Do
Kamke 923	✗	0	0	✓	0.376	36	To Do
Kamke 924	✓	1.025	53	✓	0.206	46	To Do

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#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 925	✗	0	0	✓	0.374	38	To Do
Kamke 926	✓	0.031	77	✓	0.102	67	To Do
Kamke 927	✓	0.169	100	✓	0.146	68	To Do
Kamke 928	✓	1.72	22	✓	0.48	20	To Do
Kamke 929	✗	0	0	✓	0.063	42	To Do
Kamke 930	✓	2.021	38	✓	0.712	36	To Do
Kamke 931	✓	0.03	53	✓	0.057	73	To Do
Kamke 932	✗	0	0	✓	0.208	54	To Do
Kamke 933	✓	0.107	93	✓	0.059	39	To Do
Kamke 934	✓	0.165	101	✓	0.182	39	To Do
Kamke 935	✓	48.668	117	✓	0.964	55	To Do
Kamke 936	✓	0.156	85	✓	0.095	39	To Do
Kamke 937	✓	0.028	57	✓	0.753	79	To Do
Kamke 938	✓	0.103	101	✓	0.053	39	To Do
Kamke 939	✓	0.513	137	✓	2.057	70	To Do
Kamke 940	✓	0.021	49	✓	0.062	63	To Do
Kamke 941	✓	0.407	53	✓	0.091	35	To Do
Kamke 942	✗	0	0	✓	1.43	43	To Do
Kamke 943	✓	0.473	53	✓	0.074	40	To Do
Kamke 944	✓	1.974	233	✓	0.1	47	To Do
Kamke 945	✓	1.555	213	✓	0.085	41	To Do
Kamke 946	✓	0.089	75	✓	0.185	85	To Do
Kamke 947	✓	0.119	28	✓	0.761	44	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 948	✓	0.375	39	✓	0.469	68	To Do
Kamke 949	✓	0.022	55	✓	0.06	81	To Do
Kamke 950	✓	0.252	138	✓	0.113	42	To Do
Kamke 951	✓	0.23	137	✓	0.105	41	To Do
Kamke 952	✓	0.169	141	✓	0.71	62	To Do
Kamke 953	✗	0	0	✓	0.921	145	To Do
Kamke 954	✓	0.126	108	✓	0.109	53	To Do
Kamke 955	✓	0.042	73	✓	0.212	101	To Do
Kamke 956	✓	0.237	28	✓	1.581	79	To Do
Kamke 957	✓	0.226	28	✓	0.883	79	To Do
Kamke 958	✓	0.093	80	✓	0.099	40	To Do
Kamke 959	✓	0.05	20	✓	0.228	15	To Do
Kamke 960	✓	0.039	14	✓	0.13	11	To Do
Kamke 961	✗	0	0	✓	1.017	45	To Do
Kamke 962	✓	6.513	1191	✓	1.891	79	To Do
Kamke 963	✓	0.157	101	✓	0.368	39	To Do
Kamke 964	✓	5.721	247	✓	4.441	80	To Do
Kamke 965	✓	0.065	29	✓	0.144	26	To Do
Kamke 966	✓	0.497	292	✓	2.192	50	To Do
Kamke 967	✓	0.191	143	✓	0.115	91	To Do
Kamke 968	✓	0.09	30	✓	0.923	22	To Do
Kamke 969	✓	0.063	19	✓	1.01	15	To Do
Kamke 970	✓	0.54	66	✓	0.976	181	To Do

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#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 971	✓	0.193	124	✓	3.673	86	To Do
Kamke 972	✓	0.027	32	✓	0.507	27	To Do
Kamke 973	✓	0.255	143	✓	1.176	134	To Do
Kamke 974	✓	0.01	39	✓	0.05	57	To Do
Kamke 975	✓	0.013	47	✓	0.053	59	To Do
Kamke 976	✓	0.138	101	✓	1.674	57	To Do
Kamke 977	✓	0.296	135	✓	0.836	122	To Do
Kamke 978	✓	0.088	58	✓	0.385	71	To Do
Kamke 979	✓	0.012	37	✓	0.067	57	To Do
Kamke 980	✓	0.013	44	✓	0.024	35	To Do
Kamke 981	✓	0.018	49	✓	0.03	41	To Do
Kamke 982	✓	0.165	130	✓	0.929	145	To Do
Kamke 983	✓	0.521	176	✓	0.869	188	To Do
Kamke 984	✓	9.764	341	✓	0.698	40	To Do
Kamke 985	✓	0.303	96	✓	0.056	43	To Do
Kamke 986	✓	0.015	41	✓	0.033	36	To Do
Kamke 987	✓	0.1	34	✓	0.21	22	To Do
Kamke 988	✓	0.322	77	✓	0.109	29	To Do
Kamke 989	✓	0.104	44	✓	0.097	29	To Do
Kamke 990	✓	0.462	48	✓	0.76	44	To Do
Kamke 991	✓	0.295	75	✓	0.101	29	To Do
Kamke 992	✓	0.106	36	✓	0.092	25	To Do
Kamke 993	✗	0	0	✓	0.049	35	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 994	✓	0.128	44	✓	0.043	43	To Do
Kamke 995	✓	0.017	17	✓	0.15	14	To Do
Kamke 996	✗	0	0	✓	0.112	15	To Do
Kamke 997	✓	0.031	18	✓	0.073	16	To Do
Kamke 998	✓	0.476	26	✓	0.43	27	To Do
Kamke 999	✓	0.024	24	✓	0.078	36	To Do
Kamke 1000	✗	0	0	✓	0.184	19	To Do
Kamke 1001	✓	0.004	12	✓	0.006	9	Linear second order, homogeneous, constant coefficient. First problem. Direct integration
Kamke 1002	✓	0.005	16	✓	0.023	13	Linear second order, homogeneous, constant coefficient. Direct method
Kamke 1003	✓	0.138	29	✓	0.477	26	Linear second order, Non-homogeneous, constant coefficient. variation of parameters
Kamke 1004	✓	0.119	30	✓	0.056	27	Linear second order, Non-homogeneous, constant coefficient. variation of parameters
Kamke 1005	✓	0.609	159	✓	0.121	82	Linear second order, Non-homogeneous, constant coefficient. variation of parameters

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#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 1006	✓	0.005	20	✓	0.013	15	Linear second order, homogeneous, constant coefficient
Kamke 1007	✓	0.089	36	✓	0.198	26	Linear second order, Non-homogeneous, constant coefficient. variation of parameters
Kamke 1008	✓	0.045	46	✓	0.133	41	To Do
Kamke 1009	✓	0.005	28	✓	0.036	21	To Do
Kamke 1010	✓	0.007	42	✓	0.092	31	Linear second order, homogeneous, variable coefficient. Airy ODE with plus sign, series solution
Kamke 1011	✓	0.008	33	✓	0.094	17	Linear second order, homogeneous, variable coefficient. power series solution
Kamke 1012	✓	0.008	47	✓	0.776	29	To Do
Kamke 1013	✓	0.02	43	✓	0.055	22	To Do
Kamke 1014	✓	0.031	119	✓	0.291	63	To Do
Kamke 1015	✗	0	0	✗	0	0	To Do
Kamke 1016	✓	0.152	225	✓	0.489	91	To Do
Kamke 1017	✓	0.027	46	✓	0.062	17	To Do
Kamke 1018	✓	0.023	55	✓	0.133	39	To Do
Kamke 1019	✗	0	0	✗	0	0	To Do
Kamke 1020	✓	0.728	136	✓	0.396	58	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 1021	✓	0.047	40	✓	3.908	39	To Do
Kamke 1022	✓	0.028	28	✓	0.529	21	To Do
Kamke 1023	✓	0.015	40	✓	0.472	29	To Do
Kamke 1024	✓	0.169	54	✓	0.217	30	To Do
Kamke 1025	✓	1.028	158	✓	0.378	102	To Do
Kamke 1026	✗	0	0	✗	0	0	To Do
Kamke 1027	✗	0	0	✓	1.302	69	To Do
Kamke 1028	✗	0	0	✗	0	0	To Do
Kamke 1029	✗	0	0	✓	0.609	22	To Do
Kamke 1030	✗	0	0	✗	0	0	To Do
Kamke 1031	✗	0	0	✗	0	0	To Do
Kamke 1032	✗	0	0	✓	0.411	48	To Do
Kamke 1033	✓	0.018	37	✓	0.121	27	Linear second order, homogeneous, variable coefficient. smart substitution turns it to second order with constant coefficient
Kamke 1034	✓	0.013	20	✓	0.014	15	Linear second order, homogeneous, variable coefficient. smart substitution turns it to second order with constant coefficient
Kamke 1035	✓	0.006	47	✓	0.023	41	To Do
Kamke 1036	✓	0.528	150	✓	0.357	124	To Do

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#	Mathematica			Maple			note on solution
	solved	cpu	leaf	solved	cpu	leaf	
Kamke 1037	✓	0.049	74	✓	0.209	64	To Do
Kamke 1038	✗	0	0	✗	0	0	To Do
Kamke 1039	✓	0.012	41	✓	0.012	25	To Do
Kamke 1040	✓	0.046	45	✓	0.086	34	To Do
Kamke 1041	✓	0.009	47	✓	0.162	41	To Do
Kamke 1042	✓	0.008	53	✓	0.168	41	To Do
Kamke 1043	✓	0.06	54	✓	0.798	42	Linear second order, homogeneous, variable coefficient. power series solution
Kamke 1044	✓	0.009	39	✓	0.135	35	To Do
Kamke 1045	✓	0.037	39	✓	0.014	21	To Do
Kamke 1046	✓	0.007	31	✓	0.23	31	To Do
Kamke 1047	✓	0.016	20	✓	0.075	16	Linear second order, homogeneous, variable coefficient. power series solution
Kamke 1048	✓	0.011	37	✓	0.197	37	To Do
Kamke 1049	✓	0.073	105	✓	0.425	66	To Do
Kamke 1050	✓	0.013	18	✓	0.089	14	To Do
Kamke 1051	✓	0.039	34	✓	0.102	27	To Do
Kamke 1052	✓	0.022	67	✓	0.184	58	To Do
Kamke 1053	✓	0.032	56	✓	0.077	35	To Do
Kamke 1054	✓	0.052	132	✓	0.106	98	To Do
Kamke 1055	✓	0.227	305	✓	0.307	262	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1056	✓	0.052	51	✓	0.783	48	To Do
Kamke 1057	✓	0.957	43	✓	1.428	50	To Do
Kamke 1058	✓	1.07	43	✓	0.441	29	To Do
Kamke 1059	✓	0.075	49	✓	0.237	56	To Do
Kamke 1060	✓	0.036	81	✓	0.988	81	To Do
Kamke 1061	✓	0.101	45	✓	0.159	28	To Do
Kamke 1062	✓	0.032	30	✓	0.035	19	To Do
Kamke 1063	✓	0.049	28	✓	0.382	61	To Do
Kamke 1064	✓	0.706	502	✓	0.394	125	To Do
Kamke 1065	✓	0.173	83	✓	0.532	60	To Do
Kamke 1066	✓	0.038	18	✓	0.12	15	To Do
Kamke 1067	✓	0.035	21	✓	0.061	17	To Do
Kamke 1068	✓	0.149	20	✓	0.929	45	To Do
Kamke 1069	✓	0.037	19	✓	0.164	15	To Do
Kamke 1070	✓	0.353	129	✓	0.322	60	To Do
Kamke 1071	✓	0.086	43	✓	0.139	24	To Do
Kamke 1072	✗	0	0	✗	0	0	To Do
Kamke 1073	✗	0	0	✗	0	0	To Do
Kamke 1074	✗	0	0	✓	0.088	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	✓	0.069	68	✓	0.048	33	To Do

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#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 1079	✓	0.268	299	✓	0.03	37	To Do
Kamke 1080	✗	0	0	✓	0.433	74	To Do
Kamke 1081	✗	0	0	✗	0	0	To Do
Kamke 1082	✗	0	0	✓	0.224	74	To Do
Kamke 1083	✗	0	0	✓	0.144	31	To Do
Kamke 1084	✗	0	0	✓	0.109	20	To Do
Kamke 1085	✗	0	0	✓	0.121	24	To Do
Kamke 1086	✓	0.005	42	✓	0.036	29	To Do
Kamke 1087	✓	0.011	36	✓	0.173	33	To Do
Kamke 1088	✓	0.118	97	✓	0.219	31	To Do
Kamke 1089	✓	0.046	63	✓	0.086	58	To Do
Kamke 1090	✓	0.034	45	✓	0.081	40	To Do
Kamke 1091	✓	0.029	41	✓	0.059	35	To Do
Kamke 1092	✓	0.097	53	✓	0.089	29	To Do
Kamke 1093	✓	0.005	13	✓	0.012	10	To Do
Kamke 1094	✓	0.022	41	✓	0.013	29	To Do
Kamke 1095	✓	0.01	30	✓	0.072	23	To Do
Kamke 1096	✓	0.013	55	✓	0.153	39	To Do
Kamke 1097	✓	0.028	45	✓	0.014	31	To Do
Kamke 1098	✓	0.01	41	✓	0.013	27	To Do
Kamke 1099	✗	0	0	✓	0.119	25	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1100	✓	0.032	37	✓	0.099	23	Linear second order, non-homogeneous, variable coefficient. Singularity, Frobenius series solution and also using smart transformation. Variation of parameters.
Kamke 1101	✓	0.025	52	✓	0.063	29	Linear second order, homogeneous, variable coefficient. Singularity, Frobenius series solution and also using smart transformation
Kamke 1102	✓	0.007	36	✓	0.086	33	Linear second order, homogeneous, variable coefficient. Use smart transformation to convert to Emden-Fowler then use Power series solution
Kamke 1103	✓	0.031	56	✓	0.013	33	To Do
Kamke 1104	✓	0.037	77	✓	0.024	41	To Do
Kamke 1105	✓	0.022	54	✓	0.071	39	To Do
Kamke 1106	✓	0.054	165	✓	0.213	71	To Do
Kamke 1107	✓	0.031	36	✓	0.156	30	To Do
Kamke 1108	✓	0.037	33	✓	0.162	26	To Do
Kamke 1109	✓	0.057	45	✓	0.063	33	To Do
Kamke 1110	✓	0.042	36	✓	0.111	23	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1111	✓	0.02	19	✓	0.088	13	Linear second order, homogeneous, variable coefficient. Solved using Laplace transform instead of series method
Kamke 1112	✓	0.03	30	✓	0.079	22	To Do
Kamke 1113	✓	0.024	24	✓	0.137	17	To Do
Kamke 1114	✓	0.043	39	✓	0.098	34	To Do
Kamke 1115	✓	0.069	63	✓	2.3	47	To Do
Kamke 1116	✓	0.063	38	✓	0.151	31	To Do
Kamke 1117	✓	0.098	87	✓	0.189	82	To Do
Kamke 1118	✓	0.102	46	✓	0.168	39	To Do
Kamke 1119	✓	0.18	75	✓	0.075	20	To Do
Kamke 1120	✓	0.065	135	✓	0.286	109	To Do
Kamke 1121	✓	11.782	36	✓	0.036	23	To Do
Kamke 1122	✓	11.442	44	✓	0.36	28	To Do
Kamke 1123	✓	0.013	53	✓	0.089	45	To Do
Kamke 1124	✓	0.08	65	✓	0.154	29	To Do
Kamke 1125	✓	0.243	45	✓	0.079	36	To Do
Kamke 1126	✗	0	0	✓	0.055	19	To Do
Kamke 1127	✓	0.042	25	✓	0.026	21	To Do
Kamke 1128	✗	0	0	✓	0.337	32	To Do
Kamke 1129	✓	0.043	42	✓	0.051	30	To Do
Kamke 1130	✓	0.013	46	✓	0.023	31	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1131	✓	0.011	48	✓	0.155	33	To Do
Kamke 1132	✓	0.011	44	✓	0.155	29	To Do
Kamke 1133	✓	0.1	78	✓	0.217	37	To Do
Kamke 1134	✓	0.099	44	✓	0.085	21	To Do
Kamke 1135	✓	0.01	27	✓	0.017	17	To Do
Kamke 1136	✓	0.024	23	✓	0.05	16	To Do
Kamke 1137	✓	0.1	48	✓	0.082	25	To Do
Kamke 1138	✓	0.034	32	✓	0.135	26	To Do
Kamke 1139	✓	0.013	59	✓	0.162	37	To Do
Kamke 1140	✓	0.052	120	✓	0.036	66	To Do
Kamke 1141	✓	0.113	63	✓	0.1	55	To Do
Kamke 1142	✓	0.047	89	✓	0.253	53	To Do
Kamke 1143	✓	0.046	70	✓	0.282	57	To Do
Kamke 1144	✓	0.046	69	✓	0.197	60	To Do
Kamke 1145	✓	0.407	301	✓	0.327	248	To Do
Kamke 1146	✓	0.026	18	✓	0.013	15	To Do
Kamke 1147	✓	0.017	18	✓	0.015	15	To Do
Kamke 1148	✓	0.01	42	✓	0.027	35	To Do
Kamke 1149	✓	0.066	95	✓	0.019	45	To Do
Kamke 1150	✓	0.01	42	✓	0.126	27	To Do
Kamke 1151	✓	0.019	88	✓	0.131	43	To Do
Kamke 1152	✓	0.021	79	✓	0.337	53	To Do
Kamke 1153	✓	0.034	44	✓	0.059	31	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1154	✓	0.022	88	✓	0.184	57	To Do
Kamke 1155	✓	0.054	116	✓	0.102	67	To Do
Kamke 1156	✗	0	0	✓	0.221	71	To Do
Kamke 1157	✗	0	0	✗	0	0	To Do
Kamke 1158	✓	18.526	37	✓	0.558	178	To Do
Kamke 1159	✓	0.016	39	✓	0.033	19	To Do
Kamke 1160	✓	0.01	30	✓	0.023	23	To Do
Kamke 1161	✓	0.052	78	✓	0.016	31	To Do
Kamke 1162	✓	0.065	18	✓	0.016	15	To Do
Kamke 1163	✓	0.362	70	✓	0.099	49	To Do
Kamke 1164	✓	0.022	30	✓	0.049	23	To Do
Kamke 1165	✓	0.08	26	✓	0.03	19	To Do
Kamke 1166	✓	0.015	23	✓	0.022	21	To Do
Kamke 1167	✓	0.087	130	✓	0.069	63	To Do
Kamke 1168	✓	0.006	15	✓	0.016	11	To Do
Kamke 1169	✓	0.073	103	✓	0.052	49	To Do
Kamke 1170	✓	0.025	58	✓	0.09	43	To Do
Kamke 1171	✓	0.056	92	✓	0.228	49	To Do
Kamke 1172	✓	0.071	145	✓	0.067	47	To Do
Kamke 1173	✓	0.107	74	✓	0.192	37	To Do
Kamke 1174	✓	0.023	32	✓	0.134	25	To Do
Kamke 1175	✓	0.186	33	✓	0.071	29	To Do
Kamke 1176	✓	0.019	33	✓	0.052	15	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1177	✗	0	0	✓	0.101	34	To Do
Kamke 1178	✓	0.071	63	✓	0.041	23	To Do
Kamke 1179	✓	0.023	38	✓	0.052	19	To Do
Kamke 1180	✓	0.23	66	✓	0.128	49	To Do
Kamke 1181	✓	0.046	27	✓	0.03	25	To Do
Kamke 1182	✓	0.017	20	✓	0.021	20	To Do
Kamke 1183	✓	0.03	27	✓	0.023	22	To Do
Kamke 1184	✓	0.021	30	✓	0.043	25	To Do
Kamke 1185	✓	0.04	65	✓	0.045	33	To Do
Kamke 1186	✓	0.036	37	✓	0.049	36	To Do
Kamke 1187	✓	0.013	57	✓	0.029	53	To Do
Kamke 1188	✓	0.139	243	✓	0.266	114	To Do
Kamke 1189	✓	0.074	168	✓	0.062	79	To Do
Kamke 1190	✓	0.033	95	✓	0.165	38	To Do
Kamke 1191	✓	0.01	72	✓	0.025	23	To Do
Kamke 1192	✓	13.392	34	✓	0.339	51	To Do
Kamke 1193	✓	0.052	42	✓	0.059	38	To Do
Kamke 1194	✓	0.063	66	✓	0.081	48	To Do
Kamke 1195	✓	0.037	63	✓	0.197	93	To Do
Kamke 1196	✓	0.032	34	✓	0.123	31	To Do
Kamke 1197	✓	0.021	67	✓	0.096	43	To Do
Kamke 1198	✓	0.033	41	✓	0.064	37	To Do
Kamke 1199	✓	0.013	41	✓	0.033	35	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1200	✓	0.023	45	✓	0.034	27	To Do
Kamke 1201	✓	0.059	44	✓	0.03	34	To Do
Kamke 1202	✓	0.016	21	✓	0.065	14	To Do
Kamke 1203	✓	0.023	80	✓	0.035	28	To Do
Kamke 1204	✓	0.021	84	✓	0.082	35	To Do
Kamke 1205	✗	0	0	✗	0	0	To Do
Kamke 1206	✓	0.116	102	✓	0.117	76	To Do
Kamke 1207	✓	0.13	223	✓	0.318	110	To Do
Kamke 1208	✓	0.056	49	✓	0.067	36	To Do
Kamke 1209	✓	0.023	59	✓	0.073	40	To Do
Kamke 1210	✓	0.289	231	✓	0.926	81	To Do
Kamke 1211	✓	0.062	60	✓	0.092	36	To Do
Kamke 1212	✗	0	0	✗	0	0	To Do
Kamke 1213	✓	0.09	54	✓	0.116	53	To Do
Kamke 1214	✓	0.315	191	✓	0.899	71	To Do
Kamke 1215	✓	0.166	410	✓	0.371	148	To Do
Kamke 1216	✗	0	0	✗	0	0	To Do
Kamke 1217	✓	0.158	29	✓	0.059	24	To Do
Kamke 1218	✓	0.158	37	✓	0.065	30	To Do
Kamke 1219	✗	0	0	✓	0.181	69	To Do
Kamke 1220	✓	195.204	61	✓	0.037	40	To Do
Kamke 1221	✓	0.075	30	✓	0.037	35	To Do
Kamke 1222	✓	0.027	30	✓	0.034	23	To Do

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#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 1223	✓	0.023	25	✓	0.026	39	To Do
Kamke 1224	✓	0.021	30	✓	0.029	23	To Do
Kamke 1225	✓	0.04	29	✓	0.068	23	To Do
Kamke 1226	✓	0.025	30	✓	0.095	25	To Do
Kamke 1227	✓	0.036	21	✓	0.02	16	To Do
Kamke 1228	✓	0.017	66	✓	0.188	53	To Do
Kamke 1229	✓	0.049	33	✓	0.041	31	To Do
Kamke 1230	✓	0.03	68	✓	0.322	36	To Do
Kamke 1231	✓	0.078	56	✓	0.109	52	To Do
Kamke 1232	✗	0	0	✓	0.514	409	To Do
Kamke 1233	✗	0	0	✓	0.243	409	To Do
Kamke 1234	✓	0.098	97	✗	0	0	To Do
Kamke 1235	✓	0.067	97	✓	0.037	45	To Do
Kamke 1236	✗	0	0	✗	0	0	To Do
Kamke 1237	✓	0.011	27	✓	0.179	20	To Do
Kamke 1238	✓	0.021	36	✓	0.031	26	To Do
Kamke 1239	✓	0.014	46	✓	0.097	35	To Do
Kamke 1240	✓	0.019	18	✓	0.083	15	To Do
Kamke 1241	✓	0.017	26	✓	0.09	24	To Do
Kamke 1242	✓	0.083	50	✓	0.107	41	To Do
Kamke 1243	✓	0.032	41	✓	0.074	21	To Do
Kamke 1244	✓	0.032	32	✓	0.139	27	To Do
Kamke 1245	✓	0.022	32	✓	0.105	27	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1246	✓	0.022	32	✓	0.291	28	To Do
Kamke 1247	✓	0.237	87	✓	0.038	27	To Do
Kamke 1248	✗	0	0	✓	0.574	134	To Do
Kamke 1249	✓	0.184	190	✓	0.141	134	To Do
Kamke 1250	✓	0.054	38	✓	0.034	41	To Do
Kamke 1251	✓	0.039	23	✓	0.05	20	To Do
Kamke 1252	✓	0.173	131	✓	0.124	124	To Do
Kamke 1253	✓	0.028	28	✓	0.011	16	To Do
Kamke 1254	✓	0.1	52	✓	0.1	42	To Do
Kamke 1255	✓	0.225	87	✓	0.03	42	To Do
Kamke 1256	✓	0.024	26	✓	0.265	51	To Do
Kamke 1257	✓	0.052	33	✓	0.349	27	To Do
Kamke 1258	✓	0.173	130	✓	0.119	110	To Do
Kamke 1259	✓	0.151	112	✓	0.125	92	To Do
Kamke 1260	✓	0.188	65	✓	0.905	76	To Do
Kamke 1261	✗	0	0	✓	0.458	105	To Do
Kamke 1262	✓	49.632	45	✓	0.493	53	To Do
Kamke 1263	✗	0	0	✓	0.134	52	To Do
Kamke 1264	✓	0.078	23	✓	0.074	19	To Do
Kamke 1265	✓	0.046	57	✓	9.507	93	To Do
Kamke 1266	✓	0.029	22	✓	0.015	19	To Do
Kamke 1267	✓	0.441	154	✓	0.176	41	To Do
Kamke 1268	✗	0	0	✓	0.314	39	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1269	✓	0.094	59	✓	0.21	40	To Do
Kamke 1270	✗	0	0	✓	0.539	46	To Do
Kamke 1271	✓	0.012	24	✓	0.013	14	To Do
Kamke 1272	✓	0.013	28	✓	0.066	23	To Do
Kamke 1273	✓	0.018	20	✓	0.141	17	To Do
Kamke 1274	✓	0.044	38	✓	0.014	19	To Do
Kamke 1275	✓	0.037	97	✓	0.264	53	To Do
Kamke 1276	✓	0.061	55	✓	0.125	31	To Do
Kamke 1277	✓	0.029	49	✓	0.114	27	To Do
Kamke 1278	✗	0	0	✗	0	0	To Do
Kamke 1279	✓	0.208	45	✓	0.544	32	To Do
Kamke 1280	✓	0.041	52	✓	0.087	40	To Do
Kamke 1281	✓	0.02	21	✓	0.094	15	To Do
Kamke 1282	✓	0.023	32	✓	0.089	21	To Do
Kamke 1283	✓	0.111	89	✓	0.185	48	To Do
Kamke 1284	✓	0.045	41	✓	0.034	41	To Do
Kamke 1285	✓	0.336	119	✓	0.171	52	To Do
Kamke 1286	✓	0.105	80	✓	0.031	32	To Do
Kamke 1287	✓	0.018	51	✓	0.034	27	To Do
Kamke 1288	✓	0.038	43	✓	0.038	21	To Do
Kamke 1289	✓	0.085	51	✓	0.148	33	To Do
Kamke 1290	✓	0.164	103	✓	0.033	47	To Do
Kamke 1291	✓	0.082	82	✓	0.148	62	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1292	✓	0.04	53	✓	0.155	31	To Do
Kamke 1293	✓	0.334	44	✓	0.141	33	To Do
Kamke 1294	✓	0.106	44	✓	0.137	33	To Do
Kamke 1295	✓	0.285	229	✓	0.422	106	To Do
Kamke 1296	✓	0.557	272	✓	0.444	150	To Do
Kamke 1297	✓	0.035	52	✓	0.04	63	To Do
Kamke 1298	✓	0.08	135	✓	0.224	124	To Do
Kamke 1299	✓	0.014	19	✓	0.025	27	To Do
Kamke 1300	✓	0.018	39	✓	0.067	31	To Do
Kamke 1301	✓	0.033	30	✓	0.035	19	To Do
Kamke 1302	✓	0.084	165	✓	0.143	98	To Do
Kamke 1303	✗	0	0	✓	0.379	501	To Do
Kamke 1304	✓	0.052	50	✓	0.066	38	To Do
Kamke 1305	✓	0.084	47	✓	0.099	44	To Do
Kamke 1306	✗	0	0	✓	0.7	69	To Do
Kamke 1307	✓	0.108	44	✓	0.099	36	To Do
Kamke 1308	✓	0.022	41	✓	0.027	40	To Do
Kamke 1309	✓	0.098	77	✓	0.199	85	To Do
Kamke 1310	✓	0.012	27	✓	0.04	20	To Do
Kamke 1311	✓	0.14	61	✓	0.353	52	To Do
Kamke 1312	✓	0.024	26	✓	0.032	19	To Do
Kamke 1313	✓	0.217	75	✓	0.237	35	To Do
Kamke 1314	✓	0.197	75	✓	0.197	33	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1315	✓	0.028	44	✓	0.029	45	To Do
Kamke 1316	✓	0.094	38	✓	0.097	18	To Do
Kamke 1317	✓	0.116	38	✓	0.108	13	To Do
Kamke 1318	✓	0.303	146	✓	0.282	122	To Do
Kamke 1319	✓	0.117	69	✓	0.182	31	To Do
Kamke 1320	✓	0.086	21	✓	0.117	17	To Do
Kamke 1321	✓	0.028	17	✓	0.033	15	To Do
Kamke 1322	✓	0.035	44	✓	0.039	44	To Do
Kamke 1323	✗	0	0	✓	0.028	17	To Do
Kamke 1324	✓	0.03	24	✓	0.038	18	To Do
Kamke 1325	✓	0.269	52	✓	0.275	86	To Do
Kamke 1326	✓	0.026	26	✓	0.04	22	To Do
Kamke 1327	✓	0.184	105	✓	1.518	81	To Do
Kamke 1328	✓	0.022	33	✓	0.03	27	To Do
Kamke 1329	✗	0	0	✓	0.777	64	To Do
Kamke 1330	✗	0	0	✓	9.907	1147	To Do
Kamke 1331	✓	0.045	41	✓	0.035	19	To Do
Kamke 1332	✓	0.025	21	✓	0.032	17	To Do
Kamke 1333	✓	0.117	70	✓	0.186	45	To Do
Kamke 1334	✓	0.214	89	✓	0.219	89	To Do
Kamke 1335	✓	0.344	510	✓	0.153	57	To Do
Kamke 1336	✓	0.057	51	✓	0.066	42	To Do
Kamke 1337	✓	0.087	53	✓	0.059	27	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1338	✓	0.073	40	✓	0.049	27	To Do
Kamke 1339	✓	0.277	66	✓	0.268	76	To Do
Kamke 1340	✓	0.038	23	✓	0.041	20	To Do
Kamke 1341	✗	0	0	✓	0.326	201	To Do
Kamke 1342	✓	0.076	52	✓	0.047	31	To Do
Kamke 1343	✗	0	0	✓	0.22	58	To Do
Kamke 1344	✓	0.608	100	✓	0.104	23	To Do
Kamke 1345	✓	0.046	45	✓	0.086	25	To Do
Kamke 1346	✓	0.089	37	✓	0.082	25	To Do
Kamke 1347	✓	0.107	31	✓	0.061	19	To Do
Kamke 1348	✗	0	0	✓	0.561	73	To Do
Kamke 1349	✓	0.116	73	✓	0.134	85	To Do
Kamke 1350	✓	0.01	25	✓	0.02	21	To Do
Kamke 1351	✓	0.044	44	✓	0.051	24	To Do
Kamke 1352	✓	0.014	51	✓	0.061	43	To Do
Kamke 1353	✓	0.131	77	✓	0.32	67	To Do
Kamke 1354	✓	0.093	78	✓	0.404	33	To Do
Kamke 1355	✓	0.147	57	✓	0.216	30	To Do
Kamke 1356	✓	0.317	78	✓	0.18	29	To Do
Kamke 1357	✓	0.738	264	✓	0.247	97	To Do
Kamke 1358	✓	0.068	71	✓	0.068	20	To Do
Kamke 1359	✓	0.121	84	✓	0.201	57	To Do
Kamke 1360	✓	0.101	68	✓	0.188	47	To Do

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#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 1361	✓	0.541	36	✓	0.042	33	To Do
Kamke 1362	✗	0	0	✓	0.545	109	To Do
Kamke 1363	✓	0.813	211	✓	0.227	161	To Do
Kamke 1364	✓	0.172	29	✓	0.148	25	To Do
Kamke 1365	✓	0.101	66	✓	0.077	59	To Do
Kamke 1366	✓	0.025	22	✓	0.016	17	To Do
Kamke 1367	✗	0	0	✓	0.512	88	To Do
Kamke 1368	✓	0.028	92	✓	0.154	71	To Do
Kamke 1369	✓	0.11	67	✓	0.083	55	To Do
Kamke 1370	✓	0.03	53	✓	0.019	19	To Do
Kamke 1371	✓	0.022	48	✓	0.105	37	To Do
Kamke 1372	✗	0	0	✓	0.572	110	To Do
Kamke 1373	✗	0	0	✓	0.517	84	To Do
Kamke 1374	✓	0.037	26	✓	0.104	23	To Do
Kamke 1375	✓	0.05	34	✓	0.121	29	To Do
Kamke 1376	✓	0.102	82	✓	0.049	73	To Do
Kamke 1377	✓	0.262	97	✓	0.187	83	To Do
Kamke 1378	✓	0.057	56	✓	0.06	48	To Do
Kamke 1379	✓	0.09	71	✓	0.083	60	To Do
Kamke 1380	✓	0.322	121	✓	0.116	67	To Do
Kamke 1381	✓	0.779	371	✓	0.299	175	To Do
Kamke 1382	✓	0.757	141	✓	0.179	104	To Do
Kamke 1383	✓	0.144	44	✓	0.071	39	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1384	✓	0.034	106	✓	0.332	73	To Do
Kamke 1385	✓	0.02	70	✓	0.103	55	To Do
Kamke 1386	✓	0.105	68	✓	0.083	58	To Do
Kamke 1387	✓	0.04	45	✓	0.039	28	To Do
Kamke 1388	✓	0.325	109	✓	0.159	76	To Do
Kamke 1389	✓	0.407	91	✓	0.151	68	To Do
Kamke 1390	✓	0.042	49	✓	0.046	25	To Do
Kamke 1391	✓	0.064	27	✓	0.033	20	To Do
Kamke 1392	✓	96.128	1763961	✓	0.402	561	To Do
Kamke 1393	✓	22.354	413606	✓	0.281	299	To Do
Kamke 1394	✓	0.057	73	✓	0.168	79	To Do
Kamke 1395	✓	0.158	49	✓	0.102	39	To Do
Kamke 1396	✓	1.554	199	✓	0.232	178	To Do
Kamke 1397	✓	0.044	38	✓	0.152	29	To Do
Kamke 1398	✗	0	0	✓	0.375	69	To Do
Kamke 1399	✓	0.055	51	✓	0.077	34	To Do
Kamke 1400	✓	0.082	58	✓	0.084	35	To Do
Kamke 1401	✓	0.014	56	✓	0.09	45	To Do
Kamke 1402	✗	0	0	✓	0.688	58	To Do
Kamke 1403	✗	0	0	✓	1.26	298	To Do
Kamke 1404	✓	0.025	25	✓	0.076	19	To Do
Kamke 1405	✓	0.079	70	✓	0.119	42	To Do
Kamke 1406	✗	0	0	✓	0.19	44	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1407	✗	0	0	✓	2.709	2597	To Do
Kamke 1408	✗	0	0	✗	0	0	To Do
Kamke 1409	✓	0.027	44	✓	0.029	39	To Do
Kamke 1410	✓	0.146	405	✓	0.464	253	To Do
Kamke 1411	✓	0.386	36	✓	0.027	27	To Do
Kamke 1412	✓	0.017	29	✓	0.013	23	To Do
Kamke 1413	✗	0	0	✓	0.083	12	To Do
Kamke 1414	✓	1.227	127	✓	0.448	97	To Do
Kamke 1415	✓	0.924	145	✓	0.227	36	To Do
Kamke 1416	✓	0.205	35	✓	0.352	26	To Do
Kamke 1417	✓	0.159	45	✓	0.218	31	To Do
Kamke 1418	✗	0	0	✓	3.908	59	To Do
Kamke 1419	✗	0	0	✓	0.28	12	To Do
Kamke 1420	✓	0.472	126	✓	0.582	123	To Do
Kamke 1421	✓	0.248	65	✓	0.087	27	To Do
Kamke 1422	✓	0.09	43	✓	0.33	50	To Do
Kamke 1423	✓	0.077	61	✓	0.486	132	To Do
Kamke 1424	✓	0.175	65	✓	0.499	120	To Do
Kamke 1425	✓	1.94	341	✓	0.683	91	To Do
Kamke 1426	✓	6.542	1362	✓	0.817	549	To Do
Kamke 1427	✗	0	0	✓	1.767	203	To Do
Kamke 1428	✓	0.413	87	✓	0.522	183	To Do
Kamke 1429	✓	0.061	51	✓	0.038	25	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1430	✓	0.489	22	✓	0.542	101	To Do
Kamke 1431	✓	0.208	64	✓	0.445	30	To Do
Kamke 1432	✓	0.101	33	✓	0.054	22	To Do
Kamke 1433	✓	0.259	35	✓	0.118	28	To Do
Kamke 1434	✓	110.112	1596424	✓	1.013	517	To Do
Kamke 1435	✓	0.16	61	✓	0.231	38	To Do
Kamke 1436	✓	0.563	33	✓	0.512	113	To Do
Kamke 1437	✓	0.297	36	✓	0.261	29	To Do
Kamke 1438	✓	0.987	158	✓	0.346	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	0	✓	0.066	30	To Do
Kamke 1443	✗	0	0	✗	0	0	To Do
Kamke 1444	✗	0	0	✓	0.018	37	To Do
Kamke 1445	✗	0	0	✓	0.406	20	To Do
Kamke 1446	✓	0.045	26	✓	0.059	22	To Do
Kamke 1447	✓	0.038	24	✓	0.061	20	To Do
Kamke 1448	✓	0.375	142	✓	0.14	77	To Do
Kamke 1449	✓	0.068	53	✓	0.063	47	To Do
Kamke 1450	✗	0	0	✓	0.577	1616	To Do
Kamke 1451	✓	0.023	164	✓	0.235	114	To Do
Kamke 1452	✓	0.009	52	✓	0.013	35	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1453	✓	0.804	128	✓	0.156	122	To Do
Kamke 1454	✓	0.01	79	✓	0.069	55	To Do
Kamke 1455	✓	0.029	127	✓	0.211	71	To Do
Kamke 1456	✓	0.037	183	✓	0.108	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	✓	0.006	34	✓	0.012	27	To Do
Kamke 1465	✓	0.107	52	✓	0.095	214	To Do
Kamke 1466	✓	0.017	34	✓	0.027	27	To Do
Kamke 1467	✓	0.006	84	✓	0.04	590	To Do
Kamke 1468	✓	0.087	57	✓	0.148	59	To Do
Kamke 1469	✓	0.019	68	✓	0.051	37	To Do
Kamke 1470	✗	0	0	✓	0.102	36	To Do
Kamke 1471	✗	0	0	✓	0.199	36	To Do
Kamke 1472	✗	0	0	✓	0.257	33	To Do
Kamke 1473	✗	0	0	✗	0	0	To Do
Kamke 1474	✗	0	0	✗	0	0	To Do
Kamke 1475	✓	0.028	37	✓	0.028	23	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1476	✗	0	0	✗	0	0	To Do
Kamke 1477	✓	0.185	43	✓	0.029	41	To Do
Kamke 1478	✓	0.035	90	✓	0.179	48	To Do
Kamke 1479	✓	0.154	153	✓	0.314	92	To Do
Kamke 1480	✓	0.25	91	✓	0.348	35	To Do
Kamke 1481	✓	1.185	340	✓	0.071	44	To Do
Kamke 1482	✗	0	0	✓	0.454	1614	To Do
Kamke 1483	✓	0.154	105	✓	0.366	37	To Do
Kamke 1484	✗	0	0	✗	0	0	To Do
Kamke 1485	✓	0.153	59	✓	0.48	51	To Do
Kamke 1486	✓	0.191	63	✓	0.353	51	To Do
Kamke 1487	✗	0	0	✓	0.113	38	To Do
Kamke 1488	✓	0.638	97	✓	0.787	135	To Do
Kamke 1489	✗	0	0	✗	0	0	To Do
Kamke 1490	✓	0.052	33	✓	0.091	18	To Do
Kamke 1491	✓	0.048	102	✓	0.12	88	To Do
Kamke 1492	✓	0.431	43	✓	0.155	39	To Do
Kamke 1493	✓	8.22	868	✓	0.446	1033	To Do
Kamke 1494	✓	0.033	43	✓	0.03	32	To Do
Kamke 1495	✓	0.022	24	✓	0.016	16	To Do
Kamke 1496	✓	0.293	58	✓	0.035	57	To Do
Kamke 1497	✓	0.551	127	✓	0.295	77	To Do
Kamke 1498	✓	13.162	353	✓	0.313	53	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1499	✓	0.25	91	✓	0.314	25	To Do
Kamke 1500	✗	0	0	✓	0.264	55	To Do
Kamke 1501	✓	0.2	80	✓	0.327	37	To Do
Kamke 1502	✓	0.076	98	✓	0.658	103	To Do
Kamke 1503	✓	0.121	62	✓	0.036	67	To Do
Kamke 1504	✓	1.305	65	✓	0.275	18	To Do
Kamke 1505	✗	0	0	✓	0.319	79	To Do
Kamke 1506	✗	0	0	✓	0.074	43	To Do
Kamke 1507	✗	0	0	✓	0.905	1210	To Do
Kamke 1508	✓	0.995	143	✓	0.197	81	To Do
Kamke 1509	✓	0.011	33	✓	0.068	29	To Do
Kamke 1510	✗	0	0	✗	0	0	To Do
Kamke 1511	✓	0.04	52	✓	0.04	49	To Do
Kamke 1512	✓	0.041	29	✓	0.017	18	To Do
Kamke 1513	✓	0.087	23	✓	0.318	18	To Do
Kamke 1514	✓	0.807	97	✓	0.645	135	To Do
Kamke 1515	✗	0	0	✗	0	0	To Do
Kamke 1516	✗	0	0	✓	0.536	188	To Do
Kamke 1517	✓	0.433	1656	✓	0.658	866	To Do
Kamke 1518	✓	0.271	96	✓	0.519	60	To Do
Kamke 1519	✓	0.034	58	✓	0.174	19	To Do
Kamke 1520	✗	0	0	✓	0.764	288	To Do
Kamke 1521	✓	0.068	29	✓	0.516	28	To Do

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#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 1522	✓	0.022	42	✓	0.058	34	To Do
Kamke 1523	✓	0.128	46	✓	0.524	23	To Do
Kamke 1524	✓	0.179	96	✓	0.615	98	To Do
Kamke 1525	✓	0.509	101	✓	0.658	291	To Do
Kamke 1526	✗	0	0	✓	0.274	19	To Do
Kamke 1527	✗	0	0	✓	0.612	437	To Do
Kamke 1528	✓	0.682	56	✓	0.231	71	To Do
Kamke 1529	✗	0	0	✓	0.091	25	To Do
Kamke 1530	✗	0	0	✓	0.347	113	To Do
Kamke 1531	✗	0	0	✗	0	0	To Do
Kamke 1532	✓	0.018	103	✓	0.114	58	To Do
Kamke 1533	✓	0.02	106	✓	0.134	58	To Do
Kamke 1534	✓	0.004	22	✓	0.048	21	To Do
Kamke 1535	✓	1.4	168	✓	0.039	36	To Do
Kamke 1536	✓	0.006	76	✓	0.019	50	To Do
Kamke 1537	✓	1.299	93	✓	0.181	67	To Do
Kamke 1538	✓	0.279	41	✓	0.553	51	To Do
Kamke 1539	✓	0.007	44	✓	0.043	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	✓	0.02	41	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1545	✓	0.199	40	✓	0.103	27	To Do
Kamke 1546	✓	0.875	139	✓	0.067	73	To Do
Kamke 1547	✗	0	0	✓	0.024	87	To Do
Kamke 1548	✓	0.108	50	✓	0.086	32	To Do
Kamke 1549	✓	0.014	34	✓	0.034	26	To Do
Kamke 1550	✓	5.554	214	✓	4.686	157	To Do
Kamke 1551	✓	0.455	84	✓	0.291	62	To Do
Kamke 1552	✗	0	0	✓	0.096	89	To Do
Kamke 1553	✓	0.025	29	✓	0.016	17	To Do
Kamke 1554	✓	0.026	27	✓	0.016	18	To Do
Kamke 1555	✓	0.066	156	✓	0.253	61	To Do
Kamke 1556	✓	0.024	27	✓	0.017	19	To Do
Kamke 1557	✓	0.075	146	✓	0.154	61	To Do
Kamke 1558	✓	0.168	222	✓	0.223	67	To Do
Kamke 1559	✓	0.299	100	✓	0.207	33	To Do
Kamke 1560	✓	0.028	27	✓	0.018	18	To Do
Kamke 1561	✓	4.805	310	✓	0.289	69	To Do
Kamke 1562	✓	1.246	140	✓	0.448	77	To Do
Kamke 1563	✓	2.349	187	✓	0.398	87	To Do
Kamke 1564	✓	1.532	196	✓	0.324	88	To Do
Kamke 1565	✓	0.577	242	✓	0.535	71	To Do
Kamke 1566	✓	0.693	237	✓	0.449	35	To Do
Kamke 1567	✓	0.026	27	✓	0.019	19	To Do

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#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 1568	✓	0.027	116	✓	0.041	89	To Do
Kamke 1569	✗	0	0	✓	0.651	63	To Do
Kamke 1570	✓	0.151	213	✓	0.112	49	To Do
Kamke 1571	✓	0.091	389	✓	0.4	143	To Do
Kamke 1572	✗	0	0	✓	0.563	35	To Do
Kamke 1573	✗	0	0	✓	0.06	41	To Do
Kamke 1574	✗	0	0	✓	1.019	252	To Do
Kamke 1575	✗	0	0	✓	0.521	638	To Do
Kamke 1576	✗	0	0	✓	0.036	67	To Do
Kamke 1577	✓	1.154	39	✓	0.018	21	To Do
Kamke 1578	✗	0	0	✓	0.59	89	To Do
Kamke 1579	✓	0.777	80	✓	0.523	69	To Do
Kamke 1580	✓	1.193	111	✓	0.841	147	To Do
Kamke 1581	✗	0	0	✗	0	0	To Do
Kamke 1582	✓	0.661	528	✗	0	0	To Do
Kamke 1583	✗	0	0	✓	0.052	40	To Do
Kamke 1584	✓	3.113	207	✓	0.288	118	To Do
Kamke 1585	✓	0.236	214	✓	0.05	679	To Do
Kamke 1586	✗	0	0	✗	0	0	To Do
Kamke 1587	✓	0.378	492	✓	0.939	174	To Do
Kamke 1588	✓	15.98	103	✓	0.176	90	To Do
Kamke 1589	✓	0.047	662	✓	10.189	4347	To Do
Kamke 1590	✗	0	0	✓	3.146	553	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1591	✓	0.092	26	✓	0.149	12	To Do
Kamke 1592	✓	0.031	14	✓	0.021	10	To Do
Kamke 1593	✗	0	0	✗	0	0	To Do
Kamke 1594	✓	0.522	200	✓	0.314	59	To Do
Kamke 1595	✗	0	0	✗	0	0	To Do
Kamke 1596	✗	0	0	✗	0	0	To Do
Kamke 1597	✓	2.303	131	✓	0.054	21	To Do
Kamke 1598	✗	0	0	✗	0	0	To Do
Kamke 1599	✗	0	0	✗	0	0	To Do
Kamke 1600	✓	2.617	869	✓	0.11	89	To Do
Kamke 1601	✗	0	0	✓	3.05	151	To Do
Kamke 1602	✓	124.969	45	✓	0.425	73	To Do
Kamke 1603	✗	0	0	✓	32.429	8411	To Do
Kamke 1604	✓	0.066	32	✓	0.675	23	To Do
Kamke 1605	✗	0	0	✓	1.617	104	To Do
Kamke 1606	✗	0	0	✗	0	0	To Do
Kamke 1607	✓	0.115	79	✓	0.149	49	To Do
Kamke 1608	✗	0	0	✗	0	0	To Do
Kamke 1609	✗	0	0	✗	0	0	To Do
Kamke 1610	✗	0	0	✓	0.31	92	To Do
Kamke 1611	✗	0	0	✓	0.855	57	To Do
Kamke 1612	✗	0	0	✓	1.515	57	To Do
Kamke 1613	✗	0	0	✓	0.035	27	To Do

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#	Mathematica			Maple			note on solution
	solved	cpu	leaf	solved	cpu	leaf	
Kamke 1614	✗	0	0	✓	0.104	33	To Do
Kamke 1615	✗	0	0	✓	4.678	91	To Do
Kamke 1616	✗	0	0	✓	1.256	63	To Do
Kamke 1617	✗	0	0	✗	0	0	To Do
Kamke 1618	✗	0	0	✓	1.695	56	To Do
Kamke 1619	✗	0	0	✗	0	0	To Do
Kamke 1620	✗	0	0	✓	0.151	253	To Do
Kamke 1621	✗	0	0	✓	2.551	1088	To Do
Kamke 1622	✗	0	0	✓	0.444	415	To Do
Kamke 1623	✗	0	0	✗	0	0	To Do
Kamke 1624	✗	0	0	✓	1.886	131	To Do
Kamke 1625	✗	0	0	✗	0	0	To Do
Kamke 1626	✗	0	0	✓	0.274	48	To Do
Kamke 1627	✗	0	0	✓	1.198	58	To Do
Kamke 1628	✗	0	0	✗	0	0	To Do
Kamke 1629	✗	0	0	✓	0.053	38	To Do
Kamke 1630	✓	11.753	1670	✓	0.767	783	To Do
Kamke 1631	✗	0	0	✓	0.124	38	To Do
Kamke 1632	✓	0.064	34	✓	0.163	23	To Do
Kamke 1633	✗	0	0	✓	0.377	97	To Do
Kamke 1634	✗	0	0	✗	0	0	To Do
Kamke 1635	✗	0	0	✓	0.244	79	To Do
Kamke 1636	✗	0	0	✓	1.479	59	To Do

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#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 1637	✗	0	0	✓	0.614	58	To Do
Kamke 1638	✗	0	0	✓	0.219	115	To Do
Kamke 1639	✗	0	0	✓	3.396	56	To Do
Kamke 1640	✗	0	0	✓	0.255	70	To Do
Kamke 1641	✓	2.096	57	✓	0.062	29	To Do
Kamke 1642	✗	0	0	✗	0	0	To Do
Kamke 1643	✗	0	0	✗	0	0	To Do
Kamke 1644	✗	0	0	✓	0.553	56	To Do
Kamke 1645	✗	0	0	✗	0	0	To Do
Kamke 1646	✓	11.076	262	✓	0.199	94	To Do
Kamke 1647	✓	52.459	59	✓	0.785	60	To Do
Kamke 1648	✗	0	0	✓	1.777	205	To Do
Kamke 1649	✗	0	0	✗	0	0	To Do
Kamke 1650	✓	0.026	19	✓	0.379	16	To Do
Kamke 1651	✓	0.286	414	✓	0.229	31	To Do
Kamke 1652	✗	0	0	✓	0.395	36	To Do
Kamke 1653	✓	0.069	75	✓	0.171	41	To Do
Kamke 1654	✓	0.287	308	✓	0.219	38	To Do
Kamke 1655	✓	0.872	350	✓	0.275	84	To Do
Kamke 1656	✗	0	0	✓	0.789	771	To Do
Kamke 1657	✓	0.173	43	✓	0.331	35	To Do
Kamke 1658	✗	0	0	✓	0.149	115	To Do
Kamke 1659	✗	0	0	✓	0.113	60	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 1660	✗	0	0	✓	0.854	125	To Do
Kamke 1661	✓	0.036	90	✓	0.109	51	To Do
Kamke 1662	✗	0	0	✓	0.419	56	To Do
Kamke 1663	✗	0	0	✓	0.974	125	To Do
Kamke 1664	✗	0	0	✓	3.044	155	To Do
Kamke 1665	✗	0	0	✓	0.641	84	To Do
Kamke 1666	✗	0	0	✓	1.001	93	To Do
Kamke 1667	✗	0	0	✓	1.495	121	To Do
Kamke 1668	✓	0.072	46	✓	0.201	24	To Do
Kamke 1669	✓	138.441	74	✓	0.141	32	To Do
Kamke 1670	✓	121.907	49	✓	0.454	35	To Do
Kamke 1671	✓	0.039	59	✓	0.111	35	To Do
Kamke 1672	✗	0	0	✓	0.99	65	To Do
Kamke 1673	✗	0	0	✓	0.803	60	To Do
Kamke 1674	✓	0.063	69	✓	0.099	25	To Do
Kamke 1675	✗	0	0	✗	0	0	To Do
Kamke 1676	✓	57.468	117	✓	0.324	72	To Do
Kamke 1677	✗	0	0	✓	1.77	101	To Do
Kamke 1678	✗	0	0	✓	0.362	60	To Do
Kamke 1679	✓	0.122	33	✓	0.229	27	To Do
Kamke 1680	✗	0	0	✓	0.816	103	To Do
Kamke 1681	✗	0	0	✓	0.068	31	To Do
Kamke 1682	✗	0	0	✓	1.085	94	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 1683	✓	0.082	25	✓	0.073	23	To Do
Kamke 1684	✗	0	0	✓	1.558	100	To Do
Kamke 1685	✗	0	0	✗	0	0	To Do
Kamke 1686	✗	0	0	✓	1.132	128	To Do
Kamke 1687	✓	0.071	83	✓	0.155	21	To Do
Kamke 1688	✗	0	0	✓	0.135	32	To Do
Kamke 1689	✓	0.734	259	✓	0.182	37	To Do
Kamke 1690	✗	0	0	✓	1.108	99	To Do
Kamke 1691	✗	0	0	✓	1.483	254	To Do
Kamke 1692	✗	0	0	✓	4.372	156	To Do
Kamke 1693	✗	0	0	✓	0.326	68	To Do
Kamke 1694	✓	0.226	111	✓	0.242	54	To Do
Kamke 1695	✗	0	0	✓	0.678	103	To Do
Kamke 1696	✗	0	0	✓	0.563	100	To Do
Kamke 1697	✓	0.076	68	✓	0.059	39	To Do
Kamke 1698	✓	0.051	63	✗	0	0	To Do
Kamke 1699	✓	0.048	32	✓	0.14	33	To Do
Kamke 1700	✓	0.094	44	✓	0.608	86	To Do
Kamke 1701	✓	0.121	80	✓	0.55	42	To Do
Kamke 1702	✗	0	0	✗	0	0	To Do
Kamke 1703	✓	0.256	73	✓	0.107	25	To Do
Kamke 1704	✗	0	0	✗	0	0	To Do
Kamke 1705	✗	0	0	✗	0	0	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 1706	✗	0	0	✗	0	0	To Do
Kamke 1707	✓	0.087	28	✓	0.108	39	To Do
Kamke 1708	✗	0	0	✓	1.039	73	To Do
Kamke 1709	✗	0	0	✓	1.917	84	To Do
Kamke 1710	✗	0	0	✓	2.572	91	To Do
Kamke 1711	✗	0	0	✓	0.709	81	To Do
Kamke 1712	✓	11.517	57	✓	0.122	61	To Do
Kamke 1713	✗	0	0	✓	0.372	54	To Do
Kamke 1714	✓	0.077	25	✓	0.094	68	To Do
Kamke 1715	✓	0.043	26	✓	0.08	25	To Do
Kamke 1716	✓	0.772	172	✓	0.329	68	To Do
Kamke 1717	✓	2.109	49	✓	0.412	107	To Do
Kamke 1718	✓	1.705	396	✓	0.356	133	To Do
Kamke 1719	✗	0	0	✓	0.628	70	To Do
Kamke 1720	✗	0	0	✓	0.574	173	To Do
Kamke 1721	✗	0	0	✗	0	0	To Do
Kamke 1722	✓	2.189	797	✓	0.439	98	To Do
Kamke 1723	✓	0.961	227	✓	0.151	16	To Do
Kamke 1724	✓	0.281	24	✓	0.893	21	To Do
Kamke 1725	✓	0.418	59	✓	0.821	105	To Do
Kamke 1726	✓	0.844	73	✓	0.168	39	To Do
Kamke 1727	✓	0.204	129	✓	0.445	823	To Do
Kamke 1728	✓	0.01	31	✓	0.047	24	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 1729	✗	0	0	✗	0	0	To Do
Kamke 1730	✓	0.559	77	✓	0.115	53	To Do
Kamke 1731	✓	1.466	351	✓	0.118	61	To Do
Kamke 1732	✗	0	0	✗	0	0	To Do
Kamke 1733	✓	2.908	437	✓	0.119	71	To Do
Kamke 1734	✗	0	0	✗	0	0	To Do
Kamke 1735	✗	0	0	✗	0	0	To Do
Kamke 1736	✓	10.406	285	✓	0.121	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	✓	0.035	16	✓	0.054	13	To Do
Kamke 1741	✓	0.112	17	✓	0.108	34	To Do
Kamke 1742	✗	0	0	✓	0.245	60	To Do
Kamke 1743	✓	23.377	2761	✓	0.133	71	To Do
Kamke 1744	✓	1.134	173	✓	0.452	823	To Do
Kamke 1745	✓	0.37	204	✓	0.624	117	To Do
Kamke 1746	✗	0	0	✓	0.968	207	To Do
Kamke 1747	✓	0.033	20	✓	0.026	17	To Do
Kamke 1748	✓	0.104	43	✓	0.182	67	To Do
Kamke 1749	✓	0.619	181	✓	0.548	57	To Do
Kamke 1750	✓	5.274	2281	✓	0.467	87	To Do
Kamke 1751	✗	0	0	✗	0	0	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 1752	✓	0.156	26	✓	0.137	33	To Do
Kamke 1753	✓	0.372	43	✓	0.196	147	To Do
Kamke 1754	✓	0.041	17	✓	0.062	15	To Do
Kamke 1755	✗	0	0	✓	0.393	418	To Do
Kamke 1756	✗	0	0	✓	0.204	75	To Do
Kamke 1757	✗	0	0	✗	0	0	To Do
Kamke 1758	✓	0.07	31	✓	0.1	42	To Do
Kamke 1759	✓	0.045	18	✓	0.045	31	To Do
Kamke 1760	✗	0	0	✓	0.11	114	To Do
Kamke 1761	✗	0	0	✗	0	0	To Do
Kamke 1762	✗	0	0	✓	0.926	108	To Do
Kamke 1763	✓	0.174	33	✓	0.085	148	To Do
Kamke 1764	✓	0.076	37	✓	0.24	18	To Do
Kamke 1765	✓	0.156	24	✓	0.044	27	To Do
Kamke 1766	✓	0.057	21	✓	0.058	64	To Do
Kamke 1767	✓	0.088	54	✓	0.426	50	To Do
Kamke 1768	✓	0.135	79	✓	0.071	43	To Do
Kamke 1769	✓	0.058	18	✓	0.059	21	To Do
Kamke 1770	✓	0.931	22	✓	0.093	26	To Do
Kamke 1771	✓	0.099	20	✓	0.311	22	To Do
Kamke 1772	✓	1.109	36	✓	0.186	35	To Do
Kamke 1773	✓	0.209	44	✓	0.049	30	To Do
Kamke 1774	✓	1.56	92	✓	0.342	136	To Do

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Table 3 – continued from previous page

#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 1775	✓	0.151	24	✓	0.132	31	To Do
Kamke 1776	✗	0	0	✓	0.385	49	To Do
Kamke 1777	✗	0	0	✓	0.717	79	To Do
Kamke 1778	✓	1.045	75	✓	0.892	245	To Do
Kamke 1779	✗	0	0	✓	0.779	112	To Do
Kamke 1780	✗	0	0	✓	0.836	160	To Do
Kamke 1781	✓	0.099	14	✓	0.078	11	To Do
Kamke 1782	✓	0.104	93	✓	0.072	33	To Do
Kamke 1783	✓	1.689	24	✓	0.207	23	To Do
Kamke 1784	✓	0.36	72	✓	0.883	82	To Do
Kamke 1785	✓	0.443	95	✓	0.489	83	To Do
Kamke 1786	✓	1.165	87	✓	0.34	42	To Do
Kamke 1787	✗	0	0	✓	0.428	80	To Do
Kamke 1788	✗	0	0	✗	0	0	To Do
Kamke 1789	✗	0	0	✗	0	0	To Do
Kamke 1790	✓	25.54	182	✓	0.405	119	To Do
Kamke 1791	✓	24.777	164	✓	0.436	90	To Do
Kamke 1792	✓	29.516	222	✓	0.661	194	To Do
Kamke 1793	✓	1.543	113	✓	0.081	40	To Do
Kamke 1794	✓	1.462	98	✓	0.106	46	To Do
Kamke 1795	✓	0.391	103	✓	1.811	529	To Do
Kamke 1796	✓	0.403	195	✓	0.354	51	To Do
Kamke 1797	✗	0	0	✗	0	0	To Do

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#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 1798	✗	0	0	✓	0.274	166	To Do
Kamke 1799	✓	2.231	58	✓	0.205	46	To Do
Kamke 1800	✓	0.592	78	✓	0.072	60	To Do
Kamke 1801	✗	0	0	✗	0	0	To Do
Kamke 1802	✗	0	0	✗	0	0	To Do
Kamke 1803	✓	21.803	9968	✓	2.512	115620	To Do
Kamke 1804	✓	3.157	415	✓	0.043	31	To Do
Kamke 1805	✓	2.579	436	✓	0.06	34	To Do
Kamke 1806	✗	0	0	✓	3.917	733	To Do
Kamke 1807	✗	0	0	✗	0	0	To Do
Kamke 1808	✓	104.718	155	✓	0.173	72	To Do
Kamke 1809	✗	0	0	✓	1.037	336	To Do
Kamke 1810	✓	0.107	1881	✓	0.17	91	To Do
Kamke 1811	✗	0	0	✗	0	0	To Do
Kamke 1812	✓	0.038	29	✓	0.158	19	To Do
Kamke 1813	✗	0	0	✓	0.638	138	To Do
Kamke 1814	✓	13.103	116	✓	0.262	87	To Do
Kamke 1815	✗	0	0	✓	1.066	71	To Do
Kamke 1816	✗	0	0	✓	2.084	46	To Do
Kamke 1817	✗	0	0	✓	0.334	40	To Do
Kamke 1818	✗	0	0	✓	0.47	66	To Do
Kamke 1819	✗	0	0	✓	0.087	42	To Do
Kamke 1820	✗	0	0	✓	1.229	88	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 1821	✗	0	0	✓	3.211	54	To Do
Kamke 1822	✓	1.25	369	✓	1.581	291	To Do
Kamke 1823	✗	0	0	✓	0.405	289	To Do
Kamke 1824	✓	0.368	347	✓	0.855	96	To Do
Kamke 1825	✗	0	0	✓	0.971	49	To Do
Kamke 1826	✓	0.912	119	✓	2.407	173	To Do
Kamke 1827	✗	0	0	✓	3.801	81	To Do
Kamke 1828	✓	0.01	32	✓	0.811	59	To Do
Kamke 1829	✓	0.007	24	✓	0.43	36	To Do
Kamke 1830	✓	0.029	24	✓	0.634	308	To Do
Kamke 1831	✗	0	0	✓	1.764	163	To Do
Kamke 1832	✗	0	0	✓	1.05	117	To Do
Kamke 1833	✗	0	0	✓	3.744	162	To Do
Kamke 1834	✗	0	0	✓	0.53	92	To Do
Kamke 1835	✓	0.124	131	✗	0	0	To Do
Kamke 1836	✗	0	0	✓	1.397	116	To Do
Kamke 1837	✗	0	0	✓	0.418	95	To Do
Kamke 1838	✗	0	0	✓	0.842	73	To Do
Kamke 1839	✗	0	0	✓	0.921	116	To Do
Kamke 1840	✗	0	0	✓	0.856	129	To Do
Kamke 1841	✗	0	0	✓	0.531	60	To Do
Kamke 1842	✓	0.169	282	✓	0.856	190	To Do
Kamke 1843	✓	2.953	409	✓	0.394	77	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 1844	✗	0	0	✓	0.364	17	To Do
Kamke 1845	✗	0	0	✓	0.281	17	To Do
Kamke 1846	✓	0.052	51	✓	0.018	28	To Do
Kamke 1847	✓	0.124	95	✓	0.282	49	To Do
Kamke 1848	✗	0	0	✓	1.38	789	To Do
Kamke 1849	✓	0.721	415	✓	0.2	197	To Do
Kamke 1850	✗	0	0	✓	1.432	164	To Do
Kamke 1851	✗	0	0	✗	0	0	To Do
Kamke 1852	✓	0.035	28	✓	0.22	28	To Do
Kamke 1853	✗	0	0	✓	0.846	110	To Do
Kamke 1854	✗	0	0	✗	0	0	To Do
Kamke 1855	✗	0	0	✗	0	0	To Do
Kamke 1856	✓	0.005	22	✓	0.067	19	To Do
Kamke 1857	✓	0.187	39	✓	0.052	35	To Do
Kamke 1858	✓	0.08	158	✓	0.056	64	To Do
Kamke 1859	✓	0.006	43	✓	0.037	38	To Do
Kamke 1860	✓	0.049	362	✓	0.079	177	To Do
Kamke 1861	✓	0.013	145	✓	0.12	152	To Do
Kamke 1862	✓	0.118	46	✓	0.036	39	To Do
Kamke 1863	✓	0.007	72	✓	0.036	35	To Do
Kamke 1864	✓	0.014	52	✓	0.038	44	To Do
Kamke 1865	✓	1.307	926	✓	0.193	224	To Do
Kamke 1866	✓	0.036	47	✓	0.033	39	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 1867	✓	0.09	45	✓	0.036	42	To Do
Kamke 1868	✓	0.048	76	✓	0.096	64	To Do
Kamke 1869	✓	0.242	84	✓	0.072	51	To Do
Kamke 1870	✓	0.194	71	✓	0.133	47	To Do
Kamke 1871	✓	0.216	79	✓	0.078	62	To Do
Kamke 1872	✓	0.062	76	✓	0.063	65	To Do
Kamke 1873	✓	0.05	104	✓	0.06	52	To Do
Kamke 1874	✓	0.145	105	✓	0.509	57	To Do
Kamke 1875	✗	0	0	✓	1.018	1361	To Do
Kamke 1876	✓	0.118	41	✓	0.138	18	To Do
Kamke 1877	✓	0.005	31	✓	0.036	31	To Do
Kamke 1878	✓	0.013	39	✓	0.052	39	To Do
Kamke 1879	✓	0.121	58	✓	0.079	54	To Do
Kamke 1880	✗	0	0	✓	0.069	23	To Do
Kamke 1881	✓	0.077	44	✓	0.027	48	To Do
Kamke 1882	✓	0.594	199	✓	0.169	99	To Do
Kamke 1883	✓	0.667	170	✓	0.106	80	To Do
Kamke 1884	✓	0.314	116	✓	0.105	69	To Do
Kamke 1885	✗	0	0	✓	0.338	47	To Do
Kamke 1886	✓	0.021	103	✓	0.06	49	To Do
Kamke 1887	✓	0.551	5647	✓	0.133	360	To Do
Kamke 1888	✓	27.08	20302	✓	0.24	457	To Do
Kamke 1889	✓	0.112	151	✓	0.049	60	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 1890	✗	0	0	✗	0	0	To Do
Kamke 1891	✓	0.572	200	✓	0.054	64	To Do
Kamke 1892	✓	0.408	3522	✓	0.151	463	To Do
Kamke 1893	✗	0	0	✓	1.101	1579	To Do
Kamke 1894	✗	0	0	✓	0.795	1056	To Do
Kamke 1895	✓	0.465	6816	✓	0.226	1008	To Do
Kamke 1896	✓	0.214	246	✓	0.058	67	To Do
Kamke 1897	✓	0.134	118	✓	0.187	86	To Do
Kamke 1898	✓	0.04	246	✓	0.068	71	To Do
Kamke 1899	✓	0.013	93	✓	0.083	52	To Do
Kamke 1900	✓	0.01	88	✓	0.072	50	To Do
Kamke 1901	✓	0.011	93	✓	0.063	43	To Do
Kamke 1902	✓	0.017	109	✓	0.056	51	To Do
Kamke 1903	✓	0.095	736	✓	0.148	299	To Do
Kamke 1904	✓	0.07	1084	✓	0.085	257	To Do
Kamke 1905	✗	0	0	✗	0	0	To Do
Kamke 1906	✓	0.065	177	✓	0.078	120	To Do
Kamke 1907	✓	0.014	157	✓	0.063	66	To Do
Kamke 1908	✓	0.023	551	✓	0.679	1213	To Do
Kamke 1909	✓	0.061	1630	✓	22.842	33085	To Do
Kamke 1910	✓	0.01	39	✓	0.082	37	To Do
Kamke 1911	✗	0	0	✓	0.144	309	To Do
Kamke 1912	✗	0	0	✓	2.47	2956	To Do

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Table 3 – continued from previous page

#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 1913	✓	0.062	52	✓	0.148	57	To Do
Kamke 1914	✓	0.756	198	✓	0.71	92	To Do
Kamke 1915	✗	0	0	✓	9.801	147	To Do
Kamke 1916	✗	0	0	✓	0.599	180	To Do
Kamke 1917	✗	0	0	✓	1.991	109	To Do
Kamke 1918	✗	0	0	✓	2.405	184	To Do
Kamke 1919	✗	0	0	✓	4.011	203	To Do
Kamke 1920	✗	0	0	✓	3.405	205	To Do
Kamke 1921	✗	0	0	✗	0	0	To Do
Kamke 1922	✗	0	0	✗	0	0	To Do
Kamke 1923	✓	0.013	39	✓	0.04	35	To Do
Kamke 1924	✓	0.072	179	✓	0.309	180	To Do
Kamke 1925	✗	0	0	✓	0.312	194	To Do
Kamke 1926	✗	0	0	✓	0.333	96	To Do
Kamke 1927	✗	0	0	✗	0	0	To Do
Kamke 1928	✗	0	0	✗	0	0	To Do
Kamke 1929	✗	0	0	✓	3.803	116	To Do
Kamke 1930	✓	0.052	127	✓	0.046	45	To Do
Kamke 1931	✓	5.539	1461	✓	0.81	1117	To Do
Kamke 1932	✗	0	0	✓	1.076	383	To Do
Kamke 1933	✗	0	0	✓	2.971	17738	To Do
Kamke 1934	✗	0	0	✓	1.372	377	To Do
Kamke 1935	✗	0	0	✓	1.955	741	To Do

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Table 3 – continued from previous page

#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 1936	✗	0	0	✓	0.71	704	To Do
Kamke 1937	✗	0	0	✓	0.789	242	To Do
Kamke 1938	✓	0.01	137	✓	0.127	101	To Do
Kamke 1939	✗	0	0	✓	1.524	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 = 1.01537 (sec), leaf count = 1117

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

✓ **Maple** : cpu = 0.881 (sec), leaf count = 1089

$$\left\{y(x) = 2\frac{\left(-RootOf\left(a4\,\_Z^4 + a3\,\_Z^3 + a2\,\_Z^2 + a\right.\right.}{\left(RootOf\left(a4\,\_Z^4 + a3\,\_Z^3 + a2\,\_Z^2 + a1\,\_Z + a0, index = 4\right) - RootOf\left(a4\,\_Z^4 + a3\,\_Z\right.\right.}\right.$$

Hand solution

$$y' - \frac{1}{\sqrt{a_0 + a_1x + a_2x^2 + a_3x^3 + a_4x^4}} = 0 \tag{1}$$

To Do.

2.2 ODE No. 2

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

✓ **Mathematica** : cpu = 0.0306487 (sec), leaf count = 33

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

✓ **Maple** : cpu = 0.122 (sec), leaf count = 25

$$\left\{y(x) = \left(\frac{c\mathrm{e}^{(a+b)x}}{a+b} + \_C1\right)\mathrm{e}^{-ax}\right\}$$

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}

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

Can be reduced to

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

2.3 ODE No. 3

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

✓ **Mathematica** : cpu = 0.0385958 (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 = 0.194 (sec), leaf count = 37

$$\left\{y(x) = \mathrm{e}^{-ax}\_C1 + \frac{b(\sin(cx)\, a - c\cos(cx))}{a^2 + c^2}\right\}$$

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

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

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 = 0.0091461 (sec), leaf count = 24

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

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

$$\left\{y(x) = \left(\frac{x^2}{2} + \_C1\right)e^{-x^2}\right\}$$

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 = 4.14725 (sec), leaf count = 31

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

✓ **Maple** : cpu = 1.088 (sec), leaf count = 21

$$\left\{y(x) = \mathrm{e}^{-\sin(x)}\left(\int \mathrm{e}^{2\,x+\sin(x)}\,\mathrm{d}x + \_C1\right)\right\}$$

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

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

2.6 ODE No. 6

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

✓ **Mathematica** : cpu = 0.0273222 (sec), leaf count = 18

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

✓ **Maple** : cpu = 0.034 (sec), leaf count = 15

$$\{y(x) = \sin(x) - 1 + \mathrm{e}^{-\sin(x)}\_C1\}$$

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 = 0.0252519 (sec), leaf count = 16

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

✓ **Maple** : cpu = 0.007 (sec), leaf count = 13

$$\left\{y(x) = (x + \_C1)\,\mathrm{e}^{-\sin(x)}\right\}$$

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

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

2.8 ODE No. 8

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

✓ **Mathematica** : cpu = 0.0354856 (sec), leaf count = 15

$$\{\{y(x) \to \cos(x)\left(c_1 - 2\cos(x)\right)\}\}$$

✓ **Maple** : cpu = 0.047 (sec), leaf count = 13

$$\{y(x) = \cos(x)\left(-2\cos(x) + \_C1\right)\}$$

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 = 0.0187447 (sec), leaf count = 17

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

✓ **Maple** : cpu = 0.04 (sec), leaf count = 14

$$\left\{y(x) = \_C1\, e^{x(\sin(\ln(x))+a)}\right\}$$

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 $dx = xdr$, 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 $\int e^r \cos(r)\,dr$, $\int udv = uv - \int vdu$, 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

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

2.10 ODE No. 10

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

✓ **Mathematica** : cpu = 0.00854453 (sec), leaf count = 18

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

✓ **Maple** : cpu = 0.014 (sec), leaf count = 15

$$
\left\{y(x) = f(x) - 1 + \mathrm{e}^{-f(x)}\_C1\right\}
$$

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 = 0.474227 (sec), leaf count = 48

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

✓ **Maple** : cpu = 0.063 (sec), leaf count = 24

$$\left\{y(x) = \left(\int g(x)\,\mathrm{e}^{\int f(x)\,\mathrm{d}x}\,\mathrm{d}x + \_C1\right)\mathrm{e}^{\int -f(x)\,\mathrm{d}x}\right\}$$

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 = 0.0643513 (sec), leaf count = 34

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

✓ **Maple** : cpu = 0.253 (sec), leaf count = 8

$$\{ y(x) = \tanh(x + \_C1) \}$$

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 = 0.0649251 (sec), leaf count = 69

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

✓ **Maple** : cpu = 1.352 (sec), leaf count = 79

$$\left\{y(x) = -i\sqrt[3]{-ia}\left(\text{Ai}^{(1)}\left(-(ax+b)(-ia)^{-\frac{2}{3}}\right)\_C1 + \text{Bi}^{(1)}\left(-(ax+b)(-ia)^{-\frac{2}{3}}\right)\right)\left(\text{Ai}\left(-(ax+b)(-ia)^{-\frac{2}{3}}\right.\right.\right.$$

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 = 0.0288571 (sec), leaf count = 253

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

✓ **Maple** : cpu = 0.338 (sec), leaf count = 187

$$\left\{y(x) = \frac{1}{x}\left(-J_{\frac{3+m}{m+2}}\left(2\,\frac{\sqrt{a}x^{m/2+1}}{m+2}\right)\sqrt{a}x^{\frac{m}{2}+1}\_C1 - Y_{\frac{3+m}{m+2}}\left(2\,\frac{\sqrt{a}x^{m/2+1}}{m+2}\right)\sqrt{a}x^{\frac{m}{2}+1} + \_C1\ J_{(m+2)^{-1}}\left(2\,\frac{\sqrt{a} \cdots}{m \cdots}\right.\right.\right.$$

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

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

So we have new second order ODE

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

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

$$
u=c_1Ai\left(a^{\frac{1}{3}}x\right)+c_2Bi\left(a^{\frac{1}{3}}x\right)
$$

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 $u''-ax^mu=0$ 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 $u''+ax^mu=0$ is

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

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

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

2.15 ODE No. 15

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

✓ **Mathematica** : cpu = 0.0190486 (sec), leaf count = 25

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

✓ **Maple** : cpu = 0.875 (sec), leaf count = 33

$$\left\{ y(x) = \frac{\_C1\ (x^2+1)\, (\mathrm{e}^x)^2 - x^2 + 1}{(\mathrm{e}^x)^2 \_C1 - 1} \right\}$$

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

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

To obtain same solution as Maple, we divide by C_1

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

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

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

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 = 21.3438 (sec), leaf count = 0 , could not solve

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

✓ **Maple** : cpu = 0.256 (sec), leaf count = 49

$$\left\{y(x)=1\mathrm{e}^{\int\frac{-x^2f(x)-2}{x}\,\mathrm{d}x}\left(-\_C1+\int\mathrm{e}^{\int\frac{-x^2f(x)-2}{x}\,\mathrm{d}x}\,\mathrm{d}x\right)^{-1}+x^{-1}\right\}$$

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

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

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 = 0.0240542 (sec), leaf count = 30

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

✓ **Maple** : cpu = 0.164 (sec), leaf count = 24

$$\left\{y(x) = \frac{-4\,e^{5\,x}\_C1 - 1}{-1 + e^{5\,x}\_C1}\right\}$$

Hand solution

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

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 $P(x) = -4, Q(x) = 3, R(x) = 1$. 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 = 0.0253325 (sec), leaf count = 49

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

✓ **Maple** : cpu = 0.11 (sec), leaf count = 39

$$\left\{y(x) = -1 + \frac{1}{\_C1 + \frac{i}{2}\sqrt{\pi}\mathrm{e}^{-2}\sqrt{2}Erf\left(\frac{i}{2}\sqrt{2}\,(x-2)\right)}\mathrm{e}^{\frac{x(x-4)}{2}}\right\}$$

Hand solution

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

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 $P(x) = x - 1, Q(x) = x, R(x) = 1$. 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 = 0.0101595 (sec), leaf count = 30

$$\left\{\left\{y(x) \rightarrow \frac{1}{c_1 e^{2ix} - \frac{i}{2}} - x - i\right\}\right\}$$

✓ **Maple** : cpu = 0.072 (sec), leaf count = 16

$$\{y(x) = -x - \tan(-x + \_C1)\}$$

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 = 0.84548 (sec), leaf count = 48

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

✓ **Maple** : cpu = 0.139 (sec), leaf count = 34

$$\left\{y(x)=x^2+1+1\mathrm{e}^{\frac{x^3}{3}+x}\left(\_C1-\int \mathrm{e}^{\frac{x^3}{3}+x}\,\mathrm{d}x\right)^{-1}\right\}$$

Hand solution

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

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 $P(x)=2x, Q(x)=-\left(x^2+1\right), R(x)=1$. 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

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

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 = 7.9323 (sec), leaf count = 57

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

✓ **Maple** : cpu = 0.201 (sec), leaf count = 25

$$
\left\{y(x) = -\frac{e^{-\cos(x)}}{\_C1 + \int e^{-\cos(x)} dx} + \sin(x)\right\}
$$

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 = 527.418 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 1.539 (sec), leaf count = 128

$$
\left\{ y(x) = 2\,\frac{\sin(2\,x)}{\sqrt{2\,\cos(2\,x) + 2}}\left(\_C1\,(\cos(2\,x) + 1)\,\mathit{HeunCPrime}\left(1, 1/2, -1/2, -1, \frac{7}{8}, 1/2\,\cos(2\,x) + 1/2\right)\right.\right.
$$

Hand solution

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

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 $P(x) = \cos(2x)\,, Q(x) = \sin(2x)\,, R(x) = 1$. 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

$$
\frac{1}{\cos^2 x} e^{-\cos^2 x} u = -\int \frac{e^{-\cos^2 x}}{\cos^2 x} dx + C
$$

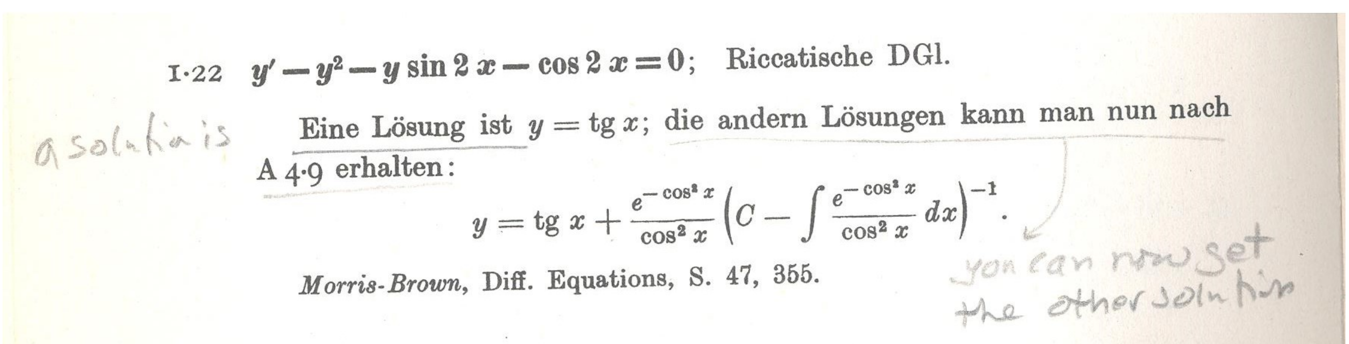
$$
u = \cos^2 x e^{\cos^2 x} \left(C - \int \frac{e^{-\cos^2 x}}{\cos^2 x} dx \right)
$$

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

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

✓ **Mathematica** : cpu = 0.929588 (sec), leaf count = 32

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

✓ **Maple** : cpu = 0.055 (sec), leaf count = 23

$$\left\{y(x)=\frac{1}{a}\tanh\left(\sqrt{ab}(x+\_C1)\right)\sqrt{ab}\right\}$$

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 = 0.0787391 (sec), leaf count = 276

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

✓ **Maple** : cpu = 0.253 (sec), leaf count = 214

$$\left\{y(x) = \frac{1}{ax}\left(-J_{\frac{3+\nu}{\nu+2}}\left(2\frac{\sqrt{-ab}x^{\nu/2+1}}{\nu+2}\right)\sqrt{-ab}x^{\frac{\nu}{2}+1}\_C1 - Y_{\frac{3+\nu}{\nu+2}}\left(2\frac{\sqrt{-ab}x^{\nu/2+1}}{\nu+2}\right)\sqrt{-ab}x^{\frac{\nu}{2}+1} + \_C1\ J_{(\nu+2)^{-}}\right.\right.$$

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 = 3.9508 (sec), leaf count = 516

$$
\left\{\left\{y(x)\to -\frac{x^\nu\left(\sqrt{b}c_1(\nu+1)\sqrt{(\nu+1)^2}U\left(\frac{1}{2}\left(\frac{\sqrt{a}c}{\sqrt{b}\sqrt{(\nu+1)^2}}+\frac{\nu}{\nu+1}\right),\frac{\nu}{\nu+1},\frac{2\sqrt{a}\sqrt{b}x^{\nu+1}}{\sqrt{(\nu+1)^2}}\right)+c_1\left(\sqrt{a}c(\nu+1)+\sqrt{b}\cdots\right.\right.}{\sqrt{a}(\nu+1)^2\left(c_1\cdots\right.}\right.\right.
$$

✓ **Maple** : cpu = 0.473 (sec), leaf count = 348

$$\left\{y(x) = -\frac{1}{2\,ax}\left(\left(\left(-\nu-2\right)b^{\frac{3}{2}}+\sqrt{a}bc\right)M_{-\frac{1}{2\,\nu+2}\left(\left(-2\,\nu-2\right)\sqrt{b}+\sqrt{a}c\right)\frac{1}{\sqrt{b}},\,(2\,\nu+2)^{-1}}\left(2\,\frac{\sqrt{a}\sqrt{b}x^{\nu+1}}{\nu+1}\right)+2\,b^{3/2}\_C1\right.\right.$$

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 = 0.293557 (sec), leaf count = 56

$$\left\{\left\{y(x) \to \frac{ae^{Ab(c_1+x)} - be^{aB(c_1+x)}}{Ae^{Ab(c_1+x)} - Be^{aB(c_1+x)}}\right\}\right\}$$

✓ **Maple** : cpu = 0.1 (sec), leaf count = 45

$$\left\{y(x) = \frac{e^{(x+\_C1)(Ab-aB)}a - b}{Ae^{(x+\_C1)(Ab-aB)} - B}\right\}$$

Hand solution

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

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

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

✓ **Mathematica** : cpu = 2.64591 (sec), leaf count = 88

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

✓ **Maple** : cpu = 0.418 (sec), leaf count = 72

$$\left\{y(x) = 1\left(2\sqrt{a}e^{-1/2\,ax^2} + x\left(\sqrt{\pi}Erf\left(\frac{\sqrt{2}x}{2}\sqrt{a}\right)\sqrt{2}a + 2\,a^{3/2}\_C1\right)\right)\left(\sqrt{\pi}Erf\left(\frac{\sqrt{2}x}{2}\sqrt{a}\right)\sqrt{2}a + 2\,a^3\right.$$

Hand solution

$$y' + ay(y - x) - 1 = 0$$
$$y' = 1 - \left(ay^2 - ayx\right)$$
$$= 1 + ayx - ay^2 \tag{1}$$

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

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

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 = 0.162832 (sec), leaf count = 63

$$\left\{\left\{y(x)\to \frac{2c_1x^2+\sqrt{\pi}x^2\mathrm{erf}\left(\frac{x^2}{2}\right)+2e^{-\frac{x^4}{4}}}{2c_1+\sqrt{\pi}\mathrm{erf}\left(\frac{x^2}{2}\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.387 (sec), leaf count = 51

$$\left\{y(x) = \frac{1}{\sqrt{\pi}}\left(\sqrt{\pi}\mathit{Erf}\left(\frac{x^2}{2}\right)\_C1\, x^2 + x^2\sqrt{\pi} + 2\,\mathrm{e}^{-1/4\,x^4}\_C1\right)\left(\mathit{Erf}\left(\frac{x^2}{2}\right)\_C1 + 1\right)^{-1}\right\}$$

Hand solution

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

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 $y = x^2 - u$

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

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

$$\begin{aligned}
\zeta' &= x^3\zeta + x \\
\zeta' - x^3\zeta &= x
\end{aligned}$$

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

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

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 = 0.0374103 (sec), leaf count = 39

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

✓ **Maple** : cpu = 0.089 (sec), leaf count = 19

$$\left\{y(x) = 3\left(-1+3\,\mathrm{e}^{-3/2\,x^2}\_C1\right)^{-1}\right\}$$

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 = 0.333364 (sec), leaf count = 197

$$\left\{\left\{y(x) \to \frac{x^a\left((-1)^a c_1\sqrt{x}\Gamma(a+1)I_{a-1}(2\sqrt{x}) + (-1)^{a+1}ac_1\Gamma(a+1)I_a(2\sqrt{x}) + (-1)^a c_1\sqrt{x}\Gamma(a+1)I_{a+1}(\right.}{2\left((-1)^a c_1\Gamma(a+1)I_a\left(2\sqrt{x}\right) + \right.}\right.\right.$$

✓ **Maple** : cpu = 0.1 (sec), leaf count = 54

$$\left\{y(x) = x^{a+1}\left(-K_{a+1}(2\sqrt{x})\_C1 + I_{a+1}(2\sqrt{x})\right)\frac{1}{\sqrt{x}}\left(K_a(2\sqrt{x})\_C1 + I_a(2\sqrt{x})\right)^{-1}\right\}$$

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

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

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 $u = \sum_{n=0}^{\infty} c_n x^n$ is used when the expansion point is not singular point. (i.e. $p(x)$ and $q(x)$ are analytic there). Forbenius series $u = x^r \sum_{n=0}^{\infty} c_n x^n$ is used when there is a removable singular point (called also regular singular point), as in this case. Starting with

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

Hence

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

Substituting in (2) gives

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

Dividing out x^r

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

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 $n\geq 1$

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

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 $\frac{1}{\sqrt{x^a}}\operatorname{BesselK}\left(a,2\sqrt{x}\right)$ 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 $u_{r=-a}(x)=\frac{1}{\sqrt{x^a}}\operatorname{BesselK}\left(a,2\sqrt{x}\right)$. Therefore, the solution is

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

But

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

Hence

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

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

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

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

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

Or

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

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 = 0.13142 (sec), leaf count = 21

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

✓ **Maple** : cpu = 0.06 (sec), leaf count = 23

$$\left\{y(x) = \tan\left(\frac{\left(x^{n+1} + (n+1)\_C1\right)a}{n+1}\right)\right\}$$

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 = 0.444756 (sec), leaf count = 26

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

✓ **Maple** : cpu = 0.503 (sec), leaf count = 28

$$\left\{y(x) = \frac{-2\left(\cos\left(x\right)\right)^3 \_C1 - 2}{\left(\left(\cos\left(x\right)\right)^3 \_C1 - 2\right)\cos\left(x\right)}\right\}$$

Hand solution

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

This is Ricatti first order non-linear ODE. $P(x) = 2\frac{\sin x}{\cos^2 x}, Q(x) = 0, R(x) = -\sin\left(x\right)$. 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 = 37.5997 (sec), leaf count = 114

$$\text{Solve}\left[c_1 = \int_1^{y(x)} \left(\frac{1}{(f(x)K[2] + g(x))^2} - \int_1^x -\frac{2(K[2]f'(K[1]) + g'(K[1]))}{(K[2]f(K[1]) + g(K[1]))^3}\, dK[1]\right) dK[2] + \int_1^x \frac{g(K[1])}{f(K[1])}\right.$$

✓ **Maple** : cpu = 0.734 (sec), leaf count = 58

$$\left\{y(x) = \frac{1}{(f(x))^2}\left(-g(x)\,f(x)\int \frac{\frac{\mathrm{d}}{\mathrm{d}x} f(x)}{g(x)\,(f(x))^2}\,\mathrm{d}x - f(x)\,g(x)\,\_C1 - 1\right)\left(\int \frac{\frac{\mathrm{d}}{\mathrm{d}x} f(x)}{g(x)\,(f(x))^2}\,\mathrm{d}x + \_C1\right)\right.$$

Hand solution

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

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

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 = 0.595267 (sec), leaf count = 51

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

✓ **Maple** : cpu = 0.037 (sec), leaf count = 28

$$\left\{y(x) = \frac{\mathrm{e}^{\int -g(x)\,\mathrm{d}x}}{\int \mathrm{e}^{\int -g(x)\,\mathrm{d}x} f(x)\,\mathrm{d}x + \_C1}\right\}$$

Hand solution

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

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

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

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

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

Hence

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

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

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

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 = 0.0579411 (sec), leaf count = 48

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

✓ **Maple** : cpu = 0.08 (sec), leaf count = 35

$$
\left\{y(x) = \tanh\left(\sqrt{a^2-b}\left(\_C1 + \int f(x)\, \mathrm{d}x\right)\right)\sqrt{a^2-b} - a\right\}
$$

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

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

Therefore

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

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 = 0.813793 (sec), leaf count = 171

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

✓ **Maple** : cpu = 0.326 (sec), leaf count = 62

$$\left\{y(x) = 2\frac{a}{a^2x^2 + 2\,RootOf\left(\sqrt[3]{-2\,a^2}\mathrm{Bi}\left(\_Z\right)\_C1\,x + \sqrt[3]{-2\,a^2}x\mathrm{Ai}\left(\_Z\right) + 2\,\mathrm{Bi}^{(1)}\left(\_Z\right)\_C1 + 2\,\mathrm{Ai}^{(1)}\left(\_Z\right.\right.}\right.$$

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 = 1.40865 (sec), leaf count = 73

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

✓ **Maple** : cpu = 0.122 (sec), leaf count = 50

$$\left\{\_C1 + \frac{1}{e^x a} e^{-\frac{\left(e^x a + (y(x))^{-1}\right)^2}{2}} + \frac{\sqrt{\pi}\sqrt{2}}{2} Erf\left(\frac{\left(e^x a + (y(x))^{-1}\right)\sqrt{2}}{2}\right) = 0\right\}$$

2.38 ODE No. 38

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

✓ **Mathematica** : cpu = 0.160829 (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 = 0.068 (sec), leaf count = 34

$$\left\{y(x) = RootOf\left(-\ln(x) + \_C1 + 2\int^{\_Z} \left(2\,a\_a^3 + \_a + 2\,b\right)^{-1} d\_a\right)\frac{1}{\sqrt{x}}\right\}$$

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 = 0.0644793 (sec), leaf count = 54

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

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

$$\left\{x - \int^{y(x)} \left(\_a^3 a3 + \_a^2 a2 + \_a\, a1 + a0\right)^{-1} d\_a + \_C1 = 0\right\}$$

2.40 ODE No. 40

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

✓ **Mathematica** : cpu = 0.498633 (sec), leaf count = 161

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

✓ **Maple** : cpu = 0.078 (sec), leaf count = 48

$$\left\{y(x) = \left(3\,ax^2 + \mathit{RootOf}\left(\sqrt[3]{-3\,a}\text{Bi}(\_Z)\_C1\,x + \sqrt[3]{-3\,a}x\text{Ai}(\_Z) + \text{Bi}^{(1)}(\_Z)\_C1 + \text{Ai}^{(1)}(\_Z)\right)\sqrt[3]{-3}\right.\right.$$

2.41 ODE No. 41

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

✓ **Mathematica** : cpu = 0.182639 (sec), leaf count = 98

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

✓ **Maple** : cpu = 0.44 (sec), leaf count = 103

$$\left\{y(x)=\frac{1}{x}\mathrm{e}^{RootOf\left(2\sqrt{b^2+4a}\,ab\,Artanh\left(\frac{2a\mathrm{e}^{\_Z}+b}{\sqrt{b^2+4a}}\right)-\ln\left(x^2\left(a\mathrm{e}^{2\_Z}+b\mathrm{e}^{\_Z}-1\right)\right)b^2+2\_C1\,b^2+2\_Z\,b^2-4\ln\left(x^2\left(a\mathrm{e}^{2\_Z}+b\mathrm{e}^{\_Z}-1\right)\right)a+8\_C1\right.}\right.$$

2.42 ODE No. 42

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

✓ **Mathematica** : cpu = 1.48843 (sec), leaf count = 136

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

✓ **Maple** : cpu = 0.04 (sec), leaf count = 40

$$\left\{\_C1+Artanh\left(x\sqrt{y(x)}\frac{1}{\sqrt{x(x+2)y(x)+2}}\right)+\frac{1}{2}\sqrt{x(x+2)y(x)+2}\frac{1}{\sqrt{y(x)}}=0\right\}$$

2.43 ODE No. 43

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

✓ **Mathematica** : cpu = 11.2014 (sec), leaf count = 352

$$\text{Solve}\left[c_1 = \frac{\left(3x - a\left(\sqrt{4-\frac{3b}{a^3}}-2\right)\right) J_{\frac{1}{2}\sqrt{4-\frac{3b}{a^3}}}\left(-\frac{1}{2}i\sqrt{\frac{3(b+ax(4a+3x))y(x)-6a}{a^3y(x)}}\right) - ia\sqrt{\frac{3y(x)(ax(4a+3x)+b)-6a}{a^3y(x)}}J_{\frac{1}{2}}(}{\left(a\left(\sqrt{4-\frac{3b}{a^3}}-2\right)-3x\right) Y_{\frac{1}{2}\sqrt{4-\frac{3b}{a^3}}}\left(-\frac{1}{2}i\sqrt{\frac{3(b+ax(4a+3x))y(x)-6a}{a^3y(x)}}\right) + ia\sqrt{\frac{3y(x)(ax(4a+3x)+b)-6a}{a^3y(x)}}Y_{\frac{1}{2}}(}\right.$$

✓ **Maple** : cpu = 2.155 (sec), leaf count = 373

$$\left\{\_C1+1\left(-K_{\frac{1}{2}\sqrt{\frac{4a^3-3b}{a^3}}+1}\left(-\frac{\sqrt{3}}{2}\sqrt{\frac{4y(x)a^2x+3ax^2y(x)+by(x)-2a}{a^3y(x)}}\right)\sqrt{3}\sqrt{\frac{4y(x)a^2x+3ax^2y(x}{a^3y(x)}}\right.\right.$$

2.44 ODE No. 44

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

✓ **Mathematica** : cpu = 0.0186119 (sec), leaf count = 65

$$\left\{\left\{y(x)\to -\frac{1}{\sqrt{c_1e^{2x^2}-\frac{1}{2}a\left(2x^2+1\right)}}\right\},\left\{y(x)\to \frac{1}{\sqrt{c_1e^{2x^2}-\frac{1}{2}a\left(2x^2+1\right)}}\right\}\right\}$$

✓ **Maple** : cpu = 0.029 (sec), leaf count = 53

$$\left\{y(x) = -2\frac{1}{\sqrt{-4ax^2+4e^{2x^2}\_C1-2a}}, y(x) = 2\frac{1}{\sqrt{-4ax^2+4e^{2x^2}\_C1-2a}}\right\}$$

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 = 1.1062 (sec), leaf count = 120

$$\text{Solve}\left[\sqrt[4]{\frac{(bxy(x)-1)^2}{a^2x^4y(x)^2}-1}\left(\frac{(bxy(x)-1)\,{}_2F_1\left(\frac{1}{2},\frac{3}{4};\frac{3}{2};\frac{(bxy(x)-1)^2}{a^2x^4y(x)^2}\right)}{2ax^2y(x)\sqrt[4]{1-\frac{(bxy(x)-1)^2}{a^2x^4y(x)^2}}}+\frac{ax}{b}\right)+c_1=0,y(x)\right]$$

✓ **Maple** : cpu = 0.261 (sec), leaf count = 123

$$\left\{\_C1+1\sqrt[4]{\left(\frac{ax}{b}+\left(\frac{b^2y\left(x\right)}{a}-\frac{b}{ax}\right)^{-1}\right)^2-1}\left(\frac{b^2y(x)}{a}-\frac{b}{ax}\right)^{-1}\frac{1}{\sqrt{\frac{ax}{b}+\left(\frac{b^2y(x)}{a}-\frac{b}{ax}\right)^{-1}}}-\int^{\frac{ax^2y(x)}{bxy(x)-1}}1\sqrt[4]{}\right.$$

2.46 ODE No. 46

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

✓ **Mathematica** : cpu = 0.427373 (sec), leaf count = 254

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

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

$$\left\{y(x)=-1\mathrm{e}^{2\frac{x}{(a-1)x^a}}\frac{}{\sqrt{\_C1-2\frac{1}{1-a}2^{-2\frac{a}{1-a}-2(1-a)^{-1}}\left((1-a)^{-1}\right)^{-\frac{a}{1-a}-(1-a)^{-1}}\left(-\frac{(a-1)(1-a)}{(a+1)(-3+a)}2^{-3+2\frac{a}{1-a}+2(1-}\right.}}\right.$$

2.47 ODE No. 47

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

✗ **Mathematica** : cpu = 35.7433 (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

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

✗ **Mathematica** : cpu = 37.5066 (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 = 29.0333 (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]
```

✗ **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(p
```

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 = 300.125 (sec), leaf count = 0 , timed out

```
$Aborted
```

✗ **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

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

✓ **Mathematica** : cpu = 0.849361 (sec), leaf count = 322

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

✓ **Maple** : cpu = 0.207 (sec), leaf count = 237

$$\left\{y(x)=\frac{1}{9\,a^3+18\,a^2b+18\,ab^2+9\,b^3}\left(2\,(a+2\,b)\,(a+b/2)\,(a-b)\,(f(x)-g(x))\,RootOf\left(-27\int^{\_Z}\frac{}{(2\_}\right.\right.\right.$$

2.52 ODE No. 52

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

✓ **Mathematica** : cpu = 173.836 (sec), leaf count = 109

$$\text{Solve}\left[\int_1^x bK[2]^{\frac{n}{1-n}}\left(\frac{aK[2]^{\frac{n}{n-1}}}{b}\right)^{\frac{1}{n}}dK[2]+c_1=\int_1^{y(x)\left(\frac{ax^{\frac{n}{n-1}}}{b}\right)^{\frac{1}{n}}}\frac{1}{-K[1]\left(\frac{(-1)^n(n-1)^{-n}b^{1-n}}{a}\right)^{\frac{1}{n}}+K[1]^n+1}\right.$$

✓ **Maple** : cpu = 0.264 (sec), leaf count = 61

$$\left\{-\int_{\_b}^{y(x)}1x^{\frac{n}{n-1}}\left(\left(ax(n-1)\_a^n+\_a\right)x^{\frac{n}{n-1}}+b(n-1)\,x\right)^{-1}\mathrm{d}\_a(n-1)+\ln(x)-\_C1=0\right\}$$

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 = 104.142 (sec), leaf count = 95

$$\text{Solve}\left[\frac{f(x)(ag(x)+b)\log(ag(x)+b)\left(f(x)^{-n}(ag(x)+b)^{-n}\right)^{\frac{1}{n}}}{a}+c_1=\int_1^{y(x)\left(f(x)^{-n}(ag(x)+b)^{-n}\right)^{\frac{1}{n}}}\frac{}{-\left(a^n\right)^{\frac{1}{n}}K}\right.$$

✓ **Maple** : cpu = 0.072 (sec), leaf count = 281

$$\left\{y(x)=\frac{(ag(x)+b)f(x)}{a}RootOf\left(-\int^{\_Z}\frac{}{\_a\left(\left(\frac{\mathrm{d}}{\mathrm{d}x}g(x)\right)(ag(x)+b)^{-n}(f(x))^{1-n}\right)^{-n-1}\left(f(x)\frac{\mathrm{d}}{\mathrm{d}x}g(x)\right)^{-}}\right.\right.$$

2.54 ODE No. 54

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

✓ **Mathematica** : cpu = 0.157262 (sec), leaf count = 74

$$\text{Solve}\left[f(x)g(x)\left(a^nf(x)^{-n}\right)^{\frac{1}{n}}+c_1=y(x)\left(a^nf(x)^{-n}\right)^{\frac{1}{n}}\,{}_2F_1\left(1,\frac{1}{n};1+\frac{1}{n};-\left(\left(a^nf(x)^{-n}\right)^{\frac{1}{n}}y(x)\right)^n\right),y(x)\right]$$

✓ **Maple** : cpu = 0.24 (sec), leaf count = 38

$$\left\{\frac{ay(x)}{nf(x)}LerchPhi\left(-\left(\frac{ay(x)}{f(x)}\right)^n,1,n^{-1}\right)-ag(x)+\_C1=0\right\}$$

2.55 ODE No. 55

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

✗ **Mathematica** : cpu = 4.1001 (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 = 2.38726 (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 = 170.178 (sec), leaf count = 263

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[-\frac{2\ 2^{3/4}(1-\#1)\sqrt[4]{1+\frac{i(1-\Re(\#1))}{|\Im(\#1)|}}\left(i|\Im(\#1)|-\Re(\#1)+1\right){}_2F_1\left(\frac{1}{4},\frac{3}{4};\frac{7}{4};\frac{i(\#1^*+}{4|\Im(}\right.}{3\left(\Im(\#1)^2+(1-\Re(\#1))^2\right)}\right.\right.\right.$$

✓ **Maple** : cpu = 0.124 (sec), leaf count = 31

$$\left\{x - \begin{cases} -2\sqrt{-y(x)} & y(x) \le 0 \\ 2\sqrt{y(x)} & 0 < y(x) \end{cases} + \_C1 = 0\right\}$$

2.58 ODE No. 58

$$a\left(-\sqrt{y(x)}\right)-bx+y'(x)=0$$

✓ **Mathematica** : cpu = 0.227216 (sec), leaf count = 114

$$\text{Solve}\left[\frac{a^2\log\left(a^2\left(\sqrt{\frac{a^2y(x)}{b^2x^2}}-\frac{2y(x)}{bx^2}+1\right)\right)+2a^2\log(x)+\frac{2a^3\tanh^{-1}\left(\frac{a^2-4b\sqrt{\frac{a^2y(x)}{b^2x^2}}}{a\sqrt{a^2+8b}}\right)}{\sqrt{a^2+8b}}+2bc_1}{b}=0,y(x)\right]$$

✓ **Maple** : cpu = 0.095 (sec), leaf count = 68

$$\left\{-\frac{1}{2}\ln\left(\sqrt{y(x)}ax+bx^2-2\,y(x)\right)+a\sqrt{y(x)}Artanh\left(1\left(a\sqrt{y(x)}+2\,bx\right)\frac{1}{\sqrt{y(x)\,(a^2+8\,b)}}\right)\frac{1}{\sqrt{y(x)\,(a}}\right.$$

2.59 ODE No. 59

$$a\left(-\sqrt{y(x)^2+1}\right)-b+y'(x)=0$$

✓ **Mathematica** : cpu = 0.188531 (sec), leaf count = 96

$$\left\{\left\{y(x)\to\text{InverseFunction}\left[\frac{\frac{b\tan^{-1}\left(\frac{\#1b}{\sqrt{\#1^2+1}\sqrt{a^2-b^2}}\right)}{\sqrt{a^2-b^2}}-\frac{b\tan^{-1}\left(\frac{\#1a}{\sqrt{a^2-b^2}}\right)}{\sqrt{a^2-b^2}}+\sinh^{-1}(\#1)}{a}\&\right][c_1+x]\right\}\right\}$$

✓ **Maple** : cpu = 0.09 (sec), leaf count = 26

$$\left\{x-\int^{y(x)}\left(a\sqrt{\_a^2+1}+b\right)^{-1}d\_a+\_C1=0\right\}$$

2.60 ODE No. 60

$$y'(x) - \frac{\sqrt{y(x)^2 - 1}}{\sqrt{x^2 - 1}} = 0$$

✓ **Mathematica** : cpu = 0.0574839 (sec), leaf count = 143

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

✓ **Maple** : cpu = 0.021 (sec), leaf count = 29

$$\left\{\ln\left(x + \sqrt{x^2 - 1}\right) - \ln\left(y(x) + \sqrt{(y(x))^2 - 1}\right) + \_C1 = 0\right\}$$

Hand solution

$$y' = \pm\frac{\sqrt{y^2 - 1}}{\sqrt{x^2 - 1}} \tag{1}$$

Separable. For the positive 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

$$\ln\left(y + \sqrt{y^2 - 1}\right) = \ln\left(x + \sqrt{x^2 - 1}\right) + C$$

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 = 0.190405 (sec), leaf count = 75

$$
\left\{\left\{y(x)\to \text{InverseFunction}\left[\frac{1}{2}\#1\sqrt{\#1^2-1}-\frac{1}{2}\log\left(\sqrt{\#1^2-1}+\#1\right)\&\right]\left[c_1+\frac{1}{2}\sqrt{x^2-1}x-\frac{1}{2}\log\left(\sqrt{\right.\right.\right.\right.
$$

✓ **Maple** : cpu = 0.018 (sec), leaf count = 50

$$
\left\{\_C1 + x\sqrt{x^2-1} - \ln\left(x+\sqrt{x^2-1}\right) - y(x)\sqrt{(y(x))^2-1} + \ln\left(y(x)+\sqrt{(y(x))^2-1}\right) = 0\right\}
$$

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 = 3.92514 (sec), leaf count = 36

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

✓ **Maple** : cpu = 0.424 (sec), leaf count = 34

$$\left\{\frac{(y(x))^2}{2} + \arctan\left(y(x)\frac{1}{\sqrt{x^2 - (y(x))^2}}\right) + \frac{x^2}{2} - \_C1 = 0\right\}$$

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

$$
\begin{aligned}
u\left(x^2u\sqrt{1-u^2}+1\right)+xu'\left(x^2u\sqrt{1-u^2}+1\right) &= u-x^2\sqrt{1-u^2}\\
x^2u^2\sqrt{1-u^2}+u+u'\left(x^3u\sqrt{1-u^2}+x\right) &= u-x^2\sqrt{1-u^2}\\
x^2u^2\sqrt{1-u^2}+u'\left(x^3u\sqrt{1-u^2}+x\right) &= -x^2\sqrt{1-u^2}\\
xu^2\sqrt{1-u^2}+u'\left(x^2u\sqrt{1-u^2}+1\right) &= -x\sqrt{1-u^2}\\
xu^2+u'\left(x^2u+\frac{1}{\sqrt{1-u^2}}\right) &= -x\\
x\left(1+u^2\right)+u'\left(x^2u+\frac{1}{\sqrt{1-u^2}}\right) &= 0
\end{aligned}
$$

Hence

$$
x\left(1+u^2\right)dx+\left(x^2u+\frac{1}{\sqrt{1-u^2}}\right)du=0 \tag{2}
$$

Let $M=x(1+u^2)\,,N=\left(x^2u+\frac{1}{\sqrt{1-u^2}}\right)$.

$$
\begin{aligned}
\frac{\partial M}{\partial u} &= 2xu\\
\frac{\partial N}{\partial x} &= 2xu
\end{aligned}
$$

Therefore (2) is exact. Let

$$
x\left(1+u^2\right)dx+\left(x^2u+\frac{1}{\sqrt{1-u^2}}\right)du=dU
$$

Since $dU=\frac{\partial U}{\partial x}dx+\frac{\partial U}{\partial u}du$. Comparing with the above, we see that

$$
\frac{\partial U}{\partial x}=x\left(1+u^2\right) \tag{3}
$$

$$
\frac{\partial U}{\partial u}=x^2u+\frac{1}{\sqrt{1-u^2}} \tag{4}
$$

From (3)

$$
\begin{aligned}
U &= \int x\left(1+u^2\right)dx\\
&= \frac{x^2}{2}\left(1+u^2\right)+f(u)
\end{aligned} \tag{5}
$$

From (4)

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

Therefore

$$
f(u)=\arcsin(u)
$$

From (5) we find

$$
U(x,u)=\frac{x^2}{2}(1+u^2)+\arcsin(u)
$$

Since $dU=0$ then

$$
\begin{aligned}
\frac{x^2}{2}(1+u^2)+\arcsin(u) &= C\\
\frac{x^2}{2}(1+u^2)+\arcsin(u)-C &= 0
\end{aligned}
$$

Since $y=ux$ then the above can be written as

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

Hence

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

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 = 300.918 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 7.432 (sec), leaf count = 35

$$\left\{-2\frac{1}{\sqrt{1+x}} - \int^{y(x)} \frac{1}{\_a^2+1}\left|\_a+\sqrt{\_a+1}\right| d\_a + \_C1 = 0\right\}$$

2.64 ODE No. 64

$$y'(x) - \sqrt{\frac{ay(x)^2+by(x)+c}{ax^2+bx+c}} = 0$$

✓ **Mathematica** : cpu = 0.186715 (sec), leaf count = 90

$$\left\{\left\{y(x) \to \frac{e^{-\sqrt{a}c_1}\left(2\sqrt{a}\left(e^{2\sqrt{a}c_1}-1\right)\sqrt{x(ax+b)+c}+b\left(e^{\sqrt{a}c_1}-1\right)^2+2ax\left(e^{2\sqrt{a}c_1}+1\right)\right)}{4a}\right\}\right\}$$

✓ **Maple** : cpu = 0.105 (sec), leaf count = 124

$$\left\{-1\sqrt{\frac{a\left(y\left(x\right)\right)^2+by\left(x\right)+c}{ax^2+bx+c}}\sqrt{ax^2+bx+c}\ln\left(\frac{1}{2}\left(2\sqrt{ax^2+bx+c}\sqrt{a}+2\,ax+b\right)\frac{1}{\sqrt{a}}\right)\frac{1}{\sqrt{a\left(y\left(x\right)\right)^2+b}}\right.$$

2.65 ODE No. 65

$$y'(x) - \sqrt{\frac{y(x)^3+1}{x^3+1}} = 0$$

✓ **Mathematica** : cpu = 1.60272 (sec), leaf count = 312

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[\frac{i(\#1+1)\sqrt{1+\frac{6i}{\left(\sqrt{3}-3i\right)(\#1+1)}}\sqrt{\frac{2}{3}-\frac{4i}{\left(\sqrt{3}+3i\right)(\#1+1)}}F\left(i\sinh^{-1}\left(\frac{\sqrt{-\frac{6i}{3i+\sqrt{3}}}}{\sqrt{\#1+1}}\right)|\frac{3}{3}\right.}{\sqrt{-\frac{i}{\sqrt{3}+3i}}\sqrt{\#1^2-\#1+1}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.059 (sec), leaf count = 47

$$\left\{\int^{y(x)} \frac{1}{\sqrt{\_a^3+1}} d\_a + \int^x -1\sqrt{\frac{(y(x))^3+1}{\_a^3+1}} \frac{1}{\sqrt{(y(x))^3+1}} d\_a + \_C1 = 0\right\}$$

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 = 300.002 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.16 (sec), leaf count = 40

$$\left\{\int \frac{1}{\sqrt{|x(x-1)(ax-1)|}} \mathrm{d}x - \int^{y(x)} \frac{1}{\sqrt{|\_a(\_a-1)(\_a\,a-1)|}} d\_a + \_C1 = 0\right\}$$

2.67 ODE No. 67

$$y'(x) - \frac{\sqrt{1-y(x)^4}}{\sqrt{1-x^4}} = 0$$

✓ **Mathematica** : cpu = 0.21885 (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 = 0.017 (sec), leaf count = 51

$$\left\{\mathit{EllipticF}(x,i)\sqrt{-x^2+1}\sqrt{x^2+1}\frac{1}{\sqrt{-x^4+1}} - \int^{y(x)} \frac{1}{\sqrt{-\_a^4+1}} d\_a + \_C1 = 0\right\}$$

2.68 ODE No. 68

$$y'(x) - \sqrt{\frac{ay(x)^4 + by(x)^2 + 1}{ax^4 + bx^2 + 1}} = 0$$

✓ **Mathematica** : cpu = 0.910628 (sec), leaf count = 373

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[-\frac{i\sqrt{\frac{2\#1^2a+\sqrt{b^2-4a}+b}{\sqrt{b^2-4a}+b}}\sqrt{\frac{2\#1^2a}{b-\sqrt{b^2-4a}}+1}F\left(i\sinh^{-1}\left(\sqrt{2}\sqrt{\frac{a}{b+\sqrt{b^2-4a}}}\#1\right)|\frac{b+\sqrt{b^2-}}{b-\sqrt{b^2-}}\right.}{\sqrt{2}\sqrt{\frac{a}{\sqrt{b^2-4a}+b}}\sqrt{\#1^4a+\#1^2b+1}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.068 (sec), leaf count = 77

$$\left\{\int^{y(x)}\frac{1}{\sqrt{\_a^4a+\_a^2b+1}}d\_a+\int^{x}-1\sqrt{\frac{a\left(y\left(x\right)\right)^4+b\left(y\left(x\right)\right)^2+1}{\_a^4a+\_a^2b+1}}\frac{1}{\sqrt{a\left(y\left(x\right)\right)^4+b\left(y\left(x\right)\right)^2+1}}d\_a+\_\right.$$

2.69 ODE No. 69

$$y'(x) - \sqrt{(\mathrm{a0} + \mathrm{a1}x + \mathrm{a2}x^2 + \mathrm{a3}x^3 + \mathrm{a4}x^4)(\mathrm{b0} + \mathrm{b1}y(x) + \mathrm{b2}y(x)^2 + \mathrm{b3}y(x)^3 + \mathrm{b4}y(x)^4)} = 0$$

✓ **Mathematica** : cpu = 96.9186 (sec), leaf count = 12750

Too large to show

✓ **Maple** : cpu = 0.213 (sec), leaf count = 111

$$\left\{\int^{y(x)}\frac{1}{\sqrt{\_a^4b4+\_a^3b3+\_a^2b2+\_a\,b1+b0}}d\_a+\int^{x}-1\sqrt{\left(b4\ \left(y\left(x\right)\right)^4+b3\ \left(y\left(x\right)\right)^3+b2\ \left(y\left(x\right)\right)^2\right.}\right.$$

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 = 287.031 (sec), leaf count = 23353

Too large to show

✓ **Maple** : cpu = 0.172 (sec), leaf count = 113

$$\left\{\int^{y(x)} \sqrt{\_a^4 b4 + \_a^3 b3 + \_a^2 b2 + \_a\, b1 + b0}\, d\_a + \int^{x} -\sqrt{\frac{\_a^4 a4 + \_a^3 a3 + \_a^2 a2 + \_a\, a}{b4\ (y(x))^4 + b3\ (y(x))^3 + b2\ (y(x))^2 +}}\right.$$

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 = 4.07203 (sec), leaf count = 2237

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

✓ **Maple** : cpu = 0.135 (sec), leaf count = 113

$$\left\{\int^{y(x)} \frac{1}{\sqrt{\_a^4 b4 + \_a^3 b3 + \_a^2 b2 + \_a\, b1 + b0}}\, d\_a + \int^{x} -1\sqrt{\frac{b4\ (y(x))^4 + b3\ (y(x))^3 + b2\ (y(x))^2}{\_a^4 a4 + \_a^3 a3 + \_a^2 a2 + \_a}}\right.$$

2.72 ODE No. 72

$$y'(x) - \mathrm{R1}\left(x, \sqrt{\mathrm{a0} + \mathrm{a1}x + \mathrm{a2}x^2 + \mathrm{a3}x^3 + \mathrm{a4}x^4}\right) \mathrm{R2}\left(y(x), \sqrt{\mathrm{b0} + \mathrm{b1}y(x) + \mathrm{b2}y(x)^2 + \mathrm{b3}y(x)^3 + \mathrm{b4}y(x)^4}\right.$$

✓ **Mathematica** : cpu = 1.08169 (sec), leaf count = 84

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[\int_1^{\#1} \frac{1}{\mathrm{R2}\left(K[1], \sqrt{\mathrm{b1}K[1] + \mathrm{b2}K[1]^2 + \mathrm{b3}K[1]^3 + \mathrm{b4}K[1]^4 + \mathrm{b0}}\right)} dK[1]\&\right]\right.\right.$$

✓ **Maple** : cpu = 0.013 (sec), leaf count = 64

$$\left\{\int R1\left(x, \sqrt{a4\, x^4 + a3\, x^3 + a2\, x^2 + a1\, x + a0}\right) \mathrm{d}x - \int^{y(x)} \left(R2\left(\_a, \sqrt{\_a^4 b4 + \_a^3 b3 + \_a^2 b2 + \_\right.\right.\right.$$

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 = 1.71927 (sec), leaf count = 733

$$\text{Solve}\left[\frac{3(\mathrm{a0} + y(x)(\mathrm{a1} + y(x)(\mathrm{a2} + \mathrm{a3}y(x))))^{2/3} \left(y(x) - \text{Root}\left[\#1^3\mathrm{a3} + \#1^2\mathrm{a2} + \#1\mathrm{a1} + \mathrm{a0}\&, 1\right]\right) F_1\left(\frac{5}{3}; \right.}{5\left(\frac{y(x) - \text{Root}\left[\#1^3\mathrm{a3}+\#1^2\mathrm{a2}+\#1\mathrm{a1}+\mathrm{a0}\&,2\right]}{\text{Root}\left[\#1^3\mathrm{a3}+\#1^2\mathrm{a2}+\#1\mathrm{a1}+\mathrm{a0}\&,1\right] - \text{Root}\left[\#1^3\mathrm{a3}+\#1^2\mathrm{a2}+\#\right.}\right.}\right.$$

✓ **Maple** : cpu = 0.365 (sec), leaf count = 91

$$\left\{\int^{y(x)} \left(\_a^3 a3 + \_a^2 a2 + \_a\, a1 + a0\right)^{\frac{2}{3}} d\_a + \int^x -\left(\frac{\_a^3 a3 + \_a^2 a2 + \_a\, a1 + a0}{a3\, \left(y\left(x\right)\right)^3 + a2\, \left(y\left(x\right)\right)^2 + a1\, y\left(x\right) + a0}\right)^{\frac{2}{3}} (a\right.$$

2.74 ODE No. 74

$$y'(x) - f(x)(y(x) - g(x))\sqrt{(y(x) - a)(y(x) - b)} = 0$$

✗ **Mathematica** : cpu = 3.03356 (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
```

✗ **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 = 0.0199862 (sec), leaf count = 18

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

✓ **Maple** : cpu = 0.18 (sec), leaf count = 20

$$\left\{y(x) = -\mathrm{e}^x + \ln\left(-1 + \mathrm{e}^{\mathrm{e}^x + \_C1}\right) - \_C1\right\}$$

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

$$\int \frac{1}{e^{-y}-1}dy = -\left[\ln\left(\frac{e^{-y}-1}{e^{-y}}\right)\right]$$
$$= -\ln(1-e^{y})$$

Back to (1), when we integrate both sides, and since $\int e^x dx = e^x + C$

$$-\ln(1-e^{y}) = e^x + C$$
$$\ln(1-e^{y}) = -e^x + C_1$$

Hence

$$1-e^{y} = \exp(-e^x + C_1)$$
$$e^{y} = 1-\exp(-e^x + C_1)$$

Taking logs

$$y = \ln(1-\exp(-e^x + C_1))$$

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 = 0.119122 (sec), leaf count = 51

$$\left\{\left\{y(x)\to 2\tan^{-1}\left(\frac{(a-b)\tanh\left(\frac{1}{2}\sqrt{a^2-b^2}(x-c_1)\right)}{\sqrt{a^2-b^2}}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.057 (sec), leaf count = 41

$$\left\{y(x) = 2\arctan\left(\frac{\tanh\left(1/2\sqrt{a^2-b^2}(x+\_C1)\right)\sqrt{a^2-b^2}}{a+b}\right)\right\}$$

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

$$\frac{2}{a+b}\int\frac{dt}{\left(1+\frac{t^2(b-a)}{(a+b)}\right)} = \frac{2}{a+b}\int\frac{\sqrt{a+b}}{\sqrt{b-a}}\frac{dz}{(1+z^2)}$$
$$= \frac{2}{a+b}\frac{\sqrt{a+b}}{\sqrt{b-a}}\int\frac{dz}{(1+z^2)}$$
$$= \frac{2}{\sqrt{a+b}}\frac{1}{\sqrt{b-a}}\int\frac{dz}{(1+z^2)}$$
$$= \frac{2}{\sqrt{(a+b)(b-a)}}\int\frac{dz}{(1+z^2)}$$
$$= \frac{2}{\sqrt{b^2-a^2}}\int\frac{dz}{(1+z^2)}$$

Now, $\int\frac{dz}{(1+z^2)} = \arctan(z)$, hence

$$\frac{2}{\sqrt{b^2-a^2}}\int\frac{dz}{(1+z^2)} = \frac{2}{\sqrt{b^2-a^2}}\arctan(z)$$
$$= \frac{2}{\sqrt{b^2-a^2}}\arctan\left(\frac{t\sqrt{b-a}}{\sqrt{a+b}}\right)$$

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 = 0.317917 (sec), leaf count = 58

$$
\left\{\left\{y(x)\to \frac{2\tan^{-1}\left(\frac{(a+b)\tanh\left(\frac{1}{2}\sqrt{a^2-b^2}(x-c_1)\right)}{\sqrt{a^2-b^2}}\right)-bx}{a}\right\}\right\}
$$

✓ **Maple** : cpu = 0.08 (sec), leaf count = 54

$$\left\{y(x)=\frac{1}{a}\left(-bx+2\,\arctan\left(\frac{\tanh\left(1/2\sqrt{a^2-b^2}(x-\_C1)\right)\sqrt{a^2-b^2}}{a-b}\right)\right)\right\}$$

Hand solution

$$y'=\cos\left(ay+bx\right)$$

This is separable after transformation of $u=ay+bx$, hence $u'=ay'+b$ or $y'=\frac{1}{a}(u'-b)$. Therefore the above becomes

$$\begin{aligned}\frac{1}{a}(u'-b)&=\cos\left(u\right)\\ u'&=a\cos u+b\\ \frac{du}{a\cos u+b}&=dx\end{aligned}$$

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 = 0.895857 (sec), leaf count = 86

$$\left\{\left\{y(x)\to \frac{2\tan^{-1}\left(\frac{\sqrt{(\beta-\alpha b)^2-a^2\alpha^2}\tan\left(\frac{1}{2}(c_1-x)\sqrt{(\beta-\alpha b)^2-a^2\alpha^2}\right)-a\alpha}{\alpha b-\beta}\right)-\beta x}{\alpha}\right\}\right\}$$

✓ **Maple** : cpu = 2.156 (sec), leaf count = 89

$$\left\{y(x)=\frac{1}{\alpha}\left(-\beta\,x+2\,\arctan\left(\frac{-\tan\left(1/2\,\sqrt{(-a^2+b^2)\,\alpha^2-2\,\alpha\,b\beta+\beta^2}(x-\_C1)\right)\sqrt{(-a^2+b^2)\,\alpha^2-}}{b\alpha-\beta}\right.\right.$$

Hand solution

$$y'=-a\sin(\alpha y+\beta x)-b$$

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

$$\begin{aligned}\frac{1}{\alpha}(u'-\beta)&=-a\sin(u)-b\\ u'&=-\alpha(a\sin(u)+b)+\beta\\ \frac{du}{\beta-\alpha(a\sin(u)+b)}&=dx \qquad (1)\end{aligned}$$

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

$$
\begin{aligned}
\int\frac{du}{\beta-\alpha\left(a\sin(u)+b\right)} &= \int\frac{2}{1+t^2}\frac{dt}{\beta-\alpha\left(a\frac{2t}{t^2+1}+b\right)}\\
&= 2\int\frac{dt}{\beta\left(t^2+1\right)-\alpha\left(a2t+b\left(t^2+1\right)\right)}\\
&= 2\int\frac{dt}{t\beta^2+\beta-\left(\alpha a2t+t^2\alpha b+\alpha b\right)}\\
&= 2\int\frac{dt}{\left(\beta-\alpha b\right)\left(\frac{t\beta^2-\alpha a2t-t^2\alpha b}{(\beta-\alpha b)}+1\right)}\\
&= \frac{2}{(\beta-\alpha b)}\int\frac{dt}{\frac{t\beta^2-\alpha a2t-t^2\alpha b}{(\beta-\alpha b)}+1}\\
&= \frac{2}{(\beta-\alpha b)}\frac{-(\alpha b-\beta)}{\sqrt{\alpha^2a^2-\left(\alpha^2b^2+\beta^2-2\alpha b\beta\right)}}\tanh^{-1}\left(\frac{\left(t+\frac{a\alpha}{b\alpha-\beta}\right)(b\alpha-\beta)}{\sqrt{\alpha^2a^2-\left(\alpha^2b^2+\beta^2-2\alpha b\beta\right)}}\right)\\
&= \frac{2}{\sqrt{\alpha^2a^2-\left(\alpha^2b^2+\beta^2-2\alpha b\beta\right)}}\tanh^{-1}\left(\frac{t(b\alpha-\beta)+a\alpha}{\sqrt{\alpha^2a^2-\left(\alpha^2b^2+\beta^2-2\alpha b\beta\right)}}\right)
\end{aligned}
$$

But $t=\tan\left(\frac{u}{2}\right)$ therefore

$$
\int\frac{du}{\beta-\alpha\left(a\sin(u)+b\right)}=\frac{2}{\sqrt{\alpha^2a^2-\left(\alpha^2b^2+\beta^2-2\alpha b\beta\right)}}\tanh^{-1}\left(\frac{\tan\left(\frac{u}{2}\right)(b\alpha-\beta)+a\alpha}{\sqrt{\alpha^2a^2-\left(\alpha^2b^2+\beta^2-2\alpha b\beta\right)}}\right)
$$

But $u=\alpha y+\beta x$, and the above becomes

$$
\int\frac{du}{\beta-\alpha\left(a\sin(u)+b\right)}=\frac{2\tanh^{-1}\left(\frac{\tan\left(\frac{\alpha y+\beta x}{2}\right)(b\alpha-\beta)+a\alpha}{\sqrt{\alpha^2a^2-\left(\alpha^2b^2+\beta^2-2\alpha b\beta\right)}}\right)}{\sqrt{\alpha^2a^2-\left(\alpha^2b^2+\beta^2-2\alpha b\beta\right)}}
$$

Back to (1), therefore after integrating both sides

$$
\frac{2\tanh^{-1}\left(\frac{\tan\left(\frac{\alpha y+\beta x}{2}\right)(b\alpha-\beta)+a\alpha}{\sqrt{\alpha^2a^2-\left(\alpha^2b^2+\beta^2-2\alpha b\beta\right)}}\right)}{\sqrt{\alpha^2a^2-\left(\alpha^2b^2+\beta^2-2\alpha b\beta\right)}}=x+C
$$

Let

$$
A=\sqrt{\alpha^2a^2-\left(\alpha^2b^2+\beta^2-2\alpha b\beta\right)}
$$

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 = 25.358 (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 = 24.0666 (sec), leaf count = 0 , could not solve

```
DSolve[-1 + f[x]*Sin[y[x]] + Cos[y[x]]*(1 - Derivative[1][f][x]) - Derivative[1][f][x
```

✓ **Maple** : cpu = 1.331 (sec), leaf count = 41

$$\left\{ y(x) = 2\arctan\left(\frac{-\mathrm{e}^{\int f(x)\,\mathrm{d}x} + \int \mathrm{e}^{\int f(x)\,\mathrm{d}x}\,\mathrm{d}x f(x) + f(x)\_C1}{\_C1 + \int \mathrm{e}^{\int f(x)\,\mathrm{d}x}\,\mathrm{d}x}\right)\right\}$$

2.81 ODE No. 81

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

✗ **Mathematica** : cpu = 43.5291 (sec), leaf count = 0 , could not solve

```
DSolve[-1 + 2*Tan[x]*Tan[y[x]] + Derivative[1][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 1.237 (sec), leaf count = 78

$$\left\{ \_C1 + \tan(x)\frac{1}{\sqrt[4]{\frac{\left(1+(\tan(y(x)))^2\right)\left(1+(\tan(x))^2\right)}{(\tan(y(x))\tan(x)-1)^2}}} + \frac{\tan(y(x)) + \tan(x)}{2\tan(y(x))\tan(x) - 2}{}_2\mathrm{F}_1(\frac{1}{2}, \frac{5}{4}; \frac{3}{2}; -\frac{(\tan(y(x)) + \tan}{(\tan(y(x))\tan(x}\right.$$

2.82 ODE No. 82

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

✗ **Mathematica** : cpu = 50.567 (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*(1+tan(y(x))^2)+tan(y(x))*tan(x) = 0,y(x))
```

2.83 ODE No. 83

$$y'(x) - \tan(xy(x)) = 0$$

✗ **Mathematica** : cpu = 40.3927 (sec), leaf count = 0 , could not solve

```
DSolve[-Tan[x*y[x]] + Derivative[1][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 0.45 (sec), leaf count = 44

$$\left\{y(x) = -i\mathit{RootOf}\left(\sqrt{2}\_C1 - \mathit{Erf}\left(\frac{(-x+\_Z)\sqrt{2}}{2}\right)\sqrt{\pi} - \sqrt{\pi}\mathit{Erf}\left(\frac{\sqrt{2}(x+\_Z)}{2}\right)\right)\right\}$$

2.84 ODE No. 84

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

✓ **Mathematica** : cpu = 10.9949 (sec), leaf count = 108

$$\text{Solve}\left[c_1 = \int_1^{y(x)}\left(-\int_1^x \frac{ab^2 f'(aK[1]+bK[2])}{(bf(aK[1]+bK[2])+a)^2}\,dK[1] - \frac{b}{bf(bK[2]+ax)+a}\right)dK[2] + \int_1^x \frac{bf(aK}{bf(aK[1]}\right.$$

✓ **Maple** : cpu = 0.138 (sec), leaf count = 37

$$\left\{y(x) = \frac{\mathit{RootOf}\left(\int^{\_Z}(f(\_a\,b)\,b+a)^{-1}\,d\_ab - x + \_C1\right)b - ax}{b}\right\}$$

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 = 199.305 (sec), leaf count = 160

$$\text{Solve}\left[c_1 = \int_1^{y(x)}\left(-\int_1^x \frac{K[1]^{a-1}K[2]^{b-1}f'\left(\frac{K[1]^a}{a}+\frac{K[2]^b}{b}\right)}{\left(f\left(\frac{K[1]^a}{a}+\frac{K[2]^b}{b}\right)+1\right)^2}\,dK[1] - \frac{K[2]^{b-1}}{f\left(\frac{K[2]^b}{b}+\frac{x^a}{a}\right)+1}\right)dK[2] + \int_1^x \frac{K}{\cdot}\right.$$

✓ **Maple** : cpu = 0.507 (sec), leaf count = 153

$$\left\{ y(x) = \sqrt[b]{-\frac{1}{a}\left(-RootOf\left(\int^{\_Z}\left(\left(\sqrt[a]{a}\right)^a f\left(\frac{\left(\sqrt[a]{a}\right)^a b + \left(\sqrt[b]{-b+\_a}\right)^b a}{ab}\right)\left(\sqrt[b]{-b+\_a}\right)^{-b}\_a - \left(\sqrt[a]{a}\right)^a\right.\right.\right.\right.}\right.$$

2.86 ODE No. 86

$$y'(x) - \frac{y(x) - xf(ay(x)^2 + x^2)}{ay(x)f\left(ay(x)^2 + x^2\right) + x} = 0$$

✗ **Mathematica** : cpu = 299.997 (sec), leaf count = 0 , timed out

```
$Aborted
```

✓ **Maple** : cpu = 0.647 (sec), leaf count = 52

$$\left\{ 1 \arctan\left(x\sqrt{a}\frac{1}{\sqrt{a^2\left(y\left(x\right)\right)^2}}\right)\frac{1}{\sqrt{a}} - \frac{1}{2}\int^{\left(y(x)\right)^2 + \frac{x^2}{a}} \frac{f(\_a\, a)}{\_a} d\_a - \_C1 = 0 \right\}$$

2.87 ODE No. 87

$$y'(x) - \frac{cx^a y(x)^b + ay(x)f(x^c y(x))}{bxf\left(x^c y(x)\right) - x^a y(x)^b} = 0$$

✗ **Mathematica** : cpu = 15.5968 (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)) + Derivat
```

✗ **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
```

2.88 ODE No. 88

$$-ce^{-2ax} - 4ay(x) - b + 2y'(x) - 3y(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.310741 (sec), leaf count = 2479

$$\left\{\left\{ y(x) \to \frac{3^{\frac{a+\sqrt{4a^2-3b}}{2a}} 4^{\frac{\sqrt{4a^4-3a^2b}}{a^2}} a^{\frac{\sqrt{4a^4-3a^2b}}{a^2}+1} b^{\frac{a+\sqrt{4a^2-3b}}{2a}} c^{\frac{a+\sqrt{4a^2-3b}}{2a}} J_{\frac{\sqrt{4a^4-3a^2b}}{2a^2}-1}\left(\frac{\sqrt{3}\sqrt{b}\sqrt{c}\sqrt{\frac{e^{-2ax}}{b}}}{2a}\right)\Gamma\left(\frac{\sqrt{4a^4-3a^2b}}{2a^2}\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.267 (sec), leaf count = 256

$$\left\{y(x) = 1\left(-\sqrt{3}\left(Y_{-\frac{1}{2a}\left(\sqrt{4a^2-3b}-2a\right)}\left(\frac{\sqrt{3}\mathrm{e}^{-ax}}{2a}\sqrt{c}\right)\_C1 + J_{-\frac{1}{2a}\left(\sqrt{4a^2-3b}-2a\right)}\left(\frac{\sqrt{3}\mathrm{e}^{-ax}}{2a}\sqrt{c}\right)\right)\mathrm{e}^{-ax}\sqrt{c} -\right.\right.$$

Hand solution

$$y' = \frac{1}{2}b + \frac{1}{2}ce^{-2ax} + 2ay + \frac{3}{2}y^2$$

This is of the form $y' = f_0 + f_1y + f_2y^2$ 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

$$\begin{aligned} \frac{-2}{3}\left(\frac{u''}{u} - \frac{(u')^2}{u^2}\right) &= \frac{1}{2}b + \frac{1}{2}ce^{-2ax} + 2a\left(\frac{-2}{3}\frac{u'}{u}\right) + \frac{3}{2}\left(\frac{-2}{3}\frac{u'}{u}\right)^2 \\ \frac{-2}{3}\frac{u''}{u} + \frac{2}{3}\frac{(u')^2}{u^2} &= \frac{1}{2}b + \frac{1}{2}ce^{-2ax} - \frac{4}{3}a\frac{u'}{u} + \frac{2}{3}\frac{(u')^2}{u^2} \\ \frac{-2}{3}\frac{u''}{u} &= \frac{1}{2}b + \frac{1}{2}ce^{-2ax} - \frac{4}{3}a\frac{u'}{u} \\ \frac{u''}{u} &= -\frac{3}{4}b - \frac{3}{4}ce^{-2ax} + 2a\frac{u'}{u} \\ u'' &= -\left(\frac{3}{4}b + \frac{3}{4}ce^{-2ax}\right)u + 2au' \end{aligned}$$

$$u'' - 2au' + \frac{3}{4}\left(b + ce^{-2ax}\right)u = 0$$

This is second order linear ODE with varying coefficient. Solved using power series method giving solutions using special functions (Bessel functions). Let $A = \frac{\sqrt{4a^2-3b}}{a}$, $B = \frac{\sqrt{3}ce^{-ax}}{a}$ then

$$u(x) = C_1e^{ax}\,\mathrm{BesselJ}\left(-\frac{1}{2}\frac{\sqrt{4a^2-3b}}{a}, \frac{1}{2}\frac{\sqrt{3}ce^{-ax}}{a}\right) + C_2e^{ax}\,\mathrm{BesselY}\left(-\frac{1}{2}\frac{\sqrt{4a^2-3b}}{a}, \frac{1}{2}\frac{\sqrt{3}ce^{-ax}}{a}\right)$$

But

$$u'(x) = C_1\,a\exp(ax)\,\mathrm{BesselJ}\left(-1/2\,\frac{\sqrt{4\,a^2-3\,b}}{a},1/2\,\frac{\sqrt{3}\sqrt{c}\exp(-ax)}{a}\right)$$
$$-1/2\,C_1\exp(ax)\left(-\mathrm{BesselJ}\left(-1/2\,\frac{\sqrt{4\,a^2-3\,b}}{a}+1,1/2\,\frac{\sqrt{3}\sqrt{c}\exp(-ax)}{a}\right)-1/3\,\frac{\sqrt{3}\sqrt{4\,a^2-3\,b}}{\sqrt{c}\exp(-ax)}\,\mathrm{BesselJ}\left(-1/2\,\frac{\sqrt{4\,a^2-}}{a}\right.\right.$$
$$+C_2\,a\exp(ax)\,\mathrm{BesselY}\left(-1/2\,\frac{\sqrt{4\,a^2-3\,b}}{a},1/2\,\frac{\sqrt{3}\sqrt{c}\exp(-ax)}{a}\right)$$
$$-1/2\,C_1\,\exp(ax)\left(-\mathrm{BesselY}\left(-1/2\,\frac{\sqrt{4\,a^2-3\,b}}{a}+1,1/2\,\frac{\sqrt{3}\sqrt{c}\exp(-ax)}{a}\right)-1/3\,\frac{\sqrt{3}\sqrt{4\,a^2-3\,b}}{\sqrt{c}\exp(-ax)}\,\mathrm{BesselY}\left(-1/2\,\frac{\sqrt{4\,a^2-}}{a}\right.\right.$$

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 = 0.0336367 (sec), leaf count = 46

$$\left\{\left\{y(x)\to\sqrt{a^2-x^2}-a\log\left(a\left(\sqrt{a^2-x^2}+a\right)\right)+a\log(x)+c_1\right\}\right\}$$

✓ **Maple** : cpu = 0.022 (sec), leaf count = 56

$$\left\{y(x)=\sqrt{a^2-x^2}-a^2\ln\left(\frac{1}{x}\left(2\,a^2+2\,\sqrt{a^2}\sqrt{a^2-x^2}\right)\right)\frac{1}{\sqrt{a^2}}+\_C1\right\}$$

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 = 0.0163707 (sec), leaf count = 19

$$\left\{\left\{y(x) \to \frac{c_1 + \sin(x) - x\cos(x)}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.019 (sec), leaf count = 17

$$\left\{y(x) = \frac{\sin(x) - \cos(x)\,x + \_C1}{x}\right\}$$

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. $\int udv = uv - \int vdu$. 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

$$xy = -x\cos x + \sin x + C$$
$$y = \frac{\sin x}{x} - \cos x + \frac{C}{x}$$

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 = 0.00691997 (sec), leaf count = 13

$$\{\{y(x) \to x(c_1 + \log(\log(x)))\}\}$$

✓ **Maple** : cpu = 0.008 (sec), leaf count = 11

$$\{y(x) = (\ln(\ln(x)) + \_C1)\, x\}$$

2.92 ODE No. 92

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

✓ **Mathematica** : cpu = 0.0132669 (sec), leaf count = 14

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

✓ **Maple** : cpu = 0.007 (sec), leaf count = 12

$$\{y(x) = x(\_C1 - \cos(x))\}$$

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 = 0.0196656 (sec), leaf count = 14

$$\{\{y(x) \to x(c_1 + \sin(\log(\log(x))))\}\}$$

✓ **Maple** : cpu = 0.019 (sec), leaf count = 12

$$\{y(x) = x(\sin(\ln(\ln(x))) + \_C1)\}$$

2.94 ODE No. 94

$$ay(x) + bx^n + xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.0164309 (sec), leaf count = 25

$$\left\{\left\{y(x) \to c_1 x^{-a} - \frac{bx^n}{a+n}\right\}\right\}$$

✓ **Maple** : cpu = 0.01 (sec), leaf count = 23

$$\left\{y(x) = -\frac{bx^n}{n+a} + x^{-a}\_C1\right\}$$

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

$$\begin{aligned} x^a y &= -\frac{bx^{a+n}}{a+n} + C \\ y &= -b\frac{x^n}{a+n} + Cx^{-a} \end{aligned}$$

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 = 0.015068 (sec), leaf count = 30

$$\left\{\left\{y(x) \to -\frac{x(c_1 J_1(x) + Y_1(x))}{c_1 J_0(x) + Y_0(x)}\right\}\right\}$$

✓ **Maple** : cpu = 0.09 (sec), leaf count = 27

$$\left\{y(x) = -\frac{(\_C1\, Y_1(x) + J_1(x))\, x}{\_C1\, Y_0(x) + J_0(x)}\right\}$$

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 = 0.0240762 (sec), leaf count = 33

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

✓ **Maple** : cpu = 0.073 (sec), leaf count = 11

$$\{y(x) = -\tanh(\ln(x) + \_C1)\}$$

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

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

✓ **Mathematica** : cpu = 0.0269011 (sec), leaf count = 36

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

✓ **Maple** : cpu = 0.049 (sec), leaf count = 25

$$\left\{y(x) = -\frac{x}{a}\tan\left(\sqrt{ab}(x + \_C1)\right)\sqrt{ab}\right\}$$

Hand solution

$$ay^2 + bx^2 + xy' - y = 0$$

This is Riccati first order non-linear. Let $y = ux$, hence the above becomes

$$\begin{aligned} au^2x^2 + bx^2 + x(u'x + u) - ux &= 0 \\ au^2x + bx + u'x &= 0 \\ au^2 + b + u' &= 0 \\ u' &= -au^2 - b \end{aligned}$$

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 = 0.0251789 (sec), leaf count = 123

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

✓ **Maple** : cpu = 0.069 (sec), leaf count = 38

$$
\left\{y(x) = -\frac{1}{x^{-b}}\tan\left(\frac{1}{b}\left(\sqrt{c}x^b\sqrt{a}+\_C1\,b\right)\right)\sqrt{c}\frac{1}{\sqrt{a}}\right\}
$$

2.99 ODE No. 99

$$
ay(x)^2 - by(x) - cx^\beta + xy'(x) = 0
$$

✓ **Mathematica** : cpu = 0.0181882 (sec), leaf count = 243

$$
\left\{\left\{y(x)\to -\frac{\sqrt{-a}\sqrt{c}x^{\beta/2}\left(c_1\left(J_{1-\frac{b}{\beta}}\left(\frac{2\sqrt{-a}\sqrt{c}x^{\beta/2}}{\beta}\right)-J_{-\frac{b+\beta}{\beta}}\left(\frac{2\sqrt{-a}\sqrt{c}x^{\beta/2}}{\beta}\right)\right)-2J_{\frac{b}{\beta}-1}\left(\frac{2\sqrt{-a}\sqrt{c}x^{\beta/2}}{\beta}\right)\right)-bc_1J_{-}}{2a\left(J_{\frac{b}{\beta}}\left(\frac{2\sqrt{-a}\sqrt{c}x^{\beta/2}}{\beta}\right)+c_1J_{-\frac{b}{\beta}}\left(\frac{2\sqrt{-a}\sqrt{c}x^{\beta/2}}{\beta}\right)\right)}\right.\right.
$$

✓ **Maple** : cpu = 0.124 (sec), leaf count = 171

$$\left\{y(x)=\frac{1}{a}\left(-\sqrt{-ac}\left(Y_{\frac{b+\beta}{\beta}}\left(2\,\frac{\sqrt{-ac}x^{\beta/2}}{\beta}\right)\_C1+J_{\frac{b+\beta}{\beta}}\left(2\,\frac{\sqrt{-ac}x^{\beta/2}}{\beta}\right)\right)x^{\frac{\beta}{2}}+b\left(Y_{\frac{b}{\beta}}\left(2\,\frac{\sqrt{-ac}x^{\beta/2}}{\beta}\right)\_C1\right.\right.\right.$$

2.100 ODE No. 100

$$a+xy'(x)+xy(x)^2=0$$

✓ **Mathematica** : cpu = 0.00855797 (sec), leaf count = 133

$$\left\{\left\{y(x)\to\frac{i\sqrt{-a}(c_1-2)\sqrt{x}J_0(2i\sqrt{-a}\sqrt{x})+c_1(J_1(2i\sqrt{-a}\sqrt{x})-i\sqrt{-a}\sqrt{x}J_2(2i\sqrt{-a}\sqrt{x}))}{2(c_1-1)xJ_1(2i\sqrt{-a}\sqrt{x})}\right\}\right\}$$

✓ **Maple** : cpu = 0.084 (sec), leaf count = 59

$$\left\{y(x)=1\sqrt{a}(J_0(2\sqrt{a}\sqrt{x})\_C1+Y_0(2\sqrt{a}\sqrt{x}))\frac{1}{\sqrt{x}}(\_C1\,J_1(2\sqrt{a}\sqrt{x})+Y_1(2\sqrt{a}\sqrt{x}))^{-1}\right\}$$

Hand solution

$$\begin{aligned}xy'+xy^2+a&=0\\y'&=-\frac{a}{x}-y^2\end{aligned}$$

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

$$u=C_1\sqrt{x}\,\mathrm{BesselJ}\left(1,2\sqrt{ax}\right)+C_2\sqrt{x}\,\mathrm{BesselY}\left(1,2\sqrt{ax}\right)$$

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 = 0.00911666 (sec), leaf count = 18

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

✓ **Maple** : cpu = 0.016 (sec), leaf count = 16

$$\left\{y(x) = 2\,\frac{x}{x^2 + 2\_C1}\right\}$$

Hand solution

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

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 = 0.0203004 (sec), leaf count = 30

$$
\left\{\left\{y(x) \to \sqrt{a}x \tanh\left(\frac{1}{2}\sqrt{a}\left(2c_1 + x^2\right)\right)\right\}\right\}
$$

✓ **Maple** : cpu = 0.056 (sec), leaf count = 22

$$
\left\{y(x) = \tanh\left(\frac{x^2 + 2\_C1}{2}\sqrt{a}\right) x\sqrt{a}\right\}
$$

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

$$
\begin{aligned}
x(v+xv')+x(xv)^2-xv-ax^3&=0\\
xv+x^2v'+x^3v^2-xv-ax^3&=0\\
x^2v'+x^3v^2-ax^3&=0\\
v'+xv^2-ax&=0\\
\frac{dv}{dx}&=x\left(a-v^2\right)\\
\frac{dv}{a-v^2}&=xdx
\end{aligned}
$$

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 = 0.135376 (sec), leaf count = 72

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

✓ **Maple** : cpu = 0.084 (sec), leaf count = 29

$$\left\{y(x) = \frac{\sqrt{2}x}{2}\left(\sqrt{2} + 2\tanh\left(1/2\left(x^2 + 2\_C1\right)\sqrt{2}\right)\right)\right\}$$

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 $C = \frac{A}{B}$

$$
\begin{aligned}
y &= -\frac{xe^{\frac{x^2}{2}}\left(C + 1 + \frac{x^2}{2}\right)}{e^{\frac{x^2}{2}}\left(C + \frac{x^2}{2}\right)}\\
&= -\frac{x\left(C + 1 + \frac{x^2}{2}\right)}{C + \frac{x^2}{2}}\\
&= -\frac{x(2C + 2 + x^2)}{2C + x^2}\\
&= -\frac{x(C_1 + 2 + x^2)}{C_1 + x^2}
\end{aligned}
$$

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 = 0.0165643 (sec), leaf count = 43

$$
\left\{\left\{y(x) \to -\sqrt{\frac{b}{a}}\tan\left(ax\sqrt{\frac{b}{a}} - c_1\right) - \frac{1}{ax}\right\}\right\}
$$

✓ **Maple** : cpu = 0.088 (sec), leaf count = 63

$$\left\{y(x) = -\frac{1}{a}\left(-\frac{1}{x}\left(i\sqrt{a}\sqrt{b}x - 1\right) + 1\mathrm{e}^{-2\,ix\sqrt{a}\sqrt{b}}\left(\_C1 - \frac{i}{2}\mathrm{e}^{-2\,ix\sqrt{a}\sqrt{b}}\frac{1}{\sqrt{a}}\frac{1}{\sqrt{b}}\right)^{-1}\right)\right\}$$

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 = 0.176929 (sec), leaf count = 301

$$
\left\{\left\{y(x) \to -\frac{i\left(\sqrt{c}c_1 U\left(\frac{1}{2}\left(b + \frac{i\sqrt{a}d}{\sqrt{c}}\right), b, 2i\sqrt{a}\sqrt{c}x\right) + c_1\left(b\sqrt{c} + i\sqrt{a}d\right) U\left(\frac{1}{2}\left(b + \frac{i\sqrt{a}d}{\sqrt{c}} + 2\right), b+1, 2i\sqrt{a}\sqrt{\right.\right.}{\sqrt{a}\left(c_1 U\left(\frac{1}{2}\left(b + \frac{i\sqrt{a}d}{\sqrt{c}}\right), b, 2i\sqrt{a}\sqrt{c}x\right) + L^{b-1}_{-\frac{b}{2}}\right.}\right.\right.
$$

✓ **Maple** : cpu = 0.333 (sec), leaf count = 844

$$
\left\{y(x) = -4c^2\left(-1/4\_C1\left(a^3c^2d^2 + a^2b^2c^3 - 2(-ac)^{3/2}abcd - 2(-ac)^{5/2}bd\right)U\left(1/2\,\frac{(-ac)^{3/2}d + c(2\right.\right.}{}\right.
$$

2.106 ODE No. 106

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

✓ **Mathematica** : cpu = 0.0423822 (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 = 0.072 (sec), leaf count = 41

$$\left\{y(x)=-1\tan\left(\frac{1}{a+b}\left(2\,x^{a/2+b/2}+\_C1\,(a+b)\right)\right)\left(x^{\frac{a}{2}-\frac{b}{2}}\right)^{-1}\right\}$$

2.107 ODE No. 107

$$ax^\alpha y(x)^2+by(x)-cx^\beta+xy'(x)=0$$

✓ **Mathematica** : cpu = 0.268925 (sec), leaf count = 1286

$$\left\{\left\{y(x)\to \frac{x^{-\alpha}\left((-1)^{\frac{b}{\alpha+\beta}}\sqrt{a}\alpha(\alpha+\beta)^{\frac{2b}{\alpha+\beta}}\sqrt{c}x^{\alpha+\beta}I_{\frac{b+\beta}{\alpha+\beta}}\left(\frac{2\sqrt{a}\sqrt{c}\sqrt{x^{\alpha+\beta}}}{\sqrt{(\alpha+\beta)^2}}\right)c_1\Gamma\left(\frac{b+\beta}{\alpha+\beta}\right)\left((\alpha+\beta)^2\right)^{\frac{\alpha}{\alpha+\beta}}+(-1)^{\frac{b}{\alpha+\beta}}\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.284 (sec), leaf count = 174

$$\left\{y(x)=-\frac{x^{1-\alpha}}{ax}\left(Y_{\frac{b+\beta}{\alpha+\beta}}\left(2\,\frac{\sqrt{-ac}x^{\alpha/2+\beta/2}}{\alpha+\beta}\right)\_C1+J_{\frac{b+\beta}{\alpha+\beta}}\left(2\,\frac{\sqrt{-ac}x^{\alpha/2+\beta/2}}{\alpha+\beta}\right)\right)x^{\frac{\alpha}{2}+\frac{\beta}{2}}\sqrt{-ac}\left(Y_{\frac{b-\alpha}{\alpha+\beta}}\left(2\,\frac{\sqrt{-ac}}{\alpha}\right.\right.\right.$$

2.108 ODE No. 108

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

✓ **Mathematica** : cpu = 0.0113495 (sec), leaf count = 15

$$\left\{\left\{y(x)\to \frac{1}{c_1x+\log(x)+1}\right\}\right\}$$

✓ **Maple** : cpu = 0.04 (sec), leaf count = 13

$$\left\{y(x)=(1+\_C1\,x+\ln(x))^{-1}\right\}$$

Hand solution

$xy' + axy^2 + 2y + bx = 0$This is Riccati non-linear first order. Converting it to standard form

$$xy' - y^2 \ln x + y = 0 \tag{1}$$

$$\begin{aligned} y' &= -\frac{1}{x}y + y^2\frac{\ln x}{x} \\ &= f_0 + f_1 y + f_2 y^2 \end{aligned}$$

This is Bernoulli non-linear first order ODE since $f_0 = 0$. Dividing by y^2 gives

$$\frac{y'}{y^2} = -\frac{1}{x}\frac{1}{y} + \frac{\ln x}{x}$$

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 = 0.0117834 (sec), leaf count = 17

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

✓ **Maple** : cpu = 0.017 (sec), leaf count = 15

$$\left\{y(x) = (2 + \_C1\, x + 2\, \ln(x))^{-1}\right\}$$

Hand solution

$xy' + axy^2 + 2y + bx = 0$This is Riccati non-linear first order. Converting it to standard form

$$\begin{aligned}
xy' - y(2y\ln x - 1) &= 0 \\
xy' &= y(2y\ln x - 1) \\
y' &= -\frac{1}{x}y + y^2\frac{2}{x}\ln x \qquad (1)\\
y' &= f_0 + f_1 y + f_2 y^2
\end{aligned}$$

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

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

Integrating

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

Therefore

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

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 = 17.1362 (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

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

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

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

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 = 0.486581 (sec), leaf count = 55

$$\text{Solve}\left[-3x = \frac{2e^{\frac{1}{2}\left(\frac{1}{y(x)}-3x\right)^2}}{2c_1 + \sqrt{2\pi}\text{erfi}\left(\frac{\frac{1}{y(x)}-3x}{\sqrt{2}}\right)}, y(x)\right]$$

✓ **Maple** : cpu = 0.173 (sec), leaf count = 54

$$\left\{\_C1 - \frac{\frac{i}{3}}{x}e^{\frac{(3xy(x)-1)^2}{2(y(x))^2}} + \frac{\sqrt{\pi}\sqrt{2}}{2}Erf\left(\frac{(-i+3iy(x)x)\sqrt{2}}{2y(x)}\right) = 0\right\}$$

2.112 ODE No. 112

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

✓ **Mathematica** : cpu = 0.0218069 (sec), leaf count = 13

$$\{\{y(x)\to x\sinh(c_1+\log(x))\}\}$$

✓ **Maple** : cpu = 0.06 (sec), leaf count = 27

$$\left\{\frac{1}{x^2}\sqrt{(y(x))^2+x^2}+\frac{y(x)}{x^2}-\_C1=0\right\}$$

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

$$xy'=\sqrt{x^2+y^2}+y$$

Let $y=xv$, then $y'=v+xv'$ and the above becomes

$$\begin{aligned}
x(v+xv') &= \sqrt{x^2+(xv)^2}+xv\\
x(v+xv') &= x\sqrt{1+v^2}+xv\\
(v+xv') &= \sqrt{1+v^2}+v\\
xv' &= \sqrt{1+v^2}
\end{aligned}$$

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 = 0.023155 (sec), leaf count = 16

$$\{\{y(x)\to x\sinh\left(c_1-a\log(x)\right)\}\}$$

✓ **Maple** : cpu = 0.032 (sec), leaf count = 33

$$\left\{\frac{x^a}{x}\sqrt{\left(y\left(x\right)\right)^2+x^2}+\frac{x^a y(x)}{x}-\_C1=0\right\}$$

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 = 0.0207996 (sec), leaf count = 12

$$
\{\{y(x) \to x\sinh(c_1 + x)\}\}
$$

✓ **Maple** : cpu = 2.618 (sec), leaf count = 28

$$
\left\{\ln\left(\sqrt{(y(x))^2 + x^2} + y(x)\right) - x - \ln(x) - \_C1 = 0\right\}
$$

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 = 0.141582 (sec), leaf count = 81

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

✓ **Maple** : cpu = 0.243 (sec), leaf count = 49

$$\left\{\ln\left(2\,\frac{\left(\sqrt{2\,(y(x))^2+2\,x^2}+y(x)+x\right)x}{y(x)-x}\right)+\frac{\sqrt{2}x^2}{2}-\ln(x)-\_C1=0\right\}$$

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 $\frac{y}{x}=z$

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

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 = 0.563498 (sec), leaf count = 142

$$\text{Solve}\left[\frac{2\sqrt{\frac{y(x)+x}{2x-y(x)}}\sqrt{\frac{y(x)+2x}{2x-y(x)}}\left(\frac{y(x)}{x}-2\right)^{3/2}\sqrt{\frac{1}{\frac{y(x)}{x}-2}+1}F\left(\sin^{-1}\left(\sqrt{\frac{x+y(x)}{4x-2y(x)}}\right)\middle|-8\right)}{\sqrt{\frac{y(x)+x}{x}}\sqrt{\frac{y(x)}{x}-1}\sqrt{\frac{y(x)}{x}+2}} = c_1 + \frac{x^2}{2}, y(x)\right]$$

✓ **Maple** : cpu = 0.263 (sec), leaf count = 86

$$\left\{\int_{\_b}^{x} 1\left(\_a\sqrt{4\_a^4 - 5\_a^2\left(y\left(x\right)\right)^2 + \left(y\left(x\right)\right)^4} + y(x)\right)\frac{1}{\sqrt{4\_a^4 - 5\_a^2\left(y\left(x\right)\right)^2 + \left(y\left(x\right)\right)^4}}\,\mathrm{d}\_a + \int^{y(x)}\right.$$

2.117 ODE No. 117

$$xy'(x) + x\left(-e^{\frac{y(x)}{x}}\right) - y(x) - x = 0$$

✓ **Mathematica** : cpu = 0.0277913 (sec), leaf count = 21

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

✓ **Maple** : cpu = 0.131 (sec), leaf count = 20

$$\left\{y(x) = \left(\ln\left(-\frac{x}{-1 + x\mathrm{e}^{\_C1}}\right) + \_C1\right)x\right\}$$

2.118 ODE No. 118

$$xy'(x) - y(x)\log(y(x)) = 0$$

✓ **Mathematica** : cpu = 0.0116429 (sec), leaf count = 13

$$\{\{y(x) \to e^{e^{c_1}x}\}\}$$

✓ **Maple** : cpu = 0.066 (sec), leaf count = 8

$$\{y(x) = \mathrm{e}^{\_C1\,x}\}$$

2.119 ODE No. 119

$$xy'(x) - y(x)(\log(xy(x)) - 1) = 0$$

✓ **Mathematica** : cpu = 0.0307217 (sec), leaf count = 17

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

✓ **Maple** : cpu = 0.075 (sec), leaf count = 14

$$\left\{y(x) = \frac{1}{x}\mathrm{e}^{\frac{x}{\_C1}}\right\}$$

2.120 ODE No. 120

$$xy'(x) - y(x)\left(x \log\left(\frac{x^2}{y(x)}\right) + 2\right) = 0$$

✓ **Mathematica** : cpu = 0.0550942 (sec), leaf count = 20

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

✓ **Maple** : cpu = 0.199 (sec), leaf count = 17

$$\left\{y(x) = x^2 \left(\mathrm{e}^{-\frac{\_C1}{\mathrm{e}^x}}\right)^{-1}\right\}$$

2.121 ODE No. 121

$$xy'(x) - \sin(x - y(x)) = 0$$

✗ **Mathematica** : cpu = 3.15679 (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 = 0.0888442 (sec), leaf count = 19

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

✓ **Maple** : cpu = 0.425 (sec), leaf count = 16

$$\left\{y(x) = \arctan\left(\frac{x^3 + 2\_C1}{x}\right)\right\}$$

2.123 ODE No. 123

$$xy'(x) - y(x) - x \sin\left(\frac{y(x)}{x}\right) = 0$$

✓ **Mathematica** : cpu = 0.0655887 (sec), leaf count = 19

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

✓ **Maple** : cpu = 0.089 (sec), leaf count = 44

$$\left\{y(x) = \arctan\left(2\,\frac{\_C1\,x}{\_C1^2x^2+1}, \frac{-\_C1^2x^2+1}{\_C1^2x^2+1}\right)x\right\}$$

2.124 ODE No. 124

$$xy'(x) - y(x) + x \cos\left(\frac{y(x)}{x}\right) + x = 0$$

✓ **Mathematica** : cpu = 0.0310135 (sec), leaf count = 16

$$\left\{\left\{y(x) \to 2x \tan^{-1}\left(c_1 - \log(x)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.037 (sec), leaf count = 12

$$\{y(x) = -2\arctan\left(\ln(x) + \_C1\right)x\}$$

2.125 ODE No. 125

$$xy'(x) - y(x) + x \tan\left(\frac{y(x)}{x}\right) = 0$$

✓ **Mathematica** : cpu = 0.0402569 (sec), leaf count = 16

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

✓ **Maple** : cpu = 0.075 (sec), leaf count = 14

$$\left\{y(x) = \arcsin\left(\frac{1}{\_C1\,x}\right)x\right\}$$

2.126 ODE No. 126

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

✓ **Mathematica** : cpu = 19.679 (sec), leaf count = 84

$$\text{Solve}\left[c_1 = \int_1^{y(x)} \left(-\int_1^x \frac{f'(K[1]K[2])}{(f(K[1]K[2])+1)^2}\,dK[1] - \frac{1}{K[2]f(xK[2])+K[2]}\right) dK[2] + \int_1^x \frac{f(y(x)\ldots}{K[1]f(y(x)K\ldots}\right.$$

✓ **Maple** : cpu = 0.028 (sec), leaf count = 29

$$\left\{y(x) = \frac{1}{x}\mathit{RootOf}\left(-\ln(x) + \_C1 + \int^{\_Z} \frac{1}{\_a\,(1+f(\_a))}d\_a\right)\right\}$$

2.127 ODE No. 127

$$xy'(x) - y(x)f\left(x^a y(x)^b\right) = 0$$

✗ **Mathematica** : cpu = 300.003 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.128 (sec), leaf count = 39

$$\left\{\int_{\_b}^{y(x)} \frac{1}{\left(f\left(x^a\_a^b\right)b+a\right)\_a}\mathrm{d}\_a - \frac{\ln(x)}{b} - \_C1 = 0\right\}$$

2.128 ODE No. 128

$$-f(x)g(x^a y(x)) + ay(x) + xy'(x) = 0$$

✓ **Mathematica** : cpu = 4.36837 (sec), leaf count = 39

$$\text{Solve}\left[\int_1^x K[2]^{a-1}f(K[2])\,dK[2] + c_1 = \int_1^{x^a y(x)} \frac{1}{g(K[1])}\,dK[1], y(x)\right]$$

✓ **Maple** : cpu = 0.305 (sec), leaf count = 33

$$\left\{y(x) = \frac{\mathit{RootOf}\left(-\int f(x)\,x^{a-1}\,\mathrm{d}x + \int^{\_Z}(g(\_a))^{-1}\,d\_a + \_C1\right)}{x^a}\right\}$$

2.129 ODE No. 129

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

✓ **Mathematica** : cpu = 0.0306663 (sec), leaf count = 37

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

✓ **Maple** : cpu = 0.036 (sec), leaf count = 33

$$\left\{y(x)=\frac{e^{x}}{-e^{-1}\left(1+x\right)Ei\left(1,-1-x\right)-e^{x}+\_C1\ \left(1+x\right)}\right\}$$

2.130 ODE No. 130

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

✓ **Mathematica** : cpu = 0.00695549 (sec), leaf count = 21

$$\left\{\left\{y(x)\to c_1\sqrt{x}+\frac{2x^3}{5}\right\}\right\}$$

✓ **Maple** : cpu = 0.011 (sec), leaf count = 15

$$\left\{y(x)=\frac{2\,x^3}{5}+\sqrt{x}\_C1\right\}$$

2.131 ODE No. 131

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

✓ **Mathematica** : cpu = 0.0181991 (sec), leaf count = 20

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

✓ **Maple** : cpu = 0.22 (sec), leaf count = 31

$$\left\{y(x)=-\ln\left(\frac{2\,x+1}{-1+\left(4\,x+2\right)e^{2\_C1}}\right)-2\_C1\right\}$$

2.132 ODE No. 132

$$3xy'(x) - y(x) - 3xy(x)^4 \log(x) = 0$$

✓ **Mathematica** : cpu = 0.0124451 (sec), leaf count = 115

$$\left\{\left\{y(x) \to \frac{(-2)^{2/3}\sqrt[3]{x}}{\sqrt[3]{4c_1 + 3x^2 - 6x^2\log(x)}}\right\}, \left\{y(x) \to \frac{2^{2/3}\sqrt[3]{x}}{\sqrt[3]{4c_1 + 3x^2 - 6x^2\log(x)}}\right\}, \left\{y(x) \to -\frac{\sqrt[3]{-1}2^{2/}}{\sqrt[3]{4c_1 + 3x^2 -}}\right.\right.$$

✓ **Maple** : cpu = 0.039 (sec), leaf count = 153

$$\left\{y(x) = \frac{1}{6\,x^2\ln(x) - 3\,x^2 - 4\_C1}\sqrt[3]{-4\,x\,(6\,x^2\ln(x) - 3\,x^2 - 4\_C1)^2}, y(x) = \frac{i\sqrt{3} - 1}{12\,x^2\ln(x) - 6\,x^2 - 8\_}\right.$$

2.133 ODE No. 133

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

✓ **Mathematica** : cpu = 0.00723132 (sec), leaf count = 22

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

✓ **Maple** : cpu = 0.012 (sec), leaf count = 16

$$\left\{y(x) = \left(Ei\left(1, x^{-1}\right) + \_C1\right)e^{x^{-1}}\right\}$$

2.134 ODE No. 134

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

✓ **Mathematica** : cpu = 0.011874 (sec), leaf count = 21

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

✓ **Maple** : cpu = 0.01 (sec), leaf count = 17

$$\left\{y(x) = \left(-e^x + \_C1\right)e^{-x^{-1}}\right\}$$

2.135 ODE No. 135

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

✓ **Mathematica** : cpu = 0.00706173 (sec), leaf count = 14

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

✓ **Maple** : cpu = 0.007 (sec), leaf count = 11

$$\left\{y(x) = \_C1\, x \mathrm{e}^{x^{-1}}\right\}$$

2.136 ODE No. 136

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

✓ **Mathematica** : cpu = 0.0135971 (sec), leaf count = 24

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

✓ **Maple** : cpu = 0.022 (sec), leaf count = 18

$$\left\{y(x) = -\frac{x(\ln(x) + \_C1 - 1)}{\ln(x) + \_C1}\right\}$$

2.137 ODE No. 137

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

✓ **Mathematica** : cpu = 0.00894067 (sec), leaf count = 16

$$\left\{\left\{y(x) \to \frac{x}{c_1 - \log(x)}\right\}\right\}$$

✓ **Maple** : cpu = 0.02 (sec), leaf count = 14

$$\left\{y(x) = \frac{x}{-\ln(x) + \_C1}\right\}$$

2.138 ODE No. 138

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

✓ **Mathematica** : cpu = 0.0142969 (sec), leaf count = 13

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

✓ **Maple** : cpu = 0.042 (sec), leaf count = 11

$$\{y(x) = \tan(\ln(x) + \_C1)\, x\}$$

2.139 ODE No. 139

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

✓ **Mathematica** : cpu = 0.133718 (sec), leaf count = 397

$$\left\{\left\{y(x) \to \frac{-\sqrt{a}c_1x^k\Gamma\left(\frac{-2b+k+1}{k}\right) J_{\frac{-2b+k+1}{k}}\left(\frac{2\sqrt{a}\sqrt{x^k}}{k}\right) + \sqrt{a}c_1x^k\Gamma\left(\frac{-2b+k+1}{k}\right) J_{-\frac{2b+k-1}{k}}\left(\frac{2\sqrt{a}\sqrt{x^k}}{k}\right) + c_1\sqrt{x^k}\Gamma\left(\frac{-}{}\right.}{2x\sqrt{x^k}\left(c_1\Gamma\left(\frac{-2}{}\right.\right.}\right.\right.$$

✓ **Maple** : cpu = 0.154 (sec), leaf count = 219

$$\left\{y(x) = \frac{1}{2\,x}\left(-2\,J_{\frac{\sqrt{(-1+2\,b)^2+k}}{k}}\left(2\,\frac{\sqrt{a}x^{k/2}}{k}\right)\sqrt{a}x^{k/2} - 2\,\sqrt{a}x^{k/2}Y_{\frac{\sqrt{(-1+2\,b)^2+k}}{k}}\left(2\,\frac{\sqrt{a}x^{k/2}}{k}\right)\_C1 + 2\left(Y_{\frac{\sqrt{(-1+2}}{k}}\right.\right.\right.$$

2.140 ODE No. 140

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

✓ **Mathematica** : cpu = 0.0101899 (sec), leaf count = 17

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

✓ **Maple** : cpu = 0.067 (sec), leaf count = 20

$$\left\{y(x) = \frac{-2\_C1 + x}{x(-x + \_C1)}\right\}$$

2.141 ODE No. 141

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

✓ **Mathematica** : cpu = 0.0267484 (sec), leaf count = 61

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

✓ **Maple** : cpu = 0.072 (sec), leaf count = 51

$$\left\{y(x) = \frac{1}{2\,x}\left(-\tanh\left(\frac{-\ln(x) + \_C1}{2}\sqrt{a^2 - 2\,a - 4\,b + 1}\right)\sqrt{a^2 - 2\,a - 4\,b + 1} - a + 1\right)\right\}$$

2.142 ODE No. 142

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

✓ **Mathematica** : cpu = 0.118093 (sec), leaf count = 71

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

✓ **Maple** : cpu = 0.103 (sec), leaf count = 52

$$\left\{y(x) = \frac{-(ax - 1)\left(a^2x^2 + 2\right)e^{ax} + \_C1}{\left(\left(a^2x^2 - 2\,ax + 2\right)e^{ax} + \_C1\right)x}\right\}$$

2.143 ODE No. 143

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

✓ **Mathematica** : cpu = 0.00934321 (sec), leaf count = 51

$$\left\{\left\{y(x) \to -\frac{\sqrt{4ab + 1}\left(\frac{2c_1}{x^{\sqrt{4ab+1}} + c_1} - 1\right) - 1}{2ax}\right\}\right\}$$

✓ **Maple** : cpu = 0.063 (sec), leaf count = 41

$$\left\{y(x) = \frac{1}{2\,ax}\left(-\tanh\left(\frac{-\ln(x) + \_C1}{2}\sqrt{4\,ab + 1}\right)\sqrt{4\,ab + 1} + 1\right)\right\}$$

2.144 ODE No. 144

$$x^2\left(ay(x)^2+y'(x)\right)+bx^\alpha+c=0$$

✓ **Mathematica** : cpu = 0.177544 (sec), leaf count = 1588

$$\left\{\left\{y(x)\to\frac{a^{\frac{\sqrt{\alpha^2(1-4ac)}}{\alpha^2}}\alpha^{\frac{2i\sqrt{4ac-1}}{\alpha}+1}(x^\alpha)^{\frac{\sqrt{\alpha^2(1-4ac)}}{\alpha^2}+\frac{1}{2}}J_{-\frac{\sqrt{\alpha^2(1-4ac)}}{\alpha^2}}\left(\frac{2\sqrt{a}\sqrt{b}\sqrt{x^\alpha}}{\alpha}\right)c_1\Gamma\left(1-\frac{\sqrt{1-4ac}}{\alpha}\right)b^{\frac{\sqrt{\alpha^2(1-4ac)}}{\alpha^2}}+a}{}\right.\right.$$

✓ **Maple** : cpu = 0.123 (sec), leaf count = 219

$$\left\{y(x)=\frac{1}{2\,ax}\left(-2\left(Y_{\frac{\sqrt{-4\,ac+1}+\alpha}{\alpha}}\left(2\,\frac{\sqrt{ab}x^{\alpha/2}}{\alpha}\right)\_C1+J_{\frac{\sqrt{-4\,ac+1}+\alpha}{\alpha}}\left(2\,\frac{\sqrt{ab}x^{\alpha/2}}{\alpha}\right)\right)\sqrt{ab}x^{\alpha/2}+(\sqrt{-4\,ac+1}\right.\right.$$

2.145 ODE No. 145

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

✓ **Mathematica** : cpu = 0.695262 (sec), leaf count = 239

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

✓ **Maple** : cpu = 0.125 (sec), leaf count = 117

$$\left\{y(x)=-\left(ax+(-2\,a)^{\frac{2}{3}}\,RootOf\left(\text{Bi}\left(\frac{1}{x}\left(\_Z^2\sqrt[3]{-2\,a}x-1\right)\frac{1}{\sqrt[3]{-2\,a}}\right)\_C1\,\_Z+\_Z\,\text{Ai}\left(\frac{1}{x}\left(\_Z^2\sqrt[3]{-2\,a}x\right.\right.\right.\right.\right.$$

2.146 ODE No. 146

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

✓ **Mathematica** : cpu = 0.94965 (sec), leaf count = 73

$$\text{Solve}\left[-\frac{ia}{x} = \frac{2e^{-\frac{(ay(x)+x)^2}{2x^2y(x)^2}}}{2c_1 - i\sqrt{2\pi}\text{erf}\left(\frac{ay(x)+x}{\sqrt{2}xy(x)}\right)}, y(x)\right]$$

✓ **Maple** : cpu = 0.174 (sec), leaf count = 84

$$\left\{\frac{1}{2}\left(a\sqrt{\pi}\sqrt{2}Erf\left(\frac{\sqrt{2}(ay(x)+x)}{2\,xy\,(x)}\right)e^{\frac{(ay(x)+x)^2}{2\,x^2(y(x))^2}} + 2\,x\right)e^{-\frac{((a-x)y(x)+x)((x+a)y(x)+x)}{2\,x^2(y(x))^2}} + \_C1 = 0\right\}$$

2.147 ODE No. 147

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

✓ **Mathematica** : cpu = 0.946483 (sec), leaf count = 279

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

✓ **Maple** : cpu = 0.477 (sec), leaf count = 178

$$\left\{y(x) = -\sqrt[3]{2}abx\left(\sqrt[3]{2}ab^2 - 2\left(a^2b^2\right)^{2/3} RootOf\left(\text{Bi}\left(-1/2\,\frac{a2^{2/3}x - 2\,\_Z^2\sqrt[3]{a^2b^2}}{\sqrt[3]{a^2b^2}}\right)\_C1\,\_Z + \_Z\,\text{Ai}\left(-\right.\right.\right.\right.$$

2.148 ODE No. 148

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

✓ **Mathematica** : cpu = 0.0136358 (sec), leaf count = 20

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

✓ **Maple** : cpu = 0.011 (sec), leaf count = 16

$$\left\{y(x)=(\mathit{Arcsinh}(x)+\_\mathit{C1})\frac{1}{\sqrt{x^2+1}}\right\}$$

2.149 ODE No. 149

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

✓ **Mathematica** : cpu = 0.0118612 (sec), leaf count = 27

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

✓ **Maple** : cpu = 0.012 (sec), leaf count = 20

$$\left\{y(x)=\frac{x^2}{3}+\frac{1}{3}+\_\mathit{C1}\frac{1}{\sqrt{x^2+1}}\right\}$$

2.150 ODE No. 150

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

✓ **Mathematica** : cpu = 0.00798456 (sec), leaf count = 25

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

✓ **Maple** : cpu = 0.007 (sec), leaf count = 23

$$\left\{y(x)=\frac{2\,x^3+3\_\mathit{C1}}{3\,x^2+3}\right\}$$

2.151 ODE No. 151

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

✓ **Mathematica** : cpu = 0.567877 (sec), leaf count = 161

$$\text{Solve}\left[c_1=\frac{i\left(x\left(\sqrt[4]{\frac{(x^2+1)(y(x)^2+1)}{(xy(x)-1)^2}}\,{}_2F_1\left(\frac{1}{2},\frac{5}{4};\frac{3}{2};-\frac{(x+y(x))^2}{(xy(x)-1)^2}\right)-2\right)+y(x)\left(\sqrt[4]{\frac{(x^2+1)(y(x)^2+1)}{(xy(x)-1)^2}}\,{}_2F_1\left(\frac{1}{2},\frac{5}{4};\frac{3}{2};-\frac{(x+}{(xy(}\right.\right.\right.}{2(xy(x)-1)\sqrt[4]{-\frac{(x^2+1)(y(x)^2+1)}{(xy(x)-1)^2}}}\right.$$

✓ **Maple** : cpu = 0.059 (sec), leaf count = 85

$$\left\{\_C1+x\frac{1}{\sqrt[4]{\left(x^{-1}+x^2\left(\frac{y(x)x^4}{x^2+1}-\frac{x^3}{x^2+1}\right)^{-1}\right)^2+1}}+\frac{y(x)+x}{2\,xy\,(x)-2}{}_2\mathrm{F}_1\left(\frac{1}{2},\frac{5}{4};\frac{3}{2};-\frac{(y(x)+x)^2}{(xy\,(x)-1)^2}\right)=0\right\}$$

2.152 ODE No. 152

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

✓ **Mathematica** : cpu = 0.246745 (sec), leaf count = 39

$$\left\{\left\{y(x)\to\tan^{-1}\left(\frac{-6c_1\sqrt{x^2+1}+x^4+2x^2+1}{3x^2+3}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.905 (sec), leaf count = 25

$$\left\{y(x)=\arctan\left(\frac{1}{3}\left(\left(x^2+1\right)^{\frac{3}{2}}+3\_C1\right)\frac{1}{\sqrt{x^2+1}}\right)\right\}$$

2.153 ODE No. 153

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

✓ **Mathematica** : cpu = 0.0171092 (sec), leaf count = 21

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

✓ **Maple** : cpu = 0.016 (sec), leaf count = 20

$$\left\{y(x) = \sqrt{x-1}\sqrt{1+x}\_C1 + ax\right\}$$

2.154 ODE No. 154

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

✓ **Mathematica** : cpu = 0.0156437 (sec), leaf count = 18

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

✓ **Maple** : cpu = 0.013 (sec), leaf count = 16

$$\left\{y(x) = \frac{\sin(x) + \_C1}{x^2 - 1}\right\}$$

2.155 ODE No. 155

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

✓ **Mathematica** : cpu = 0.0188599 (sec), leaf count = 47

$$\left\{\left\{y(x) \to \frac{2c_1x + x\log(1-x) - x\log(x+1) + 2}{2c_1 + \log(1-x) - \log(x+1)}\right\}\right\}$$

✓ **Maple** : cpu = 0.111 (sec), leaf count = 14

$$\left\{y(x) = x + (\_C1 - Artanh(x))^{-1}\right\}$$

2.156 ODE No. 156

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

✓ **Mathematica** : cpu = 0.0182663 (sec), leaf count = 21

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

✓ **Maple** : cpu = 0.02 (sec), leaf count = 20

$$\left\{y(x)=\left(\sqrt{x-1}\sqrt{1+x}\_C1+x\right)^{-1}\right\}$$

2.157 ODE No. 157

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

✓ **Mathematica** : cpu = 0.0930213 (sec), leaf count = 32

$$\left\{\left\{y(x)\to \frac{c_1P_a(x)+Q_a(x)}{c_1P_{a-1}(x)+Q_{a-1}(x)}\right\}\right\}$$

✓ **Maple** : cpu = 0.276 (sec), leaf count = 231

$$\left\{y(x)=\frac{1}{(4+4x)a}\left(8\_C1\,(1+x)\left((a-1/2)x-a/2+1/2\right)\mathit{HeunC}\left(0,-2a+1,0,0,a^2-a+1/2,2(1\right.\right.\right.$$

2.158 ODE No. 158

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

✓ **Mathematica** : cpu = 0.0366478 (sec), leaf count = 31

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

✓ **Maple** : cpu = 0.022 (sec), leaf count = 22

$$\left\{y(x)=\left(\sqrt{x-1}\sqrt{1+x}\_C1-a\right)^{-1}\right\}$$

2.159 ODE No. 159

$$(x^2 - 1)\, y'(x) - 2xy(x)\log(y(x)) = 0$$

✓ **Mathematica** : cpu = 0.0177953 (sec), leaf count = 17

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

✓ **Maple** : cpu = 0.151 (sec), leaf count = 13

$$\left\{y(x) = e^{\_C1\,(x-1)(1+x)}\right\}$$

2.160 ODE No. 160

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

✓ **Mathematica** : cpu = 0.0207676 (sec), leaf count = 27

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

✓ **Maple** : cpu = 0.036 (sec), leaf count = 21

$$\left\{y(x) = \frac{x-2}{(x+2)\,(\ln(x+2) + \_C1)}\right\}$$

2.161 ODE No. 161

$$(x^2 - 5x + 6)\, y'(x) + x^2 + 3xy(x) - 8y(x) = 0$$

✓ **Mathematica** : cpu = 0.0145644 (sec), leaf count = 34

$$\left\{\left\{y(x) \to \frac{-12c_1 - 3x^4 + 8x^3}{12(x-3)(x-2)^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.016 (sec), leaf count = 27

$$\left\{y(x) = \frac{1}{(x-2)^2\,(x-3)}\left(-\frac{x^4}{4} + \frac{2\,x^3}{3} + \_C1\right)\right\}$$

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 = 0.273015 (sec), leaf count = 99

$$\left\{\left\{y(x)\to \frac{1}{2}\left(\sqrt{-\frac{k^2(a-b)^2}{(k+1)^2}}\tan\left(\frac{(k+1)\sqrt{-\frac{k^2(a-b)^2}{(k+1)^2}}(\log(x-b)-\log(x-a))}{2(a-b)}+c_1\right)+\frac{k(a+b-2x)}{k+1}\right.\right.\right.$$

✓ **Maple** : cpu = 0.201 (sec), leaf count = 58

$$\left\{y(x)=\frac{k\left(\_C1\,(a-x)\,(a-x)^k+(b-x)^k\,(b-x)\right)}{(k+1)\left(\_C1\,\,(a-x)^k+(b-x)^k\right)}\right\}$$

2.163 ODE No. 163

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

✓ **Mathematica** : cpu = 0.0135027 (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 = 0.062 (sec), leaf count = 26

$$\left\{y(x)=i\tan\left(1(\_C1\,\sqrt{x}-2\,ia)\,\frac{1}{\sqrt{x}}\right)\sqrt{x}a\right\}$$

2.164 ODE No. 164

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

✓ **Mathematica** : cpu = 0.0825984 (sec), leaf count = 76

$$\left\{\left\{y(x)\to \frac{4a^2c_1\sqrt{x}+2ac_1x+2a\sqrt{x}e^{\frac{4a}{\sqrt{x}}}-xe^{\frac{4a}{\sqrt{x}}}}{2e^{\frac{4a}{\sqrt{x}}}-4ac_1}\right\}\right\}$$

✓ **Maple** : cpu = 0.222 (sec), leaf count = 102

$$\left\{y(x)=1\left(\left(-2\,x\_C1\,\sqrt{-\frac{a^2}{x}}-x\right)\sin\left(2\,\sqrt{-\frac{a^2}{x}}\right)-x\left(\_C1-2\,\sqrt{-\frac{a^2}{x}}\right)\cos\left(2\,\sqrt{-\frac{a^2}{x}}\right)\right)\left(2\cos\left(\right.\right.\right.$$

2.165 ODE No. 165

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

✓ **Mathematica** : cpu = 0.0172302 (sec), leaf count = 22

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

✓ **Maple** : cpu = 0.027 (sec), leaf count = 17

$$\left\{y(x)=\frac{2\,x^2+\_C1}{x+\_C1}\right\}$$

2.166 ODE No. 166

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

✓ **Mathematica** : cpu = 0.152649 (sec), leaf count = 63

$$\left\{\left\{y(x)\to-\frac{2\left(\pi G_{2,2}^{2,0}\left(x\left|\begin{array}{c}\frac{1}{2},\frac{3}{2}\\0,1\end{array}\right.\right)+c_1(K(x)-E(x))\right)}{\pi G_{2,2}^{2,0}\left(x\left|\begin{array}{c}\frac{1}{2},\frac{3}{2}\\0,0\end{array}\right.\right)+2c_1E(x)}\right\}\right\}$$

✓ **Maple** : cpu = 0.194 (sec), leaf count = 97

$$\left\{y(x)=\frac{x}{2\,x-2}\left(\mathit{LegendreQ}\left(-\frac{1}{2},1,\frac{2-x}{x}\right)\_C1-\mathit{LegendreQ}\left(\frac{1}{2},1,\frac{2-x}{x}\right)\_C1+\mathit{LegendreP}\left(-\frac{1}{2},1\right.\right.\right.$$

2.167 ODE No. 167

$$3x^2y'(x) - x^2 - 3xy(x) - 7y(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.0280684 (sec), leaf count = 29

$$\left\{\left\{y(x) \to \frac{x \tan\left(\frac{1}{3}\sqrt{7}(3c_1 + \log(x))\right)}{\sqrt{7}}\right\}\right\}$$

✓ **Maple** : cpu = 0.042 (sec), leaf count = 20

$$\left\{y(x) = \frac{x\sqrt{7}}{7} \tan\left(\frac{(\ln(x) + \_C1)\sqrt{7}}{3}\right)\right\}$$

2.168 ODE No. 168

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

✓ **Mathematica** : cpu = 0.0958272 (sec), leaf count = 99

$$\left\{\left\{y(x) \to \frac{-2c_1 x P_{-\frac{1}{6}}^{\frac{1}{3}}\left(\frac{x}{2}\right) + 3c_1 P_{\frac{5}{6}}^{\frac{1}{3}}\left(\frac{x}{2}\right) - 2xQ_{-\frac{1}{6}}^{\frac{1}{3}}\left(\frac{x}{2}\right) + 3Q_{\frac{5}{6}}^{\frac{1}{3}}\left(\frac{x}{2}\right)}{c_1 P_{-\frac{1}{6}}^{\frac{1}{3}}\left(\frac{x}{2}\right) + Q_{-\frac{1}{6}}^{\frac{1}{3}}\left(\frac{x}{2}\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.187 (sec), leaf count = 140

$$\left\{y(x) = -3\,(x+2)\left(HeunC\left(0, 4/3, -1/3, 0, \frac{25}{36}, 4\,(x+2)^{-1}\right)\_C1 - 1/3\,(-x/4 - 1/2)^{4/3}\, HeunC\left(0, -\right.\right.\right.$$

2.169 ODE No. 169

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

✓ **Mathematica** : cpu = 2.83931 (sec), leaf count = 110

$$\text{Solve}\left[-\frac{c}{\sqrt{-a(ax+b)^2}} = \frac{2\exp\left(-\frac{(a(ax+b)+cy(x))^2}{2ay(x)^2(ax+b)^2}\right)}{2c_1 - \sqrt{2\pi}\,\text{erfi}\left(\frac{a(ax+b)+cy(x)}{\sqrt{2}y(x)\sqrt{-a(ax+b)^2}}\right)}, y(x)\right]$$

✓ **Maple** : cpu = 0.167 (sec), leaf count = 153

$$\left\{\frac{1}{2}\left(\left(\left(\sqrt{\pi}\sqrt{2}Erf\left(\frac{\sqrt{2}(cy(x)+a(ax+b))}{2\,(ax+b)\,y\,(x)}\frac{1}{\sqrt{a}}\right)\mathrm{e}^{\frac{(cy(x)+a(ax+b))^2}{2\,(y(x))^2(ax+b)^2a}}ac+2\,a^{3/2}(ax+b)\right)\mathrm{e}^{-\frac{((-ax-b+c)y(x)+a(ax+b))((}{2\,(y(x))^2(ax}}\right.\right.\right.$$

2.170 ODE No. 170

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

✓ **Mathematica** : cpu = 0.0219567 (sec), leaf count = 22

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

✓ **Maple** : cpu = 0.02 (sec), leaf count = 23

$$\left\{y(x)=\frac{(\ln(x)-\_C1-1)\,x^2}{\ln(x)-\_C1}\right\}$$

2.171 ODE No. 171

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

✓ **Mathematica** : cpu = 0.0103329 (sec), leaf count = 17

$$\left\{\left\{y(x)\to\frac{x^2}{c_1x+1}\right\}\right\}$$

✓ **Maple** : cpu = 0.016 (sec), leaf count = 15

$$\left\{y(x)=\frac{x^2}{\_C1\,x+1}\right\}$$

2.172 ODE No. 172

$$x^4\left(-y(x)^2\right)+x^3y'(x)+x^2y(x)+20=0$$

✓ **Mathematica** : cpu = 0.0432727 (sec), leaf count = 27

$$\left\{\left\{y(x)\to\frac{4-5c_1x^9}{c_1x^{11}+x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.518 (sec), leaf count = 26

$$\left\{y(x)=\frac{5\,x^9+4\,\_C1}{\left(-x^9+\_C1\right)x^2}\right\}$$

2.173 ODE No. 173

$$x^6\left(-y(x)^2\right)+x^3y'(x)-(2x-3)x^2y(x)+3=0$$

✓ **Mathematica** : cpu = 0.0171684 (sec), leaf count = 25

$$\left\{\left\{y(x)\to\frac{\frac{1}{c_1e^{4x}+\frac{1}{4}}-3}{x^3}\right\}\right\}$$

✓ **Maple** : cpu = 0.052 (sec), leaf count = 27

$$\left\{y(x)=\frac{-3\left(e^x\right)^4\_C1-3}{x^3\left(\left(e^x\right)^4\_C1-3\right)}\right\}$$

2.174 ODE No. 174

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

✓ **Mathematica** : cpu = 0.00736379 (sec), leaf count = 17

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

✓ **Maple** : cpu = 0.004 (sec), leaf count = 13

$$\left\{y(x)=\_C1\frac{1}{\sqrt{x^2+1}}\right\}$$

2.175 ODE No. 175

$$ax^3 + (x^2-1)\,xy'(x) - (2x^2-1)\,y(x) = 0$$

✓ **Mathematica** : cpu = 0.0221378 (sec), leaf count = 23

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

✓ **Maple** : cpu = 0.022 (sec), leaf count = 20

$$\left\{y(x) = x\left(\sqrt{x-1}\sqrt{1+x}\_C1 + a\right)\right\}$$

2.176 ODE No. 176

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

✓ **Mathematica** : cpu = 0.126012 (sec), leaf count = 73

$$\left\{\left\{y(x) \to -\frac{2\left(\pi G_{2,2}^{2,0}\left(x^2\middle|\begin{array}{c}\frac{1}{2},\frac{3}{2}\\0,1\end{array}\right) + c_1(K(x^2) - E(x^2))\right)}{\pi G_{2,2}^{2,0}\left(x^2\middle|\begin{array}{c}\frac{1}{2},\frac{3}{2}\\0,0\end{array}\right) + 2c_1E\left(x^2\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.128 (sec), leaf count = 30

$$\left\{y(x) = \frac{\_C1\ \mathit{EllipticCE}(x) + \mathit{EllipticE}(x) - \mathit{EllipticK}(x)}{\_C1\ \mathit{EllipticCE}\,(x) - \_C1\ \mathit{EllipticCK}\,(x) + \mathit{EllipticE}\,(x)}\right\}$$

2.177 ODE No. 177

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

✓ **Mathematica** : cpu = 0.0169118 (sec), leaf count = 20

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

✓ **Maple** : cpu = 0.028 (sec), leaf count = 17

$$\left\{y(x) = \frac{x^2}{1 + \_C1\ (x-1)}\right\}$$

2.178 ODE No. 178

$$2\left(x^2-1\right)xy'(x)+2\left(x^2-1\right)y(x)^2-\left(3x^2-5\right)y(x)+x^2-3=0$$

✓ **Mathematica** : cpu = 0.0723487 (sec), leaf count = 52

$$\left\{\left\{y(x)\to \frac{\sqrt{x}}{c_1\sqrt{1-x^2}-2\sqrt{1-\frac{1}{x^2}}xF\left(\sin^{-1}\left(\frac{1}{\sqrt{x}}\right)\middle|-1\right)}+1\right\}\right\}$$

✓ **Maple** : cpu = 0.208 (sec), leaf count = 63

$$\left\{y(x)=1-2\,\frac{\sqrt{x}}{\sqrt{x-1}\sqrt{1+x}}\left(\_C1-2\,\frac{EllipticF\left(\sqrt{1+x},1/2\,\sqrt{2}\right)\sqrt{-x}\sqrt{-2\,x+2}\sqrt{2}}{\sqrt{2\,x-2}\sqrt{x}}\right)^{-1}\right\}$$

2.179 ODE No. 179

$$3x\left(x^2-1\right)y'(x)-\left(x^2+1\right)y(x)+xy(x)^2-3x=0$$

✓ **Mathematica** : cpu = 1.65845 (sec), leaf count = 1619

$$\left\{\left\{y(x)\to \frac{e^{-2\int_1^x \text{Root}[125K[1]^8-164K[1]^6+70K[1]^4-20K[1]^2+(1296K[1]^{12}-5184K[1]^{10}+7776K[1]^8-5184K[1]^6+1296K[1]^4)\#1^4+(-}{}\right.\right.$$

✓ **Maple** : cpu = 0.187 (sec), leaf count = 112

$$\left\{y(x)=35\,\frac{1}{\sqrt[3]{x}\left(8\,x^{2/3}{}_2\text{F}_1(5/6,7/6;\,4/3;\,x^2)\_C1+8\,{}_2\text{F}_1(1/2,5/6;\,2/3;\,x^2)\right)}\left(\_C1\left(\frac{8\,x^2}{7}-\frac{16}{35}\right){}_2\text{F}_1(5/\right.\right.$$

2.180 ODE No. 180

$$\left(xy'(x)-y(x)\right)\left(ax^2+bx+c\right)+x^2-y(x)^2=0$$

✓ **Mathematica** : cpu = 0.132389 (sec), leaf count = 104

$$\left\{\left\{y(x)\to -\frac{x\left(\exp\left(\frac{4\tan^{-1}\left(\frac{2ax+b}{\sqrt{4ac-b^2}}\right)}{\sqrt{4ac-b^2}}+2c_1\right)-1\right)}{\exp\left(\frac{4\tan^{-1}\left(\frac{2ax+b}{\sqrt{4ac-b^2}}\right)}{\sqrt{4ac-b^2}}+2c_1\right)+1}\right\}\right\}$$

✓ **Maple** : cpu = 0.097 (sec), leaf count = 58

$$\left\{y(x)=-\tanh\left(1\left(\_C1\sqrt{4\,ac-b^2}+2\,\arctan\left(\frac{2\,ax+b}{\sqrt{4\,ac-b^2}}\right)\right)\frac{1}{\sqrt{4\,ac-b^2}}\right)x\right\}$$

2.181 ODE No. 181

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

✓ **Mathematica** : cpu = 0.0130381 (sec), leaf count = 100

$$\left\{\left\{y(x)\to\frac{(x+i\sqrt{-a}c_1)\cosh\left(\frac{\sqrt{-a}}{x}\right)-(\sqrt{-a}+ic_1x)\sinh\left(\frac{\sqrt{-a}}{x}\right)}{x^2\left(\cosh\left(\frac{\sqrt{-a}}{x}\right)-ic_1\sinh\left(\frac{\sqrt{-a}}{x}\right)\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.084 (sec), leaf count = 28

$$\left\{y(x)=\frac{1}{x^2}\left(-\tan\left(\frac{\_C1\,x-1}{x}\sqrt{a}\right)\sqrt{a}+x\right)\right\}$$

2.182 ODE No. 182

$$\left(x^3-1\right)xy'(x)+x^2-2xy(x)^2+y(x)=0$$

✓ **Mathematica** : cpu = 0.181814 (sec), leaf count = 24

$$\left\{\left\{y(x)\to\frac{x(2c_1x+1)}{2c_1+x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.174 (sec), leaf count = 18

$$\left\{y(x)=\frac{x(x+\_C1)}{\_C1\,x^2+1}\right\}$$

2.183 ODE No. 183

$$\left(2x^4-x\right)y'(x)-2\left(x^3-1\right)y(x)=0$$

✓ **Mathematica** : cpu = 0.0150524 (sec), leaf count = 22

$$\left\{\left\{y(x)\to\frac{c_1x^2}{\sqrt[3]{1-2x^3}}\right\}\right\}$$

✓ **Maple** : cpu = 0.015 (sec), leaf count = 18

$$\left\{y(x)=\_C1\,x^2\frac{1}{\sqrt[3]{2\,x^3-1}}\right\}$$

2.184 ODE No. 184

$$\left(y'(x)+y(x)^2\right)\left(ax^2+bx+c\right)^2+A=0$$

✓ **Mathematica** : cpu = 1.62081 (sec), leaf count = 612

$$\left\{\left\{y(x)\to\frac{b^2c_1\left(-\exp\left(\frac{2\sqrt{4ac-b^2}\sqrt{1-\frac{4A}{b^2-4ac}}\tan^{-1}\left(\frac{2ax+b}{\sqrt{4ac-b^2}}\right)}{\sqrt{b^2-4ac}}\right)\right)+bc_1\sqrt{b^2-4ac}\sqrt{1-\frac{4A}{b^2-4ac}}\exp\left(\frac{2\sqrt{4ac-b^2}\sqrt{}}{}\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.456 (sec), leaf count = 493

$$\left\{y(x)=2\frac{a}{\sqrt{-4\,ac+b^2}\left(2\,ax+b+i\sqrt{4\,ac-b^2}\right)\left(i\sqrt{4\,ac-b^2}-2\,ax-b\right)}\left(\_C1\left(i\sqrt{\frac{-4\,ac+b^2-4\,A}{a^2}}a\right.\right.\right.$$

2.185 ODE No. 185

$$x^7y'(x) + 5x^3y(x)^2 + 2(x^2+1)\,y(x)^3 = 0$$

✓ **Mathematica** : cpu = 0.472041 (sec), leaf count = 106

$$\text{Solve}\left[c_1 = \frac{\frac{i\sqrt[4]{\frac{x^4}{y(x)^2}+\frac{1}{x^2}+\frac{2x}{y(x)}+1}\,(x^3+y(x))\,{}_2F_1\left(\frac{1}{2},\frac{5}{4};\frac{3}{2};-\frac{(x^3+y(x))^2}{x^2y(x)^2}\right)}{2xy(x)}+ix}{\sqrt[4]{-\frac{(x^3+y(x))^2}{x^2y(x)^2}-1}},y(x)\right]$$

✓ **Maple** : cpu = 0.049 (sec), leaf count = 63

$$\left\{\_C1 + x\frac{1}{\sqrt[4]{\left(x^{-1}+\frac{x^2}{y(x)}\right)^2+1}} + \frac{x^3+y(x)}{2\,xy\,(x)}\,{}_2\mathrm{F}_1\left(\frac{1}{2},\frac{5}{4};\,\frac{3}{2};\,-\frac{(x^3+y(x))^2}{x^2\,(y\,(x))^2}\right) = 0\right\}$$

2.186 ODE No. 186

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

✓ **Mathematica** : cpu = 0.0301918 (sec), leaf count = 19

$$\left\{\left\{y(x) \to x^{n-1}\tan\left(c_1 - \log(x)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.051 (sec), leaf count = 17

$$\left\{y(x) = \tan\left(-\ln\left(x\right) + \_C1\right)x^{n-1}\right\}$$

2.187 ODE No. 187

$$-ay(x)^2 - bx^{2n-2} + x^ny'(x) = 0$$

✓ **Mathematica** : cpu = 0.0715414 (sec), leaf count = 154

$$\left\{\left\{y(x) \to \frac{x^{n-1}\left(c_1\left(\sqrt{a}\sqrt{b}\sqrt{\frac{(n-1)^2}{ab}-4}+n-1\right)+\left(-\sqrt{a}\sqrt{b}\sqrt{\frac{(n-1)^2}{ab}-4}+n-1\right)x^{\sqrt{a}\sqrt{b}\sqrt{\frac{(n-1)^2}{ab}-4}}\right)}{2a\left(x^{\sqrt{a}\sqrt{b}\sqrt{\frac{(n-1)^2}{ab}-4}}+c_1\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.103 (sec), leaf count = 60

$$\left\{y(x)=\frac{x^{n-1}}{2\,a}\left(-\sqrt{4\,ab-n^2+2\,n-1}\tan\left(\frac{-\ln(x)+\_C1}{2}\sqrt{4\,ab-n^2+2\,n-1}\right)+n-1\right)\right\}$$

2.188 ODE No. 188

$$-ay(x)^3-bnx^3+x^{2n+1}y'(x)=0$$

✗ **Mathematica** : cpu = 21.103 (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 = 0.032 (sec), leaf count = 32

$$\left\{y(x)=RootOf\left(-\ln(x)+\_C1+\int^{\_Z}(\_a^3a-n\_a+b)^{-1}\,d\_a\right)x^n\right\}$$

2.189 ODE No. 189

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

✓ **Mathematica** : cpu = 107.912 (sec), leaf count = 90

$$\text{Solve}\left[bx^{m+1}\log(x)\left(\frac{ax^{-(m+1)n}}{b}\right)^{\frac{1}{n}}+c_1=\int_1^{y(x)\left(\frac{ax^{-(m+1)n}}{b}\right)^{\frac{1}{n}}}\frac{1}{-K[1]\left(\frac{b^{1-n}(m+1)^n}{a}\right)^{\frac{1}{n}}+K[1]^n+1}dK[1],y\right.$$

✓ **Maple** : cpu = 0.319 (sec), leaf count = 60

$$\left\{\int_{\_b}^{y(x)}-\frac{x^{mn}x^n}{(x^mxb-(m+1)\_a)\,x^nx^{mn}+x^mxa\_a^n}\,\mathrm{d}\_a+\ln(x)-\_C1=0\right\}$$

2.190 ODE No. 190

$$\sqrt{x^2-1}y'(x)-\sqrt{y(x)^2-1}=0$$

✓ **Mathematica** : cpu = 0.0575981 (sec), leaf count = 143

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

✓ **Maple** : cpu = 0.009 (sec), leaf count = 29

$$\left\{\ln\left(x+\sqrt{x^2-1}\right)-\ln\left(y(x)+\sqrt{(y(x))^2-1}\right)+\_C1=0\right\}$$

2.191 ODE No. 191

$$\sqrt{1-x^2}y'(x)-y(x)\sqrt{y(x)^2-1}=0$$

✓ **Mathematica** : cpu = 0.0304302 (sec), leaf count = 48

$$\left\{\left\{y(x)\to -\cot\left(c_1+\sin^{-1}(x)\right)\sqrt{\sec^2\left(c_1+\sin^{-1}(x)\right)}\right\},\left\{y(x)\to \cot\left(c_1+\sin^{-1}(x)\right)\sqrt{\sec^2\left(c_1+\sin^{-1}\right.}\right.$$

✓ **Maple** : cpu = 0.021 (sec), leaf count = 16

$$\left\{\arcsin(x)+\arctan\left(\frac{1}{\sqrt{(y(x))^2-1}}\right)+\_C1=0\right\}$$

2.192 ODE No. 192

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

✗ **Mathematica** : cpu = 299.997 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.018 (sec), leaf count = 36

$$\left\{y(x)=1\left(a^2\ln\left(x+\sqrt{a^2+x^2}\right)+\_C1\right)\left(x+\sqrt{a^2+x^2}\right)^{-1}\right\}$$

2.193 ODE No. 193

$$-ax(\log(x)+1)+x\log(x)y'(x)+y(x)=0$$

✓ **Mathematica** : cpu = 0.00903635 (sec), leaf count = 16

$$\left\{\left\{y(x)\to ax+\frac{c_1}{\log(x)}\right\}\right\}$$

✓ **Maple** : cpu = 0.008 (sec), leaf count = 14

$$\left\{y(x)=ax+\frac{\_C1}{\ln(x)}\right\}$$

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 = 0.0771034 (sec), leaf count = 30

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

✓ **Maple** : cpu = 0.028 (sec), leaf count = 23

$$\left\{y(x)=-\frac{\ln(x)\left((\ln(x))^2+\_C1+2\right)}{(\ln(x))^2+\_C1}\right\}$$

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 = 0.0615259 (sec), leaf count = 24

$$\left\{\left\{y(x)\to\left(\frac{1}{c_1e^{5x}+\frac{1}{5}}-4\right)\csc(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.137 (sec), leaf count = 28

$$\left\{y(x)=\frac{-4\left(e^x\right)^5\_C1-4}{\sin(x)\left(\left(e^x\right)^5\_C1-4\right)}\right\}$$

2.196 ODE No. 196

$$\cos(x)y'(x) + y(x) + (\sin(x) + 1)\cos(x) = 0$$

✓ **Mathematica** : cpu = 0.0707254 (sec), leaf count = 40

$$\left\{\left\{y(x) \to e^{-2\tanh^{-1}\left(\tan\left(\frac{x}{2}\right)\right)}\left(c_1 + \sin(x) + 4\log\left(\cos\left(\frac{x}{2}\right) - \sin\left(\frac{x}{2}\right)\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.147 (sec), leaf count = 29

$$\left\{y(x) = \frac{\sin(x) + 2\ln(\cos(x)) - 2\ln(\sec(x) + \tan(x)) + \_C1}{\sec(x) + \tan(x)}\right\}$$

2.197 ODE No. 197

$$\cos(x)y'(x) - y(x)^4 - y(x)\sin(x) = 0$$

✓ **Mathematica** : cpu = 0.053549 (sec), leaf count = 98

$$\left\{\left\{y(x) \to \frac{1}{\sqrt[3]{c_1\cos^3(x) - \sin(x) - 2\sin(x)\cos^2(x)}}\right\}, \left\{y(x) \to -\frac{\sqrt[3]{-1}}{\sqrt[3]{c_1\cos^3(x) - \sin(x) - 2\sin(x)\cos^2(x}\right.\right.$$

✓ **Maple** : cpu = 0.115 (sec), leaf count = 237

$$\left\{y(x) = \frac{1}{\_C1\,(\sin(x))^4 + 2\cos(x)(\sin(x))^3 - 2\_C1\,(\sin(x))^2 - 3\cos(x)\sin(x) + \_C1}\sqrt[3]{\cos(x)(\_C\right.$$

2.198 ODE No. 198

$$\sin(x)\cos(x)y'(x) - y(x) - \sin^3(x) = 0$$

✓ **Mathematica** : cpu = 0.0286725 (sec), leaf count = 15

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

✓ **Maple** : cpu = 0.016 (sec), leaf count = 13

$$\{y(x) = \tan(x)(\_C1 - \cos(x))\}$$

2.199 ODE No. 199

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

✓ **Mathematica** : cpu = 0.196427 (sec), leaf count = 15

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

✓ **Maple** : cpu = 0.23 (sec), leaf count = 102

$$\left\{y(x) = \frac{1}{2}\arctan\left(2\,\frac{\_C1\,(2\,\sin(2\,x)+\sin(4\,x))}{-\_C1^2\cos(4\,x)+\_C1^2+4\,\cos(2\,x)+\cos(4\,x)+3}, \frac{\_C1^2\cos(4\,x)-\_C1^2+4}{\_C1^2\cos(4\,x)-\_C1^2-4}\right.\right.$$

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 = 0.0515421 (sec), leaf count = 59

$$\left\{\left\{y(x) \to \frac{2aAx^2 - 2aAx\sin(2x) - aA\cos(2x) + 4Acx^2 + 4c_1}{4a\cos(2x) - 4(a+2b)}\right\}\right\}$$

✓ **Maple** : cpu = 0.062 (sec), leaf count = 53

$$\left\{y(x) = \frac{-A\cos(2\,x)\,a - 2\,A\sin(2\,x)\,ax + 2\,x^2(a+2\,c)\,A - 8\,\_C1}{4\,a\cos(2\,x) - 4\,a - 8\,b}\right\}$$

2.201 ODE No. 201

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

✓ **Mathematica** : cpu = 0.07625 (sec), leaf count = 38

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

✓ **Maple** : cpu = 0.052 (sec), leaf count = 23

$$\left\{y(x) = i\tan\left(-i\int\sqrt{f(x)}\,\mathrm{d}x + \_C1\right)\sqrt{f(x)}\right\}$$

2.202 ODE No. 202

$$f(x)y'(x) + g(x)\mathrm{tg}(y(x)) + h(x) = 0$$

✗ **Mathematica** : cpu = 20.5507 (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 = 3.31261 (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 = 0.111158 (sec), leaf count = 67

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

✓ **Maple** : cpu = 0.335 (sec), leaf count = 92

$$\left\{y(x) = \mathit{RootOf}\left(\_Z^2 - \mathrm{e}^{\mathit{RootOf}\left(x^2\left(\left(\tanh\left(\frac{2\_C1+\_Z+2\ln(x)}{2a}\sqrt{(a-2)(a+2)}\right)\right)^2a^2-4\left(\tanh\left(1/2\,\frac{\sqrt{(a-2)(a+2)}(2\_C1+\_Z+2\ln(x)}{a}\right.\right.\right.\right.}\right.\right.$$

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 = 26.7273 (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 = 30.3675 (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 = 0.0122621 (sec), leaf count = 47

$$\left\{\left\{y(x)\to -\sqrt{c_1e^{-2x}-4x^2}\right\},\left\{y(x)\to \sqrt{c_1e^{-2x}-4x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.029 (sec), leaf count = 37

$$\left\{y(x)=\sqrt{\mathrm{e}^{-2\,x}\_C1-4\,x^2},y(x)=-\sqrt{\mathrm{e}^{-2\,x}\_C1-4\,x^2}\right\}$$

2.208 ODE No. 208

$$ay(x)^2 - b\cos(c+x) + y(x)y'(x) = 0$$

✓ **Mathematica** : cpu = 0.0834006 (sec), leaf count = 120

$$\left\{\left\{y(x) \to -\frac{\sqrt{e^{-2ax}\left(4a^2c_1 + 2be^{2ax}\sin(c+x) + c_1\right) + 4ab\cos(c+x)}}{\sqrt{4a^2+1}}\right\}, \left\{y(x) \to \frac{\sqrt{e^{-2ax}\left(4a^2c_1 + 2be^2\right.}}{}\right.\right.$$

✓ **Maple** : cpu = 0.079 (sec), leaf count = 106

$$\left\{y(x) = \frac{1}{4\,a^2+1}\sqrt{16\,\left(a^2+1/4\right)^2 \_C1\,e^{-2\,ax} + 16\,\left(a^2+1/4\right)\left(\cos\left(x+c\right)a + 1/2\,\sin\left(x+c\right)\right)b}, y(x) = -\right.$$

2.209 ODE No. 209

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

✓ **Mathematica** : cpu = 0.0221903 (sec), leaf count = 58

$$\left\{\left\{y(x) \to -\frac{\sqrt{a^2\left(c_1+x\right)^2 - b}}{\sqrt{a}}\right\}, \left\{y(x) \to \frac{\sqrt{a^2\left(c_1+x\right)^2 - b}}{\sqrt{a}}\right\}\right\}$$

✓ **Maple** : cpu = 0.013 (sec), leaf count = 21

$$\left\{x - \frac{1}{a}\sqrt{a\left(y\left(x\right)\right)^2 + b} + \_C1 = 0\right\}$$

2.210 ODE No. 210

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

✓ **Mathematica** : cpu = 0.0170657 (sec), leaf count = 47

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

✓ **Maple** : cpu = 0.036 (sec), leaf count = 33

$$\left\{y(x) = \sqrt{e^{-x^2}\_C1 + 4}, y(x) = -\sqrt{e^{-x^2}\_C1 + 4}\right\}$$

2.211 ODE No. 211

$$y(x)y'(x) - xe^{\frac{x}{y(x)}} = 0$$

✓ **Mathematica** : cpu = 54.4885 (sec), leaf count = 38

$$\text{Solve}\left[c_1 = \int_1^{\frac{y(x)}{x}} \frac{K[1]}{K[1]^2 - e^{\frac{1}{K[1]}}} \, dK[1] + \log(x), y(x)\right]$$

✓ **Maple** : cpu = 0.04 (sec), leaf count = 31

$$\left\{y(x) = \mathit{RootOf}\left(-\int^{\_Z} \frac{\_a}{-\_a^2 + e^{\_a^{-1}}} d\_a + \ln(x) + \_C1\right) x\right\}$$

2.212 ODE No. 212

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

✓ **Mathematica** : cpu = 28.5153 (sec), leaf count = 92

$$\text{Solve}\left[c_1 = \int_1^{y(x)} \left(\frac{K[2]}{f\left(K[2]^2 + x^2\right)} - \int_1^x -\frac{2K[1]K[2]f'(K[1]^2 + K[2]^2)}{f\left(K[1]^2 + K[2]^2\right)^2} \, dK[1]\right) dK[2] + \int_1^x \left(\frac{K[1}{f\left(K[1]^2 +\right.}\right.$$

✓ **Maple** : cpu = 0.152 (sec), leaf count = 30

$$\left\{\int_{\_b}^{y(x)} \frac{\_a}{f\left(\_a^2 + x^2\right)} \mathrm{d}\_a + \int g(x) \, \mathrm{d}x - \_C1 = 0\right\}$$

2.213 ODE No. 213

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

✓ **Mathematica** : cpu = 0.149561 (sec), leaf count = 71

$$\text{Solve}\left[\frac{1}{2}\log\left(\frac{x^2 - y(x)^2 + (x-3)y(x) - x - 1}{(x-1)^2}\right) + \log(1-x) = c_1 + \frac{\tanh^{-1}\left(\frac{y(x)+2x-1}{\sqrt{5}(y(x)+1)}\right)}{\sqrt{5}}, y(x)\right]$$

✓ **Maple** : cpu = 0.805 (sec), leaf count = 66

$$\left\{-\frac{1}{2}\ln\left(\frac{(y(x))^2+(-x+3)\,y(x)-x^2+x+1}{(x-1)^2}\right)-\frac{\sqrt{5}}{5}\mathit{Artanh}\left(\frac{(-2\,y(x)-3+x)\sqrt{5}}{5\,x-5}\right)-\ln(x-1)-\right.$$

2.214 ODE No. 214

$$(y(x)+x-1)y'(x)-y(x)+2x+3=0$$

✓ **Mathematica** : cpu = 0.162192 (sec), leaf count = 78

$$\text{Solve}\left[2\sqrt{2}\tan^{-1}\left(\frac{-y(x)+2x+3}{\sqrt{2}(y(x)+x-1)}\right)=3c_1+2\log\left(\frac{6x^2+3y(x)^2-10y(x)+8x+11}{(3x+2)^2}\right)+4\log(3x+2\right.$$

✓ **Maple** : cpu = 0.212 (sec), leaf count = 48

$$\left\{y(x)=\frac{5}{3}+\frac{(-3\,x-2)\sqrt{2}\tan\left(\mathit{RootOf}\left(\sqrt{2}\ln\left(2\left((\tan(\_Z))^2+1\right)(3\,x+2)^2\right)+2\sqrt{2}\_\mathit{C1}-2\_Z\right)\right)}{3}\right\}$$

2.215 ODE No. 215

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

✓ **Mathematica** : cpu = 0.168613 (sec), leaf count = 80

$$\text{Solve}\left[6\sqrt{3}\tan^{-1}\left(\frac{4-3y(x)}{\sqrt{3}(y(x)+2x-2)}\right)=2c_1+3\log\left(\frac{3x^2+3y(x)^2+3(x-3)y(x)-6x+7}{(1-3x)^2}\right)+6\log(\right.$$

✓ **Maple** : cpu = 0.239 (sec), leaf count = 51

$$\left\{y(x)=\frac{3}{2}-\frac{x}{2}+\frac{\sqrt{3}(3\,x-1)}{6}\tan\left(\mathit{RootOf}\left(\sqrt{3}\ln\left(\frac{\left(3\,(\tan(\_Z))^2+3\right)(3\,x-1)^2}{4}\right)+2\sqrt{3}\_\mathit{C1}+6\_\right.\right.\right.$$

2.216 ODE No. 216

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

✓ **Mathematica** : cpu = 0.142871 (sec), leaf count = 82

$$\text{Solve}\left[6\sqrt{3}\tan^{-1}\left(\frac{3y(x)+1}{\sqrt{3}(-y(x)+2x-1)}\right)=2c_1+3\log\left(\frac{3x^2+3y(x)^2-3(x-1)y(x)-3x+1}{(1-3x)^2}\right)+6\log\right.$$

✓ **Maple** : cpu = 0.212 (sec), leaf count = 51

$$\left\{y(x)=\frac{(-3x+1)\sqrt{3}}{6}\tan\left(\mathit{RootOf}\left(\sqrt{3}\ln\left(\frac{\left(3\left(\tan\left(\_Z\right)\right)^2+3\right)\left(3x-1\right)^2}{4}\right)+2\sqrt{3}\_C1+6\_Z\right)\right)\right.$$

2.217 ODE No. 217

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

✓ **Mathematica** : cpu = 0.0190694 (sec), leaf count = 29

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

✓ **Maple** : cpu = 0.063 (sec), leaf count = 23

$$\left\{y(x)=x^2+\frac{\mathit{lambertW}\left(-4\_C1\,e^{-2x^2-1}\right)}{2}+\frac{1}{2}\right\}$$

2.218 ODE No. 218

$$\left(y(x)-x^2\right)y'(x)+4xy(x)=0$$

✓ **Mathematica** : cpu = 0.103971 (sec), leaf count = 232

$$\left\{\left\{y(x)\to x^2\left(1+\frac{2-2i}{\frac{i\sqrt{2}}{\sqrt{x^2\sinh\left(\frac{2c_1}{9}\right)+x^2\cosh\left(\frac{2c_1}{9}\right)-i}}-(1-i)}\right)\right\},\left\{y(x)\to x^2\left(1+\frac{2-2i}{(-1+i)-\frac{i\sqrt{}}{\sqrt{x^2\sinh\left(\frac{2c_1}{9}\right)+}}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.227 (sec), leaf count = 57

$$\left\{y(x)=-\frac{\_C1}{2}\sqrt{\_C1^2-4x^2}+\frac{\_C1^2}{2}-x^2, y(x)=\frac{\_C1}{2}\sqrt{\_C1^2-4x^2}+\frac{\_C1^2}{2}-x^2\right\}$$

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 = 301.838 (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 = 0.0141699 (sec), leaf count = 57

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

✓ **Maple** : cpu = 0.029 (sec), leaf count = 43

$$\left\{y(x)=\sqrt{e^{\frac{x^2}{2}}\_C1-x^2-2}, y(x)=-\sqrt{e^{\frac{x^2}{2}}\_C1-x^2-2}\right\}$$

2.221 ODE No. 221

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

✓ **Mathematica** : cpu = 0.0196371 (sec), leaf count = 30

$$\left\{\left\{y(x)\to\frac{1}{6}\left(4W\left(-e^{c_1+\frac{9x}{4}-1}\right)-3x+1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.087 (sec), leaf count = 21

$$\left\{y(x)=-\frac{x}{2}+\frac{2}{3}lambertW\left(\frac{e^{-\frac{1}{4}}\_C1}{4}e^{\frac{9x}{4}}\right)+\frac{1}{6}\right\}$$

2.222 ODE No. 222

$$(2y(x) + x + 7)y'(x) - y(x) + 2x + 4 = 0$$

✓ **Mathematica** : cpu = 0.0742891 (sec), leaf count = 65

$$\text{Solve}\left[5c_1 + 2\log\left(\frac{4(x^2 + y(x)^2 + 4y(x) + 6x + 13)}{5(x+3)^2}\right) + 2\tan^{-1}\left(\frac{y(x) - 2(x+2)}{2y(x) + x + 7}\right) + 4\log(x+3) = 0, y$$

✓ **Maple** : cpu = 0.088 (sec), leaf count = 32

$$\left\{y(x) = -2 + (-x-3)\tan\left(\mathit{RootOf}\left(\ln\left((\cos(\_Z))^{-2}\right) - \_Z + 2\ln(x+3) + 2\_C1\right)\right)\right\}$$

2.223 ODE No. 223

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

✓ **Mathematica** : cpu = 0.025752 (sec), leaf count = 55

$$\left\{\left\{y(x) \to \frac{1}{2}\left(x - \sqrt{5x^2 - 4e^{c_1}}\right)\right\}, \left\{y(x) \to \frac{1}{2}\left(\sqrt{5x^2 - 4e^{c_1}} + x\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.194 (sec), leaf count = 51

$$\left\{y(x) = \frac{1}{2\_C1}\left(\_C1\,x - \sqrt{5\_C1^2x^2 + 4}\right), y(x) = \frac{1}{2\_C1}\left(\_C1\,x + \sqrt{5\_C1^2x^2 + 4}\right)\right\}$$

2.224 ODE No. 224

$$(2y(x) - 6x)y'(x) - y(x) + 3x + 2 = 0$$

✓ **Mathematica** : cpu = 0.0182778 (sec), leaf count = 29

$$\left\{\left\{y(x) \to 3x - \frac{2}{5}\left(W\left(-e^{c_1 + \frac{25x}{4} - 1}\right) + 1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.068 (sec), leaf count = 35

$$\left\{y(x) = \frac{1}{5}\mathrm{e}^{-\mathit{lambertW}\left(-\frac{\mathrm{e}^{-1}}{2}\mathrm{e}^{\frac{25\,x}{4}}\mathrm{e}^{-\frac{25\_C1}{4}}\right) + \frac{25\,x}{4} - 1 - \frac{25\_C1}{4}} + 3\,x - \frac{2}{5}\right\}$$

2.225 ODE No. 225

$$(4y(x)+2x+3)y'(x)-2y(x)-x-1=0$$

✓ **Mathematica** : cpu = 0.0164958 (sec), leaf count = 26

$$\left\{\left\{y(x)\to\frac{1}{8}\left(W\left(-e^{c_1+8x-1}\right)-4x-5\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.058 (sec), leaf count = 20

$$\left\{y(x)=-\frac{x}{2}+\frac{\mathit{lambertW}\left(\mathrm{e}^{5}\left(\mathrm{e}^{x}\right)^{8}\_C1\right)}{8}-\frac{5}{8}\right\}$$

2.226 ODE No. 226

$$(4y(x)-2x-3)y'(x)+2y(x)-x-1=0$$

✓ **Mathematica** : cpu = 0.0162478 (sec), leaf count = 28

$$\left\{\left\{y(x)\to\frac{1}{8}\left(-W\left(-e^{c_1+8x-1}\right)+4x+5\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.056 (sec), leaf count = 21

$$\left\{y(x)=\frac{x}{2}-\frac{\mathit{lambertW}\left(-\mathrm{e}^{5}\left(\mathrm{e}^{x}\right)^{8}\_C1\right)}{8}+\frac{5}{8}\right\}$$

2.227 ODE No. 227

$$(4y(x)-3x-5)y'(x)-3y(x)+7x+2=0$$

✓ **Mathematica** : cpu = 0.0130579 (sec), leaf count = 71

$$\left\{\left\{y(x)\to\frac{1}{4}\left(-i\sqrt{-16c_1+19x^2-14x-25}+3x+5\right)\right\},\left\{y(x)\to\frac{1}{4}\left(i\sqrt{-16c_1+19x^2-14x-25}+3\right.\right.\right.$$

✓ **Maple** : cpu = 0.213 (sec), leaf count = 33

$$\left\{y(x)=\frac{1}{76\_C1}\left(-\sqrt{4-6859\left(x-\frac{7}{19}\right)^{2}\_C1^{2}}+(57\,x+95)\_C1\right)\right\}$$

2.228 ODE No. 228

$$(4y(x) + 11x - 11)y'(x) - 25y(x) - 8x + 62 = 0$$

✓ **Mathematica** : cpu = 0.404245 (sec), leaf count = 1677

$$\left\{\left\{y(x) \to \frac{1}{4}\left(\frac{}{\sqrt[3]{-6561\cosh\left(\frac{3c_1}{4}\right)x^4 - 6561\sinh\left(\frac{3c_1}{4}\right)x^4 + 2916\cosh\left(\frac{3c_1}{4}\right)x^3 + 2916\sinh\left(\frac{3c_1}{4}\right)x^3 + 162\cosh\left(\frac{3c_1}{8}\right)x^2 - 486\cosh\left(\frac{3c_1}{4}\right)x^2 -}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.451 (sec), leaf count = 271

$$\left\{y(x) = 1\left((-76\,x + 28)\sqrt[3]{64 - 8748\,(9\,x - 1)^2 \_C1 + 108\sqrt{43046721}\sqrt{\left(-\frac{32}{177147} + (x - 1/9)^2 \_C1\right.}}\right.\right.$$

2.229 ODE No. 229

$$(12y(x) - 5x - 8)y'(x) - 5y(x) + 2x + 3 = 0$$

✓ **Mathematica** : cpu = 0.0128093 (sec), leaf count = 77

$$\left\{\left\{y(x) \to \frac{1}{12}\left(-i\sqrt{-16(9c_1 + 4) - x^2 - 8x} + 5x + 8\right)\right\}, \left\{y(x) \to \frac{1}{12}\left(i\sqrt{-16(9c_1 + 4) - x^2 - 8x} + 5\right.\right.\right.$$

✓ **Maple** : cpu = 0.223 (sec), leaf count = 32

$$\left\{y(x) = \frac{1}{12\_C1}\left(-\sqrt{(x + 4)^2 \_C1^2 + 24} + (5\,x + 8)\_C1\right)\right\}$$

2.230 ODE No. 230

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

✓ **Mathematica** : cpu = 0.120458 (sec), leaf count = 96

$$\left\{\left\{y(x) \to -e^{-\frac{bx}{a}}\sqrt{2\int_1^x -\frac{f(K[1])e^{\frac{2bK[1]}{a}}}{a}\,dK[1] + c_1}\right\}, \left\{y(x) \to e^{-\frac{bx}{a}}\sqrt{2\int_1^x -\frac{f(K[1])e^{\frac{2bK[1]}{a}}}{a}\,dK[1] +\right.\right.$$

✓ **Maple** : cpu = 0.05 (sec), leaf count = 100

$$\left\{y(x) = \frac{1}{a}\sqrt{e^{2\frac{bx}{a}}a\left(\_C1\,a - 2\int\left(e^{\frac{bx}{a}}\right)^2 f(x)\,dx\right)}\left(e^{2\frac{bx}{a}}\right)^{-1}, y(x) = -\frac{1}{a}\sqrt{e^{2\frac{bx}{a}}a\left(\_C1\,a - 2\int\left(e^{\frac{bx}{a}}\right)^2\right.}\right.$$

2.231 ODE No. 231

$$y'(x)(ay(x) + bx + c) + \alpha y(x) + \beta x + \gamma = 0$$

✓ **Mathematica** : cpu = 3.10313 (sec), leaf count = 252

$$\text{Solve}\left[\frac{(\alpha-b)^2\left(-\log\left(\frac{(ay(x)+bx+c)^2\left(-\frac{(\alpha(bx+c)-a(\beta x+\gamma))\left(a(\alpha-b)y(x)+a(\beta x+\gamma)+b^2(-x)-bc\right)}{(ay(x)+bx+c)^2}+a\beta-\alpha b\right)}{(\alpha(bx+c)-a(\beta x+\gamma))^2}\right) - \frac{2\tan^{-1}\left(\frac{\frac{2a(\beta x+\gamma)}{ay(x)}}{(\alpha-b)\sqrt{}}\right)}{\sqrt{\frac{4(a\beta-}{(\alpha-b}}}\right.}{2(a\beta-\alpha b)}\right.$$

✓ **Maple** : cpu = 0.272 (sec), leaf count = 178

$$\left\{y(x) = \frac{1}{-a\beta + b\alpha}\left(-b\gamma + \beta c + \frac{x(a\beta - b\alpha) + a\gamma - \alpha c}{2a}\left(\sqrt{4a\beta - \alpha^2 - 2b\alpha - b^2}\tan\left(\mathit{RootOf}\left(\sqrt{4a\beta}\right.\right.\right.\right.\right.$$

2.232 ODE No. 232

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

✓ **Mathematica** : cpu = 0.00931537 (sec), leaf count = 46

$$\left\{\left\{y(x)\to -\frac{\sqrt{c_1-\frac{x^4}{2}}}{x}\right\},\left\{y(x)\to \frac{\sqrt{c_1-\frac{x^4}{2}}}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.023 (sec), leaf count = 39

$$\left\{y(x) = -\frac{1}{2x}\sqrt{-2x^4+4\_C1}, y(x) = \frac{1}{2x}\sqrt{-2x^4+4\_C1}\right\}$$

2.233 ODE No. 233

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

✓ **Mathematica** : cpu = 0.0238753 (sec), leaf count = 38

$$\left\{\left\{y(x)\to -x\sqrt{c_1-2a\sin(x)}\right\},\left\{y(x)\to x\sqrt{c_1-2a\sin(x)}\right\}\right\}$$

✓ **Maple** : cpu = 0.03 (sec), leaf count = 30

$$\left\{y(x) = \sqrt{-2a\sin(x)+\_C1}x, y(x) = -\sqrt{-2a\sin(x)+\_C1}x\right\}$$

2.234 ODE No. 234

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

✗ **Mathematica** : cpu = 29.1679 (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 = 0.072694 (sec), leaf count = 33

$$\text{Solve}\left[x = \frac{e^{-\frac{y(x)}{b}}\left(bc_1 - a\text{Ei}\left(\frac{y(x)}{b}\right)\right)}{b}, y(x)\right]$$

✓ **Maple** : cpu = 0.059 (sec), leaf count = 30

$$\left\{\_C1 + \left(-e^{\frac{y(x)}{b}}bx + aEi\left(1, -\frac{y(x)}{b}\right)\right)^{-1} = 0\right\}$$

2.236 ODE No. 236

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

✓ **Mathematica** : cpu = 0.0167044 (sec), leaf count = 84

$$\left\{\left\{y(x) \to \frac{1}{\frac{1}{x+4} - \frac{\sqrt{x}}{(x+4)^{3/2}\sqrt{c_1 - \frac{4}{x+4}}}} - 4\right\}, \left\{y(x) \to \frac{1}{\frac{\sqrt{x}}{(x+4)^{3/2}\sqrt{c_1 - \frac{4}{x+4}}} + \frac{1}{x+4}} - 4\right\}\right\}$$

✓ **Maple** : cpu = 0.074 (sec), leaf count = 141

$$\left\{y(x) = 1\left(-(x+4)^{\frac{3}{2}}\sqrt{\frac{\_C1\ (x+4) - 4}{x+4}}x - 16\sqrt{x} - 4x^{3/2}\right)\left(-(x+4)^{\frac{3}{2}}\sqrt{\frac{\_C1\ (x+4) - 4}{x+4}} + 4\sqrt{x}\right.$$

2.237 ODE No. 237

$$x(a+y(x))y'(x)+by(x)+cx=0$$

✗ **Mathematica** : cpu = 8.50438 (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 = 0.0465657 (sec), leaf count = 176

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

✓ **Maple** : cpu = 0.082 (sec), leaf count = 93

$$\left\{y(x)=\frac{1}{-a^2+\_C1}\left(-abx-\_C1\,x+\sqrt{\_C1\,(a+b)\left(ax^2+bx^2+a^2-\_C1\right)}\right),y(x)=\frac{1}{a^2-\_C1}\left(ab\right.\right.$$

2.239 ODE No. 239

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

✓ **Mathematica** : cpu = 0.0290539 (sec), leaf count = 54

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

✓ **Maple** : cpu = 0.208 (sec), leaf count = 59

$$\left\{y(x)=\frac{1}{\_C1\,x}\left(\_C1\,x^2-\sqrt{2\,\_C1^2x^4+1}\right),y(x)=\frac{1}{\_C1\,x}\left(\_C1\,x^2+\sqrt{2\,\_C1^2x^4+1}\right)\right\}$$

2.240 ODE No. 240

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

✓ **Mathematica** : cpu = 0.00985327 (sec), leaf count = 39

$$\left\{\left\{y(x)\to -\sqrt{x\left(c_1 - a\log(x)\right)}\right\},\left\{y(x)\to \sqrt{x\left(c_1 - a\log(x)\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.031 (sec), leaf count = 34

$$\left\{y(x) = \sqrt{-ax\ln(x) + \_C1\,x}, y(x) = -\sqrt{-x\left(a\ln(x) - \_C1\right)}\right\}$$

2.241 ODE No. 241

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

✓ **Mathematica** : cpu = 0.00989935 (sec), leaf count = 37

$$\left\{\left\{y(x)\to -\sqrt{x\left(c_1 - ax\right)}\right\},\left\{y(x)\to \sqrt{x\left(c_1 - ax\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.02 (sec), leaf count = 33

$$\left\{y(x) = \sqrt{-ax^2 + \_C1\,x}, y(x) = -\sqrt{-ax^2 + \_C1\,x}\right\}$$

2.242 ODE No. 242

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

✓ **Mathematica** : cpu = 0.0146105 (sec), leaf count = 60

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

✓ **Maple** : cpu = 0.022 (sec), leaf count = 39

$$\left\{y(x) = -\frac{1}{2\,x}\sqrt{-2\,x^2 + 4\,\_C1}, y(x) = \frac{1}{2\,x}\sqrt{-2\,x^2 + 4\,\_C1}\right\}$$

2.243 ODE No. 243

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

✓ **Mathematica** : cpu = 14.8853 (sec), leaf count = 451

$$\left\{\left\{y(x)\to -\frac{\sqrt[3]{2}x}{\sqrt[3]{-27c_1^2x^2+\sqrt{108c_1^3x^3+\left(27c_1^2x-27c_1^2x^2\right)^2}+27c_1^2x}}+\frac{\sqrt[3]{-27c_1^2x^2+\sqrt{108c_1^3x^3+\left(27c_1^2x\right.}}}{3\sqrt[3]{2}c_1}\right.\right.$$

✓ **Maple** : cpu = 0.16 (sec), leaf count = 391

$$\left\{y(x)=\frac{1}{80\_C1}\left(-3\left(x\left(\sqrt{5}\sqrt{\frac{80\ (x-1)^2\_C1-x}{\_C1}}+20\,x-20\right)\_C1^2\right)^{2/3}\left(1+i\sqrt{3}\right)\sqrt[3]{5}+3\left(\left(i\right.\right.\right.\right.$$

2.244 ODE No. 244

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

✓ **Mathematica** : cpu = 14.8035 (sec), leaf count = 457

$$\left\{\left\{y(x)\to -\frac{\sqrt[3]{2}x}{\sqrt[3]{27c_1^2x^2+\sqrt{\left(27c_1^2x^2+27c_1^2x\right)^2-108c_1^3x^3}+27c_1^2x}}-\frac{\sqrt[3]{27c_1^2x^2+\sqrt{\left(27c_1^2x^2+27c_1^2x\right)^2-}}}{3\sqrt[3]{2}c_1}\right.\right.$$

✓ **Maple** : cpu = 0.135 (sec), leaf count = 391

$$\left\{y(x)=-\frac{3}{80\_C1}\left(\left(\left(x\left(\sqrt{5}\sqrt{\frac{80\ (1+x)^2\_C1-x}{\_C1}}-20\,x-20\right)\_C1^2\right)^{\frac{2}{3}}\left(1+i\sqrt{3}\right)\sqrt[3]{5}-\left(\left(i\sqrt{3}-\right.\right.\right.\right.\right.$$

2.245 ODE No. 245

$$\left(4x^3+2xy(x)\right)y'(x)+112x^2y(x)+y(x)^2=0$$

✓ **Mathematica** : cpu = 0.490293 (sec), leaf count = 1453

$$\left\{\left\{y(x)\to \text{Root}\left[-1521681143169024\#1x^{22}-697437190619136\#1^2x^{20}-145299414712320\#1^3x^{18}-18\right.\right.\right.$$

✓ **Maple** : cpu = 0.345 (sec), leaf count = 31

$$\left\{y(x)=\frac{\_C1}{x^{28}\left(RootOf\left(x^{30}\_Z^{360}-24\,x^{30}\_Z^{330}-\_C1\right)\right)^{330}}\right\}$$

2.246 ODE No. 246

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

✓ **Mathematica** : cpu = 0.0310378 (sec), leaf count = 71

$$\left\{\left\{y(x)\to -\frac{\sqrt{6e^{4c_1}-2x^4}+4x^2}{6x}\right\},\left\{y(x)\to \frac{\sqrt{6e^{4c_1}-2x^4}-4x^2}{6x}\right\}\right\}$$

✓ **Maple** : cpu = 0.077 (sec), leaf count = 63

$$\left\{y(x)=\frac{1}{6\_C1\,x}\left(-4\_C1\,x^2-\sqrt{-2\_C1^2x^4+6}\right),y(x)=\frac{1}{6\_C1\,x}\left(-4\_C1\,x^2+\sqrt{-2\_C1^2x^4+6}\right)\right.$$

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 = 14.8153 (sec), leaf count = 590

$$\left\{\left\{y(x)\to \frac{x\left(\sqrt[3]{-2e^{2c_1}(3x+2)+2\sqrt{e^{2c_1}(3x+2)^2\left(e^{2c_1}-(3x+2)^2\right)}+27x^3+54x^2+36x+8}+12\right)+}{2\sqrt[3]{-2e^{2c_1}(3x+2)+2\sqrt{e^{2c_1}(3x+2)^2\left(\right.}}}\right.\right.$$

✓ **Maple** : cpu = 0.285 (sec), leaf count = 517

$$\left\{y(x) = -\frac{1}{3} + \frac{3\,x+2}{6}\left(7\left(-1/4\,\sqrt[3]{2\,(3\,x+2)\,\_C1 - 27\,(3\,x+2)^3\,\_C1^3 + 2\,\sqrt{-27\,(3\,x+2)^4\,\_C1^4 +}}\right.\right.\right.$$

2.248 ODE No. 248

$$\left(x^2 + 6xy(x) + 3\right)y'(x) + 3y(x)^2 + 2xy(x) + 2x = 0$$

✓ **Mathematica** : cpu = 0.0144966 (sec), leaf count = 83

$$\left\{\left\{y(x) \to -\frac{\sqrt{36c_1x + x^4 - 12x^3 + 6x^2 + 9} + x^2 + 3}{6x}\right\}, \left\{y(x) \to -\frac{-\sqrt{36c_1x + x^4 - 12x^3 + 6x^2 + 9} + x}{6x}\right.\right.$$

✓ **Maple** : cpu = 0.027 (sec), leaf count = 75

$$\left\{y(x) = \frac{1}{6\,x}\left(-x^2 - 3 - \sqrt{x^4 - 12\,x^3 - 12\,\_C1\,x + 6\,x^2 + 9}\right), y(x) = \frac{1}{6\,x}\left(-x^2 - 3 + \sqrt{x^4 - 12\,x^3 - 12}\right.\right.$$

2.249 ODE No. 249

$$y'(x)\left(axy(x) + bx^n\right) + \alpha y(x)^3 + \beta y(x)^2 = 0$$

✓ **Mathematica** : cpu = 5.81297 (sec), leaf count = 103

$$\text{Solve}\left[\frac{\frac{(a(-n)+a+\alpha y(x))y(x)^{\frac{a-an}{\beta}-1}(\alpha y(x)+\beta)^{\frac{a(n-1)}{\beta}}}{a(n-1)+\beta} - \frac{ax^{1-n}\exp\left(-\frac{a(n-1)(\log(y(x))-\log(\alpha y(x)+\beta))}{\beta}\right)}{b}}{a^2(n-1)^2} = c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.235 (sec), leaf count = 202

$$\left\{y(x) = \beta\left(RootOf\left(-x^{1-n}\_Z^{\frac{a(n-1)}{\beta}}a^2\beta\,n + \_C1\,a^2bn^2 + x^{1-n}\_Z^{\frac{a(n-1)}{\beta}}a^2\beta - x^{1-n}\_Z^{\frac{a(n-1)}{\beta}}a\beta^2 - \_Z^{\frac{an-}{\beta}}\right.\right.\right.$$

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 = 301.524 (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)+`

2.251 ODE No. 251

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

✓ **Mathematica** : cpu = 0.0127901 (sec), leaf count = 57

$$\left\{\left\{y(x)\to\frac{1-\sqrt{c_1x^2+2x^3+1}}{x^2}\right\},\left\{y(x)\to\frac{\sqrt{c_1x^2+2x^3+1}+1}{x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.025 (sec), leaf count = 51

$$\left\{y(x)=\frac{1}{x^2}\left(1-\sqrt{-2\_C1\,x^2+2\,x^3+1}\right),y(x)=\frac{1}{x^2}\left(1+\sqrt{-2\_C1\,x^2+2\,x^3+1}\right)\right\}$$

2.252 ODE No. 252

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

✓ **Mathematica** : cpu = 14.8816 (sec), leaf count = 501

$$\left\{\left\{y(x)\to\frac{\sqrt[3]{-(1-6c_1)^2x^3+\sqrt{(6c_1-1)^3\left(6c_1x^6+(2-12c_1)x^3+6c_1-1\right)}+36c_1^2-12c_1+1}}{6c_1-1}-\frac{}{\sqrt[3]{-}}\right.\right.$$

✓ **Maple** : cpu = 0.913 (sec), leaf count = 1338

$$\left\{y(x)=1\left(\left(\left(-\_C1+80\right)x^7-160\,x^4+80\,x\right)\sqrt[3]{4}\sqrt[3]{\_C1\left(-\frac{1}{4}+\sqrt{\frac{-5\,x^6+10\,x^3-5}{-80+\left(\_C1-80\right)x^6+160\,x^3}}\right)\left(\right.}\right.\right.$$

2.253 ODE No. 253

$$\left(x^2y(x)-1\right)y'(x)+8xy(x)^2-8=0$$

✗ **Mathematica** : cpu = 19.9765 (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 = 0.0164177 (sec), leaf count = 81

$$\left\{\left\{y(x)\to\frac{2}{\sqrt{-\frac{1}{x^3}}x^2\sqrt{-x\left(4c_1-4\log(x)+1\right)}+x}\right\},\left\{y(x)\to\frac{2}{\left(-\frac{1}{x^3}\right)^{3/2}x^5\sqrt{-x\left(4c_1-4\log(x)+1\right)}+\right.$$

✓ **Maple** : cpu = 0.036 (sec), leaf count = 59

$$\left\{y(x)=\frac{1}{\left(-2\ln(x)+2\_C1\right)x}\left(-1+\sqrt{1-4\ln(x)+4\_C1}\right),y(x)=\frac{1}{\left(2\ln(x)-2\_C1\right)x}\left(1+\sqrt{1-\right.\right.$$

2.255 ODE No. 255

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

✓ **Mathematica** : cpu = 5.47235 (sec), leaf count = 30

$$\left\{\left\{y(x)\to-\frac{3W\left(e^{\frac{9c_1}{2^{2/3}}-1}x^{2/3}\right)}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.264 (sec), leaf count = 74

$$\left\{y(x)=-3\frac{lambertW\left(2/3\sqrt[3]{-1/8x^2}\_C1\right)}{x},y(x)=-3\frac{lambertW\left(-1/3\sqrt[3]{-1/8x^2}\_C1\left(1+i\sqrt{3}\right)\right)}{x},y\right.$$

2.256 ODE No. 256

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

✓ **Mathematica** : cpu = 0.0215314 (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 = 0.061 (sec), leaf count = 31

$$\left\{y(x)=\mathrm{e}^{\frac{\_C1\,x+x\ln(x)-\mathit{lambertW}\left(-x\mathrm{e}^{\_C1+x^{-1}}\right)x+1}{x}}\right\}$$

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 = 0.4023 (sec), leaf count = 39

$$\text{Solve}\left[\frac{x\left(c_1-2\log\left(\frac{1}{1-xy(x)}\right)-2\right)}{y(x)}+2x^2+\frac{y(x)}{x}=0,y(x)\right]$$

✓ **Maple** : cpu = 0.13 (sec), leaf count = 98

$$\left\{y(x)=\frac{-\_C1+\mathrm{e}^{\mathit{RootOf}\left(-2\_Z\,x^4\left(\mathrm{e}^{\_Z}\right)^2+2\,x^4\left(\mathrm{e}^{\_Z}\right)^2-2\,\mathrm{e}^{\_Z}\_C1\,x^4+\left(\mathrm{e}^{\_Z}\right)^2-2\,\mathrm{e}^{\_Z}\_C1+\_C1^2\right)}}{x\mathrm{e}^{\mathit{RootOf}\left(-2\_Z\,x^4\left(\mathrm{e}^{\_Z}\right)^2+2\,x^4\left(\mathrm{e}^{\_Z}\right)^2-2\,\mathrm{e}^{\_Z}\_C1\,x^4+\left(\mathrm{e}^{\_Z}\right)^2-2\,\mathrm{e}^{\_Z}\_C1+\_C1^2\right)}}\right\}$$

2.258 ODE No. 258

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

✓ **Mathematica** : cpu = 0.0139484 (sec), leaf count = 43

$$\left\{\left\{y(x)\to -\sqrt{c_1e^{\frac{1}{x}}+x^2}\right\},\left\{y(x)\to\sqrt{c_1e^{\frac{1}{x}}+x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.028 (sec), leaf count = 33

$$\left\{y(x)=\sqrt{\mathrm{e}^{x^{-1}}\_C1+x^2},y(x)=-\sqrt{\mathrm{e}^{x^{-1}}\_C1+x^2}\right\}$$

2.259 ODE No. 259

$$2x^2y(x)y'(x) - e^{x-\frac{1}{x}}x^2 - y(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.0202089 (sec), leaf count = 50

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

✓ **Maple** : cpu = 0.033 (sec), leaf count = 51

$$\left\{y(x) = \sqrt{e^{-x^{-1}}\_C1 + e^{\frac{x^2-1}{x}}}, y(x) = -\sqrt{e^{-x^{-1}}\_C1 + e^{\frac{x^2-1}{x}}}\right\}$$

2.260 ODE No. 260

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

✓ **Mathematica** : cpu = 0.0153797 (sec), leaf count = 74

$$\left\{\left\{y(x) \to \frac{x}{\frac{\sqrt{x(c_1-2\log(x)+4)}}{\sqrt{\frac{1}{x^3}}} - 2x^2}\right\}, \left\{y(x) \to -\frac{x}{\frac{\sqrt{x(c_1-2\log(x)+4)}}{\sqrt{\frac{1}{x^3}}} + 2x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.037 (sec), leaf count = 59

$$\left\{y(x) = \frac{1}{(2\ln(x) - 2\_C1)\,x}\left(-2 + \sqrt{4 - 2\ln(x) + 2\_C1}\right), y(x) = \frac{1}{(-2\ln(x) + 2\_C1)\,x}\left(2 + \sqrt{4 -\right.$$

2.261 ODE No. 261

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

✓ **Mathematica** : cpu = 1.10996 (sec), leaf count = 32

$$\left\{\left\{y(x) \to -\frac{1}{2xW\left(\frac{e^{\frac{9c_1}{2^{2/3}}-1}}{x^2}\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.16 (sec), leaf count = 18

$$\left\{y(x) = -\frac{1}{2\,x}\left(lambertW\left(-\frac{\_C1}{2\,x^2}\right)\right)^{-1}\right\}$$

2.262 ODE No. 262

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

✓ **Mathematica** : cpu = 0.0684052 (sec), leaf count = 101

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

✓ **Maple** : cpu = 0.357 (sec), leaf count = 65

$$\left\{y(x) = \frac{x}{\_C1\,x^2 - 1}\left(2\,\_C1\,x^2 - \sqrt{3\,\_C1\,x^2 + 1}\right), y(x) = \frac{x}{\_C1\,x^2 - 1}\left(2\,\_C1\,x^2 + \sqrt{3\,\_C1\,x^2 + 1}\right)\right\}$$

2.263 ODE No. 263

$$2x^3 + 3x^2y(x)^2 + y(x)y'(x) + 7 = 0$$

✓ **Mathematica** : cpu = 0.0442947 (sec), leaf count = 120

$$\left\{\left\{y(x) \to -\frac{1}{3}\sqrt{9c_1e^{-2x^3} + \frac{20\ 2^{2/3}e^{-2x^3}x\Gamma\left(\frac{1}{3}, -2x^3\right)}{\sqrt[3]{-x^3}} - 6x}\right\}, \left\{y(x) \to \sqrt{c_1e^{-2x^3} + \frac{20\ 2^{2/3}e^{-2x^3}x\Gamma\left(\frac{1}{3},\right.}{9\sqrt[3]{-x^3}}}\right.\right.$$

✓ **Maple** : cpu = 0.354 (sec), leaf count = 173

$$\left\{y(x) = -\frac{2^{\frac{2}{3}}}{18\,\Gamma\left(2/3\right)}\sqrt{-240\,\sqrt[3]{-x^3}\Gamma\left(2/3\right)\sqrt[3]{2}\left(\frac{9\,\Gamma\left(2/3\right)\sqrt[3]{2}\left(-3/2\,e^{-2\,x^3}\_C1 + x\right)\sqrt[3]{-x^3}}{40} + e^{-2\,x^3}x\left(\pi\right.\right.}\right.$$

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 = 0.442585 (sec), leaf count = 680

$$\left\{\left\{y(x)\to \text{Root}\left[81\#1^7e^{\frac{21c_1}{2}}x^{12}+756\#1^6e^{\frac{21c_1}{2}}x^9+2646\#1^5e^{\frac{21c_1}{2}}x^6+4116\#1^4e^{\frac{21c_1}{2}}x^3+2401\#1^3e^{\frac{21c_1}{2}}-\right.\right.\right.$$

✓ **Maple** : cpu = 0.59 (sec), leaf count = 574

$$\left\{y(x)=\frac{-40353607\left(\mathit{RootOf}\left(9\,x^7\_Z^{98}-49\_C1\_Z^{42}+14\_C1\_Z^{21}-\_C1\right)\right)^{91}\_C1+756315\left(\mathit{Roo}\right.}{3\,x^3\left(\mathit{RootOf}\left(9\,x^7\_Z^{98}-49\_C1\_Z^{42}+14\_C1\_Z^{21}-\_C1\right)\right)^7\left(5764801\_C1\left(\mathit{RootOf}\right.\right.}\right.$$

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 = 300.081 (sec), leaf count = 0 , timed out

`$Aborted`

✗ **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 = 300.055 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 1.595 (sec), leaf count = 55

$$\left\{y(x)=\tan\left(\mathit{RootOf}\left(-\arctan(x)+\int^{-\arctan(x)+\_Z}-\frac{1}{2\,a^2+\cos(2\_a)-1}\left(\cos(2\_a)-1+\sqrt{-2\,a^2(}\right.\right.\right.\right.$$

2.267 ODE No. 267

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

✓ **Mathematica** : cpu = 0.0367153 (sec), leaf count = 36

$$\left\{\left\{y(x)\to -\sqrt{c_1+2x}\csc(x)\right\},\left\{y(x)\to \sqrt{c_1+2x}\csc(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.032 (sec), leaf count = 32

$$\left\{y(x)=\frac{1}{\sin(x)}\sqrt{2\,x+\_C1},y(x)=-\frac{1}{\sin(x)}\sqrt{2\,x+\_C1}\right\}$$

2.268 ODE No. 268

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

✓ **Mathematica** : cpu = 0.985958 (sec), leaf count = 140

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

✓ **Maple** : cpu = 0.077 (sec), leaf count = 118

$$\left\{y(x)=1\sqrt{e^{2\int\frac{g(x)}{f(x)}\,dx}\left(-2\int\frac{h(x)}{f(x)}\left(e^{\int\frac{g(x)}{f(x)}\,dx}\right)^2dx+\_C1\right)}\left(e^{2\int\frac{g(x)}{f(x)}\,dx}\right)^{-1},y(x)=-1\sqrt{e^{2\int\frac{g(x)}{f(x)}\,dx}\left(-2\int\right.}$$

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 = 329.152 (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

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

✓ **Mathematica** : cpu = 0.0214185 (sec), leaf count = 326

$$\left\{\left\{y(x) \to -\frac{\sqrt[3]{2}\left(\sqrt{(6c_1-4)\,x^3+9c_1^2+x^6}+3c_1+x^3\right)^{2/3}+2x}{2^{2/3}\sqrt[3]{\sqrt{(6c_1-4)\,x^3+9c_1^2+x^6}+3c_1+x^3}}\right\}, \left\{y(x) \to \frac{2^{2/3}(1-i\sqrt{3})\left(\sqrt{(6c_1-\right.}{4\sqrt[3]{\sqrt{(6}}}\right.$$

✓ **Maple** : cpu = 0.032 (sec), leaf count = 319

$$\left\{y(x) = \frac{1}{2}\left(\left(-4\,x^3 - 12\_C1 + 4\sqrt{x^6 + (6\_C1 - 4)\,x^3 + 9\_C1^2}\right)^{\frac{2}{3}} + 4\,x\right)\frac{}{\sqrt[3]{-4\,x^3 - 12\_C1 + 4\sqrt{}}}\right.$$

2.271 ODE No. 271

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

✓ **Mathematica** : cpu = 0.139582 (sec), leaf count = 372

$$\left\{\left\{y(x) \to \frac{\sqrt[3]{\sqrt{-8e^{3c_1}x^3+e^{6c_1}+20x^6}+e^{3c_1}-4x^3}}{\sqrt[3]{2}} - \frac{\sqrt[3]{2}x^2}{\sqrt[3]{\sqrt{-8e^{3c_1}x^3+e^{6c_1}+20x^6}+e^{3c_1}-4x^3}}\right\}, \left\{y(x\right.\right.$$

✓ **Maple** : cpu = 0.229 (sec), leaf count = 352

$$\left\{y(x) = 1\left(\frac{1}{2}\sqrt[3]{4 - 16\,x^3\_C1^{3/2} + 4\sqrt{20\_C1^3x^6 - 8\,x^3\_C1^{3/2} + 1}} - 2\,\frac{\_C1\,x}{\sqrt[3]{4 - 16\,x^3\_C1^{3/2} + 4\sqrt{20\_}}}\right.\right.$$

2.272 ODE No. 272

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

✓ **Mathematica** : cpu = 0.0732571 (sec), leaf count = 39

$$\text{Solve}\left[\log\left(\frac{y(x)}{x}\right)+\frac{2\tan^{-1}\left(\frac{\frac{2y(x)}{x}-1}{\sqrt{3}}\right)}{\sqrt{3}}+\log(x)=c_1,y(x)\right]$$

✓ **Maple** : cpu = 0.181 (sec), leaf count = 43

$$\left\{y(x)=\mathrm{e}^{\frac{2\sqrt{3}}{3}\mathit{RootOf}\left(-\sqrt{3}x\mathrm{e}^{\_C1}+3\tan(\_Z)x\mathrm{e}^{\_C1}+2\sqrt{3}\mathrm{e}^{2/3\sqrt{3}\_Z}\right)-\_C1}\right\}$$

2.273 ODE No. 273

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

✓ **Mathematica** : cpu = 0.0203065 (sec), leaf count = 294

$$\left\{\left\{y(x)\to\frac{\sqrt[3]{2}\left(\sqrt{4\left(a+x^2\right)^3+9c_1^2}+3c_1\right)^{2/3}-2a-2x^2}{2^{2/3}\sqrt[3]{\sqrt{4\left(a+x^2\right)^3+9c_1^2}+3c_1}}\right\},\left\{y(x)\to\frac{\left(1+i\sqrt{3}\right)\left(a+x^2\right)}{2^{2/3}\sqrt[3]{\sqrt{4\left(a+x^2\right)^3+9c_1^2}+3c_1}}\right.\right.$$

✓ **Maple** : cpu = 0.029 (sec), leaf count = 401

$$\left\{y(x)=-\frac{1}{4}\left(\left(i\left(-12\_C1+4\sqrt{4x^6+12ax^4+12a^2x^2+4a^3+9\_C1^2}\right)^{\frac{2}{3}}+4ix^2+4ia\right)\sqrt{3}+\left(-12\right.\right.\right.$$

2.274 ODE No. 274

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

✓ **Mathematica** : cpu = 0.0320931 (sec), leaf count = 396

$$\left\{\left\{y(x)\to\frac{\sqrt[3]{2}\left(\sqrt{4\left(a+x^2\right)^3+\left(3bx-3c_1+x^3\right)^2}-3bx+3c_1-x^3\right)^{2/3}-2a-2x^2}{2^{2/3}\sqrt[3]{\sqrt{4\left(a+x^2\right)^3+\left(3bx-3c_1+x^3\right)^2}-3bx+3c_1-x^3}}\right\},\left\{y(x)\to\frac{}{2^{2/3}\sqrt[3]{}}\right.\right.$$

✓ **Maple** : cpu = 0.042 (sec), leaf count = 657

$$\left\{y(x)=\frac{1}{2}\left(\left(-4\,x^3-12\,bx-12\_C1+4\sqrt{5\,x^6+(12\,a+6\,b)\,x^4+6\,x^3\_C1+\left(12\,a^2+9\,b^2\right)x^2+18\,bx\right.\right.\right.$$

2.275 ODE No. 275

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

✓ **Mathematica** : cpu = 0.03244 (sec), leaf count = 16

$$\text{Solve}\left[c_1+\tan^{-1}\left(\frac{x}{y(x)}\right)=y(x),y(x)\right]$$

✓ **Maple** : cpu = 0.112 (sec), leaf count = 30

$$\left\{\_C1+\frac{(ix+y(x))\,\mathrm{e}^{-2\,iy(x)}}{2\,iy\,(x)+2\,x}=0\right\}$$

2.276 ODE No. 276

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

✓ **Mathematica** : cpu = 0.0376752 (sec), leaf count = 61

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

✓ **Maple** : cpu = 0.072 (sec), leaf count = 47

$$\left\{y(x)=\frac{1}{2\_C1}\left(1+\sqrt{-4\_C1^2x^2+1}\right),y(x)=\frac{1}{2\_C1}\left(1-\sqrt{-4\_C1^2x^2+1}\right)\right\}$$

2.277 ODE No. 277

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

✓ **Mathematica** : cpu = 0.0164469 (sec), leaf count = 53

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

✓ **Maple** : cpu = 0.391 (sec), leaf count = 41

$$\left\{y(x)=-\frac{1}{2}\sqrt{4\,x^4+\_C1^2}+\frac{\_C1}{2},y(x)=\frac{1}{2}\sqrt{4\,x^4+\_C1^2}+\frac{\_C1}{2}\right\}$$

2.278 ODE No. 278

$$y'(x)\left(y(x)^2+4\sin(x)\right)-\cos(x)=0$$

✓ **Mathematica** : cpu = 0.103739 (sec), leaf count = 32

$$\text{Solve}\left[-\frac{1}{32}e^{-4y(x)}\left(8y(x)^2+4y(x)+32\sin(x)+1\right)=c_1,y(x)\right]$$

✓ **Maple** : cpu = 0.062 (sec), leaf count = 28

$$\left\{\frac{\left(-8\,(y(x))^2-4\,y(x)-32\,\sin(x)-1\right)e^{-4\,y(x)}}{32}+\_C1=0\right\}$$

2.279 ODE No. 279

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

✓ **Mathematica** : cpu = 0.720059 (sec), leaf count = 106

$$\left\{\left\{y(x) \to -\frac{\sqrt{(c_1x - x^2 + 1)^2 + 4(x - c_1)} - c_1x + x^2 - 1}{2(x - c_1)}\right\}, \left\{y(x) \to \frac{\sqrt{(c_1x - x^2 + 1)^2 + 4(x - c_1)}}{2(x - c_1)}\right.$$

✓ **Maple** : cpu = 0.186 (sec), leaf count = 116

$$\left\{y(x) = \frac{1}{-2\_C1 + 4x}\left(-2x^2 + \_C1\,x + \sqrt{4x^4 - 4\_C1\,x^3 + (\_C1^2 - 8)x^2 + (4\_C1 + 16)x - 8\_C\right.\right.$$

2.280 ODE No. 280

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

✓ **Mathematica** : cpu = 0.0436029 (sec), leaf count = 20

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

✓ **Maple** : cpu = 0.068 (sec), leaf count = 24

$$\{y(x) = a\mathit{RootOf}(\tan(\_Z)\,a - \_Z\,a + \_C1 - x) - \_C1\}$$

2.281 ODE No. 281

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

✓ **Mathematica** : cpu = 0.0630951 (sec), leaf count = 75

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

✓ **Maple** : cpu = 0.074 (sec), leaf count = 55

$$\left\{y(x) = \frac{1}{2\_C1}\left(1 + \sqrt{-4\_C1^2x^2 + 4\_C1\,x + 1}\right), y(x) = \frac{1}{2\_C1}\left(1 - \sqrt{-4\_C1^2x^2 + 4\_C1\,x + 1}\right)\right\}$$

2.282 ODE No. 282

$$(y(x)+3x-1)^2 y'(x)-(2y(x)-1)(4y(x)+6x-3)=0$$

✓ **Mathematica** : cpu = 0.153972 (sec), leaf count = 1089

$$\left\{\left\{y(x)\to \frac{1}{6}\left(12x+4e^{c_1}-\sqrt{36x^2-12x+16e^{2c_1}+16e^{c_1}(6x-1)+3\ 2^{2/3}\sqrt[3]{-e^{c_1}(6x-1)^4\left(6x+e^{c_1}-\right.}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.326 (sec), leaf count = 71

$$\left\{-\ln\left(\frac{-6\,y(x)+4-6\,x}{6\,x-1}\right)+3\,\ln\left(\frac{-6\,y(x)+3}{6\,x-1}\right)-3\,\ln\left(\frac{-6\,y(x)+18\,x}{6\,x-1}\right)-\ln\left(6\,x-1\right)-\_C1=0\right\}$$

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 = 0.0581702 (sec), leaf count = 497

$$\left\{\left\{y(x)\to -\frac{e^{-2x}\sqrt[3]{\sqrt{e^{8x}\left(-2c_1e^{3x}+c_1^2-4e^{4x}x^6+e^{6x}\right)}+c_1e^{4x}-e^{7x}}}{\sqrt[3]{2}}-\frac{\sqrt[3]{2}e^{2x}x^2}{\sqrt[3]{\sqrt{e^{8x}\left(-2c_1e^{3x}+c_1^2-4e^{4x}x^6\right.}}}\right.\right.$$

✓ **Maple** : cpu = 0.079 (sec), leaf count = 407

$$\left\{y(x)=-\frac{1}{4\,e^{2\,x}}\left(-4\,x^2\left(i\sqrt{3}-1\right)\left(e^{2\,x}\right)^2+\left(1+i\sqrt{3}\right)\left(\left(4\,e^{3\,x}-4\_C1+4\sqrt{-4\,x^6\left(e^{2\,x}\right)^2+\left(e^{3\,x}\right)^2-\right.}\right.\right.\right.\right.$$

2.284 ODE No. 284

$$\left(x^2+4y(x)^2\right)y'(x)-xy(x)=0$$

✓ **Mathematica** : cpu = 0.0360862 (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 = 0.159 (sec), leaf count = 21

$$\left\{y(x)=\mathrm{e}^{\frac{1}{2}\mathit{lambertW}\left(\frac{\left(\mathrm{e}^{-\_C1}\right)^2x^2}{4}\right)-\_C1}\right\}$$

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 = 0.0359012 (sec), leaf count = 382

$$\left\{\left\{y(x)\to \frac{1}{4}\left(\sqrt[3]{2\sqrt{4e^{3c_1}x^3+16e^{6c_1}+333x^6}+8e^{3c_1}+x^3}-\frac{11x^2}{\sqrt[3]{2\sqrt{4e^{3c_1}x^3+16e^{6c_1}+333x^6}+8e^{3c_1}+x^3}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.086 (sec), leaf count = 432

$$\left\{y(x)=\frac{1}{\_C1}\left(\frac{1}{4}\sqrt[3]{x^3\_C1^3+8+2\sqrt{333\_C1^6x^6+4x^3\_C1^3+16}}-\frac{11\_C1^2x^2}{4}\frac{}{\sqrt[3]{x^3\_C1^3+8+2\sqrt{}}}\right.\right.$$

2.286 ODE No. 286

$$(2y(x) - 3x + 1)^2 y'(x) - (3y(x) - 2x - 4)^2 = 0$$

✓ **Mathematica** : cpu = 0.209106 (sec), leaf count = 3501

✓ **Maple** : cpu = 1.145 (sec), leaf count = 1337

$$\left\{y(x) = \frac{(5\,x+3)\left(RootOf\left((115330078125\,\_C1\,x^9 - 2283535546875\,\_C1\,x^8 + 20095112812500\,\_C1\,x^7\right.\right.}{5\,\left(RootOf\left((115330078125\,\_C1\,x^9 - 2283535546875\,\_C1\,x^8 + 20095112812500\,\_C1\right.\right.}\right.$$

2.287 ODE No. 287

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

✓ **Mathematica** : cpu = 2.32417 (sec), leaf count = 69

$$\text{Solve}\left[\frac{1}{196}\left(112y(x) + \left(9\sqrt{2} - 8\right)\log\left(-7y(x) + 14x + \sqrt{2} - 4\right) - \left(8 + 9\sqrt{2}\right)\log\left(7y(x) - 14x + \sqrt{2} +\right.\right.\right.$$

✓ **Maple** : cpu = 0.082 (sec), leaf count = 56

$$\left\{-\frac{x}{7} - \frac{9\sqrt{2}}{98} Artanh\left(\frac{(7\,y(x) - 14\,x + 4)\sqrt{2}}{2}\right) - \frac{2\,\ln\left(7\,(y(x) - 2\,x)^2 + 8\,y(x) - 16\,x + 2\right)}{49} + \frac{4\,y(x)}{7} -\right.$$

2.288 ODE No. 288

$$\left(-3x^2 y(x) + 6y(x)^2 + 1\right) y'(x) - 3xy(x)^2 + x = 0$$

✓ **Mathematica** : cpu = 0.0227627 (sec), leaf count = 518

$$\left\{\left\{y(x) \to \frac{1}{36}\left(-3\sqrt[3]{3}\sqrt[3]{4\sqrt{3}\sqrt{-54c_1x^6 + 648c_1x^2 + 432c_1^2 - 27x^8 + 207x^4 + 32} + 144c_1 - 9x^6 + 108x^2\right.\right.\right.$$

✓ **Maple** : cpu = 0.041 (sec), leaf count = 579

$$\left\{y(x) = -\frac{1}{24}\left(-6\,x^2\sqrt[3]{-324\,x^2 - 432\,\_C1 + 27\,x^6 + 12\,\sqrt{-81\,x^8 - 162\,\_C1\,x^6 + 621\,x^4 + 1944\,\_C1\,x\right.\right.$$

2.289 ODE No. 289

$$a + (6y(x) - x)^2 y'(x) - 6y(x)^2 + 2xy(x) = 0$$

✓ **Mathematica** : cpu = 0.0158728 (sec), leaf count = 115

$$\left\{\left\{y(x) \to \frac{1}{6}\left(\sqrt[3]{-18ax + 18c_1 - x^3} + x\right)\right\}, \left\{y(x) \to \frac{x}{6} + \frac{1}{12}i\left(\sqrt{3} + i\right)\sqrt[3]{-18ax + 18c_1 - x^3}\right\}, \left\{y(x)\right.\right.$$

✓ **Maple** : cpu = 0.041 (sec), leaf count = 115

$$\left\{y(x) = \frac{1}{6}\sqrt[3]{-x^3 - 18\,ax - 18\_C1} + \frac{x}{6}, y(x) = -\frac{1}{12}\sqrt[3]{-x^3 - 18\,ax - 18\_C1} - \frac{i}{12}\sqrt{3}\sqrt[3]{-x^3 - 18\,ax -}\right.$$

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 = 0.08718 (sec), leaf count = 744

$$\left\{\left\{y(x) \to \frac{2^{2/3}\sqrt[3]{\sqrt{\left(a^2\left(e^{3c_1} - dx^3\right) + 3abcx^3 - 2b^3x^3\right)^2 - 4x^6\left(b^2 - ac\right)^3} + a^2e^{3c_1} - a^2dx^3 + 3abcx^3 - 2b}}{2a}\right.\right.$$

✓ **Maple** : cpu = 0.11 (sec), leaf count = 1388

$$\left\{y(x) = \frac{1}{\_C1}\left(\frac{1}{2\,a}\sqrt[3]{-4\_C1^3a^2dx^3 + 12\,cx^3\_C1^3ba - 8\,b^3x^3\_C1^3 + 4\sqrt{\_C1^6a^2d^2x^6 - 6\_C1^6abcdx}}\right.\right.$$

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 = 0.803257 (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 = 0.18 (sec), leaf count = 50

$$\left\{y(x)=\frac{-ax+\mathrm{e}^{RootOf\left(\_C1\,a\beta\,x-\_C1\,\alpha\,bx-\_Z\,a\beta\,x+\_Z\,\alpha\,bx-\_C1\,\beta\,\mathrm{e}^{-\_Z}+\mathrm{e}^{-\_Z}\_Z\,\beta+b\right)}}{b}\right\}$$

2.292 ODE No. 292

$$y'(x)(ay(x)+bx+c)^2+(\alpha y(x)+\beta x+\gamma)^2=0$$

✓ **Mathematica** : cpu = 59.7166 (sec), leaf count = 760

$$\text{Solve}\left[(\alpha b-a\beta)\text{RootSum}\left[\#1^3a\beta^3-\#1^3\alpha b\beta^2+2\#1^2a\alpha\beta^2y(x)+\#1^2ab^2\beta y(x)+3\gamma\#1^2a\beta^2-2\#1^2\alpha^2 b\right.\right.$$

✓ **Maple** : cpu = 0.047 (sec), leaf count = 115

$$\left\{y(x)=\frac{1}{a\beta-b\alpha}\left(\left((bx+c)\,\alpha-a(\beta\,x+\gamma)\right)RootOf\left(\int^{\_Z}\frac{(\_a\,a-b)^2}{\_a^3a^2-2\,\_a^2ab-\_a^2\alpha^2+2\,\_a\,\alpha\,\beta+\_a\,b\right.\right.\right.$$

2.293 ODE No. 293

$$x\left(y(x)^2-3x\right)y'(x)+2y(x)^3-5xy(x)=0$$

✓ **Mathematica** : cpu = 0.104405 (sec), leaf count = 661

$$\left\{\left\{y(x)\to\text{Root}\left[-\#1^{15}-\frac{25\#1^2e^{\frac{65c_1}{2}}}{x^{26}}+\frac{65e^{\frac{65c_1}{2}}}{x^{25}}\&,1\right]\right\},\left\{y(x)\to\text{Root}\left[-\#1^{15}-\frac{25\#1^2e^{\frac{65c_1}{2}}}{x^{26}}+\frac{65e^{\frac{65c_1}{2}}}{x^{25}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.395 (sec), leaf count = 35

$$\left\{\ln(x) - \_C1 + \frac{6}{13}\ln\left(y(x)\frac{1}{\sqrt{x}}\right) - \frac{2}{65}\ln\left(\frac{5\,(y(x))^2 - 13\,x}{x}\right) = 0\right\}$$

2.294 ODE No. 294

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

✓ **Mathematica** : cpu = 0.041988 (sec), leaf count = 65

$$\left\{\left\{y(x) \to \frac{1}{2}\left(c_1x - \sqrt{(c_1^2+4)\,x^2 - 4a}\right)\right\}, \left\{y(x) \to \frac{1}{2}\left(\sqrt{(c_1^2+4)\,x^2 - 4a} + c_1x\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.093 (sec), leaf count = 112

$$\left\{\left((y(x))^{-2} - \left(-x^2+a\right)^{-1}\right)^{-1} = -x\sqrt{x^2-a}\frac{1}{\sqrt{\_C1 + 4\,\frac{a}{x^2-a}}} + \frac{x^2}{2} - \frac{a}{2}, \left((y(x))^{-2} - \left(-x^2+a\right)^{-1}\right)^{-1} =\right.$$

2.295 ODE No. 295

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

✓ **Mathematica** : cpu = 0.061611 (sec), leaf count = 30

$$\text{Solve}\left[c_1 = \frac{x}{y(x)} + \frac{y(x)}{x} + \log\left(\frac{y(x)}{x}\right) + 2\log(x), y(x)\right]$$

✓ **Maple** : cpu = 0.219 (sec), leaf count = 29

$$\left\{y(x) = \mathrm{e}^{RootOf\left(\left(\mathrm{e}^{\_Z}\right)^2 + 2\,\mathrm{e}^{\_Z}\ln(x) + 2\,\mathrm{e}^{\_Z}\_C1 + \_Z\,\mathrm{e}^{\_Z} + 1\right)}x\right\}$$

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 = 0.593999 (sec), leaf count = 88

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

✓ **Maple** : cpu = 0.786 (sec), leaf count = 135

$$\left\{y(x) = -x\left(-x^3 + \_C1\,x + x^2 + \sqrt{-\_C1\,x^4 + \_C1^2x^2 + x^4}\right)\left(\_C1\,x - x^2 + \sqrt{-\_C1\,x^4 + \_C1^2x^2\right.$$

2.297 ODE No. 297

$$2x\left(5x^2 + y(x)^2\right)y'(x) - x^2y(x) + y(x)^3 = 0$$

✓ **Mathematica** : cpu = 0.0594876 (sec), leaf count = 216

$$\left\{\left\{y(x) \to \text{Root}\left[-\#1^5 + \frac{\#1^2e^{3c_1}}{x^{3/2}} + 3e^{3c_1}\sqrt{x}\&, 1\right]\right\}, \left\{y(x) \to \text{Root}\left[-\#1^5 + \frac{\#1^2e^{3c_1}}{x^{3/2}} + 3e^{3c_1}\sqrt{x}\&, 2\right]\right\}$$

✓ **Maple** : cpu = 0.402 (sec), leaf count = 29

$$\left\{y(x) = \left(RootOf\left(x^9\_C1\,\_Z^{45} - \_Z^{18} - 6\_Z^9 - 9\right)\right)^{\frac{9}{2}}x\right\}$$

2.298 ODE No. 298

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

✓ **Mathematica** : cpu = 0.0108254 (sec), leaf count = 72

$$\left\{\left\{y(x) \to \frac{\sqrt[3]{c_1 + x^2}}{\sqrt[3]{x}}\right\}, \left\{y(x) \to -\frac{\sqrt[3]{-1}\sqrt[3]{c_1 + x^2}}{\sqrt[3]{x}}\right\}, \left\{y(x) \to \frac{(-1)^{2/3}\sqrt[3]{c_1 + x^2}}{\sqrt[3]{x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.025 (sec), leaf count = 73

$$\left\{y(x) = \frac{1}{x}\sqrt[3]{\left(x^2 + \_C1\right)x^2}, y(x) = -\frac{1 + i\sqrt{3}}{2\,x}\sqrt[3]{\left(x^2 + \_C1\right)x^2}, y(x) = \frac{i\sqrt{3} - 1}{2\,x}\sqrt[3]{\left(x^2 + \_C1\right)x^2}\right\}$$

2.299 ODE No. 299

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

✓ **Mathematica** : cpu = 0.0209772 (sec), leaf count = 328

$$\left\{\left\{y(x) \to -\frac{\sqrt[3]{2}\left(9c_1x^2 + \sqrt{81c_1^2x^4 - 12x^9}\right)^{2/3} + 2\sqrt[3]{3}x^3}{6^{2/3}x\sqrt[3]{9c_1x^2 + \sqrt{81c_1^2x^4 - 12x^9}}}\right\}, \left\{y(x) \to \frac{\sqrt[3]{3}(1 - i\sqrt{3})\left(18c_1x^2 + 2\sqrt{81c_1^2}\right.}{12x\sqrt[3]{9c_1x^2 +}}\right.$$

✓ **Maple** : cpu = 0.233 (sec), leaf count = 276

$$\left\{y(x) = -\frac{12^{\frac{2}{3}}}{144\,x}\left(\left(-12\,ix^3 + i\left(\left(12\sqrt{-12\,x^5 + 81\,\_C1^2} + 108\,\_C1\right)x^2\right)^{\frac{2}{3}}\right)\sqrt{3} + 12\,x^3 + \left(\left(12\sqrt{-12}\right.\right.\right.$$

2.300 ODE No. 300

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

✓ **Mathematica** : cpu = 0.00999758 (sec), leaf count = 99

$$\left\{\left\{y(x) \to \frac{\sqrt[3]{4c_1 - x^2}}{2^{2/3}\sqrt[3]{x}}\right\}, \left\{y(x) \to -\frac{\sqrt[3]{-1}\sqrt[3]{4c_1 - x^2}}{2^{2/3}\sqrt[3]{x}}\right\}, \left\{y(x) \to \frac{(-1)^{2/3}\sqrt[3]{4c_1 - x^2}}{2^{2/3}\sqrt[3]{x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.026 (sec), leaf count = 83

$$\left\{y(x) = \frac{1}{2\,x}\sqrt[3]{-2\,(x^2 - 4\,\_C1)\,x^2}, y(x) = -\frac{1 + i\sqrt{3}}{4\,x}\sqrt[3]{-2\,(x^2 - 4\,\_C1)\,x^2}, y(x) = \frac{i\sqrt{3} - 1}{4\,x}\sqrt[3]{-2\,(x^2 -}\right.$$

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 = 0.0424699 (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 = 0.263 (sec), leaf count = 25

$$\left\{y(x)=\frac{1}{x}e^{-\frac{1}{2}\mathit{lambertW}\left(6\frac{e^{3\_C1}}{x^3}\right)+\frac{3\_C1}{2}}\right\}$$

2.302 ODE No. 302

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

✓ **Mathematica** : cpu = 0.0195811 (sec), leaf count = 60

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

✓ **Maple** : cpu = 0.173 (sec), leaf count = 133

$$\left\{y(x)=-\frac{1}{2\_C1\,x}\sqrt{-2\,x\_C1\,\left(-2\_C1-x+\sqrt{x\,(4\_C1+x)}\right)},y(x)=\frac{1}{2\_C1\,x}\sqrt{-2\,x\_C1\,\left(-2\_\right.}$$

2.303 ODE No. 303

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

✓ **Mathematica** : cpu = 0.0706054 (sec), leaf count = 24

$$\mathrm{Solve}\left[c_1+\frac{1}{xy(x)}+2\log(y(x))=xy(x),y(x)\right]$$

✓ **Maple** : cpu = 0.208 (sec), leaf count = 34

$$\left\{y(x)=\frac{e^{\mathit{RootOf}\left(-2\,e^{-\_Z}\ln(x)-e^{2\,-\_Z}+2\,e^{-\_Z}\_C1+2\_Z\,e^{-\_Z}+1\right)}}{x}\right\}$$

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 = 45.2274 (sec), leaf count = 45

$$\text{Solve}\left[c_1 + \frac{1}{2}\log\left(5x^2y(x)^2 + 2\right) + \log(y(x)) + \frac{\tan^{-1}\left(\sqrt{\frac{5}{2}}xy(x)\right)}{\sqrt{10}} = 0, y(x)\right]$$

✓ **Maple** : cpu = 0.311 (sec), leaf count = 44

$$\left\{y(x) = \frac{\sqrt{10}}{5\,x}\tan\left(\mathit{RootOf}\left(\sqrt{10}\ln\left(\frac{4\left(\tan\left(\_Z\right)\right)^2\left(\left(\tan\left(\_Z\right)\right)^2+1\right)}{5\,x^2}\right) + 2\sqrt{10}\_\mathit{C1} + 2\_Z\right)\right)\right\}$$

2.305 ODE No. 305

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

✓ **Mathematica** : cpu = 0.100503 (sec), leaf count = 1211

$$\left\{\left\{y(x) \to -\frac{\sqrt{\frac{4x^3+12c_1+\left(243x^2-\frac{1}{432}\sqrt{11019960576x^4-4(144x^3+432c_1)^3}\right)^{2/3}}{\sqrt[3]{243x^2-\frac{1}{432}\sqrt{11019960576x^4-4(144x^3+432c_1)^3}}}}}{\sqrt{6}} - \frac{1}{2}\sqrt{-\frac{12\sqrt{6}x}{\sqrt{\frac{4x^3+12c_1+\left(243x^2-\frac{1}{432}\sqrt{1101996057\ldots}\right.}{\sqrt[3]{243x^2-\frac{1}{432}\sqrt{11019960576x\ldots}}}}}\ldots}\right.\right.$$

✓ **Maple** : cpu = 0.027 (sec), leaf count = 21

$$\left\{\frac{x^3}{3} - 3\,xy(x) + \frac{\left(y(x)\right)^4}{4} + \_\mathit{C1} = 0\right\}$$

2.306 ODE No. 306

$$\left(y(x)^3-x^3\right)y'(x)-x^2y(x)=0$$

✓ **Mathematica** : cpu = 0.0524671 (sec), leaf count = 201

$$\left\{\left\{y(x)\to\sqrt[3]{x^3-\sqrt{x^6-e^{6c_1}}}\right\},\left\{y(x)\to-\sqrt[3]{-1}\sqrt[3]{x^3-\sqrt{x^6-e^{6c_1}}}\right\},\left\{y(x)\to(-1)^{2/3}\sqrt[3]{x^3-\sqrt{x^6-e\right.$$

✓ **Maple** : cpu = 0.405 (sec), leaf count = 231

$$\left\{y(x)=x\frac{1}{\sqrt[3]{-\left(\_C1\,x^3-\sqrt{\_C1^2x^6+1}\right)x^3\_C1}},y(x)=x\frac{1}{\sqrt[3]{-\left(\_C1\,x^3+\sqrt{\_C1^2x^6+1}\right)x^3\_C1}},y(\right.$$

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 = 0.02317 (sec), leaf count = 149

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

✓ **Maple** : cpu = 0.056 (sec), leaf count = 125

$$\left\{y(x)=\sqrt{-x^2-a-\sqrt{4\,ax^2+a^2-4\_C1}},y(x)=\sqrt{-x^2-a+\sqrt{4\,ax^2+a^2-4\_C1}},y(x)=-\sqrt{-x\right.$$

2.308 ODE No. 308

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

✓ **Mathematica** : cpu = 0.00754362 (sec), leaf count = 48

$$\left\{\{y(x)\to 0\},\left\{y(x)\to-\sqrt{2c_1-\frac{x^2}{2}}\right\},\left\{y(x)\to\sqrt{2c_1-\frac{x^2}{2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.036 (sec), leaf count = 37

$$\left\{y(x)=0,y(x)=-\frac{1}{2}\sqrt{-2\,x^2+4\_C1},y(x)=\frac{1}{2}\sqrt{-2\,x^2+4\_C1}\right\}$$

2.309 ODE No. 309

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

✓ **Mathematica** : cpu = 0.0133462 (sec), leaf count = 151

$$\left\{\left\{y(x) \to -\frac{\sqrt{-\sqrt{8c_1 + 4x^4 + 4x^2 + 1} - 1}}{\sqrt{2}}\right\}, \left\{y(x) \to \frac{\sqrt{-\sqrt{8c_1 + 4x^4 + 4x^2 + 1} - 1}}{\sqrt{2}}\right\}, \left\{y(x) \to -\right.\right.$$

✓ **Maple** : cpu = 0.049 (sec), leaf count = 113

$$\left\{y(x) = -\frac{1}{2}\sqrt{-2 - 2\sqrt{4x^4 + 4x^2 + 8\_C1 + 1}}, y(x) = \frac{1}{2}\sqrt{-2 - 2\sqrt{4x^4 + 4x^2 + 8\_C1 + 1}}, y(x) = -\right.$$

2.310 ODE No. 310

$$x^3 + \left(5x^2 y(x) + 2y(x)^3\right) y'(x) + 5xy(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.04782 (sec), leaf count = 159

$$\left\{\left\{y(x) \to -\frac{\sqrt{-\sqrt{2e^{4c_1} + 23x^4} - 5x^2}}{\sqrt{2}}\right\}, \left\{y(x) \to \frac{\sqrt{-\sqrt{2e^{4c_1} + 23x^4} - 5x^2}}{\sqrt{2}}\right\}, \left\{y(x) \to -\frac{\sqrt{\sqrt{2e^{4c_1} +}}}{\sqrt{}}\right.\right.$$

✓ **Maple** : cpu = 0.132 (sec), leaf count = 125

$$\left\{y(x) = -\frac{1}{2}\sqrt{-10\_C1\, x^2 - 2\sqrt{23\_C1^2 x^4 + 2}\frac{1}{\sqrt{\_C1}}}, y(x) = \frac{1}{2}\sqrt{-10\_C1\, x^2 - 2\sqrt{23\_C1^2 x^4 + 2}\frac{}{\sqrt{}}}\right.$$

2.311 ODE No. 311

$$4x^3 + 9x^2 y(x) + \left(3x^3 + 6x^2 y(x) - 3xy(x)^2 + 20y(x)^3\right) y'(x) + 6xy(x)^2 - y(x)^3 = 0$$

✓ **Mathematica** : cpu = 0.187068 (sec), leaf count = 2201

$$\left\{\left\{y(x) \to \frac{x}{20} + \frac{1}{2}\sqrt{-\frac{39x^2}{100} + \frac{\sqrt[3]{99x^6 + 351e^{c_1}x^2 + \sqrt{3}\sqrt{-67037x^{12} + 185406e^{c_1}x^8 - 83733e^{2c_1}x^4 + 320}}}{5\sqrt[3]{2}3^{2/3}}}\right.\right.$$

✓ **Maple** : cpu = 0.102 (sec), leaf count = 50

$$\left\{y(x) = \frac{RootOf\left(x^4\_C1^4 + 3\,x^3\_C1^3\_Z + 3\_C1^2\_Z^2x^2 - \_C1\,\_Z^3x + 5\_Z^4 - 1\right)}{\_C1}\right\}$$

2.312 ODE No. 312

$$(y(x)y'(x) + x)\left(\frac{x^2}{a} + \frac{y(x)^2}{b}\right) + \frac{(a-b)\,(y(x)y'(x) - x)}{a+b} = 0$$

✓ **Mathematica** : cpu = 0.265747 (sec), leaf count = 190

$$\left\{\left\{y(x) \to -\frac{\sqrt{b}\sqrt{2a^2W\left(\frac{c_1(a+b)e^{-\frac{a^2\left(b+x^2\right)+ab^2-b^2x^2}{2a^2b}}}{2a^3b^2}\right) + (a+b)\left(a-x^2\right)}}{\sqrt{a}\sqrt{a+b}}\right\}, \left\{y(x) \to \frac{\sqrt{b}\sqrt{2a^2W\left(\frac{c_1(a+

$$\left\{y(x)=\frac{1}{6\,a}\left((-12\,cx+12\_C1)\,a+\left(\left(\left(-108\,bx^3+108\_C1\,x+12\sqrt{81\,ab^2x^6-162\_C1\,abx^4+12\,c\right.\right.\right.\right.\right.$$

2.314 ODE No. 314

$$xy(x)^3y'(x)+y(x)^4-x\sin(x)=0$$

✓ **Mathematica** : cpu = 0.0465439 (sec), leaf count = 164

$$\left\{\left\{y(x)\to-\frac{\sqrt[4]{c_1+16x\,(x^2-6)\sin(x)-4\,(x^4-12x^2+24)\cos(x)}}{x}\right\},\left\{y(x)\to-\frac{i\sqrt[4]{c_1+16x\,(x^2-6)\,\mathrm{s}}}{}\right.\right.$$

✓ **Maple** : cpu = 0.058 (sec), leaf count = 158

$$\left\{y(x)=\frac{1}{x}\sqrt[4]{(-4\,x^4+48\,x^2-96)\cos(x)+(16\,x^3-96\,x)\sin(x)+\_C1},y(x)=\frac{-i}{x}\sqrt[4]{(-4\,x^4+48\,x^2-9}\right.$$

2.315 ODE No. 315

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

✓ **Mathematica** : cpu = 0.11139 (sec), leaf count = 331

$$\left\{\left\{y(x)\to\frac{\sqrt[3]{2}\left(\sqrt{81x^6-12e^{3c_1}x^3}-9x^3\right)^{2/3}+2\sqrt[3]{3}e^{c_1}x}{6^{2/3}\sqrt[3]{\sqrt{81x^6-12e^{3c_1}x^3}-9x^3}}\right\},\left\{y(x)\to\frac{i\sqrt[3]{2}\sqrt[6]{3}\left(\sqrt{3}+i\right)\left(\sqrt{81x^6-12e^{3c_1}x^3}\right.}{2\;2^{2/3}3^{5/6}\sqrt[3]{\sqrt{81x^6-}}}\right.\right.$$

✓ **Maple** : cpu = 0.106 (sec), leaf count = 376

$$\left\{y(x)=\frac{\sqrt[3]{12}}{6\_C1}\left(x\sqrt[3]{12}\_C1+\left(x\left(-9\_C1\,x^2+\sqrt{3}\sqrt{\frac{27\_C1^3x^4-4\,x}{\_C1}}\right)\_C1^2\right)^{\frac{2}{3}}\right)\frac{}{\sqrt[3]{x\left(-9\_C1\,x\right.}}\right.$$

2.316 ODE No. 316

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

✓ **Mathematica** : cpu = 0.0674917 (sec), leaf count = 41

$$\left\{\{y(x)\to 0\},\text{Solve}\left[x=\frac{1}{4}e^{-\frac{1}{2}y(x)^2}\left(4c_1-\text{Ei}\left(\frac{y(x)^2}{2}\right)\right),y(x)\right]\right\}$$

✓ **Maple** : cpu = 0.06 (sec), leaf count = 53

$$\left\{y(x)=0,y(x)=\sqrt{-2\,RootOf\left(e^{\_Z}Ei\left(1,\_Z\right)+4\,e^{\_Z}\_C1-4\,x\right)},y(x)=-\sqrt{-2\,RootOf\left(e^{\_Z}Ei\left(1,\_Z\right.\right.}$$

2.317 ODE No. 317

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

✓ **Mathematica** : cpu = 0.361391 (sec), leaf count = 23

$$\text{Solve}\left[c_1+\frac{x}{y(x)}=y(x)^2+\log(y(x))+\log(x),y(x)\right]$$

✓ **Maple** : cpu = 0.148 (sec), leaf count = 29

$$\left\{y(x)=e^{RootOf\left(-\left(e^{\_Z}\right)^3-e^{\_Z}\ln(x)+e^{\_Z}\_C1-\_Z\,e^{\_Z}+x\right)}\right\}$$

2.318 ODE No. 318

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

✓ **Mathematica** : cpu = 0.151758 (sec), leaf count = 2353

$$\left\{\{y(x)\to 0\},\left\{y(x)\to-\frac{\sqrt{\frac{8\sqrt[3]{2}x^4+8\sqrt[3]{2}x^3+2\left(2\sqrt[3]{16x^6+24x^5-3(9c_1^2-4)x^4+2x^3+3\sqrt{3}\sqrt{-x^7c_1^2(32x^3+48x^2-27c_1^2x+24x+4)}+\sqrt[3]{\cdots}}\right.}{x^2\sqrt[3]{1\cdots}}}}{\cdots}\right.\right.$$

✓ **Maple** : cpu = 0.022 (sec), leaf count = 28

$$\left\{x+(y(x))^{-2}-\frac{\_C1}{(y(x))^2}\frac{1}{\sqrt{(y(x))^2-2}}=0, y(x)=0\right\}$$

2.319 ODE No. 319

$$\left(7xy(x)^3+y(x)-5x\right)y'(x)+y(x)^4-5y(x)=0$$

✓ **Mathematica** : cpu = 0.0258067 (sec), leaf count = 302

$$\{\{y(x)\to \text{Root}\left[10\#1^7x+2\#1^5-100\#1^4x-25\#1^2+250\#1x-10c_1\&,1\right]\},\{y(x)\to \text{Root}\left[10\#1^7x+\right.$$

✓ **Maple** : cpu = 0.039 (sec), leaf count = 35

$$\left\{x+\frac{2(y(x))^5-25(y(x))^2-10\_C1}{10\,y(x)\left((y(x))^3-5\right)^2}=0\right\}$$

2.320 ODE No. 320

$$\left(x^2y(x)^3+xy(x)\right)y'(x)-1=0$$

✓ **Mathematica** : cpu = 0.0583244 (sec), leaf count = 76

$$\left\{\left\{y(x)\to -\frac{\sqrt{2xW\left(c_1e^{\frac{1}{2x}-1}\right)+2x-1}}{\sqrt{x}}\right\},\left\{y(x)\to \frac{\sqrt{2xW\left(c_1e^{\frac{1}{2x}-1}\right)+2x-1}}{\sqrt{x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.11 (sec), leaf count = 78

$$\left\{y(x)=\frac{1}{x}\sqrt{2\,x^2 lambertW\left(1/2\_C1\,\mathrm{e}^{-1/2\,\frac{2\,x-1}{x}}\right)+2\,x^2-x}, y(x)=-\frac{1}{x}\sqrt{2\,x^2 lambertW\left(1/2\_C1\,\mathrm{e}^{-1/2}\right.}\right.$$

2.321 ODE No. 321

$$\left(2x^2y(x)^3 + x^2y(x)^2 - 2x\right)y'(x) - 2y(x) - 1 = 0$$

✓ **Mathematica** : cpu = 0.302612 (sec), leaf count = 42

$$\text{Solve}\left[\frac{1}{64}\left(-4y(x)^2 + 4y(x) - \frac{16}{2xy(x)+x} - 2\log(8y(x)+4) + 3\right) = c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.195 (sec), leaf count = 42

$$\left\{y(x) = \frac{e^{RootOf\left(x\left(e^{\_Z}\right)^3 - 4x\left(e^{\_Z}\right)^2 + 8\_C1\, xe^{\_Z} + 2\_Z\, xe^{\_Z} + 3\, xe^{\_Z} + 16\right)}}{2} - \frac{1}{2}\right\}$$

2.322 ODE No. 322

$$\left(10x^2y(x)^3 - 3y(x)^2 - 2\right)y'(x) + 5xy(x)^4 + x = 0$$

✓ **Mathematica** : cpu = 0.204729 (sec), leaf count = 2097

$$\left\{\left\{y(x) \to -\frac{\sqrt{3}\sqrt{\frac{5\sqrt[3]{6}\sqrt[3]{189x^2-18c_1+\sqrt{3}\sqrt{27(21x^2-2c_1)^2-16(5x^4-10c_1x^2-2)^3}}\,x^2+\frac{10\ 6^{2/3}\left(5x^4-10c_1x^2-2\right)x^2}{\sqrt[3]{189x^2-18c_1+\sqrt{3}\sqrt{27\left(21x^2-2c_1\right)^2-16\left(5x^4-10c_1 \cdots\right.}}}}{x^4}}}{\cdots}\right.\right.$$

✓ **Maple** : cpu = 0.033 (sec), leaf count = 29

$$\left\{\frac{5\,x^2(y(x))^4}{2} - (y(x))^3 + \frac{x^2}{2} - 2\,y(x) + \_C1 = 0\right\}$$

2.323 ODE No. 323

$$xy'(x)\left(axy(x)^3+c\right)+y(x)\left(bx^3y(x)+c\right)=0$$

✓ **Mathematica** : cpu = 0.0461494 (sec), leaf count = 484

$$\left\{\left\{y(x)\to \frac{x(2c_1-bx^2)}{\sqrt[3]{3}\sqrt[3]{\sqrt{3}\sqrt{a^3x^4\left(27ac^2+x^2\left(bx^2-2c_1\right)^3\right)}+9a^2cx^2}}+\frac{\sqrt[3]{\sqrt{3}\sqrt{a^3x^4\left(27ac^2+x^2\left(bx^2-2c_1\right)^3\right)}}}{3^{2/3}ax}\right.\right.$$

✓ **Maple** : cpu = 0.134 (sec), leaf count = 630

$$\left\{y(x)=-\frac{3^{\frac{2}{3}}}{18\,ax}\left(\left(\left(3\,i\left(bx^2-2\_C1\right)x^2a+i\left(\left(\left(27\,c+3\sqrt{\frac{3\,b^3x^8-18\_C1\,b^2x^6+36\_C1^2bx^4-24\_}{a}}\right.\right.\right.\right.\right.\right.\right.$$

2.324 ODE No. 324

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

✓ **Mathematica** : cpu = 0.0342543 (sec), leaf count = 672

$$\left\{\left\{y(x)\to \frac{c_1x^2+\frac{x^4(c_1-2x)^2}{\sqrt[3]{12c_1x^8-6c_1^2x^7+c_1^3x^6+3\sqrt{3}\sqrt{x^8\left(-24c_1x^4+12c_1^2x^3-2c_1^3x^2+16x^5+27\right)}-8x^9-27x^4}}+\sqrt[3]{12c_1x^8-6c_1^2x^7+}}{6x^2}\right.\right.$$

✓ **Maple** : cpu = 0.14 (sec), leaf count = 815

$$\left\{y(x)=-\frac{1}{12\,x}\left(\left(-2\_C1\,x+4\,x^2\right)\sqrt[3]{\left(\_C1^3x^2-6\_C1^2x^3+12\_C1\,x^4-8\,x^5+3\sqrt{-6\_C1^3x^2+36}\right.}\right.\right.$$

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 = 0.0592898 (sec), leaf count = 133

$$\text{Solve}\left[7c_1+\log\left(1-\frac{y(x)}{x}\right)=\text{RootSum}\left[\#1^4+\#1^3+3\#1^2+\#1+1\&,\frac{8\#1^3\log\left(\frac{y(x)}{x}-\#1\right)+9\#1^2\right.\right.$$

✓ **Maple** : cpu = 0.632 (sec), leaf count = 124

$$\left\{-\frac{2}{7}\ln\left(\frac{4\,x^4+4\,x^3y(x)+12\,x^2(y(x))^2+4\,x(y(x))^3+4\,(y(x))^4}{x^4}\right)-\frac{2\sqrt{3}}{7}\arctan\left(\frac{\sqrt{3}(x+2\,y(x))}{3\,x}\right)+\right.$$

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 = 4.9544 (sec), leaf count = 13289

Too large to show

✓ **Maple** : cpu = 0.515 (sec), leaf count = 160

$$\left\{y(x)=\frac{x\left(\_C1\,x-bRootOf\left(b^2\_Z^4-2\,bx\_C1\,\_Z^3+\left(a^2x^2\_C1^2+b^2x^2\_C1^2+\_C1^2x^2-a^2\right)\_Z^2-\right.\right.}{aRootOf\left(b^2\_Z^4-2\,bx\_C1\,\_Z^3+\left(a^2x^2\_C1^2+b^2x^2\_C1^2+\_C1^2x^2-a^2\right)\_Z^2-2\,bx\right.}\right.$$

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 = 0.396922 (sec), leaf count = 575

$$\left\{\left\{y(x)\to\frac{\frac{2c_1\left(c_1+3x^2\right)}{\sqrt[3]{\frac{9}{2}\left(c_1^2+3\right)x^2+\frac{3}{2}\sqrt{3}\sqrt{-4c_1^3x^6+\left(-c_1^4+18c_1^2+27\right)x^4+4c_1^3x^2+c_1^3}}}+2^{2/3}\sqrt[3]{9\left(c_1^2+3\right)x^2+3\sqrt{3}\sqrt{-4c_1^3x^6+\left(-c_1^4\right.}}}{6x}\right.\right.$$

✓ **Maple** : cpu = 0.21 (sec), leaf count = 583

$$\left\{y(x) = \frac{1}{12\_C1\, x}\left(\left(\left(-12\, ix^2\_C1 - i\left(108\_C1^3 x^2 + 12\sqrt{3}\sqrt{27\_C1^4 x^2 + 18\_C1^2 x^2 + (4\,x^4 - 4)\_C\right.\right.\right.\right.\right.$$

2.328 ODE No. 328

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

✓ **Mathematica** : cpu = 0.126164 (sec), leaf count = 35

$$\text{Solve}\left[\frac{n(-\log(-axy(x)^n + n + 2) - 2\log(y(x)) + \log(x))}{n+2} = c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.218 (sec), leaf count = 33

$$\left\{\frac{((y(x))^n)^2 ((y(x))^n ax - n - 2)^n}{x^n} - \_C1 = 0\right\}$$

2.329 ODE No. 329

$$x^n y(x)^m (axy'(x) + by(x)) + \alpha xy'(x) + \beta y(x) = 0$$

✓ **Mathematica** : cpu = 0.413813 (sec), leaf count = 97

$$\text{Solve}\left[\frac{m((a\beta - \alpha b)\log(x^n y(x)^m(bm - an) - \alpha n + \beta m) + \alpha(bm - an)\log(y(x)(\beta m - \alpha n)) + \beta\log(x)(b\right.}{(bm - an)(\beta m - \alpha n)}$$

✓ **Maple** : cpu = 0.388 (sec), leaf count = 71

$$\left\{x^{\beta\, m(an - bm)}(x^n(an - bm)\,(y(x))^m - \beta\, m + \alpha\, n)^{-a\beta\, m + \alpha\, bm}\,((y(x))^m)^{\alpha\,(an - bm)} - \_C1 = 0\right\}$$

2.330 ODE No. 330

$$(f(y(x)+x)+1)y'(x)+f(y(x)+x)=0$$

✓ **Mathematica** : cpu = 55.4958 (sec), leaf count = 49

$$\text{Solve}\left[c_1=\int_1^{y(x)}\left(-\int_1^x f'(K[1]+K[2])\,dK[1]+f(K[2]+x)+1\right)dK[2]+\int_1^x f(K[1]+y(x))\,dK[1],y$$

✓ **Maple** : cpu = 0.039 (sec), leaf count = 22

$$\left\{y(x)=-x+\mathit{RootOf}\left(-x+\int^{\_Z}1+f(\_a)\,d\_a+\_C1\right)\right\}$$

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 = 56.0907 (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}]*Derivati
```

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

```
dsolve(diff(y(x),x)*sum(f[nu](x)*y(x)^nu,nu = 1 .. p)-sum(g[nu](x)*y(x)^nu,nu = 1 .. q
```

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 = 0.12029 (sec), leaf count = 23

$$\text{Solve}\left[c_1+\log(x)=\frac{2}{\sqrt{xy(x)}}+\log(y(x)),y(x)\right]$$

✓ **Maple** : cpu = 0.02 (sec), leaf count = 33

$$\left\{-1\left(1+\left(\_C1-\ln(x)+\frac{\ln(xy(x))}{2}\right)\sqrt{xy(x)}\right)\frac{1}{\sqrt{xy(x)}}=0\right\}$$

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 = 0.272697 (sec), leaf count = 53

$$\text{Solve}\left[\frac{\sqrt{xy(x)}\left(-3x^{3/2}y(x)^{3/2}(\log(x)-2\log(y(x)))-6xy(x)+2\right)}{3x^2y(x)^2}=c_1,y(x)\right]$$

✓ **Maple** : cpu = 0.112 (sec), leaf count = 32

$$\left\{\ln\left(y(x)\right)-1\frac{1}{\sqrt{x}}\frac{1}{\sqrt{y\left(x\right)}}+\frac{1}{3}(y(x))^{-\frac{3}{2}}x^{-\frac{3}{2}}-\frac{\ln\left(x\right)}{2}-\_C1=0\right\}$$

2.334 ODE No. 334

$$\left(\sqrt{y(x)+x}+1\right)y'(x)+1=0$$

✓ **Mathematica** : cpu = 0.0357573 (sec), leaf count = 39

$$\left\{\left\{y(x)\to-2\sqrt{c_1+x+1}+c_1+2\right\},\left\{y(x)\to 2\sqrt{c_1+x+1}+c_1+2\right\}\right\}$$

✓ **Maple** : cpu = 0.038 (sec), leaf count = 19

$$\left\{-y(x)-2\sqrt{y\left(x\right)+x}-\_C1=0\right\}$$

2.335 ODE No. 335

$$\sqrt{y(x)^2-1}y'(x)-\sqrt{x^2-1}=0$$

✓ **Mathematica** : cpu = 0.191568 (sec), leaf count = 75

$$\left\{\left\{y(x)\to\text{InverseFunction}\left[\frac{1}{2}\#1\sqrt{\#1^2-1}-\frac{1}{2}\log\left(\sqrt{\#1^2-1}+\#1\right)\&\right]\left[c_1+\frac{1}{2}\sqrt{x^2-1}x-\frac{1}{2}\log\left(\sqrt{\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.018 (sec), leaf count = 50

$$\left\{\_C1+x\sqrt{x^2-1}-\ln\left(x+\sqrt{x^2-1}\right)-y(x)\sqrt{\left(y\left(x\right)\right)^2-1}+\ln\left(y(x)+\sqrt{\left(y\left(x\right)\right)^2-1}\right)=0\right\}$$

2.336 ODE No. 336

$$\left(ax+\sqrt{y(x)^2+1}\right)y'(x)+ay(x)+\sqrt{x^2+1}=0$$

✓ **Mathematica** : cpu = 0.0752833 (sec), leaf count = 43

$$\text{Solve}\left[y(x)\left(2ax+\sqrt{y(x)^2+1}\right)+\sqrt{x^2+1}x+\sinh^{-1}(y(x))+\sinh^{-1}(x)=2c_1,y(x)\right]$$

✓ **Maple** : cpu = 0.039 (sec), leaf count = 41

$$\left\{\frac{x}{2}\sqrt{x^2+1}+\frac{\mathit{Arcsinh}(x)}{2}+axy(x)+\frac{y(x)}{2}\sqrt{(y(x))^2+1}+\frac{\mathit{Arcsinh}(y(x))}{2}+\_C1=0\right\}$$

2.337 ODE No. 337

$$\left(\sqrt{x^2+y(x)^2}+x\right)y'(x)-y(x)=0$$

✓ **Mathematica** : cpu = 0.059916 (sec), leaf count = 52

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

✓ **Maple** : cpu = 0.085 (sec), leaf count = 28

$$\left\{-\_C1+\frac{1}{(y(x))^2}\sqrt{(y(x))^2+x^2}+\frac{x}{(y(x))^2}=0\right\}$$

2.338 ODE No. 338

$$y'(x)\left(\sin(\alpha)\left(y(x)^2-x^2\right)-2x\cos(\alpha)y(x)+\sqrt{x^2+y(x)^2}y(x)\right)+\cos(\alpha)\left(y(x)^2-x^2\right)+2x\sin(\alpha)y(x)+x\sqrt{}$$

✓ **Mathematica** : cpu = 100.78 (sec), leaf count = 17681

Too large to show

✓ **Maple** : cpu = 0.835 (sec), leaf count = 129

$$\left\{y(x)=\mathit{RootOf}\left(-\ln(x)+\int^{\_Z}\frac{1}{(\_a^2+1)(\cos(2\alpha)\_a^2+2\_a\sin(2\alpha)+\_a^2-\cos(2\alpha)+1)}\left(-\cos\right.\right.\right.$$

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 = 0.12452 (sec), leaf count = 27

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

✓ **Maple** : cpu = 0.227 (sec), leaf count = 27

$$\left\{\arctan\left(\frac{y(x)}{x}\right)-\sqrt{x^2+(y(x))^2+1}-\_C1=0\right\}$$

2.340 ODE No. 340

$$y'(x)\left(\frac{\mathrm{e1}(a+x)}{\left((a+x)^2+y(x)^2\right)^{3/2}}+\frac{\mathrm{e2}(x-a)}{\left((x-a)^2+y(x)^2\right)^{3/2}}\right)-y(x)\left(\frac{\mathrm{e1}}{\left((a+x)^2+y(x)^2\right)^{3/2}}+\frac{\mathrm{e2}}{\left((x-a)^2+y(x)^2\right.}\right.$$

✗ **Mathematica** : cpu = 300. (sec), leaf count = 0 , timed out

`$Aborted`

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , exception

`time expired`

2.341 ODE No. 341

$$\left(xe^{y(x)}+e^x\right)y'(x)+e^xy(x)+e^{y(x)}=0$$

✓ **Mathematica** : cpu = 0.0538696 (sec), leaf count = 33

$$\left\{\left\{y(x)\to c_1e^{-x}-W\left(xe^{c_1e^{-x}-x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.079 (sec), leaf count = 33

$$\left\{y(x)=\frac{1}{\mathrm{e}^x}\left(-\mathit{lambertW}\left(\frac{x}{\mathrm{e}^x}\left(\mathrm{e}^{\frac{\_C1}{\mathrm{e}^x}}\right)^{-1}\right)\mathrm{e}^x-\_C1\right)\right\}$$

2.342 ODE No. 342

$$x\left(2e^{-xy(x)}+3e^{xy(x)}\right)\left(xy'(x)+y(x)\right)+1=0$$

✓ **Mathematica** : cpu = 0.291812 (sec), leaf count = 163

$$\left\{\left\{y(x)\to-\frac{\cosh^{-1}\left(\frac{1}{24}\left(-5\sqrt{\log^2\left(\frac{c_1}{x}\right)+24}-\log\left(\frac{c_1}{x}\right)\right)\right)}{x}\right\},\left\{y(x)\to\frac{\cosh^{-1}\left(\frac{1}{24}\left(-5\sqrt{\log^2\left(\frac{c_1}{x}\right)+24}\right.\right.}{x}\right.$$

✓ **Maple** : cpu = 0.051 (sec), leaf count = 17

$$\left\{y(x)=\frac{1}{x}\ln\left(-\frac{\ln(x)}{5}+\frac{\_C1}{5}\right)\right\}$$

2.343 ODE No. 343

$$y'(x)(\log(y(x))+x)-1=0$$

✓ **Mathematica** : cpu = 0.0659161 (sec), leaf count = 22

$$\text{Solve}\left[\log(y(x))+x=e^{y(x)}(c_1+\text{Ei}(-y(x))),y(x)\right]$$

✓ **Maple** : cpu = 0.11 (sec), leaf count = 27

$$\left\{y(x)=e^{RootOf\left(-x-\_Z-Ei\left(1,e^{-\_Z}\right)e^{e^{-\_Z}}+\_C1\,e^{e^{-\_Z}}\right)}\right\}$$

2.344 ODE No. 344

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

✓ **Mathematica** : cpu = 0.0205507 (sec), leaf count = 23

$$\left\{\left\{y(x)\to-\frac{W\left(-2c_1e^{-2x}\right)}{2c_1}\right\}\right\}$$

✓ **Maple** : cpu = 0.04 (sec), leaf count = 19

$$\left\{y(x)=e^{-lambertW\left(-2\,e^{-2\,x}\_C1\right)-2\,x}\right\}$$

2.345 ODE No. 345

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

✓ **Mathematica** : cpu = 0.0743713 (sec), leaf count = 23

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

✓ **Maple** : cpu = 0.082 (sec), leaf count = 36

$$\left\{y(x)=e^{\mathit{RootOf}\left(2\_Z\,x^2\left(e^{\_Z}\right)^2-x^2\left(e^{\_Z}\right)^2+2\_C1\,x^2+2\,e^{\_Z}\right)}\right\}$$

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 = 0.0866024 (sec), leaf count = 20

$$\text{Solve}[(ax-y(x))\log(xy(x))=c_1,y(x)]$$

✓ **Maple** : cpu = 0.307 (sec), leaf count = 19

$$\left\{(xy(x))^{-ax+y(x)}-\_C1=0\right\}$$

2.347 ODE No. 347

$$(\sin(x)+1)y'(x)\sin(y(x))+\cos(x)(\cos(y(x))-1)=0$$

✓ **Mathematica** : cpu = 0.141868 (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 = 0.201 (sec), leaf count = 16

$$\{y(x)=\pi-\arccos\left(\sin\left(x\right)\_C1+\_C1-1\right)\}$$

2.348 ODE No. 348

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

✓ **Mathematica** : cpu = 0.0545746 (sec), leaf count = 17

$$\text{Solve}[c_1=x\sin(y(x))+y(x)\sin(x),y(x)]$$

✓ **Maple** : cpu = 0.127 (sec), leaf count = 15

$$\{y(x)\sin(x)+x\sin(y(x))+\_C1=0\}$$

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 = 0.0490769 (sec), leaf count = 15

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

✓ **Maple** : cpu = 0.062 (sec), leaf count = 17

$$\left\{y(x)=\arcsin\left((2\ln(x)+2\_C1)^{-1}\right)x\right\}$$

2.350 ODE No. 350

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

✓ **Mathematica** : cpu = 0.632679 (sec), leaf count = 53

$$\left\{\left\{y(x)\to\csc^{-1}\left(\frac{1}{2}\left(-2c_1e^{-x}-\sin(x)-\cos(x)\right)\right)\right\},\left\{y(x)\to-\csc^{-1}\left(\frac{1}{2}\left(2c_1e^{-x}+\sin(x)+\cos(x)\right)\right)\right.$$

✓ **Maple** : cpu = 0.998 (sec), leaf count = 226

$$\left\{y(x)=\arctan\left(-2\frac{e^x}{e^x(\cos(x)+\sin(x))+2\_C1},\frac{\sqrt{16}}{4\_C1^2+4e^x(\cos(x)+\sin(x))\_C1+(e^x)^2(2\cos\right.\right.$$

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 = 0.405634 (sec), leaf count = 61

$$\left\{\left\{y(x) \to -\cot^{-1}\left(\sqrt{e^{x^2}\left(4c_1 - \sqrt{\pi}\operatorname{erf}(x)\right)}\right)\right\}, \left\{y(x) \to \cot^{-1}\left(\sqrt{e^{x^2}\left(4c_1 - \sqrt{\pi}\operatorname{erf}(x)\right)}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.497 (sec), leaf count = 55

$$\left\{y(x) = -\arcsin\left(\frac{1}{\sqrt{1 - \sqrt{\pi}\,\mathit{Erf}\,(x)\,\mathrm{e}^{x^2} - 2\_\mathit{C1}\,\mathrm{e}^{x^2}}}\right), y(x) = \arcsin\left(\frac{1}{\sqrt{1 - \sqrt{\pi}\,\mathit{Erf}\,(x)\,\mathrm{e}^{x^2} - 2\_\mathit{C1}\,\mathrm{e}^{x}}}\right.\right.$$

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 = 0.159641 (sec), leaf count = 32

$$\text{Solve}[c_1 + 2y(x) + \sin(2y(x)) + 2x + \sin(2x) = 4\sin(\alpha)\sin(x)\sin(y(x)), y(x)]$$

✓ **Maple** : cpu = 0.465 (sec), leaf count = 33

$$\left\{\frac{(-2\sin(\alpha)\sin(x) + \cos(y(x)))\sin(y(x))}{2} + \frac{\cos(x)\sin(x)}{2} + \frac{x}{2} + \_\mathit{C1} + \frac{y(x)}{2} = 0\right\}$$

2.353 ODE No. 353

$$xy'(x)\cos(y(x)) + \sin(y(x)) = 0$$

✓ **Mathematica** : cpu = 0.021492 (sec), leaf count = 14

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

✓ **Maple** : cpu = 0.1 (sec), leaf count = 12

$$\left\{y(x) = \arcsin\left(\frac{1}{\_\mathit{C1}\,x}\right)\right\}$$

2.354 ODE No. 354

$$y'(x)(x\sin(y(x))-1)+\cos(y(x))=0$$

✓ **Mathematica** : cpu = 0.0700131 (sec), leaf count = 145

$$\left\{\left\{y(x)\to -\cos^{-1}\left(\frac{c_1x-\sqrt{c_1^2-x^2+1}}{c_1^2+1}\right)\right\},\left\{y(x)\to \cos^{-1}\left(\frac{c_1x-\sqrt{c_1^2-x^2+1}}{c_1^2+1}\right)\right\},\left\{y(x)\to -\text{co}\right.\right.$$

✓ **Maple** : cpu = 0.06 (sec), leaf count = 108

$$\left\{y(x)=\arctan\left(\frac{1}{\_C1^2+1}\left(-\_C1\sqrt{\_C1^2-x^2+1}+x\right),\frac{1}{\_C1^2+1}\left(\_C1\,x+\sqrt{\_C1^2-x^2+1}\right)\right),\right.$$

2.355 ODE No. 355

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

✓ **Mathematica** : cpu = 0.0539547 (sec), leaf count = 17

$$\text{Solve}[c_1=x\sin(y(x))+y(x)\cos(x),y(x)]$$

✓ **Maple** : cpu = 0.109 (sec), leaf count = 15

$$\{y(x)\cos(x)+x\sin(y(x))+\_C1=0\}$$

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 = 0.0718982 (sec), leaf count = 21

$$\text{Solve}\left[c_1=x^2\sin(y(x))+y(x)^2\sin(x),y(x)\right]$$

✓ **Maple** : cpu = 0.127 (sec), leaf count = 19

$$\left\{(y(x))^2\sin(x)+x^2\sin(y(x))+\_C1=0\right\}$$

2.357 ODE No. 357

$$x\log(x)y'(x)\sin(y(x)) + \cos(y(x))(1 - x\cos(y(x))) = 0$$

✓ **Mathematica** : cpu = 0.328376 (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 = 0.563 (sec), leaf count = 13

$$\left\{y(x) = \arccos\left(\frac{\ln(x)}{x + \_C1}\right)\right\}$$

2.358 ODE No. 358

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

✓ **Mathematica** : cpu = 0.0471148 (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 = 0.119 (sec), leaf count = 11

$$\left\{y(x) = \arccos\left(\frac{\_C1}{\cos(x)}\right)\right\}$$

2.359 ODE No. 359

$$3\sin(x)y'(x)\sin(y(x)) + 5y(x)\cos^4(x) = 0$$

✓ **Mathematica** : cpu = 0.0632189 (sec), leaf count = 42

$$\left\{\left\{y(x) \to \text{SinIntegral}^{(-1)}\left(c_1 - \frac{5}{36}\left(15\cos(x) + \cos(3x) + 12\left(\log\left(\sin\left(\frac{x}{2}\right)\right) - \log\left(\cos\left(\frac{x}{2}\right)\right)\right)\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.069 (sec), leaf count = 28

$$\left\{\frac{\cos(3x)}{12} + \frac{5\cos(x)}{4} + \ln(\csc(x) - \cot(x)) + \frac{3\,Si(y(x))}{5} + \_C1 = 0\right\}$$

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 = 5.6072 (sec), leaf count = 369

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[-\frac{i(\cos(\#1a)+1)\sqrt{\frac{2c\cos(\#1a)+\cos(2\#1a)-1}{(\cos(\#1a)+1)^2}}\sqrt{\frac{c\tan^2\left(\frac{\#1a}{2}\right)+\sqrt{c^2+4}+2}{\sqrt{c^2+4}+2}}\sqrt{1-\frac{c\tan^2\left(\#\right.}{\sqrt{c^2+4}}}}{a\left(c^2-1\right)\sqrt{\frac{}{4-2\sqrt{}}}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.361 (sec), leaf count = 48

$$\left\{x + \int^{y(x)} 2\frac{\cos(\_a\, a)}{b\left(c\cos(\_a\, a) - 1\right)\sqrt{2\cos(2\_a\, a) - 2 + 4c\cos(\_a\, a)}}d\_a + \_C1 = 0\right\}$$

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 = 0.3685 (sec), leaf count = 23

$$\text{Solve}[c_1 + \cos(xy(x)) = \sin(y(x)+x) + \cos(y(x)) + \sin(x), y(x)]$$

✓ **Maple** : cpu = 0.249 (sec), leaf count = 22

$$\{-\cos(xy(x)) + \sin(x) + \sin(y(x)+x) + \cos(y(x)) + \_C1 = 0\}$$

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 = 0.102191 (sec), leaf count = 20

$$\text{Solve}[c_1 + 4\log(y(x)) + \cos(xy(x)) + \log(x) = 0, y(x)]$$

✓ **Maple** : cpu = 0.299 (sec), leaf count = 23

$$\left\{y(x) = \frac{1}{x}\mathit{RootOf}\left(-\_Z + e^{-\frac{\cos(\_Z)}{4}}\_C1\, x^{\frac{3}{4}}\right)\right\}$$

2.363 ODE No. 363

$$(xy'(x) - y(x))\cos^2\left(\frac{y(x)}{x}\right) + x = 0$$

✓ **Mathematica** : cpu = 0.0483832 (sec), leaf count = 28

$$\text{Solve}\left[4c_1 = \frac{2y(x)}{x} + \sin\left(\frac{2y(x)}{x}\right) + 4\log(x), y(x)\right]$$

✓ **Maple** : cpu = 0.082 (sec), leaf count = 35

$$\left\{-\frac{1}{2\,x}\left(\cos\left(\frac{y(x)}{x}\right)\sin\left(\frac{y(x)}{x}\right)x + y(x)\right) - \ln(x) - \_C1 = 0\right\}$$

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 = 0.0853458 (sec), leaf count = 27

$$\text{Solve}\left[c_1 + \log\left(\frac{y(x)}{x}\right) + \log\left(\cos\left(\frac{y(x)}{x}\right)\right) + 2\log(x) = 0, y(x)\right]$$

✓ **Maple** : cpu = 0.128 (sec), leaf count = 23

$$\left\{y(x) = \frac{\_C1}{\cos\left(\mathit{RootOf}\left(-\_Z\,\cos(\_Z)\,x^2 + \_C1\right)\right)x}\right\}$$

2.365 ODE No. 365

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

✗ **Mathematica** : cpu = 299.997 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.41 (sec), leaf count = 42

$$\left\{y(x) = x\left(\tan\left(\mathit{RootOf}\left(-2\_Z - \int^{\frac{x^2\left((\tan(\_Z))^2+1\right)}{(\tan(\_Z))^2}}\frac{f(\_a)}{\_a}d\_a + 2\_C1\right)\right)\right)^{-1}\right\}$$

2.366 ODE No. 366

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

✗ **Mathematica** : cpu = 299.996 (sec), leaf count = 0 , timed out

```
$Aborted
```

✓ **Maple** : cpu = 0.113 (sec), leaf count = 45

$$\left\{-ax(y(x))^2\frac{1}{\sqrt{a^2\left(y\left(x\right)\right)^2}}-\int^{-\frac{a(y(x))^2}{2}-\frac{x^2}{2}}f(-2\_a)\,d\_a+\_C1=0\right\}$$

2.367 ODE No. 367

$$f(x^cy(x))\left(bxy'(x)-a\right)-x^ay(x)^b\left(cy(x)+xy'(x)\right)=0$$

✗ **Mathematica** : cpu = 13.9811 (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*Derivati
```

✗ **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 = 299.998 (sec), leaf count = 0 , timed out

```
$Aborted
```

✗ **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 = 0.0401001 (sec), leaf count = 99

$$\left\{\left\{y(x)\to -\frac{a\tan(x-c_1)}{\sqrt{\sec^2(x-c_1)}}\right\},\left\{y(x)\to \frac{a\tan(x-c_1)}{\sqrt{\sec^2(x-c_1)}}\right\},\left\{y(x)\to -\frac{a\tan(c_1+x)}{\sqrt{\sec^2(c_1+x)}}\right\},\left\{y(x)\to \frac{a\,\mathrm{t}}{\sqrt{\mathrm{s}}}\right.\right.$$

✓ **Maple** : cpu = 0.167 (sec), leaf count = 68

$$\left\{y(x)=a, y(x)=\tan(-x+\_C1)\sqrt{\frac{a^2}{(\tan(-x+\_C1))^2+1}}, y(x)=-a, y(x)=-\tan(-x+\_C1)\sqrt{\right.$$

2.370 ODE No. 370

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

✗ **Mathematica** : cpu = 17.672 (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 = 0.0270578 (sec), leaf count = 35

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

✓ **Maple** : cpu = 0.097 (sec), leaf count = 20

$$\left\{y(x)=1, y(x)=\left(\tan\left(-\frac{x}{2}+\frac{\_C1}{2}\right)\right)^2+1\right\}$$

2.372 ODE No. 372

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

✓ **Mathematica** : cpu = 0.0195565 (sec), leaf count = 27

$$\{\{y(x) \to \wp(x - c_1; a, b)\}, \{y(x) \to \wp(x + c_1; a, b)\}\}$$

✓ **Maple** : cpu = 0.081 (sec), leaf count = 232

$$\left\{y(x) = \frac{1}{6}\left(\left(27\,b + 3\,\sqrt{-3\,a^3 + 81\,b^2}\right)^{\frac{2}{3}} + 3\,a\right)\frac{1}{\sqrt[3]{27\,b + 3\,\sqrt{-3\,a^3 + 81\,b^2}}}, y(x) = -\frac{1}{12}\left(\left(i\left(27\,b + 3\,\sqrt{-\right.\right.\right.$$

2.373 ODE No. 373

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

✓ **Mathematica** : cpu = 0.234097 (sec), leaf count = 185

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

✓ **Maple** : cpu = 0.596 (sec), leaf count = 49

$$\left\{y(x) = \left(\mathrm{e}^{-\sin(a(x-\_C1))}\right)^{-1}, y(x) = \mathrm{e}^{-\sin(a(x-\_C1))}, y(x) = \mathrm{e}^{RootOf\left(a^2\left(\mathrm{e}^{\_Z}\right)^2\left(\_Z^2-1\right)\right)}\right\}$$

2.374 ODE No. 374

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

✓ **Mathematica** : cpu = 0.066524 (sec), leaf count = 73

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[-\frac{\sqrt{\#1^2+1}}{\#1} - \frac{1}{\#1} + \sinh^{-1}(\#1)\&\right][c_1 - x]\right\}, \left\{y(x) \to \text{InverseFunction}\left[\right.\right.\right.$$

✓ **Maple** : cpu = 0.04 (sec), leaf count = 85

$$\left\{x - (y(x))^{-1} - \frac{1}{y(x)}\left((y(x))^2 + 1\right)^{\frac{3}{2}} + y(x)\sqrt{(y(x))^2 + 1} + Arcsinh(y(x)) - \_C1 = 0, x + \frac{1}{y(x)}\left((y(x)\right.\right.$$

2.375 ODE No. 375

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

✓ **Mathematica** : cpu = 0.0454889 (sec), leaf count = 68

$$\left\{\left\{y(x) \to c_1 - \frac{(a^2 - 4bx)^{3/2} + 6abx}{12b}\right\}, \left\{y(x) \to \frac{1}{2}\left(\frac{(a^2 - 4bx)^{3/2}}{6b} - ax\right) + c_1\right\}\right\}$$

✓ **Maple** : cpu = 0.04 (sec), leaf count = 49

$$\left\{y(x) = -\frac{ax}{2} - \frac{1}{12\,b}(a^2 - 4\,bx)^{\frac{3}{2}} + \_C1, y(x) = -\frac{ax}{2} + \frac{1}{12\,b}(a^2 - 4\,bx)^{\frac{3}{2}} + \_C1\right\}$$

2.376 ODE No. 376

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

✓ **Mathematica** : cpu = 0.339892 (sec), leaf count = 110

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[-\frac{\sqrt{a^2 - 4\#1b} + a\log\left(\sqrt{a^2 - 4\#1b} - a\right)}{2b}\&\right]\left[c_1 + \frac{x}{2}\right]\right\}, \left\{y(x) \to \text{InverseF}\right.\right.$$

✓ **Maple** : cpu = 0.749 (sec), leaf count = 219

$$\left\{y(x) = -\frac{1}{4\,b}\mathrm{e}^{\frac{1}{2\,a}\left(-2\,alambertW\left(2\,\frac{\mathrm{e}^{-1}}{a}\mathrm{e}^{\frac{\_C1\,b}{a}}\frac{1}{\sqrt{-b^{-1}}}\left(\mathrm{e}^{\frac{bx}{a}}\right)^{-1}\right)-a\ln(-\frac{1}{4\,b})-2\,a+(-2\,x+2\_C1)b\right)}\left(\mathrm{e}^{\frac{1}{2\,a}\left(-2\,alambertW\left(2\,\frac{\mathrm{e}^{-1}}{a}\mathrm{e}^{-}\right.\right.}\right.\right.$$

2.377 ODE No. 377

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

✓ **Mathematica** : cpu = 0.00449866 (sec), leaf count = 17

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

✓ **Maple** : cpu = 0.022 (sec), leaf count = 24

$$\left\{y(x) = -\frac{x^2}{4} + x, y(x) = 1 + \_C1^2 + (x-2)\_C1\right\}$$

2.378 ODE No. 378

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

✓ **Mathematica** : cpu = 0.00529414 (sec), leaf count = 13

$$\{\{y(x)\to c_1(a+c_1+x)\}\}$$

✓ **Maple** : cpu = 0.023 (sec), leaf count = 20

$$\left\{y(x)=\_C1\,(\_C1+a+x)\,,y(x)=-\frac{(x+a)^2}{4}\right\}$$

2.379 ODE No. 379

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

✓ **Mathematica** : cpu = 0.00447594 (sec), leaf count = 15

$$\{\{y(x)\to c_1(-c_1+x+1)\}\}$$

✓ **Maple** : cpu = 0.022 (sec), leaf count = 22

$$\left\{y(x)=\_C1\,(-\_C1+x+1)\,,y(x)=\frac{(1+x)^2}{4}\right\}$$

2.380 ODE No. 380

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

✓ **Mathematica** : cpu = 0.492589 (sec), leaf count = 1445

$$\left\{\left\{y(x)\to\frac{1}{36}\left(-9x^2-\frac{9(x^3+8\cosh(3c_1)+8}{\sqrt[3]{x^6-20\cosh(3c_1)\,x^3-20\sinh(3c_1)\,x^3-8\cosh(6c_1)-8\sinh(6c_1)+8\sqrt{-((}}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.046 (sec), leaf count = 619

$$\left\{y(x)=\frac{1}{16}\left(i\left(6\_C1-x^3+2\sqrt{-3\_C1\,x^3+9\_C1^2}\right)^{\frac{2}{3}}\sqrt{3}-i\sqrt{3}x^2-\left(6\_C1-x^3+2\sqrt{-3\_C1\,x^3}\right.\right.\right.$$

2.381 ODE No. 381

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

✓ **Mathematica** : cpu = 0.505699 (sec), leaf count = 1445

$$\left\{\left\{y(x) \to \frac{1}{36}\left(9x^2 + \frac{9(x^3 + 8\cosh(3c_1) + 8\sin}{\sqrt[3]{x^6 - 20\cosh(3c_1)x^3 - 20\sinh(3c_1)x^3 - 8\cosh(6c_1) - 8\sinh(6c_1) + 8\sqrt{-((x}}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.04 (sec), leaf count = 579

$$\left\{y(x) = -\frac{1}{16}\left(i\left(-6\_C1 + x^3 + 2\sqrt{-3\_C1\,x^3 + 9\_C1^2}\right)^{\frac{2}{3}}\sqrt{3} - i\sqrt{3}x^2 - \left(-6\_C1 + x^3 + 2\sqrt{-3\_\right.\right.\right.$$

2.382 ODE No. 382

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

✓ **Mathematica** : cpu = 0.289062 (sec), leaf count = 186

$$\left\{\left\{y(x) \to \frac{1}{4}x\sqrt{x^2(a^2+4b)+4c} + \frac{c\log\left(\sqrt{a^2+4b}\sqrt{x^2(a^2+4b)+4c} + a^2x + 4bx\right)}{\sqrt{a^2+4b}} - \frac{ax^2}{4} + c_1\right\}, \left\{y\right.\right.$$

✓ **Maple** : cpu = 0.04 (sec), leaf count = 146

$$\left\{y(x) = -\frac{x}{4}\sqrt{(a^2+4b)x^2+4c} - c\ln\left(\sqrt{a^2+4b}x + \sqrt{(a^2+4b)x^2+4c}\right)\frac{1}{\sqrt{a^2+4b}} - \frac{ax^2}{4} + \_C1, y(x\right.$$

2.383 ODE No. 383

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

✗ **Mathematica** : cpu = 300. (sec), leaf count = 0 , timed out

```
$Aborted
```

✗ **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 = 2.16568 (sec), leaf count = 133

$$\left\{\left\{y(x) \to -\frac{2\sqrt{-a^4e^{2c_1}(x+1)^2} + a^3(-(2x+1)) + 2a^2bx + a(b^2 + e^{2c_1} - 4c)}{4a^2}\right\}, \left\{y(x) \to \frac{2\sqrt{-a^4e^{2c_1}(x}{}\right.\right.$$

✓ **Maple** : cpu = 0.028 (sec), leaf count = 50

$$\left\{y(x) = \frac{\_C1^2 + (ax+b)\_C1 + c}{a}, y(x) = \frac{-a^2x^2 - 2\,abx - b^2 + 4\,c}{4\,a}\right\}$$

2.385 ODE No. 385

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

✗ **Mathematica** : cpu = 301.968 (sec), leaf count = 0 , timed out

```
$Aborted
```

✓ **Maple** : cpu = 0.535 (sec), leaf count = 169

$$\left\{y(x) = \frac{x^4 - \left(RootOf\left(x^{16} - 12\,\_Z^2x^{12} + 16\,\_Z^3x^{10} + 30\,\_Z^4x^8 - 96\,\_Z^5x^6 + 100\,\_Z^6x^4 - 48\,\_Z^7x^2\right.\right.}{2\,x}\right.$$

2.386 ODE No. 386

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

✓ **Mathematica** : cpu = 0.232011 (sec), leaf count = 98

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

✓ **Maple** : cpu = 0.781 (sec), leaf count = 27

$$\left\{y(x) = -\frac{ax^4}{8}, y(x) = \_C1\, x^2 + 2\frac{\_C1^2}{a}\right\}$$

2.387 ODE No. 387

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

✓ **Mathematica** : cpu = 0.908611 (sec), leaf count = 133

$$\left\{\text{Solve}\left[\frac{e^{x/2}\sqrt{4y(x)+e^x} + 4y(x)\log\left(\sqrt{4y(x)+e^x} + e^{x/2}\right) - e^x}{2y(x)} = c_1, y(x)\right], \text{Solve}\left[2\log(y(x)) = c_1 +\right.\right.$$

✓ **Maple** : cpu = 1.367 (sec), leaf count = 115

$$\left\{\ln(y(x)) - \frac{1}{2\,y(x)}\sqrt{e^{2\,x} + 4\,y(x)\,e^x} - 2\,Artanh\left(\sqrt{e^{2\,x} + 4\,y(x)\,e^x}e^{-x}\right) - \frac{e^x}{2\,y(x)} - \_C1 = 0, \ln(y(x))\right.$$

2.388 ODE No. 388

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

✓ **Mathematica** : cpu = 0.768753 (sec), leaf count = 41

$$\text{Solve}\left[\left\{x = \frac{\text{K\$1846402}(2c_1 + \sinh^{-1}(\text{K\$1846402}))}{2\sqrt{\text{K\$1846402}^2 + 1}}, \text{K\$1846402} = 2\left(\frac{x}{\text{K\$1846402}} + y(x)\right)\right\}, \{y(x), \text{K\$1}\right.$$

✓ **Maple** : cpu = 0.175 (sec), leaf count = 223

$$\left\{1\left(\left(\frac{y(x)}{2}-\frac{1}{2}\sqrt{(y(x))^2+2x}\right)Arcsinh\left(-y(x)+\sqrt{(y(x))^2+2x}\right)+x\sqrt{2(y(x))^2+2x-2y(x)\sqrt{(}\right.\right.$$

2.389 ODE No. 389

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

✓ **Mathematica** : cpu = 0.0484552 (sec), leaf count = 55

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

✓ **Maple** : cpu = 2.236 (sec), leaf count = 71

$$\left\{y(x)=-\frac{1}{4},y(x)=\frac{1}{\_C1}\left(-(\mathrm{e}^x)^2\sqrt{-\frac{\_C1}{(\mathrm{e}^x)^2}}+\_C1\right)\frac{1}{\sqrt{-\frac{\_C1}{(\mathrm{e}^x)^2}}},y(x)=-\frac{1}{\_C1}\left((\mathrm{e}^x)^2\sqrt{-\frac{\_C1}{(\mathrm{e}^x)^2}}+\_C1\right.\right.$$

2.390 ODE No. 390

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

✓ **Mathematica** : cpu = 2.26281 (sec), leaf count = 82

$$\text{Solve}\left[\left\{\left\{\frac{c}{b}+x=\frac{\text{K\$1846815}\left(\tan^{-1}\left(\frac{\sqrt{a}\text{K\$1846815}}{\sqrt{b-a\text{K\$1846815}^2}}\right)+\sqrt{a}c_1\right)}{\sqrt{a}\sqrt{b-a\text{K\$1846815}^2}},y(x)=\frac{bx+c-\text{K\$1846815}^2}{a\text{K\$1846815}}\right\},\{y(x),\text{K}\right.\right.$$

✓ **Maple** : cpu = 1.085 (sec), leaf count = 281

$$\left\{y(x)=2\frac{\mathrm{e}^{RootOf\left(\sqrt{a}\_C1\,b\mathrm{e}^{2\_Z}-\mathrm{e}^{2\_Z}abx-\mathrm{e}^{2\_Z}\_Z\,b-\mathrm{e}^{2\_Z}ac+\sqrt{a}\_C1\,b^2+ab^2x-\_Z\,b^2+abc\right)}\left(-1/4\left(\mathrm{e}^{2\,RootOf\left(\sqrt{a}\_C1\,b\mathrm{e}^{2\_Z}\right.}\right.\right.}{a^{3/2}\left(\mathrm{e}^{2\,RootOf\left(\sqrt{a}\_\right.}\right.}\right.$$

2.391 ODE No. 391

$$y'(x)(ay(x)+bx)+abxy(x)+y'(x)^2=0$$

✓ **Mathematica** : cpu = 0.00597026 (sec), leaf count = 29

$$\left\{\left\{y(x)\to c_1e^{-ax}\right\},\left\{y(x)\to c_1-\frac{bx^2}{2}\right\}\right\}$$

✓ **Maple** : cpu = 0.039 (sec), leaf count = 22

$$\left\{y(x)=\_C1\,\mathrm{e}^{-ax},y(x)=-\frac{bx^2}{2}+\_C1\right\}$$

2.392 ODE No. 392

$$y(x)^2\log(ay(x))-xy(x)y'(x)+y'(x)^2=0$$

✓ **Mathematica** : cpu = 0.254525 (sec), leaf count = 25

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

✓ **Maple** : cpu = 1.853 (sec), leaf count = 50

$$\left\{y(x)=\frac{1}{a}\mathrm{e}^{\frac{x^2}{4}},y(x)=\frac{1}{\mathrm{e}^{\_C1^2}\mathrm{e}^{\_C1\,x}a},y(x)=\frac{\mathrm{e}^{\_C1\,x}}{\mathrm{e}^{\_C1^2}a}\right\}$$

2.393 ODE No. 393

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

✓ **Mathematica** : cpu = 0.0345138 (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 = 0.265 (sec), leaf count = 77

$$\left\{y(x)=\frac{\_C1}{\tan(x)}\left(1+\sqrt{(\tan(x))^2+1}\right)\frac{1}{\sqrt{\frac{(\tan(x))^2}{(\tan(x))^2+1}}},y(x)=\frac{\_C1\,((\tan(x))^2+1)}{\tan(x)}\sqrt{\frac{(\tan(x))^2}{(\tan(x))^2+1}}\Bigl(1+$$

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 = 55.0923 (sec), leaf count = 0 , could not solve

```
DSolve[-((-f[x]^2 + g[x])/E^(2*Integrate[f[xp], {xp, a, x}])) + g[x]*y[x]^2 + 2*f[x]*y
```

✓ **Maple** : cpu = 7.263 (sec), leaf count = 109

$$\left\{y(x)=\tan\left(-\int\left(\mathrm{e}^{\int_a^x f(xp)\,\mathrm{d}xp}\right)^2\sqrt{\frac{g(x)-(f(x))^2}{\left(\mathrm{e}^{\int_a^x f(xp)\,\mathrm{d}xp}\right)^4}}\,\mathrm{d}x+\_C1\right)\sqrt{\mathrm{e}^{-2\int_a^x f(xp)\,\mathrm{d}xp}\left(\left(\tan\left(-\int\left(\mathrm{e}^{\int_a^x f(xp)}\right.\right.\right.\right.}\right.$$

2.395 ODE No. 395

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

✗ **Mathematica** : cpu = 32.3632 (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 ==
```

✗ **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 = 0.0110695 (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 = 0.047 (sec), leaf count = 20

$$\left\{y(x)=(x+\_C1)^{-1},y(x)=\mathrm{e}^{\frac{x^2}{2}}\_C1\right\}$$

2.397 ODE No. 397

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

✓ **Mathematica** : cpu = 0.661879 (sec), leaf count = 136

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

✓ **Maple** : cpu = 0.765 (sec), leaf count = 128

$$\left\{y(x)=\frac{-2\sqrt{2}x^2-2\_C1}{2\_C1\,x^4-\_C1^3},y(x)=\frac{2\sqrt{2}x^2-2\_C1}{2\_C1\,x^4-\_C1^3},y(x)=\frac{\left(\sqrt{2}x^2\_C1-2\right)\_C1^2}{2\_C1^2x^4-4},y(x)=-4\,x^{-4},y\right.$$

2.398 ODE No. 398

$$y'(x)^2-3xy(x)^{2/3}y'(x)+9y(x)^{5/3}=0$$

✓ **Mathematica** : cpu = 1.05023 (sec), leaf count = 169

$$\left\{\text{Solve}\left[\frac{1}{6}\left(\frac{\left(x^2-4\sqrt[3]{y(x)}\right)^{3/2}y(x)^2\left(6\log\left(\sqrt{x^2-4\sqrt[3]{y(x)}}+x\right)-\log(y(x))\right)}{\left(\left(x^2-4\sqrt[3]{y(x)}\right)y(x)^{4/3}\right)^{3/2}}+\log(y(x))\right)=c_1,y(\right.\right.$$

✓ **Maple** : cpu = 2.563 (sec), leaf count = 138

$$\left\{\ln(x)+\frac{1}{6}\ln\left(64\frac{y(x)}{x^6}-1\right)-\frac{1}{6}\ln\left(4\sqrt[3]{\frac{y(x)}{x^6}}-1\right)-\frac{1}{6}\ln\left(16\left(\frac{y(x)}{x^6}\right)^{2/3}+4\sqrt[3]{\frac{y(x)}{x^6}}+1\right)+\frac{1}{6}\ln\left(\right.\right.$$

2.399 ODE No. 399

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

✓ **Mathematica** : cpu = 0.00471784 (sec), leaf count = 15

$$\{\{y(x) \to c_1(2c_1 + x - 1)\}\}$$

✓ **Maple** : cpu = 0.021 (sec), leaf count = 22

$$\left\{ y(x) = \_C1\ (2\_C1 + x - 1)\,, y(x) = -\frac{(x-1)^2}{8} \right\}$$

2.400 ODE No. 400

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

✓ **Mathematica** : cpu = 0.482218 (sec), leaf count = 183

$$\left\{ \text{Solve}\left[\frac{1}{3}\left(\frac{\sqrt{x^4 - 6xy(x)}\left(\log\left(1 - \frac{x^{3/2}}{\sqrt{x^3-6y(x)}}\right) - \log\left(\frac{x^{3/2}}{\sqrt{x^3-6y(x)}} + 1\right)\right)}{\sqrt{x}\sqrt{x^3 - 6y(x)}} + \log(y(x)) \right) = c_1, y(x) \right], \text{Solv}$$

✓ **Maple** : cpu = 0.361 (sec), leaf count = 74

$$\left\{ y(x) = \frac{x^3}{6}, y(x) = \frac{1}{3\_C1}\left(-\sqrt{-6\_C1\ xx} + 3\right), y(x) = \frac{1}{3\_C1}\left(\sqrt{-6\_C1\ xx} + 3\right), y(x) = -\frac{x}{3}\sqrt{-6}\right.$$

2.401 ODE No. 401

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

✓ **Mathematica** : cpu = 0.354048 (sec), leaf count = 1093

$$\{\{y(x) \to \text{Root}\left[-16e^{6c_1}x^6 + 3\#1^4x^4 + 144e^{6c_1}\#1x^4 - 24\#1^5x^2 - 378e^{6c_1}\#1^2x^2 + 243e^{12c_1} + 48\#1^6 + 2\right.$$

✓ **Maple** : cpu = 0.099 (sec), leaf count = 580

$$\left\{ y(x) = -\frac{1}{48}\left(i\left(-54\_C1 + x^3 + 6\sqrt{-3\_C1\ x^3 + 81\_C1^2}\right)^{\frac{2}{3}}\sqrt{3} - i\sqrt{3}x^2 - \left(-54\_C1 + x^3 + 6\sqrt{-}\right.\right.\right.$$

2.402 ODE No. 402

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

✗ **Mathematica** : cpu = 300.62 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.245 (sec), leaf count = 101

$$\left\{ y(x) = -\frac{x^2}{3}, y(x) = \frac{-3\_C1^2x^2 - 2\sqrt{3}\_C1\,x + 3}{12\_C1^2}, y(x) = \frac{-3\_C1^2x^2 + 2\sqrt{3}\_C1\,x + 3}{12\_C1^2}, y(x) = -\frac{\sqrt{}}{}\right.$$

2.403 ODE No. 403

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

✓ **Mathematica** : cpu = 0.329527 (sec), leaf count = 116

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[\frac{\sqrt{4\#1a + b^2} + b\log\left(\sqrt{4\#1a + b^2} - b\right)}{2a}\&\right]\left[\frac{x}{2a} + c_1\right]\right\}, \left\{y(x) \to \text{InverseFu}\right.\right.$$

✓ **Maple** : cpu = 3.199 (sec), leaf count = 197

$$\left\{ y(x) = \frac{1}{4\,a}\mathrm{e}^{-\frac{1}{2\,b}\left(2\,b\mathit{lambertW}\left(2\,\frac{\mathrm{e}^{-1}}{b\sqrt{a-1}}\mathrm{e}^{\frac{x}{b}}\left(\mathrm{e}^{-\frac{\_C1}{b}}\right)^{-1}\right)+b\ln\left(\frac{1}{4\,a}\right)+2\_C1+2\,b-2\,x\right)}\left(\mathrm{e}^{-\frac{1}{2\,b}\left(2\,b\mathit{lambertW}\left(2\,\frac{\mathrm{e}^{-1}}{b\sqrt{a-1}}\mathrm{e}^{\frac{x}{b}}\left(\mathrm{e}^{-\frac{\_C1}{b}}\right)^{-1}\right.\right.}\right.\right.$$

2.404 ODE No. 404

$$ay'(x)^2 + bx^2y'(x) + cxy(x) = 0$$

✗ **Mathematica** : cpu = 300.001 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.48 (sec), leaf count = 389

$$\left\{ \int_{\_b}^{x} 1\left(-b\_a^2 - \sqrt{\_a^4b^2 - 4\_a\,acy(x)}\right)\left(b\_a^3 + \sqrt{\_a^4b^2 - 4\_a\,acy(x)}\_a + 6\,ay(x)\right)^{-1}\mathrm{d}\_a + \int^{y(x)}\right.$$

2.405 ODE No. 405

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

✓ **Mathematica** : cpu = 1.32885 (sec), leaf count = 40

$$\text{Solve}\left[\left\{x = \frac{\text{K\$1887439}(a\sin^{-1}(\text{K\$1887439}) + c_1)}{\sqrt{1 - \text{K\$1887439}^2}}, a\text{K\$1887439} + y(x) = \frac{x}{\text{K\$1887439}}\right\}, \{y(x), \text{K\$18874}$$

✓ **Maple** : cpu = 0.47 (sec), leaf count = 378

$$\left\{ \_C1\left(y(x) - \sqrt{4\,ax + (y\,(x))^2}\right) \frac{1}{\sqrt{\frac{1}{a}\left(-y\,(x) + \sqrt{4\,ax + (y\,(x))^2} - 2\,a\right)}} \frac{1}{\sqrt{\frac{1}{a}\left(-y\,(x) + \sqrt{4\,ax + (y\,(x}\right.}}\right.$$

2.406 ODE No. 406

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

✓ **Mathematica** : cpu = 0.989952 (sec), leaf count = 38

$$\text{Solve}\left[\left\{x = \frac{\text{K\$1887624}(a\sinh^{-1}(\text{K\$1887624}) + c_1)}{\sqrt{\text{K\$1887624}^2 + 1}}, a\text{K\$1887624} = \frac{x}{\text{K\$1887624}} + y(x)\right\}, \{y(x), \text{K\$188}$$

✓ **Maple** : cpu = 0.189 (sec), leaf count = 262

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

2.407 ODE No. 407

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

✓ **Mathematica** : cpu = 0.0170564 (sec), leaf count = 41

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

✓ **Maple** : cpu = 0.074 (sec), leaf count = 39

$$\left\{y(x)=0, y(x)=\frac{1}{x}\left(-x+\sqrt{\_C1\,x}\right)^2, y(x)=\frac{1}{x}\left(x+\sqrt{\_C1\,x}\right)^2\right\}$$

2.408 ODE No. 408

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

✓ **Mathematica** : cpu = 1.13086 (sec), leaf count = 163

$$\left\{\text{Solve}\left[\frac{\left(\sqrt{\frac{2y(x)}{x}-1}-1\right)\left(\left(\sqrt{\frac{2y(x)}{x}-1}-1\right)\log\left(\sqrt{\frac{2y(x)}{x}-1}-1\right)-1\right)}{\sqrt{\frac{2y(x)}{x}-1}-\frac{y(x)}{x}}=c_1+\log(x),y(x)\right],\text{Solve}\right.$$

✓ **Maple** : cpu = 0.106 (sec), leaf count = 73

$$\left\{y(x)=\left(\frac{1}{2}\left(lambertW\left(\frac{1}{\_C1}\sqrt{\_C1\,x}\right)+1\right)^2\left(lambertW\left(\frac{1}{\_C1}\sqrt{\_C1\,x}\right)\right)^{-2}+\frac{1}{2}\right)x, y(x)=\left(\frac{1}{2}\right.\right.$$

2.409 ODE No. 409

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

✓ **Mathematica** : cpu = 30.8002 (sec), leaf count = 39

$$\text{Solve}\left[\left\{\text{K\$1888232}x=\frac{y(\text{K\$1888232})}{\text{K\$1888232}}+2, y(x)=\frac{\text{K\$1888232}(c_1\text{K\$1888232}-2\text{K\$1888232}\log(\text{K\$18882}}{(\text{K\$1888232}-1)^2}\right.\right.$$

✓ **Maple** : cpu = 0.174 (sec), leaf count = 63

$$\left\{y(x)=x\mathrm{e}^{2\,RootOf\left(-x\mathrm{e}^{2\_Z}+2\,x\mathrm{e}^{\_Z}+2\,\mathrm{e}^{\_Z}+\_C1-2\_Z-x\right)}-2\,\mathrm{e}^{RootOf\left(-x\mathrm{e}^{2\_Z}+2\,x\mathrm{e}^{\_Z}+2\,\mathrm{e}^{\_Z}+\_C1-2\_Z-x\right)}\right\}$$

2.410 ODE No. 410

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

✓ **Mathematica** : cpu = 31.5139 (sec), leaf count = 40

$$\text{Solve}\left[\left\{\text{K\$1888546}x + 4 = \frac{2y(\text{K\$1888546})}{\text{K\$1888546}}, y(x) = \frac{\text{K\$1888546}(c_1\text{K\$1888546} + 4\text{K\$1888546}\log(\text{K\$1888}}{(\text{K\$1888546} - 2)^2}\right.\right.$$

✓ **Maple** : cpu = 0.2 (sec), leaf count = 64

$$\left\{y(x) = \frac{x e^{2\,RootOf\left(-x e^{2\_Z} + 4\,x e^{\_Z} - 4\,e^{\_Z} + \_C1 + 8\_Z - 4\,x\right)}}{2} + 2\,e^{RootOf\left(-x e^{2\_Z} + 4\,x e^{\_Z} - 4\,e^{\_Z} + \_C1 + 8\_Z - 4\,x\right)}\right\}$$

2.411 ODE No. 411

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

✓ **Mathematica** : cpu = 1.31113 (sec), leaf count = 180

$$\left\{\text{Solve}\left[\frac{x\left(\sqrt{\frac{4y(x)}{x}+1}-1\right)\left(\left(\left(\sqrt{\frac{4y(x)}{x}+1}-1\right)\log\left(\sqrt{\frac{4y(x)}{x}+1}-1\right)-1\right)\right.}{2x\left(\sqrt{\frac{4y(x)}{x}+1}-1\right)-4y(x)} = c_1 + \frac{\log(x)}{2}, y(x)\right], \text{Solv}\right.$$

✓ **Maple** : cpu = 0.109 (sec), leaf count = 65

$$\left\{y(x) = \frac{x}{4}\left(1 + 2\,lambertW\left(-1/2\,\frac{1}{\sqrt{\frac{\_C1}{x}}}\right)\right)\left(lambertW\left(-\frac{1}{2}\frac{1}{\sqrt{\frac{\_C1}{x}}}\right)\right)^{-2}, y(x) = \frac{x}{4}\left(1 + 2\,lamber\right.\right.$$

2.412 ODE No. 412

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

✓ **Mathematica** : cpu = 27.8654 (sec), leaf count = 16145

Too large to show

✓ **Maple** : cpu = 0.142 (sec), leaf count = 146

$$\left\{ -\_C1\, x^2 \left(\frac{1}{x} \left(-y(x) + \sqrt{(y(x))^2 - 4\,ax} \right) \right)^{\frac{3}{2}} \left(-y(x) + \sqrt{(y(x))^2 - 4\,ax} \right)^{-2} + x + \frac{4\,ax^2}{3} \left(-y(x) + \sqrt{\right.\right.$$

2.413 ODE No. 413

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

✗ **Mathematica** : cpu = 300.001 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.326 (sec), leaf count = 269

$$\left\{ \int_{\_b}^{x} \frac{1}{\_a} \left(-y(x) - \sqrt{4\_a^3 + (y(x))^2} \right) \left(\sqrt{4\_a^3 + (y(x))^2} + 4\,y(x) \right)^{-1} d\_a + \int^{y(x)} 1 \left(-2 + \left(-48\_f \right.\right.\right.$$

2.414 ODE No. 414

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

✗ **Mathematica** : cpu = 300.002 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.329 (sec), leaf count = 269

$$\left\{ \int_{\_b}^{x} \frac{1}{\_a} \left(-y(x) - \sqrt{-4\_a^4 + (y(x))^2} \right) \left(\sqrt{-4\_a^4 + (y(x))^2} + 5\,y(x) \right)^{-1} d\_a + \int^{y(x)} 1 \left(-2 + \left(80\_ \right.\right.\right.$$

2.415 ODE No. 415

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

✓ **Mathematica** : cpu = 0.223351 (sec), leaf count = 133

$$\left\{\left\{y(x) \to -\frac{\sqrt{\tanh^2\left(\frac{1}{2}(c_1 - \log(x))\right) - 1}}{2\sqrt{x}}\right\}, \left\{y(x) \to \frac{\sqrt{\tanh^2\left(\frac{1}{2}(c_1 - \log(x))\right) - 1}}{2\sqrt{x}}\right\}, \left\{y(x) \to -\frac{\sqrt{}}{}\right.\right.$$

✓ **Maple** : cpu = 0.459 (sec), leaf count = 95

$$\left\{y(x) = -\frac{1}{2}\frac{1}{\sqrt{-x}}, y(x) = \frac{1}{2}\frac{1}{\sqrt{-x}}, y(x) = -\frac{1}{2x}\sqrt{-\left(\tanh\left(-\frac{\ln(x)}{2} + \frac{\_C1}{2}\right)\right)^2 x + x\left(\tanh\left(-\frac{\ln(x)}{2}\right.\right.}\right.$$

2.416 ODE No. 416

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

✗ **Mathematica** : cpu = 302.024 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.131 (sec), leaf count = 136

$$\left\{-\frac{\_C1}{x}\left(5x - y(x) + \sqrt{9x^2 - 10xy(x) + (y(x))^2}\right)\left(\frac{1}{x}\left(3x - y(x) + \sqrt{9x^2 - 10xy(x) + (y(x))^2}\right)\right)\right.$$

2.417 ODE No. 417

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

✓ **Mathematica** : cpu = 0.411499 (sec), leaf count = 183

$$\left\{\left\{y(x) \to -\frac{-8a^2 - \sqrt{a(\sinh(2c_1) + \cosh(2c_1))\left((-4a + x - 1)\sinh\left(\frac{c_1}{2}\right) + (4a - x - 1)\cosh\left(\frac{c_1}{2}\right)\right)^2 +}}{-4a + \sinh(c_1) + \cosh(c_1)}\right.\right.$$

✓ **Maple** : cpu = 0.056 (sec), leaf count = 35

$$\left\{y(x) = \frac{x\_C1^2 + a}{\_C1}, y(x) = -2\sqrt{ax}, y(x) = 2\sqrt{ax}\right\}$$

2.418 ODE No. 418

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

✓ **Mathematica** : cpu = 0.929131 (sec), leaf count = 158

$$\left\{\text{Solve}\left[\frac{y(x)}{ax} + \frac{\sqrt{\frac{y(x)}{x}}\sqrt{\frac{y(x)}{x} - 4a}}{a} + 4c_1 + 2\log(x) = 4\log\left(\sqrt{\frac{y(x)}{x} - 4a} + \sqrt{\frac{y(x)}{x}}\right), y(x)\right], \text{Solve}\left[\frac{\sqrt{\frac{y}{}}\cdots}{}\right.\right.$$

✓ **Maple** : cpu = 0.079 (sec), leaf count = 42

$$\left\{y(x) = 0, y(x) = -ax\left(\mathit{lambertW}\left(-\frac{x\mathrm{e}}{\_C1\,a}\right) - 1\right)^2\left(\mathit{lambertW}\left(-\frac{x\mathrm{e}}{\_C1\,a}\right)\right)^{-1}\right\}$$

2.419 ODE No. 419

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

✓ **Mathematica** : cpu = 1.72883 (sec), leaf count = 6977

$$\left\{\left\{y(x) \to \frac{-\sqrt{\frac{36x^6 + \frac{36\ 2^{2/3}\left(2x^6 - \cosh(6c_1) - \sinh(6c_1)\right)x^4}{\sqrt[3]{32x^{12} + 40\cosh(6c_1)x^6 + 40\sinh(6c_1)x^6 - \cosh(12c_1) - \sinh(12c_1) + \sqrt{\left(\left(16x^6+1\right)\cosh(3c_1) + \left(1-16x^6\right)\sinh(3c_1)\right)^3(\cosh(15c_1) + \cdots}}}}{\cdots}}\cdots}{\cdots}\right.\right.$$

✓ **Maple** : cpu = 0.075 (sec), leaf count = 109

$$\left\{x + \frac{\_C1}{x}\left(y(x) - \sqrt{(y(x))^2 + x^2}\right)\left(\frac{1}{x^2}\left(2x^2 + 6(y(x))^2 - 6y(x)\sqrt{(y(x))^2 + x^2}\right)\right)^{-\frac{2}{3}} = 0, \frac{\_C1}{x}\left(\sqrt{\cdots}\right.\right.$$

2.420 ODE No. 420

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

✓ **Mathematica** : cpu = 1.90715 (sec), leaf count = 9391

✓ **Maple** : cpu = 0.145 (sec), leaf count = 689

$$\left\{ y(x) = \frac{x}{12\_C1}\left(4\frac{x^2}{\sqrt[3]{-36\,a\_C1^2 + 8\,x^3 + 12\sqrt{a\left(9\,a\_C1^2 - 4\,x^3\right)}\_C1}} + 2\,x + \sqrt[3]{-36\,a\_C1^2 + 8\,x^3}\right.\right.$$

2.421 ODE No. 421

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

✓ **Mathematica** : cpu = 0.0318624 (sec), leaf count = 27

$$\{\{y(x) \to x\sinh(c_1 - \log(x))\}, \{y(x) \to x\sinh(c_1 + \log(x))\}\}$$

✓ **Maple** : cpu = 0.057 (sec), leaf count = 32

$$\left\{ y(x) = -ix, y(x) = ix, y(x) = -\frac{\_C1^2 - x^2}{2\_C1} \right\}$$

2.422 ODE No. 422

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

✓ **Mathematica** : cpu = 0.0485758 (sec), leaf count = 29

$$\{\{y(x) \to 2x\cosh(c_1 - \log(x))\}, \{y(x) \to 2x\cosh(c_1 + \log(x))\}\}$$

✓ **Maple** : cpu = 0.061 (sec), leaf count = 30

$$\left\{y(x) = -2x, y(x) = 2x, y(x) = \frac{4\_C1^2 + x^2}{2\_C1}\right\}$$

2.423 ODE No. 423

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

✓ **Mathematica** : cpu = 0.0796002 (sec), leaf count = 51

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

✓ **Maple** : cpu = 0.066 (sec), leaf count = 44

$$\left\{y(x) = \left(1 - \sqrt{2}\right)x, y(x) = \left(1 + \sqrt{2}\right)x, y(x) = \frac{2\_C1^2 + 2\_C1\,x + x^2}{2\_C1}\right\}$$

2.424 ODE No. 424

$$ay(x)y'(x) + bx + xy'(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.642587 (sec), leaf count = 223

$$\left\{\text{Solve}\left[\frac{-2a\tan^{-1}\left(\frac{ay(x)}{x\sqrt{4b-\frac{a^2y(x)^2}{x^2}}}\right) + (a+2)\left(2\tan^{-1}\left(\frac{(a+2)y(x)}{x\sqrt{4b-\frac{a^2y(x)^2}{x^2}}}\right) - i\log\left(\frac{(a+1)y(x)^2}{x^2} + b\right)\right)}{8(a+1)} = c_1 +\right.\right.$$

✓ **Maple** : cpu = 0.283 (sec), leaf count = 193

$$\left\{\frac{1}{x}\left(-\_C1\left(ay(x)-\sqrt{a^2\left(y\left(x\right)\right)^2-4\,bx^2}\right)\left(\frac{a}{2\,x^2}\left(-y(x)\left(a+1\right)\sqrt{a^2\left(y\left(x\right)\right)^2-4\,bx^2}+\left(a^2+a\right)\left(y(x)\right.\right.\right.\right.\right.$$

2.425 ODE No. 425

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

✓ **Mathematica** : cpu = 0.277315 (sec), leaf count = 57

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

✓ **Maple** : cpu = 0.06 (sec), leaf count = 45

$$\left\{y(x)=\frac{\_C1\,(\_C1\,x+\_C1-x)}{\_C1-1},y(x)=x+2-2\sqrt{1+x},y(x)=x+2+2\sqrt{1+x}\right\}$$

2.426 ODE No. 426

$$(3x+1)y'(x)^2-3(y(x)+2)y'(x)+9=0$$

✓ **Mathematica** : cpu = 0.423408 (sec), leaf count = 150

$$\left\{\left\{y(x)\to-\frac{\sqrt{(\sinh\left(2c_1\right)+\cosh\left(2c_1\right))\left((3x-34)\cosh\left(\frac{c_1}{2}\right)-3(x-12)\sinh\left(\frac{c_1}{2}\right)\right)^2}+8\sinh\left(c_1\right)+8\cos\right.}{\sinh\left(c_1\right)+\cosh\left(c_1\right)-36}\right.\right.$$

✓ **Maple** : cpu = 0.061 (sec), leaf count = 51

$$\left\{y(x)=\frac{9+(3\,x+1)\,\_C1^2-6\,\_C1}{3\,\_C1},y(x)=-2-2\sqrt{3\,x+1},y(x)=-2+2\sqrt{3\,x+1}\right\}$$

2.427 ODE No. 427

$$(3x+5)y'(x)^2-(3y(x)+x)y'(x)+y(x)=0$$

✓ **Mathematica** : cpu = 0.657718 (sec), leaf count = 300

$$\left\{\left\{y(x)\to -\frac{-3e^{\frac{4c_1}{3}}(2x+5)+\sqrt{5}\sqrt{-e^{\frac{4c_1}{3}}\left(e^{\frac{4c_1}{3}}-12x-15\right)^2+30x+25}}{18\left(e^{\frac{4c_1}{3}}+5\right)}\right\},\left\{y(x)\to \frac{3e^{\frac{4c_1}{3}}(2x+5)-}{}\right.\right.$$

✓ **Maple** : cpu = 0.06 (sec), leaf count = 60

$$\left\{y(x)=\frac{(3x+5)\_C1^2-\_C1\,x}{3\_C1-1},y(x)=\frac{x}{3}+\frac{10}{9}-\frac{2}{9}\sqrt{15x+25},y(x)=\frac{x}{3}+\frac{10}{9}+\frac{2}{9}\sqrt{15x+25}\right\}$$

2.428 ODE No. 428

$$y'(x)(-ay(x)+bx+c)+axy'(x)^2-by(x)=0$$

✗ **Mathematica** : cpu = 300.046 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.091 (sec), leaf count = 66

$$\left\{y(x)=\frac{1}{a}\left(-bx+c-2\sqrt{-bcx}\right),y(x)=\frac{1}{a}\left(-bx+c+2\sqrt{-bcx}\right),y(x)=\frac{\_C1\,(\_C1\,ax+bx+c)}{\_C1\,a+b}\right\}$$

2.429 ODE No. 429

$$-y'(x)(ay(x)-a+bx-b)+axy'(x)^2+by(x)=0$$

✗ **Mathematica** : cpu = 300.123 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.102 (sec), leaf count = 72

$$\left\{y(x)=\frac{1}{a}\left(bx+a+b-2\sqrt{bx(a+b)}\right),y(x)=\frac{1}{a}\left(bx+a+b+2\sqrt{bx(a+b)}\right),y(x)=\frac{\_C1\,(\_C1\,ax-}{\_C1\,a}\right.$$

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 = 265.685 (sec), leaf count = 296

$$\text{Solve}\left[\left\{x = (\mathrm{b0} + \mathrm{b1K\$3169819})(\mathrm{a0} + \mathrm{K\$3169819}(\mathrm{a1} + \mathrm{K\$3169819}(\mathrm{a2} + \mathrm{b1}) + \mathrm{b0}))^{-\frac{2\mathrm{a2}+\mathrm{b1}}{2(\mathrm{a2}+\mathrm{b1})}} \exp\left(\frac{(\mathrm{b1}(\mathrm{b}\right.\right.\right.$$

✓ **Maple** : cpu = 1.954 (sec), leaf count = 1602

$$\left\{\frac{1}{2\,a2\,x + 2\,c2}\left(2\left(b1\,\sqrt{b1^2\,(y(x))^2 + ((2\,b1\,a1 - 4\,a2\,b0)\,x - 4\,b0\,c2 + 2\,b1\,c1)\,y(x) + (-4\,a0\,a2 + \right.\right.\right.$$

2.431 ODE No. 431

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

✓ **Mathematica** : cpu = 0.0377143 (sec), leaf count = 103

$$\left\{\left\{y(x) \to \sqrt{\sec^2(c_1 - \log(x))}(-\cot(c_1 - \log(x)))\right\}, \left\{y(x) \to \sqrt{\sec^2(c_1 - \log(x))}\cot(c_1 - \log(x))\right\}, \left\{\right.\right.$$

✓ **Maple** : cpu = 0.372 (sec), leaf count = 62

$$\left\{y(x) = -1, y(x) = 1, y(x) = \frac{1}{\tan(-\ln(x) + \_C1)}\sqrt{(\tan(-\ln(x) + \_C1))^2 + 1}, y(x) = -\frac{1}{\tan(-\ln(x\right.$$

2.432 ODE No. 432

$$(a + xy'(x))^2 - 2ay(x) + x^2 = 0$$

✓ **Mathematica** : cpu = 1.83313 (sec), leaf count = 49

$$\text{Solve}\left[\left\{\frac{(\text{K\$3172799}^2 + 1)\,x^2}{a} + a + 2\text{K\$3172799}x = 2y(x), x = \frac{c_1 - a\sinh^{-1}(\text{K\$3172799})}{\sqrt{\text{K\$3172799}^2 + 1}}\right\}, \{y(x), \text{K\$3}$$

✓ **Maple** : cpu = 9.984 (sec), leaf count = 242

$$\left\{y(x) = \frac{1}{2\,a\left(\left(\mathit{RootOf}\left((\mathit{Arcsinh}(\_Z))^2 a^2 - \_Z^2x^2 - 2\,\mathit{Arcsinh}(\_Z)\,\_C1\,a + \_C1^2 - x^2\right)\right)^2 + 1\right)}\left(-2\right.\right.$$

2.433 ODE No. 433

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

✓ **Mathematica** : cpu = 0.524063 (sec), leaf count = 22

$$\left\{\left\{y(x) \to \frac{c_1(c_1 - 2x) - a}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.401 (sec), leaf count = 34

$$\left\{y(x) = \frac{-x^2 - a}{x}, y(x) = \_C1 + \frac{\_C1^2 - 4\,a}{4\,x}\right\}$$

2.434 ODE No. 434

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

✓ **Mathematica** : cpu = 0.0341983 (sec), leaf count = 27

$$\{\{y(x) \to x\sinh(c_1 - \log(x))\}, \{y(x) \to x\sinh(c_1 + \log(x))\}\}$$

✓ **Maple** : cpu = 0.02 (sec), leaf count = 7

$$\{y(x) = x + \_C1\}$$

2.435 ODE No. 435

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

✓ **Mathematica** : cpu = 0.0370615 (sec), leaf count = 55

$$\left\{\left\{y(x) \to \frac{c_1^2 x}{4} - ic_1\sqrt{x} + x - 1\right\}, \left\{y(x) \to \frac{c_1^2 x}{4} + ic_1\sqrt{x} + x - 1\right\}\right\}$$

✓ **Maple** : cpu = 0.554 (sec), leaf count = 22

$$\left\{y(x) = x, y(x) = \_C1\sqrt{x} - \frac{x\_C1^2}{4} + x - 1\right\}$$

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 = 0.0349765 (sec), leaf count = 26

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

✓ **Maple** : cpu = 4.388 (sec), leaf count = 61

$$\left\{y(x) = -ix, y(x) = ix, y(x) = -\frac{x\left((\mathrm{e}^x)^2 - \_C1^2\right)}{2\,\mathrm{e}^x\_C1}, y(x) = \frac{x\left((\mathrm{e}^x)^2\_C1^2 - 1\right)}{2\,\mathrm{e}^x\_C1}\right\}$$

2.437 ODE No. 437

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

✓ **Mathematica** : cpu = 0.300038 (sec), leaf count = 47

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

✓ **Maple** : cpu = 0.095 (sec), leaf count = 36

$$\left\{y(x) = -\frac{a}{4\,x}, y(x) = \_C1\,x - \sqrt{\_C1\,a}, y(x) = \_C1\,x + \sqrt{\_C1\,a}\right\}$$

2.438 ODE No. 438

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

✓ **Mathematica** : cpu = 0.00702141 (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 = 0.026 (sec), leaf count = 17

$$\left\{y(x) = \frac{\_C1}{x^2}, y(x) = \frac{\_C1}{x}\right\}$$

2.439 ODE No. 439

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

✓ **Mathematica** : cpu = 0.0144319 (sec), leaf count = 49

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

✓ **Maple** : cpu = 0.115 (sec), leaf count = 33

$$\left\{y(x) = \_C1\; x^{-\frac{i}{2}\sqrt{3}} x^{-\frac{3}{2}}, y(x) = \_C1\; x^{\frac{i}{2}\sqrt{3}} x^{-\frac{3}{2}}\right\}$$

2.440 ODE No. 440

$$x^2y'(x)^2 + 4xy(x)y'(x) - 5y(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.00658879 (sec), leaf count = 19

$$\left\{\left\{y(x) \to \frac{c_1}{x^5}\right\}, \{y(x) \to c_1 x\}\right\}$$

✓ **Maple** : cpu = 0.028 (sec), leaf count = 15

$$\left\{y(x) = \frac{\_C1}{x^5}, y(x) = \_C1\; x\right\}$$

2.441 ODE No. 441

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

✓ **Mathematica** : cpu = 0.0959875 (sec), leaf count = 59

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

✓ **Maple** : cpu = 4.48 (sec), leaf count = 137

$$\left\{y(x)=-2, y(x)=\frac{1}{\_C1}\left(x^2-2\sqrt{2}\sqrt{\_C1\,x^2}\right), y(x)=\frac{1}{\_C1}\left(2\sqrt{2}\sqrt{\_C1\,x^2}+x^2\right), y(x)=\frac{x(-8\_C}{\_C1^2(-4}\right.$$

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 = 0.00907731 (sec), leaf count = 26

$$\left\{\left\{y(x)\to c_1e^{-x}x\right\},\left\{y(x)\to x(c_1-x)\right\}\right\}$$

✓ **Maple** : cpu = 0.03 (sec), leaf count = 21

$$\left\{y(x)=(-x+\_C1)\,x, y(x)=\_C1\,\mathrm{e}^{-x}x\right\}$$

2.443 ODE No. 443

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

✓ **Mathematica** : cpu = 0.57194 (sec), leaf count = 1921

$$\left\{\left\{y(x)\to \mathrm{Root}\left[1024x^{12}-576e^{12c_1}\#1^4x^8-2176e^{12c_1}\#1^3x^6+81e^{24c_1}\#1^8x^4-1536e^{12c_1}\#1^2x^4+36e^{24c_1}\right.\right.\right.$$

✓ **Maple** : cpu = 6.944 (sec), leaf count = 221

$$\left\{y(x)=-\frac{2}{9\,x^2}, y(x)=\frac{\left(RootOf\left(-729\_C1\,x^{12}+\_Z^8-12\_Z^7+60\_Z^6-160\_Z^5+240\_Z^4-192\right.\right.}{}\right.$$

2.444 ODE No. 444

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

✓ **Mathematica** : cpu = 0.15472 (sec), leaf count = 73

$$\left\{\left\{y(x) \to \frac{\sinh(2c_1) - \cosh(2c_1)}{x\sinh(2c_1) + x\cosh(2c_1) - 1}\right\}, \left\{y(x) \to \frac{\sinh(2c_1) - \cosh(2c_1)}{x\sinh(2c_1) + x\cosh(2c_1) + 1}\right\}\right\}$$

✓ **Maple** : cpu = 4.137 (sec), leaf count = 120

$$\left\{y(x) = \frac{\_C1^3\sqrt{2} - 2x\_C1^2}{-2\_C1^2 + 4x^2}, y(x) = \frac{\_C1^2(\sqrt{2}\_C1 + 2x)}{2\_C1^2 - 4x^2}, y(x) = 4x, y(x) = -2\frac{\_C1^2(-\sqrt{2}\_C1 +}{-2\_C1^2 + x^2}\right.$$

2.445 ODE No. 445

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

✓ **Mathematica** : cpu = 0.00979791 (sec), leaf count = 49

$$\left\{\left\{y(x) \to -\frac{1}{\sqrt{2ax - 2c_1}}\right\}, \left\{y(x) \to \frac{1}{\sqrt{2ax - 2c_1}}\right\}, \left\{y(x) \to \frac{b}{x} + c_1\right\}\right\}$$

✓ **Maple** : cpu = 0.051 (sec), leaf count = 35

$$\left\{y(x) = \frac{1}{\sqrt{2ax + \_C1}}, y(x) = -\frac{1}{\sqrt{2ax + \_C1}}, y(x) = \frac{b}{x} + \_C1\right\}$$

2.446 ODE No. 446

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

✓ **Mathematica** : cpu = 0.508063 (sec), leaf count = 167

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

✓ **Maple** : cpu = 0.104 (sec), leaf count = 57

$$\left\{y(x) = \sqrt{x^2 + 1}, y(x) = -\sqrt{x^2 + 1}, y(x) = \_C1\,x - \sqrt{-\_C1^2 + 1}, y(x) = \_C1\,x + \sqrt{-\_C1^2 + 1}\right\}$$

2.447 ODE No. 447

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

✓ **Mathematica** : cpu = 0.0142079 (sec), leaf count = 89

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

✓ **Maple** : cpu = 0.079 (sec), leaf count = 33

$$\left\{y(x)=-\ln\left(x+\sqrt{x^2-1}\right)+\_C1,y(x)=\ln\left(x+\sqrt{x^2-1}\right)+\_C1\right\}$$

2.448 ODE No. 448

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

✓ **Mathematica** : cpu = 0.100583 (sec), leaf count = 287

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

✓ **Maple** : cpu = 99.797 (sec), leaf count = 166

$$\left\{1\sqrt{(-1+y(x))(1+y(x))}\ln\left(y(x)+\sqrt{(y(x))^2-1}\right)\frac{1}{\sqrt{-1+y(x)}}\frac{1}{\sqrt{1+y(x)}}+\int^x\frac{1}{\_a^2-1}\sqrt{(\_a^2}\right.$$

2.449 ODE No. 449

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

✓ **Mathematica** : cpu = 0.0099307 (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 = 0.029 (sec), leaf count = 23

$$\left\{y(x)=\frac{\_C1}{a-x},y(x)=\frac{\_C1}{x+a}\right\}$$

2.450 ODE No. 450

$$\left(x^2-a^2\right)y'(x)^2-x^2-2xy(x)y'(x)=0$$

✓ **Mathematica** : cpu = 0.456419 (sec), leaf count = 26

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

✓ **Maple** : cpu = 0.738 (sec), leaf count = 51

$$\left\{y(x)=\sqrt{a^2-x^2},y(x)=-\sqrt{a^2-x^2},y(x)=\_C1\,x^2-\_C1\,a^2-\frac{1}{4\_C1}\right\}$$

2.451 ODE No. 451

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

✗ **Mathematica** : cpu = 300.532 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.16 (sec), leaf count = 78

$$\left\{y(x)=\frac{1}{a}\sqrt{-ab\left(x^2+a\right)},y(x)=-\frac{1}{a}\sqrt{-ab\left(x^2+a\right)},y(x)=\_C1\,x-\sqrt{-a\_C1^2-b},y(x)=\_C1\,x+\right.$$

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 = 301.246 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 1.787 (sec), leaf count = 37

$$\left\{y(x)=-3\,x-2\,\sqrt{2\,x^2+1},y(x)=-3\,x+2\,\sqrt{2\,x^2+1}\right\}$$

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 = 0.770837 (sec), leaf count = 369

$$\left\{\text{Solve}\left[\frac{a\left(2\log\left(x-a^2x\right)-\log\left(\frac{\left(a^2-1\right)\left(y(x)+ix\left(a\sqrt{a^2-\frac{y(x)^2}{x^2}}-1+a^2-1\right)\right)}{a^3(x+iy(x))}\right)+\log\left(\frac{i\left(a^2-1\right)\left(x\left(a\sqrt{a^2-\frac{y(x)^2}{x^2}}-1+a^2\right.\right.}{a^3(x-iy(x))}\right.\right.}{2\left(a^2-1\right)}\right.\right.$$

✓ **Maple** : cpu = 2.388 (sec), leaf count = 229

$$\left\{\frac{1}{2a}\left(-2\_C1\,a+2a\ln(x)+\ln\left(\frac{(y(x))^2+x^2}{x^2}\right)a-2\sqrt{-a^2}\arctan\left(\frac{a^2y(x)}{\sqrt{-a^2}x}\frac{1}{\sqrt{\frac{(y(x))^2+(-a^2+1)x^2}{x^2}}}\right)+2\right.\right.$$

2.454 ODE No. 454

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

✓ **Mathematica** : cpu = 0.341317 (sec), leaf count = 241

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

✓ **Maple** : cpu = 0.283 (sec), leaf count = 106

$$\left\{y(x)=\sqrt{-a}x,y(x)=RootOf\left(-\ln(x)-\int^{\_Z}\frac{1}{(a-1)\left(\_a^2+a\right)}\sqrt{(a-1)\left(\_a^2+a\right)a}d\_a+\_C1\right)x,\right.$$

2.455 ODE No. 455

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

✓ **Mathematica** : cpu = 0.405235 (sec), leaf count = 123

$$\left\{\left\{y(x) \to -\frac{e^{-\frac{c_1}{2}}\left(2ae^{c_1}+x\right)}{\sqrt{2}x}\right\},\left\{y(x) \to \frac{e^{-\frac{c_1}{2}}\left(2ae^{c_1}+x\right)}{\sqrt{2}x}\right\},\left\{y(x) \to -\frac{e^{-\frac{c_1}{2}}\left(2ax+e^{c_1}\right)}{\sqrt{2}x}\right\},\left\{y(x) \to \frac{e}{}\right.\right.$$

✓ **Maple** : cpu = 0.556 (sec), leaf count = 66

$$\left\{y(x) = -2\,\frac{\sqrt{ax}}{x}, y(x) = 2\,\frac{\sqrt{ax}}{x}, y(x) = \frac{\_C1^2 + 4\,ax}{2\_C1\,x}, y(x) = \frac{x\_C1^2 + 4\,a}{2\_C1\,x}\right\}$$

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 = 0.122194 (sec), leaf count = 61

$$\left\{\left\{y(x) \to x\cos\left(2\tan^{-1}\left(\sqrt{\frac{x-1}{x+1}}\right)+ic_1\right)\right\},\left\{y(x) \to x\cos\left(2\tan^{-1}\left(\sqrt{\frac{x-1}{x+1}}\right)-ic_1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.753 (sec), leaf count = 33

$$\left\{y(x) = x, y(x) = -x, y(x) = \sqrt{-\_C1^2+1} + \sqrt{x^2-1}\_C1\right\}$$

2.457 ODE No. 457

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

✓ **Mathematica** : cpu = 1.2066 (sec), leaf count = 406

$$\left\{\text{Solve}\left[\frac{2x\sqrt{4x^2y(x)+1}\log(x) + x\sqrt{4x^2y(x)+1}\log(y(x)) - x\sqrt{4x^2y(x)+1}\log\left(4x^2y(x)+1\right) - 2x\sqrt{4}}{}\right.\right.$$

✓ **Maple** : cpu = 0.97 (sec), leaf count = 45

$$\left\{y(x) = \frac{i\_C1 - x}{x\_C1^2}, y(x) = \frac{-i\_C1 - x}{x\_C1^2}, y(x) = -\frac{1}{4\,x^2}\right\}$$

2.458 ODE No. 458

$$x^2(x^2-a^2)\,y'(x)^2-1=0$$

✓ **Mathematica** : cpu = 0.0671227 (sec), leaf count = 139

$$\left\{\left\{y(x)\to c_1-\frac{ix\sqrt{x^2-a^2}\log\left(\frac{2\left(\sqrt{x^2-a^2}-ia\right)}{x}\right)}{a\sqrt{x^4-a^2x^2}}\right\},\left\{y(x)\to c_1+\frac{ix\sqrt{x^2-a^2}\log\left(\frac{2\left(\sqrt{x^2-a^2}-ia\right)}{x}\right)}{a\sqrt{x^4-a^2x^2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.06 (sec), leaf count = 90

$$\left\{y(x)=-1\ln\left(\frac{1}{x}\left(-2\,a^2+2\,\sqrt{-a^2}\sqrt{-a^2+x^2}\right)\right)\frac{1}{\sqrt{-a^2}}+\_C1,y(x)=1\ln\left(\frac{1}{x}\left(-2\,a^2+2\,\sqrt{-a^2}\sqrt{-a^2}\right.\right.\right.$$

2.459 ODE No. 459

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

✓ **Mathematica** : cpu = 3.27401 (sec), leaf count = 241

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

✓ **Maple** : cpu = 0.711 (sec), leaf count = 65

$$\left\{y(x)=x+\ln\left(\frac{1}{\mathrm{e}^x}\left(-1-\sqrt{(\mathrm{e}^x)^2-\frac{(\mathrm{e}^x)^2}{(\mathrm{e}^{\_C1})^2}}\right)\right)+\_C1,y(x)=x+\ln\left(\frac{1}{\mathrm{e}^x}\left(-1+\sqrt{(\mathrm{e}^x)^2-\frac{(\mathrm{e}^x)^2}{(\mathrm{e}^{\_C1})^2}}\right)\right.\right.$$

2.460 ODE No. 460

$$\cos^4(x)\left(y'(x)^2+y(x)^2\right)-a^2=0$$

✗ **Mathematica** : cpu = 56.6131 (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 = 300.061 (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
```

2.462 ODE No. 462

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

✓ **Mathematica** : cpu = 0.0153052 (sec), leaf count = 43

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

✓ **Maple** : cpu = 0.034 (sec), leaf count = 27

$$\left\{x-\frac{2}{3}(y(x))^{\frac{3}{2}}-\_C1=0,x+\frac{2}{3}(y(x))^{\frac{3}{2}}-\_C1=0\right\}$$

2.463 ODE No. 463

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

✓ **Mathematica** : cpu = 0.0180833 (sec), leaf count = 47

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

✓ **Maple** : cpu = 0.091 (sec), leaf count = 50

$$\left\{-1\sqrt{\left(e^x\right)^2 y\left(x\right)}\frac{1}{\sqrt{y\left(x\right)}}+\frac{2}{3}(y(x))^{\frac{3}{2}}+\_C1=0,1\sqrt{\left(e^x\right)^2 y\left(x\right)}\frac{1}{\sqrt{y\left(x\right)}}+\frac{2}{3}(y(x))^{\frac{3}{2}}+\_C1=0\right\}$$

2.464 ODE No. 464

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

✓ **Mathematica** : cpu = 0.064472 (sec), leaf count = 52

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

✓ **Maple** : cpu = 0.45 (sec), leaf count = 70

$$\left\{y(x)=\sqrt{\_C1^2-2\,x\_C1},y(x)=\sqrt{\_C1^2+2\,x\_C1},y(x)=-ix,y(x)=ix,y(x)=-\sqrt{\_C1\ (2\,x+\_$$

2.465 ODE No. 465

$$y(x)y'(x)^2 + 2xy'(x) - 9y(x) = 0$$

✗ **Mathematica** : cpu = 300.247 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.079 (sec), leaf count = 210

$$\left\{\_C1\,x\left(x+\sqrt{x^2+9\,\left(y\left(x\right)\right)^2}\right)\left(\frac{1}{y\left(x\right)}\left(-x-\sqrt{x^2+9\,\left(y\left(x\right)\right)^2}\right)\right)^{\frac{2}{7}}\left(x\sqrt{x^2+9\,\left(y\left(x\right)\right)^2}+x^2+(y(x)\right.$$

2.466 ODE No. 466

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

✓ **Mathematica** : cpu = 0.264793 (sec), leaf count = 119

$$\left\{\left\{y(x) \to -\sqrt{-(\sinh(c_1) + \cosh(c_1))(\sinh(c_1) + \cosh(c_1) + 2x)}\right\}, \left\{y(x) \to \sqrt{-(\sinh(c_1) + \cosh(c_1)\right.\right.$$

✓ **Maple** : cpu = 0.392 (sec), leaf count = 71

$$\left\{y(x) = x, y(x) = \sqrt{\_C1^2 - 2\,ix\_C1}, y(x) = \sqrt{\_C1^2 + 2\,ix\_C1}, y(x) = -x, y(x) = -\sqrt{\_C1^2 - 2\,ix\_\right.$$

2.467 ODE No. 467

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

✗ **Mathematica** : cpu = 300.125 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.074 (sec), leaf count = 148

$$\left\{-\frac{\_C1\,x}{y(x)}\frac{1}{\sqrt[3]{\frac{1}{(y(x))^2}\left(8\,x^2 - 4\,(y(x))^2 - 4\,x\sqrt{-(y(x))^2 + 4\,x^2}\right)}}\frac{1}{\sqrt[3]{\frac{1}{y(x)}\left(2\,x - \sqrt{-(y(x))^2 + 4\,x^2}\right)}} + x\right.$$

2.468 ODE No. 468

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

✗ **Mathematica** : cpu = 300.344 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.082 (sec), leaf count = 181

$$\left\{-\frac{\_C1\,x}{ay(x)}\frac{1}{\sqrt[3]{\frac{a^2}{(y(x))^2}\left(2\,a^2x^2 + \sqrt{4\,a^2x^2 - (y(x))^2}ax - (y(x))^2\right)}}\frac{1}{\sqrt[3]{\frac{a}{y(x)}\left(2\,ax + \sqrt{4\,a^2x^2 - (y(x))^2}\right)}} + x\right.$$

2.469 ODE No. 469

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

✓ **Mathematica** : cpu = 0.510391 (sec), leaf count = 245

$$\left\{\text{Solve}\left[\frac{1}{8}\left(\frac{2a\tanh^{-1}\left(\frac{\sqrt{a^2-\frac{4by(x)^2}{x^2}}}{a}\right)-2(a+2b)\tanh^{-1}\left(\frac{\sqrt{a^2-\frac{4by(x)^2}{x^2}}}{a+2b}\right)+a\log\left(a+b+\frac{y(x)^2}{x^2}\right)+2b\log\right.}{a+b}\right.\right.$$

✓ **Maple** : cpu = 0.112 (sec), leaf count = 264

$$\left\{\frac{x}{(y(x))^2}\left(\_C1\left(-\frac{1}{2\,y(x)}\left(ax+\sqrt{a^2x^2-4\,b\,(y(x))^2}\right)\right)^{-\frac{a}{a+b}}\left(ax+\sqrt{a^2x^2-4\,b\,(y(x))^2}\right)\left(\frac{a}{2\,(y(x))^2}\right.\right.\right.$$

2.470 ODE No. 470

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

✓ **Mathematica** : cpu = 0.425766 (sec), leaf count = 197

$$\left\{\text{Solve}\left[\frac{\sqrt{x^6+4x^2y(x)^2}\left(\log\left(1-\frac{x^2}{\sqrt{x^4+4y(x)^2}}\right)-\log\left(\frac{x^2}{\sqrt{x^4+4y(x)^2}}+1\right)\right)}{4x\sqrt{x^4+4y(x)^2}}+\frac{1}{2}\log(y(x))=c_1,y(x)\right],\text{Solve}\right.$$

✓ **Maple** : cpu = 0.352 (sec), leaf count = 87

$$\left\{y(x)=-\frac{i}{2}x^2, y(x)=\frac{i}{2}x^2, y(x)=-\frac{1}{4}\sqrt{-4\_C1\,x^2+\_C1^2}, y(x)=\frac{1}{4}\sqrt{-4\_C1\,x^2+\_C1^2}, y(x)=-\right.$$

2.471 ODE No. 471

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

✓ **Mathematica** : cpu = 0.00742235 (sec), leaf count = 47

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

✓ **Maple** : cpu = 0.023 (sec), leaf count = 33

$$\left\{y(x) = \sqrt{-x^2 + \_C1}, y(x) = -\sqrt{-x^2 + \_C1}, y(x) = x + \_C1\right\}$$

2.472 ODE No. 472

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

✓ **Mathematica** : cpu = 0.201694 (sec), leaf count = 121

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

✓ **Maple** : cpu = 0.445 (sec), leaf count = 121

$$\left\{\ln(x) - Artanh\left(\frac{y(x) + 2x}{2x}\frac{1}{\sqrt{\frac{(y(x))^2 + xy(x) + x^2}{x^2}}}\right) + \ln\left(\frac{y(x)}{x}\right) - \_C1 = 0, \ln(x) + Artanh\left(\frac{y(x) + 2x}{2x}\right.\right.$$

2.473 ODE No. 473

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

✓ **Mathematica** : cpu = 0.389256 (sec), leaf count = 137

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

✓ **Maple** : cpu = 0.594 (sec), leaf count = 71

$$\left\{y(x) = 2 + \_C1 - \sqrt{\_C1\left(-\_C1 + 2x - 2\right)}, y(x) = 2 + \frac{\_C1}{2} - \frac{1}{2}\sqrt{\_C1\left(-\_C1 + 4x - 4\right)}, y(x) =\right.$$

2.474 ODE No. 474

$$2y(x)y'(x)^2 - (4x-5)y'(x) + 2y(x) = 0$$

✓ **Mathematica** : cpu = 0.241137 (sec), leaf count = 135

$$\left\{\left\{y(x) \to -i\sqrt{2}e^{\frac{c_1}{2}}\sqrt{8e^{c_1}+4x-5}\right\}, \left\{y(x) \to i\sqrt{2}e^{\frac{c_1}{2}}\sqrt{8e^{c_1}+4x-5}\right\}, \left\{y(x) \to -\frac{1}{4}ie^{\frac{c_1}{2}}\sqrt{e^{c_1}+8x-1\right.\right.$$

✓ **Maple** : cpu = 1.243 (sec), leaf count = 152

$$\left\{\ln\left(x-\frac{5}{4}\right) - \frac{1}{2}\ln\left(4\frac{y(x)}{4x-5}+1\right) - \frac{1}{2}\ln\left(4\frac{y(x)}{4x-5}-1\right) + \ln\left(\frac{y(x)}{4x-5}\right) + \frac{1}{2}\ln\left(16\frac{(y(x))^2}{(4x-5)^2}-1\right)\right.$$

2.475 ODE No. 475

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

✓ **Mathematica** : cpu = 0.0705002 (sec), leaf count = 57

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

✓ **Maple** : cpu = 0.447 (sec), leaf count = 67

$$\left\{y(x) = \sqrt{\_C1^2 - x\_C1}, y(x) = \sqrt{\_C1^2 + x\_C1}, y(x) = -\frac{i}{2}x, y(x) = \frac{i}{2}x, y(x) = -\sqrt{\_C1\ (x+\_C\right.$$

2.476 ODE No. 476

$$4x^3y'(x) - 4x^2y(x) + 9y(x)y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.430162 (sec), leaf count = 197

$$\left\{\text{Solve}\left[\frac{\sqrt{x^6+9x^2y(x)^2}\left(\log\left(1-\frac{x^2}{\sqrt{x^4+9y(x)^2}}\right)-\log\left(\frac{x^2}{\sqrt{x^4+9y(x)^2}}+1\right)\right)}{4x\sqrt{x^4+9y(x)^2}} + \frac{1}{2}\log(y(x)) = c_1, y(x)\right], \text{Solve}\right.$$

✓ **Maple** : cpu = 0.299 (sec), leaf count = 87

$$\left\{y(x) = -\frac{i}{3}x^2, y(x) = \frac{i}{3}x^2, y(x) = -\frac{1}{6}\sqrt{-4\_C1\ x^2 + \_C1^2}, y(x) = \frac{1}{6}\sqrt{-4\_C1\ x^2 + \_C1^2}, y(x) = -\right.$$

2.477 ODE No. 477

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

✓ **Mathematica** : cpu = 0.311782 (sec), leaf count = 136

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

✓ **Maple** : cpu = 0.495 (sec), leaf count = 622

$$\left\{\int_{\_b}^{x} 1\left(-4\_a + 2\,b - 2\sqrt{4\,a\left(y\left(x\right)\right)^2 + \left(b - 2\_a\right)^2}\right)\left(\left(-b + 2\_a\right)\sqrt{4\,a\left(y\left(x\right)\right)^2 + \left(b - 2\_a\right)^2} + 4\,a(y(x\right.\right.\right.$$

2.478 ODE No. 478

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

✓ **Mathematica** : cpu = 0.172847 (sec), leaf count = 141

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[\frac{c\tan^{-1}\left(\frac{\sqrt{\#1a+b}}{\sqrt{-\#1a-b+c}}\right) - \sqrt{\#1a+b}\sqrt{-\#1a-b+c}}{a}\&\right]\left[c_1 - x\right]\right\}, \left\{y(x) \to\right.\right.$$

✓ **Maple** : cpu = 0.094 (sec), leaf count = 88

$$\left\{x - \int^{y(x)} (\_a\,a + b)\frac{1}{\sqrt{-\left(\_a\,a + b\right)\left(\_a\,a + b - c\right)}}d\_a - \_C1 = 0, x - \int^{y(x)} -(\_a\,a + b)\frac{}{\sqrt{-\left(\_a\,a + \right.}}\right.$$

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 = 300.032 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.3 (sec), leaf count = 929

$$\left\{x - e^{\int \frac{1}{2\,b2\,y(x) + 2\,a2\,x + 2\,c2}\left(-a1\,x - b1\,y(x) - c1 + \sqrt{-4\,a0\,a2\,x^2 - 4\,a0\,b2\,xy(x) + a1^2x^2 + 2\,a1\,b1\,xy(x) - 4\,a2\,b0\,xy(x) - 4\,b0\,b2\,(y(x))^2 + b1^2(y(x))^2 - 4\,a0\,c2\,x\right.}}\right.$$

2.480 ODE No. 480

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

✗ **Mathematica** : cpu = 30.8793 (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]^
```

✗ **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

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

✓ **Mathematica** : cpu = 0.00894355 (sec), leaf count = 49

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

✓ **Maple** : cpu = 0.023 (sec), leaf count = 35

$$\left\{y(x)=\sqrt{-x^2+\_C1},y(x)=\frac{\_C1}{x},y(x)=-\sqrt{-x^2+\_C1}\right\}$$

2.482 ODE No. 482

$$\left(a+x^{22}-y(x)^2\right)y'(x)+xy(x)y'(x)^2-xy(x)=0$$

✗ **Mathematica** : cpu = 64.1115 (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
```

✗ **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 = 0.189444 (sec), leaf count = 69

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

✓ **Maple** : cpu = 0.079 (sec), leaf count = 103

$$\left\{y(x)=0,y(x)=RootOf\left(-2\ln(x)+\int^{\_Z}\frac{1}{\_a\left(\_a^2+1\right)}\left(-2\_a^2+\sqrt{2}\sqrt{\_a\left(\_a-1\right)^2}\right)d\_a+2\_C$$

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 = 0.174965 (sec), leaf count = 79

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

✓ **Maple** : cpu = 0.079 (sec), leaf count = 115

$$\left\{y(x)=0,y(x)=RootOf\left(-2\ln(x)+\int^{\_Z}\frac{1}{\_a\left(\_a^2-4\_a+1\right)}\left(-2\_a^2+\sqrt{2}\sqrt{\_a\left(\_a+1\right)^2}+4\_\right.\right.$$

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 = 300. (sec), leaf count = 0 , timed out

```
$Aborted
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , exception

```
time expired
```

2.486 ODE No. 486

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

✓ **Mathematica** : cpu = 0.0264691 (sec), leaf count = 89

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

✓ **Maple** : cpu = 0.113 (sec), leaf count = 54

$$\left\{y(x)=a,y(x)=\sqrt{-\_C1^2+2\_C1\,x+a^2-x^2},y(x)=-a,y(x)=-\sqrt{(-\_C1+a+x)(\_C1+a-}\right.$$

2.487 ODE No. 487

$$-6x^3y'(x)+4x^2y(x)+y(x)^2y'(x)^2=0$$

✓ **Mathematica** : cpu = 0.489713 (sec), leaf count = 215

$$\left\{\text{Solve}\left[\frac{\sqrt{9x^6-4x^2y(x)^3}\left(\log\left(1-\frac{3x^2}{\sqrt{9x^4-4y(x)^3}}\right)-\log\left(\frac{3x^2}{\sqrt{9x^4-4y(x)^3}}+1\right)\right)}{4x\sqrt{9x^4-4y(x)^3}}+\frac{3}{4}\log(y(x))=c_1,y(x)\right],\text{So}\right.$$

✓ **Maple** : cpu = 0.421 (sec), leaf count = 100

$$\left\{y(x)=RootOf\left(-\ln(x)+\int^{\_Z}-\frac{3}{4\_a\,(4\_a^3-9)}\left(4\_a^3+3\sqrt{-4\_a^3+9}-9\right)d\_a+\_C1\right)x^{\frac{4}{3}},y(x\right.$$

2.488 ODE No. 488

$$4a^2-4ay(x)y'(x)-4ax+y(x)^2y'(x)^2+y(x)^2=0$$

✓ **Mathematica** : cpu = 0.396546 (sec), leaf count = 85

$$\left\{\left\{y(x)\to -\frac{\sqrt{16a^3x-4a^2x^2-4ac_1x-c_1^2}}{2a}\right\},\left\{y(x)\to \frac{\sqrt{16a^3x-4a^2x^2-4ac_1x-c_1^2}}{2a}\right\}\right\}$$

✓ **Maple** : cpu = 0.415 (sec), leaf count = 111

$$\left\{y(x)=-2\sqrt{ax},y(x)=2\sqrt{ax},y(x)=-\frac{1}{4a}\sqrt{-16a^4+32a^3x+(-16x^2+8\_C1)a^2+8xa\_C1-\_C}\right.$$

2.489 ODE No. 489

$$ay(x)^2 + bx + c + y(x)^2y'(x)^2 + 2xy(x)y'(x) = 0$$

✗ **Mathematica** : cpu = 301.043 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 2.219 (sec), leaf count = 551

$$\left\{ y(x) = -\frac{\sqrt{16}}{2\,a\,(a+1)}\sqrt{\left((a+1)^2\,a\left(ax-\frac{b}{2}+x\right)^2 RootOf\left(-b\ln\left(2\,ax-b+2\,x\right)+2\int^{\_Z} 1/4\,\frac{}{(4\_a\,a}\right.\right.}\right.$$

2.490 ODE No. 490

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

✓ **Mathematica** : cpu = 0.614215 (sec), leaf count = 63

$$\left\{\left\{y(x)\to -\sqrt{-\frac{a}{2}+4c_1x-2c_1^2-x^2}\right\},\left\{y(x)\to \sqrt{-\frac{a}{2}+4c_1x-2c_1^2-x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.421 (sec), leaf count = 145

$$\left\{ y(x) = \sqrt{-2\,\sqrt{a+2\_C1}x-\_C1-x^2-a}, y(x) = \sqrt{2\,\sqrt{a+2\_C1}x-\_C1-x^2-a}, y(x) = -\sqrt{-\right.$$

2.491 ODE No. 491

$$(a-1)b + ax^2 + 2axy(x)y'(x) + (1-a)y(x)^2 + y(x)^2y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 1.02986 (sec), leaf count = 65

$$\left\{\left\{y(x)\to -\sqrt{-2(a-1)c_1x+(a-1)c_1^2+b-x^2}\right\},\left\{y(x)\to \sqrt{-2(a-1)c_1x+(a-1)c_1^2+b-x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.721 (sec), leaf count = 195

$$\left\{ y(x) = \sqrt{-ax^2+b}, y(x) = \frac{1}{a}\sqrt{a\left(-2\,x\sqrt{-a\,(b-\_C1)\,(a-1)}+(-x^2+b)\,a-b+\_C1\right)}, y(x) = \frac{1}{a}\sqrt{\right.$$

2.492 ODE No. 492

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

✓ **Mathematica** : cpu = 0.291883 (sec), leaf count = 111

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[\sqrt{a^2 - \#1^2} - a \log\left(a\sqrt{a^2 - \#1^2} + a^2\right) + a\log(\#1)\&\right][c_1 - x]\right\}, \left\{y(x) -\right.\right.$$

✓ **Maple** : cpu = 0.399 (sec), leaf count = 122

$$\left\{x - \sqrt{a^2 - (y(x))^2} + a^2 \ln\left(\frac{1}{y(x)}\left(2a^2 + 2\sqrt{a^2}\sqrt{a^2 - (y(x))^2}\right)\right)\frac{1}{\sqrt{a^2}} - \_C1 = 0, x + \sqrt{a^2 - (y(x))}\right.$$

2.493 ODE No. 493

$$(a^2 - 2ax + y(x)^2)\, y'(x)^2 + 2ay(x)y'(x) + y(x)^2 = 0$$

✓ **Mathematica** : cpu = 9.33235 (sec), leaf count = 393

$$\left\{\text{Solve}\left[\left\{y(x) = -\frac{\sqrt{-a\text{K\$3195500}^2\left(a\text{K\$3195500}^2 - 2\left(\text{K\$3195500}^2 + 1\right)x\right)} + a\text{K\$3195500}}{\text{K\$3195500}^2 + 1}, x = \frac{a\left(c_1^2\right.}{}\right.\right.\right.$$

✓ **Maple** : cpu = 1.034 (sec), leaf count = 111

$$\left\{\left[x(\_T) = \frac{1}{2a}\left(\left(Artanh\left(\frac{1}{\sqrt{\_T^2 + 1}}\right)\right)^2\sqrt{\_T^2 + 1}a^2 + \left(-2a\_C1\sqrt{\_T^2 + 1} - 2a^2\right)Artanh\left(\frac{}{\sqrt{}}\right.\right.\right.\right.$$

2.494 ODE No. 494

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

✗ **Mathematica** : cpu = 301.198 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.18 (sec), leaf count = 161

$$\left\{y(x) = \sqrt{a^2 - 1}x, y(x) = RootOf\left(-\ln(x) + \int^{\_Z}\frac{1}{(\_a^2 + 1)(\_a^2 - a^2 + 1)}\left(-\_a^3 + \_a\, a^2 + \sqrt{\_a^2a^2}\right.\right.\right.$$

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 = 0.147074 (sec), leaf count = 79

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

✓ **Maple** : cpu = 0.421 (sec), leaf count = 61

$$\left\{y(x) = \tan\left(\mathit{RootOf}\left(-2\_Z\sqrt{a-1} - \ln\left(\frac{x^2}{(\cos(\_Z))^2}\right) + 2\_\mathit{C1}\right)\right)x, y(x) = \tan\left(\mathit{RootOf}\left(2\_Z\sqrt{\right.\right.\right.$$

2.496 ODE No. 496

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

✓ **Mathematica** : cpu = 97.2234 (sec), leaf count = 53

$$\left\{\left\{y(x) \to c_1 - \sqrt{a^2-(x-c_1)^2}\right\}, \left\{y(x) \to \sqrt{a^2-(x-c_1)^2} + c_1\right\}\right\}$$

✓ **Maple** : cpu = 0.247 (sec), leaf count = 130

$$\left\{y(x) = x - \sqrt{2}a, y(x) = x + \sqrt{2}a, y(x) = x + \mathit{RootOf}\left(-x + \int^{\_Z} -\frac{1}{2\_a^2 - 4a^2}\left(\_a^2 - 2a^2 + \sqrt{-\_a\right.\right.\right.$$

2.497 ODE No. 497

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

✓ **Mathematica** : cpu = 0.182909 (sec), leaf count = 203

$$\left\{\left\{y(x) \to -\frac{\sqrt{-4ix\sinh(3c_1) - 4ix\cosh(3c_1) + \sinh(6c_1) + \cosh(6c_1) - 3x^2}}{\sqrt{3}}\right\}, \left\{y(x) \to \frac{\sqrt{-4ix\sinh\right.\right.\right.$$

✓ **Maple** : cpu = 0.534 (sec), leaf count = 203

$$\left\{\ln(x) - \frac{\sqrt{3}}{6}\sqrt{\frac{\left(\sqrt{3}x + 3y(x)\right)\left(\sqrt{3}x - 3y(x)\right)}{x^2}} + \frac{1}{2}\sqrt{\frac{x^2 - 3(y(x))^2}{x^2}} - \mathit{Artanh}\left(\frac{1}{2}\sqrt{\frac{x^2-3(y(x))^2}{x^2}}\right)\right.$$

2.498 ODE No. 498

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

✓ **Mathematica** : cpu = 0.108821 (sec), leaf count = 107

$$\left\{\left\{y(x)\to \text{InverseFunction}\left[-\sqrt{1-\#1}\sqrt{3\#1-2}-\frac{\sin^{-1}\left(\sqrt{3-3\#1}\right)}{\sqrt{3}}\&\right][c_1-2x]\right\},\left\{y(x)\to \text{Invers}\right.\right.$$

✓ **Maple** : cpu = 0.296 (sec), leaf count = 99

$$\left\{y(x)=1,y(x)=\frac{\sin\left(\mathit{RootOf}\left(-8\sqrt{3}\_C1\_Z+8\sqrt{3}x\_Z-(\cos(\_Z))^2+48\_C1^2-96\_C1\,x+48\,x\right.\right.}{6}\right.$$

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 = 0.304955 (sec), leaf count = 126

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

✓ **Maple** : cpu = 0.203 (sec), leaf count = 189

$$\left\{y(x)=\mathit{RootOf}\left(-\ln(x)+\int^{\_Z}\frac{\_a}{\left(\_a^2+1\right)\left(\_a^2a^2-\_a^2+a^2\right)}\left(-\_a^2a^2+\_a^2-a^2+\sqrt{\_a^2a^2-\_a^2}\right.\right.\right.$$

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 = 1.33685 (sec), leaf count = 86

$$\left\{\left\{y(x)\to -\frac{\sqrt{a\left((x-c_1)^2-b\right)+b\left(b-x^2\right)}}{\sqrt{b-a}}\right\},\left\{y(x)\to \frac{\sqrt{a\left((x-c_1)^2-b\right)+b\left(b-x^2\right)}}{\sqrt{b-a}}\right\}\right\}$$

✓ **Maple** : cpu = 0.881 (sec), leaf count = 220

$$\left\{y(x)=\frac{1}{b}\sqrt{b\left(-2\,x\sqrt{-ab\,(b-\_C1)}+(-x^2+\_C1+a)\,b-\_C1\,a\right)},y(x)=\frac{1}{b}\sqrt{\left(2\,x\sqrt{-ab\,(b-\_C1\right.}$$

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 = 32.3596 (sec), leaf count = 613

$$\left\{\text{Solve}\left[\left\{y(x)=\frac{b\text{K\$3265384}-\sqrt{\text{K\$3265384}^2\left(-4bx\left(a\text{K\$3265384}^2+d\right)-4c\left(a\text{K\$3265384}^2+d\right)+b^2\right.}}{2\left(a\text{K\$3265384}^2+d\right)}\right.\right.\right.$$

✓ **Maple** : cpu = 4.406 (sec), leaf count = 215

$$\left\{[x(\_T)=-\frac{1}{4\,bd}\left(\left(\ln\left(\frac{1}{\_T}\left(\sqrt{d}\sqrt{\_T^2a+d}+d\right)\right)\right)^2\sqrt{\_T^2a+d}b^2+\left(\left(2\,\ln(2)\,b^2+4\,\sqrt{d}\_C1\,b\right)\sqrt{\right.\right.\right.$$

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 = 1.74292 (sec), leaf count = 71

$$\left\{\left\{y(x)\to\frac{bc_1-\sqrt{c^2-b^2\,(x-c_1)^2}}{a}\right\},\left\{y(x)\to\frac{\sqrt{c^2-b^2\,(x-c_1)^2}+bc_1}{a}\right\}\right\}$$

✓ **Maple** : cpu = 0.367 (sec), leaf count = 195

$$\left\{y(x)=\frac{bx-\sqrt{2}c}{a},y(x)=\frac{bx+\sqrt{2}c}{a},y(x)=\frac{1}{a}\left(RootOf\left(-x+\int^{\_Z}\frac{a}{(2\,\_a^2a^2-4\,c^2)\,b}\left(-\_a^2a^2+2\,c^2\right.\right.\right.\right.$$

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 = 300.05 (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
```

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 = 300. (sec), leaf count = 0 , timed out

```
$Aborted
```

✓ **Maple** : cpu = 0.799 (sec), leaf count = 247

$$\left\{\int_{\_b}^{y(x)} \_a^2 \frac{1}{\sqrt{x^6 + (-2\_a^3 - 2a)x^3 + (-\_a^3 + a)^2}} d\_a - \frac{\ln(x)}{2} - \_C1 = 0, \int_{\_b}^{y(x)} \_a^2 \frac{}{\sqrt{x^6 + (-2\_a^3}}\right.$$

2.505 ODE No. 505

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

✓ **Mathematica** : cpu = 0.0148364 (sec), leaf count = 73

$$\left\{\left\{y(x) \to -\sqrt{2c_1 + x^2}\right\}, \left\{y(x) \to \sqrt{2c_1 + x^2}\right\}, \left\{y(x) \to -\sqrt{c_1x^4 + x^2}\right\}, \left\{y(x) \to \sqrt{c_1x^4 + x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.035 (sec), leaf count = 52

$$\left\{y(x) = \sqrt{x^2 + \_C1}, y(x) = \sqrt{\_C1\,x^2 + 1}x, y(x) = -\sqrt{x^2 + \_C1}, y(x) = -\sqrt{\_C1\,x^2 + 1}x\right\}$$

2.506 ODE No. 506

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

✗ **Mathematica** : cpu = 63.2637 (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*(y(x)-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 = 30.9609 (sec), leaf count = 408

$$\left\{\text{Solve}\left[\left\{x=\frac{\text{K\$3275690}y(\text{K\$3275690})-\frac{\sqrt{a^2\left(\text{K\$3275690}^4+\text{K\$3275690}^2\right)y(\text{K\$3275690})^4}}{a^2}}{\text{K\$3275690}^2},ac_1\sqrt{\text{K\$3275690}}+\frac{2a\sqrt[4]{}}{}\right.\right.\right.$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , exception

```
time expired
```

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 = 55.2558 (sec), leaf count = 0 , could not solve

```
DSolve[-y[x]^2 + 2*x*y[x]*Derivative[1][y][x] + (-x^2 + x^2*y[x]^2 + y[x]^4)*Derivativ
```

✓ **Maple** : cpu = 1.865 (sec), leaf count = 60

$$\{y(x)=-ix,y(x)=ix,y(x)=-Artanh\left(RootOf\left((Artanh(\_Z))^2\_Z^2-2\,Artanh(\_Z)\_C1\,\_Z^2+\_C\right.\right.$$

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 = 299.997 (sec), leaf count = 0 , timed out

```
$Aborted
```

✓ **Maple** : cpu = 1.319 (sec), leaf count = 212

$$\left\{y(x)=\sqrt[6]{-4\,x^2+4}, y(x)=-\sqrt[6]{-4\,x^2+4}, y(x)=-\frac{i\sqrt{3}-1}{2}\sqrt[6]{-4\,x^2+4}, y(x)=\frac{i\sqrt{3}-1}{2}\sqrt[6]{-4\,x^2+4}, y\right.$$

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 = 61.0098 (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]
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 = 1.77823 (sec), leaf count = 225

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

✓ **Maple** : cpu = 4.663 (sec), leaf count = 199

$$\left\{\arctan\left(\frac{x}{y\left(x\right)}\right)-2\,\frac{\sqrt{a^2\left(\left(y\left(x\right)\right)^2+x^2\right)\left(-a^2+\sqrt{\left(y\left(x\right)\right)^2+x^2}\right)}}{a\sqrt{\left(y\left(x\right)\right)^2+x^2}\sqrt{-a^2+\sqrt{\left(y\left(x\right)\right)^2+x^2}}}\arctan\left(\frac{\sqrt{-a^2+\sqrt{\left(y\left(x\right)\right)^2+x^2}}}{a}\right)\right.$$

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 = 6.05523 (sec), leaf count = 713

$$\left\{\text{Solve}\left[\tan^{-1}\left(\frac{x}{y(x)}\right)-\frac{i\sqrt{a\left(\left(x^2+y(x)^2\right)^{5/2}-a\left(x^2+y(x)^2\right)^3\right)}\left(\sqrt{2}\left(\log\left(\frac{a^{3/2}\left(3i\sqrt{2}a\sqrt{x^2+y(x)^2}+4\sqrt{a}\sqrt{\sqrt{}\right.}{4a\sqrt{x^2+y}}\right.\right.\right.}{}\right.\right.\right.$$

✓ **Maple** : cpu = 7.115 (sec), leaf count = 137

$$\left\{y(x)=x\left(\tan\left(RootOf\left(-\_Z+\int^{\frac{x^2\left((\tan(\_Z))^2+1\right)}{(\tan(\_Z))^2}}-\frac{1}{2\_a^2\left(\_a\,a^2-1\right)}\left(a\sqrt{\_a}+1\right)\sqrt{-\_a^3a^2+\_a^{\frac{5}{2}}ad\right.}\right.\right.\right.\right.$$

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 = 300.038 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 4.607 (sec), leaf count = 1134

$$\left\{\left[x(\_T)=\frac{1}{2\_T}\left(\left(\left(\cos\left(\frac{1}{2}\arctan\left(1\left(\_C1^2\_T^2-2\_T\_C1\sqrt[3]{\_C1^3\_T^3+54\_T\_C1+6\sqrt{3}\sqrt{}\right.}\right.\right.\right.\right.\right.\right.\right.$$

2.514 ODE No. 514

$$y'(x)^2(a\cos(y(x))+b)-c\cos(y(x))+d=0$$

✓ **Mathematica** : cpu = 15.4497 (sec), leaf count = 605

$$\left\{\left\{y(x)\to \text{InverseFunction}\left[\frac{4\sin^2\left(\frac{\#1}{2}\right)\csc(\#1)\sqrt{a\cos(\#1)+b}\sqrt{\frac{\cot^2\left(\frac{\#1}{2}\right)(c-d)}{c+d}}\sqrt{\frac{\csc^2\left(\frac{\#1}{2}\right)(a+b)(d-c\cos(\#1))}{ad+bc}}}{}\right.\right.\right.$$

✓ **Maple** : cpu = 0.343 (sec), leaf count = 87

$$\left\{x-\int^{y(x)}(a\cos(\_a)+b)\frac{1}{\sqrt{(a\cos(\_a)+b)(c\cos(\_a)-d)}}d\_a-\_C1=0, x-\int^{y(x)}-(a\cos(\_a)+\right.$$

2.515 ODE No. 515

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

✗ **Mathematica** : cpu = 300. (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 2.48 (sec), leaf count = 113

$$\left\{y(x)=x\left(\tan\left(RootOf\left(-\_Z+\int^{\frac{x^2\left((\tan(\_Z))^2+1\right)}{(\tan(\_Z))^2}}-\frac{1}{2\_a\left(f\left(\_a\right)-\_a\right)}\sqrt{-\left(f\left(\_a\right)-\_a\right)f\left(\_a\right)}d\_a\right.\right.\right.\right.$$

2.516 ODE No. 516

$$\left(x^2+y(x)^2\right)f\left(\frac{x}{\sqrt{x^2+y(x)^2}}\right)\left(y'(x)^2+1\right)-(xy'(x)-y(x))^2=0$$

✓ **Mathematica** : cpu = 3.90664 (sec), leaf count = 229

$$\left\{\text{Solve}\left[c_1=\log(x)+\int_1^{\frac{y(x)}{x}}\frac{(K[1]^2+1)\,f\left(\frac{1}{\sqrt{K[1]^2+1}}\right)-1}{(K[1]-i)(K[1]+i)\sqrt{f\left(\frac{1}{\sqrt{K[1]^2+1}}\right)}\left(K[1]\sqrt{f\left(\frac{1}{\sqrt{K[1]^2+1}}\right)}+i\sqrt{f\left(\frac{1}{\sqrt{K[1]^2+1}}\right.}\right.}\right.\right.$$

✓ **Maple** : cpu = 1.222 (sec), leaf count = 70

$$\left\{y(x)=RootOf\left(-\ln(x)+\int^{\_Z}-\frac{1}{\_a^2+1}\left(\_a\,f\left(\frac{1}{\sqrt{\_a^2+1}}\right)+\sqrt{-\left(f\left(\frac{1}{\sqrt{\_a^2+1}}\right)\right)^2+f\left(\frac{}{\sqrt{\_a}}\right.}\right.\right.\right.$$

2.517 ODE No. 517

$$\left(x^2+y(x)^2\right)f\left(\frac{y(x)}{\sqrt{x^2+y(x)^2}}\right)\left(y'(x)^2+1\right)-\left(xy'(x)-y(x)\right)^2=0$$

✓ **Mathematica** : cpu = 4.17096 (sec), leaf count = 253

$$\left\{\text{Solve}\left[c_1=\log(x)+\int_1^{\frac{y(x)}{x}}\frac{(K[1]^2+1)\,f\left(\frac{K[1]}{\sqrt{K[1]^2+1}}\right)-1}{(K[1]-i)(K[1]+i)\sqrt{f\left(\frac{K[1]}{\sqrt{K[1]^2+1}}\right)}\left(K[1]\sqrt{f\left(\frac{K[1]}{\sqrt{K[1]^2+1}}\right)}+i\sqrt{f\left(\frac{K[1]}{\sqrt{K[1]^2+1}}\right.}\right.}\right.\right.$$

✓ **Maple** : cpu = 1.252 (sec), leaf count = 155

$$\left\{y(x)=RootOf\left(-\ln(x)+\int^{\_Z}\frac{1}{\_a^2+1}\left(-\_a\,f\left(\_a\frac{1}{\sqrt{\_a^2+1}}\right)+\sqrt{-\left(f\left(\_a\frac{1}{\sqrt{\_a^2+1}}\right)\right)^2+f}\right.\right.\right.$$

2.518 ODE No. 518

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

✓ **Mathematica** : cpu = 0.797865 (sec), leaf count = 236

$$\left\{\left\{y(x)\to\text{InverseFunction}\left[-\frac{3\sqrt[3]{a-\#1}\left(\frac{\#1-b}{a-b}\right)^{2/3}\,{}_2F_1\left(\frac{1}{3},\frac{2}{3};\frac{4}{3};\frac{a-\#1}{a-b}\right)}{(b-\#1)^{2/3}}\&\right][c_1+x]\right\},\left\{y(x)\to\text{InverseFu}\right.\right.$$

✓ **Maple** : cpu = 0.772 (sec), leaf count = 126

$$\left\{x-\int^{y(x)}\frac{1}{\sqrt[3]{(\_a-a)^2(\_a-b)^2}}d\_a-\_C1=0, x-\int^{y(x)}2\frac{1}{(i\sqrt{3}-1)\sqrt[3]{(-\_a+a)^2(-\_a+b)^2}}d\_a\right.$$

2.519 ODE No. 519

$$y'(x)^3-f(x)\left(ay(x)^2+by(x)+c\right)^2=0$$

✓ **Mathematica** : cpu = 1.9505 (sec), leaf count = 473

$$\left\{\left\{y(x)\to\text{InverseFunction}\left[\frac{3\left(2\#1a-\sqrt{b^2-4ac}+b\right)\left(\frac{2\#1a+\sqrt{b^2-4ac}+b}{\sqrt{b^2-4ac}}\right)^{2/3}{}_2F_1\left(\frac{1}{3},\frac{2}{3};\frac{4}{3};\frac{-b-2a\#1+\sqrt{b^2-4ac}}{2\sqrt{b^2-4ac}}\right.}{2\,2^{2/3}a(\#1(\#1a+b)+c)^{2/3}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.505 (sec), leaf count = 197

$$\left\{\int^{y(x)}\left(\_a^2a+b\_a+c\right)^{-\frac{2}{3}}d\_a+\int^{x}-1\sqrt[3]{f(\_a)\left(a\left(y(x)\right)^2+by(x)+c\right)^2}\left(a(y(x))^2+by(x)+c\right)^{-\frac{2}{3}}d\_\right.$$

2.520 ODE No. 520

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

✓ **Mathematica** : cpu = 233.727 (sec), leaf count = 3323

$$\left\{\left\{y(x)\to\text{InverseFunction}\left[\frac{\left(243\#1^2-27\sqrt{81\#1^2+12}\#1-24\sqrt[3]{2}\sqrt[6]{3}\tan^{-1}\left(\frac{1}{\sqrt{3}}-\left(\frac{2}{3}\right)^{2/3}\sqrt[3]{\sqrt{81\#1^2}}\right.\right.}{}\right.\right.\right.$$

✓ **Maple** : cpu = 0.699 (sec), leaf count = 245

$$\left\{x-\int^{y(x)}6\frac{\sqrt[3]{108\_a+12\sqrt{81\_a^2+12}}}{\left(108\_a+12\sqrt{81\_a^2+12}\right)^{2/3}-12}d\_a-\_C1=0, x-\int^{y(x)}-12\frac{}{(i\sqrt{3}-1)\left(-\sqrt[3]{108\_\right.}}\right.$$

2.521 ODE No. 521

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

✓ **Mathematica** : cpu = 0.00411851 (sec), leaf count = 14

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

✓ **Maple** : cpu = 0.57 (sec), leaf count = 33

$$\left\{y(x) = \_C1\ (\_C1^2 + x)\,, y(x) = -\frac{2\,x}{9}\sqrt{-3\,x}, y(x) = \frac{2\,x}{9}\sqrt{-3\,x}\right\}$$

2.522 ODE No. 522

$$y'(x)^3 - (x+5)y'(x) + y(x) = 0$$

✓ **Mathematica** : cpu = 0.00425611 (sec), leaf count = 17

$$\{\{y(x) \to c_1 (-c_1^2 + x + 5)\}\}$$

✓ **Maple** : cpu = 0.585 (sec), leaf count = 44

$$\left\{y(x) = \_C1\ (-\_C1^2 + x + 5)\,, y(x) = -\frac{2\,x+10}{9}\sqrt{3\,x+15}, y(x) = \frac{2\,x+10}{9}\sqrt{3\,x+15}\right\}$$

2.523 ODE No. 523

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

✗ **Mathematica** : cpu = 299.998 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.597 (sec), leaf count = 231

$$\left\{y(x) = \int i\left(\left(\frac{i}{12} - \frac{\sqrt{3}}{12}\right)\left(-108\,x^3 + 12\sqrt{-12\,a^3x^3 + 81\,x^6}\right)^{\frac{2}{3}} + a\left(\sqrt{3} + i\right)x\right)\frac{1}{\sqrt[3]{-108\,x^3 + 12\sqrt{-12}}}\right.$$

2.524 ODE No. 524

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

✗ **Mathematica** : cpu = 611.964 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.6 (sec), leaf count = 261

$$\left\{x - \int^{y(x)} 6 \frac{\sqrt[3]{-108\_a^2 + 12\sqrt{3}\sqrt{27\_a^4 - 32\_a^3}}}{\left(-108\_a^2 + 12\sqrt{3}\sqrt{27\_a^4 - 32\_a^3}\right)^{2/3} + 24\_a} d\_a - \_C1 = 0, x - \int^{y(x)} 24 \frac{}{(i\sqrt{3}+1)}\right.$$

2.525 ODE No. 525

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

✓ **Mathematica** : cpu = 5.95425 (sec), leaf count = 121

$$\left\{\left\{y(x) \to \frac{c_1 e^{\frac{1}{4}\left(ax^2 + \sqrt{a}x\sqrt{ax^2-8}\right)}}{\left(\sqrt{a}\sqrt{ax^2-8} + ax\right)^2}\right\}, \left\{y(x) \to a c_1 e^{\frac{1}{4}\left(ax^2 - \sqrt{a}x\sqrt{ax^2-8}\right)}\left(\sqrt{ax^2-8} + \sqrt{a}x\right)^2\right\}\right\}$$

✓ **Maple** : cpu = 0.625 (sec), leaf count = 122

$$\left\{y(x) = \_C1\left(a^2x\frac{1}{\sqrt{a^2}} + \sqrt{a^2x^2 - 8a}\right)^{-2\frac{a}{\sqrt{a^2}}} \mathrm{e}^{\frac{x}{4}\left(ax + \sqrt{a^2x^2-8a}\right)}, y(x) = \_C1\left(a^2x\frac{1}{\sqrt{a^2}} + \sqrt{a^2x^2 - 8a}\right)^2\right.$$

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 = 0.186442 (sec), leaf count = 43

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

✓ **Maple** : cpu = 0.022 (sec), leaf count = 32

$$\left\{y(x) = (\_C1 - x)^{-1}, y(x) = \_C1\,\mathrm{e}^{\frac{x^2}{2}}, y(x) = \frac{x^3}{3} + \_C1\right\}$$

2.527 ODE No. 527

$$-xy(x)^4y'(x) + y'(x)^3 - y(x)^5 = 0$$

✗ **Mathematica** : cpu = 299.999 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 1.239 (sec), leaf count = 43

$$\left\{y(x) = \sqrt{\frac{\_C1^{10}}{(\_C1^4x-1)^2}}\_C1, y(x) = -\frac{3\sqrt{3}}{2}x^{-\frac{3}{2}}, y(x) = \frac{3\sqrt{3}}{2}x^{-\frac{3}{2}}\right\}$$

2.528 ODE No. 528

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

✗ **Mathematica** : cpu = 300.006 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.644 (sec), leaf count = 86

$$\left\{y(x) = -ax - \frac{\left(e^{RootOf(-2a^2\_Z-3e^{2\_Z}+8ae^{\_Z}+2\_C1b-5a^2-2bx)} - a\right)^2 e^{RootOf(-2a^2\_Z-3e^{2\_Z}+8ae^{\_Z}+2\_C1b-5a}}{b}\right.$$

2.529 ODE No. 529

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

✓ **Mathematica** : cpu = 64.755 (sec), leaf count = 1484

$$\left\{\left\{y(x) \to \frac{-16x^4 + 8\left(\sqrt[3]{-8x^3 - 36x^2 - 54x + 108c_1 + 6\sqrt{6}\sqrt{(2c_1+1)(-4x^3 - 18x^2 - 27x + 27c_1)} +}\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.597 (sec), leaf count = 1251

$$\left\{y(x) = 0, y(x) = 1\left((4x-6)\sqrt[3]{-36x^2 - 54x + 108\_C1 - 8x^3 + 27 + 6\sqrt{-6(1+2\_C1)(4x^3+18}}\right.\right.$$

2.530 ODE No. 530

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

✗ **Mathematica** : cpu = 300.014 (sec), leaf count = 0 , timed out

```
$Aborted
```

✓ **Maple** : cpu = 0.666 (sec), leaf count = 432

$$\left\{x - \int^{y(x)} 6 \frac{\sqrt[3]{-108\_a^2 + 8\_a^3 + 12\sqrt{-12\_a^5 + 81\_a^4}}}{4\_a^2 + 2\_a\sqrt[3]{-108\_a^2 + 8\_a^3 + 12\sqrt{-12\_a^5 + 81\_a^4}} + \left(-108\_a^2 + 8\_a^3 + 12\sqrt{-\right.}}\right.$$

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 = 71.0576 (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] + Deri
```

✗ **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^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 = 300.002 (sec), leaf count = 0 , timed out

```
$Aborted
```

✓ **Maple** : cpu = 0.697 (sec), leaf count = 848

$$\left\{x - \int^{y(x)} 6 \frac{a\sqrt[3]{12\sqrt{3}\sqrt{27\,(d+}}}{\left(12\sqrt{3}\sqrt{27\,(d+\_a)^2a^2 + 18\,c\left((d+\_a)\,b + 2/9\,c^2\right)a + (-4\,d - 4\_a)\,b^3 - b^2c^2a + (108\,d\right.}}\right.$$

2.533 ODE No. 533

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

✗ **Mathematica** : cpu = 300.263 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.576 (sec), leaf count = 76

$$\left\{y(x)=\frac{\_C1^3x+a}{\_C1^2}, y(x)=\frac{3\sqrt[3]{2}}{2}\sqrt[3]{ax^2}, y(x)=\frac{3\sqrt[3]{2}(i\sqrt{3}-1)}{4}\sqrt[3]{ax^2}, y(x)=-\frac{3\sqrt[3]{2}(i\sqrt{3}+1)}{4}\sqrt[3]{ax^2}\right\}$$

2.534 ODE No. 534

$$4xy'(x)^3-6y(x)y'(x)^2+3y(x)-x=0$$

✗ **Mathematica** : cpu = 300.001 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.638 (sec), leaf count = 84

$$\left\{y(x)=x, y(x)=-\frac{(1+\sqrt{3})\,x}{2}, y(x)=\frac{(\sqrt{3}-1)\,x}{2}, y(x)=\frac{1}{3\_C1}\left(-\sqrt{2}(\_C1+x)\sqrt{\_C1\ (\_C1+x}\right.$$

2.535 ODE No. 535

$$8xy'(x)^3-12y(x)y'(x)^2+9y(x)=0$$

✗ **Mathematica** : cpu = 300. (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.594 (sec), leaf count = 51

$$\left\{y(x)=0, y(x)=-\frac{3x}{2}, y(x)=\frac{3x}{2}, y(x)=-\frac{1}{3\_C1^2}(\_C1\ (3\_C1+x))^{\frac{3}{2}}, y(x)=\frac{1}{3\_C1^2}(\_C1\ (3\_C$$

2.536 ODE No. 536

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

✓ **Mathematica** : cpu = 0.0165045 (sec), leaf count = 64

$$\left\{\left\{y(x)\to c_1-\frac{bx^2}{2}\right\},\left\{y(x)\to c_1-\tan^{-1}\left(\frac{x}{\sqrt{a^2-x^2}}\right)\right\},\left\{y(x)\to \tan^{-1}\left(\frac{x}{\sqrt{a^2-x^2}}\right)+c_1\right\}\right\}$$

✓ **Maple** : cpu = 0.589 (sec), leaf count = 52

$$\left\{y(x)=-\frac{bx^2}{2}+\_C1,y(x)=-\arctan\left(x\frac{1}{\sqrt{a^2-x^2}}\right)+\_C1,y(x)=\arctan\left(x\frac{1}{\sqrt{a^2-x^2}}\right)+\_C1\right\}$$

2.537 ODE No. 537

$$(x^6+3xy(x)^2)\,y'(x)-2x^5y(x)+x^3y'(x)^3-3x^2y(x)y'(x)^2-y(x)^3=0$$

✗ **Mathematica** : cpu = 300. (sec), leaf count = 0 , timed out

`$Aborted`

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

```
dsolve(x^3*diff(y(x),x)^3-3*x^2*y(x)*diff(y(x),x)^2+(3*x*y(x)^2+x^6)*diff(y(x),x)-
y(x)^3-2*x^5*y(x)=0,y(x))
```

2.538 ODE No. 538

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

✗ **Mathematica** : cpu = 299.999 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 1.496 (sec), leaf count = 1532

$$\left\{\int_{\_b}^{x}1\left(-6^{\frac{2}{3}}\left(-9\,y(x)\left(-1/9\sqrt{3}\sqrt{\frac{27\_a\,(y(x))^2-2\,y(x)}{\_a}}+y(x)\right)\_a^2\right)^{\frac{2}{3}}+6\_a\,y(x)\left(\sqrt[3]{6}\sqrt[3]{-9\,y(x\right.\right.\right.$$

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 = 0.0358302 (sec), leaf count = 45

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

✓ **Maple** : cpu = 1.182 (sec), leaf count = 32

$$\{y(x) = \_C1\, e^x, y(x) = -\cos(x) + \_C1, y(x) = -\ln(\csc(x) - \cot(x)) + \_C1\}$$

2.540 ODE No. 540

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

✓ **Mathematica** : cpu = 0.0213839 (sec), leaf count = 61

$$\left\{\left\{y(x) \to c_1 + \frac{x}{2}\right\}, \left\{y(x) \to \left(\frac{3c_1}{2} - ix^{3/2}\right)^{2/3}\right\}, \left\{y(x) \to \left(\frac{3c_1}{2} + ix^{3/2}\right)^{2/3}\right\}\right\}$$

✓ **Maple** : cpu = 0.634 (sec), leaf count = 109

$$\left\{x + \frac{\_C1\, x}{y(x)}\left(\frac{1}{y(x)}\left(-\sqrt{-xy(x)} + y(x)\right)\right)^{-\frac{2}{3}}\left(\frac{1}{y(x)}\left(-x + \sqrt{-xy(x)} + y(x)\right)\right)^{-\frac{2}{3}} = 0, x + \frac{\_C1\, x}{y(x)}\left(\right.\right.$$

2.541 ODE No. 541

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

✗ **Mathematica** : cpu = 300. (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 1.118 (sec), leaf count = 103

$$\left\{y(x) = \sqrt{\_C1^3 + 2\,\_C1\, x}, y(x) = -\frac{2\,i}{3}\sqrt[4]{2}\sqrt[4]{3}\sqrt[4]{-x^3}, y(x) = \frac{2\,i}{3}\sqrt[4]{2}\sqrt[4]{3}\sqrt[4]{-x^3}, y(x) = -\sqrt{\_C1^3 + 2\,\_C\right.$$

2.542 ODE No. 542

$$16y(x)^2y'(x)^3 + 2xy'(x) - y(x) = 0$$

✗ **Mathematica** : cpu = 300. (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 1.089 (sec), leaf count = 107

$$\left\{y(x) = \sqrt{16\_C1^3 + 2\_C1\,x}, y(x) = -\frac{i}{3}\sqrt[4]{2}\sqrt[4]{3}\sqrt[4]{-x^3}, y(x) = \frac{i}{3}\sqrt[4]{2}\sqrt[4]{3}\sqrt[4]{-x^3}, y(x) = -\sqrt{16\_C1^3 + 2\right.$$

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 = 300.015 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 1.931 (sec), leaf count = 277

$$\left\{y(x) = -\frac{i}{2}\sqrt[4]{-16\,x^4 + 40\,x^2 + 2 - 2\sqrt{-\left(8\,x^2-1\right)^3}}, y(x) = -\frac{i}{2}\sqrt[4]{-16\,x^4 + 40\,x^2 + 2 + 2\sqrt{-\left(8\,x^2-1\right.}}\right.$$

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 = 299.999 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 1.584 (sec), leaf count = 4201

$$\left\{\int_{\_b}^{x}\frac{1}{\_a}\left(\left(-1-i\sqrt{3}\right)\left(-108\,(y(x))^6\,\_a^{12} + 12\sqrt{3}\sqrt{\frac{27\,\_a^6\,(y(x))^3-4}{y(x)}}(y(x))^5\,\_a^9 + 72\,\_a^6(y(x))^3 -\right.\right.\right.$$

2.545 ODE No. 545

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

✓ **Mathematica** : cpu = 0.820463 (sec), leaf count = 383

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[-\frac{\sqrt[4]{a-\#1}\sqrt{\frac{\#1-b}{a-b}}B_{\frac{a-\#1}{a-b}}\left(\frac{1}{4},\frac{1}{2}\right)}{\sqrt{b-\#1}\sqrt[4]{\frac{a-\#1}{a-b}}}\&\right]\left[c_1-\sqrt[4]{-1}x\right]\right\},\left\{y(x) \to \text{InverseFunct}\right.\right.$$

✓ **Maple** : cpu = 0.737 (sec), leaf count = 144

$$\left\{x - \int^{y(x)} \frac{1}{\sqrt[4]{(\_a-a)^3(\_a-b)^2}} d\_a - \_C1 = 0, x - \int^{y(x)} -i \frac{1}{\sqrt[4]{-(-\_a+a)^3(-\_a+b)^2}} d\_a - \_C\right.$$

2.546 ODE No. 546

$$y'(x)^4 + 3(x-1)y'(x)^2 - 3(2y(x)-1)y'(x) + 3x = 0$$

✗ **Mathematica** : cpu = 300.008 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.682 (sec), leaf count = 171

$$\left\{y(x) = 1\left(\left(-6+\_C1^3+(6x-6)\_C1\right)\sqrt{\_C1^2+4x} - 2\_C1^4 + (-14x+6)\_C1^2 + \left(\left(\_C1^2+4\right.\right.\right.\right.$$

2.547 ODE No. 547

$$y'(x)^4 - 4y(x)\left(xy'(x)-2y(x)\right)^2 = 0$$

✓ **Mathematica** : cpu = 1.80494 (sec), leaf count = 321

$$\left\{\text{Solve}\left[\frac{\sqrt{x^2-4\sqrt{y(x)}}\sqrt{y(x)}\left(4\log\left(\sqrt{x^2-4\sqrt{y(x)}}+x\right)-\log(y(x))\right)}{\sqrt{\left(x^2-4\sqrt{y(x)}\right)y(x)}}+\log(y(x))=4c_1,y(x)\right],\text{So}\right.$$

✓ **Maple** : cpu = 0.809 (sec), leaf count = 118

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

2.548 ODE No. 548

$$y'(x)^6-(y(x)-a)^4(y(x)-b)^3=0$$

✓ **Mathematica** : cpu = 1.10865 (sec), leaf count = 569

$$\left\{\left\{y(x)\to \text{InverseFunction}\left[-\frac{\sqrt[3]{a-\#1}\sqrt{\frac{\#1-b}{a-b}}B_{\frac{a-\#1}{a-b}}\left(\frac{1}{3},\frac{1}{2}\right)}{\sqrt{b-\#1}\sqrt[3]{\frac{a-\#1}{a-b}}}\&\right][c_1-ix]\right\},\left\{y(x)\to \text{InverseFunction}\left[\right.\right.\right.$$

✓ **Maple** : cpu = 0.898 (sec), leaf count = 246

$$\left\{x-\int^{y(x)}\frac{1}{\sqrt[6]{(\_a-a)^4(\_a-b)^3}}d\_a-\_C1=0,x-\int^{y(x)}\frac{-2i}{\sqrt{3}-i}\frac{1}{\sqrt[6]{-(-\_a+a)^4(-\_a+b)^3}}d\_a-\right.$$

2.549 ODE No. 549

$$x^2\left(y'(x)^2+1\right)^3-a^2=0$$

✓ **Mathematica** : cpu = 0.49358 (sec), leaf count = 360

$$\left\{\left\{y(x)\to c_1-\frac{1}{4}\sqrt[3]{x}\sqrt{-4+\frac{2i\left(\sqrt{3}+i\right)a^{2/3}}{x^{2/3}}}\left(2x^{2/3}+\left(1-i\sqrt{3}\right)a^{2/3}\right)\right\},\left\{y(x)\to c_1+\frac{1}{4}\sqrt[3]{x}\sqrt{-4+}\right.\right.$$

✓ **Maple** : cpu = 1.07 (sec), leaf count = 545

$$\left\{y(x)=1\sqrt{-\frac{1}{a^4}(a^2x)^{\frac{4}{3}}\left((a^2x)^{\frac{2}{3}}-a^2\right)}\left(a^2-(a^2x)^{\frac{2}{3}}\right)(a^2x)^{-\frac{2}{3}}+\_C1,y(x)=1\sqrt{-\frac{1}{a^4}(a^2x)^{\frac{4}{3}}\left((a^2x)^{\frac{2}{3}}-\right.}\right.$$

2.550 ODE No. 550

$$-ay(x)^s - bx^{\frac{rs}{r-s}} + y'(x)^r = 0$$

✗ **Mathematica** : cpu = 299.997 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.319 (sec), leaf count = 60

$$\left\{(-r+s)\int_{\_b}^{y(x)}\left(x(r-s)\sqrt[r]{a\_a^s + bx^{\frac{rs}{r-s}}} - r\_a\right)^{-1} \mathrm{d}\_a + \ln(x) - \_C1 = 0\right\}$$

2.551 ODE No. 551

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

✓ **Mathematica** : cpu = 0.941048 (sec), leaf count = 79

$$\left\{\left\{y(x) \to \frac{a(a-b)^n \left(\int_1^x (-1)^{\frac{1}{n}+1} f(K[1])\, dK[1] + c_1\right)^n + bn^n}{(a-b)^n \left(\int_1^x (-1)^{\frac{1}{n}+1} f(K[1])\, dK[1] + c_1\right)^n + n^n}\right\}\right\}$$

✓ **Maple** : cpu = 0.446 (sec), leaf count = 55

$$\left\{y(x) = 1\left(b\left(-\frac{n}{(a-b)\left(\int f(x)\,\mathrm{d}x + \_C1\right)}\right)^n - a\right)\left(-1 + \left(-\frac{n}{(a-b)\left(\int f(x)\,\mathrm{d}x + \_C1\right)}\right)^n\right)^{-1}\right\}$$

2.552 ODE No. 552

$$y'(x)^n - f(x)g(y(x)) = 0$$

✓ **Mathematica** : cpu = 0.178343 (sec), leaf count = 39

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[\int_1^{\#1} g(K[1])^{-1/n}\, dK[1]\&\right]\left[\int_1^x f(K[2])^{\frac{1}{n}}\, dK[2] + c_1\right]\right\}\right\}$$

✓ **Maple** : cpu = 0.094 (sec), leaf count = 43

$$\left\{\int^{y(x)} (g(\_a))^{-n^{-1}}\, d\_a + \int^x -\frac{\sqrt[n]{f(\_a)\, g(y(x))}}{\sqrt[n]{g(y(x))}} d\_a + \_C1 = 0\right\}$$

2.553 ODE No. 553

$$ay'(x)^m + by'(x)^n - y(x) = 0$$

✓ **Mathematica** : cpu = 0.183762 (sec), leaf count = 51

$$\text{Solve}\left[\left\{x = \frac{am\text{K\$5280599}^{m-1}}{m-1} + \frac{bn\text{K\$5280599}^{n-1}}{n-1} + c_1, a\text{K\$5280599}^m + b\text{K\$5280599}^n = y(x)\right\}, \{y(x),$$

✓ **Maple** : cpu = 0.061 (sec), leaf count = 36

$$\left\{x - \int^{y(x)} (RootOf(-a\_Z^m - b\_Z^n + \_a))^{-1} \, d\_a - \_C1 = 0, y(x) = 0\right\}$$

2.554 ODE No. 554

$$x^{n-1}y'(x)^n - nxy'(x) + y(x) = 0$$

✓ **Mathematica** : cpu = 0.124577 (sec), leaf count = 44

$$\text{Solve}\left[\left\{\text{K\$5280784}nx = \text{K\$5280784}^n x^{n-1} + y(x), x = c_1(\text{K\$5280784} - \text{K\$5280784}n)^{\frac{n}{1-n}}\right\}, \{y(x), \text{K\$528}$$

✓ **Maple** : cpu = 0.438 (sec), leaf count = 32

$$\left\{y(x) = \frac{1}{\_C1}\left(\_C1^2 n \sqrt[n]{\frac{x}{\_C1}} - \left(\_C1^{-1}\right)^{-n}\right)\right\}$$

2.555 ODE No. 555

$$xy'(x) + \sqrt{y'(x)^2 + 1} - y(x) = 0$$

✗ **Mathematica** : cpu = 301.855 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 1.141 (sec), leaf count = 15

$$\left\{y(x) = \sqrt{\_C1^2 + 1} + \_C1\, x\right\}$$

2.556 ODE No. 556

$$xy'(x)^2 + \sqrt{y'(x)^2 + 1} + y(x) = 0$$

✓ **Mathematica** : cpu = 7.0677 (sec), leaf count = 50

$$\text{Solve}\left[\left\{x = -\frac{-c_1 + \sqrt{\text{K\$5281017}^2 + 1} + \sinh^{-1}(\text{K\$5281017})}{(\text{K\$5281017} + 1)^2}, \text{K\$5281017}^2 x + \sqrt{\text{K\$5281017}^2 + 1} + y(x\right.\right.$$

✓ **Maple** : cpu = 1.318 (sec), leaf count = 581

$$\left\{\_C1\, x^2 \left(\sqrt{-4\,xy\,(x) + 2 + 2\,\sqrt{4\,x^2 - 4\,xy\,(x) + 1}} - 2\,x\right)^{-2} + x + 2\,\frac{x^2}{\left(\sqrt{-4\,xy\,(x) + 2 + 2\,\sqrt{4\,x^2 - 4\,x}}\right.}\right.$$

2.557 ODE No. 557

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

✓ **Mathematica** : cpu = 0.0167966 (sec), leaf count = 37

$$\left\{\left\{y(x) \to -\sqrt{-x\,(x - c_1)}\right\}, \left\{y(x) \to \sqrt{-x\,(x - c_1)}\right\}\right\}$$

✓ **Maple** : cpu = 1.251 (sec), leaf count = 74

$$\left\{2\,xy(x)\,\_C1\,\frac{1}{\sqrt{\frac{\left((y(x))^2 + x^2\right)^2}{x^2\,(y(x))^2}}}\left(\sqrt{\frac{x^4 + 2\,x^2\,(y\,(x))^2 + (y\,(x))^4}{x^2\,(y\,(x))^2}}xy(x) + (y(x))^2 - x^2\right)^{-1} + x = 0\right\}$$

2.558 ODE No. 558

$$ax\sqrt{y'(x)^2+1}+xy'(x)-y(x)=0$$

✓ **Mathematica** : cpu = 0.800949 (sec), leaf count = 369

$$\left\{\text{Solve}\left[\frac{a\left(2\log\left(x-a^2x\right)-\log\left(\frac{(a^2-1)\left(y(x)+ix\left(a\sqrt{a^2-\frac{y(x)^2}{x^2}-1}+a^2-1\right)\right)}{a^3(x+iy(x))}\right)+\log\left(\frac{i(a^2-1)\left(x\left(a\sqrt{a^2-\frac{y(x)^2}{x^2}-1}+a^2\right.\right.}{a^3(x-iy(x))}\right.\right.}{2\left(a^2-1\right)}\right.\right.$$

✓ **Maple** : cpu = 1.29 (sec), leaf count = 223

$$\left\{x-\_C1\,\mathrm{e}^{\frac{1}{a}Arcsinh\left(\frac{1}{(a^2-1)x}\left(\sqrt{-a^2x^2+x^2+(y(x))^2}a+y(x)\right)\right)}\frac{1}{\sqrt{\frac{1}{(a^2-1)^2x^2}\left(-a^2x^2+a^2\left(y\left(x\right)\right)^2+2\sqrt{-a^2x^2+x^2+\right.}}}\right.$$

2.559 ODE No. 559

$$-ay(x)y'(x)-ax+y(x)\sqrt{y'(x)^2+1}=0$$

✓ **Mathematica** : cpu = 0.334332 (sec), leaf count = 126

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

✓ **Maple** : cpu = 1.421 (sec), leaf count = 215

$$\left\{-\mathrm{e}^{\int^{\frac{1}{(a^2-1)y(x)}\left(-a^2x-\sqrt{(a^2-1)(y(x))^2+a^2x^2}\right)}a\left(a\sqrt{\_a^2+1}-\_a\right)\frac{1}{\sqrt{\_a^2+1}}\left(\_a\,a-\sqrt{\_a^2+1}\right)^{-1}\left(\_a^2a-\sqrt{\_a^2+1}\_a+a\right)^{-1}d\_a}\_C1+\right.$$

2.560 ODE No. 560

$$ay(x)\sqrt{y'(x)^2+1}-x^2-2xy(x)y'(x)+y(x)^2=0$$

✓ **Mathematica** : cpu = 22.0818 (sec), leaf count = 86

$$\left\{\left\{y(x)\to -\frac{\sqrt{4x^2-a^2\left(c_1x+2\right)^2}}{\sqrt{a^2c_1^2-4}}\right\},\left\{y(x)\to \frac{\sqrt{4x^2-a^2\left(c_1x+2\right)^2}}{\sqrt{a^2c_1^2-4}}\right\}\right\}$$

✓ **Maple** : cpu = 2.122 (sec), leaf count = 1120

$$\left\{\int_{\_b}^{x}1\left(2\_a^3-2\_a\left(y(x)\right)^2+\sqrt{a^2\left(\_a^4+2\_a^2\left(y\left(x\right)\right)^2-a^2\left(y\left(x\right)\right)^2+\left(y\left(x\right)\right)^4\right)}\right)\left(-2\,a^2\_a\left(y(x)\right)^2+\right.\right.$$

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 = 300.002 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 2.066 (sec), leaf count = 50

$$\left\{y(x)=x\left(\tan\left(RootOf\left(-2\_Z+\int^{\frac{x^2\left((\tan(\_Z))^2+1\right)}{(\tan(\_Z))^2}}\frac{f(\_a)}{\_a}\frac{1}{\sqrt{-\left(f\left(\_a\right)\right)^2+\_a}}d\_a+2\_C1\right)\right)\right)^{-1}\right\}$$

2.562 ODE No. 562

$$a\sqrt[3]{y'(x)^3+1}+bxy'(x)-y(x)=0$$

✗ **Mathematica** : cpu = 300.03 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 1.29 (sec), leaf count = 3306

$$\left\{\left(-\int^{\frac{1}{2\,b^3x^3+2\,a^3}}\left(2\,b^2x^2y(x)\sqrt[3]{-4\,b^6x^6-8\,a^3b^3x^3-4\,b^3x^3(y(x))^3+4\,\sqrt{b^6x^6+2\,a^3b^3x^3+2\,b^3x^3(y(x))^3+a^6-2\,(y(x))^3a^3+(y(x))^6}b^3x^3-4\,a^6\right.\right.\right.$$

2.563 ODE No. 563

$$ay(x)+b+xy'(x)+\log(y'(x))=0$$

✓ **Mathematica** : cpu = 0.158852 (sec), leaf count = 52

$$\text{Solve}\left[W\left(xe^{-ay(x)-b}\right)+\frac{(a+1)\log\left(1-aW\left(xe^{-ay(x)-b}\right)\right)}{a}+ay(x)=c_1,y(x)\right]$$

✓ **Maple** : cpu = 0.181 (sec), leaf count = 66

$$\left\{-\left(\mathrm{e}^{-ay(x)-lambertW\left(x\mathrm{e}^{-ay(x)-b}\right)-b}\right)^{-(a+1)^{-1}}\_C1+x-\frac{\mathrm{e}^{ay(x)+lambertW\left(x\mathrm{e}^{-ay(x)-b}\right)+b}}{a}=0\right\}$$

2.564 ODE No. 564

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

✓ **Mathematica** : cpu = 0.0427089 (sec), leaf count = 21

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

✓ **Maple** : cpu = 0.029 (sec), leaf count = 32

$$\left\{y(x)=\frac{1}{a}\left(\ln\left(-\frac{1}{ax}\right)-1\right),y(x)=\_C1\,x+\frac{\ln(\_C1)}{a}\right\}$$

2.565 ODE No. 565

$$y'(x)+y(x)\log(y'(x))-xy(x)-y(x)\log(y(x))=0$$

✓ **Mathematica** : cpu = 0.0118145 (sec), leaf count = 24

$$\left\{\left\{y(x)\to c_1e^{\frac{1}{2}W(e^x)(W(e^x)+2)}\right\}\right\}$$

✓ **Maple** : cpu = 0.18 (sec), leaf count = 17

$$\left\{y(x)=\_C1\,\mathrm{e}^{\frac{lambertW(\mathrm{e}^x)(lambertW(\mathrm{e}^x)+2)}{2}}\right\}$$

2.566 ODE No. 566

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

✗ **Mathematica** : cpu = 0.0194614 (sec), leaf count = 0 , could not solve

```
DSolve[-x + Sin[Derivative[1][y][x]] + Derivative[1][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 0.038 (sec), leaf count = 16

$$\left\{y(x) = \int RootOf(\sin(\_Z) + \_Z - x)\,dx + \_C1\right\}$$

2.567 ODE No. 567

$$a\cos(y'(x)) + by'(x) + x = 0$$

✗ **Mathematica** : cpu = 0.0121245 (sec), leaf count = 0 , could not solve

```
DSolve[x + a*Cos[Derivative[1][y][x]] + b*Derivative[1][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 0.042 (sec), leaf count = 18

$$\left\{y(x) = \int RootOf(a\cos(\_Z) + \_Z\,b + x)\,dx + \_C1\right\}$$

2.568 ODE No. 568

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

✓ **Mathematica** : cpu = 0.0552216 (sec), leaf count = 27

$$\text{Solve}\left[\left\{\cos(\text{K\$5321143}) + x = c_1 + \text{K\$5321143}\sin(\text{K\$5321143}), \text{K\$5321143}^2\sin(\text{K\$5321143}) = y(x)\right\}, \{y$$

✓ **Maple** : cpu = 0.071 (sec), leaf count = 32

$$\left\{x - \int^{y(x)} \left(RootOf\left(\sin(\_Z)\,\_Z^2 - \_a\right)\right)^{-1} d\_a - \_C1 = 0, y(x) = 0\right\}$$

2.569 ODE No. 569

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

✓ **Mathematica** : cpu = 0.0425547 (sec), leaf count = 59

$$\left\{\left\{y(x)\to c_1x-\frac{1}{2}\cos^{-1}\left(\frac{c_1^2-1}{c_1^2+1}\right)\right\},\left\{y(x)\to c_1x+\frac{1}{2}\cos^{-1}\left(\frac{c_1^2-1}{c_1^2+1}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.562 (sec), leaf count = 147

$$\left\{y(x)=\_C1\,x-\arcsin\left(\frac{1}{\sqrt{\_C1^2+1}}\right),y(x)=\_C1\,x+\arcsin\left(\frac{1}{\sqrt{\_C1^2+1}}\right),y(x)=-x\sqrt{x^{-1}}\sqrt{1$$

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 = 0.114217 (sec), leaf count = 0 , could not solve

```
DSolve[Derivative[1][y][x] + (a*x + ArcTan[Derivative[1][y][x]])*(1 + Derivative[1][y]
```

✓ **Maple** : cpu = 0.064 (sec), leaf count = 30

$$\left\{y(x)=\int\tan\left(RootOf\left(ax(\tan(\_Z))^2+(\tan(\_Z))^2\_Z+ax+\tan(\_Z)+\_Z\right)\right)\,dx+\_C1\right\}$$

2.571 ODE No. 571

$$ax^nf(y'(x))+xy'(x)-y(x)=0$$

✓ **Mathematica** : cpu = 0.112931 (sec), leaf count = 67

$$\text{Solve}\left[\left\{\left\{af(\text{K\$5321505})x^n+\text{K\$5321505}x=y(x),\left(f(\text{K\$5321505})^{\frac{1}{n}-1}\left((n-1)\int_1^{\text{K\$5321505}}-\frac{f(K[1])^{-1/n}}{an}\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.286 (sec), leaf count = 169

$$\left\{[y(\_T)=a\left(\left(\frac{1}{anf(\_T)}\left((1-n)\int(f(\_T))^{-n^{-1}}\,d\_T+\_C1\,an\right)\right)^{(n-1)^{-1}}(f(\_T))^{\frac{1}{n(n-1)}}\right)^nf(\_T)$$

2.572 ODE No. 572

$$f(y'(x))\,(xy'(x)-y(x))^n+y(x)g(y'(x))+xh(y'(x))=0$$

✗ **Mathematica** : cpu = 0.0310708 (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))=
```

2.573 ODE No. 573

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

✓ **Mathematica** : cpu = 0.0131712 (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 = 0.163 (sec), leaf count = 16

$$\left\{y(x)=f\left(\frac{\_C1^2}{4}\right)+\_C1\,\sqrt{x}\right\}$$

2.574 ODE No. 574

$$f\left(x-\frac{3}{2}y'(x)^2\right)+y'(x)^3-y(x)=0$$

✓ **Mathematica** : cpu = 0.0161083 (sec), leaf count = 62

$$\left\{\left\{y(x)\to\frac{1}{9}\left(9f(c_1)+2\sqrt{6}(x-c_1)^{3/2}\right),y(x)\to\frac{1}{9}\left(9f(c_1)-2\sqrt{6}(x-c_1)^{3/2}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.148 (sec), leaf count = 41

$$\left\{y(x)=f(\_C1)-\frac{2\sqrt{6}}{9}\sqrt{(-\_C1+x)^3},y(x)=f(\_C1)+\frac{2\sqrt{6}}{9}\sqrt{(-\_C1+x)^3}\right\}$$

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 = 0.0168097 (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]]*Deri
```

✗ **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

$$\phi(f(x,y(x),y'(x)),g(x,y(x),y'(x)))=0$$

✗ **Mathematica** : cpu = 0.00731643 (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
```

✗ **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 = 15.8652 (sec), leaf count = 141

$$\text{Solve}\left[c_1=\int_1^{y(x)}\left(\frac{1}{K[2]-(a+x)F\left(\frac{K[2]}{a+x}\right)}-\int_1^x\frac{(K[1]+a)F\left(\frac{K[2]}{K[1]+a}\right)-K[2]F'\left(\frac{K[2]}{K[1]+a}\right)}{(K[1]+a)\left(K[2]-(K[1]+a)F\left(\frac{K[2]}{K[1]+a}\right)\right)^2}dK[1]\right)\right.$$

✓ **Maple** : cpu = 0.042 (sec), leaf count = 28

$$\left\{y(x)=-RootOf\left(\int^{\_Z}(F(-\_a)+\_a)^{-1}\,d\_a+\ln(x+a)+\_C1\right)(x+a)\right\}$$

2.578 ODE No. 578

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

✓ **Mathematica** : cpu = 20.5121 (sec), leaf count = 88

$$\text{Solve}\left[c_1 = \int_1^{y(x)} \left(-\int_1^x -\frac{2K[1]F'(K[2]-K[1]^2)}{F\left(K[2]-K[1]^2\right)^2}\, dK[1] - \frac{1}{F\left(K[2]-x^2\right)}\right) dK[2] + \int_1^x \left(\frac{2K[1]}{F\left(y(x)-K[\right.}\right.\right.$$

✓ **Maple** : cpu = 0.053 (sec), leaf count = 22

$$\left\{y(x) = x^2 + RootOf\left(-x + \int^{\_Z} (F(\_a))^{-1}\, d\_a + \_C1\right)\right\}$$

2.579 ODE No. 579

$$y'(x) = F\left(\frac{ax^2}{4} + \frac{bx}{2} + y(x)\right) - \frac{ax}{2}$$

✓ **Mathematica** : cpu = 16.549 (sec), leaf count = 162

$$\text{Solve}\left[c_1 = \int_1^{y(x)} \left(-\int_1^x \frac{2(aK[1]+b)F'\left(\frac{1}{4}aK[1]^2 + \frac{1}{2}bK[1] + K[2]\right)}{\left(2F\left(\frac{1}{4}aK[1]^2 + \frac{1}{2}bK[1] + K[2]\right) + b\right)^2}\, dK[1] - \frac{2}{2F\left(K[2] + \frac{ax^2}{4} + \frac{bx}{2}\right) + b}\right.\right.$$

✓ **Maple** : cpu = 0.058 (sec), leaf count = 35

$$\left\{y(x) = -\frac{ax^2}{4} - \frac{bx}{2} + RootOf\left(-x + 2\int^{\_Z} (2\,F(\_a) + b)^{-1}\, d\_a + \_C1\right)\right\}$$

2.580 ODE No. 580

$$y'(x) = e^{bx} F\left(e^{-bx} y(x)\right)$$

✓ **Mathematica** : cpu = 33.5262 (sec), leaf count = 161

$$\text{Solve}\left[c_1 = \int_1^{y(x)} \left(\frac{1}{bK[2] - e^{bx}F\left(e^{-bx}K[2]\right)} - \int_1^x \frac{b\left(e^{bK[1]}F\left(K[2]e^{-bK[1]}\right) - K[2]F'\left(K[2]e^{-bK[1]}\right)\right)}{\left(e^{bK[1]}F\left(K[2]e^{-bK[1]}\right) - bK[2]\right)^2}\, dK[1]\right.\right.$$

✓ **Maple** : cpu = 0.074 (sec), leaf count = 31

$$\left\{y(x)=\frac{RootOf\left(-x+\int^{-Z}(F(\_a)-b\_a)^{-1}d\_a+\_C1\right)}{e^{-bx}}\right\}$$

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 = 48.8932 (sec), leaf count = 107

$$\text{Solve}\left[c_1=\int_1^{y(x)}\left(-\int_1^x-\frac{F'\left(K[2]+\frac{1}{4K[1]^2}\right)}{2K[1]^3F\left(K[2]+\frac{1}{4K[1]^2}\right)^2}dK[1]-\frac{1}{F\left(K[2]+\frac{1}{4x^2}\right)}\right)dK[2]+\int_1^x\frac{\frac{1}{F\left(\frac{1}{4K[1]^2}+y(\right.}}{2K}\right.$$

✓ **Maple** : cpu = 0.107 (sec), leaf count = 32

$$\left\{y(x)=\frac{4\,RootOf\left(\int^{-Z}(F(\_a))^{-1}d\_ax+\_C1\,x+1\right)x^2-1}{4\,x^2}\right\}$$

2.582 ODE No. 582

$$y'(x)=\frac{ax^2F\left(\frac{axy(x)+1}{ax}\right)+1}{ax^2}$$

✓ **Mathematica** : cpu = 21.0914 (sec), leaf count = 103

$$\text{Solve}\left[c_1=\int_1^{y(x)}\left(\frac{1}{F\left(K[2]+\frac{1}{ax}\right)}-\int_1^x\frac{F'\left(\frac{1}{aK[1]}+K[2]\right)}{aK[1]^2F\left(\frac{1}{aK[1]}+K[2]\right)^2}dK[1]\right)dK[2]+\int_1^x\left(-\frac{1}{aK[1]^2F\left(\frac{}{a}\right.}\right.\right.$$

✓ **Maple** : cpu = 0.228 (sec), leaf count = 30

$$\left\{y(x)=\frac{RootOf\left(-x+\int^{-Z}(F(\_a))^{-1}d\_a+\_C1\right)ax-1}{ax}\right\}$$

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 = 51.4666 (sec), leaf count = 111

$$\text{Solve}\left[c_1 = \int_1^{y(x)} \left(-\int_1^x \frac{aK[1]^3F'\left(\frac{1}{8}aK[1]^4 + K[2]\right)}{2F\left(\frac{1}{8}aK[1]^4 + K[2]\right)^2}\,dK[1] - \frac{1}{F\left(K[2] + \frac{ax^4}{8}\right)}\right) dK[2] + \int_1^x \left(K[1] - \frac{}{2I\ldots}\right.\right.$$

✓ **Maple** : cpu = 0.152 (sec), leaf count = 31

$$\left\{y(x) = -\frac{ax^4}{8} + \mathit{RootOf}\left(-x^2 + 2\int^{\_Z} (F(\_a))^{-1}\,d\_a + 2\_C1\right)\right\}$$

2.584 ODE No. 584

$$y'(x) = \frac{2a}{2aF\left(y(x)^2 - 4ax\right) + y(x)}$$

✓ **Mathematica** : cpu = 24.2744 (sec), leaf count = 107

$$\text{Solve}\left[c_1 = \int_1^{y(x)} \left(\frac{\frac{K[2]}{F(K[2]^2-4ax)} + 2a}{4a^2} - \int_1^x \frac{K[2]F'\left(K[2]^2 - 4aK[1]\right)}{aF\left(K[2]^2 - 4aK[1]\right)^2}\,dK[1]\right) dK[2] + \int_1^x -\frac{1}{2aF\left(y(x)^2 - \ldots\right.}\right.$$

✓ **Maple** : cpu = 0.082 (sec), leaf count = 35

$$\left\{\frac{y(x)}{2\,a} + \frac{\int^{(y(x))^2-4\,ax} (F(\_a))^{-1}\,d\_a}{8\,a^2} - \_C1 = 0\right\}$$

2.585 ODE No. 585

$$y'(x) = y(x)F(\log(\log(y(x))) - \log(x))$$

✓ **Mathematica** : cpu = 157.691 (sec), leaf count = 141

$$\text{Solve}\left[c_1 = \int_1^{y(x)} \left(\frac{1}{xK[2]F(\log(\log(K[2])) - \log(x)) - K[2]\log(K[2])} - \int_1^x \frac{F'(\log(\log(K[2])) - \log(K[}{K[2](\log(K[2]) - K[1]}\right.\right.$$

✓ **Maple** : cpu = 0.669 (sec), leaf count = 120

$$\left\{\int_{\_b}^{x} \frac{F(\ln(\ln(y(x))) - \ln(\_a))}{-\_a\, F(\ln(\ln(y(x))) - \ln(\_a)) + \ln(y(x))} \,\mathrm{d}\_a + \int^{y(x)} - \frac{1}{\_f\,(-xF(\ln(\ln(\_f)) - \ln(x)) + \ln(\_}\right.$$

2.586 ODE No. 586

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

✓ **Mathematica** : cpu = 200.045 (sec), leaf count = 395

$$\text{Solve}\left[c_1 = \int_1^{y(x)} \frac{-\left(\left(x^2+1\right)F\left(\frac{K[2]}{\sqrt{x^2+1}}\right)^2 - K[2]^2\right)\left(\int_1^x \frac{K[1]\left(\left(K[1]^2+1\right)^{3/2}K[2]F\left(\frac{K[2]}{\sqrt{K[1]^2+1}}\right)\right)^2\left(F'\left(\frac{K[2]}{\sqrt{K[1]^2+1}}\right)-2\right.}{}\right.}{}\right.$$

✓ **Maple** : cpu = 0.279 (sec), leaf count = 39

$$\left\{y(x) = RootOf\left(-\ln\left(x^2+1\right) + 2\int^{\_Z} \left(F(\_a) - \_a\right)^{-1} d\_a + 2\_C1\right)\sqrt{x^2+1}\right\}$$

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 = 261.979 (sec), leaf count = 109

$$\text{Solve}\left[c_1 = \int_1^{y(x)} \left(-\int_1^x -\frac{K[1]^2 F'\left(K[2] - \frac{K[1]^3}{6}\right)}{2F\left(K[2] - \frac{K[1]^3}{6}\right)^2} dK[1] - \frac{1}{F\left(K[2] - \frac{x^3}{6}\right)}\right) dK[2] + \int_1^x \left(\frac{K[1]^2}{2F\left(y(x) - \right.}\right.\right.$$

✓ **Maple** : cpu = 0.144 (sec), leaf count = 29

$$\left\{\int_{\_b}^{y(x)} \left(F\left(\_a - \frac{x^3}{6}\right)\right)^{-1} \mathrm{d}\_a - \frac{2}{3}x^{\frac{3}{2}} - \_C1 = 0\right\}$$

2.588 ODE No. 588

$$y'(x) = \frac{F(-(x - y(x))(y(x) + x)) + x}{y(x)}$$

✓ **Mathematica** : cpu = 40.8576 (sec), leaf count = 99

$$\text{Solve}\left[c_1 = \int_1^{y(x)} \left(-\int_1^x -\frac{2K[1]K[2]F'(K[2]^2 - K[1]^2)}{F\left(K[2]^2 - K[1]^2\right)^2} dK[1] - \frac{K[2]}{F\left(K[2]^2 - x^2\right)}\right) dK[2] + \int_1^x \left(\frac{}{F(y(x\right.\right.$$

✓ **Maple** : cpu = 0.144 (sec), leaf count = 53

$$\left\{y(x) = \sqrt{x^2 + RootOf\left(-2\,x + \int^{\_Z} (F(\_a))^{-1} d\_a + 2\_C1\right)}, y(x) = -\sqrt{x^2 + RootOf\left(-2\,x + \int\right.}\right.$$

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 = 25.5939 (sec), leaf count = 118

$$\text{Solve}\left[c_1 = \int_1^{y(x)} \left(-\int_1^x -\frac{F'\left(\frac{1}{K[2]} - \log(K[1])\right)}{K[1]K[2]^2\left(F\left(\frac{1}{K[2]} - \log(K[1])\right)+1\right)^2} dK[1] - \frac{1}{K[2]^2\left(F\left(\frac{1}{K[2]} - \log(x)\right) + \right.}\right.\right.$$

✓ **Maple** : cpu = 0.168 (sec), leaf count = 38

$$\left\{\int_{\_b}^{y(x)} \frac{1}{\_a^2}\left(F\left(\frac{1-\_a \ln(x)}{\_a}\right)+1\right)^{-1} d\_a - \ln(x) - \_C1 = 0\right\}$$

2.590 ODE No. 590

$$y'(x) = \frac{x}{F(x^2 + y(x)^2) - y(x)}$$

✓ **Mathematica** : cpu = 39.1142 (sec), leaf count = 91

$$\text{Solve}\left[c_1 = \int_1^{y(x)} \left(-\int_1^x \frac{2K[1]K[2]F'(K[1]^2+K[2]^2)}{F(K[1]^2+K[2]^2)^2} dK[1] - \frac{K[2]}{F(K[2]^2+x^2)} + 1\right) dK[2] + \int_1^x -\frac{}{F(K\right.$$

✓ **Maple** : cpu = 0.156 (sec), leaf count = 28

$$\left\{-y(x) + \frac{\int^{(y(x))^2+x^2} (F(\_a))^{-1} d\_a}{2} - \_C1 = 0\right\}$$

2.591 ODE No. 591

$$y'(x) = \frac{xF\left(\frac{ay(x)^2+bx^2}{a}\right)}{\sqrt{a}y(x)}$$

✓ **Mathematica** : cpu = 26.3451 (sec), leaf count = 160

$$\text{Solve}\left[c_1 = \int_1^{y(x)} \left(-\int_1^x \frac{2b^2K[1]K[2]F'\left(\frac{bK[1]^2}{a}+K[2]^2\right)}{\sqrt{a}\left(\sqrt{a}F\left(\frac{bK[1]^2}{a}+K[2]^2\right)+b\right)^2}dK[1] - \frac{bK[2]}{\sqrt{a}F\left(K[2]^2+\frac{bx^2}{a}\right)+b}\right)dK[2] +\right.$$

✓ **Maple** : cpu = 0.217 (sec), leaf count = 108

$$\left\{y(x) = \frac{1}{a}\sqrt{a\left(-bx^2 + RootOf\left(\int^{\_Z}\left(F(\_a)\,a + b\sqrt{a}\right)^{-1}d\_aba^{\frac{3}{2}} - bx^2 + 2\_C1\;a\right)a\right)}, y(x) = -\frac{1}{a}\sqrt{\right.$$

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 = 300.001 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.206 (sec), leaf count = 33

$$\left\{\int_{\_b}^{y(x)}\left(F\left(\_a - \frac{2\,x^3}{5} - 2\sqrt{x}\right)\right)^{-1}d\_a - \ln(x) - \_C1 = 0\right\}$$

2.593 ODE No. 593

$$y'(x) = \frac{e^xF\left(y(x)^{3/2} - \frac{3e^x}{2}\right)}{\sqrt{y(x)}}$$

✓ **Mathematica** : cpu = 35.9726 (sec), leaf count = 149

$$\text{Solve}\left[c_1=\int_1^{y(x)}\left(\frac{\sqrt{K[2]}}{F\left(K[2]^{3/2}-\frac{3e^x}{2}\right)-1}-\int_1^x\frac{3e^{K[1]}\sqrt{K[2]}F'\left(K[2]^{3/2}-\frac{3e^{K[1]}}{2}\right)}{2\left(F\left(K[2]^{3/2}-\frac{3e^{K[1]}}{2}\right)-1\right)^2}dK[1]\right)dK[2]+\int_1^x\right.$$

✓ **Maple** : cpu = 0.363 (sec), leaf count = 35

$$\left\{\int_{\_b}^{y(x)}1\sqrt{\_a}\left(F\left(\_a^{\frac{3}{2}}-\frac{3\,\mathrm{e}^x}{2}\right)-1\right)^{-1}d\_a-\mathrm{e}^x-\_C1=0\right\}$$

2.594 ODE No. 594

$$y'(x)=\frac{xF\left(\frac{y(x)^2-b}{x^2}\right)}{y(x)}$$

✓ **Mathematica** : cpu = 23.8897 (sec), leaf count = 188

$$\text{Solve}\left[c_1=\int_1^{y(x)}\left(\frac{K[2]}{x^2F\left(\frac{K[2]^2-b}{x^2}\right)-K[2]^2+b}-\int_1^x-\frac{2K[2]\left(\left(b-K[2]^2\right)F'\left(\frac{K[2]^2-b}{K[1]^2}\right)+K[1]^2F\left(\frac{K[2]^2-b}{K[1]^2}\right.\right.}{K[1]\left(K[1]^2F\left(\frac{K[2]^2-b}{K[1]^2}\right)-K[2]^2+b\right)^2}\right.\right.$$

✓ **Maple** : cpu = 0.168 (sec), leaf count = 67

$$\left\{y(x)=\sqrt{RootOf\left(-2\ln(x)+\int^{\_Z}(F(\_a)-\_a)^{-1}d\_a+2\_C1\right)x^2+b},y(x)=-\sqrt{RootOf\left(-2\right.}\right.$$

2.595 ODE No. 595

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

✓ **Mathematica** : cpu = 24.7921 (sec), leaf count = 127

$$\text{Solve}\left[c_1=\int_1^{y(x)}\frac{\left(1-2F\left(K[2]^2+\frac{1}{x}\right)\right)\int_1^x\frac{2K[2]F'\left(K[2]^2+\frac{1}{K[1]}\right)}{K[1]^2\left(1-2F\left(K[2]^2+\frac{1}{K[1]}\right)\right)^2}dK[1]+K[2]}{2F\left(K[2]^2+\frac{1}{x}\right)-1}dK[2]+\int_1^x-\frac{F(}{K[1]^2\left(2F\right.}\right.$$

✓ **Maple** : cpu = 0.158 (sec), leaf count = 72

$$\left\{y(x) = \frac{1}{x}\sqrt{x\left(RootOf\left(\left(\int^{\_Z}(-1+2F(\_a))^{-1}d\_ax+\_C1\,x+1\right)x-1\right)}, y(x) = -\frac{1}{x}\sqrt{x\left(RootOf\right.}\right.$$

2.596 ODE No. 596

$$y'(x) = \frac{F(x^2+y(x)-x)-2x^2+x}{x}$$

✓ **Mathematica** : cpu = 243.588 (sec), leaf count = 103

$$\text{Solve}\left[c_1 = \int_1^{y(x)}\left(-\int_1^x \frac{(2K[1]-1)F'(K[1]^2-K[1]+K[2])}{F\left(K[1]^2-K[1]+K[2]\right)^2}dK[1]-\frac{1}{F\left(K[2]+x^2-x\right)}\right)dK[2]+\int_1^x\right.$$

✓ **Maple** : cpu = 0.109 (sec), leaf count = 26

$$\left\{y(x) = -x^2+RootOf\left(-\ln(x)+\int^{\_Z}(F(\_a))^{-1}d\_a+\_C1\right)+x\right\}$$

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 = 33.757 (sec), leaf count = 112

$$\text{Solve}\left[c_1 = \int_1^{y(x)}\left(-\int_1^x \frac{2K[2]F'\left(K[2]^2-\frac{4a}{K[1]}\right)}{K[1]^2F\left(K[2]^2-\frac{4a}{K[1]}\right)^2}dK[1]-\frac{K[2]}{2aF\left(K[2]^2-\frac{4a}{x}\right)}+1\right)dK[2]+\int_1^x-\frac{}{K[1]^2}\right.$$

✓ **Maple** : cpu = 0.413 (sec), leaf count = 37

$$\left\{-\frac{y(x)}{2a}+\frac{1}{8a^2}\int^{(y(x))^2-4\frac{a}{x}}(F(\_a))^{-1}d\_a-\_C1=0\right\}$$

2.598 ODE No. 598

$$y'(x) = \frac{F\left(\frac{y(x)}{x}\right) + y(x)}{x-1}$$

✓ **Mathematica** : cpu = 0.10243 (sec), leaf count = 35

$$\text{Solve}\left[c_1 + \log(1-x) = \int_1^{\frac{y(x)}{x}} \frac{1}{F(K[1]) + K[1]} \, dK[1] + \log(x), y(x)\right]$$

✓ **Maple** : cpu = 0.031 (sec), leaf count = 29

$$\left\{y(x) = \mathit{RootOf}\left(-\int^{\_Z} (F(\_a) + \_a)^{-1} \, d\_a + \ln(x-1) - \ln(x) + \_C1\right) x\right\}$$

2.599 ODE No. 599

$$y'(x) = \frac{F(x^2 + y(x)^2) - x}{y(x)}$$

✓ **Mathematica** : cpu = 28.1177 (sec), leaf count = 92

$$\text{Solve}\left[c_1 = \int_1^{y(x)} \left(-\int_1^x \frac{2K[1]K[2]F'(K[1]^2 + K[2]^2)}{F\left(K[1]^2 + K[2]^2\right)^2} \, dK[1] - \frac{K[2]}{F\left(K[2]^2 + x^2\right)}\right) dK[2] + \int_1^x \left(1 - \frac{}{F(K\right.\right.$$

✓ **Maple** : cpu = 0.115 (sec), leaf count = 57

$$\left\{y(x) = \sqrt{-x^2 + \mathit{RootOf}\left(-2\,x + \int^{\_Z} (F(\_a))^{-1} \, d\_a + 2\_C1\right)}, y(x) = -\sqrt{-x^2 + \mathit{RootOf}\left(-2\,x + \right.}\right.$$

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 = 26.2149 (sec), leaf count = 119

$$\text{Solve}\left[c_1 = \int_1^{y(x)} \left(-\int_1^x -\frac{4F'\left(\frac{1}{K[2]} - 2\log(K[1])\right)}{K[1]K[2]^2\left(F\left(\frac{1}{K[2]} - 2\log(K[1])\right)+2\right)^2}\, dK[1] - \frac{2}{K[2]^2\left(F\left(\frac{1}{K[2]} - 2\log(x)\right.\right.}\right.\right.$$

✓ **Maple** : cpu = 0.174 (sec), leaf count = 38

$$\left\{\int_{\_b}^{y(x)} \frac{1}{\_a^2}\left(F\left(\frac{-2\_a\ln(x)+1}{\_a}\right)+2\right)^{-1} \mathrm{d}\_a - \ln(x) - \_C1 = 0\right\}$$

2.601 ODE No. 601

$$y'(x) = \frac{xF(-(x-y(x))(y(x)+x))}{y(x)}$$

✓ **Mathematica** : cpu = 41.7872 (sec), leaf count = 116

$$\text{Solve}\left[c_1 = \int_1^{y(x)} \left(\frac{K[2]}{F(K[2]^2 - x^2) - 1} - \int_1^x \frac{2K[1]K[2]F'(K[2]^2 - K[1]^2)}{(F(K[2]^2 - K[1]^2) - 1)^2}\, dK[1]\right) dK[2] + \int_1^x \frac{K[1]F(y}{1 - F(y}\right.$$

✓ **Maple** : cpu = 0.152 (sec), leaf count = 61

$$\left\{y(x) = \sqrt{x^2 + RootOf\left(-x^2 + \int^{\_Z} (F(\_a) - 1)^{-1}\, d\_a + 2\_C1\right)}, y(x) = -\sqrt{x^2 + RootOf\left(-x^2 + \right.}\right.$$

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 = 239.346 (sec), leaf count = 111

$$\text{Solve}\left[c_1 = \int_1^{y(x)} \left(-\int_1^x \frac{2F'\left(\frac{1}{K[2]} - \frac{1}{K[1]^2}\right)}{K[1]^3 K[2]^2 F\left(\frac{1}{K[2]} - \frac{1}{K[1]^2}\right)^2} dK[1] - \frac{1}{K[2]^2 F\left(\frac{1}{K[2]} - \frac{1}{x^2}\right)}\right) dK[2] + \int_1^x \left(\frac{}{K[} \right.\right.$$

✓ **Maple** : cpu = 0.152 (sec), leaf count = 33

$$\left\{ y(x) = \frac{x^2}{\mathit{RootOf}\left(-\ln(x) - \int^{\_Z} (F(\_a))^{-1} d\_a + \_C1\right) x^2 + 1} \right\}$$

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 = 20.9561 (sec), leaf count = 102

$$\text{Solve}\left[c_1 = \int_1^{y(x)} \left(\frac{1}{F(K[2] + \log(2x+1))} - \int_1^x -\frac{2F'(K[2] + \log(2K[1]+1))}{(2K[1]+1)F(K[2] + \log(2K[1]+1))^2} dK[1]\right) dK[2]\right.$$

✓ **Maple** : cpu = 0.157 (sec), leaf count = 27

$$\left\{ y(x) = -\ln(2x+1) + \mathit{RootOf}\left(-x + \int^{\_Z} (F(\_a))^{-1} d\_a + \_C1\right) \right\}$$

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 = 29.325 (sec), leaf count = 97

$$\text{Solve}\left[c_1 = \int_1^{y(x)} \left(\frac{\frac{1}{F\left(\frac{1}{K[2]^2}+4x\right)}+2K[2]}{2K[2]^3} - \int_1^x -\frac{2F'\left(4K[1]+\frac{1}{K[2]^2}\right)}{K[2]^3F\left(4K[1]+\frac{1}{K[2]^2}\right)^2}\,dK[1]\right)dK[2] + \int_1^x -\frac{}{F\left(4K\right.}\right.$$

✓ **Maple** : cpu = 0.163 (sec), leaf count = 30

$$\left\{-\_C1 - (y(x))^{-1} - \frac{\int^{4\,x+(y(x))^{-2}}(F(\_a))^{-1}\,d\_a}{4} = 0\right\}$$

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 = 215.819 (sec), leaf count = 103

$$\text{Solve}\left[c_1 = \int_1^{y(x)} \left(-\int_1^x -\frac{2F'\left(\frac{1}{K[2]}-\frac{K[1]}{2}\right)}{K[2]^2F\left(\frac{1}{K[2]}-\frac{K[1]}{2}\right)^2}\,dK[1] - \frac{4}{K[2]^2F\left(\frac{1}{K[2]}-\frac{x}{2}\right)}\right)dK[2] + \int_1^x \left(\frac{1}{K[1]} - \right.\right.$$

✓ **Maple** : cpu = 0.148 (sec), leaf count = 29

$$\left\{y(x) = 2\left(2\,RootOf\left(-\ln(x) - 4\int^{\_Z}(F(\_a))^{-1}\,d\_a + \_C1\right) + x\right)^{-1}\right\}$$

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 = 78.7855 (sec), leaf count = 180

$$\text{Solve}\left[c_1 = \int_1^{y(x)} \left(-\int_1^x \frac{e^{-K[1]^2}K[1]\left(K[1]^2-1\right)F'\left(K[2]-\frac{1}{2}e^{-K[1]^2}K[1]^2\right)}{F\left(K[2]-\frac{1}{2}e^{-K[1]^2}K[1]^2\right)^2}dK[1] - \frac{1}{F\left(K[2]-\frac{1}{2}e^{-x^2}x^2\right.}\right.\right.$$

✓ **Maple** : cpu = 0.88 (sec), leaf count = 34

$$\left\{y(x) = \frac{x^2 e^{-x^2}}{2} + RootOf\left(x^2 - 2\int^{\_Z}(F(\_a))^{-1}\,d\_a + 2\_C1\right)\right\}$$

2.607 ODE No. 607

$$y'(x) = \frac{x^3 F\left(\frac{y(x)}{x^2}\right) + 2y(x)}{x}$$

✗ **Mathematica** : cpu = 299.998 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.109 (sec), leaf count = 22

$$\left\{y(x) = RootOf\left(-x + \int^{\_Z}(F(\_a))^{-1}\,d\_a + \_C1\right)x^2\right\}$$

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 = 300.002 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.174 (sec), leaf count = 40

$$\left\{\frac{\ln(y(x))}{2} - \int^{x\frac{1}{\sqrt{y(x)}} - \sqrt{y(x)}}(2F(\_a) - \_a)^{-1}\,d\_a - \_C1 = 0\right\}$$

2.609 ODE No. 609

$$y'(x) = \frac{F(x^3y(x)) - 3x^2y(x)}{x^3}$$

✓ **Mathematica** : cpu = 62.7832 (sec), leaf count = 107

$$\text{Solve}\left[c_1 = \int_1^{y(x)} \left(-\int_1^x \frac{3K[1]^5K[2]F'(K[1]^3K[2]) - 3K[1]^2F(K[1]^3K[2])}{F\left(K[1]^3K[2]\right)^2} dK[1] - \frac{x^3}{F\left(x^3K[2]\right)}\right) dK[2]\right.$$

✓ **Maple** : cpu = 0.179 (sec), leaf count = 22

$$\left\{y(x) = \frac{\mathit{RootOf}\left(x - \int^{\_Z} (F(\_a))^{-1} d\_a + \_C1\right)}{x^3}\right\}$$

2.610 ODE No. 610

$$y'(x) = \frac{x^2F\left(\frac{y(x)}{x}\right) + y(x)}{x}$$

✓ **Mathematica** : cpu = 0.0777875 (sec), leaf count = 24

$$\text{Solve}\left[c_1 + x = \int_1^{\frac{y(x)}{x}} \frac{1}{F(K[1])} dK[1], y(x)\right]$$

✓ **Maple** : cpu = 0.022 (sec), leaf count = 20

$$\left\{y(x) = \mathit{RootOf}\left(x - \int^{\_Z} (F(\_a))^{-1} d\_a + \_C1\right) x\right\}$$

2.611 ODE No. 611

$$y'(x) = \frac{F(x(y(x)+x)) - y(x) - 2x}{x}$$

✓ **Mathematica** : cpu = 47.1978 (sec), leaf count = 116

$$\text{Solve}\left[c_1 = \int_1^{y(x)} \left(-\int_1^x \frac{K[1](2K[1]+K[2])F'(K[1](K[1]+K[2])) - F(K[1](K[1]+K[2]))}{F(K[1](K[1]+K[2]))^2} dK[1] - \frac{}{F}\right.\right.$$

✓ **Maple** : cpu = 0.098 (sec), leaf count = 28

$$\left\{ y(x) = \frac{-x^2 + \mathit{RootOf}\left(-x + \int^{\_Z} (F(\_a))^{-1} d\_a + \_C1\right)}{x} \right\}$$

2.612 ODE No. 612

$$y'(x) = \frac{1}{2} e^{\frac{x^2}{4}} \left(2F\left(e^{-\frac{x^2}{4}} y(x)\right) + e^{-\frac{x^2}{4}} x y(x)\right)$$

✓ **Mathematica** : cpu = 60.227 (sec), leaf count = 169

$$\text{Solve}\left[c_1 = \int_1^{y(x)} \left(-\int_1^x \frac{e^{-\frac{1}{2}K[1]^2} K[1] \left(e^{\frac{K[1]^2}{4}} F\left(e^{-\frac{1}{4}K[1]^2} K[2]\right) - K[2] F'\left(e^{-\frac{1}{4}K[1]^2} K[2]\right)\right)}{2F\left(e^{-\frac{1}{4}K[1]^2} K[2]\right)^2} dK[1] - \frac{e}{F\left(e\right.}\right.\right.$$

✓ **Maple** : cpu = 0.155 (sec), leaf count = 27

$$\left\{ y(x) = \mathit{RootOf}\left(-x + \int^{\_Z} (F(\_a))^{-1} d\_a + \_C1\right) \left(\mathrm{e}^{-\frac{x^2}{4}}\right)^{-1} \right\}$$

2.613 ODE No. 613

$$y'(x) = \frac{x^2 F\left(\frac{y(x)-x\log(x)}{x}\right) + y(x) + x}{x}$$

✗ **Mathematica** : cpu = 299.999 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.114 (sec), leaf count = 23

$$\left\{y(x) = \left(\ln(x) + RootOf\left(-x + \int^{\_Z} (F(\_a))^{-1} d\_a + \_C1\right)\right)x\right\}$$

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 = 90.1062 (sec), leaf count = 144

$$\text{Solve}\left[c_1 = \int_1^{y(x)} \left(-\int_1^x \frac{K[1]K[2]F'\left(\frac{1}{2}(K[2]^2 - (a^2-1)K[1]^2)\right)}{F\left(\frac{1}{2}(K[2]^2 - (a^2-1)K[1]^2)\right)^2} dK[1] + \frac{K[2]}{(a-1)(a+1)F\left(\frac{1}{2}(K[2]^2 - a\right.}\right.\right.$$

✓ **Maple** : cpu = 0.439 (sec), leaf count = 60

$$\left\{\frac{y(x)}{(a-1)(a+1)} + \frac{1}{2a^4 - 4a^2 + 2}\int^{-a^2x^2+x^2+(y(x))^2} \left(F\left(\frac{\_a}{2}\right)\right)^{-1} d\_a - \_C1 = 0\right\}$$

2.615 ODE No. 615

$$y'(x) = \frac{y(x)}{x(y(x)F(xy(x)) - 1)}$$

✓ **Mathematica** : cpu = 19.8811 (sec), leaf count = 74

$$\text{Solve}\left[c_1 = \int_1^{y(x)} \left(-\int_1^x \frac{F'(K[1]K[2])}{F(K[1]K[2])^2} dK[1] - \frac{1}{K[2]F(xK[2])} + 1\right) dK[2] + \int_1^x -\frac{1}{K[1]F(y(x)K[1])} d\right.$$

✓ **Maple** : cpu = 0.145 (sec), leaf count = 26

$$\left\{-y(x)+\int^{xy(x)}\frac{1}{F(\_a)\_a}d\_a-\_C1=0\right\}$$

2.616 ODE No. 616

$$y'(x)=\frac{F(x(xy(x)-1))-2x^3y(x)+x^2}{x^4}$$

✓ **Mathematica** : cpu = 58.3193 (sec), leaf count = 126

$$\text{Solve}\left[c_1=\int_1^{y(x)}\left(-\int_1^x\frac{K[1]\left(K[1](2K[1]K[2]-1)F'(K[1](K[1]K[2]-1))-2F(K[1](K[1]K[2]-1))\right)}{F(K[1](K[1]K[2]-1))^2}\right.\right.$$

✓ **Maple** : cpu = 0.101 (sec), leaf count = 26

$$\left\{y(x)=\frac{RootOf\left(\int^{\_Z}(F(\_a))^{-1}\,d\_ax+\_C1\,x+1\right)+x}{x^2}\right\}$$

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 = 279.88 (sec), leaf count = 302

$$\text{Solve}\left[c_1=\int_1^{y(x)}\left(-\int_1^x\frac{27e^{\frac{3K[1]^2}{2}}K[1]K[2]F\left(\frac{e^{\frac{3K[1]^2}{2}}(K[2]+3)}{3K[2]}\right)-9e^{3K[1]^2}K[1](K[2]+3)F'\left(\frac{e^{\frac{3K[1]^2}{2}}(K[2]+3)}{3K[2]}\right.}{K[2]\left(K[2]F\left(\frac{e^{\frac{3K[1]^2}{2}}(K[2]+3)}{3K[2]}\right)-9e^{\frac{3K[1]^2}{2}}(K[2]+3)\right)^2}\right.\right.$$

✓ **Maple** : cpu = 0.31 (sec), leaf count = 47

$$\left\{y(x)=-3\,\frac{e^{3/2\,x^2}}{e^{3/2\,x^2}-3\,RootOf\left(-x^2-18\,\int^{\_Z}(F(\_a)-27\,\_a)^{-1}\,d\_a+2\,\_C1\right)}\right\}$$

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 = 0.096942 (sec), leaf count = 25

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

✓ **Maple** : cpu = 0.496 (sec), leaf count = 34

$$\left\{y(x)=\frac{1}{x}\left(e^{-lambertW\left(-\frac{e^{\_C1\, e^x-1}}{x}\right)+\_C1\, e^x-1}-x\right)\right\}$$

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 = 263.339 (sec), leaf count = 195

$$\text{Solve}\left[c_1=\int_1^{y(x)}\left(-\int_1^x\frac{(8K[2]^3+9K[2]^2+12K[2]+6)\,F'\left(K[1]-\frac{1}{6}K[2]\,(2K[2]^3+3K[2]^2+6K[2]+\right.}{F\left(K[1]-\frac{1}{6}K[2]\,(2K[2]^3+3K[2]^2+6K[2]+6)\right)^2}\right.\right.$$

✓ **Maple** : cpu = 0.444 (sec), leaf count = 81

$$\left\{\int_{\_b}^{y(x)}\frac{1}{\_a}\left(-8\_a^4-9\_a^3-12\_a^2+F\left(-\frac{\_a^4}{3}-\frac{\_a^3}{2}-\_a^2-\_a+x\right)-6\_a\right)\left(F\left(-\frac{\_a^4}{3}-\frac{\_a}{2}\right.\right.\right.$$

2.620 ODE No. 620

$$y'(x) = \frac{e^{2F(-(x-y(x))(y(x)+x))} + x^2 + 2xy(x) + y(x)^2}{-e^{2F(-(x-y(x))(y(x)+x))} + x^2 + 2xy(x) + y(x)^2}$$

✗ **Mathematica** : cpu = 299.999 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.224 (sec), leaf count = 37

$$\left\{ y(x) = e^{RootOf\left(-\_Z + \int^{\left(e^{\_Z}\right)^2 - 2e^{\_Z}x} \left(e^{2F(\_a)} + \_a\right)^{-1} d\_a + \_C1\right)} - x \right\}$$

2.621 ODE No. 621

$$y'(x) = \frac{1}{y(x) + \sqrt{x}}$$

✓ **Mathematica** : cpu = 0.0890061 (sec), leaf count = 445

$$\left\{ \left\{ y(x) \to \frac{1}{\text{Root}\left[\#1^6 \left(16e^{12c_1} + 16x^3\right) - 24\#1^4 x^2 + 8\#1^3 x^{3/2} + 9\#1^2 x - 6\#1\sqrt{x} + 1\&, 1\right]} - \sqrt{x} \right\}, \left\{ y \right.$$

✓ **Maple** : cpu = 0.366 (sec), leaf count = 59

$$\left\{ y(x) = 1\left(\sqrt{x}\left(RootOf\left(\_Z^{18}\_C1 - 9x\_Z^6 - 6\sqrt{x}\_Z^3 - 1\right)\right)^3 + 1\right) \left(RootOf\left(\_Z^{18}\_C1 - 9x\_Z^6 - 6\right.\right.$$

2.622 ODE No. 622

$$y'(x) = \frac{1}{y(x) + \sqrt{3x+1} + 2}$$

✓ **Mathematica** : cpu = 0.44448 (sec), leaf count = 140

$$\text{Solve}\left[44c_1 + 6\sqrt{33}\tanh^{-1}\left(\frac{3y(x) + 7\sqrt{3x+1} + 6}{\sqrt{33}\left(y(x) + \sqrt{3x+1} + 2\right)}\right) = 33\left(\log\left(\frac{-3\sqrt{3x+1}y(x)^2 - 3(3x + 4\sqrt{3x}}{}\right.\right.\right.$$

✓ **Maple** : cpu = 0.243 (sec), leaf count = 77

$$\left\{ \ln\left((3y(x) + 6)\sqrt{3x+1} + 3(y(x))^2 - 6x + 12y(x) + 10\right) - 6\frac{\sqrt{3x+1}}{\sqrt{99x+33}} Artanh\left(\frac{3\sqrt{3x+1} + 6y(x}{\sqrt{99x+33}}\right.\right.$$

2.623 ODE No. 623

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

✓ **Mathematica** : cpu = 0.218485 (sec), leaf count = 77

$$\text{Solve}\left[44c_1 + 6\sqrt{33}\tanh^{-1}\left(\frac{7x^{3/2} + 3y(x)}{\sqrt{33}\,(x^{3/2} + y(x))}\right) = 33\left(\log\left(-\frac{3y(x)}{2x^{3/2}} - \frac{3y(x)^2}{2x^3} + 1\right) + 3\log(x)\right), y(x)\right]$$

✓ **Maple** : cpu = 0.278 (sec), leaf count = 49

$$\left\{\ln\left(3\,x^{3/2}y(x) - 2\,x^3 + 3\,(y(x))^2\right) - \frac{2\,\sqrt{33}}{11}\mathit{Artanh}\left(\frac{\sqrt{33}}{11}\left(x^{\frac{3}{2}} + 2\,y(x)\right)x^{-\frac{3}{2}}\right) - \_C1 = 0\right\}$$

2.624 ODE No. 624

$$y'(x) = \frac{x^{5/3}}{x^{4/3} + y(x)}$$

✓ **Mathematica** : cpu = 50.4989 (sec), leaf count = 9837

Too large to show

✓ **Maple** : cpu = 1.454 (sec), leaf count = 46

$$\left\{y(x) = \frac{1}{2}\left(\mathit{RootOf}\left(\_Z^{192} + 12\,x^{4/3}\_Z^{176} + 48\,x^{8/3}\_Z^{160} + 64\,x^4\_Z^{144} - \_C1\right)\right)^{16} + \frac{1}{2}x^{\frac{4}{3}}\right\}$$

2.625 ODE No. 625

$$y'(x) = \frac{1}{2}ix^2\left(-2\sqrt{6y(x) - x^3} + i\right)$$

✓ **Mathematica** : cpu = 0.294718 (sec), leaf count = 67

$$\text{Solve}\left[12ic_1 + 2\sqrt{6y(x) - x^3} + i\log\left(-x^3 + 6y(x) + 1\right) + 2ix^3 = 2\tan^{-1}\left(\sqrt{6y(x) - x^3}\right), y(x)\right]$$

✓ **Maple** : cpu = 0.232 (sec), leaf count = 55

$$\left\{\ln\left(-x^3 + 6\,y(x) + 1\right) - 2\,i\sqrt{-x^3 + 6\,y\,(x)} + 2\,i\arctan\left(\sqrt{-x^3 + 6\,y\,(x)}\right) + 2\,x^3 - \_C1 = 0\right\}$$

2.626 ODE No. 626

$$y'(x) = \frac{x}{\sqrt{x^2+1}+y(x)}$$

✓ **Mathematica** : cpu = 0.238508 (sec), leaf count = 88

$$\text{Solve}\left[\frac{1}{2}\left(\log\left(-\frac{y(x)^2}{x^2+1}-\frac{y(x)}{\sqrt{x^2+1}}+1\right)+\log\left(x^2+1\right)\right)=c_1+\frac{\tanh^{-1}\left(\frac{3\sqrt{x^2+1}+y(x)}{\sqrt{5}\left(\sqrt{x^2+1}+y(x)\right)}\right)}{\sqrt{5}},y(x)\right]$$

✓ **Maple** : cpu = 0.403 (sec), leaf count = 115

$$\left\{\frac{2}{3}\ln\left(-\frac{1296}{11}\left(\sqrt{x^2+1}y(x)-x^2+(y(x))^2-1\right)\left(y(x)+\sqrt{x^2+1}\right)^{-2}\right)-\frac{4\sqrt{5}}{15}Artanh\left(\sqrt{5}\left(3\sqrt{x^2+1}\right.\right.\right.$$

2.627 ODE No. 627

$$y'(x) = \frac{(y(x)\log(x)-1)^2}{x}$$

✓ **Mathematica** : cpu = 1.00894 (sec), leaf count = 25

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

✓ **Maple** : cpu = 0.268 (sec), leaf count = 35

$$\left\{y(x)=\frac{\sin\left(\ln\left(x\right)\right)\_C1+\cos\left(\ln\left(x\right)\right)}{\left(\_C1+\ln\left(x\right)\right)\cos\left(\ln\left(x\right)\right)+\sin\left(\ln\left(x\right)\right)\left(\ln\left(x\right)\_C1-1\right)}\right\}$$

2.628 ODE No. 628

$$y'(x) = \frac{1}{3}x\left(3\sqrt{x^2+3y(x)}-2\right)$$

✓ **Mathematica** : cpu = 0.0788533 (sec), leaf count = 32

$$\left\{\left\{y(x)\to \frac{1}{48}\left(-2(27c_1+8)\,x^2+81c_1^2+9x^4\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.242 (sec), leaf count = 23

$$\left\{\_C1+\frac{3\,x^2}{4}+\frac{2}{3}-\sqrt{x^2+3\,y\left(x\right)}=0\right\}$$

2.629 ODE No. 629

$$y'(x) = \frac{(2y(x)\log(x)-1)^2}{x}$$

✓ **Mathematica** : cpu = 0.782168 (sec), leaf count = 38

$$\left\{\left\{y(x)\to \frac{1}{\sqrt{2}\left(\sqrt{2}\log(x)-\tan\left(\frac{c_1+2\log(x)}{\sqrt{2}}\right)\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.22 (sec), leaf count = 62

$$\left\{y(x)=\frac{\sin\left(\ln\left(x\right)\sqrt{2}\right)\_C1-\cos\left(\ln\left(x\right)\sqrt{2}\right)}{\sin\left(\ln\left(x\right)\sqrt{2}\right)\left(2\_C1\ \ln\left(x\right)+\sqrt{2}\right)+\left(\sqrt{2}\_C1-2\ \ln\left(x\right)\right)\cos\left(\ln\left(x\right)\sqrt{2}\right)}\right\}$$

2.630 ODE No. 630

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

✓ **Mathematica** : cpu = 0.631021 (sec), leaf count = 101

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

✓ **Maple** : cpu = 0.359 (sec), leaf count = 98

$$\left\{y(x) = \frac{1}{\mathrm{e}^{-bx}} \mathit{RootOf}\left(-\mathrm{e}^{\mathit{RootOf}\left(\left(\tanh\left(\frac{2\_C1\,b-2\,bx-\_Z}{2\,b}\sqrt{b^2+4\,b}\right)\right)^2 b+4\left(\tanh\left(1/2\,\frac{\sqrt{b^2+4\,b}(2\_C1\,b-2\,bx-\_Z)}{b}\right)\right)^2-4\,\mathrm{e}^{-\_Z}-b-4\right)}\right.\right.$$

2.631 ODE No. 631

$$y'(x) = \frac{1}{2}x^2\left(2\sqrt{x^3-6y(x)}+1\right)$$

✓ **Mathematica** : cpu = 0.0895143 (sec), leaf count = 31

$$\left\{\left\{y(x) \to \frac{1}{6}\left((1-12c_1)\,x^3-36c_1^2-x^6\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.226 (sec), leaf count = 23

$$\left\{\_C1 - x^3 - \frac{1}{2} - \sqrt{x^3-6\,y\,(x)} = 0\right\}$$

2.632 ODE No. 632

$$y'(x) = \frac{e^x}{e^{-x}y(x)+1}$$

✓ **Mathematica** : cpu = 0.226849 (sec), leaf count = 65

$$\text{Solve}\left[\frac{1}{2}\log\left(-e^{-2x}y(x)^2-e^{-x}y(x)+1\right)+x = c_1+\frac{\tanh^{-1}\left(\frac{y(x)+3e^x}{\sqrt{5}(y(x)+e^x)}\right)}{\sqrt{5}}, y(x)\right]$$

✓ **Maple** : cpu = 0.276 (sec), leaf count = 54

$$\left\{x - \frac{\sqrt{5}}{5}\mathit{Artanh}\left(\frac{2\,y(x)\sqrt{5}\mathrm{e}^{-x}}{5}+\frac{\sqrt{5}}{5}\right)+\frac{\ln\left((y(x))^2\left(\mathrm{e}^{-x}\right)^2+y(x)\,\mathrm{e}^{-x}-1\right)}{2}-\_C1 = 0\right\}$$

2.633 ODE No. 633

$$y'(x) = \frac{e^{2x/3}}{e^{-2x/3}y(x) + 1}$$

✓ **Mathematica** : cpu = 0.25893 (sec), leaf count = 85

$$\text{Solve}\left[7\left(-9c_1 + 3\log\left(-\frac{2}{3}e^{-4x/3}y(x)^2 - \frac{2}{3}e^{-2x/3}y(x) + 1\right) + 4x\right) = 6\sqrt{7}\tanh^{-1}\left(\frac{y(x) + 4e^{2x/3}}{\sqrt{7}\left(y(x) + e^{2x/3}\right)}\right),$$

✓ **Maple** : cpu = 1.015 (sec), leaf count = 52

$$\left\{y(x) = 1\mathit{RootOf}\left(-\mathrm{e}^{\mathit{RootOf}\left(343-343\left(\tanh\left(1/6\left(4\_C1-4x-3\_Z\right)\sqrt{7}\right)\right)^2+98\,\mathrm{e}^{\_Z}\right)} - 3 + 2\_Z + 2\_Z^2\right)\left(\mathrm{e}^{-\frac{2x}{3}}\right)^{-1}\right.$$

2.634 ODE No. 634

$$y'(x) = \frac{x^5\sqrt{4x^2y(x) + 1} + \frac{1}{2}}{x^3}$$

✓ **Mathematica** : cpu = 0.174837 (sec), leaf count = 31

$$\left\{\left\{y(x) \to \frac{1}{16}\left(-8c_1x^4 + 16c_1^2 + x^8 - \frac{4}{x^2}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.264 (sec), leaf count = 26

$$\left\{\_C1 - \frac{1}{x}\sqrt{4\,x^2y\left(x\right) + 1} + \frac{x^4}{2} = 0\right\}$$

2.635 ODE No. 635

$$y'(x) = \frac{1}{2}x\left(2\sqrt{x^3 - 6y(x)} + x\right)$$

✓ **Mathematica** : cpu = 0.120605 (sec), leaf count = 33

$$\left\{\left\{y(x) \to \frac{1}{24}\left(36c_1x^2 - 36c_1^2 - 9x^4 + 4x^3\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.218 (sec), leaf count = 22

$$\left\{\_C1 - \frac{3\,x^2}{2} - \sqrt{x^3 - 6\,y\left(x\right)} = 0\right\}$$

2.636 ODE No. 636

$$y'(x) = y(x)\left(x^2 - \log(y(x))\right)$$

✓ **Mathematica** : cpu = 0.0522832 (sec), leaf count = 24

$$\left\{\left\{y(x) \to e^{-2c_1e^{-x}+x^2-2x+2}\right\}\right\}$$

✓ **Maple** : cpu = 0.244 (sec), leaf count = 19

$$\left\{y(x) = \mathrm{e}^{\frac{\_C1}{\mathrm{e}^{x}}+x^2-2\,x+2}\right\}$$

2.637 ODE No. 637

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

✓ **Mathematica** : cpu = 16.0273 (sec), leaf count = 53

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

✓ **Maple** : cpu = 0.478 (sec), leaf count = 84

$$\left\{y(x) = -\frac{1}{\mathrm{e}^{x^2}}\tan\left(\mathit{RootOf}\left(2\,x^2 + 2\,\ln\left(9/2\,\tan\left(\_Z\right) - 9/2\right) - \ln\left(\frac{81\left(\tan\left(\_Z\right)\right)^2}{10} + \frac{81}{10}\right) + 6\_C1 -\right.\right.\right.$$

2.638 ODE No. 638

$$y'(x) = y(x)(-(\log(x) - \log(\log(y(x)))))$$

✗ **Mathematica** : cpu = 2.70105 (sec), leaf count = 0 , could not solve

```
DSolve[Derivative[1][y][x] == -((Log[x] - Log[Log[y[x]]])*y[x]), y[x], x]
```

✓ **Maple** : cpu = 0.237 (sec), leaf count = 35

$$\left\{\int_{\_b}^{y(x)} \frac{1}{\_a\left(x\ln(x) - \ln(\ln(\_a))\,x + \ln(\_a)\right)}\,\mathrm{d}\_a + \ln(x) - \_C1 = 0\right\}$$

2.639 ODE No. 639

$$y'(x) = y(x)(\log(x) - \log(\log(y(x))))^2$$

✗ **Mathematica** : cpu = 0.323946 (sec), leaf count = 0 , could not solve

```
DSolve[Derivative[1][y][x] == (Log[x] - Log[Log[y[x]]])^2*y[x], y[x], x]
```

✓ **Maple** : cpu = 0.355 (sec), leaf count = 50

$$\left\{\int_{\_b}^{y(x)} \frac{1}{\_a\ \left(x\left(\ln\left(x\right)\right)^2 - 2\ln\left(x\right)\ln\left(\ln\left(\_a\right)\right)x + \left(\ln\left(\ln\left(\_a\right)\right)\right)^2 x - \ln\left(\_a\right)\right)} \mathrm{d}\_a - \ln\left(x\right) - \_C1 = 0\right\}$$

2.640 ODE No. 640

$$y'(x) = \frac{y(x)}{\log(\log(y(x))) - \log(x) + 1}$$

✗ **Mathematica** : cpu = 3.67285 (sec), leaf count = 0 , could not solve

```
DSolve[Derivative[1][y][x] == y[x]/(1 - Log[x] + Log[Log[y[x]]]), y[x], x]
```

✓ **Maple** : cpu = 0.515 (sec), leaf count = 47

$$\left\{\int_{\_b}^{y(x)} \frac{-\ln\left(\ln\left(\_a\right)\right) + \ln\left(x\right) - 1}{\left(\ln\left(\_a\right)\ln\left(x\right) - \ln\left(\_a\right)\ln\left(\ln\left(\_a\right)\right) + x - \ln\left(\_a\right)\right)\_a} \mathrm{d}\_a - \_C1 = 0\right\}$$

2.641 ODE No. 641

$$y'(x) = \frac{x^4\sqrt{4x^2y(x)+1} + \frac{1}{2}}{x^3}$$

✓ **Mathematica** : cpu = 0.174807 (sec), leaf count = 33

$$\left\{\left\{y(x) \to -\frac{2c_1x^3}{3} + c_1^2 + \frac{x^6}{9} - \frac{1}{4x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.251 (sec), leaf count = 26

$$\left\{\_C1 - \frac{1}{x}\sqrt{4\,x^2y\left(x\right)+1} + \frac{2\,x^3}{3} = 0\right\}$$

2.642 ODE No. 642

$$y'(x)=\frac{(4ax-y(x)^2)^2}{y(x)}$$

✓ **Mathematica** : cpu = 0.134522 (sec), leaf count = 95

$$\left\{\left\{y(x)\to -\sqrt{4ax-\sqrt{2}\sqrt{a}\tanh\left(\frac{\sqrt{2}\,(2ax-c_1)}{\sqrt{a}}\right)}\right\},\left\{y(x)\to \sqrt{4ax-\sqrt{2}\sqrt{a}\tanh\left(\frac{\sqrt{2}\,(2ax-c_1)}{\sqrt{a}}\right.}\right.\right.$$

✓ **Maple** : cpu = 0.283 (sec), leaf count = 286

$$\left\{y(x)=\sqrt{4}\sqrt{\left(\_C1\,e^{2x\left(\sqrt{2}\sqrt{a}-2ax\right)}+e^{-2x\left(\sqrt{2}\sqrt{a}+2ax\right)}\right)\left(\_C1\left(ax-\frac{\sqrt{2}}{4}\sqrt{a}\right)e^{2x\left(\sqrt{2}\sqrt{a}-2ax\right)}+e^{-2x(\sqrt{}}\right.}\right.$$

2.643 ODE No. 643

$$y'(x)=\frac{1}{3}x\left(3x\sqrt{x^2+3y(x)}-2\right)$$

✓ **Mathematica** : cpu = 0.121572 (sec), leaf count = 31

$$\left\{\left\{y(x)\to\frac{1}{12}\left(-6c_1x^3+9c_1^2+x^6-4x^2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.219 (sec), leaf count = 22

$$\left\{\_C1+\frac{x^3}{2}-\sqrt{x^2+3\,y\left(x\right)}=0\right\}$$

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 = 0.271347 (sec), leaf count = 34

$$\left\{\left\{y(x) \to \frac{1}{72}a\left(-96c_1x^3 + 144c_1^2 + 16x^6 - 9x^4\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.388 (sec), leaf count = 27

$$\left\{\_C1 + \frac{4\,ax^3}{3} - \sqrt{a\left(ax^4 + 8\,y\left(x\right)\right)} = 0\right\}$$

2.645 ODE No. 645

$$y'(x) = y(x)(x - \log(y(x)))$$

✓ **Mathematica** : cpu = 0.0358369 (sec), leaf count = 20

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

✓ **Maple** : cpu = 0.171 (sec), leaf count = 14

$$\left\{y(x) = \mathrm{e}^{\frac{\_C1}{\mathrm{e}^x}-1+x}\right\}$$

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 = 0.175496 (sec), leaf count = 35

$$\left\{\left\{y(x) \to \frac{1}{6}\left(18c_1\log(x+1) - 9c_1^2 + x^3 - 9\log^2(x+1)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.294 (sec), leaf count = 23

$$\left\{\_C1 - 3\ln\left(1+x\right) - \sqrt{x^3 - 6\,y\left(x\right)} = 0\right\}$$

2.647 ODE No. 647

$$y'(x) = \frac{x\left(ay(x)^2 + bx^2\right)^2}{a^{5/2}y(x)}$$

✓ **Mathematica** : cpu = 0.388574 (sec), leaf count = 117

$$\left\{\left\{y(x)\to -\sqrt{\frac{a^{3/4}\sqrt{b}\tan\left(\frac{a^{3/2}bx^2+2c_1}{a^{9/4}\sqrt{b}}\right)-bx^2}{a}}\right\},\left\{y(x)\to \sqrt{\frac{a^{3/4}\sqrt{b}\tan\left(\frac{a^{3/2}bx^2+2c_1}{a^{9/4}\sqrt{b}}\right)-bx^2}{a}}\right\}\right\}$$

✓ **Maple** : cpu = 0.321 (sec), leaf count = 460

$$\left\{y(x)=\frac{1}{a}\sqrt{-\left(\_C1\,\mathrm{e}^{\frac{x^2}{2}\left(2\,a^{3/2}\sqrt{-\frac{b}{a^{3/2}}}+bx^2\right)a^{-\frac{3}{2}}}+\mathrm{e}^{\frac{x^2}{2}\left(-2\,a^{3/2}\sqrt{-\frac{b}{a^{3/2}}}+bx^2\right)a^{-\frac{3}{2}}}\right)a\left(\left(bx^2-a^{\frac{3}{2}}\sqrt{-ba^{-\frac{3}{2}}}\right)\mathrm{e}^{\frac{x^2}{2}}\right.}\right.$$

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 = 0.343122 (sec), leaf count = 96

$$\left\{\left\{y(x)\to\frac{1}{72}a\left(-96c_1x^3+72(2c_1-1)\,x^2-48\left(-6c_1+2x^3-3x^2+6x+9\right)\log(x+1)-144(2c_1-3)\,x\right.\right.\right.$$

✓ **Maple** : cpu = 0.693 (sec), leaf count = 41

$$\left\{\frac{1}{4}\sqrt{ax^4+8\,y\,(x)}\frac{1}{\sqrt{a}}-\frac{x^3}{3}+\frac{x^2}{2}-x+\ln\,(1+x)-\_C1=0\right\}$$

2.649 ODE No. 649

$$y'(x) = x\sqrt{x^2 + 8y(x) - 2x + 1} - \frac{x}{4} + \frac{1}{4}$$

✓ **Mathematica** : cpu = 0.174886 (sec), leaf count = 36

$$\left\{\left\{y(x) \to \frac{1}{8}\left(-(16c_1 + 1)\,x^2 + 16c_1^2 + 4x^4 + 2x - 1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.247 (sec), leaf count = 27

$$\left\{\_C1 + 2\,x^2 + \frac{1}{4} - \sqrt{x^2 - 2\,x + 1 + 8\,y\,(x)} = 0\right\}$$

2.650 ODE No. 650

$$y'(x) = x\sqrt{a^2 + 2ax + x^2 + 4y(x)} - \frac{a}{2} - \frac{x}{2}$$

✓ **Mathematica** : cpu = 0.235919 (sec), leaf count = 39

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

✓ **Maple** : cpu = 0.271 (sec), leaf count = 28

$$\left\{\_C1 + x^2 + \frac{1}{2} - \sqrt{x^2 + 2\,ax + a^2 + 4\,y\,(x)} = 0\right\}$$

2.651 ODE No. 651

$$y'(x) = \frac{y(x)\,(x^2 + \log(y(x)))}{x}$$

✓ **Mathematica** : cpu = 0.0333049 (sec), leaf count = 15

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

✓ **Maple** : cpu = 0.079 (sec), leaf count = 13

$$\left\{y(x) = \mathrm{e}^{\_C1\,x}\mathrm{e}^{x^2}\right\}$$

2.652 ODE No. 652

$$y'(x)=\frac{x\sqrt{4ax-y(x)^2}+2a}{y(x)}$$

✓ **Mathematica** : cpu = 1.89049 (sec), leaf count = 103

$$\left\{\left\{y(x)\to -\frac{\sqrt{256a^4x\left(16a-x^3\right)+32a^2e^{c_1}x^2-e^{2c_1}}}{32a^2}\right\},\left\{y(x)\to \frac{\sqrt{256a^4x\left(16a-x^3\right)+32a^2e^{c_1}x^2-e^{2c}}}{32a^2}\right.$$

✓ **Maple** : cpu = 0.187 (sec), leaf count = 27

$$\left\{-\sqrt{-\left(y\left(x\right)\right)^{2}+4\,ax}-\frac{x^{2}}{2}-\_C1=0\right\}$$

2.653 ODE No. 653

$$y'(x)=x\sqrt{x^2+4y(x)-4x}-\frac{x}{2}+1$$

✓ **Mathematica** : cpu = 0.176385 (sec), leaf count = 31

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

✓ **Maple** : cpu = 0.222 (sec), leaf count = 24

$$\left\{\_C1+x^{2}+\frac{1}{2}-\sqrt{x^{2}-4\,x+4\,y\left(x\right)}=0\right\}$$

2.654 ODE No. 654

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

✓ **Mathematica** : cpu = 0.159764 (sec), leaf count = 37

$$\left\{\left\{y(x)\to \frac{1}{12}\left(-18c_1\log(x+1)+9c_1^2-4x^2+9\log^2(x+1)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.292 (sec), leaf count = 23

$$\left\{\_C1+\frac{3\,\ln\left(1+x\right)}{2}-\sqrt{x^{2}+3\,y\left(x\right)}=0\right\}$$

2.655 ODE No. 655

$$y'(x) = \frac{e^{-4x/3}y(x)^3}{e^{-2x/3}y(x)+1}$$

✓ **Mathematica** : cpu = 20.2263 (sec), leaf count = 79

$$\text{Solve}\left[\frac{3}{2}\log(y(x)) - \frac{3}{4}\log\left(-3y(x)^2 + 2e^{2x/3}y(x) + 2e^{4x/3}\right) + \frac{3\tanh^{-1}\left(\frac{y(x)+2e^{2x/3}}{\sqrt{7}y(x)}\right)}{2\sqrt{7}} + x = c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.706 (sec), leaf count = 66

$$\left\{x + \frac{3\sqrt{7}}{14}Artanh\left(\frac{3\,y(x)\,\sqrt{7}}{7}e^{-\frac{2x}{3}} - \frac{\sqrt{7}}{7}\right) - \frac{3}{4}\ln\left(3\,(y(x))^2\left(e^{-2/3\,x}\right)^2 - 2\,y(x)\,e^{-2/3\,x} - 2\right) + \frac{3}{2}\ln\left(y(x)\right.$$

2.656 ODE No. 656

$$y'(x) = \frac{y(x)\left(x^3 + \log(y(x))\right)}{x}$$

✓ **Mathematica** : cpu = 0.0390253 (sec), leaf count = 20

$$\left\{\left\{y(x) \to e^{3c_1x + \frac{x^3}{2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.089 (sec), leaf count = 15

$$\left\{y(x) = e^{\frac{x^3}{2}}e^{-\_C1\,x}\right\}$$

2.657 ODE No. 657

$$y'(x) = x^2\sqrt{x^2 + 8y(x) - 2x + 1} - \frac{x}{4} + \frac{1}{4}$$

✓ **Mathematica** : cpu = 0.182646 (sec), leaf count = 37

$$\left\{\left\{y(x) \to \frac{1}{72}\left(-96c_1x^3 + 144c_1^2 + 16x^6 - 9x^2 + 18x - 9\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.239 (sec), leaf count = 26

$$\left\{\_C1 + \frac{4\,x^3}{3} - \sqrt{x^2 - 2\,x + 1 + 8\,y\left(x\right)} = 0\right\}$$

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 = 0.243088 (sec), leaf count = 46

$$\left\{\left\{y(x) \to \frac{1}{8}\left(16c_1^2 - x^2 + 2x - 1\right) - 4c_1 \log(4(x+1)) + 2\log^2(4(x+1))\right\}\right\}$$

✓ **Maple** : cpu = 0.331 (sec), leaf count = 28

$$\left\{\_C1 + 4\ln(1+x) - \frac{1}{4} - \sqrt{x^2 - 2x + 1 + 8y(x)} = 0\right\}$$

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 = 0.433611 (sec), leaf count = 51

$$\left\{\left\{y(x) \to \frac{a^2\left(-(4c_1 + 1)x^2 + 4c_1^2 + x^4\right) - 2abx - b^2 + 4c}{4a}\right\}\right\}$$

✓ **Maple** : cpu = 0.271 (sec), leaf count = 41

$$\left\{\_C1 + ax^2 + \frac{a}{2} - \sqrt{a^2x^2 + 2abx + b^2 + 4ay(x) - 4c} = 0\right\}$$

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 = 0.258556 (sec), leaf count = 42

$$\left\{\left\{y(x) \to \frac{1}{36}\left(-9a^2 - 18ax - 24c_1x^3 + 36c_1^2 + 4x^6 - 9x^2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.26 (sec), leaf count = 29

$$\left\{\_C1 + \frac{2x^3}{3} - \sqrt{x^2 + 2ax + a^2 + 4y(x)} = 0\right\}$$

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 = 0.428699 (sec), leaf count = 54

$$\left\{\left\{y(x) \to \frac{a^2(-24c_1x^3 + 36c_1^2 + 4x^6 - 9x^2) - 18abx - 9b^2 + 36c}{36a}\right\}\right\}$$

✓ **Maple** : cpu = 0.255 (sec), leaf count = 39

$$\left\{\_C1 + \frac{2\,ax^3}{3} - \sqrt{a^2x^2 + 2\,abx + b^2 + 4\,ay\,(x) - 4\,c} = 0\right\}$$

2.662 ODE No. 662

$$y'(x) = x^2\sqrt{x^2 - 4y(x) + 2x + 1} + \frac{x}{2} + \frac{1}{2}$$

✓ **Mathematica** : cpu = 0.187073 (sec), leaf count = 37

$$\left\{\left\{y(x) \to \frac{1}{36}(24c_1x^3 - 36c_1^2 - 4x^6 + 9x^2 + 18x + 9)\right\}\right\}$$

✓ **Maple** : cpu = 0.251 (sec), leaf count = 26

$$\left\{\_C1 - \frac{2\,x^3}{3} - \sqrt{x^2 + 2\,x + 1 - 4\,y\,(x)} = 0\right\}$$

2.663 ODE No. 663

$$y'(x) = \frac{x^2\sqrt{4ax - y(x)^2} + 2a}{y(x)}$$

✓ **Mathematica** : cpu = 2.17623 (sec), leaf count = 103

$$\left\{\left\{y(x) \to -\frac{\sqrt{4096a^6x\,(36a - x^5) + 128a^3e^{c_1}x^3 - e^{2c_1}}}{192a^3}\right\}, \left\{y(x) \to \frac{\sqrt{4096a^6x\,(36a - x^5) + 128a^3e^{c_1}x^3}}{192a^3}\right.$$

✓ **Maple** : cpu = 0.182 (sec), leaf count = 27

$$\left\{-\sqrt{-\left(y\,(x)\right)^2 + 4\,ax} - \frac{x^3}{3} - \_C1 = 0\right\}$$

2.664 ODE No. 664

$$y'(x) = x^2\sqrt{x^2 + 4y(x) - 4x} - \frac{x}{2} + 1$$

✓ **Mathematica** : cpu = 0.185587 (sec), leaf count = 34

$$\left\{\left\{y(x) \to -\frac{2c_1x^3}{3} + c_1^2 + \frac{x^6}{9} - \frac{x^2}{4} + x\right\}\right\}$$

✓ **Maple** : cpu = 0.221 (sec), leaf count = 25

$$\left\{\_C1 + \frac{2\,x^3}{3} - \sqrt{x^2 - 4\,x + 4\,y\,(x)} = 0\right\}$$

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 = 0.25935 (sec), leaf count = 39

$$\left\{\left\{y(x) \to -4ac_1\log(x+1) + 2ac_1^2 - \frac{ax^4}{8} + 2a\log^2(x+1)\right\}\right\}$$

✓ **Maple** : cpu = 0.524 (sec), leaf count = 28

$$\left\{-\frac{1}{4}\sqrt{ax^4 + 8\,y\,(x)}\frac{1}{\sqrt{a}} + \ln\,(1+x) - \_C1 = 0\right\}$$

2.666 ODE No. 666

$$y'(x) = y(x)\left(x^3 + x^2 - \log(y(x)) + 1\right)$$

✓ **Mathematica** : cpu = 0.0704419 (sec), leaf count = 29

$$\left\{\left\{y(x) \to e^{-c_1e^{-x}+x^3-2x^2+4x-3}\right\}\right\}$$

✓ **Maple** : cpu = 0.255 (sec), leaf count = 24

$$\left\{y(x) = \mathrm{e}^{\frac{\_C1}{\mathrm{e}^x}+x^3-2\,x^2+4\,x-3}\right\}$$

2.667 ODE No. 667

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

✓ **Mathematica** : cpu = 1.19101 (sec), leaf count = 84

$$\text{Solve}\left[\frac{\log(y(x))}{b} - \frac{\log\left(y(x)^2 - be^{bx}\left(e^{bx} + y(x)\right)\right)}{2b} + \frac{\tanh^{-1}\left(\frac{\sqrt{\frac{b}{b+4}}\left(2e^{bx}+y(x)\right)}{y(x)}\right)}{\sqrt{b}\sqrt{b+4}} + x = c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.236 (sec), leaf count = 82

$$\left\{bx - bArtanh\left(\left(-2\,y(x)\,e^{-bx} + b\right)\frac{1}{\sqrt{b^2+4\,b}}\right)\frac{1}{\sqrt{b^2+4\,b}} - \frac{\ln\left(-by(x)\,e^{-bx} + (y(x))^2\left(e^{-bx}\right)^2 - b\right)}{2} + \ln\left(\right.\right.$$

2.668 ODE No. 668

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

✓ **Mathematica** : cpu = 0.668362 (sec), leaf count = 59

$$\text{Solve}\left[\log(y(x)) - \frac{1}{2}\log\left(-y(x)^2 + e^x y(x) + e^{2x}\right) + \frac{\tanh^{-1}\left(\frac{y(x)+2e^x}{\sqrt{5}y(x)}\right)}{\sqrt{5}} + x = c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.78 (sec), leaf count = 58

$$\left\{y(x) = e^{RootOf\left(2\sqrt{5}Artanh\left(1/5\,\frac{\left(-2\,e^{\_Z}+e^{x}\right)\sqrt{5}}{e^{x}}\right)+5\,\ln\left(-\left(e^{x}\right)^2-e^{x+\_Z}+\left(e^{\_Z}\right)^2\right)+10\_C1-10\_Z-10\,x\right)}\right\}$$

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 = 0.842076 (sec), leaf count = 222

$$\left\{\left\{y(x) \to \frac{\left(\frac{3}{2}e^{3c_1+x} + e^{3c_1} - e^{3e^x} + \frac{3}{2}e^{x+3e^x}\right)^{2/3}}{\sqrt[3]{\left(e^{3c_1} + e^{3e^x}\right)^2}}\right\}, \left\{y(x) \to -\frac{\sqrt[3]{-1}\left(\frac{3}{2}e^{3c_1+x} + e^{3c_1} - e^{3e^x} + \frac{3}{2}e^{x+3e^x}\right)^{2/3}}{\sqrt[3]{\left(e^{3c_1} + e^{3e^x}\right)^2}}\right.\right.$$

✓ **Maple** : cpu = 0.219 (sec), leaf count = 72

$$\left\{\_C1 + 1\mathrm{e}^{-\frac{3\,\mathrm{e}^x}{2} - \frac{9\,\mathrm{e}^{2\,x}}{8}} \left(-2\,(y(x))^{3/2}\,\mathrm{e}^x + 3\,\mathrm{e}^{2\,x} + 2\,\mathrm{e}^x\right) \left(\mathrm{e}^{\frac{3\,\mathrm{e}^x}{2} - \frac{9\,\mathrm{e}^{2\,x}}{8}}\right)^{-1} \left(-2\,(y(x))^{3/2}\,\mathrm{e}^x + 3\,\mathrm{e}^{2\,x} - 2\,\mathrm{e}^x\right)^{-1} =\right.$$

2.670 ODE No. 670

$$y'(x) = \frac{1}{2}ixy(x)\left(-2\sqrt{4\log(a) - x^2 + 4\log(y(x))} + i\right)$$

✓ **Mathematica** : cpu = 0.488872 (sec), leaf count = 83

$$\text{Solve}\left[2i\sqrt{4\log(a) - x^2 + 4\log(y(x))} - 2i\tan^{-1}\left(\sqrt{4\log(a) - x^2 + 4\log(y(x))}\right) + 8\log(a) = \log\left(4\log(a\right.\right.$$

✓ **Maple** : cpu = 0.361 (sec), leaf count = 70

$$\left\{\frac{1}{2}\sqrt{-x^2 + 4\,\ln(a) + 4\,\ln(y(x))} - \frac{1}{2}\arctan\left(\sqrt{-x^2 + 4\,\ln(a) + 4\,\ln(y(x))}\right) + \frac{i}{4}\ln\left(x^2 - 4\,\ln(a) - 4\right.\right.$$

2.671 ODE No. 671

$$y'(x) = \frac{\left(xy(x)^2 + 1\right)^2}{x^4 y(x)}$$

✓ **Mathematica** : cpu = 0.411664 (sec), leaf count = 162

$$\left\{\left\{y(x)\to-\frac{\sqrt{\frac{\left(\sqrt{2}x-2\right)e^{\frac{2\sqrt{2}(c_1x+1)}{x}}-\sqrt{2}x-2}{x}}}{\sqrt{2}\sqrt{e^{\frac{2\sqrt{2}(c_1x+1)}{x}}+1}}\right\},\left\{y(x)\to\frac{\sqrt{\frac{\left(\sqrt{2}x-2\right)e^{\frac{2\sqrt{2}(c_1x+1)}{x}}-\sqrt{2}x-2}{x}}}{\sqrt{2}\sqrt{e^{\frac{2\sqrt{2}(c_1x+1)}{x}}+1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.237 (sec), leaf count = 237

$$\left\{y(x)=-\frac{\sqrt{2}}{2\,x}\sqrt{-\left(\_C1\,\left(\sqrt{2}x+2\right)\mathrm{e}^{\frac{-1-\sqrt{2}x}{x^2}}+\left(2-\sqrt{2}x\right)\mathrm{e}^{\frac{-1+\sqrt{2}x}{x^2}}\right)x\left(\_C1\,\mathrm{e}^{\frac{-1-\sqrt{2}x}{x^2}}+\mathrm{e}^{\frac{-1+\sqrt{2}x}{x^2}}\right)\left(\_C1\,\mathrm{e}\right.}\right.$$

2.672 ODE No. 672

$$y'(x)=\frac{x^2\left(\sqrt{4y(x)^3-9x^4}+3x\right)}{y(x)^2}$$

✗ **Mathematica** : cpu = 300.092 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.213 (sec), leaf count = 36

$$\left\{\int_{\_b}^{y(x)}\_a^2\frac{1}{\sqrt{-9\,x^4+4\,\_a^3}}\,\mathrm{d}\_a-\frac{x^3}{3}-\_C1=0\right\}$$

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 = 0.0832016 (sec), leaf count = 23

$$\left\{\left\{y(x)\to\tan^{-1}\left(\frac{3c_1+2x^3}{6x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.447 (sec), leaf count = 17

$$\left\{y(x)=\arctan\left(\frac{x^3+6\,\_C1}{3\,x}\right)\right\}$$

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 = 0.224409 (sec), leaf count = 32

$$\left\{\left\{y(x) \to -2c_1 \log(x+1) + c_1^2 - \frac{x^2}{4} + x + \log^2(x+1)\right\}\right\}$$

✓ **Maple** : cpu = 0.325 (sec), leaf count = 27

$$\left\{\_C1 + 2\ln(1+x) - 1 - \sqrt{x^2 - 4x + 4y(x)} = 0\right\}$$

2.675 ODE No. 675

$$y'(x) = \frac{ax^4 + ae^x x^3 + ax^3 - x^2 y(x)^2 - e^x x y(x)^2 - x y(x)^2 + y(x)}{x}$$

✓ **Mathematica** : cpu = 0.0515133 (sec), leaf count = 45

$$\left\{\left\{y(x) \to \sqrt{a} x \tanh\left(\frac{1}{6}\sqrt{a}(6c_1 + 2x^3 + 3x^2 + 6e^x(x-1))\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.076 (sec), leaf count = 37

$$\left\{y(x) = \tanh\left(\frac{(6x-6)e^x + 2x^3 + 3x^2 + 6\_C1}{6}\sqrt{a}\right) x\sqrt{a}\right\}$$

2.676 ODE No. 676

$$y'(x) = \frac{x^6\sqrt{4x^2 y(x) + 1} + \frac{x}{2} + \frac{1}{2}}{x^3(x+1)}$$

✓ **Mathematica** : cpu = 0.331112 (sec), leaf count = 120

$$\left\{\left\{y(x) \to -\frac{1}{12}(6c_1 - 11)x^4 + \left(\frac{2c_1}{3} - 1\right)x^3 - (c_1 - 1)x^2 + \left(-2c_1 + \frac{x^4}{2} - \frac{2x^3}{3} + x^2 - 2x\right)\log(x+1)\right.\right.$$

✓ **Maple** : cpu = 0.585 (sec), leaf count = 43

$$\left\{\_C1 + 2\ln(1+x) - \frac{1}{x}\sqrt{4x^2 y(x) + 1} - 2x + x^2 - \frac{2x^3}{3} + \frac{x^4}{2} = 0\right\}$$

2.677 ODE No. 677

$$y'(x) = \frac{ax^4 + ax^3 + ax^3 \log(x+1) - x^2y(x)^2 - xy(x)^2 + y(x) - xy(x)^2 \log(x+1)}{x}$$

✓ **Mathematica** : cpu = 0.0355605 (sec), leaf count = 51

$$\left\{\left\{y(x) \to \sqrt{a}x \tanh\left(\frac{1}{12}\sqrt{a}(12c_1 + 4x^3 + 3x^2 + 6(x^2-1)\log(x+1) + 6x)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.077 (sec), leaf count = 48

$$\left\{y(x) = \tanh\left(\frac{6\ln(1+x)x^2 + 4x^3 + 3x^2 - 6\ln(1+x) + 12\_C1 + 6x + 9}{12}\sqrt{a}\right)x\sqrt{a}\right\}$$

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 = 0.240924 (sec), leaf count = 90

$$\left\{\left\{y(x) \to \left(-3c_1 + x^3 - \frac{3x^2}{2} + 3x\right)\log(x+1) + \frac{1}{24}(8(3c_1+5)x^3 - 36(c_1+1)x^2 + 72c_1x - 36c_1^2 - 4x^6$$

✓ **Maple** : cpu = 0.357 (sec), leaf count = 37

$$\left\{\_C1 - x^3 + \frac{3x^2}{2} - 3x + 3\ln(1+x) - \frac{1}{2} - \sqrt{x^3 - 6y(x)} = 0\right\}$$

2.679 ODE No. 679

$$y'(x) = \frac{x^4 + x^3 + x^3\log(x) + 7x^2y(x)^2 + 7xy(x)^2 + y(x) + 7xy(x)^2\log(x)}{x}$$

✓ **Mathematica** : cpu = 0.0329753 (sec), leaf count = 44

$$\left\{\left\{y(x) \to \frac{x\tan\left(\frac{1}{12}\sqrt{7}(12c_1 + 4x^3 + 3x^2 + 6x^2\log(x))\right)}{\sqrt{7}}\right\}\right\}$$

✓ **Maple** : cpu = 0.065 (sec), leaf count = 37

$$\left\{y(x)=\frac{x\sqrt{7}}{7}\tan\left(\frac{\left(6\,x^{2}\ln\left(x\right)+4\,x^{3}+3\,x^{2}+12\_C1\right)\sqrt{7}}{12}\right)\right\}$$

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 = 0.225691 (sec), leaf count = 39

$$\left\{\left\{y(x)\to\frac{1}{4}\left(8c_1\log(x+1)-4c_1^2+x^2+2x-4\log^2(x+1)+1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.336 (sec), leaf count = 28

$$\left\{\_C1-2\,\ln\left(1+x\right)-\frac{1}{2}-\sqrt{x^{2}+2\,x+1-4\,y\left(x\right)}=0\right\}$$

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 = 0.0413496 (sec), leaf count = 54

$$\left\{\left\{y(x)\to\frac{\sqrt{b}x\tan\left(\frac{1}{12}\sqrt{a}\sqrt{b}(12c_1+4x^3+9x^2-6x^2\log(x))\right)}{\sqrt{a}}\right\}\right\}$$

✓ **Maple** : cpu = 0.083 (sec), leaf count = 45

$$\left\{y(x)=\frac{x}{a}\tan\left(\frac{4\,x^{3}+6\,x^{2}\ln\left(x^{-1}\right)+9\,x^{2}+12\_C1}{12}\sqrt{ab}\right)\sqrt{ab}\right\}$$

2.682 ODE No. 682

$$y'(x) = \frac{2a}{x\left(-8a^2 + 2axy(x)^2 - xy(x)\right)}$$

✓ **Mathematica** : cpu = 0.115544 (sec), leaf count = 33

$$\text{Solve}\left[\frac{e^{-4ay(x)}\left(xy(x)^2 - 4a\right)}{8ax} = c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.294 (sec), leaf count = 28

$$\left\{\_C1 + \frac{-x(y(x))^2 + 4a}{e^{4ay(x)}x} = 0\right\}$$

2.683 ODE No. 683

$$y'(x) = \frac{y(x)\left(x^4y(x)\log(x(x+1)) - x^3\log(x(x+1)) - 1\right)}{x}$$

✓ **Mathematica** : cpu = 0.388746 (sec), leaf count = 72

$$\left\{\left\{y(x) \to \frac{e^{\frac{1}{9}x(2x^2+3)}}{x\left(c_1e^{\frac{x^2}{6}}\sqrt[3]{x+1}(x(x+1))^{\frac{x^3}{3}} + e^{\frac{1}{9}x(2x^2+3)}\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.203 (sec), leaf count = 152

$$\left\{y(x) = \frac{1}{x}(x(1+x))^{-\frac{x^3}{3}} e^{\frac{2x^3}{9}} e^{-\frac{x^2}{6}} e^{\frac{x}{3}} \left((1+x)^{-\frac{x^3}{3}} x^{-\frac{x^3}{3}} e^{\frac{x}{6}\left(ix^2\pi\left(csgn(ix(1+x))\right)^3 - ix^2(csgn(ix)+csgn(i+ix))\pi\left(csgn(ix(1+\right.\right.}\right.\right.$$

2.684 ODE No. 684

$$y'(x) = \frac{x^2\sqrt{x^2 + y(x)^2} + y(x)}{x}$$

✓ **Mathematica** : cpu = 0.024035 (sec), leaf count = 18

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

✓ **Maple** : cpu = 3.462 (sec), leaf count = 30

$$\left\{\ln\left(\sqrt{(y(x))^2+x^2}+y(x)\right)-\frac{x^2}{2}-\ln(x)-\_C1=0\right\}$$

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 = 0.0365175 (sec), leaf count = 62

$$\left\{\left\{y(x)\to\frac{x\tan\left(\frac{1}{2}\sqrt{7}(2c_1-x^2+x^2\log(x-1)+x^2\log(x+1)-\log(1-x)-\log(x+1))\right)}{\sqrt{7}}\right\}\right\}$$

✓ **Maple** : cpu = 0.098 (sec), leaf count = 48

$$\left\{y(x)=\frac{x\sqrt{7}}{7}\tan\left(\frac{\left(x^2\ln((x-1)(1+x))-x^2-\ln((x-1)(1+x))+2\_C1+1\right)\sqrt{7}}{2}\right)\right\}$$

2.686 ODE No. 686

$$y'(x)=\frac{e^{2x^2}xy(x)^3}{e^{x^2}y(x)+1}$$

✓ **Mathematica** : cpu = 15.6215 (sec), leaf count = 49

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

✓ **Maple** : cpu = 0.433 (sec), leaf count = 85

$$\left\{y(x)=\frac{1}{e^{x^2}}\left(1-\tan\left(RootOf\left(-2x^2+2\ln(9/2\tan(\_Z)-9/2)-\ln\left(\frac{81(\tan(\_Z))^2}{10}+\frac{81}{10}\right)+6\_\right.\right.\right.\right.$$

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 = 0.062577 (sec), leaf count = 111

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

✓ **Maple** : cpu = 0.127 (sec), leaf count = 39

$$\left\{y(x) = -\tanh\left(\frac{x^2}{2}\ln\left(\frac{1+x}{x-1}\right) - \frac{1}{2}\ln\left(\frac{1+x}{x-1}\right) + \_C1 + x - 1\right)x\right\}$$

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 = 0.111451 (sec), leaf count = 45

$$\left\{\left\{y(x)\to x\tan\left(c_1 - 4e\text{Ei}\left(\frac{2}{x-1}\right) + \frac{1}{2}e^{\frac{x+1}{x-1}}\left(x^2+2x-3\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.109 (sec), leaf count = 42

$$\left\{y(x) = \tan\left(\frac{x^2+2x-3}{2}e^{\frac{1+x}{x-1}} + 4\,e Ei\left(1, -2(x-1)^{-1}\right) + \_C1\right)x\right\}$$

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 = 0.0706954 (sec), leaf count = 55

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

✓ **Maple** : cpu = 0.066 (sec), leaf count = 25

$$\left\{y(x) = -\tanh\left(e^{1+x} - e^{2} Ei(1, 1-x) + \_C1\right) x\right\}$$

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 = 0.309514 (sec), leaf count = 106

$$\left\{\left\{y(x) \to -\frac{2}{3}\left(-6c_1 + 2x^3 - 3x^2 + 6x + 11\right)\log(4(x+1)) + \frac{1}{72}\left((32 - 96c_1)\,x^3 + 3(48c_1 - 43)\,x^2 - 6(48\right.\right.\right.$$

✓ **Maple** : cpu = 0.389 (sec), leaf count = 40

$$\left\{\_C1 + \frac{4\,x^3}{3} - 2\,x^2 + 4\,x - 4\,\ln\left(1+x\right) - \sqrt{x^2 - 2\,x + 1 + 8\,y\left(x\right)} = 0\right\}$$

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 = 0.0780879 (sec), leaf count = 21

$$\left\{\left\{y(x) \to \tan^{-1}\left(\frac{2c_1 + x^4}{4x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.674 (sec), leaf count = 17

$$\left\{y(x) = \arctan\left(\frac{x^4 + 8\_C1}{4\,x}\right)\right\}$$

2.692 ODE No. 692

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

✓ **Mathematica** : cpu = 0.0236843 (sec), leaf count = 18

$$\left\{\left\{y(x)\to x\sinh\left(c_1+\frac{x^3}{3}\right)\right\}\right\}$$

✓ **Maple** : cpu = 3.109 (sec), leaf count = 30

$$\left\{\ln\left(\sqrt{(y(x))^2+x^2}+y(x)\right)-\frac{x^3}{3}-\ln(x)-\_C1=0\right\}$$

2.693 ODE No. 693

$$y'(x) = e^{bx}\left(e^{-3bx}y(x)^3+e^{-2bx}y(x)^2+1\right)$$

✓ **Mathematica** : cpu = 0.244658 (sec), leaf count = 143

$$\text{Solve}\left[3(9b+29)^{2/3}\text{RootSum}\left[\#1^3(9b+29)^{2/3}-9\#1b-3\#1+(9b+29)^{2/3}\&,\frac{\log\left(\frac{e^{-2bx}\left(e^{bx}+3y(x)\right)}{\sqrt[3]{(9b+29)e^{-3bx}}}-\#\right.}{\#1^2\left(-(9b+29)^{2/3}\right)+3b\right.}\right.\right.$$

✓ **Maple** : cpu = 0.118 (sec), leaf count = 40

$$\left\{y(x)=\frac{1}{e^{-bx}}RootOf\left(-x-\int^{\_Z}-\left(\_a^3+\_a^2-b\_a+1\right)^{-1}d\_a+\_C1\right)\right\}$$

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 = 0.283941 (sec), leaf count = 43

$$\left\{\left\{y(x)\to -2c_1x-2(x-c_1)\log(x+1)+c_1^2+x^2-\frac{1}{4x^2}+\log^2(x+1)\right\}\right\}$$

✓ **Maple** : cpu = 0.359 (sec), leaf count = 30

$$\left\{-2\ln(1+x)-\frac{1}{x}\sqrt{4x^2y(x)+1}+2x+\_C1=0\right\}$$

2.695 ODE No. 695

$$y'(x) = \frac{x^4 + x^3 + x^2 y(x)^2 + xy(x)^2 + y(x)\log(x-1)}{x\log(x-1)}$$

✓ **Mathematica** : cpu = 0.0736661 (sec), leaf count = 34

$$\{\{y(x) \to x\tan(c_1 + 2\text{Ei}(\log(x-1)) + 3\text{Ei}(2\log(x-1)) + \text{Ei}(3\log(x-1)))\}\}$$

✓ **Maple** : cpu = 0.066 (sec), leaf count = 39

$$\{y(x) = \tan(-\mathit{Ei}(1, -3\ln(x-1)) - 3\,\mathit{Ei}(1, -2\ln(x-1)) - 2\,\mathit{Ei}(1, -\ln(x-1)) + \_C1)\,x\}$$

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 = 299.997 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.076 (sec), leaf count = 32

$$\left\{y(x) = \frac{x\sqrt{7}}{7}\tan\left(\left(\mathrm{e}\int\frac{x\mathrm{e}^{x}}{\ln(x-1)}\,dx + \_C1\right)\sqrt{7}\right)\right\}$$

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 = 0.204075 (sec), leaf count = 112

$$\text{Solve}\left[105\text{RootSum}\left[-35\#1^3 + 9\sqrt[3]{35}\#1 - 35\&, \frac{\log\left(\frac{e^{-4x/3}(3y(x)+e^{2x/3})}{\sqrt[3]{35}\sqrt[3]{e^{-2x}}} - \#1\right)}{3\sqrt[3]{35} - 35\#1^2}\&\right] + 9c_1 + 35^{2/3}e^{4x/3}(e^{-2}$$

✓ **Maple** : cpu = 0.118 (sec), leaf count = 40

$$\left\{y(x) = \mathit{RootOf}\left(-x + 3\int^{\_Z}\left(3\_a^3 + 3\_a^2 - 2\_a + 3\right)^{-1}d\_a + \_C1\right)\left(\mathrm{e}^{-\frac{2x}{3}}\right)^{-1}\right\}$$

2.698 ODE No. 698

$$y'(x) = e^x \left(e^{-3x} y(x)^3 + e^{-2x} y(x)^2 + 1\right)$$

✓ **Mathematica** : cpu = 0.205971 (sec), leaf count = 104

$$\text{Solve}\left[57\text{RootSum}\left[-19\#1^3 + 6\sqrt[3]{38}\#1 - 19\&, \frac{\log\left(\frac{e^{-2x}(3y(x)+e^x)}{\sqrt[3]{38}\sqrt[3]{e^{-3x}}} - \#1\right)}{2\sqrt[3]{38} - 19\#1^2}\&\right] + 9c_1 + 38^{2/3}e^{2x}\left(e^{-3x}\right)^{2/3} x$$

✓ **Maple** : cpu = 0.102 (sec), leaf count = 34

$$\left\{ y(x) = \frac{RootOf\left(-x + \int^{\_Z} (\_a^3 + \_a^2 - \_a + 1)^{-1} d\_a + \_C1\right)}{e^{-x}} \right\}$$

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 = 0.245965 (sec), leaf count = 90

$$\left\{\left\{y(x) \to \frac{1}{48}\left(-12(2c_1+3)x^3 + 4(9c_1+5)x^2 - 12\left(-6c_1 + 2x^3 - 3x^2 + 6x\right)\log(x+1) - 72c_1x + 36c_1^2\right.\right.\right.$$

✓ **Maple** : cpu = 0.359 (sec), leaf count = 36

$$\left\{\_C1 + \frac{x^3}{2} - \frac{3x^2}{4} - \frac{3\ln(1+x)}{2} + \frac{3x}{2} - \sqrt{x^2 + 3y(x)} = 0\right\}$$

2.700 ODE No. 700

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

✓ **Mathematica** : cpu = 0.0660066 (sec), leaf count = 72

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

✓ **Maple** : cpu = 0.134 (sec), leaf count = 62

$$\left\{y(x) = \frac{1}{x}\sqrt{x\left(2\, lambertW\left(1/2\_C1\, e^{-1/2\,\frac{x-1}{x}}\right)x + x - 1\right)}, y(x) = -\frac{1}{x}\sqrt{x\left(2\, lambertW\left(1/2\_C1\, e^{-1/\right.\right.}}$$

2.701 ODE No. 701

$$y'(x) = \frac{x^4 + x^4\log(x) - 2x^2y(x) - 2x^2y(x)\log(x) + y(x)^2 + y(x)^2\log(x) + 2e^x x - 2x - \log(x) - 1}{e^x - 1}$$

✗ **Mathematica** : cpu = 300.04 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 5.999 (sec), leaf count = 71

$$\left\{y(x) = 1\left(-x^2\left(e^{\int \frac{\ln(x)+1}{e^x-1}\,dx}\right)^2 + \_C1\,x^2 + \left(e^{\int \frac{\ln(x)+1}{e^x-1}\,dx}\right)^2 + \_C1\right)\left(-\left(e^{\int \frac{\ln(x)+1}{e^x-1}\,dx}\right)^2 + \_C1\right)^{-1}\right\}$$

2.702 ODE No. 702

$$y'(x) = \frac{-x^3 + x^3(-\log(x)) - xy(x)^2 + xy(x) - e^x y(x) - xy(x)^2\log(x)}{x\left(x - e^x\right)}$$

✗ **Mathematica** : cpu = 300.041 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.097 (sec), leaf count = 35

$$\left\{y(x) = \tan\left(\left(\int \frac{x\ln(x)}{e^x - x}\,dx + \int \frac{x}{e^x - x}\,dx + \_C1\right)x\right)\right\}$$

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 = 301.303 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.342 (sec), leaf count = 44

$$\left\{y(x) = \frac{e^{dilog(x)}}{x e^{x}(x-1)}\left(\int -\frac{e^{dilog(x)}(x+\ln(x))}{(x-1)^2 e^{x}}\,dx + \_C1\right)^{-1}\right\}$$

2.704 ODE No. 704

$$y'(x) = \frac{2ax^3 y(x)^2 + 2bx^5 - y(x) + xy(x)\log(x)}{x(x\log(x) - 1)}$$

✗ **Mathematica** : cpu = 300.038 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.074 (sec), leaf count = 38

$$\left\{y(x) = \frac{x}{a}\tan\left(2\sqrt{ab}\left(\_C1 + \int \frac{x^3}{x\ln(x) - 1}\,dx\right)\right)\sqrt{ab}\right\}$$

2.705 ODE No. 705

$$y'(x) = \frac{y(x)\left(x^4 + x^3 + \log(y(x)) + x\right)}{x}$$

✓ **Mathematica** : cpu = 0.0670514 (sec), leaf count = 30

$$\left\{\left\{y(x) \to x^x e^{c_1 x + \frac{x^4}{3} + \frac{x^3}{2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.237 (sec), leaf count = 24

$$\left\{y(x) = e^{\frac{x^4}{3}} e^{\frac{x^3}{2}} e^{\_C1\, x} x^x\right\}$$

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 = 300.029 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.69 (sec), leaf count = 65

$$\left\{\int_{\_b}^{y(x)}\frac{1}{2\_a+2}\left(\frac{x^2(\_a+1)\ln(\_a+1)}{2}-\frac{x^2(\_a+1)\ln(\_a-1)}{2}+x^2(\_a+1)\ln(x)+4\_a-4\right)^{-1}\mathrm{d}$$

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 = 300. (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.628 (sec), leaf count = 105

$$\left\{\int_{\_b}^{y(x)}\frac{1}{4\_a+4}\left(\frac{x^2(\_a+1)(\ln(\_a-1))^2}{4}-\left(\ln(x)+\frac{\ln(\_a+1)}{2}\right)(\_a+1)x^2\ln(\_a-1)+\frac{x^2(\_a}{}\right.$$

2.708 ODE No. 708

$$y'(x) = \frac{(4ax-y(x)^2)^3}{y(x)(4ax-y(x)^2-1)}$$

✓ **Mathematica** : cpu = 0.316698 (sec), leaf count = 82

$$\text{Solve}\left[2ax = \text{RootSum}\left[-\#1^3+2\#1a-2a\&, \frac{\#1a\log(-\#1+4ax-y(x)^2)-a\log(-\#1+4ax-y(x)^2}{2a-3\#1^2}\right.\right.$$

✓ **Maple** : cpu = 15.668 (sec), leaf count = 229

$$\left\{\int_{\_b}^{x}-\frac{(4\_a\,a-(y(x))^2)^3}{-(y(x))^6+12\_a\,a(y(x))^4+(-48\_a^2a^2+2a)(y(x))^2+64\_a^3a^3-8\_a\,a^2+2a}\mathrm{d}\_a+\int^{y(x}\right.$$

2.709 ODE No. 709

$$y'(x) = \frac{x^3\sqrt{4ax - y(x)^2} + 2ax + 2a}{(x+1)y(x)}$$

✓ **Mathematica** : cpu = 5.48258 (sec), leaf count = 143

$$\left\{\left\{y(x) \to -\frac{1}{6}\sqrt{144ax - (6c_1 + 2x^3 - 3x^2 + 6x)^2 + 12(6c_1 + 2x^3 - 3x^2 + 6x)\log(x+1) - 36\log^2(x+\right.\right.$$

✓ **Maple** : cpu = 0.287 (sec), leaf count = 39

$$\left\{-\sqrt{-(y(x))^2 + 4ax} - \frac{x^3}{3} + \frac{x^2}{2} - x + \ln(1+x) - \_C1 = 0\right\}$$

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 = 300.02 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 2.484 (sec), leaf count = 31

$$\left\{y(x) = -x + \tan\left(2\_C1 - 2\int -\frac{x}{\ln(x) - e^{x^{-1}}}\,dx\right)\right\}$$

2.711 ODE No. 711

$$y'(x) = -\frac{y(x)(x\log(y(x)) + \log(y(x)) - 1)}{x+1}$$

✓ **Mathematica** : cpu = 0.0821572 (sec), leaf count = 24

$$\left\{\left\{y(x) \to e^{e^{-x-1}(ec_1 + \text{Ei}(x+1))}\right\}\right\}$$

✓ **Maple** : cpu = 0.15 (sec), leaf count = 31

$$\left\{y(x) = 1e^{\frac{-C1}{e^x}}\left(e^{\frac{Ei(1,-1-x)}{e^x e}}\right)^{-1}\right\}$$

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 = 0.284873 (sec), leaf count = 102

$$\left\{\left\{y(x) \to \frac{1}{36}\left(8(3c_1 - 1)x^3 + (39 - 36c_1)x^2 + 12\left(-6c_1 + 2x^3 - 3x^2 + 6x + 11\right)\log(x+1) + 6(12c_1 - 1\right.\right.\right.$$

✓ **Maple** : cpu = 0.386 (sec), leaf count = 38

$$\left\{\_C1 - \frac{2x^3}{3} + x^2 - 2x + 2\ln(1+x) - \sqrt{x^2 + 2x + 1 - 4y(x)} = 0\right\}$$

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 = 0.13143 (sec), leaf count = 607

$$\left\{\left\{y(x) \to \frac{\frac{1}{\text{Root}\left[\#1^6\left(16e^{12c_1} + 16x^3\right) - \frac{24\#1^4x^2}{a^4} + \frac{8\#1^3x^{3/2}}{a^6} + \frac{9\#1^2x}{a^8} - \frac{6\#1\sqrt{x}}{a^{10}} + \frac{1}{a^{12}}\&,1\right]} + a\left(a\left(-\sqrt{x}\right) + a + bx + b\right)}{a^2}\right\}, \left\{y(\right.\right.$$

✓ **Maple** : cpu = 0.403 (sec), leaf count = 86

$$\left\{y(x) = \frac{1}{2a}\left(3\tanh\left(RootOf\left(729x^3(\tanh(\_Z))^6a^6 - 2187x^3(\tanh(\_Z))^4a^6 + 2187x^3(\tanh(\_Z))^2a^6\right.\right.\right.\right.$$

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 = 300.049 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.207 (sec), leaf count = 96

$$\left\{y(x) = 1e^{\int \frac{x\ln(x)+x^2+\ln(x^{-1})-e^x}{(-\ln(x^{-1})+e^x)x}\,dx}\left(\int \frac{x(x+\ln(x))}{-\ln(x^{-1})+e^x}e^{\int \frac{x\ln(x)+x^2+\ln(x^{-1})-e^x}{(-\ln(x^{-1})+e^x)x}\,dx}\,dx + \_C1\right)^{-1}\right\}$$

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 = 0.301611 (sec), leaf count = 89

$$\left\{\left\{y(x) \to -\frac{1}{3}(2c_1+3)x^3 + \left(c_1 + \frac{3}{4}\right)x^2 + \left(2c_1 - \frac{2x^3}{3} + x^2 - 2x\right)\log(x+1) - 2c_1x + c_1^2 + \frac{x^6}{9} - \frac{x^5}{3} +\right.\right.$$

✓ **Maple** : cpu = 0.348 (sec), leaf count = 39

$$\left\{\_C1 + \frac{2\,x^3}{3} - x^2 + 2\,x - 2\,\ln(1+x) - \sqrt{x^2 - 4\,x + 4\,y(x)} = 0\right\}$$

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 = 5.67084 (sec), leaf count = 133

$$\left\{\left\{y(x) \to \left(-\frac{3}{2}\right)^{2/3}\sqrt[3]{8c_1\log(x+1) - 4c_1^2 + x^4 - 4\log^2(x+1)}\right\}, \left\{y(x) \to \left(\frac{3}{2}\right)^{2/3}\sqrt[3]{8c_1\log(x+1) -\right.\right.$$

✓ **Maple** : cpu = 0.341 (sec), leaf count = 37

$$\left\{\int_{\_b}^{y(x)} \_a^2 \frac{1}{\sqrt{9\,x^4 - 4\_a^3}}\,\mathrm{d}\_a - \ln(1+x) - \_C1 = 0\right\}$$

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 = 0.337539 (sec), leaf count = 44

$$\left\{\left\{y(x) \to -\frac{a^2}{4} - \frac{ax}{2} - 2c_1 \log(x+1) + c_1^2 - \frac{x^2}{4} + \log^2(x+1)\right\}\right\}$$

✓ **Maple** : cpu = 0.414 (sec), leaf count = 33

$$\left\{\_C1 + \frac{a}{2} + 2\ln(1+x) - \sqrt{x^2 + 2\,ax + a^2 + 4\,y(x)} = 0\right\}$$

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 = 0.193932 (sec), leaf count = 123

$$\text{Solve}\left[\frac{11}{3}\text{RootSum}\left[11\#1^3 + 15\sqrt[3]{11}\#1 + 11\&, \frac{\log\left(\frac{e^{x^2} x\left(3e^{x^2} y(x)+1\right)}{\sqrt[3]{11}\sqrt[3]{e^{3x^2} x^3}} - \#1\right)}{11\#1^2 + 5\sqrt[3]{11}}\&\right] = c_1 + \frac{1}{18} 11^{2/3} e^{-2x^2}\left(e^{3x}\right.\right.$$

✓ **Maple** : cpu = 0.073 (sec), leaf count = 44

$$\left\{y(x) = \frac{-11\,RootOf\left(-5\,x^2 + 20250\int^{\_Z}\left(121\_a^3 + 3375\_a - 3375\right)^{-1} d\_a + 6\_C1\right) - 15}{45\,e^{x^2}}\right\}$$

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 = 0.11635 (sec), leaf count = 44

$$\left\{\left\{y(x)\to \frac{2^{e^{-x}}}{x\left(c_1x^{-e^{-x}}e^{\text{Ei}(-x)}+2^{e^{-x}}\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.155 (sec), leaf count = 34

$$\left\{y(x) = \left(2^{-e^{-x}}\_C1\ x^{-e^{-x}+1}e^{-Ei(1,x)}+x\right)^{-1}\right\}$$

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 = 5.91932 (sec), leaf count = 272

$$\left\{\left\{y(x)\to \sqrt[3]{(6c_1+9)\,x^3 - 9\,(c_1+1)\,x^2 + 3\,(-6c_1+2x^3-3x^2+6x)\log(x+1) + 18c_1x - 9c_1^2 - x^6 + 3x}\right.\right.$$

✓ **Maple** : cpu = 0.247 (sec), leaf count = 48

$$\left\{\int_{\_b}^{y(x)}\_a^2\frac{1}{\sqrt{9\,x^4-4\,\_a^3}}\,\mathrm{d}\_a - \frac{x^3}{3}+\frac{x^2}{2}-x+\ln(1+x)-\_C1 = 0\right\}$$

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 = 0.022093 (sec), leaf count = 27

$$\left\{\left\{y(x)\to \frac{1}{c_1-\frac{2x^{3/2}}{3}}+\frac{x^3}{6}\right\}\right\}$$

✓ **Maple** : cpu = 0.085 (sec), leaf count = 19

$$\left\{y(x) = \frac{x^3}{6} + \left(\_C1 - \frac{2}{3}x^{\frac{3}{2}}\right)^{-1}\right\}$$

2.722 ODE No. 722

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

✓ **Mathematica** : cpu = 84.3171 (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 = 0.441 (sec), leaf count = 70

$$\left\{y(x) = 1\mathrm{e}^{RootOf\left(-\mathrm{e}^{\_Z}\ln\left(\frac{\mathrm{e}^{\_Z}+2}{2x^4}\right)+3\_C1\,\mathrm{e}^{\_Z}+\_Z\,\mathrm{e}^{\_Z}+2\right)}\left(1 + (2\ln(x) - 1)\,\mathrm{e}^{RootOf\left(-\mathrm{e}^{\_Z}\ln\left(\frac{\mathrm{e}^{\_Z}+2}{2x^4}\right)+3\_C1\,\mathrm{e}^{\_Z}+\_\right.}\right.\right.$$

2.723 ODE No. 723

$$y'(x) = \frac{2a}{32a^3x^2 - 16a^2xy(x)^2 + 2ay(x)^4 + y(x)}$$

✓ **Mathematica** : cpu = 0.0818036 (sec), leaf count = 672

$$\left\{\left\{y(x) \to -\frac{\sqrt[3]{-1024a^6c_1^3 + 9216a^5c_1x - 432a^2 + 16\sqrt{a^4\left((64a^4c_1^3 - 576a^3c_1x + 27\right)^2 - 4096a^5\left(ac_1^2 + 3\right.}}}{12\sqrt[3]{2}a}\right.\right.$$

✓ **Maple** : cpu = 0.085 (sec), leaf count = 856

$$\left\{y(x) = -\frac{1}{12\,a}\left(-8\_C1\,a^2\sqrt[3]{\left(64\_C1^3a^4 - 576\_C1\,a^3x + 3\sqrt{-12288\_C1^4a^7x + 24576\_C1^2a^6x^2 -}\right.}\right.\right.$$

2.724 ODE No. 724

$$y'(x) = -\frac{y(x)^3}{x(-y(x) + y(x)\log(x) - 1)}$$

✓ **Mathematica** : cpu = 90.9813 (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

$$\left\{y(x) = \left(-\mathit{lambertW}\left(\_C1\, \mathrm{e}^{-2}x\right) + \ln(x) - 2\right)^{-1}\right\}$$

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 = 0.275193 (sec), leaf count = 19

$$\{\{y(x) \to \tan(c_1 + \log(2)\mathrm{li}(x) + x) - x\}\}$$

✓ **Maple** : cpu = 0.976 (sec), leaf count = 25

$$\{y(x) = -x - \tan(\ln(2)\, \mathit{Ei}(1, -\ln(x)) + \_C1 - x)\}$$

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 = 0.103583 (sec), leaf count = 607

$$\left\{\left\{y(x) \to \frac{\frac{1}{\text{Root}\left[\#1^6\left(16e^{12c_1}+16x^3\right)-\frac{24\#1^4x^2}{a^4}+\frac{8\#1^3x^{3/2}}{a^6}+\frac{9\#1^2x}{a^8}-\frac{6\#1\sqrt{x}}{a^{10}}+\frac{1}{a^{12}}\&,1\right]} + a\left(a\left(-\sqrt{x}\right) - bx + c\right)}{a^2}\right\}, \left\{y(x) -\right.\right.$$

✓ **Maple** : cpu = 0.312 (sec), leaf count = 83

$$\left\{y(x) = \frac{1}{2\,a}\left(3\,\tanh\left(RootOf\left(-729\,x^3(\tanh(\_Z))^6\,a^6 + 2187\,x^3(\tanh(\_Z))^4\,a^6 - 2187\,x^3(\tanh(\_Z))^2\right.\right.\right.\right.$$

2.727 ODE No. 727

$$y'(x) = \frac{y(x)(y(x) + 2x + 2)}{(x+1)(\log(y(x)) + 2x - 1)}$$

✓ **Mathematica** : cpu = 0.52934 (sec), leaf count = 29

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

✓ **Maple** : cpu = 0.42 (sec), leaf count = 25

$$\left\{y(x) = \mathrm{e}^{-lambertW((\ln(1+x) - \_C1)\mathrm{e}^{-2\,x}) - 2\,x}\right\}$$

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 = 0.438695 (sec), leaf count = 72

$$\left\{\left\{y(x) \to -\frac{\sqrt{x}\sqrt{W\left(\frac{6e^{2c_1 + x^2}}{x}\right)}}{\sqrt{6}}\right\}, \left\{y(x) \to \frac{\sqrt{x}\sqrt{W\left(\frac{6e^{2c_1 + x^2}}{x}\right)}}{\sqrt{6}}\right\}\right\}$$

✓ **Maple** : cpu = 0.375 (sec), leaf count = 50

$$\left\{\left((y(x))^{-2} + 6\,x^{-1}\right)^{-1} = \frac{x}{54}\left(\mathrm{e}^{RootOf\left(x^2\mathrm{e}^{\_Z} - \mathrm{e}^{\_Z}\ln\left(\frac{(\mathrm{e}^{\_Z}+9)x}{2}\right) + 3\_C1\,\mathrm{e}^{\_Z} + \_Z\,\mathrm{e}^{\_Z} + 9\right)} + 9\right)\right\}$$

2.729 ODE No. 729

$$y'(x) = \frac{(x - y(x))y(x)}{x\,(x - y(x)^3)}$$

✓ **Mathematica** : cpu = 0.363675 (sec), leaf count = 315

$$\left\{\left\{y(x)\to \frac{2\sqrt[3]{2}(c_1-\log(x))}{\sqrt[3]{2\sqrt{(6c_1-6\log(x))^{3}+729x^2}+54x}}-\frac{\sqrt[3]{2\sqrt{(6c_1-6\log(x))^{3}+729x^2}+54x}}{3\sqrt[3]{2}}\right\},\left\{y(x)\to\right.\right.$$

✓ **Maple** : cpu = 0.118 (sec), leaf count = 404

$$\left\{y(x) = \frac{1}{3}\left(\left(-27\,x+3\,\sqrt{24\_C1^{3}-72\_C1^{2}\ln(x)+72\_C1\,(\ln(x))^{2}-24\,(\ln(x))^{3}+81\,x^{2}}\right)^{\frac{2}{3}}+6\,\ln\right.\right.$$

2.730 ODE No. 730

$$y'(x) = \frac{e^x\left(2y(x)^{3/2} - 3e^x\right)^3}{4\sqrt{y(x)}\,(2y(x)^{3/2} - 3e^x + 2)}$$

✗ **Mathematica** : cpu = 50.4353 (sec), leaf count = 0 , could not solve

```
DSolve[Derivative[1][y][x] == (E^x*(-3*E^x + 2*y[x]^(3/2))^3)/(4*Sqrt[y[x]]*(2 - 3*E^x
```

✓ **Maple** : cpu = 1.892 (sec), leaf count = 41

$$\left\{ e^x - \int^{(y(x))^{\frac{3}{2}} - \frac{3\,e^x}{2}} \frac{2 + 2\_a}{3\_a^3 - 3\_a - 3} d\_a - \_C1 = 0 \right\}$$

2.731 ODE No. 731

$$y'(x) = \frac{2y(x)+1}{x\left(2xy(x)^3 + xy(x)^2 - 2\right)}$$

✓ **Mathematica** : cpu = 0.332074 (sec), leaf count = 42

$$\text{Solve}\left[\frac{1}{64}\left(-4y(x)^2 + 4y(x) - \frac{16}{2xy(x)+x} - 2\log(8y(x)+4) + 3\right) = c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.204 (sec), leaf count = 42

$$\left\{y(x) = \frac{\mathrm{e}^{RootOf\left(x\left(\mathrm{e}^{\_Z}\right)^3 - 4\left(\mathrm{e}^{\_Z}\right)^2 x + 8\_C1\, x\mathrm{e}^{\_Z} + 2\_Z\,\mathrm{e}^{\_Z} x + 3\,\mathrm{e}^{\_Z} x + 16\right)}}{2} - \frac{1}{2}\right\}$$

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 = 0.525318 (sec), leaf count = 105

$$\left\{\left\{y(x) \to -\frac{a^2}{4} - \frac{ax}{2} - \frac{2c_1x^3}{3} + c_1x^2 + \left(2c_1 - \frac{2x^3}{3} + x^2 - 2x\right)\log(x+1) - 2c_1x + c_1^2 + \frac{x^6}{9} - \frac{x^5}{3} + \frac{11x}{12}\right.\right.$$

✓ **Maple** : cpu = 0.428 (sec), leaf count = 43

$$\left\{\_C1 + \frac{2\,x^3}{3} - x^2 + 2\,x - 2\,\ln(1+x) - \sqrt{x^2+2\,ax+a^2+4\,y(x)} = 0\right\}$$

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 = 300.01 (sec), leaf count = 0 , timed out

`$Aborted`

✗ **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)^
```

2.734 ODE No. 734

$$y'(x) = \frac{y(x)\left(x^3 - x\log(y(x)) - \log(y(x))\right)}{x+1}$$

✓ **Mathematica** : cpu = 0.126356 (sec), leaf count = 37

$$\left\{\left\{y(x) \to \exp\left(-c_1 e^{-x} - e^{-x-1}\text{Ei}(x+1) + x^2 - 3x + 4\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.168 (sec), leaf count = 39

$$\left\{y(x) = \frac{e^{x^2} e^4}{(e^x)^3} e^{-\frac{\_C1}{e^x}} e^{\frac{Ei(1,-1-x)}{e^x e}}\right\}$$

2.735 ODE No. 735

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

✗ **Mathematica** : cpu = 299.999 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.082 (sec), leaf count = 78

$$\left\{y(x) = \frac{71\, RootOf\left(-82944 \int^{\_Z} (5041\,\_a^3 - 27648\,\_a + 27648)^{-1} d\_a - 16\ln(x) + 3\,\_C\right.}{(142\ln(x) - 71)\, RootOf\left(-82944 \int^{\_Z} (5041\,\_a^3 - 27648\,\_a + 27648)^{-1} d\_a - 16\ln(x) + 3\,\_\right.}\right.$$

2.736 ODE No. 736

$$y'(x) = \frac{x^4 - 2x^2y(x) + 2x^2 + y(x)^2 + 2x - 1}{x+1}$$

✓ **Mathematica** : cpu = 0.113672 (sec), leaf count = 30

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

✓ **Maple** : cpu = 0.183 (sec), leaf count = 43

$$\left\{y(x) = \frac{\_C1\,(x^4 + 2\,x^3 - x^2 - 2\,x - 2) + x^2 + 1}{1 + (x^2 + 2\,x)\,\_C1}\right\}$$

2.737 ODE No. 737

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

✓ **Mathematica** : cpu = 0.0371284 (sec), leaf count = 36

$$\left\{\left\{y(x) \to \frac{1}{2}\left(W\left(-e^{c_1 + \frac{4x^3}{3} - 2x^2 - 1}\right) + 1\right) + x^2\right\}\right\}$$

✓ **Maple** : cpu = 0.107 (sec), leaf count = 29

$$\left\{y(x) = x^2 + \frac{1}{2} lambertW\left(-2 \frac{e^{4/3\,x^3}\_C1\, e^{-1}}{\left(e^{x^2}\right)^2}\right) + \frac{1}{2}\right\}$$

2.738 ODE No. 738

$$y'(x) = \frac{2a}{32a^3 - 16a^2xy(x)^2 + 2ax^2y(x)^4 - x^2y(x)}$$

✓ **Mathematica** : cpu = 0.561394 (sec), leaf count = 1200

$$\left\{\left\{y(x) \to \frac{-2(4a + e^{c_1}) + \frac{2\sqrt[3]{2304x^2a^4 - 64x^3a^3 + 576e^{c_1}x^2a^3 - 48e^{c_1}x^3a^2 - 216x^3a^2 - 12e^{2c_1}x^3a - e^{3c_1}x^3 + \sqrt{x^3\left(x\left(-2304a^4 - 64(9e\right.\right.}}}{x}}{}\right.\right.$$

✓ **Maple** : cpu = 0.816 (sec), leaf count = 1054

$$\left\{y(x) = \frac{1}{24\_C1\, ax}\left(-2\,x\sqrt[3]{-216\_C1^3a^2x^3 + 576\_C1^2a^3x^2 + 12\,a\_C1\,x^2\sqrt{\frac{(324\_C1^4a^2 + 3\_C1)\,x}{}}}\right.\right.$$

2.739 ODE No. 739

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

✓ **Mathematica** : cpu = 0.247033 (sec), leaf count = 34

$$\text{Solve}\left[\frac{1}{8}\left(-2y(x)-\frac{4}{2xy(x)+x}+\log(4y(x)+2)-1\right)=c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.199 (sec), leaf count = 35

$$\left\{y(x)=\frac{e^{RootOf\left(\left(e^{-}Z\right)^2 x+2\_C1\, xe^{-}Z-\_Z\, e^{-}Z x-e^{-}Z x+4\right)}}{2}-\frac{1}{2}\right\}$$

2.740 ODE No. 740

$$y'(x) = \frac{x^4-2x^2y(x)^2+y(x)^4+x}{y(x)}$$

✓ **Mathematica** : cpu = 0.0702624 (sec), leaf count = 74

$$\left\{\left\{y(x)\to-\frac{\sqrt{2c_1x^2+2x^3-1}}{\sqrt{2}\sqrt{c_1+x}}\right\},\left\{y(x)\to\frac{\sqrt{2c_1x^2+2x^3-1}}{\sqrt{2}\sqrt{c_1+x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.111 (sec), leaf count = 72

$$\left\{y(x)=\frac{\sqrt{2}}{2\_C1+2\,x}\sqrt{(\_C1+x)\,(2\_C1\,x^2+2\,x^3-1)}, y(x)=-\frac{\sqrt{2}}{2\_C1+2\,x}\sqrt{(\_C1+x)\,(2\_C1\,x^2$$

2.741 ODE No. 741

$$y'(x) = \frac{x(ay(x)^2+bx^2)^3}{a^{5/2}y(x)\,(ay(x)^2+a+bx^2)}$$

✓ **Mathematica** : cpu = 3.67628 (sec), leaf count = 172

$$\text{Solve}\Big[x^2 = a^{3/2}\text{RootSum}\Big[\#1^3b^3+3\#1^2ab^2y(x)^2+\#1a^{3/2}b^2+3\#1a^2by(x)^4+a^{5/2}by(x)^2+a^{5/2}b+a^3y($$

✓ **Maple** : cpu = 1.049 (sec), leaf count = 246

$$\left\{\int_{\_b}^{x}\frac{\left(\_a^2b+a(y(x))^2\right)^3\_a}{a^3}\left(b\left((y(x))^2+1\right)a^{\frac{5}{2}}+a^{\frac{3}{2}}b^2\_a^2+\left(\_a^2b+a(y(x))^2\right)^3\right)^{-1}\mathrm{d}\_a+\int^{y(x)}1\left(\left((-\right.\right.$$

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 = 5.80925 (sec), leaf count = 221

$$\left\{\left\{y(x)\to-\sec^{-1}\left(\frac{-\sqrt{2c_1\log(x+1)+c_1^2-x^2+\log^2(x+1)+1}+c_1x+x\log(x+1)}{x^2-1}\right)\right\},\left\{y(x)\to\right.\right.$$

✓ **Maple** : cpu = 1.676 (sec), leaf count = 239

$$\left\{y(x)=\arctan\left(\frac{1}{\_C1^2-2\_C1\ \ln(1+x)+(\ln(1+x))^2+1}\left((-\ln(1+x)+\_C1)\sqrt{(\ln(1+x))^2-2}\right.\right.\right.$$

2.743 ODE No. 743

$$y'(x)=-\frac{i(x^4+8x^2y(x)^2+16y(x)^4+8ix)}{32y(x)}$$

✗ **Mathematica** : cpu = 47.4469 (sec), leaf count = 0 , could not solve

```
DSolve[Derivative[1][y][x] == ((-I/32)*((8*I)*x + x^4 + 8*x^2*y[x]^2 + 16*y[x]^4))/y[x
```

✓ **Maple** : cpu = 0.456 (sec), leaf count = 296

$$\left\{y(x)=\sqrt{2}\sqrt{\left(\left(i\sqrt{3}+1\right)\_C1\ \mathrm{Ai}^{(1)}\left(\frac{\left(-\sqrt{3}+i\right)x}{2}\right)+\left(i\sqrt{3}+1\right)\mathrm{Bi}^{(1)}\left(\frac{\left(-\sqrt{3}+i\right)x}{2}\right)-\frac{x^2}{2}\left(\mathrm{Ai}\left(\right.\right.\right.}\right.$$

2.744 ODE No. 744

$$y'(x) = \frac{x}{x^4 + 2x^2y(x)^2 + y(x)^4 - y(x)}$$

✓ **Mathematica** : cpu = 0.0559614 (sec), leaf count = 534

$$\left\{\left\{y(x) \to \frac{\sqrt[3]{144c_1x^2 + 2\sqrt{(12x^2 - 4c_1^2)^3 + 4(36c_1x^2 + 4c_1^3 - 27)^2} + 16c_1^3 - 108}}{6\sqrt[3]{2}} + \frac{}{3\sqrt[3]{36c_1x^2 + 3\sqrt{3}\sqrt{}}}\right.\right.$$

✓ **Maple** : cpu = 0.216 (sec), leaf count = 621

$$\left\{y(x) = -\frac{1}{12}\left(2\_C1\sqrt[3]{-36\_C1\,x^2 - 54 - \_C1^3 + 6\sqrt{48\,x^6 + 24\,x^4\_C1^2 + \left(3\_C1^4 + 108\_C1\right)x^2}}\right.\right.$$

2.745 ODE No. 745

$$y'(x) = \frac{(y(x)\log(x) - 1)^3}{x(-y(x) + y(x)\log(x) - 1)}$$

✗ **Mathematica** : cpu = 299.998 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.08 (sec), leaf count = 78

$$\left\{y(x) = \frac{47\,RootOf\left(-27783\int^{\_Z}(2209\_a^3 - 9261\_a + 9261)^{-1}d\_a - 7\ln(x) + 3\_C1\right)}{(47\ln(x) - 47)\,RootOf\left(-27783\int^{\_Z}(2209\_a^3 - 9261\_a + 9261)^{-1}d\_a - 7\ln(x) + 3\_C1\right.}\right.$$

2.746 ODE No. 746

$$y'(x) = -\frac{i(x^4 + 2x^2y(x)^2 + y(x)^4 + ix)}{y(x)}$$

✗ **Mathematica** : cpu = 46.0786 (sec), leaf count = 0 , could not solve

```
DSolve[Derivative[1][y][x] == ((-I)*(I*x + x^4 + 2*x^2*y[x]^2 + y[x]^4))/y[x], y[x], x
```

✓ **Maple** : cpu = 0.386 (sec), leaf count = 232

$$\left\{y(x) = \frac{\sqrt{2}}{2\,\mathrm{Ai}\left(-\sqrt[3]{-8}\,ix\right)\_C1 + 2\,\mathrm{Bi}\left(-\sqrt[3]{-8}\,ix\right)}\sqrt{\left(\left(i\sqrt{3}+1\right)\_C1\,\mathrm{Ai}^{(1)}\left(-\sqrt[3]{-8}\,ix\right) + \left(i\sqrt{3}+1\right)\mathrm{Bi}^{(1}\right.}\right.$$

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 = 300.018 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.37 (sec), leaf count = 75

$$\left\{y(x) = 1\mathrm{e}^{\int \frac{-x\ln(x)-x\ln(2)-\tan(x)}{x\tan(x)}\,\mathrm{d}x}\left(\int -\frac{x(\ln(2)+\ln(x))}{\tan(x)}\mathrm{e}^{\int \frac{-x\ln(x)-x\ln(2)-\tan(x)}{x\tan(x)}\,\mathrm{d}x}\,\mathrm{d}x + \_C1\right)^{-1}\right\}$$

2.748 ODE No. 748

$$y'(x) = \frac{y(x)(y(x)+x)}{x\left(y(x)^3+x\right)}$$

✓ **Mathematica** : cpu = 0.366453 (sec), leaf count = 286

$$\left\{\left\{y(x) \to \frac{2\sqrt[3]{2}(c_1+\log(x))}{\sqrt[3]{\sqrt{2916x^2-864\left(c_1+\log(x)\right)^3}+54x}} + \frac{\sqrt[3]{\frac{1}{6}\sqrt{2916x^2-864\left(c_1+\log(x)\right)^3}+9x}}{3^{2/3}}\right\}, \left\{y(x)\right.\right.$$

✓ **Maple** : cpu = 0.117 (sec), leaf count = 404

$$\left\{y(x) = -\frac{1}{6}\left(\left(i\left(27\,x + 3\sqrt{-24\_C1^3 - 72\_C1^2\ln(x) - 72\_C1\,(\ln(x))^2 - 24\,(\ln(x))^3 + 81\,x^2}\right)^{\frac{2}{3}} -\right.\right.\right.$$

2.749 ODE No. 749

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

✓ **Mathematica** : cpu = 0.113753 (sec), leaf count = 102

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

✓ **Maple** : cpu = 0.155 (sec), leaf count = 192

$$\left\{y(x)=1\sqrt{\left(\_C1\,\mathrm{e}^{-\frac{x^2\left(x^2-2\right)}{2}}+\mathrm{e}^{-\frac{x^2\left(x^2+2\right)}{2}}\right)\left(\left(x^2+1\right)\mathrm{e}^{-\frac{x^2\left(x^2+2\right)}{2}}+\_C1\,\left(x^2-1\right)\mathrm{e}^{-\frac{x^2\left(x^2-2\right)}{2}}\right)\left(\_C1\,\mathrm{e}^{-\frac{x^2}{}}\right.}\right.$$

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 = 0.398561 (sec), leaf count = 68

$$\left\{\left\{y(x)\to-\frac{\sqrt{x}\sqrt{W\left(\frac{6e^{2(c_1+x)}}{x}\right)}}{\sqrt{6}}\right\},\left\{y(x)\to\frac{\sqrt{x}\sqrt{W\left(\frac{6e^{2(c_1+x)}}{x}\right)}}{\sqrt{6}}\right\}\right\}$$

✓ **Maple** : cpu = 0.359 (sec), leaf count = 49

$$\left\{\left((y(x))^{-2}+6\,x^{-1}\right)^{-1}=\frac{x}{54}\left(\mathrm{e}^{\mathit{RootOf}\left(-\mathrm{e}^{\_Z}\ln\left(\frac{\left(\mathrm{e}^{\_Z}+9\right)x}{2}\right)+3\,\_C1\,\mathrm{e}^{\_Z}+\_Z\,\mathrm{e}^{\_Z}+2\,\mathrm{e}^{\_Z}x+9\right)}+9\right)\right\}$$

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 = 0.0855551 (sec), leaf count = 29

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

✓ **Maple** : cpu = 0.117 (sec), leaf count = 26

$$\left\{y(x) = \frac{(1+x)^x \,\mathrm{e}^{\_C1\,x}}{\mathrm{e}^{x^2}}\mathrm{e}^{\frac{x^3}{2}}\right\}$$

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 = 33.5384 (sec), leaf count = 0 , could not solve

```
DSolve[Derivative[1][y][x] == (Cos[y[x]]*(-1 - x + x^3*Cos[y[x]]))/((1 + x)*(-
1 + x*Sin[y[x]])), y[x], x]
```

✓ **Maple** : cpu = 1.475 (sec), leaf count = 723

$$\left\{y(x) = \arctan\left(\frac{1}{36\,(\ln(1+x))^2 + \left(-24\,x^3 + 36\,x^2 - 72\_C1 - 72\,x\right)\ln(1+x) + 4\,x^6 - 12\,x^5 + 33\,x^4 +\right.\right.$$

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 = 0.124865 (sec), leaf count = 41

$$\left\{\left\{y(x) \to \exp\left(\frac{12x}{12c_1 - 3x^4 + 4x^3 - 6x^2 + 12x - 12\log(x+1)}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.17 (sec), leaf count = 38

$$\left\{y(x) = \mathrm{e}^{-12\,\frac{x}{3\,x^4 - 4\,x^3 + 6\,x^2 + 12\,\ln(1+x) - 12\_C1 - 12\,x}}\right\}$$

2.754 ODE No. 754

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

✓ **Mathematica** : cpu = 0.0347119 (sec), leaf count = 47

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

✓ **Maple** : cpu = 0.027 (sec), leaf count = 26

$$\left\{y(x) = RootOf\left(-\int^{\_Z} \left(\_a^3 + \_a^2 + 1\right)^{-1} d\_a + x + \_C1\right) x\right\}$$

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 = 0.213749 (sec), leaf count = 2213

$$\left\{\left\{y(x) \to \frac{1}{3}\left(2\left(x + e^{c_1} + 2e^{2c_1}\right) - \sqrt[3]{x^3 + 3e^{c_1}x^2 - 3e^{2c_1}(4x-1)x - 96e^{5c_1} - 64e^{6c_1} + 6e^{4c_1}(8x-5) +}\right.\right.\right.$$

✓ **Maple** : cpu = 0.115 (sec), leaf count = 44

$$\left\{2\,\frac{\sqrt{y(x)}}{y(x) - x} + (y(x) - x)^{-1} - 2\,\frac{x}{(y(x) - x)\sqrt{y(x)}} - \_C1 = 0\right\}$$

2.756 ODE No. 756

$$y'(x) = \frac{x^6 + 2x^3 y(x) + x^2 y(x)^2 + y(x)^3}{x^4}$$

✓ **Mathematica** : cpu = 0.127242 (sec), leaf count = 93

$$\text{Solve}\left[87\text{RootSum}\left[-29\#1^3 + 3\sqrt[3]{29}\#1 - 29\&, \frac{\log\left(\frac{x^2+3y(x)}{\sqrt[3]{29}\sqrt[3]{\frac{1}{x^6}}x^4} - \#1\right)}{\sqrt[3]{29} - 29\#1^2}\&\right] + 9c_1 + 29^{2/3}\left(\frac{1}{x^6}\right)^{2/3} x^5 = 0,$$

✓ **Maple** : cpu = 0.042 (sec), leaf count = 37

$$\left\{y(x) = \frac{\left(-3 + 29\,RootOf\left(-81\int^{\_Z}(841\_a^3 - 27\_a + 27)^{-1}d\_a + x + 3\_C1\right)\right)x^2}{9}\right\}$$

2.757 ODE No. 757

$$y'(x) = \frac{x^3 + 2x^2 - 4xy(x) - 4x - 8}{2x^2 - 8y(x) + 4x - 8}$$

✓ **Mathematica** : cpu = 0.0319904 (sec), leaf count = 33

$$\left\{\left\{y(x) \to \frac{1}{4}\left(8W\left(-e^{c_1 - \frac{x}{4} - 1}\right) + x^2 + 2x + 4\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.085 (sec), leaf count = 26

$$\left\{y(x) = \frac{x^2}{4} + 2\,lambertW\left(1/2\_C1\,e^{-x/4}e^{-1/2}\right) + \frac{x}{2} + 1\right\}$$

2.758 ODE No. 758

$$y'(x) = \frac{y(x)\left(x^3 y(x) + 2x + 2\right)}{(x+1)(\log(y(x)) + 2x - 1)}$$

✓ **Mathematica** : cpu = 1.09633 (sec), leaf count = 459

$$\left\{\left\{y(x) \to \frac{6W\left(-\frac{1}{6}\sqrt[6]{e^{-12x}\left(6c_1 + 2x^3 - 3x^2 + 6x - 6\log(x+1)\right)^6}\right)}{6c_1 + 2x^3 - 3x^2 + 6x - 6\log(x+1)}\right\}, \left\{y(x) \to \frac{6W\left(\frac{1}{6}\sqrt[6]{e^{-12x}\left(6c_1 + \right.}\right.}{6c_1 + 2x^3 -}\right.$$

✓ **Maple** : cpu = 0.25 (sec), leaf count = 41

$$\left\{y(x) = e^{-\mathit{lambertW}\left(-\frac{\left(-2x^3+3x^2+6\ln(1+x)+6\_C1-6x\right)e^{-2x}}{6}\right)-2x}\right\}$$

2.759 ODE No. 759

$$y'(x) = -\frac{ix(x^8 + 18x^4 y(x)^2 + 54ix^2 + 81y(x)^4)}{243y(x)}$$

✗ **Mathematica** : cpu = 40.9393 (sec), leaf count = 0 , could not solve

```
DSolve[Derivative[1][y][x] == ((-I/243)*x*((54*I)*x^2 + x^8 + 18*x^4*y[x]^2 + 81*y[x]^
```

✓ **Maple** : cpu = 0.581 (sec), leaf count = 305

$$\left\{y(x) = -\frac{\sqrt{3}}{3x}\sqrt{\left(J_{\frac{1}{3}}\left(\left(\frac{2}{27} - \frac{2i}{27}\right)\sqrt{6}x^3\right)\_C1 + Y_{\frac{1}{3}}\left(\left(\frac{2}{27} - \frac{2i}{27}\right)\sqrt{6}x^3\right)\right)\left(-9\left(1/27\,x^6 + i\right)\_C1\, J_{1/}\right.}\right.$$

2.760 ODE No. 760

$$y'(x) = \frac{\left(xy(x)^2 + 1\right)^3}{x^4 y(x)\left(xy(x)^2 + x + 1\right)}$$

✓ **Mathematica** : cpu = 1.57349 (sec), leaf count = 85

$$\text{Solve}\left[5\left(c_1 + \frac{1}{x}\right) + 2\log\left(xy(x)^2 - x + 1\right) + \tan^{-1}\left(2xy(x)^4 + 2(x+1)y(x)^2 + x + 1\right) = \log\left(2x^2 y(x)^4 + \right.\right.$$

✓ **Maple** : cpu = 1.796 (sec), leaf count = 137

$$\left\{\frac{(-1+y(x))\,(1+y(x))\,\left(2\,\ln\left(x(y(x))^2-x+1\right)x-\ln\left(2\,x^2(y(x))^4+\left(2\,x^2+4\,x\right)(y(x))^2+x^2+2\,x+2\right.\right.}{10\,x}\right.$$

2.761 ODE No. 761

$$y'(x)=\frac{-x^3+4x^2-4xy(x)-4x+8}{2x^2+8y(x)-8x+8}$$

✓ **Mathematica** : cpu = 0.0291189 (sec), leaf count = 26

$$\left\{\left\{y(x)\to W\left(-e^{c_1-x-1}\right)-\frac{x^2}{4}+x\right\}\right\}$$

✓ **Maple** : cpu = 0.074 (sec), leaf count = 18

$$\left\{y(x)=-\frac{x^2}{4}+\mathit{lambertW}\left(\frac{\_C1}{e^x}\right)+x\right\}$$

2.762 ODE No. 762

$$y'(x)=-\frac{y(x)(x\log(y(x))+\log(y(x))-x)}{x(x+1)}$$

✓ **Mathematica** : cpu = 0.0675246 (sec), leaf count = 26

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

✓ **Maple** : cpu = 0.133 (sec), leaf count = 22

$$\left\{y(x)=\frac{e}{\sqrt[x]{1+x}}e^{-\frac{\_C1}{x}}\right\}$$

2.763 ODE No. 763

$$y'(x) = \frac{y(x)(x\log(y(x)) + \log(y(x)) + x)}{x(x+1)}$$

✓ **Mathematica** : cpu = 0.0663589 (sec), leaf count = 21

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

✓ **Maple** : cpu = 0.12 (sec), leaf count = 14

$$\left\{y(x) = \left(\frac{\_C1\, x}{1+x}\right)^x\right\}$$

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 = 0.104082 (sec), leaf count = 46

$$\left\{\left\{y(x) \to (x+1)^{\frac{1}{x}} \exp\left(-\frac{12c_1 - 3x^4 + 4x^3 - 6x^2 + 12x + 25}{12x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.148 (sec), leaf count = 36

$$\left\{y(x) = \mathrm{e}^{\frac{x^3}{4}} \mathrm{e}^{-\frac{x^2}{3}} \mathrm{e}^{\frac{x}{2}} \sqrt[x]{1+x}\,\mathrm{e}^{\frac{-\_C1}{x}} \mathrm{e}^{-1}\right\}$$

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 = 300.002 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.269 (sec), leaf count = 106

$$\left\{y(x) = \frac{\mathrm{e}^{dilog(1+x)} x^{\ln(1+x)}}{x\mathrm{e}^{dilog(x)}} \mathrm{e}^{-\frac{(\ln(x))^2}{2}} \left(\int -\frac{\mathrm{e}^{dilog(1+x)} x^{\ln(1+x)}}{x\mathrm{e}^{dilog(x)}} \mathrm{e}^{-\frac{(\ln(x))^2}{2}} \ln\left(\frac{(x-1)(1+x)}{x}\right) \left(x^{\ln\left(\frac{(x-1)(1+x)}{x}\right)}\right)^{-}\right.\right.$$

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 = 299.998 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.182 (sec), leaf count = 89

$$\left\{y(x) = 1\mathrm{e}^{\int \frac{1}{x\ln(x)}\left(-x\ln\left(\frac{(x-1)(1+x)}{x}\right)-\ln(x)\right)\mathrm{d}x}\left(\int -\frac{x}{\ln(x)}\mathrm{e}^{\int \frac{1}{x\ln(x)}\left(-x\ln\left(\frac{(x-1)(1+x)}{x}\right)-\ln(x)\right)\mathrm{d}x}\ln\left(\frac{(x-1)(1+x)}{x}\right)\right.\right.$$

2.767 ODE No. 767

$$y'(x) = \frac{-x^3 + 2x^2 - 8xy(x) - 8x + 32}{4x^2 + 32y(x) - 8x + 32}$$

✓ **Mathematica** : cpu = 0.0309524 (sec), leaf count = 35

$$\left\{\left\{y(x) \to 4W\left(-e^{c_1 - \frac{x}{16} - 1}\right) - \frac{x^2}{8} + \frac{x}{4} + 3\right\}\right\}$$

✓ **Maple** : cpu = 0.085 (sec), leaf count = 26

$$\left\{y(x) = -\frac{x^2}{8} + 4\,\mathit{lambertW}\left(1/4\_C1\,\mathrm{e}^{-x/16}\mathrm{e}^{-3/4}\right) + \frac{x}{4} + 3\right\}$$

2.768 ODE No. 768

$$y'(x) = \frac{y(x)(y(x)+1)}{x(xy(x) - y(x) - 1)}$$

✓ **Mathematica** : cpu = 1.60318 (sec), leaf count = 66

$$\mathrm{Solve}\left[\frac{2^{2/3}\left(xy(x)\left(-\log\left(\frac{xy(x)}{(x-1)y(x)-1}\right) + \log\left(\frac{y(x)+1}{-xy(x)+y(x)+1}\right) + \log(x) + 1\right) - 1\right)}{9xy(x)} = c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.104 (sec), leaf count = 26

$$\left\{y(x) = -\left(x\mathrm{lambertW}\left(\frac{1}{x\mathrm{e}^{x^{-1}}\_C1}\right)+1\right)^{-1}\right\}$$

2.769 ODE No. 769

$$y'(x) = -\frac{ix(x^8+8x^4y(x)^2+16ix^2+16y(x)^4)}{32y(x)}$$

✗ **Mathematica** : cpu = 42.9508 (sec), leaf count = 0 , could not solve

```
DSolve[Derivative[1][y][x] == ((-I/32)*x*((16*I)*x^2 + x^8 + 8*x^4*y[x]^2 + 16*y[x]^4)
```

✓ **Maple** : cpu = 0.47 (sec), leaf count = 251

$$\left\{y(x) = -\frac{\sqrt{4}}{2\,x}\sqrt{\left(-2\,\left(1/8\,x^6+i\right)\_C1\;J_{1/3}\left(\left(1/3-i/3\right)x^3\right)+\left(-\frac{x^6}{4}-2\,i\right)Y_{\frac{1}{3}}\left(\left(\frac{1}{3}-\frac{i}{3}\right)x^3\right)+(1+i\right.}$$

2.770 ODE No. 770

$$y'(x) = \frac{2y(x)^6}{32x^2y(x)^4+y(x)^3+16xy(x)^2+2}$$

✓ **Mathematica** : cpu = 0.14317 (sec), leaf count = 687

$$\left\{\left\{y(x)\to\frac{2\sqrt[3]{2}\sqrt[3]{4608c_1^2x^2+3\sqrt{3}\sqrt{(1-16c_1x)^2\left(2048c_1^2x^2+64c_1\left(4c_1^3-9\right)x-16c_1^3+4096x^3+27\right)}-}}{}\right.\right.$$

✓ **Maple** : cpu = 0.147 (sec), leaf count = 1105

$$\left\{y(x) = \frac{1}{96\,x+6\,\_C1}\left(32\,\_C1\,x\sqrt[3]{96\,\sqrt{3}\left(\_C1/16+x\right)\sqrt{\left(4096\,x^3+27\right)\_C1^4+576\,x\,\_C1^3+2048\,x\right.}}\right.\right.$$

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 = 0.0380669 (sec), leaf count = 48

$$\left\{\left\{y(x) \to -\frac{abx^2 + 8W\left(-e^{-\frac{b^2x}{4}+c_1-1}\right) + 2b^2x + 4b + 8}{4b}\right\}\right\}$$

✓ **Maple** : cpu = 0.148 (sec), leaf count = 84

$$\left\{y(x) = \frac{1}{4\,b}\left(-ax^2b - 2\,b^2x - 4\,b + 4\,e^{1/4\,\frac{1}{a}\left(-4\,lambertW\left(-1/2\,e^{-1/4\,b^2x}e^{-1/2\,\frac{\_C1\,b^2}{a}}e^{-b/2}e^{-1}\right)a+(-b^2x-2\,b-4)a-2\_C1\,b\right.}\right.\right.$$

2.772 ODE No. 772

$$y'(x) = \frac{y(x)\log(y(x))(x\log(y(x)) + x + 1)}{x(x+1)}$$

✓ **Mathematica** : cpu = 0.0753505 (sec), leaf count = 21

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

✓ **Maple** : cpu = 0.132 (sec), leaf count = 18

$$\left\{y(x) = e^{\frac{x}{\ln(1+x) + \_C1 - x}}\right\}$$

2.773 ODE No. 773

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

✓ **Mathematica** : cpu = 0.0913292 (sec), leaf count = 59

$$\text{Solve}\left[\frac{1}{2}\log\left(\frac{x^2 + xy(x) + y(x)^2}{x^2}\right) + \frac{\tan^{-1}\left(\frac{2y(x)+x}{\sqrt{3}x}\right)}{\sqrt{3}} + \log(x) = c_1 + \log(1-x), y(x)\right]$$

✓ **Maple** : cpu = 0.315 (sec), leaf count = 48

$$\left\{y(x)=-\frac{x}{2}+\frac{\sqrt{3}x}{2}\tan\left(RootOf\left(-\sqrt{3}\ln\left(\frac{3\,x^2\left((\tan(\_Z))^2+1\right)}{4\,(x-1)^2}\right)+2\sqrt{3}\_C1-2\_Z\right)\right)\right\}$$

2.774 ODE No. 774

$$y'(x)=\frac{-2ax^2-x^3-4xy(x)-4x+8}{4ax+2x^2+8y(x)+8}$$

✓ **Mathematica** : cpu = 0.0360075 (sec), leaf count = 46

$$\left\{\left\{y(x)\to-\frac{8W\left(-e^{-\frac{a^2x}{4}+c_1-1}\right)+2a^2x+a(x^2+4)+8}{4a}\right\}\right\}$$

✓ **Maple** : cpu = 0.131 (sec), leaf count = 51

$$\left\{y(x)=\frac{1}{4\,a}\left(-2\,a^2x-ax^2-8\,lambertW\left(-1/2\,e^{-1/4\,a^2x}e^{-a/2}e^{-1}e^{1/4\_C1\,a^2}\right)-4\,a-8\right)\right\}$$

2.775 ODE No. 775

$$y'(x)=\frac{-y(x)+\sqrt{y(x)}+x}{-y(x)+\sqrt{y(x)}+x+1}$$

✓ **Mathematica** : cpu = 0.11259 (sec), leaf count = 943

$$\{\{y(x)\to\text{Root}\left[x^6-2e^{3c_1}x^3+e^{6c_1}+\#1^6+(-6x-6)\#1^5+\left(15x^2+24x+9\right)\#1^4+\left(-20x^3-36x^2-\right.\right.$$

✓ **Maple** : cpu = 0.105 (sec), leaf count = 44

$$\left\{-2\,(y(x))^{3/2}+(y(x))^3+(-3\,x-3)\,(y(x))^2+\left(3\,x^2+3\,x\right)y(x)-x^3-\_C1=0\right\}$$

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 = 300.046 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.228 (sec), leaf count = 96

$$\left\{y(x)=1\mathrm{e}^{\int\frac{1}{x\ln(x^{-1})}\left(-\ln\left(\frac{x^2+1}{x}\right)x-\ln(x^{-1})\right)\,\mathrm{d}x}\left(\int-\frac{x}{\ln(x^{-1})}\mathrm{e}^{\int\frac{1}{x\ln(x^{-1})}\left(-\ln\left(\frac{x^2+1}{x}\right)x-\ln(x^{-1})\right)\,\mathrm{d}x}\ln\left(\frac{x^2+1}{x}\right)\mathrm{d}x+\right.\right.$$

2.777 ODE No. 777

$$y'(x)=\frac{y(x)(y(x)+1)}{x\left(xy(x)^4-y(x)-1\right)}$$

✓ **Mathematica** : cpu = 0.155963 (sec), leaf count = 34

$$\mathrm{Solve}\left[y(x)+\frac{3}{2}=c_1+\frac{y(x)^2}{2}+\frac{1}{xy(x)}+\log(y(x)+1),y(x)\right]$$

✓ **Maple** : cpu = 0.226 (sec), leaf count = 51

$$\left\{y(x)=\mathrm{e}^{RootOf\left(x\left(\mathrm{e}^{\_Z}\right)^3-5\left(\mathrm{e}^{\_Z}\right)^2x+2\_C1\,x\mathrm{e}^{\_Z}+2\_Z\,\mathrm{e}^{\_Z}x+7\,\mathrm{e}^{\_Z}x-2\_C1\,x-2\,x\_Z-3\,x+2\right)}-1\right\}$$

2.778 ODE No. 778

$$y'(x)=\frac{x^9y(x)^3+x^6y(x)^2-3x^2y(x)+1}{x^3}$$

✓ **Mathematica** : cpu = 0.112769 (sec), leaf count = 95

$$\mathrm{Solve}\left[-\frac{29}{3}\mathrm{RootSum}\left[-29\#1^3+3\sqrt[3]{29}\#1-29\&,\frac{\log\left(\frac{3x^6y(x)+x^3}{\sqrt[3]{29}\sqrt[3]{x^9}}-\#1\right)}{\sqrt[3]{29}-29\#1^2}\&\right]=c_1+\frac{29^{2/3}\left(x^9\right)^{2/3}}{9x^5},y(x)\right]$$

✓ **Maple** : cpu = 0.04 (sec), leaf count = 37

$$\left\{ y(x) = \frac{-3 + 29\, RootOf\left(-81 \int^{\_Z} (841\_a^3 - 27\_a + 27)^{-1} d\_a + x + 3\_C1\right)}{9\, x^3} \right\}$$

2.779 ODE No. 779

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

✓ **Mathematica** : cpu = 0.0533349 (sec), leaf count = 51

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

✓ **Maple** : cpu = 0.122 (sec), leaf count = 50

$$\left\{ \frac{1}{2}\ln\left(\frac{y(x)+x}{x}\right) - \frac{1}{4}\ln\left(\frac{(y(x))^2 + x^2}{x^2}\right) + \frac{1}{2}\arctan\left(\frac{y(x)}{x}\right) - \ln(x-1) + \ln(x) - \_C1 = 0 \right\}$$

2.780 ODE No. 780

$$y'(x) = \frac{x\sqrt{x^2 + y(x)^2} + x y(x) + y(x)}{x(x+1)}$$

✓ **Mathematica** : cpu = 0.0300308 (sec), leaf count = 15

$$\{\{y(x) \to x \sinh(c_1 + \log(x+1))\}\}$$

✓ **Maple** : cpu = 0.486 (sec), leaf count = 27

$$\left\{ \_C1 + \frac{1}{x(1+x)}\left(\sqrt{(y(x))^2 + x^2} + y(x)\right) = 0 \right\}$$

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 = 0.616553 (sec), leaf count = 82

$$\left\{\left\{y(x) \to -\frac{\sqrt{x}\sqrt{W\left(6xe^{2c_1+\frac{2x^3}{3}+x^2}\right)}}{\sqrt{6}}\right\},\left\{y(x) \to \frac{\sqrt{x}\sqrt{W\left(6xe^{2c_1+\frac{2x^3}{3}+x^2}\right)}}{\sqrt{6}}\right\}\right\}$$

✓ **Maple** : cpu = 0.436 (sec), leaf count = 61

$$\left\{\left((y(x))^{-2} + 6\,x^{-1}\right)^{-1} = \frac{x}{54}\left(e^{RootOf\left(2\,x^3 e^{\_Z}+3\,x^2 e^{\_Z}-3\,e^{\_Z}\ln\left(1/2\,\frac{e^{\_Z}+9}{x}\right)+9\_C1\,e^{\_Z}+3\_Z\,e^{\_Z}+27\right)} + 9\right)\right\}$$

2.782 ODE No. 782

$$y'(x) = \frac{y(x)\coth\left(\frac{1}{x}\right)\left(x^2 y(x)\log\left(\frac{x^2+1}{x}\right) - x\log\left(\frac{x^2+1}{x}\right) - \tanh\left(\frac{1}{x}\right)\right)}{x}$$

✗ **Mathematica** : cpu = 299.999 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 1.455 (sec), leaf count = 96

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

2.783 ODE No. 783

$$y'(x) = -\frac{y(x)\coth(x)\left(x^2 y(x)(-\log(2x)) + x\log(2x) + \tanh(x)\right)}{x}$$

✗ **Mathematica** : cpu = 300.052 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.195 (sec), leaf count = 75

$$\left\{y(x) = 1e^{\int \frac{-x\ln(x)-x\ln(2)-\tanh(x)}{x\tanh(x)}dx}\left(\int -\frac{x(\ln(2)+\ln(x))}{\tanh(x)}e^{\int \frac{-x\ln(x)-x\ln(2)-\tanh(x)}{x\tanh(x)}dx}dx + \_C1\right)^{-1}\right\}$$

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 = 300.085 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 29.607 (sec), leaf count = 24

$$\left\{y(x) = -x - \tan\left(\_C1 - \int \frac{\ln(x)}{\sinh(x)}\, dx\right)\right\}$$

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 = 300.055 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 86.08 (sec), leaf count = 24

$$\left\{y(x) = -x - \tan\left(\_C1 - \int \frac{\sinh(x)}{\ln(x)}\, dx\right)\right\}$$

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 = 300.038 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.089 (sec), leaf count = 33

$$\left\{y(x) = \frac{x}{a}\tan\left(\sqrt{ab}\left(\_C1 + \int \frac{x\cosh(x)}{\ln(x)}\, dx\right)\right)\sqrt{ab}\right\}$$

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 = 44.4699 (sec), leaf count = 488

$$\text{Solve}\left[\frac{\left(2-\frac{x(x^2-x-1)(2x^2-2y(x)+3)}{\sqrt[3]{x^3(x^2-x-1)^3(x^2-y(x))}}\right)\left(\frac{x(x^2-x-1)(2x^2-2y(x)+3)}{\sqrt[3]{x^3(x^2-x-1)^3(x^2-y(x))}}+4\right)\left(\left(1-\frac{x(x^2-x-1)(2x^2-2y(x)+3)}{2\sqrt[3]{x^3(x^2-x-1)^3(x^2-y(x))}}\right)\log\left(\cdots\right.\right.}{18\sqrt[3]{2}\left(-\frac{(2x^2-2y(x)+3)^3}{8(x^2-y(x))^3}+\frac{3x(x^2-\cdots}{2\sqrt[3]{x^3(\cdots}}\right.}\right.$$

✓ **Maple** : cpu = 0.472 (sec), leaf count = 191

$$\left\{y(x) = 1\left(4x^2 e^{RootOf\left(8x^3 e^{\_Z} - 24x^2 e^{\_Z} - 36x^3 + 6\ln\left(\frac{2e^{\_Z}-9}{(1+x)^4}\right)e^{\_Z} + 18\_C1\, e^{\_Z} - 6\_Z\, e^{\_Z} + 24e^{\_Z}x + 108x^2 - 27\ln\left(\frac{2e^{\_Z}-9}{(1+x)^4}\right) - \cdots\right.}\right.\right.$$

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 = 300.007 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.279 (sec), leaf count = 108

$$\left\{y(x) = 1\left(e^{-\int\frac{-\ln(x-1)\sinh(1+x)-x\cosh(1+x)}{\sinh(1+x)x\ln(x-1)}\,dx}\right)^{-1}\left(\_C1 + \int -\frac{x\cosh(1+x)}{\ln(x-1)\sinh(1+x)} e^{\int\frac{-\ln(x-1)\sinh(1+x)-x\cosh(1+x)}{\sinh(1+x)x\ln(x-1)}\cdots}\right.\right.$$

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 = 300.007 (sec), leaf count = 0 , timed out

```
$Aborted
```

✗ **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)/ln(x-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 = 300.009 (sec), leaf count = 0 , timed out

```
$Aborted
```

✗ **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

$$y'(x) = \frac{\operatorname{sech}\left(\frac{1}{x-1}\right) \left(x^5 + x^4 - 2x^3 y(x) - 2x^2 y(x) + 2x^2 \cosh\left(\frac{1}{x-1}\right) + xy(x)^2 + y(x)^2 - x - 2x \cosh\left(\frac{1}{x-1}\right)\right.}{x-1}$$

✗ **Mathematica** : cpu = 300.058 (sec), leaf count = 0 , timed out

```
$Aborted
```

✓ **Maple** : cpu = 18.084 (sec), leaf count = 306

$$\left\{ y(x) = 1 \left(\left(-x^2+1\right) \left(e^{\frac{1}{\left(e^{(x-1)^{-1}}\right)^2+1} \int \frac{e^{(x-1)^{-1}}(1+x)}{\left(\left(e^{(x-1)^{-1}}\right)^2+1\right)(x-1)} dx} \right)^4 \left(e^{\frac{1}{\left(e^{(x-1)^{-1}}\right)^2+1} \int \frac{e^{(x-1)^{-1}}(1+x)}{\left(\left(e^{(x-1)^{-1}}\right)^2+1\right)(x-1)} dx e^{2(x-1)}} \right.\right.\right.$$

2.792 ODE No. 792

$$y'(x) = \frac{y(x)\operatorname{sech}\left(\frac{1}{x+1}\right)\left(x^3 y(x) + x^2 y(x) - x^2 - x - x\cosh\left(\frac{1}{x+1}\right) + \cosh\left(\frac{1}{x+1}\right)\right)}{(x-1)x}$$

✗ **Mathematica** : cpu = 316.528 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.407 (sec), leaf count = 112

$$\left\{y(x) = 1\mathrm{e}^{\int \frac{(1-x)\cosh\left((1+x)^{-1}\right)-x^2-x}{x(x-1)\cosh\left((1+x)^{-1}\right)}\,\mathrm{d}x}\left(\int -\frac{x(1+x)}{(x-1)\cosh\left((1+x)^{-1}\right)}\mathrm{e}^{\int \frac{(1-x)\cosh\left((1+x)^{-1}\right)-x^2-x}{x(x-1)\cosh\left((1+x)^{-1}\right)}\,\mathrm{d}x}\,\mathrm{d}x + \_C1\right)^{-1}\right.$$

2.793 ODE No. 793

$$y'(x) = -\frac{y(x)(xy(x)+1)}{x(xy(x)-y(x)+1)}$$

✓ **Mathematica** : cpu = 25.0813 (sec), leaf count = 399

$$\text{Solve}\left[-\frac{\sqrt[3]{-2}\left(\frac{2^{2/3}((x-1)y(x)-2)}{\sqrt[3]{-\frac{1}{(x-1)^3}}(x-1)((x-1)y(x)+1)} + (-2)^{2/3}\right)\left(\frac{-xy(x)+y(x)+2}{\sqrt[3]{2}\sqrt[3]{-\frac{1}{(x-1)^3}}(x-1)((x-1)y(x)+1)} + (-2)^{2/3}\right)\left(\left(\frac{\sqrt[3]{-1}}{\sqrt[3]{-\frac{1}{(x-1)}}}\right.\right.}{}\right.$$

✓ **Maple** : cpu = 0.142 (sec), leaf count = 32

$$\left\{y(x) = -2\,\frac{1}{x}\mathrm{e}^{-\mathit{lambertW}\left(-2\,\frac{(x-1)\left(\mathrm{e}^{\_C1}\right)^3\mathrm{e}^{-1}}{x}\right)+3\_C1-1}\right\}$$

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 = 0.114555 (sec), leaf count = 66

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

✓ **Maple** : cpu = 0.442 (sec), leaf count = 32

$$\left\{-y(x)+\int^{xy(x)}\frac{1}{\_a\,(\_a^3+\_a^2+1)}d\_a-\_C1=0\right\}$$

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 = 0.297673 (sec), leaf count = 106

$$\text{Solve}\left[57\text{RootSum}\left[-19\#1^3+6\sqrt[3]{38}\#1-19\&,\frac{\log\left(\frac{a+3y(x)+x}{\sqrt[3]{38}\sqrt[3]{\frac{1}{(a+x)^6}}(a+x)^3}-\#1\right)}{2\sqrt[3]{38}-19\#1^2}\&\right]+38^{2/3}\left(\frac{1}{(a+x)^6}\right)^{2/3}($$

✓ **Maple** : cpu = 0.037 (sec), leaf count = 37

$$\left\{y(x)=-RootOf\left(-\int^{\_Z}\left(\_a^3-\_a^2-\_a-1\right)^{-1}d\_a+\ln(x+a)+\_C1\right)(x+a)\right\}$$

2.796 ODE No. 796

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

✓ **Mathematica** : cpu = 17.7638 (sec), leaf count = 103

$$\text{Solve}\left[-\frac{1}{2}\log\left(9e^{\frac{3x^2}{2}}(y(x)+3)y(x) + 3e^{3x^2}(y(x)+3)^2 - y(x)^2\right) + 3\sqrt{\frac{3}{31}}\tanh^{-1}\left(\frac{\sqrt{\frac{3}{31}}\left(2e^{\frac{3x^2}{2}}(y(x)+3)\right.}{y(x)}\right.\right.$$

✓ **Maple** : cpu = 1.475 (sec), leaf count = 143

$$\left\{y(x) = \mathit{RootOf}\left(\left(\left(7\,\mathrm{e}^{3\,x^2+\mathit{RootOf}\left(\left(\mathrm{e}^{3/2\,x^2}\right)^2\left(217\left(\tanh\left(\frac{(\_C1-5\_Z)\sqrt{93}}{90}\right)\right)^2\mathrm{e}^{3\,x^2+\_Z}+42\tanh\left(\frac{(\_C1-5\_Z)\sqrt{93}}{90}\right)\sqrt{93}\mathrm{e}^{3\,x^2+\_Z}+1\right.\right.}\right.\right.\right.\right.$$

2.797 ODE No. 797

$$y'(x) = \frac{y(x)\left(x^3y(x)\cosh\left(\frac{x+1}{x-1}\right) + x^2y(x)\cosh\left(\frac{x+1}{x-1}\right) - x^2\cosh\left(\frac{x+1}{x-1}\right) - x\cosh\left(\frac{x+1}{x-1}\right) - 1\right)}{x}$$

✓ **Mathematica** : cpu = 2.69668 (sec), leaf count = 146

$$\left\{\left\{y(x) \to \frac{\exp\left(\frac{(3e^2-1)\mathrm{Chi}\left(\frac{2}{x-1}\right)+(1+3e^2)\mathrm{Shi}\left(\frac{2}{x-1}\right)}{e}\right)}{x\left(c_1\exp\left(\frac{(x-1)\left((-x+e^2(x+5)-1)\sinh\left(\frac{2}{x-1}\right)+(x+e^2(x+5)+1)\cosh\left(\frac{2}{x-1}\right)\right)}{4e}\right)+\exp\left(\frac{(3e^2-1)\mathrm{Chi}\left(\frac{2}{x-1}\right)+(1+3e^2\right.}{e}\right.\right.}\right.\right.$$

✓ **Maple** : cpu = 0.421 (sec), leaf count = 168

$$\left\{y(x) = \frac{1}{x}\left(\mathrm{e}^{\frac{x^2-1}{4}\mathrm{e}^{\frac{-1-x}{x-1}}+\frac{x^2+4x-5}{4}\mathrm{e}^{\frac{1+x}{x-1}}-\mathit{Ei}\left(1,2(x-1)^{-1}\right)\mathrm{e}^{-1}+3\,\mathrm{e}\,\mathit{Ei}\left(1,-2(x-1)^{-1}\right)}\right)^{-1}\left(\_C1+\int-\cosh\left(\frac{1+x}{x-1}\right)\mathrm{e}^{\right.\right.$$

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 = 0.766854 (sec), leaf count = 25

$$\text{Solve}\left[c_1 + \frac{x}{y(x)} + \log(x + 1) = y(x)^2 + \log(y(x)), y(x)\right]$$

✓ **Maple** : cpu = 0.173 (sec), leaf count = 30

$$\left\{y(x) = \mathrm{e}^{\mathit{RootOf}\left(-\left(\mathrm{e}^{\_Z}\right)^3 + \ln(1+x)\mathrm{e}^{\_Z} + \_C1\,\mathrm{e}^{\_Z} - \_Z\,\mathrm{e}^{\_Z} + x\right)}\right\}$$

2.799 ODE No. 799

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

✓ **Mathematica** : cpu = 0.51033 (sec), leaf count = 50

$$\left\{\left\{y(x) \to \frac{1}{c_1 x \exp\left(\frac{1}{2}e^{\frac{x+1}{x-1}}\left(x^2 + 4x - 5\right) - 6e\text{Ei}\left(\frac{2}{x-1}\right)\right) + x}\right\}\right\}$$

✓ **Maple** : cpu = 0.362 (sec), leaf count = 147

$$\left\{y(x) = \frac{1}{x}\mathrm{e}^{\frac{5}{2}\mathrm{e}^{\frac{1+x}{x-1}}}\mathrm{e}^{-\frac{x^2}{2}\mathrm{e}^{\frac{1+x}{x-1}}}\left(\mathrm{e}^{\mathrm{e}Ei\left(1,-2\,(x-1)^{-1}\right)}\right)^{-6}\left(\mathrm{e}^{x\mathrm{e}^{\frac{1+x}{x-1}}}\right)^{-2}\left(\int -(1+x)\mathrm{e}^{\frac{1+x}{x-1}}\mathrm{e}^{\frac{5}{2}\mathrm{e}^{\frac{1+x}{x-1}}}\mathrm{e}^{-\frac{x^2}{2}\mathrm{e}^{\frac{1+x}{x-1}}}\left(\mathrm{e}^{\mathrm{e}Ei\left(1,-2\,(x\right.\right.}\right.\right.$$

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 = 0.289902 (sec), leaf count = 118

$$\text{Solve}\left[57\text{RootSum}\left[-19\#1^3 + 6\sqrt[3]{38}\#1 - 19\&, \frac{\log\left(\frac{b-6y(x)-2x}{\sqrt[3]{38}\sqrt[3]{\frac{1}{(b-2x)^6}}(b-2x)^3} - \#1\right)}{2\sqrt[3]{38} - 19\#1^2}\&\right] + 38^{2/3}\left(\frac{1}{(b-2x)^6}\right)^{2/}$$

✓ **Maple** : cpu = 0.038 (sec), leaf count = 41

$$\left\{y(x) = \frac{RootOf\left(-\int^{-Z}(\_a^3 - \_a^2 - \_a - 1)^{-1}d\_a + \ln(-2x+b) + \_C1\right)(-2x+b)}{2}\right\}$$

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 = 0.180674 (sec), leaf count = 124

$$\text{Solve}\left[87\text{RootSum}\left[-29\#1^3 + 3\sqrt[3]{29}\#1 - 29\&, \frac{\log\left(\frac{e^{-\frac{x^2}{2}}\left(e^{\frac{x^2}{4}}+3y(x)\right)}{\sqrt[3]{29}\sqrt[3]{e^{-\frac{3x^2}{4}}}} - \#1\right)}{\sqrt[3]{29} - 29\#1^2}\&\right] + 9c_1 + 29^{2/3}e^{\frac{x^2}{2}}\left(e^{-\frac{3x^2}{4}}\right.$$

✓ **Maple** : cpu = 0.073 (sec), leaf count = 63

$$\left\{y(x) = \frac{1}{9}\left(-3\,e^{-1/4\,x^2}e^{1/4\,x^2} + 29\,RootOf\left(-81\int^{-Z}(841\_a^3 - 27\_a + 27)^{-1}d\_a + x + 3\_C1\right)\right)\left(e\right.$$

2.802 ODE No. 802

$$y'(x) = \frac{\_F1\left(y(x) + \frac{1}{x}\right) + \frac{1}{x}}{x}$$

✓ **Mathematica** : cpu = 0.0930712 (sec), leaf count = 88

$$\text{Solve}\left[c_1 = \int_1^{y(x)} \left(-\int_1^x -\frac{\_F1'\left(K[2] + \frac{1}{K[1]}\right)}{K[1]^2 \left(\_F1\left(K[2] + \frac{1}{K[1]}\right)\right)^2} dK[1] - \frac{1}{\_F1\left(K[2] + \frac{1}{x}\right)}\right) dK[2] + \int_1^x \frac{\_F1\left(\frac{}{K}\right.}{}\right.$$

✓ **Maple** : cpu = 0.122 (sec), leaf count = 27

$$\left\{y(x) = \frac{RootOf\left(-\ln(x) + \int^{\_Z} (\_F1(\_a))^{-1} d\_a + \_C1\right) x - 1}{x}\right\}$$

2.803 ODE No. 803

$$y'(x) = \frac{\_F1(y(x)^2 - 2\log(x))}{x\sqrt{y(x)^2}}$$

✓ **Mathematica** : cpu = 0.107856 (sec), leaf count = 234

$$\text{Solve}\left[c_1 = \int_1^{y(x)} \frac{-((\_F1(K[2]^2 - 2\log(x)))^2 - 1)\left(\int_1^x \frac{2\left(\sqrt{K[2]^2}(\_F1(K[2]^2 - 2\log(K[1])))^2 + 2K[2]\_F1(K[2]^2 - 2\log(\right.}{K[1]((\_F1(K[2]^2 - 2\log(K[1]))}\right.}{(\_F1(K[2]^2 - 2\log}\right.$$

✓ **Maple** : cpu = 0.491 (sec), leaf count = 65

$$\left\{y(x) = \sqrt{2\ln(x) + 2\,RootOf\left(\ln(x) - \int^{\_Z} (\_F1(2\_a) - 1)^{-1} d\_a + \_C1\right)}, y(x) = -\sqrt{2\ln(x) + 2\right.$$

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 = 0.512204 (sec), leaf count = 43

$$\left\{\left\{y(x) \to \tan^{-1}\left(\frac{-12c_1 + 3x^4 - 4x^3 + 6x^2 - 12x + 12\log(x+1) - 25}{12x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 1.154 (sec), leaf count = 38

$$\left\{y(x) = \arctan\left(\frac{3\,x^4 - 4\,x^3 + 6\,x^2 + 12\,\ln(1+x) - 12\_C1 - 12\,x}{12\,x}\right)\right\}$$

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 = 0.0409954 (sec), leaf count = 35

$$\left\{\left\{y(x) \to x\sinh\left(c_1 + \frac{x^3}{3} - \frac{x^2}{2} + x - \log(x+1) + \frac{11}{6}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.688 (sec), leaf count = 42

$$\left\{\ln\left(y(x) + \sqrt{(y(x))^2 + x^2}\right) - \frac{x^3}{3} + \frac{x^2}{2} - x + \ln(1+x) - \ln(x) - \_C1 = 0\right\}$$

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 = 0.257519 (sec), leaf count = 22

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

✓ **Maple** : cpu = 0.674 (sec), leaf count = 22

$$\left\{y(x) = -\arctan\left(\frac{-x + \ln(1+x) - \_C1}{x}\right)\right\}$$

2.807 ODE No. 807

$$y'(x) = -\frac{1}{-e^{y(x)}y(x)\_F1(y(x) - \log(x)) - x}$$

✗ **Mathematica** : cpu = 2.10644 (sec), leaf count = 0 , could not solve

```
DSolve[Derivative[1][y][x] == -(-x - E^y[x]*y[x]*_F1[-Log[x] + y[x]])^(-
1), y[x], x]
```

✓ **Maple** : cpu = 0.687 (sec), leaf count = 43

$$\left\{ \frac{(\ln(x))^2}{2} - y(x)\ln(x) - \int^{y(x)-\ln(x)} \frac{\_F1(\_a)\_a + e^{-\_a}}{\_F1(\_a)} d\_a + \_C1 = 0 \right\}$$

2.808 ODE No. 808

$$y'(x) = \frac{(y(x)+1)(2y(x)+1)}{x(2xy(x) - 2y(x) + x - 2)}$$

✓ **Mathematica** : cpu = 2.31121 (sec), leaf count = 149

$$\text{Solve}\left[\frac{2^{2/3}\left(x\log\left(-\frac{6\ 2^{2/3}(y(x)+1)}{2(x-1)y(x)+x-2}\right) - x\log\left(\frac{3\ 2^{2/3}(2xy(x)+x)}{2(x-1)y(x)+x-2}\right) + 2xy(x)\left(\log\left(-\frac{6\ 2^{2/3}(y(x)+1)}{2(x-1)y(x)+x-2}\right) - \log\left(\frac{3\ 2^{2/}}{2(x-}\right.\right.\right.}{9(2xy(x)+x)}\right.$$

✓ **Maple** : cpu = 0.102 (sec), leaf count = 45

$$\left\{ y(x) = 1\left(-x\,lambertW\left(\frac{1}{xe^{x^{-1}}\_C1}\right) - 2\right)\left(2\,x\,lambertW\left(\frac{1}{xe^{x^{-1}}\_C1}\right) + 2\right)^{-1} \right\}$$

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 = 0.259583 (sec), leaf count = 118

$$\text{Solve}\left[57\text{RootSum}\left[-19\#1^3 + 6\sqrt[3]{38}\#1 - 19\&, \frac{\log\left(\frac{12y(x)+4x-5}{\sqrt[3]{38}\sqrt[3]{\frac{1}{(5-4x)^6}}(4x-5)^3} - \#1\right)}{2\sqrt[3]{38} - 19\#1^2}\&\right] + 9c_1 + 38^{2/3}\left(\frac{1}{(5-4\right.\right.$$

✓ **Maple** : cpu = 0.035 (sec), leaf count = 41

$$\left\{y(x) = -\frac{RootOf\left(-\int^{-Z}(\_a^3 - \_a^2 - \_a - 1)^{-1} d\_a + \ln(4x-5) + \_C1\right)(4x-5)}{4}\right\}$$

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 = 0.020048 (sec), leaf count = 18

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

✓ **Maple** : cpu = 0.05 (sec), leaf count = 16

$$\left\{y(x) = \left(\ln(x) + (\_C1 - x)^{-1}\right)x\right\}$$

2.811 ODE No. 811

$$y'(x) = \frac{x^4 + x^3e^{y(x)} + xy(x) + e^{y(x)}y(x) - x\log\left(e^{y(x)} + x\right) - e^{y(x)}\log\left(e^{y(x)} + x\right) + x}{x^2}$$

✓ **Mathematica** : cpu = 2.61822 (sec), leaf count = 29

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

✓ **Maple** : cpu = 2.295 (sec), leaf count = 32

$$\left\{y(x) = \frac{x^3}{2} + \_C1\,x + \ln\left(-x\left(-1 + e^{\frac{x^3}{2}}e^{\_C1\,x}\right)^{-1}\right)\right\}$$

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 = 0.374485 (sec), leaf count = 76

$$\left\{\left\{y(x) \to \left(\frac{3c_1}{4} - 1\right)x^4 + \left(c_1 + \frac{1}{6}\right)x^3 + 3c_1x - \frac{3c_1^2}{2} - \frac{3x^8}{32} - \frac{x^7}{4} - \frac{x^6}{6} - \frac{3x^5}{4} - \frac{3x^2}{2}\right\}\right\}$$

✓ **Maple** : cpu = 0.289 (sec), leaf count = 30

$$\left\{\_C1 - \frac{3\,x^4}{4} - x^3 - 3\,x - \sqrt{x^3 - 6\,y\,(x)} = 0\right\}$$

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 = 0.556973 (sec), leaf count = 64

$$\left\{\left\{y(x) \to \frac{1}{72}a\left((87 - 72c_1)\,x^4 - 96c_1x^3 - 288c_1x + 144c_1^2 + 9x^8 + 24x^7 + 16x^6 + 72x^5 + 144x^2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.568 (sec), leaf count = 40

$$\left\{\frac{1}{4}\sqrt{ax^4 + 8\,y\,(x)} + \frac{-3\,x^4 - 4\,x^3 - 12\,x}{12}\sqrt{a} - \_C1 = 0\right\}$$

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 = 0.0204428 (sec), leaf count = 70

$$\left\{\left\{y(x) \to \frac{x}{\frac{\sqrt{x(c_1-2x+1)}}{\sqrt{\frac{1}{x^7}}} - x^4}\right\}, \left\{y(x) \to -\frac{x}{\frac{\sqrt{x(c_1-2x+1)}}{\sqrt{\frac{1}{x^7}}} + x^4}\right\}\right\}$$

✓ **Maple** : cpu = 0.047 (sec), leaf count = 38

$$\left\{y(x) = \frac{1}{x^3}\left(\sqrt{\_C1 - 2\,x} - 1\right)^{-1}, y(x) = -\frac{1}{x^3}\left(\sqrt{\_C1 - 2\,x} + 1\right)^{-1}\right\}$$

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 = 19.202 (sec), leaf count = 100

$$\text{Solve}\left[\frac{1}{6}\left(\log\left(-81e^{\frac{3x^2}{2}}(y(x)+3)y(x) + e^{3x^2}(y(x)+3)^2 - 243y(x)^2\right) - 2\log(y(x)+3)\right) = c_1 + \sqrt{\frac{3}{31}}\,\text{tanh}$$

✓ **Maple** : cpu = 1.016 (sec), leaf count = 168

$$\left\{-10\,\ln\left(\frac{10\,e^{3/2\,x^2}(3+y(x))}{27\,e^{3/2\,x^2} + 9\,e^{3/2\,x^2}y\,(x) + 27\,y\,(x)}\right) + 5\,\ln\left(\frac{100\,(3+y(x))^2\left(e^{3/2\,x^2}\right)^2 + \left(-8100\,(y(x))^2 - 24\right.}{189\,\left(e^{3/2\,x^2}\,(3+y\,(x)) + \right.}\right.\right.$$

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 = 0.180857 (sec), leaf count = 72

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

✓ **Maple** : cpu = 0.711 (sec), leaf count = 190

$$\left\{\int_{\_b}^{x}\frac{\left(\_a - y(x)\right)^3\left(\_a + y(x)\right)^3\_a}{\_a^6 - 3\,\_a^4\left(y\,(x)\right)^2 + 3\,\_a^2\left(y\,(x)\right)^4 - \left(y\,(x)\right)^6 - \_a^2 + \left(y\,(x)\right)^2 + 1}\,d\_a + \int^{y(x)} - \frac{(}{-\_f^6 + 3\,\_f^4 x}\right.$$

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 = 0.43147 (sec), leaf count = 59

$$\left\{\left\{y(x) \to -\sec^{-1}\left(-\frac{9c_1 + x^3 - 3x^3 \log(x)}{9 \log(x)}\right)\right\}, \left\{y(x) \to \sec^{-1}\left(-\frac{9c_1 + x^3 - 3x^3 \log(x)}{9 \log(x)}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.723 (sec), leaf count = 27

$$\left\{y(x) = \arccos\left(9 \frac{\ln(x)}{3 x^3 \ln(x) - x^3 + 9\_C1}\right)\right\}$$

2.818 ODE No. 818

$$y'(x) = \frac{y(x)}{x \left(xy(x)^4 + xy(x)^3 + xy(x) - 1\right)}$$

✓ **Mathematica** : cpu = 0.0858181 (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 = 0.208 (sec), leaf count = 34

$$\left\{y(x) = e^{\mathit{RootOf}\left(-2\,x\left(e^{\_Z}\right)^4 - 3\,x\left(e^{\_Z}\right)^3 + 6\_C1\,x e^{\_Z} - 6\_Z\,e^{\_Z} x - 6\right)}\right\}$$

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 = 0.255669 (sec), leaf count = 63

$$\left\{\left\{y(x) \to \frac{1}{192}\left((96 - 72c_1)\, x^4 - 96c_1 x^3 - 288c_1 x + 144c_1^2 + 9x^8 + 24x^7 + 16x^6 + 72x^5 + 80x^2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.287 (sec), leaf count = 30

$$\left\{\_C1 + \frac{3\,x^4}{8} + \frac{x^3}{2} + \frac{3\,x}{2} - \sqrt{x^2 + 3\,y(x)} = 0\right\}$$

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 = 0.380749 (sec), leaf count = 59

$$\left\{\left\{y(x)\to -\sec^{-1}\left(-\frac{4c_1+x^2-2x^2\log(x)}{4\log(x)}\right)\right\},\left\{y(x)\to \sec^{-1}\left(-\frac{4c_1+x^2-2x^2\log(x)}{4\log(x)}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.706 (sec), leaf count = 27

$$\left\{y(x) = \arccos\left(4\frac{\ln(x)}{2x^2\ln(x)-x^2+4\_C1}\right)\right\}$$

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 = 0.175289 (sec), leaf count = 1993

$$\left\{\left\{y(x)\to \frac{c_1}{4}-\frac{1}{2}\sqrt{\frac{c_1^2}{4}+\frac{\sqrt[3]{36c_1^2x^6+27x^5+\sqrt{x^9\left(216x^3\left(6c_1-1\right)c_1^3+216x^2c_1^2-9x\left(512c_1-81\right)-409\right.}}}{6x^3}}\right.\right.$$

✓ **Maple** : cpu = 0.165 (sec), leaf count = 27

$$\left\{-\frac{1}{3x^3\left(y(x)\right)^3}-\frac{1}{2x^2\left(y(x)\right)^2}-y(x)+\_C1=0\right\}$$

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 = 0.0511664 (sec), leaf count = 32

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

✓ **Maple** : cpu = 0.129 (sec), leaf count = 25

$$\left\{y(x) = \frac{x^2 e^{-x^2}}{2} + \left(\_C1 - \frac{x^2}{2}\right)^{-1}\right\}$$

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 = 0.515067 (sec), leaf count = 35

$$\text{Solve}\left[\frac{y(x)^3}{3} + \frac{y(x)^2}{2} + \log(y(x)) = c_1 + \frac{x}{y(x)} + \log(x), y(x)\right]$$

✓ **Maple** : cpu = 0.202 (sec), leaf count = 38

$$\left\{y(x) = e^{RootOf\left(-2\left(e^{\_Z}\right)^4 - 3\left(e^{\_Z}\right)^3 + 6e^{\_Z}\ln(x) + 6\_C1\, e^{\_Z} - 6\_Z\, e^{\_Z} + 6x\right)}\right\}$$

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 = 0.103049 (sec), leaf count = 66

$$\text{Solve}\left[\log\left(\frac{y(x)}{x}\right) + \frac{\tan^{-1}\left(\frac{2y(x)+x}{\sqrt{3}x}\right)}{\sqrt{3}} + \log(x) = c_1 + \frac{1}{2}\log\left(\frac{x^2 + xy(x) + y(x)^2}{x^2}\right) + \log(1-x), y(x)\right]$$

✓ **Maple** : cpu = 0.591 (sec), leaf count = 61

$$\left\{-\frac{1}{2}\ln\left(\frac{(y(x))^2+xy(x)+x^2}{x^2}\right)+\frac{\sqrt{3}}{3}\arctan\left(\frac{\sqrt{3}(x+2\,y(x))}{3\,x}\right)+\ln\left(\frac{y(x)}{x}\right)-\ln(x-1)+\ln(x)-\_\right.$$

2.825 ODE No. 825

$$y'(x)=\frac{x\left(x^2y(x)^3+(x^2+1)^{3/2}\,y(x)^2+x^2(x^2+1)^{3/2}+(x^2+1)^{3/2}+y(x)^3\right)}{(x^2+1)^3}$$

✓ **Mathematica** : cpu = 0.31871 (sec), leaf count = 144

$$\text{Solve}\left[-\frac{19}{3}\text{RootSum}\left[-19\#1^3+6\sqrt[3]{38}\#1-19\&,\frac{\log\left(\frac{x\left(\frac{3y(x)}{(x^2+1)^2}+\frac{1}{(x^2+1)^{3/2}}\right)}{\sqrt[3]{38}\sqrt[3]{\frac{x^3}{(x^2+1)^{9/2}}}}-\#1\right)}{2\sqrt[3]{38}-19\#1^2}\&\right]=\frac{1}{18}\left(18c_1+\frac{3}{\cdot}\right.\right.$$

✓ **Maple** : cpu = 0.115 (sec), leaf count = 48

$$\left\{y(x)=\frac{19\,RootOf\left(-1296\int^{\_Z}(361\_a^3-432\_a+432)^{-1}d\_a+2\,\ln(x^2+1)+3\_C1\right)-6}{18}\sqrt{x^2+1}\right.$$

2.826 ODE No. 826

$$y'(x)=\frac{y(x)\,(3xy(x)^2+3y(x)^2+x)}{x(x+1)\,(6y(x)^2+x)}$$

✓ **Mathematica** : cpu = 0.742797 (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 = 0.513 (sec), leaf count = 51

$$\left\{ \left((y(x))^{-2} + 6\,x^{-1}\right)^{-1} = \frac{x}{54}\left(\mathrm{e}^{\mathit{RootOf}\left(-\mathrm{e}^{-Z}\ln\left(\frac{(1+x)^2\left(\mathrm{e}^{-Z}+9\right)}{2\,x}\right)+3\_C1\,\mathrm{e}^{-Z}+\_Z\,\mathrm{e}^{-Z}+9\right)} + 9\right) \right\}$$

2.827 ODE No. 827

$$y'(x) = \frac{x^2 y(x)\sqrt{x^2+y(x)^2} + x^3\left(-\sqrt{x^2+y(x)^2}\right) + y(x)}{x}$$

✓ **Mathematica** : cpu = 0.152296 (sec), leaf count = 93

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

✓ **Maple** : cpu = 0.259 (sec), leaf count = 49

$$\left\{ \ln\left(2\,\frac{x\left(\sqrt{2\,(y(x))^2 + 2\,x^2} + y(x) + x\right)}{y(x) - x}\right) + \frac{\sqrt{2}x^3}{3} - \ln(x) - \_C1 = 0 \right\}$$

2.828 ODE No. 828

$$y'(x) = \frac{(y(x)+1)(2y(x)+1)}{x\,(2xy(x)^4 + xy(x)^3 - 2y(x) - 2)}$$

✓ **Mathematica** : cpu = 0.414039 (sec), leaf count = 46

$$\text{Solve}\left[\frac{1}{16}\left(-2y(x)^2 + 6y(x) - \frac{8}{2xy(x)+x} - 8\log(y(x)+1) + \log(2y(x)+1)\right) = c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.399 (sec), leaf count = 54

$$\left\{ y(x) = \frac{1}{2}\mathrm{e}^{\mathit{RootOf}\left(x\left(\mathrm{e}^{-Z}\right)^3 - 8\left(\mathrm{e}^{-Z}\right)^2 x + 16\,\ln\left(1/2\,\mathrm{e}^{-Z}+1/2\right)x\mathrm{e}^{-Z} + 8\_C1\,x\mathrm{e}^{-Z} - 2\_Z\,\mathrm{e}^{-Z}x + 7\,\mathrm{e}^{-Z}x + 16\right)} - \frac{1}{2} \right\}$$

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 = 0.43994 (sec), leaf count = 81

$$\left\{\left\{y(x) \to -\frac{2c_1x^5}{5} - \frac{1}{4}(2c_1-1)x^4 - c_1x^2 + c_1^2 + \frac{x^{10}}{25} + \frac{x^9}{10} + \frac{x^8}{16} + \frac{x^7}{5} + \frac{x^6}{4} - \frac{1}{4x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.348 (sec), leaf count = 34

$$\left\{\_C1 - \frac{1}{x}\sqrt{4\,x^2y\,(x)+1} + x^2 + \frac{x^4}{2} + \frac{2\,x^5}{5} = 0\right\}$$

2.830 ODE No. 830

$$y'(x) = \frac{(x-y(x))y(x)}{x\left(-y(x)^4 - y(x)^3 - y(x) + x\right)}$$

✓ **Mathematica** : cpu = 0.576527 (sec), leaf count = 34

$$\text{Solve}\left[\log(x) = c_1 + \frac{y(x)^3}{3} + \frac{y(x)^2}{2} + \frac{x}{y(x)} + \log(y(x)), y(x)\right]$$

✓ **Maple** : cpu = 0.179 (sec), leaf count = 38

$$\left\{y(x) = \mathrm{e}^{RootOf\left(2\,(\mathrm{e}^{\_Z})^4 + 3\,(\mathrm{e}^{\_Z})^3 - 6\,\mathrm{e}^{\_Z}\ln(x) + 6\,\_C1\,\mathrm{e}^{\_Z} + 6\,\_Z\,\mathrm{e}^{\_Z} + 6\,x\right)}\right\}$$

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 = 5.04915 (sec), leaf count = 79

$$\left\{\left\{y(x) \to -\frac{1}{12}\sqrt{576ax - (12c_1+3x^4+4x^3+12x)^2}\right\}, \left\{y(x) \to \frac{1}{12}\sqrt{576ax - (12c_1+3x^4+4x^3+12}\right.\right.$$

✓ **Maple** : cpu = 0.339 (sec), leaf count = 35

$$\left\{-\sqrt{-\left(y\left(x\right)\right)^{2}+4\,ax}-\frac{x^{4}}{4}-\frac{x^{3}}{3}-x-\_C1=0\right\}$$

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 = 3.6994 (sec), leaf count = 2405

$$\left\{\left\{y(x)\to\frac{1}{8}\left(-4\sqrt{\frac{-8x+3c_1+3\log(x}{\sqrt[3]{36\left(c_1+\log(x+1)\right)^2+18\left(c_1+\log(x+1)\right)+69x+\sqrt{\left(36\left(c_1+\log(x+1)\right)^2+1\right.}}}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.199 (sec), leaf count = 31

$$\left\{\ln\left(1+x\right)+\frac{x}{y\left(x\right)}-\frac{\left(y\left(x\right)\right)^{3}}{3}-\frac{\left(y\left(x\right)\right)^{2}}{2}-y(x)+\_C1=0\right\}$$

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 = 0.156925 (sec), leaf count = 87

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

✓ **Maple** : cpu = 0.209 (sec), leaf count = 49

$$\left\{\ln\left(2\,\frac{x\left(\sqrt{2\,\left(y\left(x\right)\right)^{2}+2\,x^{2}}+y(x)+x\right)}{y\left(x\right)-x}\right)+\frac{\sqrt{2}x^{4}}{4}-\ln\left(x\right)-\_C1=0\right\}$$

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 = 0.926321 (sec), leaf count = 90

$$\left\{\left\{y(x)\to -\frac{\sqrt{x}\sqrt{W\left(\frac{6(x+1)^2e^{2c_1+x^2-2x-3}}{x}\right)}}{\sqrt{6}}\right\},\left\{y(x)\to \frac{\sqrt{x}\sqrt{W\left(\frac{6(x+1)^2e^{2c_1+x^2-2x-3}}{x}\right)}}{\sqrt{6}}\right\}\right\}$$

✓ **Maple** : cpu = 0.644 (sec), leaf count = 60

$$\left\{\left((y(x))^{-2}+6\,x^{-1}\right)^{-1}=\frac{x}{54}\left(\mathrm{e}^{RootOf\left(x^2\mathrm{e}^{\_Z}-\mathrm{e}^{\_Z}\ln\left(\frac{\left(\mathrm{e}^{\_Z}+9\right)x}{2\,(1+x)^2}\right)+3\_C1\,\mathrm{e}^{\_Z}+\_Z\,\mathrm{e}^{\_Z}-2\,\mathrm{e}^{\_Z}x+9\right)}+9\right)\right\}$$

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 = 3.02542 (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]^3])^(-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 = 21.2753 (sec), leaf count = 379

$$\mathrm{Solve}\left[\frac{1}{9}2^{2/3}\left(\frac{\left(1-\frac{(x-1)^2\left(\frac{x^6}{(x-1)^3}\right)^{2/3}((x+2)y(x)+x)}{x^4((x-1)y(x)+x)}\right)\left(\frac{\left(\frac{x^6}{(x-1)^3}\right)^{2/3}(x-1)^2((x+2)y(x)+x)}{x^4((x-1)y(x)+x)}+2\right)\left(\left(1-\frac{(x-1)^2\left(\frac{x^6}{(x-1)^3}\right)^{2}}{x^4((x-1}\right.\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.345 (sec), leaf count = 73

$$\left\{y(x) = -x\mathrm{e}^{RootOf\left(-\ln\left(\frac{\mathrm{e}^{-Z}}{2}+\frac{9}{2}\right)\mathrm{e}^{-Z}+3\_C1\,\mathrm{e}^{-Z}+\_Z\,\mathrm{e}^{-Z}-\mathrm{e}^{-Z}x+9\right)}\left(-9+(x-1)\,\mathrm{e}^{RootOf\left(-\ln\left(\frac{\mathrm{e}^{-Z}}{2}+\frac{9}{2}\right)\mathrm{e}^{-Z}+3\_C1\,\mathrm{e}^{-Z}+\right.}\right.\right.$$

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 = 3.55007 (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
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)
```

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 = 0.0329968 (sec), leaf count = 29

$$\left\{\left\{y(x)\to\frac{1}{c_1-\log(x)}+\frac{2x^3}{5}+2\sqrt{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.118 (sec), leaf count = 25

$$\left\{y(x)=\frac{2\,x}{5}\left(x^2+5\,\frac{1}{\sqrt{x}}\right)+\left(\_C1-\ln(x)\right)^{-1}\right\}$$

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 = 0.0878126 (sec), leaf count = 28

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

✓ **Maple** : cpu = 0.085 (sec), leaf count = 19

$$\left\{y(x) = \ln\left(2\frac{x}{-x^2 + \_C1}\right)x\right\}$$

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 = 0.105776 (sec), leaf count = 28

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

✓ **Maple** : cpu = 0.08 (sec), leaf count = 19

$$\left\{y(x) = \ln\left(3\frac{x}{-x^3 + \_C1}\right)x\right\}$$

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 = 1.5048 (sec), leaf count = 208

$$\left\{\left\{y(x) \to -\frac{\sqrt{-2a^{5/2}\left(c - bx^2\right) + 4a^3bx\left(bx^2 - c\right) + a^2x + 4\sqrt{a}bc_1\left(bx^2 - c\right) + 2bc_1x}}{\sqrt{2}\sqrt{2a^{3/2}bc_1 + a^{7/2} + 2a^4bx}}\right\}, \left\{y(x) \to \frac{\sqrt{-2a}}{}\right.$$

✓ **Maple** : cpu = 0.337 (sec), leaf count = 97

$$\left\{y(x) = \frac{1}{\_C1\,x+1}\sqrt{\left(\left(\_C1\,x+1\right)\left(bx^2-c\right)\sqrt{a}+\frac{x}{2}\right)\left(\_C1\,x+1\right)a^{\frac{3}{2}}}\,a^{-\frac{3}{2}}, y(x) = -2\,\frac{\sqrt{\left(\left(\_C1\,x+1\right)\right.}}{}\right.$$

2.842 ODE No. 842

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

✓ **Mathematica** : cpu = 0.134354 (sec), leaf count = 44

$$\left\{\left\{y(x) \to \frac{\log(x)\left(-4(c_1+1) + x^2 - 2x^2\log(x)\right)}{4c_1 - x^2 + 2x^2\log(x)}\right\}\right\}$$

✓ **Maple** : cpu = 0.036 (sec), leaf count = 43

$$\left\{y(x) = -\frac{\ln(x)\left(2\,x^2\ln(x) - x^2 + 2\,\_C1 + 4\right)}{2\,x^2\ln(x) - x^2 + 2\,\_C1}\right\}$$

2.843 ODE No. 843

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

✓ **Mathematica** : cpu = 0.141499 (sec), leaf count = 44

$$\left\{\left\{y(x) \to \frac{\log(x)\left(-9(c_1+1) + x^3 - 3x^3\log(x)\right)}{9c_1 - x^3 + 3x^3\log(x)}\right\}\right\}$$

✓ **Maple** : cpu = 0.04 (sec), leaf count = 43

$$\left\{y(x) = -\frac{\ln(x)\left(6\,x^3\ln(x) - 2\,x^3 + 9\,\_C1 + 18\right)}{6\,x^3\ln(x) - 2\,x^3 + 9\,\_C1}\right\}$$

2.844 ODE No. 844

$$y'(x) = \frac{y(x)(y(x)+1)(y(x)+x)}{x(xy(x)+y(x)+x)}$$

✓ **Mathematica** : cpu = 26.7652 (sec), leaf count = 386

$$\text{Solve}\left[\frac{2^{2/3}\left(1-\frac{\left(\frac{x^6}{(x+1)^3}\right)^{2/3}(x+1)^2((x-2)y(x)+x)}{x^4((x+1)y(x)+x)}\right)\left(\frac{\left(\frac{x^6}{(x+1)^3}\right)^{2/3}(x+1)^2((x-2)y(x)+x)}{x^4((x+1)y(x)+x)}+2\right)\left(\left(1-\frac{\left(\frac{x^6}{(x+1)^3}\right)^{2/3}(x+1)^2((x}{x^4((x+1)y(x)}\right.\right.}{9}\right.$$

✓ **Maple** : cpu = 0.332 (sec), leaf count = 97

$$\left\{y(x) = -xe^{RootOf\left(-\ln\left(\frac{e^{\_Z}}{2}+\frac{9}{2}\right)e^{\_Z}+3\_C1\,e^{\_Z}+\_Z\,e^{\_Z}+e^{\_Z}x+9\right)}\left(e^{RootOf\left(-\ln\left(\frac{e^{\_Z}}{2}+\frac{9}{2}\right)e^{\_Z}+3\_C1\,e^{\_Z}+\_Z\,e^{\_Z}+e^{\_Z}x+9\right.}\right.\right.$$

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 = 6.58029 (sec), leaf count = 218

$$\left\{\left\{y(x)\to -\frac{1}{2}\sqrt[3]{-\frac{1}{2}}\sqrt[3]{12\left(6c_1+11\right)x^4+96c_1x^3+288c_1x+144c_1^2+9x^8+24x^7+16x^6+72x^5+144x^2}\right.\right.$$

✓ **Maple** : cpu = 0.264 (sec), leaf count = 44

$$\left\{\int_{\_b}^{y(x)}\_a^2\frac{1}{\sqrt{-9\,x^4+4\,\_a^3}}\,d\_a-\frac{x^4}{4}-\frac{x^3}{3}-x-\_C1=0\right\}$$

2.846 ODE No. 846

$$y'(x) = \frac{1}{x^2 \left(-\left(\frac{1}{y(x)}+1\right)\right) \_\mathrm{F1}\left(x\left(\frac{1}{y(x)}+1\right)\right) + x^2 \_\mathrm{F1}\left(x\left(\frac{1}{y(x)}+1\right)\right) + x\left(\frac{1}{y(x)}+1\right) - x}$$

✓ **Mathematica** : cpu = 1.60597 (sec), leaf count = 174

$$\text{Solve}\left[c_1 = \int_1^{y(x)} \left(\frac{x\_\mathrm{F1}\left(x\left(\frac{1}{K[2]}+1\right)\right) - 1}{x(K[2]+1)\_\mathrm{F1}\left(x\left(\frac{1}{K[2]}+1\right)\right) - K[2]} - \int_1^x \frac{K[1](K[2]+1)\_\mathrm{F1}'\left(K[1]\left(\frac{1}{K[2]}+1\right)\right.}{K[2]\left(K[2]-K[1](K[2]+1)\_\right.}\right.\right.$$

✓ **Maple** : cpu = 0.22 (sec), leaf count = 40

$$\left\{ y(x) = \mathrm{e}^{RootOf\left(-\_Z - \int^{\frac{\mathrm{e}^{\_Z} x}{\mathrm{e}^{\_Z}-1}} \frac{1}{(\_F1(\_a)\_a-1)\_a} d\_a + \_C1\right)} - 1 \right\}$$

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 = 0.403375 (sec), leaf count = 69

$$\left\{\left\{y(x) \to \frac{1}{144}\left(24(3c_1-4)x^4 + 96c_1x^3 + 72(4c_1+1)x - 144c_1^2 - 9x^8 - 24x^7 - 16x^6 - 72x^5 - 108x^2 + \right.\right.\right.$$

✓ **Maple** : cpu = 0.326 (sec), leaf count = 34

$$\left\{ \_C1 - \frac{x^4}{2} - \frac{2\,x^3}{3} - 2\,x - \sqrt{x^2+2\,x+1-4\,y\,(x)} = 0 \right\}$$

2.848 ODE No. 848

$$y'(x) = \_\mathrm{F1}(y(x) - \log(\sinh(x))) + \coth(x)$$

✓ **Mathematica** : cpu = 0.132786 (sec), leaf count = 91

$$\mathrm{Solve}\left[c_1 = \int_1^{y(x)} \left(\frac{1}{\_\mathrm{F1}(K[2] - \log(\sinh(x)))} - \int_1^x \frac{\coth(K[1])\_\mathrm{F1}'(K[2] - \log(\sinh(K[1])))}{(\_\mathrm{F1}(K[2] - \log(\sinh(K[1]))))^2} dK[1]\right) dK$$

✓ **Maple** : cpu = 0.609 (sec), leaf count = 27

$$\left\{\int_{\_b}^{y(x)} (\_F1(\_a - \ln(\sinh(x))))^{-1} \, d\_a - x - \_C1 = 0\right\}$$

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 = 0.365431 (sec), leaf count = 73

$$\left\{\left\{y(x) \to -\frac{1}{6}(3c_1 - 4)x^4 - \frac{2c_1x^3}{3} - 2c_1x + c_1^2 + \frac{x^8}{16} + \frac{x^7}{6} + \frac{x^6}{9} + \frac{x^5}{2} + \frac{3x^2}{4} + x\right\}\right\}$$

✓ **Maple** : cpu = 0.337 (sec), leaf count = 33

$$\left\{\_C1 + \frac{x^4}{2} + \frac{2x^3}{3} + 2x - \sqrt{x^2 - 4x + 4y(x)} = 0\right\}$$

2.850 ODE No. 850

$$y'(x) = \_\mathrm{F1}(y(x) - \log(\sin(x)) + \log(\cos(x) + 1)) + \csc(x)$$

✓ **Mathematica** : cpu = 0.246239 (sec), leaf count = 114

$$\mathrm{Solve}\left[c_1 = \int_1^{y(x)} \left(\frac{1}{\_\mathrm{F1}(K[2] - \log(\sin(x)) + \log(\cos(x) + 1))} - \int_1^x \frac{\csc(K[1])\_\mathrm{F1}'(K[2] - \log(\sin(K[1]$$

✓ **Maple** : cpu = 1.155 (sec), leaf count = 32

$$\left\{\int_{\_b}^{y(x)} (\_F1(\_a - \ln(\sin(x)) + \ln(\cos(x) + 1)))^{-1} \, d\_a - x - \_C1 = 0\right\}$$

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 = 0.256512 (sec), leaf count = 136

$$\text{Solve}\left[3(27a+29b)^{2/3}\text{RootSum}\left[\#1^3(27a+29b)^{2/3} - 3\#1b^{2/3} + (27a+29b)^{2/3}\&, \frac{\log\left(\frac{3ax+3by(x)+b}{b\sqrt[3]{\frac{27a}{b}+29}} - \#1\right.}{b^{2/3} - \#1^2(27a+29b)}\right.\right.$$

✓ **Maple** : cpu = 0.079 (sec), leaf count = 42

$$\left\{y(x) = \frac{RootOf\left(\int^{-Z}(\_a^3b + \_a^2b + a + b)^{-1}\,d\_ab - x + \_C1\right)b - ax}{b}\right\}$$

2.852 ODE No. 852

$$y'(x) = \frac{\alpha^3y(x)^3 + \alpha^3y(x)^2 + \alpha^3 + 3\alpha^2\beta xy(x)^2 + 2\alpha^2\beta xy(x) + 3\alpha\beta^2x^2y(x) + \alpha\beta^2x^2 + \beta^3x^3}{\alpha^3}$$

✓ **Mathematica** : cpu = 0.248095 (sec), leaf count = 136

$$\text{Solve}\left[3(29\alpha+27\beta)^{2/3}\text{RootSum}\left[\#1^3(29\alpha+27\beta)^{2/3} - 3\#1\alpha^{2/3} + (29\alpha+27\beta)^{2/3}\&, \frac{\log\left(\frac{3\alpha y(x)+\alpha+3\beta x}{\alpha\sqrt[3]{\frac{27\beta}{\alpha}+29}} -\right.}{\alpha^{2/3} - \#1^2(29\alpha+2}\right.\right.$$

✓ **Maple** : cpu = 0.082 (sec), leaf count = 42

$$\left\{y(x) = \frac{RootOf\left(\int^{-Z}(\_a^3\alpha + \_a^2\alpha + \alpha + \beta)^{-1}\,d\_a\alpha - x + \_C1\right)\alpha - \beta\,x}{\alpha}\right\}$$

2.853 ODE No. 853

$$y'(x) = \frac{x^3y(x)^3 + 6x^2y(x)^2 + 14xy(x) + 2x + 12}{x^2(xy(x) + x + 2)}$$

✓ **Mathematica** : cpu = 0.0230312 (sec), leaf count = 75

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

✓ **Maple** : cpu = 0.047 (sec), leaf count = 63

$$\left\{y(x) = \frac{1}{x}\left(-2\sqrt{\_C1 - 2x} - x - 2\right)\left(\sqrt{\_C1 - 2x} + 1\right)^{-1}, y(x) = \frac{1}{x}\left(-2\sqrt{\_C1 - 2x} + x + 2\right)\left(\sqrt{\_\right.$$

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 = 0.767822 (sec), leaf count = 0 , could not solve

```
DSolve[Derivative[1][y][x] == ((-1 + Log[x] + x^2*Log[x]^2 + Log[y[x]] + 2*x^2*Log[x]*
```

✓ **Maple** : cpu = 0.342 (sec), leaf count = 51

$$\left\{y(x) = 1\left(x^{\frac{x^3}{x^3+3\_C1}}\right)^{-1}\left(x^{\frac{\_C1}{x^3+3\_C1}}\right)^{-3}\left(e^{\frac{x}{x^3+3\_C1}}\right)^{-3}\right\}$$

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 = 0.804365 (sec), leaf count = 0 , could not solve

```
DSolve[Derivative[1][y][x] == ((-1 + Log[x] + x^3*Log[x]^2 + Log[y[x]] + 2*x^3*Log[x]*
```

✓ **Maple** : cpu = 0.354 (sec), leaf count = 51

$$\left\{y(x) = 1\left(x^{\frac{x^4}{x^4+4\_C1}}\right)^{-1}\left(x^{\frac{\_C1}{x^4+4\_C1}}\right)^{-4}\left(e^{\frac{x}{x^4+4\_C1}}\right)^{-4}\right\}$$

2.856 ODE No. 856

$$y'(x) = -\frac{x\left(-\_\mathrm{F1}(y(x)^2 - 2x) - \frac{1}{x}\right)}{\sqrt{y(x)^2}}$$

✓ **Mathematica** : cpu = 1.05229 (sec), leaf count = 100

$$\text{Solve}\left[c_1 = \int_1^{y(x)} \left(\frac{\sqrt{K[2]^2}}{\_\mathrm{F1}\left(K[2]^2 - 2x\right)} - \int_1^x \frac{2K[2]\_\mathrm{F1}'(K[2]^2 - 2K[1])}{\left(\_\mathrm{F1}\left(K[2]^2 - 2K[1]\right)\right)^2} dK[1]\right) dK[2] + \int_1^x \left(-\frac{}{\_\mathrm{F1}\,(y(}\right.\right.$$

✓ **Maple** : cpu = 0.372 (sec), leaf count = 65

$$\left\{y(x) = \sqrt{2\,RootOf\left(x^2 - 2\int^{\_Z} (\_F1\,(2\,\_a))^{-1}\,d\_a + 4\,\_C1\right) + 2\,x}, y(x) = -\sqrt{2\,RootOf\left(x^2 - 2\int\right.}\right.$$

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 = 0.383251 (sec), leaf count = 77

$$\left\{\left\{y(x) \to \left(\frac{4}{3} - c_1\right)x^4 - \frac{4c_1x^3}{3} + \left(\frac{1}{4} - 4c_1\right)x + 2c_1^2 + \frac{x^8}{8} + \frac{x^7}{3} + \frac{2x^6}{9} + x^5 + \frac{15x^2}{8} - \frac{1}{8}\right\}\right\}$$

✓ **Maple** : cpu = 0.326 (sec), leaf count = 32

$$\left\{\_C1 + x^4 + \frac{4\,x^3}{3} + 4\,x - \sqrt{x^2 - 2\,x + 1 + 8\,y\,(x)} = 0\right\}$$

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 = 0.258441 (sec), leaf count = 136

$$\text{Solve}\left[3(29a+27b)^{2/3}\text{RootSum}\left[\#1^3(29a+27b)^{2/3} - 3\#1a^{2/3} + (29a+27b)^{2/3}\&, \frac{\log\left(\frac{3ay(x)+a+3bx}{a\sqrt[3]{\frac{27b}{a}+29}} - \#\right.}{a^{2/3} - \#1^2(29a+27b)}\right.\right.$$

✓ **Maple** : cpu = 0.081 (sec), leaf count = 42

$$\left\{y(x) = \frac{RootOf\left(\int^{\_Z}(\_a^3a + \_a^2a + a + b)^{-1}\,d\_aa - x + \_C1\right)a - bx}{a}\right\}$$

2.859 ODE No. 859

$$y'(x) = \frac{\_\text{F1}(y(x)^2 - 2x) + x}{x\sqrt{y(x)^2}}$$

✓ **Mathematica** : cpu = 1.52031 (sec), leaf count = 102

$$\text{Solve}\left[c_1 = \int_1^{y(x)}\left(\frac{\sqrt{K[2]^2}}{\_\text{F1}\left(K[2]^2 - 2x\right)} - \int_1^x \frac{2K[2]\_\text{F1}'(K[2]^2 - 2K[1])}{\left(\_\text{F1}\left(K[2]^2 - 2K[1]\right)\right)^2}dK[1]\right)dK[2] + \int_1^x\left(-\frac{}{\_\text{F1}\left(y(\right.}\right.\right.$$

✓ **Maple** : cpu = 0.32 (sec), leaf count = 63

$$\left\{y(x) = \sqrt{2\,RootOf\left(\ln(x) - \int^{\_Z}(\_F1\,(2\_a))^{-1}\,d\_a + 2\_C1\right) + 2\,x}, y(x) = -\sqrt{2\,RootOf\left(\ln(x) - \right.}\right.$$

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 = 0.171996 (sec), leaf count = 35

$$\left\{\left\{y(x) \to \tan^{-1}\left(\frac{c_1}{2x} + \frac{x^4}{5} + \frac{x^3}{4} + \frac{x}{2}\right)\right\}\right\}$$

✓ **Maple** : cpu = 2.081 (sec), leaf count = 29

$$\left\{y(x) = \arctan\left(\frac{4\,x^5 + 5\,x^4 + 10\,x^2 + 40\_C1}{20\,x}\right)\right\}$$

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 = 2.13422 (sec), leaf count = 137

$$\mathrm{Solve}\left[c_1 = \int_1^{y(x)} \left(-\int_1^x \frac{e^{\frac{1}{K[1]}}\left(\_\mathrm{F1}\left(e^{\frac{1}{K[1]}}K[2]\right) - e^{\frac{1}{K[1]}}K[2]\_\mathrm{F1}'\left(e^{\frac{1}{K[1]}}K[2]\right)\right)}{K[1]^2\left(\_\mathrm{F1}\left(e^{\frac{1}{K[1]}}K[2]\right)\right)^2}\, dK[1] - \frac{e^{\frac{1}{x}}}{\_\mathrm{F1}\left(e^{\frac{1}{x}}K[2]\right)}\right)\right.$$

✓ **Maple** : cpu = 0.197 (sec), leaf count = 26

$$\left\{y(x) = \frac{RootOf\left(-\ln(x) + \int^{\_Z}(\_F1(\_a))^{-1}\,d\_a + \_C1\right)}{e^{x^{-1}}}\right\}$$

2.862 ODE No. 862

$$y'(x) = -\log(y(x)-1)\left(\frac{\text{Ei}(-\log(y(x)-1))}{x} - \_\text{F1}(x)\right)$$

✗ **Mathematica** : cpu = 1.32494 (sec), leaf count = 0 , could not solve

```
DSolve[Derivative[1][y][x] == -(Log[-1 + y[x]]*(ExpIntegralEi[-Log[-1 + y[x]]]/x - _F1
```

✓ **Maple** : cpu = 0.249 (sec), leaf count = 27

$$\left\{y(x) = \mathrm{e}^{\mathit{RootOf}\left(\int \frac{-\mathit{F1}(x)}{x}\,\mathrm{d}x x + \_\mathit{C1}\,x + \mathit{Ei}(1,-\_Z)\right)} + 1\right\}$$

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 = 0.0402805 (sec), leaf count = 26

$$\left\{\left\{y(x) \to x\sinh\left(c_1 + \frac{x^4}{4} + \frac{x^3}{3} + x\right)\right\}\right\}$$

✓ **Maple** : cpu = 6.411 (sec), leaf count = 38

$$\left\{\ln\left(y(x) + \sqrt{(y(x))^2 + x^2}\right) - \frac{x^4}{4} - \frac{x^3}{3} - x - \ln(x) - \_\mathit{C1} = 0\right\}$$

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 = 0.0498129 (sec), leaf count = 98

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

✓ **Maple** : cpu = 0.105 (sec), leaf count = 162

$$\left\{y(x) = 1\left(\mathrm{e}^{\frac{x^2}{2}}\left(\sqrt{\_\mathit{C1} - 2\,x} - 1\right)\mathrm{e}^{-\frac{x^2}{4}} - \mathrm{e}^{\frac{x^2}{4}}\sqrt{\_\mathit{C1} - 2\,x}\right)\left(\mathrm{e}^{-\frac{x^2}{4}}\right)^{-1}\left(\mathrm{e}^{-\frac{x^2}{4}}\mathrm{e}^{\frac{x^2}{2}} + \mathrm{e}^{\frac{x^2}{4}}\sqrt{\_\mathit{C1} - 2\,x}\right)^{-1},\right.$$

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 = 300. (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.352 (sec), leaf count = 23

$$\left\{y(x) = e^{\int \frac{f(x)}{\ln(x)}\,dx \ln(x)} x^{-C1} + 1\right\}$$

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 = 0.545014 (sec), leaf count = 85

$$\left\{\left\{y(x) \to -\frac{a^2}{4} - \frac{ax}{2} - \frac{1}{6}(3c_1 - 4)\,x^4 - \frac{2c_1x^3}{3} - 2c_1x + c_1^2 + \frac{x^8}{16} + \frac{x^7}{6} + \frac{x^6}{9} + \frac{x^5}{2} + \frac{3x^2}{4}\right\}\right\}$$

✓ **Maple** : cpu = 0.368 (sec), leaf count = 37

$$\left\{\_C1 + \frac{x^4}{2} + \frac{2\,x^3}{3} + 2\,x - \sqrt{x^2 + 2\,ax + a^2 + 4\,y\,(x)} = 0\right\}$$

2.867 ODE No. 867

$$y'(x) = \frac{x^6}{27} + \frac{1}{3}x^4y(x) + \frac{x^4}{9} + x^2y(x)^2 + \frac{2}{3}x^2y(x) + y(x)^3 + y(x)^2 - \frac{2x}{3} + 1$$

✓ **Mathematica** : cpu = 0.105247 (sec), leaf count = 75

$$\text{Solve}\left[87\text{RootSum}\left[-29\#1^3 + 3\sqrt[3]{29}\#1 - 29\&, \frac{\log\left(\frac{x^2+3y(x)+1}{\sqrt[3]{29}} - \#1\right)}{\sqrt[3]{29} - 29\#1^2}\&\right] + 9c_1 + 29^{2/3}x = 0, y(x)\right]$$

✓ **Maple** : cpu = 0.079 (sec), leaf count = 30

$$\left\{y(x) = -\frac{x^2}{3} + \mathit{RootOf}\left(-x + \int^{\_Z}\left(\_a^3 + \_a^2 + 1\right)^{-1} d\_a + \_C1\right)\right\}$$

2.868 ODE No. 868

$$y'(x) = -x^6 + 3x^4 y(x) + x^4 - 3x^2 y(x)^2 - 2x^2 y(x) + y(x)^3 + y(x)^2 + 2x + 1$$

✓ **Mathematica** : cpu = 0.0701453 (sec), leaf count = 77

$$\text{Solve}\left[87\text{RootSum}\left[-29\#1^3 + 3\sqrt[3]{29}\#1 - 29\&, \frac{\log\left(\frac{-3x^2+3y(x)+1}{\sqrt[3]{29}} - \#1\right)}{\sqrt[3]{29} - 29\#1^2}\&\right] + 9c_1 + 29^{2/3}x = 0, y(x)\right]$$

✓ **Maple** : cpu = 0.074 (sec), leaf count = 28

$$\left\{y(x) = x^2 + \mathit{RootOf}\left(-x + \int^{\_Z}\left(\_a^3 + \_a^2 + 1\right)^{-1} d\_a + \_C1\right)\right\}$$

2.869 ODE No. 869

$$y'(x) = \frac{2x^5 + 2x^4 - 2x^3 y(x) + x^3 - 2x^2 y(x) + 3x^2 - 2y(x) - x + 1}{x^2 - y(x)}$$

✓ **Mathematica** : cpu = 0.0418731 (sec), leaf count = 42

$$\left\{\left\{y(x) \to \frac{1}{2}\left(W\left(-e^{c_1 + x^4 + \frac{4x^3}{3} - 2x^2 + 4x - 1}\right) + 1\right) + x^2\right\}\right\}$$

✓ **Maple** : cpu = 0.111 (sec), leaf count = 37

$$\left\{y(x) = x^2 + \frac{1}{2}\mathit{lambertW}\left(-2\,\frac{e^{x^4} e^{4/3\,x^3}\_C1\,\left(e^x\right)^4 e^{-1}}{\left(e^{x^2}\right)^2}\right) + \frac{1}{2}\right\}$$

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 = 2.01045 (sec), leaf count = 32

$$\left\{\left\{y(x) \to -x\log\left(-\frac{c_1}{x} - \frac{x^3}{4} - \frac{x^2}{3} - 1\right)\right\}\right\}$$

✓ **Maple** : cpu = 1.033 (sec), leaf count = 30

$$\left\{y(x)=-\ln\left(-\frac{3\,x^4+4\,x^3+12\_C1+12\,x}{12\,x}\right)x\right\}$$

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 = 0.0276437 (sec), leaf count = 22

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

✓ **Maple** : cpu = 0.091 (sec), leaf count = 26

$$\left\{y(x)=\frac{-1+(\_C1-x)\ln(2\,x+1)}{-\_C1+x}\right\}$$

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 = 0.0519894 (sec), leaf count = 92

$$\left\{\left\{y(x)\to\sqrt{-\frac{1}{x}}\sqrt{-x\left(c_1+2\log(x)+1\right)}+\frac{2x^3}{5}+2\sqrt{x}-1\right\},\left\{y(x)\to\left(-\frac{1}{x}\right)^{3/2}x\sqrt{-x\left(c_1+2\log(x)\right.}\right.$$

✓ **Maple** : cpu = 0.073 (sec), leaf count = 49

$$\left\{y(x)=\frac{2\,x^3}{5}+2\,\sqrt{x}-\sqrt{\_C1+2\,\ln(x)}-1,y(x)=\frac{2\,x^3}{5}+2\,\sqrt{x}+\sqrt{\_C1+2\,\ln(x)}-1\right\}$$

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 = 0.703386 (sec), leaf count = 48

$$\text{Solve}\left[\frac{1}{192}\left(-16y(x)^3-12y(x)^2+12y(x)-\frac{96}{2xy(x)+x}-54\log(4y(x)+2)+7\right)=c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.309 (sec), leaf count = 50

$$\left\{y(x)=\frac{e^{\mathit{RootOf}\left(2x\left(e^{\_Z}\right)^4-3x\left(e^{\_Z}\right)^3-6\left(e^{\_Z}\right)^2x+48\_C1\,xe^{\_Z}+54\_Z\,e^{\_Z}x+7\,e^{\_Z}x+96\right)}}{2}-\frac{1}{2}\right\}$$

2.874 ODE No. 874

$$y'(x)=\frac{1}{512}x\left(a^3x^{12}+24a^2x^8y(x)+8a^2x^8+192ax^4y(x)^2+128ax^4y(x)-256ax^2+512y(x)^3+512y(x)^2\right.$$

✓ **Mathematica** : cpu = 0.108145 (sec), leaf count = 95

$$\text{Solve}\left[174\text{RootSum}\left[-29\#1^3+3\sqrt[3]{29}\#1-29\&,\frac{\log\left(\frac{x\left(3ax^4+24y(x)+8\right)}{8\sqrt[3]{29}\sqrt[3]{x^3}}-\#1\right)}{\sqrt[3]{29}-29\#1^2}\&\right]+18c_1+29^{2/3}\left(x^3\right)^{2/3}=\right.$$

✓ **Maple** : cpu = 0.061 (sec), leaf count = 40

$$\left\{y(x)=-\frac{ax^4}{8}-\frac{1}{3}+\frac{29\,\mathit{RootOf}\left(x^2-162\int^{\_Z}\left(841\_a^3-27\_a+27\right)^{-1}d\_a+6\_C1\right)}{9}\right\}$$

2.875 ODE No. 875

$$y'(x) = \frac{x^5\left(-\sqrt{x^2+y(x)^2}\right) + x^4 y(x)\sqrt{x^2+y(x)^2} + xy(x) + y(x)}{x(x+1)}$$

✓ **Mathematica** : cpu = 0.397783 (sec), leaf count = 213

$$\left\{\left\{y(x) \to \frac{x\left(2(x+1)^{\sqrt{2}}\exp\left(\frac{12c_1+3x^4+6x^2+4(x^2+3)x+25}{6\sqrt{2}}\right) + (x+1)^{2\sqrt{2}}\left(-e^{\frac{4c_1+x^4+2x^2}{\sqrt{2}}}\right) + e^{\frac{4x^3+12x+25}{3\sqrt{2}}}\right)}{-2(x+1)^{\sqrt{2}}\exp\left(\frac{12c_1+3x^4+6x^2+4(x^2+3)x+25}{6\sqrt{2}}\right) + (x+1)^{2\sqrt{2}}\left(-e^{\frac{4c_1+x^4+2x^2}{\sqrt{2}}}\right) + e^{\frac{4x^3+12x+25}{3\sqrt{2}}}}\right\}\right\}$$

✓ **Maple** : cpu = 0.295 (sec), leaf count = 73

$$\left\{\ln\left(2\,\frac{x\left(\sqrt{2\,(y(x))^2+2\,x^2}+y(x)+x\right)}{y(x)-x}\right) + \sqrt{2}\ln(1+x) + \frac{(3\,x^4-4\,x^3+6\,x^2-12\,x)\sqrt{2}}{12} - \_C1 -$$

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 = 0.0231 (sec), leaf count = 89

$$\left\{\left\{y(x) \to \frac{2}{\sqrt{2}\sqrt{-\frac{1}{x}}\sqrt{-x\left(2c_1-\log(x)+2\right)}+x-2}\right\},\left\{y(x) \to -\frac{2}{\sqrt{2}\sqrt{-\frac{1}{x}}\sqrt{-x\left(2c_1-\log(x)+2\right)}-\right.$$

✓ **Maple** : cpu = 0.059 (sec), leaf count = 41

$$\left\{y(x) = -4\left(\sqrt{\_C1-8\,\ln(x)}-2\,x+4\right)^{-1}, y(x) = 4\left(\sqrt{\_C1-8\,\ln(x)}+2\,x-4\right)^{-1}\right\}$$

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 = 0.02127 (sec), leaf count = 47

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

✓ **Maple** : cpu = 0.056 (sec), leaf count = 73

$$\left\{y(x) = \frac{1}{-2\_C1 + 2x}\left(-2\_C1\, x^2 + 2x^3 + \sqrt{2\_C1 - 2x + 1} - 1\right), y(x) = \frac{1}{-2x + 2\_C1}\left(2\_C1\, x^2\right.$$

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 = 0.325962 (sec), leaf count = 128

$$\text{Solve}\left[2ax = a\text{RootSum}\left[64\#1^3a^3 - 48\#1^2a^2y(x)^2 - 16\#1^2a^2 + 12\#1ay(x)^4 + 8\#1ay(x)^2 + 2a - y(x)^6\right.\right.$$

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

```
dsolve(diff(y(x),x) = (1+y(x)^4-8*a*x*y(x)^2+16*a^2*x^2+y(x)^6-12*y(x)^4*a*x+48*y(x)^2
64*a^3*x^3)/y(x),y(x))
```

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 = 0.198454 (sec), leaf count = 109

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

✓ **Maple** : cpu = 0.26 (sec), leaf count = 55

$$\left\{\ln\left(2\,\frac{x\left(\sqrt{2\,\left(y\left(x\right)\right)^{2}+2\,x^{2}}+y(x)+x\right)}{y\left(x\right)-x}\right)+\sqrt{2}x-\sqrt{2}\ln\left(1+x\right)-\ln\left(x\right)-\_C1=0\right\}$$

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 = 0.173741 (sec), leaf count = 126

$$\text{Solve}\left[8ac_1=\frac{\text{RootSum}\left[-64\#1^3a^3+48\#1^2a^2y(x)^2+16\#1^2a^2-12\#1ay(x)^4-8\#1ay(x)^2+y(x)^6+y}{a}$$

✓ **Maple** : cpu = 0.079 (sec), leaf count = 41

$$\left\{\frac{y(x)}{2\,a}+\frac{\int^{(y(x))^2-4\,ax}(\_a^3+\_a^2+1)^{-1}\,d\_a}{8\,a^2}-\_C1=0\right\}$$

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 = 0.0212978 (sec), leaf count = 57

$$\left\{\left\{y(x)\to\frac{27}{\sqrt{c_1-1458x}-27}-\frac{x^2}{3}\right\},\left\{y(x)\to-\frac{27}{\sqrt{c_1-1458x}+27}-\frac{x^2}{3}\right\}\right\}$$

✓ **Maple** : cpu = 0.059 (sec), leaf count = 77

$$\left\{y(x)=\frac{1}{6\_C1-6\,x}\left(-2\_C1\,x^2+2\,x^3-3\,\sqrt{2\_C1-2\,x+1}+3\right),y(x)=\frac{1}{6\_C1-6\,x}\left(-2\_C1\,x^2\right.$$

2.882 ODE No. 882

$$y'(x) = -\frac{1}{216}\sqrt{x}\left(-108x^{3/2} + x^9 - 18x^6y(x) - 6x^6 + 108x^3y(x)^2 + 72x^3y(x) - 216y(x)^3 - 216y(x)^2 - 21\right.$$

✓ **Mathematica** : cpu = 0.119687 (sec), leaf count = 106

$$\text{Solve}\left[261\text{RootSum}\left[-29\#1^3 + 3\sqrt[3]{29}\#1 - 29\&, \frac{\log\left(-\#1 - \frac{\sqrt{x}(x^3-6y(x)-2)}{2\sqrt[3]{29}\sqrt[3]{x^{3/2}}}\right)}{\sqrt[3]{29} - 29\#1^2}\&\right] + 27c_1 + 2\ 29^{2/3}\sqrt{x}(x^3\right.$$

✓ **Maple** : cpu = 0.073 (sec), leaf count = 41

$$\left\{y(x) = \frac{x^3}{6} - \frac{1}{3} + \frac{29}{9}RootOf\left(2\,x^{3/2} - 243\int^{\_Z}\left(841\_a^3 - 27\_a + 27\right)^{-1}d\_a + 9\_C1\right)\right\}$$

2.883 ODE No. 883

$$y'(x) = \frac{x(a^3y(x)^6 + a^3y(x)^4 + a^3 + 3a^2bx^2y(x)^4 + 2a^2bx^2y(x)^2 + 3ab^2x^4y(x)^2 + ab^2x^4 + b^3x^6)}{a^{7/2}y(x)}$$

✓ **Mathematica** : cpu = 1.73623 (sec), leaf count = 159

$$\text{Solve}\left[x^2 = a^{5/2}\text{RootSum}\left[\#1^3b^3 + 3\#1^2ab^2y(x)^2 + \#1^2ab^2 + 3\#1a^2by(x)^4 + 2\#1a^2by(x)^2 + a^{5/2}b + a^3y\right.\right.$$

✓ **Maple** : cpu = 0.742 (sec), leaf count = 352

$$\left\{\int_{\_b}^{x}(b^3\_a^6 + 3\,(y(x))^2\,ab^2\_a^4 + 3\,(y(x))^4\,a^2b\_a^2 + (y(x))^6\,a^3 + a\_a^4b^2 + 2\,a^2(y(x))^2\,b\_a^2 + (y(x))^4\,a^3\right.$$

2.884 ODE No. 884

$$y'(x) = -\frac{x(x^6 - 3x^4y(x)^2 - x^4 + 3x^2y(x)^4 + 2x^2y(x)^2 - y(x)^6 - y(x)^4 - 1)}{y(x)}$$

✓ **Mathematica** : cpu = 0.62982 (sec), leaf count = 71

$$\text{Solve}\left[\frac{1}{4}\left(2\log\left(-x^2 + y(x)^2 + 1\right) - 2x^2 - \frac{1}{y(x)(y(x)+x)} + \frac{1}{xy(x) - y(x)^2} - 2\log(x - y(x)) - 2\log(y(x\right.\right.$$

✓ **Maple** : cpu = 0.503 (sec), leaf count = 107

$$\left\{y(x) = e^{RootOf\left(3\,x^2\left(e^{\_Z}\right)^2 - 6\,x^3 e^{\_Z} - 3\left(e^{\_Z}\right)^2 \ln\left(\frac{\left(e^{\_Z}\right)^2 - 2\,e^{\_Z}x + 1}{e^{\_Z} - 2\,x}\right) - 2\left(e^{\_Z}\right)^2 \_C1 + 3\,\_Z\left(e^{\_Z}\right)^2 + 6\,e^{\_Z}\ln\left(\frac{\left(e^{\_Z}\right)^2 - 2\,e^{\_Z}x + 1}{e^{\_Z} - 2\,x}\right)x + \right.}\right.$$

2.885 ODE No. 885

$$y'(x) = -\frac{i(x^6 + 12x^4y(x)^2 + 4x^4 + 48x^2y(x)^4 + 32x^2y(x)^2 + 64y(x)^6 + 64y(x)^4 + 32ix + 64)}{128y(x)}$$

✗ **Mathematica** : cpu = 40.9953 (sec), leaf count = 0 , could not solve

```
DSolve[Derivative[1][y][x] == ((-I/128)*(64 + (32*I)*x + 4*x^4 + x^6 + 32*x^2*y[x]^2 +
```

✗ **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
```

2.886 ODE No. 886

$$y'(x) = \frac{x^6y(x)^3 - 3x^5y(x)^2 + x^4y(x)^2 + 3x^4y(x) - 4x^3y(x) - x^3 + 2x^2 + 1}{x^4}$$

✓ **Mathematica** : cpu = 0.09962 (sec), leaf count = 79

$$\text{Solve}\left[87\text{RootSum}\left[-29\#1^3 + 3\sqrt[3]{29}\#1 - 29\&, \frac{\log\left(\frac{3x^2y(x)-3x+1}{\sqrt[3]{29}} - \#1\right)}{\sqrt[3]{29} - 29\#1^2}\&\right] + 9c_1 = \frac{29^{2/3}}{x}, y(x)\right]$$

✓ **Maple** : cpu = 0.049 (sec), leaf count = 42

$$\left\{y(x) = \frac{9\,x - 3 + 29\,RootOf\left(-81\int^{\_Z}\left(841\,\_a^3 - 27\,\_a + 27\right)^{-1} d\_a x + 3\,\_C1\,x - 1\right)}{9\,x^2}\right\}$$

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 = 0.0302666 (sec), leaf count = 91

$$\left\{\left\{y(x) \to \frac{a^3}{\sqrt{c_1 - 2a^6x} - a^3} - \frac{1}{ax}\right\}, \left\{y(x) \to -\frac{\sqrt{c_1 - 2a^6x} + a^4x + a^3}{ax\sqrt{c_1 - 2a^6x} + a^4x}\right\}\right\}$$

✓ **Maple** : cpu = 0.06 (sec), leaf count = 72

$$\left\{y(x) = \frac{1}{ax}\left(-ax - \sqrt{\_C1 - 2x} - 1\right)\left(\sqrt{\_C1 - 2x} + 1\right)^{-1}, y(x) = \frac{1}{ax}\left(ax - \sqrt{\_C1 - 2x} + 1\right)\left(\sqrt{\_\right.\right.$$

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 = 0.0235739 (sec), leaf count = 67

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

✓ **Maple** : cpu = 0.071 (sec), leaf count = 79

$$\left\{y(x) = \frac{1}{x^2}\left(\sqrt{\frac{\_C1\,x + 2}{x}}x - x + 1\right)\left(\sqrt{\frac{\_C1\,x + 2}{x}} - 1\right)^{-1}, y(x) = \frac{1}{x^2}\left(\sqrt{\frac{\_C1\,x + 2}{x}}x + x - 1\right)\left(\sqrt{\right.\right.$$

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 = 300.29 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 1.217 (sec), leaf count = 49

$$\left\{e^x - \frac{2}{3}\ln\left((y(x))^{\frac{3}{2}} - \frac{3\,e^x}{2} + 1\right) - 4\left(-6\,(y(x))^{3/2} + 9\,e^x\right)^{-1} + \frac{2}{3}\ln\left((y(x))^{\frac{3}{2}} - \frac{3\,e^x}{2}\right) - \_C1 = 0\right\}$$

2.890 ODE No. 890

$$y'(x) = \frac{x}{x^6 + 3x^4 y(x)^2 + x^4 + 3x^2 y(x)^4 + 2x^2 y(x)^2 + y(x)^6 + y(x)^4 - y(x) + 1}$$

✓ **Mathematica** : cpu = 0.174856 (sec), leaf count = 103

$$\text{Solve}\left[\text{RootSum}\left[\#1^3 + 3\#1^2 y(x)^2 + \#1^2 + 3\#1 y(x)^4 + 2\#1 y(x)^2 + y(x)^6 + y(x)^4 + 1\&, \frac{}{3\#1^2 + 6\#1 y(}\right.\right.$$

✓ **Maple** : cpu = 0.806 (sec), leaf count = 34

$$\left\{-y(x) + \frac{\int^{(y(x))^2 + x^2} \left(\_a^3 + \_a^2 + 1\right)^{-1} d\_a}{2} - \_C1 = 0\right\}$$

2.891 ODE No. 891

$$y'(x) = \frac{y(x)^2\left(x^4 y(x) + 2x^2 y(x) + 2x^2 - 2y(x)\right)}{x^3\left(x^2 y(x) + x^2 - y(x)\right)}$$

✓ **Mathematica** : cpu = 0.0302647 (sec), leaf count = 86

$$\left\{\left\{y(x) \to \frac{x^2}{x^2\left(\sqrt{\frac{1}{x^5}}\sqrt{x^5\left(c_1 - 2\log(x) + 1\right)} - 1\right) + 1}\right\}, \left\{y(x) \to -\frac{x^2}{x^2\left(\sqrt{\frac{1}{x^5}}\sqrt{x^5\left(c_1 - 2\log(x) + 1\right)} + \right.}\right.\right.$$

✓ **Maple** : cpu = 0.07 (sec), leaf count = 56

$$\left\{y(x)=x^{2}\left(\sqrt{\_C1-2\ln(x)}x^{2}-x^{2}+1\right)^{-1},y(x)=-x^{2}\left(\sqrt{\_C1-2\ln(x)}x^{2}+x^{2}-1\right)^{-1}\right\}$$

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 = 300.026 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.607 (sec), leaf count = 40

$$\left\{y(x)=\mathrm{e}^{RootOf\left(-\_Z+\int^{\left(\mathrm{e}^{\_Z}\right)^{2}-2\,\mathrm{e}^{\_Z}x}\left(\mathrm{e}^{2\,(\_a+1)^{-1}}+\_a\right)^{-1}d\_a+\_C1\right)}-x\right\}$$

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 = 0.102397 (sec), leaf count = 77

$$\text{Solve}\left[87\text{RootSum}\left[-29\#1^3+3\sqrt[3]{29}\#1-29\&,\frac{\log\left(\frac{3xy(x)+x+6}{\sqrt[3]{29}x}-\#1\right)}{\sqrt[3]{29}-29\#1^2}\&\right]+9c_1+29^{2/3}x=0,y(x)\right]$$

✓ **Maple** : cpu = 0.044 (sec), leaf count = 41

$$\left\{y(x)=\frac{29\,RootOf\left(-81\int^{\_Z}\left(841\_a^{3}-27\_a+27\right)^{-1}d\_a+x+3\_C1\right)x-3\,x-18}{9\,x}\right\}$$

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 = 40.8903 (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
```

✗ **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+
```

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 = 0.0290958 (sec), leaf count = 63

$$\left\{\left\{y(x)\to \frac{512}{\sqrt{c_1-262144x^2}-512}-\frac{ax^4}{8}\right\},\left\{y(x)\to -\frac{ax^4}{8}-\frac{512}{\sqrt{c_1-262144x^2}+512}\right\}\right\}$$

✓ **Maple** : cpu = 0.064 (sec), leaf count = 79

$$\left\{y(x) = 1\left(-8+\left(-\sqrt{-x^2+\_C1}-1\right)ax^4\right)\left(8+8\sqrt{-x^2+\_C1}\right)^{-1}, y(x) = 1\left(8+\left(-\sqrt{-x^2+\_C1}\right.\right.\right.$$

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 = 0.272599 (sec), leaf count = 102

$$\text{Solve}\left[2(c_1+x) = \text{RootSum}\left[-\#1^3 + 3\#1^2y(x)^2 + \#1^2 - 3\#1y(x)^4 - 2\#1y(x)^2 + y(x)^6 + y(x)^4 + 1\&,\right.\right.$$

✓ **Maple** : cpu = 0.619 (sec), leaf count = 63

$$\left\{\int_{\_b}^{y(x)} \frac{\_a}{-\_a^6 + 3\,\_a^4x^2 - 3\,x^4\,\_a^2 + x^6 - \_a^4 + 2\,x^2\,\_a^2 - x^4 - 1}\,\mathrm{d}\_a + x - \_C1 = 0\right\}$$

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 = 0.0314452 (sec), leaf count = 65

$$\left\{\left\{y(x)\to\frac{x^3}{6}-\frac{216}{\sqrt{c_1-62208x^{3/2}}+216}\right\},\left\{y(x)\to\frac{216}{\sqrt{c_1-62208x^{3/2}}-216}+\frac{x^3}{6}\right\}\right\}$$

✓ **Maple** : cpu = 0.085 (sec), leaf count = 87

$$\left\{y(x)=1\left(\sqrt{9\_C1-12\,x^{3/2}}x^3-3\,x^3+18\right)\left(6\,\sqrt{9\_C1-12\,x^{3/2}}-18\right)^{-1},y(x)=1\left(\sqrt{9\_C1-12\,x^{3}}\right.\right.$$

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 = 0.0271506 (sec), leaf count = 95

$$\left\{\left\{y(x)\to\frac{-\sqrt{c_1+\frac{8192}{x}}+256x^2+64}{4x^2\left(\sqrt{c_1+\frac{8192}{x}}-64\right)}\right\},\left\{y(x)\to-\frac{\sqrt{c_1+\frac{8192}{x}}+256x^2+64}{4x^2\left(\sqrt{c_1+\frac{8192}{x}}+64\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.058 (sec), leaf count = 87

$$\left\{y(x)=\frac{1}{4\,x^2}\left(-4\,x^2-\sqrt{\frac{\_C1\,x+2}{x}}-1\right)\left(\sqrt{\frac{\_C1\,x+2}{x}}+1\right)^{-1},y(x)=\frac{1}{4\,x^2}\left(4\,x^2-\sqrt{\frac{\_C1\,x+2}{x}}+\right.\right.$$

2.899 ODE No. 899

$$y'(x) = \frac{x^6 y(x)^3 + x^6 y(x)^2 + x^6 + \frac{x^5}{2} + \frac{3}{4}x^4 y(x)^2 + \frac{1}{2}x^4 y(x) + \frac{3}{16}x^2 y(x) + \frac{x^2}{16} + \frac{1}{64}}{x^8}$$

✓ **Mathematica** : cpu = 0.120303 (sec), leaf count = 101

$$\text{Solve}\left[29^{2/3}\left(\frac{1}{x^6}\right)^{2/3} x^3 = 87\text{RootSum}\left[-29\#1^3 + 3\sqrt[3]{29}\#1 - 29\&, \frac{\log\left(\frac{12x^2 y(x)+4x^2+3}{4\sqrt[3]{29}\sqrt[3]{\frac{1}{x^6}}x^4} - \#1\right)}{\sqrt[3]{29} - 29\#1^2}\&\right] + 9c_1,$$

✓ **Maple** : cpu = 0.049 (sec), leaf count = 47

$$\left\{y(x) = \frac{116\, RootOf\left(-81\int^{\_Z}(841\_a^3 - 27\_a + 27)^{-1} d\_a x + 3\_C1\, x - 1\right) x^2 - 12\, x^2 - 9}{36\, x^2}\right\}$$

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 = 0.106797 (sec), leaf count = 381

$$\{\{y(x) \to \text{Root}[8\#1^5 a - 16\#1^4 a^2 c_1 - 64\#1^3 a^2 x + \#1^2(128a^3 c_1 x - 2) + 128\#1 a^3 x^2 - 256 a^4 c_1 x^2 + 8ax$$

✓ **Maple** : cpu = 0.086 (sec), leaf count = 48

$$\left\{\frac{y(x)}{2\,a} - \frac{1}{16\,a^2\left((y(x))^2 - 4\,ax\right)^2} + \left(32\,a^3 x - 8\,a^2 (y(x))^2\right)^{-1} - \_C1 = 0\right\}$$

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 = 0.169782 (sec), leaf count = 29

$$\text{Solve}\left[2c_1 + x^2 + 2y(x)(\log(y(x)) + \log(x)) = 2ax\log(y(x)), y(x)\right]$$

✓ **Maple** : cpu = 0.631 (sec), leaf count = 30

$$\left\{y(x) = \mathrm{e}^{\mathit{RootOf}\left(-2\_Z\,ax+2\,\mathrm{e}^{-\_Z}\ln(x)+2\_Z\,\mathrm{e}^{-\_Z}+2\_\mathit{C1}\,a+x^2\right)}\right\}$$

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 = 0.120381 (sec), leaf count = 195

$$\left\{\left\{y(x) \to -\frac{1}{2}\sqrt{-\frac{4c_1x^2 + \sqrt{4c_1 - 4x + 1} - 4x^3 + 1}{x - c_1}}\right\}, \left\{y(x) \to \frac{1}{2}\sqrt{-\frac{4c_1x^2 + \sqrt{4c_1 - 4x + 1} - 4x^3 +}{x - c_1}}\right.$$

✓ **Maple** : cpu = 0.269 (sec), leaf count = 183

$$\left\{y(x) = \frac{1}{2\_\mathit{C1} + 6\,x}\sqrt{(\_\mathit{C1} + 3\,x)\left(4\_\mathit{C1}\,x^2 + 12\,x^3 - \sqrt{-12\_\mathit{C1} - 36\,x + 9} - 3\right)}, y(x) = \frac{1}{2\_\mathit{C1} +}\right.$$

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 = 0.0689802 (sec), leaf count = 19

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

✓ **Maple** : cpu = 0.09 (sec), leaf count = 48

$$\left\{y(x)=\arctan\left(2\frac{e^{x}\_C1}{\_C1^{2}(e^{x})^{2}+1},\frac{-\_C1^{2}(e^{x})^{2}+1}{\_C1^{2}(e^{x})^{2}+1}\right)x\right\}$$

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 = 0.0588351 (sec), leaf count = 23

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

✓ **Maple** : cpu = 0.071 (sec), leaf count = 64

$$\left\{y(x)=\arctan\left(2\frac{e^{1/2\,x^{2}}\_C1}{(e^{1/2\,x^{2}})^{2}\_C1^{2}+1},1\left(-\left(e^{\frac{x^{2}}{2}}\right)^{2}\_C1^{2}+1\right)\left(\left(e^{\frac{x^{2}}{2}}\right)^{2}\_C1^{2}+1\right)^{-1}\right)x\right\}$$

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 = 0.0879962 (sec), leaf count = 83

$$\text{Solve}\left[87\text{RootSum}\left[-29\#1^3+3\sqrt[3]{29}\#1-29\&,\frac{\log\left(\frac{\frac{ax+3}{ax}+3y(x)}{\sqrt[3]{29}}-\#1\right)}{\sqrt[3]{29}-29\#1^2}\&\right]+9c_1+29^{2/3}x=0,y(x)\right]$$

✓ **Maple** : cpu = 0.057 (sec), leaf count = 46

$$\left\{y(x)=\frac{29\,\mathit{RootOf}\left(-81\int^{-Z}(841\_a^{3}-27\_a+27)^{-1}d\_a+x+3\_C1\right)ax-3\,ax-9}{9\,ax}\right\}$$

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 = 0.0629981 (sec), leaf count = 326

$$\{\{y(x) \to \text{Root}[4\#1^5 - 4\#1^4c_1 + 8\#1^3x^2 + \#1^2(2 - 8c_1x^2) + 4\#1x^4 - 4c_1x^4 + 2x^2 + 1\&, 1]\}, \{y(x) -$$

✓ **Maple** : cpu = 0.346 (sec), leaf count = 37

$$\left\{-\frac{1}{4\left((y(x))^2 + x^2\right)^2} - \left(2x^2 + 2(y(x))^2\right)^{-1} - y(x) + \_C1 = 0\right\}$$

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 = 0.0612222 (sec), leaf count = 21

$$\left\{\left\{y(x) \to \frac{1}{c_1 - \log(x)} + x + x(-\cos(x))\right\}\right\}$$

✓ **Maple** : cpu = 0.169 (sec), leaf count = 20

$$\{y(x) = -(-1 + \cos(x))x + (\_C1 - \ln(x))^{-1}\}$$

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 = 1.88568 (sec), leaf count = 1003

$$\left\{\left\{y(x) \to \frac{c_1 + \sqrt[3]{-9x^2c_1a^6 + 27x^2c_1a^4 + 27a^4 - 27x^2c_1a^2 - 54a^2 + c_1^3 + 9x^2c_1 + \frac{1}{2}\sqrt{4\left(-9x^2c_1a^6 + 27\right.}}}{}\right.\right.$$

✓ **Maple** : cpu = 0.422 (sec), leaf count = 1742

$$\left\{y(x) = -\frac{9^{\frac{2}{3}}}{54\,a^2-54}\left(\left(2\_C1\,a^2-2\_C1\right)\sqrt[3]{9}\sqrt[3]{(a+1)^2\,(a-1)^2\left(\frac{1}{3}\sqrt{-3\,(a-1)^5\,(a+1)^5\,x^6+6\_C\right.}}\right.\right.$$

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 = 40.8656 (sec), leaf count = 0 , could not solve

```
DSolve[Derivative[1][y][x] == (1 + x + x^3 + 3*x*y[x]^2 + 2*x^2*y[x]^2 + 3*x^2*y[x]^4
```

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

```
dsolve(diff(y(x),x) = (x^3+y(x)^4*x^3+2*x^2*y(x)^2+x+x^3*y(x)^6+3*x^2*y(x)^4+3*x*y(x)
```

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 = 0.106269 (sec), leaf count = 95

$$\text{Solve}\left[87\text{RootSum}\left[-29\#1^3 + 3\sqrt[3]{29}\#1 - 29\&, \frac{\log\left(\frac{x(3x^2+3xy(x)+1)}{\sqrt[3]{29}\sqrt[3]{x^3}} - \#1\right)}{\sqrt[3]{29} - 29\#1^2}\&\right] + 9c_1 + \frac{29^{2/3}\left(x^3\right)^{2/3}}{x} = 0,\right.$$

✓ **Maple** : cpu = 0.047 (sec), leaf count = 42

$$\left\{y(x) = \frac{-9\,x^2 + 29\,RootOf\left(-81\,\int^{\_Z}\left(841\,\_a^3 - 27\,\_a + 27\right)^{-1}d\_a + x + 3\_C1\right) - 3}{9\,x}\right\}$$

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 = 3.79748 (sec), leaf count = 53

$$\text{Solve}\left[c_1 + 2\sin(1)\log(y(x)) = \int_1^x \frac{2K[1]\sin(K[1])\_\text{F1}(K[1]) + 2\log(y(x))(\sin(K[1]) - K[1]\cos(K[1]))}{K[1]^2}\right.$$

✓ **Maple** : cpu = 0.607 (sec), leaf count = 30

$$\left\{y(x) = \mathrm{e}^{\frac{\_C1\, x}{\sin(x)}}\mathrm{e}^{\frac{x}{\sin(x)}\int\frac{\_F1(x)\sin(x)}{x}\,\mathrm{d}x}\right\}$$

2.912 ODE No. 912

$$y'(x) = \frac{2ax}{-128a^4 + 96a^3xy(x)^2 + 32a^3x - 24a^2x^2y(x)^4 - 16a^2x^2y(x)^2 + 2ax^3y(x)^6 + 2ax^3y(x)^4 + 2ax^3 -}$$

✓ **Mathematica** : cpu = 1.93003 (sec), leaf count = 199

$$\text{Solve}\left[y(x) = \text{RootSum}\left[-\#1^3y(x)^6 - \#1^3y(x)^4 - \#1^3 + 12\#1^2ay(x)^4 + 8\#1^2ay(x)^2 - 48\#1a^2y(x)^2 -\right.\right.$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , exception

```
time expired
```

2.913 ODE No. 913

$$y'(x) = \frac{y(x)^3 + y(x) + y(x)^3\left(-\log^3(x)\right) + y(x)^3\log^2(x) + 3y(x)^2\log^2(x) - 2y(x)^2\log(x) - 3y(x)\log(x)}{xy(x)}$$

✗ **Mathematica** : cpu = 299.998 (sec), leaf count = 0 , timed out

```
$Aborted
```

✓ **Maple** : cpu = 0.079 (sec), leaf count = 43

$$\left\{y(x) = 9\left(9\ln(x) + 56\,\mathit{RootOf}\left(-81\int^{\_Z}\left(3136\_a^3 - 27\_a + 27\right)^{-1}d\_a - \ln(x) + 3\_C1\right) - 3\right)^{-1}\right.$$

2.914 ODE No. 914

$$y'(x) = \frac{2a(-4a + xy(x)^2 + x)}{-128a^4 + 96a^3xy(x)^2 - 24a^2x^2y(x)^4 + 2ax^3y(x)^6 + 4ax^2y(x) - x^3y(x)^3 - x^3y(x)}$$

✓ **Mathematica** : cpu = 2.05103 (sec), leaf count = 401

$$\{\{y(x) \to \text{Root}\left[8\#1^5ax^2 - 8\#1^4ac_1x^2 - 64\#1^3a^2x + \#1^2\left(64a^2c_1x + 2x^2\right) + 128\#1a^3 - 128a^3c_1 - 8ax$$

✓ **Maple** : cpu = 3.152 (sec), leaf count = 71

$$\left\{\frac{x(y(x))^4 + (-4\,a + x)\,(y(x))^2 - 2\,a}{2\,a\,(y\,(x))^4\left(-x\,(y\,(x))^2 + 4\,a\right)^2} + \frac{8\,a(y(x))^5 + 2\,(y(x))^2 + 1}{16\,a^2\,(y\,(x))^4} + \_C1 = 0\right\}$$

2.915 ODE No. 915

$$y'(x) = \frac{y(x)^3 + y(x) - 8y(x)^3\log^3(x) + 4y(x)^3\log^2(x) + 12y(x)^2\log^2(x) - 4y(x)^2\log(x) - 6y(x)\log(x)}{xy(x)}$$

✗ **Mathematica** : cpu = 299.999 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.099 (sec), leaf count = 43

$$\left\{y(x) = 9\left(18\,\ln(x) + 83\,RootOf\left(-81\int^{\_Z}\left(6889\,\_a^3 - 27\,\_a + 27\right)^{-1}d\_a - \ln(x) + 3\,\_C1\right) - 3\right)^{-}$$

2.916 ODE No. 916

$$y'(x) = \frac{y(x)\left(x^4\log^2(y(x)) + 2x^4\log(x)\log(y(x)) + x^4\log^2(x) + x\log(y(x)) + \log(y(x)) - x + x\log(x) +}{x(x+1)}$$

✗ **Mathematica** : cpu = 2.62613 (sec), leaf count = 0 , could not solve

```
DSolve[Derivative[1][y][x] == ((-1 - x + Log[x] + x*Log[x] + x^4*Log[x]^2 + Log[y[x]]
```

✓ **Maple** : cpu = 0.469 (sec), leaf count = 73

$$\left\{y(x) = e^{\frac{-12\,\ln(x)\ln(1+x) + \left(-3\,x^4 + 4\,x^3 - 6\,x^2 + 12\,\_C1 + 12\,x\right)\ln(x) - 12\,x}{3\,x^4 - 4\,x^3 + 6\,x^2 + 12\,\ln(1+x) - 12\,\_C1 - 12\,x}}\right\}$$

2.917 ODE No. 917

$$y'(x) = \frac{y(x)\left(x\log^2(y(x)) + 2x\log(x)\log(y(x)) + x\log(y(x)) + \log(y(x)) - x + x\log^2(x) + x\log(x) + \mathrm{lo}\right.}{x(x+1)}$$

✗ **Mathematica** : cpu = 1.55329 (sec), leaf count = 0 , could not solve

```
DSolve[Derivative[1][y][x] == ((-1 - x + Log[x] + x*Log[x] + x*Log[x]^2 + Log[y[x]] +
```

✓ **Maple** : cpu = 0.378 (sec), leaf count = 38

$$\left\{y(x) = \mathrm{e}^{\frac{\ln(x)\ln(1+x)+(\_C1-x)\ln(x)-x}{-\ln(1+x)-\_C1+x}}\right\}$$

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 = 300.009 (sec), leaf count = 0 , timed out

```
$Aborted
```

✓ **Maple** : cpu = 1.384 (sec), leaf count = 41

$$\left\{x - \mathit{RootOf}\left(\int^{\_Z} \left(64\_a^3 + 16\_a^2 + 1\right)^{-1} d\_ay(x) + \_C1\, y(x) + 1\right) + \frac{1}{4\,(y\,(x))^2} = 0\right\}$$

2.919 ODE No. 919

$$y'(x) = \frac{\left(-y(x) + \sqrt{y(x)} + x\right)y(x)^{3/2}}{x^3 - 3x^2y(x) + 3xy(x)^2 + xy(x)^{3/2} - y(x)^3 - y(x)^{5/2} + y(x)^2}$$

✗ **Mathematica** : cpu = 300.651 (sec), leaf count = 0 , timed out

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$Aborted
```

✓ **Maple** : cpu = 0.179 (sec), leaf count = 61

$$\left\{-1\left(\left(x - y(x) - \sqrt{y\,(x)}\right)\sqrt{2\,y\,(x) - \sqrt{y\,(x)} - 2\,x} + \_C1\,(y(x) - x)^{\frac{3}{2}}\,(y(x))^{\frac{3}{4}}\right)(y(x) - x)^{-\frac{3}{2}}\,(y(x))^{-\frac{3}{4}}\right.$$

2.920 ODE No. 920

$$y'(x) = \frac{2y(x)^6 (4xy(x)^2 + y(x)^2 + 1)}{128x^3y(x)^6 + 96x^2y(x)^4 + 4xy(x)^5 + y(x)^5 + y(x)^3 + 24xy(x)^2 + 2}$$

✓ **Mathematica** : cpu = 0.276486 (sec), leaf count = 301

$$\{\{y(x) \to \text{Root}[\#1^5(128c_1x^2 - 8x - 1) + 128\#1^4x^2 + \#1^3(64c_1x - 2) + 64\#1^2x + 8\#1c_1 + 8\&, 1]\}, \{$$

✗ **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*
```

2.921 ODE No. 921

$$y'(x) = -y(x)\left(-\_\text{F1}(x) - \frac{\log(y(x))}{x} + \frac{\log(y(x))}{x\log(x)}\right)$$

✓ **Mathematica** : cpu = 3.23732 (sec), leaf count = 47

$$\text{Solve}\left[\text{ConditionalExpression}\left[c_1 = \int_1^x -\frac{K[1]\log(K[1])\_\text{F1}(K[1]) + \log(y(x))(\log(K[1]) - 1)}{K[1]^2}\, dK[1], \Re($$

✓ **Maple** : cpu = 0.188 (sec), leaf count = 30

$$\left\{y(x) = e^{\frac{\_C1\, x}{\ln(x)}} e^{\frac{x}{\ln(x)} \int \frac{\_F1(x)\ln(x)}{x}\, dx}\right\}$$

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 = 300.056 (sec), leaf count = 0 , timed out

```
$Aborted
```

✓ **Maple** : cpu = 0.188 (sec), leaf count = 47

$$\left\{\frac{\ln(y(x))}{2} - \int^{x\frac{1}{\sqrt{y(x)}} - \sqrt{y(x)}} \left(2\_a^3 + 2\_a^2 - \_a + 2\right)^{-1} d\_a - \_C1 = 0\right\}$$

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 = 299.998 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.376 (sec), leaf count = 36

$$\left\{y(x) = \mathrm{e}^{\mathit{RootOf}\left(-\_Z+\int^{\left(\mathrm{e}^{\_Z}\right)^2-2\,\mathrm{e}^{\_Z}x}\left(\mathrm{e}^{2\_a}+\_a\right)^{-1}d\_a+\_C1\right)} - x\right\}$$

2.924 ODE No. 924

$$y'(x) = -\frac{y(x)\left(-\_\mathrm{F1}(x) - \frac{\log^2(y(x))}{2x}\right)}{\log(y(x))}$$

✓ **Mathematica** : cpu = 1.0248 (sec), leaf count = 53

$$\mathrm{Solve}\left[\mathrm{ConditionalExpression}\left[2c_1 = 2\int_1^x -\frac{2K[1]\_\mathrm{F1}(K[1]) + \log^2(y(x))}{2K[1]^2}\,dK[1] + \log^2(y(x)), \Re(x) > 0 \lor\right.\right.$$

✓ **Maple** : cpu = 0.206 (sec), leaf count = 46

$$\left\{y(x) = \mathrm{e}^{\sqrt{2\int\frac{\_F1(x)}{x}\,\mathrm{d}x x+2\_C1\,x}}, y(x) = \mathrm{e}^{-\sqrt{2}\sqrt{x\left(\int\frac{\_F1(x)}{x}\,\mathrm{d}x+\_C1\right)}}\right\}$$

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 = 299.999 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.374 (sec), leaf count = 38

$$\left\{y(x) = \mathrm{e}^{\mathit{RootOf}\left(-\_Z+\int^{\left(\mathrm{e}^{\_Z}\right)^2-2\,\mathrm{e}^{\_Z}x}\left(\mathrm{e}^{2\_a^2}+\_a\right)^{-1}d\_a+\_C1\right)} - x\right\}$$

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 = 0.0309082 (sec), leaf count = 77

$$\left\{\left\{y(x)\to\frac{2\left(\sqrt{c_1+2048\log(x)}-64\right)}{x\left(\sqrt{c_1+2048\log(x)}-64\right)+128}\right\},\left\{y(x)\to\frac{2\left(\sqrt{c_1+2048\log(x)}+64\right)}{x\left(\sqrt{c_1+2048\log(x)}+64\right)-128}\right\}\right\}$$

✓ **Maple** : cpu = 0.102 (sec), leaf count = 67

$$\left\{y(x)=1\left(2\sqrt{\_C1+8\ln(x)}-8\right)\left(x\sqrt{\_C1+8\ln(x)}-4x+8\right)^{-1},y(x)=1\left(2\sqrt{\_C1+8\ln(x)}+8\right.\right.$$

2.927 ODE No. 927

$$y'(x)=-\frac{1}{8}x\left(12e^{-x^2}x^2y(x)^2+8e^{-x^2}x^2y(x)+8e^{-x^2}x^2-8e^{-x^2}+e^{-3x^2}x^6-6e^{-2x^2}x^4y(x)-2e^{-2x^2}x^4-8y\right.$$

✓ **Mathematica** : cpu = 0.168687 (sec), leaf count = 100

$$\text{Solve}\left[174\text{RootSum}\left[-29\#1^3+3\sqrt[3]{29}\#1-29\&,\frac{\log\left(\frac{-\frac{3}{2}e^{-x^2}x^3+3xy(x)+x}{\sqrt[3]{29}\sqrt[3]{x^3}}-\#1\right)}{\sqrt[3]{29}-29\#1^2}\&\right]+18c_1+29^{2/3}\left(x^3\right)^{2/3}\right.$$

✓ **Maple** : cpu = 0.146 (sec), leaf count = 68

$$\left\{y(x)=\frac{58\,RootOf\left(x^2-162\int^{\_Z}(841\_a^3-27\_a+27)^{-1}d\_a+6\_C1\right)+\left(9x^2-6e^{x^2}\right)e^{-x^2}}{18e^{-x^2}e^{x^2}}\right\}$$

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 = 1.7204 (sec), leaf count = 22

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

✓ **Maple** : cpu = 0.48 (sec), leaf count = 20

$$\left\{y(x) = -\ln\left(\frac{-\ln(1+x) + \_C1}{x}\right)x\right\}$$

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 = 299.998 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.063 (sec), leaf count = 42

$$\left\{y(x) = 18\left(58\,RootOf\left(-324\int^{\_Z}\left(841\_a^3 - 27\_a + 27\right)^{-1}d\_a - \ln(x) + 12\_C1\right) + 9x - 6\right)^{-1}\right\}$$

2.930 ODE No. 930

$$y'(x) = \frac{e^{\frac{y(x)}{x}}\left(x^4 + x^2e^{-\frac{y(x)}{x}} + xe^{-\frac{y(x)}{x}} + xe^{-\frac{y(x)}{x}}y(x) + e^{-\frac{y(x)}{x}}y(x)\right)}{x(x+1)}$$

✓ **Mathematica** : cpu = 2.02138 (sec), leaf count = 38

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

✓ **Maple** : cpu = 0.712 (sec), leaf count = 36

$$\left\{y(x) = -\ln\left(\frac{-2x^3 + 3x^2 + 6\ln(1+x) - 6\_C1 - 6x}{6x}\right)x\right\}$$

2.931 ODE No. 931

$$y'(x) = \frac{x^6 + 3x^5y(x) + 3x^4y(x)^2 + x^3y(x)^3 - 2x^3 - 3x^2y(x) - xy(x)^2 - y(x) - 2x}{x(x^2 + xy(x) + 1)}$$

✓ **Mathematica** : cpu = 0.0304228 (sec), leaf count = 53

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

✓ **Maple** : cpu = 0.057 (sec), leaf count = 73

$$\left\{y(x) = \frac{1}{x}\left(-\sqrt{\_C1 - 2\,x}x^2 - x^2 - 1\right)\left(\sqrt{\_C1 - 2\,x} + 1\right)^{-1}, y(x) = \frac{1}{x}\left(-\sqrt{\_C1 - 2\,x}x^2 + x^2 + 1\right)\left(\right.$$

2.932 ODE No. 932

$$y'(x) = \frac{e^{-\frac{3x^2}{2}}x\left(3e^{3x^2}y(x)^3 + e^{\frac{9x^2}{2}}y(x)^3 + 18e^{3x^2}y(x)^2 + 9e^{\frac{9x^2}{2}}y(x)^2 + 27e^{3x^2}y(x) + 27e^{\frac{9x^2}{2}}y(x) + 27e^{\frac{9x^2}{2}} +\right.}{243y(x)}$$

✗ **Mathematica** : cpu = 299.999 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.208 (sec), leaf count = 54

$$\left\{y(x) = -369\,\frac{e^{3/2\,x^2}}{123 + 123\,e^{3/2\,x^2} - 136\,RootOf\left(-41\,x^2 - 50243409\int^{-Z}(9248\,\_a^3 - 1860867\,\_a + 18608\right.}\right.$$

2.933 ODE No. 933

$$y'(x) = \frac{x^3 + x^3\left(-\log^3(x)\right) + x^3\log^2(x) + 3x^2y(x)\log^2(x) - 2x^2y(x)\log(x) + x^2 + xy(x)^2 + xy(x) + y(x}{x^2}$$

✓ **Mathematica** : cpu = 0.107182 (sec), leaf count = 93

$$\text{Solve}\left[87\text{RootSum}\left[-29\#1^3 + 3\sqrt[3]{29}\#1 - 29\&, \frac{\log\left(\frac{3y(x)+x-3x\log(x)}{\sqrt[3]{29}\sqrt[3]{\frac{1}{x^3}}x^2} - \#1\right)}{\sqrt[3]{29} - 29\#1^2}\&\right] + 9c_1 + \frac{29^{2/3}}{\sqrt[3]{\frac{1}{x^3}}} = 0, y(x)\right]$$

✓ **Maple** : cpu = 0.059 (sec), leaf count = 39

$$\left\{y(x)=\frac{x\left(9\ln(x)-3+29\,\mathit{RootOf}\left(-81\int^{\_Z}\left(841\_a^3-27\_a+27\right)^{-1}d\_a+x+3\_C1\right)\right)}{9}\right\}$$

2.934 ODE No. 934

$$y'(x)=-\frac{x^6}{64}-\frac{3x^5}{32}+\frac{3}{16}x^4y(x)-\frac{x^4}{8}+\frac{3}{4}x^3y(x)+\frac{x^3}{8}-\frac{3}{4}x^2y(x)^2+\frac{1}{4}x^2y(x)+\frac{x^2}{4}-\frac{3}{2}xy(x)^2-xy(x)+y(x)^3+y(x$$

✓ **Mathematica** : cpu = 0.164997 (sec), leaf count = 101

$$\text{Solve}\left[-\frac{31}{3}\text{RootSum}\left[-31\#1^3+3\,2^{2/3}\sqrt[3]{31}\#1-31\&,\frac{\log\left(\sqrt[3]{\frac{2}{31}}\left(-\frac{3x^2}{4}+3y(x)-\frac{3x}{2}+1\right)-\#1\right)}{2^{2/3}\sqrt[3]{31}-31\#1^2}\&\right]=$$

✓ **Maple** : cpu = 0.182 (sec), leaf count = 39

$$\left\{y(x)=\frac{x^2}{4}+\frac{x}{2}+\mathit{RootOf}\left(-x+2\int^{\_Z}\left(2\_a^3+2\_a^2+1\right)^{-1}d\_a+\_C1\right)\right\}$$

2.935 ODE No. 935

$$y'(x)=\frac{x^6}{64}-\frac{3x^5}{16}+\frac{3}{16}x^4y(x)+\frac{13x^4}{16}-\frac{3}{2}x^3y(x)-\frac{3x^3}{2}+\frac{3}{4}x^2y(x)^2+\frac{7}{2}x^2y(x)+x^2-3xy(x)^2-2xy(x)+y(x)^3+y($$

✓ **Mathematica** : cpu = 48.6677 (sec), leaf count = 117

$$\text{Solve}\left[-\frac{2^{2/3}(x^2(-\log(4y(x)+(x-2)^2))+(x-4)x\log(-4y(x)-(x-4)x)+4x\log(4y(x)+(x-2)^2)}{9(4y(x)+(x-4)x)}\right.$$

✓ **Maple** : cpu = 0.964 (sec), leaf count = 55

$$\left\{y(x)=\frac{e^{\mathit{RootOf}\left(\ln(e^{\_Z}-4)e^{\_Z}+\_C1\,e^{\_Z}-\_Z\,e^{\_Z}+e^{\_Z}x-4\ln(e^{\_Z}-4)-4\_C1+4\_Z-4x+4\right)}}{4}-1-\frac{x^2}{4}+x\right\}$$

2.936 ODE No. 936

$$y'(x) = \frac{x^6}{512} - \frac{3x^5}{256} + \frac{3}{64}x^4y(x) + \frac{5x^4}{128} - \frac{3}{16}x^3y(x) - \frac{5x^3}{64} + \frac{3}{8}x^2y(x)^2 + \frac{7}{16}x^2y(x) + \frac{x^2}{16} - \frac{3}{4}xy(x)^2 - \frac{1}{2}xy(x) + y(x)^3$$

✓ **Mathematica** : cpu = 0.156153 (sec), leaf count = 85

$$\text{Solve}\left[1068\text{RootSum}\left[-89\#1^3 + 6\sqrt[3]{178}\#1 - 89\&, \frac{\log\left(\frac{3x^2+24y(x)-6x+8}{4\sqrt[3]{178}} - \#1\right)}{2\sqrt[3]{178} - 89\#1^2}\&\right] + 36c_1 + 178^{2/3}x = 0,$$

✓ **Maple** : cpu = 0.095 (sec), leaf count = 39

$$\left\{y(x) = -\frac{x^2}{8} + \frac{x}{4} + RootOf\left(-x + 4\int^{\_Z}\left(4\_a^3 + 4\_a^2 + 3\right)^{-1}d\_a + \_C1\right)\right\}$$

2.937 ODE No. 937

$$y'(x) = \frac{2xy(x)^3 + y(x)^3 - 2y(x) + 6xy(x)\log^2(2x+1) + 3y(x)\log^2(2x+1) + 6xy(x)^2\log(2x+1) + 3y(}{(2x+1)(y(x) + \log(2x+1) +}$$

✓ **Mathematica** : cpu = 0.0277468 (sec), leaf count = 57

$$\left\{\left\{y(x) \to \frac{1}{\sqrt{c_1 - 2x} - 1} - \log(2x+1)\right\}, \left\{y(x) \to -\frac{1}{\sqrt{c_1 - 2x} + 1} - \log(2x+1)\right\}\right\}$$

✓ **Maple** : cpu = 0.753 (sec), leaf count = 79

$$\left\{y(x) = 1\left(-\sqrt{\_C1 - 2x}\ln(2x+1) - \ln(2x+1) - 1\right)\left(\sqrt{\_C1 - 2x} + 1\right)^{-1}, y(x) = 1\left(-\sqrt{\_C1 - 2}\right.\right.$$

2.938 ODE No. 938

$$y'(x) = \frac{x^6 - 3x^5 + 3x^4y(x) + 4x^4 - 6x^3y(x) - 3x^3 + 3x^2y(x)^2 + 5x^2y(x) - x^2 - 3xy(x)^2 - 2xy(x) + y(x}{x}$$

✓ **Mathematica** : cpu = 0.103253 (sec), leaf count = 101

$$\text{Solve}\left[87\text{RootSum}\left[-29\#1^3+3\sqrt[3]{29}\#1-29\&,\frac{\log\left(\frac{3x^2+3y(x)-3x+1}{\sqrt[3]{29}\sqrt[3]{\frac{1}{x^3}}x}-\#1\right)}{\sqrt[3]{29}-29\#1^2}\&\right]+9c_1+29^{2/3}\left(\frac{1}{x^3}\right)^{2/3}x^2$$

✓ **Maple** : cpu = 0.053 (sec), leaf count = 39

$$\left\{y(x)=-x^2+x-\frac{1}{3}+\frac{29\,RootOf\left(-81\int^{\_Z}(841\_a^3-27\_a+27)^{-1}d\_a+\ln(x)+3\_C1\right)}{9}\right\}$$

2.939 ODE No. 939

$$y'(x)=\frac{x^6+6x^5-12x^4y(x)+12x^4-48x^3y(x)+16x^3+48x^2y(x)^2-48x^2y(x)+16x^2+96xy(x)^2-32}{16x^2-64y(x)+32x-64}$$

✓ **Mathematica** : cpu = 0.513419 (sec), leaf count = 137

$$\text{Solve}\left[2\text{RootSum}\left[\#1^4+4\#1^3-8\#1^2y(x)-16\#1y(x)-8\#1+16y(x)^2+16y(x)+8\&,\frac{\#1^2(-\log(x-}{}\right.\right.$$

✓ **Maple** : cpu = 2.057 (sec), leaf count = 70

$$\left\{x-\frac{4}{5}\ln\left(y(x)-\frac{x^2}{4}-\frac{x}{2}-1\right)+\frac{2}{5}\ln\left(2\left(y(x)-1/4\,x^2-x/2\right)^2+2\,y(x)-\frac{x^2}{2}-x+1\right)-\frac{2}{5}\arctan\left(\right.\right.$$

2.940 ODE No. 940

$$y'(x)=\frac{x^3\log^3(x)-3x^2y(x)\log^2(x)-x^2+x^2\log(x)-y(x)^3-y(x)^2-2xy(x)+3xy(x)^2\log(x)+xy(x)}{x(-y(x)-x+x\log(x))}$$

✓ **Mathematica** : cpu = 0.0211314 (sec), leaf count = 49

$$\left\{\left\{y(x)\to x\left(\log(x)-\frac{1}{\sqrt{c_1-2x}+1}\right)\right\},\left\{y(x)\to x\left(\frac{1}{\sqrt{c_1-2x}-1}+\log(x)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.062 (sec), leaf count = 63

$$\left\{y(x)=x\left(\ln(x)\sqrt{\_C1-2\,x}-\ln(x)+1\right)\left(\sqrt{\_C1-2\,x}-1\right)^{-1},y(x)=x\left(\ln(x)\sqrt{\_C1-2\,x}+\ln(x\right.\right.$$

2.941 ODE No. 941

$$y'(x) = \frac{x^6 - 12x^5 + 12x^4y(x) + 48x^4 - 96x^3y(x) - 72x^3 + 48x^2y(x)^2 + 192x^2y(x) + 32x^2 - 192xy(x)^2 -}{16x^2 + 64y(x) - 64x + 64}$$

✓ **Mathematica** : cpu = 0.406547 (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 = 0.091 (sec), leaf count = 35

$$\left\{y(x) = -\frac{x^2}{4} + x + \mathit{RootOf}\left(-x + \int^{\_Z} \frac{\_a + 1}{\_a^3 - \_a - 1} d\_a + \_C1\right)\right\}$$

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 = 300.001 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 1.43 (sec), leaf count = 43

$$\left\{y(x) = \mathrm{e}^{\mathit{RootOf}\left(-\_Z + \int^{\left(\mathrm{e}^{\_Z}\right)^2 - 2\,\mathrm{e}^{\_Z} x} \left(\mathrm{e}^{2\frac{\_a^3}{\_a+1}} + \_a\right)^{-1} d\_a + \_C1\right)} - x\right\}$$

2.943 ODE No. 943

$$y'(x) = \frac{x^6 - 6x^5 + 24x^4y(x) + 12x^4 - 96x^3y(x) - 24x^3 + 192x^2y(x)^2 + 96x^2y(x) + 32x^2 - 384xy(x)^2 -}{64x^2 + 512y(x) - 128x + 512}$$

✓ **Mathematica** : cpu = 0.473396 (sec), leaf count = 53

$$\text{Solve}\left[x = 16\text{RootSum}\left[6656\#1^3 - 23\#1 - 1\&, \#1 \log\left(79872\#1^2 - 18304\#1 + 181x^2 + 1448y(x) - 362\right.\right.\right.$$

✓ **Maple** : cpu = 0.074 (sec), leaf count = 40

$$\left\{y(x) = -\frac{x^2}{8} + \frac{x}{4} + \mathit{RootOf}\left(-x + \int^{\_Z} 4\frac{\_a + 1}{4\_a^3 - \_a - 1} d\_a + \_C1\right)\right\}$$

2.944 ODE No. 944

$$y'(x) = \frac{a^3x^6 + 6a^2bx^5 + 12a^2x^4y(x) - 8a^2x^3 + 12ab^2x^4 + 48abx^3y(x) - 16abx^2 + 48ax^2y(x)^2 - 32axy(x)}{16ax^2 + 32bx + 64y(x) + 64}$$

✓ **Mathematica** : cpu = 1.97403 (sec), leaf count = 233

$$\text{Solve}\left[x = 4\text{RootSum}\left[\#1^6a^3 + 6\#1^5a^2b + 12\#1^4a^2y(x) + 12\#1^4ab^2 + 48\#1^3aby(x) + 8\#1^3b^3 + 8\#1^2ab\right.\right.$$

✓ **Maple** : cpu = 0.1 (sec), leaf count = 47

$$\left\{y(x) = -\frac{ax^2}{4} - \frac{bx}{2} + RootOf\left(bx + 2\int^{\_Z} -\frac{b(\_a+1)}{2\_a^3 + b\_a + b}d\_a + 2\_C1\right)\right\}$$

2.945 ODE No. 945

$$y'(x) = \frac{8a^3x^3 + 12a^2x^4 + 48a^2x^2y(x) + 6ax^5 + 48ax^3y(x) - 16ax^2 + 96axy(x)^2 + x^6 + 12x^4y(x) - 8x^3 +}{32ax + 16x^2 + 64y(x) + 64}$$

✓ **Mathematica** : cpu = 1.55542 (sec), leaf count = 213

$$\text{Solve}\left[x = 4\text{RootSum}\left[\#1^6 + 6\#1^5a + 12\#1^4a^2 + 12\#1^4y(x) + 8\#1^3a^3 + 48\#1^3ay(x) + 48\#1^2a^2y(x) +\right.\right.$$

✓ **Maple** : cpu = 0.085 (sec), leaf count = 41

$$\left\{y(x) = -\frac{x^2}{4} - \frac{ax}{2} + RootOf\left(-x + \int^{\_Z} 2\frac{\_a+1}{2\_a^3 + \_a\,a + a}d\_a + \_C1\right)\right\}$$

2.946 ODE No. 946

$$y'(x) = \frac{x\left(12e^{-x^2}x^2y(x)^2 + 8e^{-x^2}x^2y(x) - 8e^{-x^2}y(x) + 4e^{-2x^2}x^2 + 8e^{-x^2}x^2 - 8e^{-x^2} + e^{-3x^2}x^6 - 6e^{-2x^2}x^4\right.}{4e^{-x^2}x^2 - 8y(x) - 8}$$

✓ **Mathematica** : cpu = 0.0888007 (sec), leaf count = 75

$$\left\{\left\{y(x) \to \frac{8}{\sqrt{c_1 - 64x^2} - 8} + \frac{1}{2}e^{-x^2}x^2\right\}, \left\{y(x) \to \frac{1}{2}e^{-x^2}x^2 - \frac{8}{\sqrt{c_1 - 64x^2} + 8}\right\}\right\}$$

✓ **Maple** : cpu = 0.185 (sec), leaf count = 85

$$\left\{y(x)=1\left(-2+x^2\left(\sqrt{-x^2+\_C1}+1\right)\mathrm{e}^{-x^2}\right)\left(2\sqrt{-x^2+\_C1}+2\right)^{-1}, y(x)=1\left(2+x^2\left(\sqrt{-x^2+\_C\right.\right.\right.$$

2.947 ODE No. 947

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

✓ **Mathematica** : cpu = 0.118684 (sec), leaf count = 28

$$\left\{\left\{y(x)\to\frac{1}{c_1-\log(x)}+\frac{\sin(x)-x\cos(x)-1}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.761 (sec), leaf count = 44

$$\left\{y(x)=\frac{(\cos(x)\,x-\sin(x)+1)\ln(x)-\cos(x)\,\_C1\,x+\sin(x)\,\_C1+x-\_C1}{x\,(\_C1-\ln(x))}\right\}$$

2.948 ODE No. 948

$$y'(x)=-\frac{216y(x)}{36x^2+4y(x)^8+12y(x)^7+33y(x)^6+60y(x)^5-24xy(x)^4-216y(x)^4-36xy(x)^3-252y(x)^3-}$$

✓ **Mathematica** : cpu = 0.375051 (sec), leaf count = 39

$$\mathrm{Solve}\left[\frac{36}{y(x)\,(2y(x)^3+3y(x)^2+6y(x)+6)-6x}+\log(y(x))=c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.469 (sec), leaf count = 68

$$\left\{y(x)=\mathrm{e}^{RootOf\left(-12\_C1\,(\mathrm{e}^{\_Z})^4-2\,(\mathrm{e}^{\_Z})^4\_Z-18\,(\mathrm{e}^{\_Z})^3\_C1-3\,(\mathrm{e}^{\_Z})^3\_Z-36\,(\mathrm{e}^{\_Z})^2\_C1-6\_Z\,(\mathrm{e}^{\_Z})^2-36\_C1\,\mathrm{e}^{\_Z}-6\_Z\,\mathrm{e}^{\_Z}+3\right.}\right.$$

2.949 ODE No. 949

$$y'(x) = \frac{x^6 - 3x^5 + 3x^4y(x) + x^4 - 6x^3y(x) + 2x^3 + 3x^2y(x)^2 + x^2y(x) - 3x^2 - 3xy(x)^2 + xy(x) + y(x)^3}{x(x^2 + y(x) - x + 1)}$$

✓ **Mathematica** : cpu = 0.0217093 (sec), leaf count = 55

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

✓ **Maple** : cpu = 0.06 (sec), leaf count = 81

$$\left\{y(x) = 1\left((-x^2 + x)\sqrt{\_C1 - 2\ln(x)} - x^2 + x - 1\right)\left(1 + \sqrt{\_C1 - 2\ln(x)}\right)^{-1}, y(x) = 1\left((-x^2 + x)\right.\right.$$

2.950 ODE No. 950

$$y'(x) = \frac{a^3x^6}{64} + \frac{3}{32}a^2bx^5 + \frac{3}{16}a^2x^4y(x) + \frac{a^2x^4}{16} + \frac{3}{16}ab^2x^4 + \frac{3}{4}abx^3y(x) + \frac{1}{4}abx^3 + \frac{3}{4}ax^2y(x)^2 + \frac{1}{2}ax^2y(x) - \frac{ax}{2} + \frac{b}{}$$

✓ **Mathematica** : cpu = 0.252374 (sec), leaf count = 138

$$\text{Solve}\left[-\frac{1}{3}(27b + 58)^{2/3}\text{RootSum}\left[\#1^3(27b + 58)^{2/3} - 3\ 2^{2/3}\#1 + (27b + 58)^{2/3}\&, \frac{\log\left(\frac{\sqrt[3]{2}\left(\frac{1}{4}(3ax^2 + 6bx + 4) + 3\right.}{\sqrt[3]{27b + 58}}\right.}{2^{2/3} - \#1^2(27b +}\right.\right.$$

✓ **Maple** : cpu = 0.113 (sec), leaf count = 42

$$\left\{y(x) = -\frac{ax^2}{4} - \frac{bx}{2} + RootOf\left(-x + 2\int^{\_Z}\left(2\_a^3 + 2\_a^2 + b + 2\right)^{-1}d\_a + \_C1\right)\right\}$$

2.951 ODE No. 951

$$y'(x) = \frac{a^3x^3}{8} + \frac{3a^2x^4}{16} + \frac{3}{4}a^2x^2y(x) + \frac{a^2x^2}{4} + \frac{3ax^5}{32} + \frac{3}{4}ax^3y(x) + \frac{ax^3}{4} + \frac{3}{2}axy(x)^2 + axy(x) + \frac{x^6}{64} + \frac{3}{16}x^4y(x) + \frac{x^4}{16}$$

✓ **Mathematica** : cpu = 0.229789 (sec), leaf count = 137

$$\text{Solve}\left[-\frac{1}{3}(27a+58)^{2/3}\text{RootSum}\left[\#1^3(27a+58)^{2/3} - 3\ 2^{2/3}\#1 + (27a+58)^{2/3}\&, \frac{\log\left(\frac{\sqrt[3]{2}\left(\frac{1}{4}(6ax+3x^2+4)+3\right.}{\sqrt[3]{27a+58}}\right.}{2^{2/3} - \#1^2(27a+}\right.\right.$$

✓ **Maple** : cpu = 0.105 (sec), leaf count = 41

$$\left\{y(x) = -\frac{x^2}{4} - \frac{ax}{2} + RootOf\left(-x + 2\int^{\_Z}\left(2\_a^3 + 2\_a^2 + a + 2\right)^{-1} d\_a + \_C1\right)\right\}$$

2.952 ODE No. 952

$$y'(x) = \frac{-x^2\sqrt{x^2+y(x)^2} + xy(x)\sqrt{x^2+y(x)^2} + x^5\left(-\sqrt{x^2+y(x)^2}\right) + x^4y(x)\sqrt{x^2+y(x)^2} - x^4\sqrt{x^2+}}{x}$$

✓ **Mathematica** : cpu = 0.168538 (sec), leaf count = 141

$$\left\{\left\{y(x) \to \frac{x\left(-2e^{\frac{20c_1+4x^5+5x^4+10x^2}{10\sqrt{2}}} + e^{\frac{20c_1+4x^5+5x^4+10x^2}{5\sqrt{2}}} - 1\right)}{2e^{\frac{20c_1+4x^5+5x^4+10x^2}{10\sqrt{2}}} + e^{\frac{20c_1+4x^5+5x^4+10x^2}{5\sqrt{2}}} - 1}\right\}\right\}$$

✓ **Maple** : cpu = 0.71 (sec), leaf count = 62

$$\left\{\ln\left(2\,\frac{x\left(\sqrt{2\,(y(x))^2 + 2\,x^2} + y(x) + x\right)}{y(x) - x}\right) + \frac{(4\,x^5 + 5\,x^4 + 10\,x^2)\sqrt{2}}{20} - \_C1 - \ln(x) = 0\right\}$$

2.953 ODE No. 953

$$y'(x) = \frac{y(x)\left(x^4\log^2(y(x)) + 2x^4\log(x)\log(y(x)) + x^4\log^2(x) + x^3\log^2(y(x)) + 2x^3\log(x)\log(y(x)) + x^3\cdots\right.}{x}$$

✗ **Mathematica** : cpu = 1.54226 (sec), leaf count = 0 , could not solve

```
DSolve[Derivative[1][y][x] == ((-1 + Log[x] + x*Log[x]^2 + x^3*Log[x]^2 + x^4*Log[x]^2
```

✓ **Maple** : cpu = 0.921 (sec), leaf count = 145

$$\left\{y(x) = 1\left(x^{\frac{x^5}{4\,x^5+5\,x^4+10\,x^2+20\,\_C1}}\right)^{-4}\left(x^{\frac{x^4}{4\,x^5+5\,x^4+10\,x^2+20\,\_C1}}\right)^{-5}\left(x^{\frac{x^2}{4\,x^5+5\,x^4+10\,x^2+20\,\_C1}}\right)^{-10}\left(x^{\frac{\_C1}{4\,x^5+5\,x^4+10\,x^2+20\,\_C1}}\cdots\right.\right.$$

2.954 ODE No. 954

$$y'(x) = \frac{\frac{24}{5}x^{7/2}y(x) - \frac{24x^{13/2}}{25} + \frac{8x^{7/2}}{5} - 8x^{3/2} - \frac{8x^9}{125} + \frac{12}{25}x^6y(x) + \frac{4x^6}{25} - \frac{24x^4}{5} - \frac{6}{5}x^3y(x)^2 - \frac{4}{5}x^3y(x) + \frac{6x^3}{5} + \cdots}{x}$$

✓ **Mathematica** : cpu = 0.125687 (sec), leaf count = 108

$$\text{Solve}\left[87\text{RootSum}\left[-29\#1^3 + 3\sqrt[3]{29}\#1 - 29\&, \frac{\log\left(\frac{-6x^3+15y(x)-30\sqrt{x}+5}{5\sqrt[3]{29}\sqrt[3]{\frac{1}{x^3}}x} - \#1\right)}{\sqrt[3]{29} - 29\#1^2}\&\right] + 9c_1 + 29^{2/3}\left(\frac{1}{x^3}\right)^{2/\cdots}\right.$$

✓ **Maple** : cpu = 0.109 (sec), leaf count = 53

$$\left\{y(x) = \frac{1}{45}\left(18\,x^{7/2} + 145\,RootOf\left(-81\int^{\_Z}\left(841\,\_a^3 - 27\,\_a + 27\right)^{-1}d\_a + \ln(x) + 3\,\_C1\right)\sqrt{x} - 1\cdots\right.\right.$$

2.955 ODE No. 955

$$y'(x) = \frac{-24x^{7/2}y(x) + \frac{24x^{13/2}}{5} + 14x^{7/2} + 40x^{3/2} + \frac{8x^9}{25} - \frac{12}{5}x^6y(x) + \frac{12x^6}{5} + 24x^4 + 6x^3y(x)^2 - 6x^3y(x) - \cdots}{x\left(2x^3 - 5y(x) + 10\sqrt{x} - 5\right)}$$

✓ **Mathematica** : cpu = 0.0423076 (sec), leaf count = 73

$$\left\{\left\{y(x) \to -\frac{125}{\sqrt{c_1 - 31250\log(x)} + 125} + \frac{2x^3}{5} + 2\sqrt{x}\right\}, \left\{y(x) \to \frac{125}{\sqrt{c_1 - 31250\log(x)} - 125} + \frac{2x^3}{5} + 2\cdots\right.\right.$$

✓ **Maple** : cpu = 0.212 (sec), leaf count = 101

$$\left\{y(x) = 1\left(\left(2\,x^3+10\,\sqrt{x}\right)\sqrt{\_C1-2\,\ln\left(x\right)}-2\,x^3-10\,\sqrt{x}+5\right)\left(5\,\sqrt{\_C1-2\,\ln\left(x\right)}-5\right)^{-1}, y(x) = 1\right.$$

2.956 ODE No. 956

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

✓ **Mathematica** : cpu = 0.23732 (sec), leaf count = 28

$$\left\{\left\{y(x)\to\frac{1}{\left(c_1e^{\frac{x^4}{4}}+1\right)(\log(x)+1)}\right\}\right\}$$

✓ **Maple** : cpu = 1.581 (sec), leaf count = 79

$$\left\{y(x) = \frac{1}{\ln\left(x\right)+1}e^{-\frac{x^4}{4}}\left(x^{-2\,\frac{\ln(x)}{\ln(x)+1}}\left(\ln\left(x\right)+1\right)e^{\frac{(-4\,\ln(x)-4)\ln(\ln(x)+1)-x^4\ln(x)-x^4+8\,(\ln(x))^2}{4\,\ln(x)+4}}+\_C1\right)^{-1}\right\}$$

2.957 ODE No. 957

$$y'(x) = \frac{y(x)\left(y(x)e^{\frac{2\log^2(x)}{\log(x)+1}}x^{\frac{2}{\log(x)+1}+3}+y(x)e^{\frac{2\log^2(x)}{\log(x)+1}}\log^2(x)x^{\frac{2}{\log(x)+1}+3}+2y(x)e^{\frac{2\log^2(x)}{\log(x)+1}}\log(x)x^{\frac{2}{\log(x)+1}+3}-e^{\frac{2}{1}}\right.}{x(\log(x)+1)}$$

✓ **Mathematica** : cpu = 0.225523 (sec), leaf count = 28

$$\left\{\left\{y(x)\to\frac{1}{\left(c_1e^{\frac{x^5}{5}}+1\right)(\log(x)+1)}\right\}\right\}$$

✓ **Maple** : cpu = 0.883 (sec), leaf count = 79

$$\left\{y(x) = \frac{1}{\ln\left(x\right)+1}e^{-\frac{x^5}{5}}\left(x^{-2\,\frac{\ln(x)}{\ln(x)+1}}\left(\ln\left(x\right)+1\right)e^{\frac{(-5\,\ln(x)-5)\ln(\ln(x)+1)-x^5\ln(x)-x^5+10\,(\ln(x))^2}{5\,\ln(x)+5}}+\_C1\right)^{-1}\right\}$$

2.958 ODE No. 958

$$y'(x) = \frac{2xy(x)^3 + y(x)^3 + 2xy(x)^2 + y(x)^2 + 6xy(x)\log^2(2x+1) + 3y(x)\log^2(2x+1) + 6xy(x)^2\log(2x}{}$$

✓ **Mathematica** : cpu = 0.0932245 (sec), leaf count = 80

$$\text{Solve}\left[87\text{RootSum}\left[-29\#1^3 + 3\sqrt[3]{29}\#1 - 29\&, \frac{\log\left(\frac{3y(x)+3\log(2x+1)+1}{\sqrt[3]{29}} - \#1\right)}{\sqrt[3]{29} - 29\#1^2}\&\right] + 9c_1 + 29^{2/3}x = 0, y(x$$

✓ **Maple** : cpu = 0.099 (sec), leaf count = 40

$$\left\{y(x) = -\ln(2x+1) - \frac{1}{3} + \frac{29\,RootOf\left(-81\int^{-Z}(841\_a^3 - 27\_a + 27)^{-1}d\_a + x + 3\_C1\right)}{9}\right\}$$

2.959 ODE No. 959

$$y'(x) = \frac{\csc\left(\frac{y(x)}{2x}\right)\sec\left(\frac{y(x)}{2x}\right)\sec\left(\frac{y(x)}{x}\right)\left(x^3\sin\left(\frac{y(x)}{2x}\right)\sin\left(\frac{y(x)}{x}\right)\cos\left(\frac{y(x)}{2x}\right) - \frac{1}{2}y(x)\sin\left(\frac{y(x)}{x}\right) + \frac{1}{2}y(x)\sin}{x}$$

✓ **Mathematica** : cpu = 0.049913 (sec), leaf count = 20

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

✓ **Maple** : cpu = 0.228 (sec), leaf count = 15

$$\left\{y(x) = \arcsin\left(e^{\frac{x^2}{2}}\_C1\right)x\right\}$$

2.960 ODE No. 960

$$y'(x) = \frac{\csc\left(\frac{y(x)}{2x}\right)\sec\left(\frac{y(x)}{2x}\right)\sec\left(\frac{y(x)}{x}\right)\left(x^2\sin\left(\frac{y(x)}{2x}\right)\sin\left(\frac{y(x)}{x}\right)\cos\left(\frac{y(x)}{2x}\right) - \frac{1}{2}y(x)\sin\left(\frac{y(x)}{x}\right) + \frac{1}{2}y(x)\sin}{x}$$

✓ **Mathematica** : cpu = 0.0387277 (sec), leaf count = 14

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

✓ **Maple** : cpu = 0.13 (sec), leaf count = 11

$$\{y(x) = \arcsin(\_C1\, \mathrm{e}^{x})\, x\}$$

2.961 ODE No. 961

$$y'(x) = \frac{\exp(-2x^6 + 6x^4y(x)^2 + 2x^4 - 6x^2y(x)^4 - 4x^2y(x)^2 + 2y(x)^6 + 2y(x)^4 + 2) + x^2 + 2xy(x) + y(x}{-\exp(-2x^6 + 6x^4y(x)^2 + 2x^4 - 6x^2y(x)^4 - 4x^2y(x)^2 + 2y(x)^6 + 2y(x)^4 + 2) + x^2 + 2xy(x) + y}$$

✗ **Mathematica** : cpu = 300.002 (sec), leaf count = 0 , timed out

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$Aborted
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✓ **Maple** : cpu = 1.017 (sec), leaf count = 45

$$\left\{ y(x) = \mathrm{e}^{\mathit{RootOf}\left(-\_Z+\int^{\left(\mathrm{e}^{\_Z}\right)^2-2\,\mathrm{e}^{\_Z}x}\left(\mathrm{e}^{2\_a^3+2\_a^2+2}+\_a\right)^{-1}d\_a+\_C1\right)} - x \right\}$$

2.962 ODE No. 962

$$y'(x) = \frac{4(a-1)(a+1)x(a^2x^2}{a^8x^6 - 4a^6x^6 - 3a^6x^4y(x)^2 + 6a^4x^6 + 9a^4x^4y(x)^2 + 3a^4x^2y(x)^4 - 4a^2x^6 - 9a^2x^4y(x)^2 - 6a^2x^2y(x}$$

✓ **Mathematica** : cpu = 6.51272 (sec), leaf count = 1191

$$\{\{y(x) \to \text{Root}\left[2x^4a^8 - 8x^4a^6 + e^{c_1}x^4a^4 + 11x^4a^4 - 2e^{c_1}x^4a^2 - 6x^4a^2 + 4x^2a^2 + \left(2a^2-2\right)\#1^5 + e^{c_1}x^4\right.$$

✓ **Maple** : cpu = 1.891 (sec), leaf count = 79

$$\left\{ -\frac{y(x)}{(a-1)(a+1)} + 2\,\frac{1}{(a^2-1)^2\left(a^2x^2-x^2-(y(x))^2\right)^2} - 2\,\frac{1}{(a^2-1)^2\left(a^2x^2-x^2-(y(x))^2\right)} + \_C1 = 0\right.$$

2.963 ODE No. 963

$$y'(x) = \frac{-\frac{5x^3}{2} + \frac{15}{4}x^3\cos(x) - \frac{3}{2}x^3\cos(2x) + \frac{1}{4}x^3\cos(3x) + \frac{9}{2}x^2y(x) - 6x^2y(x)\cos(x) + \frac{3}{2}x^2y(x)\cos(2x) +}{}$$

✓ **Mathematica** : cpu = 0.156711 (sec), leaf count = 101

$$\text{Solve}\left[87\text{RootSum}\left[-29\#1^3 + 3\sqrt[3]{29}\#1 - 29\&, \frac{\log\left(\frac{3y(x)-3x+3x\cos(x)+1}{\sqrt[3]{29}\sqrt[3]{\frac{1}{x^3}}x} - \#1\right)}{\sqrt[3]{29} - 29\#1^2}\&\right] + 9c_1 + 29^{2/3}\left(\frac{1}{x^3}\right)^{2/3}\right.$$

✓ **Maple** : cpu = 0.368 (sec), leaf count = 39

$$\left\{y(x) = -\cos(x)\,x + x - \frac{1}{3} + \frac{29\,RootOf\left(-81\int^{-Z}(841\_a^3 - 27\_a + 27)^{-1}\,d\_a + \ln(x) + 3\_C1\right)}{9}\right\}$$

2.964 ODE No. 964

$$y'(x) = -\frac{}{a^8x^6 - 4a^6x^6 - 3a^6x^4y(x)^2 - 2a^6x^4 + 6a^4x^6 + 9a^4x^4y(x)^2 + 6a^4x^4 + 3a^4x^2y(x)^4 + 4a^4x^2y(x)^2 +}$$

✓ **Mathematica** : cpu = 5.72073 (sec), leaf count = 247

$$\text{Solve}\left[\left(a^2-1\right)c_1 = \frac{4\text{RootSum}\left[-\#1^3a^6 + 3\#1^3a^4 - 3\#1^3a^2 + \#1^3 + 3\#1^2a^4y(x)^2 + 2\#1^2a^4 - 6\#1^2a^2\right.}{}\right.$$

✓ **Maple** : cpu = 4.441 (sec), leaf count = 80

$$\left\{\frac{y(x)}{(a-1)(a+1)} + 4\frac{1}{a^4 - 2a^2 + 1}\sum_{\_R=RootOf(\_Z^3+2\_Z^2+8)}\frac{\ln\left(-a^2x^2 + x^2 + (y(x))^2 - \_R\right)}{3\_R^2 + 4\_R} - \_C1 = 0\right\}$$

2.965 ODE No. 965

$$y'(x) = \frac{\csc\left(\frac{y(x)}{2x}\right)\sec\left(\frac{y(x)}{2x}\right)\sec\left(\frac{y(x)}{x}\right)\left(x^4\sin\left(\frac{y(x)}{2x}\right)\sin\left(\frac{y(x)}{x}\right)\cos\left(\frac{y(x)}{2x}\right)+x^3\sin\left(\frac{y(x)}{2x}\right)\sin\left(\frac{y(x)}{x}\right)\cos\left(\right.\right.}{}$$

✓ **Mathematica** : cpu = 0.0651388 (sec), leaf count = 29

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

✓ **Maple** : cpu = 0.144 (sec), leaf count = 26

$$\left\{y(x)=\arcsin\left(\_C1\,x\left(e^{-\frac{x^3}{3}}\right)^{-1}\left(e^{-\frac{x^2}{2}}\right)^{-1}\right)x\right\}$$

2.966 ODE No. 966

$$y'(x) = -\frac{}{216x^3-216x^2y(x)^4-324x^2y(x)^3-648x^2y(x)^2-648x^2y(x)+216x^2-8y(x)^{12}-36y(x)^{11}-1}$$

✓ **Mathematica** : cpu = 0.496767 (sec), leaf count = 292

$$\text{Solve}\left[c_1=72\text{RootSum}\left[-216\#1^3+216\#1^2y(x)^4+324\#1^2y(x)^3+648\#1^2y(x)^2+648\#1^2y(x)-216\#\right.\right.$$

✓ **Maple** : cpu = 2.192 (sec), leaf count = 50

$$\left\{y(x)=e^{RootOf\left(-\_Z-6\int^{x-1/3\left(e^{\_Z}\right)^4-1/2\left(e^{\_Z}\right)^3-\left(e^{\_Z}\right)^2-e^{\_Z}}\left(\_a^3+\_a^2+1\right)^{-1}d\_a+\_C1\right)}\right\}$$

2.967 ODE No. 967

$$y'(x) = -\frac{x(64x^9-288x^8y(x)-96x^8+432x^7y(x)^2+288x^7y(x)-144x^7-216x^6y(x)^3-216x^6y(x)^2-2}{}$$

✓ **Mathematica** : cpu = 0.191033 (sec), leaf count = 143

$$\text{Solve}\left[174\text{RootSum}\left[-29\#1^3+3\sqrt[3]{29}\#1-29\&,\frac{\log\left(\frac{\left(\frac{x^3}{(x^2+1)^3}\right)^{2/3}(x^2+1)(-4x^3+6x^2y(x)+2x^2+6y(x)+5)}{2\sqrt[3]{29}x^2}-\#1\right)}{\sqrt[3]{29}-29\#1^2}\right.\right.$$

✓ **Maple** : cpu = 0.115 (sec), leaf count = 91

$$\left\{y(x)=\frac{58\,RootOf\left(-162\int^{\_Z}(841\_a^3-27\_a+27)^{-1}d\_a+\ln(x^2+1)+6\_C1\right)x^2+12\,x^3-6\,x^2}{18\,x^2+18}\right.$$

2.968 ODE No. 968

$$y'(x)=\frac{\csc\left(\frac{y(x)}{2x}\right)\sec\left(\frac{y(x)}{2x}\right)\sec\left(\frac{y(x)}{x}\right)\left(x^4\sin\left(\frac{y(x)}{2x}\right)\sin\left(\frac{y(x)}{x}\right)\cos\left(\frac{y(x)}{2x}\right)-\frac{1}{2}xy(x)\sin\left(\frac{y(x)}{x}\right)-\frac{1}{2}y(x)\sin\right.}{}$$

✓ **Mathematica** : cpu = 0.0899114 (sec), leaf count = 30

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

✓ **Maple** : cpu = 0.923 (sec), leaf count = 22

$$\left\{y(x)=\arcsin\left(\frac{\_C1\,(1+x)}{e^x}e^{\frac{x^2}{2}}\right)x\right\}$$

2.969 ODE No. 969

$$y'(x)=\frac{\csc\left(\frac{y(x)}{2x}\right)\sec\left(\frac{y(x)}{2x}\right)\sec\left(\frac{y(x)}{x}\right)\left(-\frac{1}{2}xy(x)\sin\left(\frac{y(x)}{x}\right)-\frac{1}{2}y(x)\sin\left(\frac{y(x)}{x}\right)+x\sin\left(\frac{y(x)}{2x}\right)\sin\left(\frac{y(x)}{x}\right)\cos\right.}{}$$

✓ **Mathematica** : cpu = 0.0632535 (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 = 1.01 (sec), leaf count = 15

$$\left\{y(x) = \arcsin\left(\frac{\_C1\,x}{1+x}\right)x\right\}$$

2.970 ODE No. 970

$$y'(x) = -\frac{}{216x^3 - 216x^2y(x)^4 - 324x^2y(x)^3 - 648x^2y(x)^2 - 648x^2y(x) - 8y(x)^{12} - 36y(x)^{11} - 126y(x)^{10}}$$

✓ **Mathematica** : cpu = 0.540043 (sec), leaf count = 66

$$\text{Solve}\left[\frac{36(2y(x)^4 + 3y(x)^3 + 6y(x)^2 + 6y(x) - 6x - 3)}{(y(x)\,(2y(x)^3 + 3y(x)^2 + 6y(x) + 6) - 6x)^2} + \log(y(x)) = c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.976 (sec), leaf count = 181

$$\left\{\frac{1}{6\_C1 - 6\ln(y(x))}\left(-6\sqrt{3\ln(y(x)) - 3\_C1 + 9} + \left(2(y(x))^4 + 3(y(x))^3 + 6(y(x))^2 - 6x + 6y(x)\right)\right.\right.$$

2.971 ODE No. 971

$$y'(x) = \frac{(xy(x)+1)^3}{x^5}$$

✓ **Mathematica** : cpu = 0.193417 (sec), leaf count = 124

$$\text{Solve}\left[6\left(c_1 + \left(-\frac{1}{x^6}\right)^{5/3}x^9\right) + \log\left(-\sqrt[3]{-\frac{1}{x^6}}(xy(x)+1)^2 + \left(-\frac{1}{x^6}\right)^{2/3}x^3(xy(x)+1) + 1\right) = 2\left(\sqrt{3}\,\mathrm{ta}\right.\right.$$

✓ **Maple** : cpu = 3.673 (sec), leaf count = 86

$$\left\{y(x) = \frac{\sqrt{3}}{6\,x}\left(3\tan\left(RootOf\left(-18\,x^3(-x^{-6})^{2/3} - 6\_Z\sqrt{3} - \ln\left(\frac{(\sqrt{3} + \tan(\_Z))^6}{((\tan(\_Z))^2 + 1)^3}\right) + 18\_C1\right)\right) x\right.\right.$$

2.972 ODE No. 972

$$y'(x) = \frac{x(-2x^4 + 2x^2y(x) - x^2 + 1)}{y(x) - x^2}$$

✓ **Mathematica** : cpu = 0.0268076 (sec), leaf count = 32

$$\left\{\left\{y(x) \to \frac{1}{2}\left(W\left(-e^{c_1+x^4-2x^2-1}\right) + 1\right) + x^2\right\}\right\}$$

✓ **Maple** : cpu = 0.507 (sec), leaf count = 27

$$\left\{y(x) = x^2 + \frac{1}{2}\mathit{lambertW}\left(-2\,\frac{\mathrm{e}^{x^4}\_C1\,\mathrm{e}^{-1}}{\left(\mathrm{e}^{x^2}\right)^2}\right) + \frac{1}{2}\right\}$$

2.973 ODE No. 973

$$y'(x) = e^{-2bx}y(x)\left(e^{bx}y(x) + e^{2bx} + y(x)^2\right)$$

✓ **Mathematica** : cpu = 0.254827 (sec), leaf count = 143

$$\text{Solve}\left[3(9b-7)^{2/3}\text{RootSum}\left[\#1^3(9b-7)^{2/3} - 9\#1b + 6\#1 + (9b-7)^{2/3}\&, \frac{\log\left(\frac{e^{-2bx}\left(e^{bx}+3y(x)\right)}{\sqrt[3]{(9b-7)e^{-3bx}}} - \#1\right)}{\#1^2\left(-(9b-7)^{2/3}\right) + 3b - 2\right.$$

✓ **Maple** : cpu = 1.176 (sec), leaf count = 134

$$\left\{y(x) = -\frac{1}{2}\tan\left(\mathit{RootOf}\left(-\sqrt{-\left(\mathrm{e}^{bx}\right)^2(4\,b-3)}\ln\left(\left(4\left(\tan\left(\_Z\right)\right)^2 b - 3\left(\tan\left(\_Z\right)\right)^2 + 4\,b - 3\right)\left(\tan\left(\_\right.\right.\right.\right.\right.$$

2.974 ODE No. 974

$$y'(x) = -x^6 + 3x^4y(x) - 3x^2y(x)^2 + y(x)^3 + 2x$$

✓ **Mathematica** : cpu = 0.010354 (sec), leaf count = 39

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

✓ **Maple** : cpu = 0.05 (sec), leaf count = 57

$$\left\{y(x) = 1\left(x^2\sqrt{-2\,x + 2\_C1} - 1\right)\frac{1}{\sqrt{-2\,x + 2\_C1}}, y(x) = 1\left(x^2\sqrt{-2\,x + 2\_C1} + 1\right)\frac{1}{\sqrt{-2\,x + 2\_C1}}\right.$$

2.975 ODE No. 975

$$y'(x) = \frac{x^6}{27} + \frac{1}{3}x^4 y(x) + x^2 y(x)^2 + y(x)^3 - \frac{2x}{3}$$

✓ **Mathematica** : cpu = 0.0125949 (sec), leaf count = 47

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

✓ **Maple** : cpu = 0.053 (sec), leaf count = 59

$$\left\{y(x) = -\frac{1}{3}\left(x^2\sqrt{-54\_C1 - 2\,x} - 3\right)\frac{1}{\sqrt{-54\_C1 - 2\,x}}, y(x) = -\frac{1}{3}\left(x^2\sqrt{-54\_C1 - 2\,x} + 3\right)\frac{}{\sqrt{-54\_}}\right.$$

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 = 0.138371 (sec), leaf count = 101

$$\text{Solve}\left[-\frac{7}{3}\text{RootSum}\left[-7\#1^3 + 6\sqrt[3]{-7}\#1 - 7\&, \frac{\log\left(\frac{3x^6 y(x) + x^3}{\sqrt[3]{7}\sqrt[3]{-x^9}} - \#1\right)}{2\sqrt[3]{-7} - 7\#1^2}\&\right] = c_1 + \frac{7^{2/3}\left(-x^9\right)^{2/3}}{9x^5}, y(x)\right]$$

✓ **Maple** : cpu = 1.674 (sec), leaf count = 57

$$\left\{y(x) = \frac{1}{2\,x^3}\left(\sqrt{3}\tan\left(\mathit{RootOf}\left(-\sqrt{3}\ln\left(\frac{9\left(\tan\left(\_Z\right)\right)^2 + 9}{7\left(\sqrt{3} - 3\tan\left(\_Z\right)\right)^2}\right) + 3\sqrt{3}\_C1 - 2\sqrt{3}x - 2\_Z\right)\right) - \right.\right.$$

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 = 0.295733 (sec), leaf count = 135

$$\text{Solve}\left[-\frac{25}{3}\text{RootSum}\left[-25\#1^3 + 24\sqrt[3]{-1}5^{2/3}\#1 - 25\&, \frac{\log\left(\frac{e^{x^2} x\left(3e^{x^2} y(x) + 1\right)}{5^{2/3}\sqrt[3]{-e^{3x^2} x^3}} - \#1\right)}{8\sqrt[3]{-1}5^{2/3} - 25\#1^2}\&\right] = c_1 + \frac{5}{18}\sqrt[3]{5}e^{-2}\right.$$

✓ **Maple** : cpu = 0.836 (sec), leaf count = 122

$$\left\{y(x)=\frac{1}{2\,\mathrm{e}^{x^2}}\left(\sqrt{11}\tan\left(\mathit{RootOf}\left(-4\sqrt{11}x^2+4\sqrt{11}\ln(11)+8\sqrt{11}\ln\left(-\frac{36\sqrt{11}}{11}+36\tan(\_Z)\right)-\right.\right.\right.\right.$$

2.978 ODE No. 978

$$y'(x)=\frac{y(x)\left(x^2+xy(x)+y(x)^2+x\right)}{x^2}$$

✓ **Mathematica** : cpu = 0.088449 (sec), leaf count = 58

$$\text{Solve}\left[\log\left(\frac{y(x)}{x}\right)=c_1+\frac{1}{2}\log\left(\frac{x^2+xy(x)+y(x)^2}{x^2}\right)+\frac{\tan^{-1}\left(\frac{2y(x)+x}{\sqrt{3}x}\right)}{\sqrt{3}}+x,y(x)\right]$$

✓ **Maple** : cpu = 0.385 (sec), leaf count = 71

$$\left\{y(x)=-\frac{x}{2}+\frac{\sqrt{3}x}{2}\tan\left(\mathit{RootOf}\left(-\sqrt{3}\ln(3)-\sqrt{3}\ln\left(\frac{4}{3+3\,(\tan(\_Z))^2}\right)-2\sqrt{3}\ln\left(-1/6\sqrt{3}+1/2\right.\right.\right.\right.$$

2.979 ODE No. 979

$$y'(x)=\frac{-x^3+3x^2y(x)-3xy(x)^2+y(x)^3+x}{x}$$

✓ **Mathematica** : cpu = 0.0115335 (sec), leaf count = 37

$$\left\{\left\{y(x)\to x-\frac{1}{\sqrt{c_1-2\log(x)}}\right\},\left\{y(x)\to\frac{1}{\sqrt{c_1-2\log(x)}}+x\right\}\right\}$$

✓ **Maple** : cpu = 0.067 (sec), leaf count = 57

$$\left\{y(x)=1\left(x\sqrt{2\_C1-2\ln(x)}-1\right)\frac{1}{\sqrt{2\_C1-2\ln(x)}},y(x)=1\left(x\sqrt{2\_C1-2\ln(x)}+1\right)\frac{}{\sqrt{2\_C1}}\right.$$

2.980 ODE No. 980

$$y'(x) = \frac{x^3 y(x)^3 + 6x^2 y(x)^2 + 12xy(x) + 2x + 8}{x^3}$$

✓ **Mathematica** : cpu = 0.0134054 (sec), leaf count = 44

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

✓ **Maple** : cpu = 0.024 (sec), leaf count = 35

$$\left\{y(x) = -\frac{1}{\sqrt{\_C1 - 2\,x}} - 2\,x^{-1}, y(x) = \frac{1}{\sqrt{\_C1 - 2\,x}} - 2\,x^{-1}\right\}$$

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 = 0.0184813 (sec), leaf count = 49

$$\left\{\left\{y(x) \to -\frac{1}{ax} - \frac{1}{\sqrt{c_1-2x}}\right\}, \left\{y(x) \to \frac{1}{\sqrt{c_1-2x}} - \frac{1}{ax}\right\}\right\}$$

✓ **Maple** : cpu = 0.03 (sec), leaf count = 41

$$\left\{y(x) = -\frac{1}{\sqrt{\_C1 - 2\,x}} - \frac{1}{ax}, y(x) = \frac{1}{\sqrt{\_C1 - 2\,x}} - \frac{1}{ax}\right\}$$

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 = 0.164922 (sec), leaf count = 130

$$\text{Solve}\left[21\text{RootSum}\left[-7\#1^3 + 6\sqrt[3]{-7}\#1 - 7\&, \frac{\log\left(\frac{e^{-\frac{x^2}{2}}\left(e^{\frac{x^2}{4}}+3y(x)\right)}{\sqrt[3]{7}\sqrt[3]{-e^{-\frac{3x^2}{4}}}} - \#1\right)}{2\sqrt[3]{-7} - 7\#1^2}\&\right] + 9c_1 + 7^{2/3}e^{\frac{x^2}{2}}\left(-e^{-\frac{3x^2}{4}}\right.\right.$$

✓ **Maple** : cpu = 0.929 (sec), leaf count = 145

$$\left\{-\frac{2}{3}\ln\left(-6+\left(18\,y(x)\,\mathrm{e}^{-1/2\,x^2}+6\,\mathrm{e}^{-1/4\,x^2}\right)\mathrm{e}^{\frac{x^2}{4}}\right)+\frac{1}{3}\ln\left(36+\frac{324}{7}\left(y(x)\,\mathrm{e}^{-\frac{x^2}{2}}+\frac{1}{3}\mathrm{e}^{-\frac{x^2}{4}}\right)^2\left(\mathrm{e}^{\frac{x^2}{4}}\right)^2+\frac{1}{7}(1\right.\right.$$

2.983 ODE No. 983

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

✓ **Mathematica** : cpu = 0.520806 (sec), leaf count = 176

$$\text{Solve}\left[\frac{1}{6}\left(-\log\left(\left(\frac{1}{(x^2-1)^3}\right)^{2/3}(x^2-1)^2(x-y(x))+\frac{(x-y(x))^2}{\left(\frac{1}{(x^2-1)^3}\right)^{2/3}(x^2-1)^2}+1\right)+2\log\left(\frac{y(x)}{\sqrt[3]{\frac{1}{(x^2-1)^3}}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.869 (sec), leaf count = 188

$$\left\{y(x)=\frac{\sqrt{3}}{2}\left(\frac{x^2-1}{3}\left(3\,\tan\left(\mathit{RootOf}\left(9\left(\frac{1}{(1+x)^3(x-1)^3}\right)^{2/3}\ln\left(\frac{x-1}{1+x}\right)x^4-18\left(\frac{1}{(1+x)^3(x-1)^3}\right.\right.\right.\right.\right.\right.$$

2.984 ODE No. 984

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

✓ **Mathematica** : cpu = 9.76365 (sec), leaf count = 341

$$\text{Solve}\left[\frac{2^{2/3}\left(1-\frac{e^x\left(e^{-3x}(x-1)^3\right)^{2/3}(3xy(x)+e^x)}{(x-1)^2}\right)\left(\frac{e^x\left(e^{-3x}(x-1)^3\right)^{2/3}(3xy(x)+e^x)}{(x-1)^2}+2\right)\left(\left(1-\frac{e^x\left(e^{-3x}(x-1)^3\right)^{2/3}(3xy(x)+e\right.}{(x-1)^2}\right.\right.}{9\left(-e^{-3x}(3x\right.}\right.$$

✓ **Maple** : cpu = 0.698 (sec), leaf count = 40

$$\left\{y(x)=\frac{1}{9\,x}\mathrm{e}^{\mathit{RootOf}\left(-\mathrm{e}^{-\_Z}\ln\left(\frac{(\mathrm{e}^{-\_Z}+9)x}{2}\right)+3\_\mathit{C1}\,\mathrm{e}^{-\_Z}+\_Z\,\mathrm{e}^{-\_Z}+\mathrm{e}^{-\_Z}x+9\right)+x}\right\}$$

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 = 0.303364 (sec), leaf count = 96

$$\text{Solve}\left[34^{2/3}\left(-\frac{1}{x^6}\right)^{2/3}x^3 = 51\text{RootSum}\left[-17\#1^3+3\sqrt[3]{-34}\#1-17\&,\frac{\log\left(\frac{3xy(x)+x+3}{\sqrt[3]{34}\sqrt[3]{-\frac{1}{x^6}}x^3}-\#1\right)}{\sqrt[3]{-34}-17\#1^2}\&\right]+9c$$

✓ **Maple** : cpu = 0.056 (sec), leaf count = 43

$$\left\{y(x) = \frac{17\,RootOf\left(162\int^{\_Z}(289\_a^3+54\_a-54)^{-1}d\_a x+3\_C1\,x+2\right)x-3\,x-9}{9\,x}\right\}$$

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 = 0.0148441 (sec), leaf count = 41

$$\left\{\left\{y(x)\to x\left(\log(x)-\frac{1}{\sqrt{c_1-2x}}\right)\right\},\left\{y(x)\to x\left(\frac{1}{\sqrt{c_1-2x}}+\log(x)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.033 (sec), leaf count = 36

$$\left\{y(x) = -x\frac{1}{\sqrt{\_C1-2\,x}}+x\ln(x),y(x) = x\frac{1}{\sqrt{\_C1-2\,x}}+x\ln(x)\right\}$$

2.987 ODE No. 987

$$y'(x)=\frac{y(x)}{x}-F(x)\left(y(x)^2-ax^2\right)$$

✓ **Mathematica** : cpu = 0.100115 (sec), leaf count = 34

$$\left\{\left\{y(x)\to\sqrt{a}x\tanh\left(\sqrt{a}\left(\int_1^x K[1]F(K[1])\,dK[1]+c_1\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.21 (sec), leaf count = 22

$$\left\{y(x)=\tanh\left(\sqrt{a}\left(\_C1+\int F(x)\,x\,\mathrm{d}x\right)\right)x\sqrt{a}\right\}$$

2.988 ODE No. 988

$$y'(x)=\frac{y(x)}{x}-F(x)\left(-x^2-2xy(x)+y(x)^2\right)$$

✓ **Mathematica** : cpu = 0.322391 (sec), leaf count = 77

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

✓ **Maple** : cpu = 0.109 (sec), leaf count = 29

$$\left\{y(x)=\frac{x\left(\sqrt{2}+2\tanh\left(\left(\_C1+\int F(x)\,x\,\mathrm{d}x\right)\sqrt{2}\right)\right)\sqrt{2}}{2}\right\}$$

2.989 ODE No. 989

$$y'(x)=\frac{y(x)}{x}-F(x)\left(-ay(x)^2-bx^2\right)$$

✓ **Mathematica** : cpu = 0.103905 (sec), leaf count = 44

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

✓ **Maple** : cpu = 0.097 (sec), leaf count = 29

$$\left\{y(x) = \frac{x}{a} \tan\left(\sqrt{ab}\left(\_C1 + \int F(x)\, x\, \mathrm{d}x\right)\right)\sqrt{ab}\right\}$$

2.990 ODE No. 990

$$y'(x) = 2x - F(x)\left(-x^4 + 2x^2 y(x) - y(x)^2 + 1\right)$$

✓ **Mathematica** : cpu = 0.461554 (sec), leaf count = 48

$$\left\{\left\{y(x) \to -\frac{2e^{\int_1^x 2F(K[5])\,dK[5]}}{e^{\text{Integrate}[2F(K[5]),\{K[5],1,x\},\text{Assumptions}\to\text{True}]} - 2c_1} + x^2 + 1\right\}\right\}$$

✓ **Maple** : cpu = 0.76 (sec), leaf count = 44

$$\left\{y(x) = \frac{-x^2\left(\mathrm{e}^{\int F(x)\,\mathrm{d}x}\right)^2 + \_C1\, x^2 + \left(\mathrm{e}^{\int F(x)\,\mathrm{d}x}\right)^2 + \_C1}{-\left(\mathrm{e}^{\int F(x)\,\mathrm{d}x}\right)^2 + \_C1}\right\}$$

2.991 ODE No. 991

$$y'(x) = \frac{y(x)}{x} - F(x)\left(x^2 + 2xy(x) - y(x)^2\right)$$

✓ **Mathematica** : cpu = 0.294911 (sec), leaf count = 75

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

✓ **Maple** : cpu = 0.101 (sec), leaf count = 29

$$\left\{y(x) = \frac{x\left(\sqrt{2} - 2\tanh\left(\left(\_C1 + \int F(x)\, x\, \mathrm{d}x\right)\sqrt{2}\right)\right)\sqrt{2}}{2}\right\}$$

2.992 ODE No. 992

$$y'(x) = \frac{y(x)}{x} - F(x)\left(-x^3 - 7xy(x)^2\right)$$

✓ **Mathematica** : cpu = 0.105968 (sec), leaf count = 36

$$\left\{\left\{y(x) \to \frac{x \tan\left(\sqrt{7}\left(\int_1^x K[1]^2 F(K[1])\, dK[1] + c_1\right)\right)}{\sqrt{7}}\right\}\right\}$$

✓ **Maple** : cpu = 0.092 (sec), leaf count = 25

$$\left\{y(x) = \frac{\tan\left(\left(\int F(x)\, x^2\, dx + \_C1\right)\sqrt{7}\right) x\sqrt{7}}{7}\right\}$$

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 = 299.998 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.049 (sec), leaf count = 35

$$\left\{y(x) = -\frac{\ln(x)\left(\int -2\ln(x)\, F(x)\, dx - \_C1 - 2\right)}{\int -2\ln(x)\, F(x)\, dx - \_C1}\right\}$$

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 = 0.128321 (sec), leaf count = 44

$$\left\{\left\{y(x) \to \frac{\log(x)\left(-16(c_1+1) + x^4 - 4x^4\log(x)\right)}{16c_1 - x^4 + 4x^4\log(x)}\right\}\right\}$$

✓ **Maple** : cpu = 0.043 (sec), leaf count = 43

$$\left\{y(x) = -\frac{\ln(x)\left(4\,x^4\ln(x) - x^4 + 8\_C1 + 16\right)}{4\,x^4\ln(x) - x^4 + 8\_C1}\right\}$$

2.995 ODE No. 995

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

✓ **Mathematica** : cpu = 0.0174033 (sec), leaf count = 17

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

✓ **Maple** : cpu = 0.15 (sec), leaf count = 14

$$\{y(x) = e^x + (\_C1 - x)^{-1}\}$$

2.996 ODE No. 996

$$y'(x) = \frac{(y(x) - \mathrm{Si}(x))^2 + \sin(x)}{x}$$

✗ **Mathematica** : cpu = 72.0067 (sec), leaf count = 0 , could not solve

```
DSolve[Derivative[1][y][x] == (Sin[x] + (-SinIntegral[x] + y[x])^2)/x, y[x], x]
```

✓ **Maple** : cpu = 0.112 (sec), leaf count = 15

$$\{y(x) = Si(x) + (\_C1 - \ln(x))^{-1}\}$$

2.997 ODE No. 997

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

✓ **Mathematica** : cpu = 0.0308541 (sec), leaf count = 18

$$\left\{\left\{y(x) \to \frac{1}{c_1 - x} - \cos(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.073 (sec), leaf count = 16

$$\{y(x) = -\cos(x) + (\_C1 - x)^{-1}\}$$

2.998 ODE No. 998

$$y'(x) = \frac{(-\text{Ci}(x) + y(x) - \log(x))^2 + \cos(x)}{x}$$

✓ **Mathematica** : cpu = 0.476039 (sec), leaf count = 26

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

✓ **Maple** : cpu = 0.43 (sec), leaf count = 27

$$\left\{y(x) = \ln(x) + Ci(x) + \frac{-\_C1\, x^2 + 1}{\_C1\, x^2 + 1}\right\}$$

2.999 ODE No. 999

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

✓ **Mathematica** : cpu = 0.0240231 (sec), leaf count = 24

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

✓ **Maple** : cpu = 0.078 (sec), leaf count = 36

$$\left\{y(x) = \frac{-(\ln(1+x))^2 + (-\_C1 + x)\ln(1+x) + \_C1\, x - 1}{\ln(1+x) + \_C1}\right\}$$

2.1000 ODE No. 1000

$$y'(x) = \frac{x^3 + 2x^2 y(x) - xy(x) - y(x)^2 + xy(x)\log(x)}{x^2(x + \log(x))}$$

✗ **Mathematica** : cpu = 300.057 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.184 (sec), leaf count = 19

$$\left\{y(x) = \frac{x(\_C1\, x - 1)}{\ln(x)\,\_C1 + 1}\right\}$$

2.1001 ODE No. 1001

$$y''(x) = 0$$

✓ **Mathematica** : cpu = 0.00409388 (sec), leaf count = 12

$$\{\{y(x) \to c_2 x + c_1\}\}$$

✓ **Maple** : cpu = 0.006 (sec), leaf count = 9

$$\{y(x) = \_C1\, x + \_C2\}$$

Hand solution

$$y'' = 0$$

Integration twice gives

$$y(x) = c_1 x + c_2$$

2.1002 ODE No. 1002

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

✓ **Mathematica** : cpu = 0.00482152 (sec), leaf count = 16

$$\{\{y(x) \to c_2 \sin(x) + c_1 \cos(x)\}\}$$

✓ **Maple** : cpu = 0.023 (sec), leaf count = 13

$$\{y(x) = \_C1\ \sin(x) + \_C2\ \cos(x)\}$$

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 = 0.138313 (sec), leaf count = 29

$$\left\{\left\{y(x) \to c_2 \sin(x) + c_1 \cos(x) - \frac{\sin(nx)}{n^2 - 1}\right\}\right\}$$

✓ **Maple** : cpu = 0.477 (sec), leaf count = 26

$$\left\{y(x) = \sin(x)\_C2 + \cos(x)\_C1 - \frac{\sin(nx)}{n^2 - 1}\right\}$$

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

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

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

2.1004 ODE No. 1004

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

✓ **Mathematica** : cpu = 0.119277 (sec), leaf count = 30

$$
\left\{\left\{y(x) \to -\frac{a\cos(bx)}{b^2 - 1} + c_2\sin(x) + c_1\cos(x)\right\}\right\}
$$

✓ **Maple** : cpu = 0.056 (sec), leaf count = 27

$$
\left\{y(x) = \sin(x)\_C2 + \cos(x)\_C1 - \frac{a\cos(bx)}{b^2 - 1}\right\}
$$

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 = 0.609458 (sec), leaf count = 159

$$
\left\{\left\{y(x) \to \frac{a^4 c_2 \sin(x) - 2a^2 b^2 c_2 \sin(x) - a^2 \sin(ax)\sin(bx) - 2a^2 c_2 \sin(x) + c_1 \left(a^4 - 2a^2(b^2+1) + (b^2 -\right.}{(a-b-1)(a}\right.\right.
$$

✓ **Maple** : cpu = 0.121 (sec), leaf count = 82

$$
\left\{y(x) = \sin(x)\_C2 + \cos(x)\_C1 + \frac{-(a+b+1)(a+b-1)\cos(x(a-b)) + \cos((a+b)x)(a-b+1}{2a^4 + (-4b^2 - 4)a^2 + 2b^4 - 4b^2 + 2}\right.
$$

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

$$
\begin{aligned}
y_p &= -\frac{1}{4}\left(\frac{\cos\left((a-b-1)x\right)}{a-b-1} - \frac{\cos\left((a-b+1)x\right)}{a-b+1} - \frac{\cos\left((a+b-1)x\right)}{a+b-1} + \frac{\cos\left((a+b+1)x\right)}{a+b+1}\right)\cos x \\
&\quad + \frac{1}{4}\left(\frac{\sin\left((a-b-1)x\right)}{a-b-1} + \frac{\sin\left((a-b+1)x\right)}{a-b+1} - \frac{\sin\left((a+b-1)x\right)}{a+b-1} - \frac{\sin\left((a+b+1)x\right)}{a+b+1}\right)\sin x
\end{aligned}
$$

$$
\begin{aligned}
&= \frac{1}{4}\left(-\frac{\cos^2\left((a-b-1)x\right)}{a-b-1} + \frac{\sin^2\left((a-b-1)x\right)}{a-b-1}\right) + \frac{1}{4}\left(\frac{\cos^2\left((a-b+1)x\right)}{a-b+1} + \frac{\sin^2\left((a-b+1)x\right)}{a-b+1}\right) \\
&\quad + \frac{1}{4}\left(\frac{\cos^2\left((a+b-1)x\right)}{a+b-1} - \frac{\sin^2\left((a+b-1)x\right)}{a+b-1}\right) + \frac{1}{4}\left(-\frac{\cos^2\left((a+b+1)x\right)}{a+b+1} - \frac{\sin^2\left((a+b+1)x\right)}{a+b+1}\right)
\end{aligned}
$$

$$
\begin{aligned}
&= \frac{1}{4}\left(-\frac{\cos^2\left((a-b-1)x\right)}{a-b-1} + \frac{\sin^2\left((a-b-1)x\right)}{a-b-1}\right) + \frac{1}{4}\left(\frac{1}{a-b+1}\right) \\
&\quad + \frac{1}{4}\left(\frac{\cos^2\left((a+b-1)x\right)}{a+b-1} - \frac{\sin^2\left((a+b-1)x\right)}{a+b-1}\right) - \frac{1}{4}\left(\frac{1}{a+b+1}\right)
\end{aligned}
$$

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/
y0:=yp+_C1*sin(x)+_C2*cos(x);
not zero
```

2.1006 ODE No. 1006

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

✓ **Mathematica** : cpu = 0.00472456 (sec), leaf count = 20

$$\{\{y(x) \to c_1 e^x + c_2 e^{-x}\}\}$$

✓ **Maple** : cpu = 0.013 (sec), leaf count = 15

$$\{y(x) = \_C1\, e^x + \_C2\, e^{-x}\}$$

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 = 0.0890615 (sec), leaf count = 36

$$\left\{\left\{y(x) \to c_1 e^{\sqrt{2}x} + c_2 e^{-\sqrt{2}x} + e^{x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.198 (sec), leaf count = 26

$$\left\{y(x) = e^{\sqrt{2}x}\_C2 + e^{-\sqrt{2}x}\_C1 + e^{x^2}\right\}$$

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 = 0.0448451 (sec), leaf count = 46

$$
\left\{\left\{y(x) \to \frac{\sin(ax)\left(a^2c_2 + \log\left(\sin\left(\frac{ax}{2}\right)\right) - \log\left(\cos\left(\frac{ax}{2}\right)\right)\right)}{a^2} + c_1\cos(ax)\right\}\right\}
$$

✓ **Maple** : cpu = 0.133 (sec), leaf count = 41

$$
\left\{y(x) = \sin(ax)\_C2 + \cos(ax)\_C1 + \frac{\sin(ax)}{a^2}\ln\left(\frac{1-\cos(ax)}{\sin(ax)}\right)\right\}
$$

2.1009 ODE No. 1009

$$ly(x) + y''(x) = 0$$

✓ **Mathematica** : cpu = 0.00501735 (sec), leaf count = 28

$$\left\{\left\{y(x) \to c_2 \sin\left(\sqrt{l}x\right) + c_1 \cos\left(\sqrt{l}x\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.036 (sec), leaf count = 21

$$\left\{y(x) = \_C1 \sin\left(\sqrt{l}x\right) + \_C2 \cos\left(\sqrt{l}x\right)\right\}$$

2.1010 ODE No. 1010

$$y(x)(ax+b) + y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0072454 (sec), leaf count = 42

$$\left\{\left\{y(x) \to c_1 \text{Ai}\left(-\frac{b+ax}{(-a)^{2/3}}\right) + c_2 \text{Bi}\left(-\frac{b+ax}{(-a)^{2/3}}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.092 (sec), leaf count = 31

$$\left\{y(x) = \_C1 \text{ Ai}\left(-(ax+b)a^{-\frac{2}{3}}\right) + \_C2 \text{ Bi}\left(-(ax+b)a^{-\frac{2}{3}}\right)\right\}$$

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

$$
\begin{aligned}
2a^2 c_2 &= 0 && (3)\\
a^2(n+1)(n+2)\,c_{n+2} + c_{n-1} &= 0 \qquad n \geq 1 && (4)
\end{aligned}
$$

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

$$
\begin{aligned}
f(\xi) &= \sum_{n=0}^{\infty} 3^n\left(\frac{1}{3}\right)_n \frac{\xi^{3n}}{(3n)!}\\
g(\xi) &= \sum_{n=0}^{\infty} 3^n\left(\frac{2}{3}\right)_n \frac{\xi^{3n+1}}{(3n+1)!}
\end{aligned}
$$

Now looking at definition of $\mathrm{AiryAI}(z)$ we see

$$
\begin{aligned}
\mathrm{AiryAI}(z) &= r_1 f(z) - r_2 g(z)\\
\mathrm{AiryBI}(z) &= \sqrt{3}(r_1 f(z) + r_2 g(z))
\end{aligned}
$$

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

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

✓ **Mathematica** : cpu = 0.00783961 (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 = 0.094 (sec), leaf count = 17

$$\left\{y(x) = \mathrm{e}^{\frac{x^2}{2}} \left(\mathit{Erf}(x)\_C2 + \_C1\right)\right\}$$

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

$$y' = \sum_{n=0}^{\infty} n c_n x^{n-1} = \sum_{n=1}^{\infty} n c_n x^{n-1} = \sum_{n=0}^{\infty} (n+1)\, c_{n+1} x^n$$
$$y'' = \sum_{n=0}^{\infty} n(n+1)\, c_{n+1} x^{n-1} = \sum_{n=1}^{\infty} n(n+1)\, c_{n+1} x^{n-1} = \sum_{n=0}^{\infty} (n+1)\,(n+2)\, c_{n+2} x^n$$

Substituting back in the original ODE gives

$$\sum_{n=0}^{\infty} (n+1)\,(n+2)\, c_{n+2} x^n - (x^2+1) \sum_{n=0}^{\infty} c_n x^n = 0$$
$$\sum_{n=0}^{\infty} (n+1)\,(n+2)\, c_{n+2} x^n - x^2 \sum_{n=0}^{\infty} c_n x^n - \sum_{n=0}^{\infty} c_n x^n = 0$$
$$\sum_{n=0}^{\infty} (n+1)\,(n+2)\, c_{n+2} x^n - \sum_{n=0}^{\infty} c_n x^{n+2} - \sum_{n=0}^{\infty} c_n x^n = 0$$
$$\sum_{n=0}^{\infty} (n+1)\,(n+2)\, c_{n+2} x^n - \sum_{n=2}^{\infty} c_{n-2} x^n - \sum_{n=0}^{\infty} c_n x^n = 0$$

For $n = 0$

$$(n+1)\,(n+2)\, c_{n+2} - c_n = 0$$
$$2c_2 - c_0 = 0$$
$$c_2 = \frac{c_0}{2}$$

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

$$c_0\left(1+\frac{x^2}{2}+\frac{1}{8}x^4+\frac{1}{48}x^6+\cdots\right) = c_0 e^{\frac{x^2}{2}}$$

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

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

✓ **Mathematica** : cpu = 0.0081036 (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 = 0.776 (sec), leaf count = 29

$$\left\{y(x) = 1\left(\_C2\, W_{-\frac{a}{4},\frac{1}{4}}\left(x^2\right)+\_C1\, M_{-\frac{a}{4},\frac{1}{4}}\left(x^2\right)\right)\frac{1}{\sqrt{x}}\right\}$$

2.1013 ODE No. 1013

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

✓ **Mathematica** : cpu = 0.0198835 (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 = 0.055 (sec), leaf count = 22

$$\left\{y(x) = e^{\frac{ax^2}{2}}\left(Erf\left(\sqrt{a}x\right)\_C2+\_C1\right)\right\}$$

2.1014 ODE No. 1014

$$y''(x) - cx^a y(x) = 0$$

✓ **Mathematica** : cpu = 0.0306689 (sec), leaf count = 119

$$\left\{\left\{y(x)\to (a+2)^{-\frac{1}{a+2}}\sqrt{x}c^{\frac{1}{2a+4}}\left(c_1\Gamma\left(\frac{a+1}{a+2}\right)I_{-\frac{1}{a+2}}\left(\frac{2\sqrt{c}x^{\frac{a}{2}+1}}{a+2}\right)+(-1)^{\frac{1}{a+2}}c_2\Gamma\left(1+\frac{1}{a+2}\right)I_{\frac{1}{a+2}}\left(\frac{2\sqrt{cx}}{a+}\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.291 (sec), leaf count = 63

$$\left\{y(x) = \sqrt{x}\left(Y_{(a+2)^{-1}}\left(2\,\frac{\sqrt{-c}x^{a/2+1}}{a+2}\right)\_C2+J_{(a+2)^{-1}}\left(2\,\frac{\sqrt{-c}x^{a/2+1}}{a+2}\right)\_C1\right)\right\}$$

2.1015 ODE No. 1015

$$y''(x) - y(x)\left(a^2x^{2n} - 1\right) = 0$$

✗ **Mathematica** : cpu = 0.348802 (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

$$\left\{y(x) = DESol\left(\left\{\frac{d^2}{dx^2}\_Y(x) + \left(-a^2x^{2n} + 1\right)\_Y(x)\right\}, \{\_Y(x)\}\right)\right\}$$

2.1016 ODE No. 1016

$$y(x)\left(ax^{2c} + bx^{c-1}\right) + y''(x) = 0$$

✓ **Mathematica** : cpu = 0.152081 (sec), leaf count = 225

$$\left\{\left\{y(x) \to 2^{\frac{c}{2c+2}} x^{-c/2} \left(x^{c+1}\right)^{\frac{c}{2c+2}} e^{-\frac{\sqrt{a}x^{c+1}}{\sqrt{-(c+1)^2}}} \left(c_1 U\left(-\frac{(c+1)\left(cb + b + \sqrt{a}c\sqrt{-(c+1)^2}\right)}{2\sqrt{a}\left(-(c+1)^2\right)^{3/2}}, \frac{c}{c+1}, \frac{2\sqrt{a}x^{c-}}{\sqrt{-(c+}}\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.489 (sec), leaf count = 91

$$\left\{y(x) = x^{-\frac{c}{2}}\left(M_{\frac{-ib}{2c+2}\frac{1}{\sqrt{a}}, (2c+2)^{-1}}\left(\frac{2ix^{c+1}}{c+1}\sqrt{a}\right)\_C1 + W_{\frac{-ib}{2c+2}\frac{1}{\sqrt{a}}, (2c+2)^{-1}}\left(\frac{2ix^{c+1}}{c+1}\sqrt{a}\right)\_C2\right)\right\}$$

2.1017 ODE No. 1017

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

✓ **Mathematica** : cpu = 0.0270895 (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 = 0.062 (sec), leaf count = 17

$$\{y(x) = \_C1\, J_v(e^x) + \_C2\, Y_v(e^x)\}$$

2.1018 ODE No. 1018

$$ae^{bx}y(x) + y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0226904 (sec), leaf count = 55

$$\left\{\left\{y(x) \to c_1 J_0\left(\frac{2\sqrt{a}\sqrt{e^{bx}}}{b}\right) + 2c_2 Y_0\left(\frac{2\sqrt{a}\sqrt{e^{bx}}}{b}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.133 (sec), leaf count = 39

$$\left\{y(x) = \_C1\ J_0\left(2\,\frac{\sqrt{a}\mathrm{e}^{1/2\,bx}}{b}\right) + \_C2\ Y_0\left(2\,\frac{\sqrt{a}\mathrm{e}^{1/2\,bx}}{b}\right)\right\}$$

2.1019 ODE No. 1019

$$y''(x) - y(x)\left(4a^2b^2x^2e^{2bx^2} - 1\right) = 0$$

✗ **Mathematica** : cpu = 0.814252 (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

$$\left\{y(x) = DESol\left(\left\{\frac{\mathrm{d}^2}{\mathrm{d}x^2}\_Y(x) + \left(-4\,a^2b^2x^2\mathrm{e}^{2\,bx^2} + 1\right)\_Y(x)\right\}, \{\_Y(x)\}\right)\right\}$$

2.1020 ODE No. 1020

$$y(x)\left(ae^{2x} + be^x + c\right) + y''(x) = 0$$

✓ **Mathematica** : cpu = 0.727741 (sec), leaf count = 136

$$\left\{\left\{y(x) \to e^{-i\sqrt{a}e^x}(e^x)^{i\sqrt{c}}\left(c_1 U\left(\frac{ib}{2\sqrt{a}} + i\sqrt{c} + \frac{1}{2}, 2i\sqrt{c} + 1, 2i\sqrt{a}e^x\right) + c_2 L_{-\frac{ib}{2\sqrt{a}} - i\sqrt{c} - \frac{1}{2}}^{2i\sqrt{c}}\left(2i\sqrt{a}e^x\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.396 (sec), leaf count = 58

$$\left\{y(x) = \mathrm{e}^{-\frac{x}{2}}\left(M_{-\frac{i}{2}b\frac{1}{\sqrt{a}}, i\sqrt{c}}(2\,i\sqrt{a}\mathrm{e}^x)\_C1 + W_{-\frac{i}{2}b\frac{1}{\sqrt{a}}, i\sqrt{c}}(2\,i\sqrt{a}\mathrm{e}^x)\_C2\right)\right\}$$

2.1021 ODE No. 1021

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

✓ **Mathematica** : cpu = 0.0469676 (sec), leaf count = 40

$$\left\{\left\{y(x)\to c_1\text{MathieuC}\left[\frac{a}{2}+b,-\frac{a}{4},x\right]+c_2\text{MathieuS}\left[\frac{a}{2}+b,-\frac{a}{4},x\right]\right\}\right\}$$

✓ **Maple** : cpu = 3.908 (sec), leaf count = 39

$$\left\{y(x)=\_C1\ \mathit{MathieuC}\left(-\frac{a}{2}-b,\frac{a}{4},ix\right)+\_C2\ \mathit{MathieuS}\left(-\frac{a}{2}-b,\frac{a}{4},ix\right)\right\}$$

2.1022 ODE No. 1022

$$y(x)(a\cos(2x)+b)+y''(x)=0$$

✓ **Mathematica** : cpu = 0.0281999 (sec), leaf count = 28

$$\left\{\left\{y(x)\to c_1\text{MathieuC}\left[b,-\frac{a}{2},x\right]+c_2\text{MathieuS}\left[b,-\frac{a}{2},x\right]\right\}\right\}$$

✓ **Maple** : cpu = 0.529 (sec), leaf count = 21

$$\left\{y(x)=\_C1\ \mathit{MathieuC}\left(b,-\frac{a}{2},x\right)+\_C2\ \mathit{MathieuS}\left(b,-\frac{a}{2},x\right)\right\}$$

2.1023 ODE No. 1023

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

✓ **Mathematica** : cpu = 0.0147596 (sec), leaf count = 40

$$\left\{\left\{y(x)\to c_1\text{MathieuC}\left[\frac{a}{2}+b,-\frac{a}{4},x\right]+c_2\text{MathieuS}\left[\frac{a}{2}+b,-\frac{a}{4},x\right]\right\}\right\}$$

✓ **Maple** : cpu = 0.472 (sec), leaf count = 29

$$\left\{y(x)=\_C1\ \mathit{MathieuC}\left(\frac{a}{2}+b,-\frac{a}{4},x\right)+\_C2\ \mathit{MathieuS}\left(\frac{a}{2}+b,-\frac{a}{4},x\right)\right\}$$

2.1024 ODE No. 1024

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

✓ **Mathematica** : cpu = 0.168943 (sec), leaf count = 54

$$\left\{\left\{y(x) \to \frac{\sqrt[4]{\sin^2(x)}\left(-c_2\sqrt{\sin^2(x)} + 2c_1\sec(x) + c_2\sec(x)\sin^{-1}(\cos(x))\right)}{2\sqrt[4]{-\sin^2(x)}}\right\}\right\}$$

✓ **Maple** : cpu = 0.217 (sec), leaf count = 30

$$\left\{y(x) = \frac{i\cos(x)\sin(x)\_C2 + \ln(\cos(x) + i\sin(x))\_C2 + \_C1}{\cos(x)}\right\}$$

2.1025 ODE No. 1025

$$y''(x) - y(x)\left(a + (m-1)m\sec^2(x) + (n-1)n\csc^2(x)\right) = 0$$

✓ **Mathematica** : cpu = 1.02848 (sec), leaf count = 158

$$\left\{\left\{y(x) \to \frac{(-1)^{-m}\cos^2(x)^{-\frac{m}{2}-\frac{1}{4}}\left(-\sin^2(x)\right)^{n/2}\left(c_1(-1)^m\cos^2(x)^{m+\frac{1}{2}}\,{}_2F_1\left(\frac{1}{2}\left(m+n-\sqrt{-a}\right), \frac{1}{2}(m+n+\right.\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.378 (sec), leaf count = 102

$$\left\{y(x) = (\sin(x))^n\left((\cos(x))^{-m+1}\,{}_2\mathrm{F}_1\left(\frac{n}{2} - \frac{m}{2} + \frac{i}{2}\sqrt{a} + \frac{1}{2}, \frac{n}{2} - \frac{m}{2} - \frac{i}{2}\sqrt{a} + \frac{1}{2}; \frac{3}{2} - m; (\cos(x))^2\right)\_C2\right.\right.$$

2.1026 ODE No. 1026

$$y''(x) - y(x)(B + n(n+1)\wp(x; \mathrm{g2}, \mathrm{g3})) = 0$$

✗ **Mathematica** : cpu = 0.184525 (sec), leaf count = 0 , could not solve

```
DSolve[-((B + n*(1 + n)*WeierstrassP[x, {g2, g3}])*y[x]) + Derivative[2][y][x] == 0, y
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x) = \mathit{DESol}\left(\left\{\frac{\mathrm{d}^2}{\mathrm{d}x^2}\_Y(x) + (-n(n+1)\,\mathit{WeierstrassP}(x, g2, g3) - B)\_Y(x)\right\}, \{\_Y(x)\}\right)\right\}$$

2.1027 ODE No. 1027

$$y(x)\left(a\,\mathrm{sn}(x|k)^2+b\right)+y''(x)=0$$

✗ **Mathematica** : cpu = 1.68429 (sec), leaf count = 0 , could not solve

```
DSolve[(b + a*JacobiSN[x, k]^2)*y[x] + Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 1.302 (sec), leaf count = 69

$$\left\{y(x)=\_C1\ HeunG\left(k^{-2},\frac{b}{4\,k^2},-\frac{n}{2},\frac{n}{2}+\frac{1}{2},\frac{1}{2},\frac{1}{2},(JacobiSN(x,k))^2\right)+\_C2\ HeunG\left(k^{-2},\frac{k^2+b+1}{4\,k^2},\right.$$

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 = 0.291498 (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][
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x)=DESol\left(\left\{\frac{d^2}{dx^2}\_Y(x)+\left(-\frac{\frac{d^4}{dx^4}p(x)}{30}-\frac{7\,\frac{d^2}{dx^2}p(x)}{3}-ap(x)-b\right)\_Y(x)\right\},\{\_Y(x)\}\right)\right\}$$

2.1029 ODE No. 1029

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

✗ **Mathematica** : cpu = 0.122683 (sec), leaf count = 0 , could not solve

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

✓ **Maple** : cpu = 0.609 (sec), leaf count = 22

$$\left\{y(x)=\left(\int e^{\int -2\,f(x)\,dx}\,dx+\_C1\right)e^{\int f(x)\,dx}\_C2\right\}$$

2.1030 ODE No. 1030

$$y(x)(l+P(x))+y''(x)=0$$

✗ **Mathematica** : cpu = 0.130571 (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

$$\left\{y(x)=DESol\left(\left\{(P(x)+l)\_Y(x)+\frac{\mathrm{d}^2}{\mathrm{d}x^2}\_Y(x)\right\},\{\_Y(x)\}\right)\right\}$$

2.1031 ODE No. 1031

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

✗ **Mathematica** : cpu = 0.10018 (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

$$\left\{y(x)=DESol\left(\left\{-f(x)\_Y(x)+\frac{\mathrm{d}^2}{\mathrm{d}x^2}\_Y(x)\right\},\{\_Y(x)\}\right)\right\}$$

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 = 0.551328 (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)*D
```

✓ **Maple** : cpu = 0.411 (sec), leaf count = 48

$$\left\{y(x)=1\left(\_C2\,W_{\frac{i}{2}v^2-\frac{i}{8},\frac{1}{2}}(2\,ig(x))+\_C1\,M_{\frac{i}{2}v^2-\frac{i}{8},\frac{1}{2}}(2\,ig(x))\right)\frac{1}{\sqrt{\frac{\mathrm{d}}{\mathrm{d}x}g\left(x\right)}}\right\}$$

2.1033 ODE No. 1033

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

✓ **Mathematica** : cpu = 0.0181857 (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 = 0.121 (sec), leaf count = 27

$$\left\{y(x) = \_C1\ \sin\left(\mathrm{e}^{-x}\sqrt{a}\right) + \_C2\ \cos\left(\mathrm{e}^{-x}\sqrt{a}\right)\right\}$$

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

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

Hence the original ODE becomes

$$\begin{aligned}\frac{d^2\eta}{d\xi^2}\left(e^{-2x}\right) + \frac{d\eta}{d\xi}\left(e^{-x}\right) + \frac{d\eta}{d\xi}\left(-e^{-x}\right) + ae^{-2x}\eta(\xi) = 0 \\ \eta'' + a\eta = 0\end{aligned}$$

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 = 0.0134515 (sec), leaf count = 20

$$\{\{y(x) \to c_2 \sin\left(e^x\right) + c_1 \cos\left(e^x\right)\}\}$$

✓ **Maple** : cpu = 0.014 (sec), leaf count = 15

$$\{y(x) = \_C1\ \sin\left(e^x\right) + \_C2\ \cos\left(e^x\right)\}$$

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

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

Hence the original ODE becomes

$$
\begin{aligned}
\frac{d^2\eta}{d\xi^2}\left(e^{2x}\right) + \frac{d\eta}{d\xi}(e^x) - \frac{d\eta}{d\xi}(e^x) + e^{2x}\eta = 0 \\
\eta'' + \eta = 0
\end{aligned}
$$

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 = 0.0056314 (sec), leaf count = 47

$$\left\{\left\{y(x)\to e^{-\frac{1}{2}x\left(\sqrt{a^2-4b}+a\right)}\left(c_2e^{x\sqrt{a^2-4b}}+c_1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.023 (sec), leaf count = 41

$$\left\{y(x) = \_C1\,\mathrm{e}^{-\frac{x}{2}\left(a-\sqrt{a^2-4\,b}\right)} + \_C2\,\mathrm{e}^{-\frac{x}{2}\left(a+\sqrt{a^2-4\,b}\right)}\right\}$$

2.1036 ODE No. 1036

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

✓ **Mathematica** : cpu = 0.527777 (sec), leaf count = 150

$$\left\{\left\{y(x)\to e^{-\frac{1}{2}x\left(\sqrt{a^2-4b}+a\right)}\left(\int_1^x -\frac{f(K[1])e^{\frac{1}{2}\left(\sqrt{a^2-4b}+a\right)K[1]}}{\sqrt{a^2-4b}}\,dK[1] + e^{x\sqrt{a^2-4b}}\int_1^x \frac{f(K[2])e^{\frac{1}{2}\left(a-\sqrt{a^2-4b}\right)K[2]}}{\sqrt{a^2-4b}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.357 (sec), leaf count = 124

$$\left\{y(x) = \mathrm{e}^{-\frac{x}{2}\left(a-\sqrt{a^2-4\,b}\right)}\_C2 + \mathrm{e}^{-\frac{x}{2}\left(a+\sqrt{a^2-4\,b}\right)}\_C1 + 1\left(\int f(x)\,\mathrm{e}^{-\frac{x}{2}\left(-a+\sqrt{a^2-4\,b}\right)}\,\mathrm{d}x\mathrm{e}^{x\sqrt{a^2-4\,b}} - \int f(x)\,\mathrm{e}^{\frac{x}{2}\left(\right.}\right.\right.$$

2.1037 ODE No. 1037

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

✓ **Mathematica** : cpu = 0.0485969 (sec), leaf count = 74

$$\left\{\left\{y(x)\to e^{-\frac{1}{2}x(a+bx)}\left(c_1H_{-\frac{a^2+4(b+c)}{8b}}\left(\sqrt{b}x\right)+c_2\,{}_1F_1\left(\frac{a^2+4(b+c)}{16b};\frac{1}{2};bx^2\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.209 (sec), leaf count = 64

$$\left\{y(x) = \mathrm{e}^{-\frac{x(bx+a)}{2}}x\left(U\left(\frac{a^2+12\,b+4\,c}{16\,b},\,\frac{3}{2},\,bx^2\right)\_C2 + M\left(\frac{a^2+12\,b+4\,c}{16\,b},\,\frac{3}{2},\,bx^2\right)\_C1\right)\right\}$$

2.1038 ODE No. 1038

$$2ay'(x) + f(x)y(x) + y''(x) = 0$$

✗ **Mathematica** : cpu = 0.275464 (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

$$\left\{y(x) = DESol\left(\left\{f(x)\_Y(x) + 2\,a\frac{\mathrm{d}}{\mathrm{d}x}\_Y(x) + \frac{\mathrm{d}^2}{\mathrm{d}x^2}\_Y(x)\right\}, \{\_Y(x)\}\right)\right\}$$

2.1039 ODE No. 1039

$$y''(x) + xy'(x) + y(x) = 0$$

✓ **Mathematica** : cpu = 0.0122861 (sec), leaf count = 41

$$\left\{\left\{y(x) \to \frac{1}{2}e^{-\frac{x^2}{2}}\left(\sqrt{2\pi}c_1\text{erfi}\left(\frac{x}{\sqrt{2}}\right) + 2c_2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.012 (sec), leaf count = 25

$$\left\{y(x) = \left(Erf\left(\frac{i}{2}\sqrt{2}x\right)\_C1 + \_C2\right)\left(\mathrm{e}^{\frac{x^2}{2}}\right)^{-1}\right\}$$

2.1040 ODE No. 1040

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

✓ **Mathematica** : cpu = 0.0456886 (sec), leaf count = 45

$$\left\{\left\{y(x) \to -\sqrt{\frac{\pi}{2}}c_2x\text{erf}\left(\frac{x}{\sqrt{2}}\right) - c_2e^{-\frac{x^2}{2}} + c_1x\right\}\right\}$$

✓ **Maple** : cpu = 0.086 (sec), leaf count = 34

$$\left\{y(x) = -\_C2\,\mathrm{e}^{-\frac{x^2}{2}} + \left(-\frac{\_C2\,\sqrt{\pi}\sqrt{2}}{2}Erf\left(\frac{\sqrt{2}x}{2}\right) + \_C1\right)x\right\}$$

2.1041 ODE No. 1041

$$(n+1)y(x) + y''(x) + xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.00942641 (sec), leaf count = 47

$$\left\{\left\{y(x) \to e^{-\frac{x^2}{2}}\left(c_1 H_n\left(\frac{x}{\sqrt{2}}\right) + c_2\, {}_1F_1\left(-\frac{n}{2}; \frac{1}{2}; \frac{x^2}{2}\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.162 (sec), leaf count = 41

$$\left\{y(x) = e^{-\frac{x^2}{2}} x \left(U\left(-\frac{n}{2} + \frac{1}{2}, \frac{3}{2}, \frac{x^2}{2}\right) \_C2 + M\left(-\frac{n}{2} + \frac{1}{2}, \frac{3}{2}, \frac{x^2}{2}\right) \_C1\right)\right\}$$

2.1042 ODE No. 1042

$$-ny(x) + y''(x) + xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.0083551 (sec), leaf count = 53

$$\left\{\left\{y(x) \to e^{-\frac{x^2}{2}}\left(c_1 H_{-n-1}\left(\frac{x}{\sqrt{2}}\right) + c_2\, {}_1F_1\left(\frac{n+1}{2}; \frac{1}{2}; \frac{x^2}{2}\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.168 (sec), leaf count = 41

$$\left\{y(x) = e^{-\frac{x^2}{2}} x \left(U\left(\frac{n}{2} + 1, \frac{3}{2}, \frac{x^2}{2}\right) \_C2 + M\left(\frac{n}{2} + 1, \frac{3}{2}, \frac{x^2}{2}\right) \_C1\right)\right\}$$

2.1043 ODE No. 1043

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

✓ **Mathematica** : cpu = 0.0603023 (sec), leaf count = 54

$$\left\{\left\{y(x) \to \frac{1}{4} c_2 \left(\sqrt{2\pi}\left(x^2 - 1\right) \operatorname{erfi}\left(\frac{x}{\sqrt{2}}\right) - 2e^{\frac{x^2}{2}} x\right) + c_1\left(x^2 - 1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.798 (sec), leaf count = 42

$$\left\{y(x) = 2\, e^{1/2\, x^2} \_C1\, x - (x-1)(1+x)\left(\sqrt{2} erfi\left(\frac{\sqrt{2}x}{2}\right)\sqrt{\pi} \_C1 - \_C2\right)\right\}$$

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

$$\begin{aligned}
y' &= \sum_{n=0}^{\infty} n c_n x^{n-1} = \sum_{n=1}^{\infty} n c_n x^{n-1} = \sum_{n=0}^{\infty} (n+1)\, c_{n+1} x^n \\
y'' &= \sum_{n=0}^{\infty} n(n+1)\, c_{n+1} x^{n-1} = \sum_{n=1}^{\infty} n(n+1)\, c_{n+1} x^{n-1} = \sum_{n=0}^{\infty} (n+1)\,(n+2)\, c_{n+2} x^n
\end{aligned}$$

Substituting back in the original ODE gives

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

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 $n \geq 1$

$$\begin{aligned}
(n+1)\,(n+2)\, c_{n+2} - n c_n + 2c_n &= 0 \\
c_{n+2} &= \frac{c_n(n-2)}{(n+1)\,(n+2)}
\end{aligned}$$

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

$$\begin{aligned}
y &= \sum_{n=0}^{\infty} c_n x^n \\
&= c_0 + c_1 x + c_2 x^2 + c_3 x^3 + \cdots \\
&= c_0 + c_1 x - c_0 x^2 - \frac{c_1}{(2)(3)} x^3 - \frac{c_1}{(2)(3)(4)(5)} x^5 - \frac{3c_1}{(2)(3)(4)(5)(6)(7)} x^7 - \frac{(3)(5)c_1}{(2)(3)(4)(5)(6)(7)(8)(9} \\
&= c_0\left(1 - x^2\right) + c_1\left(x - \frac{1}{(2)(3)} x^3 - \frac{1}{(2)(3)(4)(5)} x^5 - \frac{3}{(2)(3)(4)(5)(6)(7)} x^7 - \frac{(3)(5)}{(2)(3)(4)(5)(6)(7)(8} \right. \\
&= c_0\left(1 - x^2\right) + c_1\left(x - \frac{1}{3!} x^3 - \frac{1}{5!} x^5 - \frac{3}{7!} x^7 - \frac{15}{9!} x^9 - \cdots\right)
\end{aligned}$$

Hence

$$y(x) = c_0\left(1 - x^2\right) + c_1\left(x - \frac{1}{6} x^3 - \frac{1}{120} x^5 - \frac{1}{1680} x^7 - \frac{1}{24\,192} x^9 - \cdots\right)$$

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 = 0.00891891 (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 = 0.135 (sec), leaf count = 35

$$\left\{y(x) = x\left(U\left(\frac{1}{2} + \frac{a}{2}, \frac{3}{2}, \frac{x^2}{2}\right)\_C2 + M\left(\frac{1}{2} + \frac{a}{2}, \frac{3}{2}, \frac{x^2}{2}\right)\_C1\right)\right\}$$

2.1045 ODE No. 1045

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

✓ **Mathematica** : cpu = 0.0373293 (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 = 0.014 (sec), leaf count = 21

$$\left\{y(x) = \mathrm{e}^x\left(Erf\left(\frac{i}{2}\sqrt{2}(x-2)\right)\_C1 + \_C2\right)\right\}$$

2.1046 ODE No. 1046

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

✓ **Mathematica** : cpu = 0.00714364 (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 = 0.23 (sec), leaf count = 31

$$\left\{y(x) = x\left(U\left(\frac{1}{2} - \frac{a}{4}, \frac{3}{2}, x^2\right)\_C2 + M\left(\frac{1}{2} - \frac{a}{4}, \frac{3}{2}, x^2\right)\_C1\right)\right\}$$

2.1047 ODE No. 1047

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

✓ **Mathematica** : cpu = 0.0157592 (sec), leaf count = 20

$$\left\{\left\{y(x)\to e^{-x^2}(c_2x+c_1)\right\}\right\}$$

✓ **Maple** : cpu = 0.075 (sec), leaf count = 16

$$\left\{y(x)=\mathrm{e}^{-x^2}(\_C2\,x+\_C1)\right\}$$

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 $n\geq 2$

$$
\begin{aligned}
(n+1)(n+2)c_{n+2}+4nc_n+4c_{n-2}+2c_n &= 0\\
c_{n+2} &= \frac{(-4n-2)c_n-4c_{n-2}}{(n+1)(n+2)}
\end{aligned}
$$

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

$$
\begin{aligned}
y &= \sum_{n=0}^{\infty}c_nx^n\\
&= c_0+c_1x+c_2x^2+\cdots\\
&= c_0+c_1x-c_0x^2-c_1x^3+c_0\frac{6}{(3)(4)}x^4+c_1\frac{10}{(4)(5)}x^5-c_0\frac{5}{(5)(7)}x^6-c_1\frac{7}{(6)(7)}x^7+c_0\frac{12}{7}\frac{1}{(7)(8)}x^8+\cdots\\
&= c_0\left(1-x^2+\frac{6}{(3)(4)}x^4-\frac{5}{(5)(6)}x^6+\frac{7}{3}\frac{1}{(7)(8)}x^8+\cdots\right)+c_1\left(x-x^3+\frac{10}{(4)(5)}x^5-\frac{7}{(6)(7)}x^7+\cdots\right)\\
&= c_0\left(1-x^2+\frac{1}{2}x^4-\frac{1}{6}x^6+\frac{1}{24}x^8+\cdots\right)+c_1\left(x-x^3+\frac{1}{2}x^5-\frac{1}{6}x^7+\cdots\right)
\end{aligned}
$$

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

$$\left(2n + 3x^2 - 1\right) y(x) + y''(x) - 4xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.0108491 (sec), leaf count = 37

$$\left\{\left\{y(x) \to e^{\frac{x^2}{2}} \left(c_1 H_n(x) + c_2 \, {}_1F_1\left(-\frac{n}{2}; \frac{1}{2}; x^2\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.197 (sec), leaf count = 37

$$\left\{y(x) = \mathrm{e}^{\frac{x^2}{2}} x \left(U\left(-\frac{n}{2} + \frac{1}{2}, \frac{3}{2}, x^2\right) \_C2 + M\left(-\frac{n}{2} + \frac{1}{2}, \frac{3}{2}, x^2\right) \_C1\right)\right\}$$

2.1049 ODE No. 1049

$$\left(4x^2 - 1\right) y(x) + y''(x) - 4xy'(x) - e^x = 0$$

✓ **Mathematica** : cpu = 0.0732687 (sec), leaf count = 105

$$\left\{\left\{y(x) \to \frac{1}{4} e^{x(x-i)-\frac{i}{2}} \left(2e^{\frac{i}{2}} \left(2c_1 - ic_2 e^{2ix}\right) - ie^i \sqrt{\pi} \mathrm{erf}\left(-x + \left(\frac{1}{2} + \frac{i}{2}\right)\right) + \sqrt{\pi} e^{2ix} \mathrm{erfi}\left(\left(\frac{1}{2} + \frac{i}{2}\right) - ix\right)\right.\right.$$

✓ **Maple** : cpu = 0.425 (sec), leaf count = 66

$$\left\{y(x) = \frac{\left(\left(i \cos(x) + \sin(x)\right) \sqrt{\pi} \mathrm{e}^{\frac{i}{2}} \mathit{Erf}\left(x - \frac{1}{2} - \frac{i}{2}\right) - \mathrm{e}^{-\frac{i}{2}} \sqrt{\pi} (i \cos(x) - \sin(x)) \mathit{Erf}\left(x - \frac{1}{2} + \frac{i}{2}\right) + 4 \sin\right.}{4}\right.$$

2.1050 ODE No. 1050

$$\left(4x^2-2\right)y(x)+y''(x)-4xy'(x)=0$$

✓ **Mathematica** : cpu = 0.0129024 (sec), leaf count = 18

$$\left\{\left\{y(x)\to e^{x^2}(c_2x+c_1)\right\}\right\}$$

✓ **Maple** : cpu = 0.089 (sec), leaf count = 14

$$\left\{y(x)=\mathrm{e}^{x^2}(\_C2\,x+\_C1)\right\}$$

2.1051 ODE No. 1051

$$\left(4x^2-3\right)y(x)-e^{x^2}+y''(x)-4xy'(x)=0$$

✓ **Mathematica** : cpu = 0.0394275 (sec), leaf count = 34

$$\left\{\left\{y(x)\to\frac{1}{2}e^{(x-1)x}\left(c_2e^{2x}+2c_1-2e^x\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.102 (sec), leaf count = 27

$$\left\{y(x)=\mathrm{e}^{x(1+x)}\_C2+\mathrm{e}^{(x-1)x}\_C1-\mathrm{e}^{x^2}\right\}$$

2.1052 ODE No. 1052

$$axy'(x)+by(x)+y''(x)=0$$

✓ **Mathematica** : cpu = 0.0221029 (sec), leaf count = 67

$$\left\{\left\{y(x)\to e^{-\frac{ax^2}{2}}\left(c_1H_{\frac{b}{a}-1}\left(\frac{\sqrt{a}x}{\sqrt{2}}\right)+c_2\,{}_1F_1\left(\frac{a-b}{2a};\frac{1}{2};\frac{ax^2}{2}\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.184 (sec), leaf count = 58

$$\left\{y(x)=\mathrm{e}^{-\frac{ax^2}{2}}x\left(U\left(\frac{2\,a-b}{2\,a},\frac{3}{2},\frac{ax^2}{2}\right)\_C2+M\left(\frac{2\,a-b}{2\,a},\frac{3}{2},\frac{ax^2}{2}\right)\_C1\right)\right\}$$

2.1053 ODE No. 1053

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

✓ **Mathematica** : cpu = 0.0317981 (sec), leaf count = 56

$$\left\{\left\{y(x) \to \frac{e^{-\frac{ax^2}{2}-\sqrt{a}x}\left(c_2e^{2\sqrt{a}x} + 2\sqrt{a}c_1\right)}{2\sqrt{a}}\right\}\right\}$$

✓ **Maple** : cpu = 0.077 (sec), leaf count = 35

$$\left\{y(x) = \_C1\, e^{-\frac{x}{2}(ax-2\sqrt{a})} + \_C2\, e^{-\frac{x}{2}(ax+2\sqrt{a})}\right\}$$

2.1054 ODE No. 1054

$$(ax+b)y'(x) + y(x)(cx+d) + y''(x) = 0$$

✓ **Mathematica** : cpu = 0.052494 (sec), leaf count = 132

$$\left\{\left\{y(x) \to e^{\frac{cx}{a}-\frac{ax^2}{2}-bx}\left(c_2\, {}_1F_1\left(\frac{a^3-da^2+bca-c^2}{2a^3}; \frac{1}{2}; \frac{(xa^2+ba-2c)^2}{2a^3}\right) + c_1 H_{\frac{-a^3+da^2-bca+c^2}{a^3}}\left(\frac{xa^2+ba}{\sqrt{2}a^{3/}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.106 (sec), leaf count = 98

$$\left\{y(x) = e^{-\frac{cx}{a}}\left(U\left(\frac{a^2d-abc+c^2}{2\,a^3}, \frac{1}{2}, -\frac{(a^2x+ab-2\,c)^2}{2\,a^3}\right)\_C2 + M\left(\frac{a^2d-abc+c^2}{2\,a^3}, \frac{1}{2}, -\frac{(a^2x+ab-}{2\,a^3}\right.\right.\right.$$

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 = 0.22678 (sec), leaf count = 305

$$\left\{\left\{y(x) \to \exp\left(-\frac{x\left(a\left(x\sqrt{a^2-4\mathrm{a1}}+2b\right)+2b\sqrt{a^2-4\mathrm{a1}}+a^2x-4(\mathrm{a1}x+\mathrm{b1})\right)}{4\sqrt{a^2-4\mathrm{a1}}}\right)\left(c_1H_{\frac{-a^3-\left(\sqrt{a^2-4\mathrm{a1}}-2\mathrm{c1}\right)}{}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.307 (sec), leaf count = 262

$$\left\{y(x) = \left(\_C2\,\left(a^2x+ab-4\,a1\,x-2\,b1\right){}_1\mathrm{F}_1\left(\frac{1}{4}\left(3\left(a^2-4\,a1\right)^{3/2}+a^3-2\,a^2c1+(2\,b1\,b-4\,a1)\,a+(\right.\right.\right.\right.$$

2.1056 ODE No. 1056

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

✓ **Mathematica** : cpu = 0.0516147 (sec), leaf count = 51

$$\left\{\left\{y(x) \to -c_2 e^{\frac{x^3}{3}} + \frac{c_2 \sqrt[3]{-x^3}\,\Gamma\left(\frac{2}{3}, -\frac{x^3}{3}\right)}{\sqrt[3]{3}} + c_1 x\right\}\right\}$$

✓ **Maple** : cpu = 0.783 (sec), leaf count = 48

$$\left\{y(x) = \frac{1}{x^2}\left(-\left(-x^3\right)^{\frac{2}{3}} \sqrt[3]{3} \mathrm{e}^{\frac{x^3}{3}} \_C2 + x^3\left(\_C2\,\Gamma\left(\frac{2}{3}\right) - \_C2\,\Gamma\left(\frac{2}{3}, -\frac{x^3}{3}\right) + \_C1\right)\right)\right\}$$

2.1057 ODE No. 1057

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

✓ **Mathematica** : cpu = 0.957095 (sec), leaf count = 43

$$\left\{\left\{y(x) \to e^{\frac{x^3}{3}+x}\left(c_2 \int_1^x e^{-\frac{1}{3}K[1]\left(K[1]^2+6\right)}\, dK[1] + c_1\right)\right\}\right\}$$

✓ **Maple** : cpu = 1.428 (sec), leaf count = 50

$$\left\{y(x) = \_C1\ HeunT\left(0, -3, 2\sqrt[3]{3}, \frac{3^{\frac{2}{3}} x}{3}\right) \mathrm{e}^{-x} + \_C2\ HeunT\left(0, 3, 2\sqrt[3]{3}, -\frac{3^{\frac{2}{3}} x}{3}\right) \mathrm{e}^{\frac{x\left(x^2+3\right)}{3}}\right\}$$

2.1058 ODE No. 1058

$$\left(x^4 - 2\right) xy(x) - (x+1)x^2 y'(x) + y''(x) = 0$$

✓ **Mathematica** : cpu = 1.06986 (sec), leaf count = 43

$$\left\{\left\{y(x) \to e^{\frac{x^3}{3}}\left(c_2 \int_1^x e^{\frac{1}{12}K[1]^3(3K[1]-4)}\, dK[1] + c_1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.441 (sec), leaf count = 29

$$\left\{y(x) = \mathrm{e}^{\frac{x^3}{3}}\left(\int \mathrm{e}^{\frac{x^4}{4} - \frac{x^3}{3}}\, \mathrm{d}x\_C2 + \_C1\right)\right\}$$

2.1059 ODE No. 1059

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

✓ **Mathematica** : cpu = 0.0745403 (sec), leaf count = 49

$$\left\{\left\{y(x) \to -c_2 e^{-\frac{x^5}{5}} + \frac{c_2 \sqrt[5]{x^5}\,\Gamma\left(\frac{4}{5}, \frac{x^5}{5}\right)}{\sqrt[5]{5}} + c_1 x\right\}\right\}$$

✓ **Maple** : cpu = 0.237 (sec), leaf count = 56

$$\left\{y(x) = \frac{1}{x^7}\left(9\_C2\,\mathrm{e}^{-1/10\,x^5}\left(x^5+4\right)M_{7/5,\,\frac{9}{10}}\left(1/5\,x^5\right) + x^8\left(x^2\_C2\,\mathrm{e}^{-\frac{x^5}{10}}M_{\frac{2}{5},\,\frac{9}{10}}\left(\frac{x^5}{5}\right) + \_C1\right)\right)\right\}$$

2.1060 ODE No. 1060

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

✓ **Mathematica** : cpu = 0.0364833 (sec), leaf count = 81

$$\left\{\left\{y(x) \to c_2 q^{-1/q} a^{\frac{1}{q}} \left(x^q\right)^{\frac{1}{q}}\ {}_1F_1\left(\frac{a+b}{aq}; 1+\frac{1}{q}; -\frac{ax^q}{q}\right) + c_1\,{}_1F_1\left(\frac{b}{aq}; \frac{q-1}{q}; -\frac{ax^q}{q}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.988 (sec), leaf count = 81

$$\left\{y(x) = \mathrm{e}^{-\frac{ax^q}{q}} x\left(U\left(\frac{aq-b}{aq}, \frac{q+1}{q}, \frac{ax^q}{q}\right)\_C2 + M\left(\frac{aq-b}{aq}, \frac{q+1}{q}, \frac{ax^q}{q}\right)\_C1\right)\right\}$$

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 = 0.10066 (sec), leaf count = 45

$$\left\{\left\{y(x) \to \frac{1}{18}e^{-\frac{1}{3}(\sqrt{x}+9)x}\left(3c_2e^{6x} + 18c_1 - 2e^{3x}x\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.159 (sec), leaf count = 28

$$\left\{y(x) = -\frac{-9\cosh(3\,x)\_C1 - 9\sinh(3\,x)\_C2 + x}{9}\mathrm{e}^{-\frac{1}{3}x^{\frac{3}{2}}}\right\}$$

2.1062 ODE No. 1062

$$\frac{(x+\sqrt{x}-8)\,y(x)}{4x^2}+y''(x)-\frac{y'(x)}{\sqrt{x}}=0$$

✓ **Mathematica** : cpu = 0.0321507 (sec), leaf count = 30

$$\left\{\left\{y(x)\to\frac{e^{\sqrt{x}}(c_2x^3+3c_1)}{3x}\right\}\right\}$$

✓ **Maple** : cpu = 0.035 (sec), leaf count = 19

$$\left\{y(x)=\frac{\_C2\;x^3+\_C1}{x}\mathrm{e}^{\sqrt{x}}\right\}$$

2.1063 ODE No. 1063

$$y''(x)-(2e^x+1)\,y'(x)+e^{2x}y(x)-e^{3x}=0$$

✓ **Mathematica** : cpu = 0.0486449 (sec), leaf count = 28

$$\left\{\left\{y(x)\to c_1e^{e^x}+c_2e^{x+e^x}+e^x+2\right\}\right\}$$

✓ **Maple** : cpu = 0.382 (sec), leaf count = 61

$$\left\{y(x)=\left(\_C1\;\cosh\left(\frac{x}{2}\right)+\_C2\;\sinh\left(\frac{x}{2}\right)\right)\mathrm{e}^{\mathrm{e}^x+\frac{x}{2}}+\left(\left(\mathrm{e}^{2\,x}+\mathrm{e}^x+1\right)\cosh\left(\frac{x}{2}\right)-3\left(\mathrm{e}^x+1/3\,\mathrm{e}^{2\,x}+1\right)\mathrm{sin}\right.$$

2.1064 ODE No. 1064

$$ay'(x)+by(x)+y''(x)+\tan(x)=0$$

✓ **Mathematica** : cpu = 0.705721 (sec), leaf count = 502

$$\left\{\left\{y(x)\to\frac{e^{-\frac{1}{2}x\left(\sqrt{a^2-4b}+a\right)}\left((2a-i(b-4))\left(2ib\sqrt{a^2-4b}\left(c_2e^{x\sqrt{a^2-4b}}+c_1\right)+\left(\sqrt{a^2-4b}+a\right)e^{\frac{1}{2}x\left(\sqrt{a^2-4l\right.}\right.\right.}}{}\right.\right.$$

✓ **Maple** : cpu = 0.394 (sec), leaf count = 125

$$\left\{y(x)=\mathrm{e}^{-\frac{x}{2}\left(a-\sqrt{a^2-4\,b}\right)}\_C2+\mathrm{e}^{-\frac{x}{2}\left(a+\sqrt{a^2-4\,b}\right)}\_C1-1\left(\int\tan(x)\,\mathrm{e}^{-\frac{x}{2}\left(-a+\sqrt{a^2-4\,b}\right)}\,\mathrm{d}x\mathrm{e}^{x\sqrt{a^2-4\,b}}-\int\tan(x\right.\right.$$

2.1065 ODE No. 1065

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

✓ **Mathematica** : cpu = 0.173468 (sec), leaf count = 83

$$\left\{\left\{y(x) \to \left(-\sin^2(x)\right)^{\frac{1}{4}-\frac{n}{2}} \left(c_1 P_{\sqrt{2n^2-a^2}-\frac{1}{2}}^{n-\frac{1}{2}}(\cos(x)) + c_2 Q_{\sqrt{2n^2-a^2}-\frac{1}{2}}^{n-\frac{1}{2}}(\cos(x))\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.532 (sec), leaf count = 60

$$\left\{y(x) = (\sin(x))^{-n+\frac{1}{2}} \left(\mathit{LegendreP}\left(-\frac{1}{2} + \sqrt{-a^2 + 2\,n^2}, n - \frac{1}{2}, \cos(x)\right) \_C1 + \mathit{LegendreQ}\left(-\frac{1}{2} + \sqrt{-a\right.\right.\right.$$

2.1066 ODE No. 1066

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

✓ **Mathematica** : cpu = 0.0384925 (sec), leaf count = 18

$$\{\{y(x) \to c_2 \sin(\sin(x)) + c_1 \cos(\sin(x))\}\}$$

✓ **Maple** : cpu = 0.12 (sec), leaf count = 15

$$\{y(x) = \_C1\ \sin(\sin(x)) + \_C2\ \cos(\sin(x))\}$$

2.1067 ODE No. 1067

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

✓ **Mathematica** : cpu = 0.0345519 (sec), leaf count = 21

$$\{\{y(x) \to c_1 \cosh(\sin(x)) + ic_2 \sinh(\sin(x))\}\}$$

✓ **Maple** : cpu = 0.061 (sec), leaf count = 17

$$\left\{y(x) = \_C1\, e^{\sin(x)} + \_C2\, e^{-\sin(x)}\right\}$$

2.1068 ODE No. 1068

$$v(v+1)y(x)+y''(x)+\cot(x)y'(x)=0$$

✓ **Mathematica** : cpu = 0.149439 (sec), leaf count = 20

$$\{\{y(x)\to c_1P_v(\cos(x))+c_2Q_v(\cos(x))\}\}$$

✓ **Maple** : cpu = 0.929 (sec), leaf count = 45

$$\left\{y(x)=\_C1\ {}_2\mathrm{F}_1(-\frac{v}{2},\frac{1}{2}+\frac{v}{2};\ \frac{1}{2};\ (\cos(x))^2)+\_C2\ \cos(x)\,{}_2\mathrm{F}_1(1+\frac{v}{2},\frac{1}{2}-\frac{v}{2};\ \frac{3}{2};\ (\cos(x))^2)\right\}$$

2.1069 ODE No. 1069

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

✓ **Mathematica** : cpu = 0.0370826 (sec), leaf count = 19

$$\{\{y(x)\to c_1\cos(\cos(x))-c_2\sin(\cos(x))\}\}$$

✓ **Maple** : cpu = 0.164 (sec), leaf count = 15

$$\{y(x)=\_C1\ \sin(\cos(x))+\_C2\ \cos(\cos(x))\}$$

2.1070 ODE No. 1070

$$a\tan(x)y'(x)+by(x)+y''(x)=0$$

✓ **Mathematica** : cpu = 0.352534 (sec), leaf count = 129

$$\left\{\left\{y(x)\to c_1\,{}_2F_1\left(\frac{1}{4}\left(-a-\sqrt{a^2+4b}\right),\frac{1}{4}\left(\sqrt{a^2+4b}-a\right);\frac{1-a}{2};\cos^2(x)\right)+i^{a+1}c_2\cos^{a+1}(x)\,{}_2F_1\left(\frac{1}{4}\left(a\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.322 (sec), leaf count = 60

$$\left\{y(x)=(\cos(x))^{\frac{1}{2}+\frac{a}{2}}\left(LegendreQ\left(\frac{1}{2}\sqrt{a^2+4\,b}-\frac{1}{2},\frac{1}{2}+\frac{a}{2},\sin(x)\right)\_C2+LegendreP\left(\frac{1}{2}\sqrt{a^2+4\,b}-\frac{1}{2}\right.\right.\right.$$

2.1071 ODE No. 1071

$$(b^2 - a^2)\, y(x) + 2a\cot(ax)y'(x) + y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0856508 (sec), leaf count = 43

$$\left\{\left\{y(x) \to \frac{1}{2}e^{-ibx}\csc(ax)\left(2c_1 - \frac{ic_2e^{2ibx}}{b}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.139 (sec), leaf count = 24

$$\left\{y(x) = \frac{\_C1\ \sin(bx) + \_C2\ \cos(bx)}{\sin(ax)}\right\}$$

2.1072 ODE No. 1072

$$y(x)\left(-4anp(x)^2 + a + bp(x)\right) + ap''(x)y'(x) + y''(x) = 0$$

✗ **Mathematica** : cpu = 0.29564 (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] +
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x) = DESol\left(\left\{\frac{d^2}{dx^2}\_Y(x) + a\left(\frac{d^2}{dx^2}p(x)\right)\frac{d}{dx}\_Y(x) + \left(a + bp(x) - 4\,na(p(x))^2\right)\_Y(x)\right\}, \{\_Y(x)$$

2.1073 ODE No. 1073

$$\frac{y'(x)\left(-\wp(x;a,b)\wp'(x;a,b) + \wp(x;a,b)^3 - 6\wp(x;a,b)^2 + \frac{a}{2}\right)}{\wp'(x;a,b) - \wp(x;a,b)^2} + \frac{y(x)\left(\wp(x;a,b)^2(-\wp'(x;a,b)) - (6\wp(x;a,b)^2\right.}{\wp(x;a,b)^2 + \wp'(x;}$$

✗ **Mathematica** : cpu = 1.3532 (sec), leaf count = 0 , could not solve

```
DSolve[((-(WeierstrassP[x, {a, b}]*(-a/2 + 6*WeierstrassP[x, {a, b}]^2)) - Weierstrass
WeierstrassP[x, {a, b}]^2 + WeierstrassPPrime[x, {a, b}]) + Derivative[2][y][x] == 0,
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x) = DESol\left(\left\{\frac{d^2}{dx^2}\_Y(x) + \frac{\frac{d}{dx}\_Y(x)}{WeierstrassPPrime(x,a,b) + (WeierstrassP(x,a,b))^2}\left(11\ Weierstrass\right.\right.\right.$$

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 = 56.4014 (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]
```

✓ **Maple** : cpu = 0.088 (sec), leaf count = 21

$$\{y(x) = \_C1 \sin(nJacobiAM(x,k)) + \_C2 \cos(nJacobiAM(x,k))\}$$

2.1075 ODE No. 1075

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

✗ **Mathematica** : cpu = 0.185445 (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

$$\left\{y(x) = DESol\left(\left\{g(x)\_Y(x) + f(x)\frac{\mathrm{d}}{\mathrm{d}x}\_Y(x) + \frac{\mathrm{d}^2}{\mathrm{d}x^2}\_Y(x)\right\}, \{\_Y(x)\}\right)\right\}$$

2.1076 ODE No. 1076

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

✗ **Mathematica** : cpu = 0.20895 (sec), leaf count = 0 , could not solve

```
DSolve[-g[x] + y[x]*(a + Derivative[1][f][x]) + f[x]*Derivative[1][y][x] + Derivative[
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x) = DESol\left(\left\{\frac{\mathrm{d}^2}{\mathrm{d}x^2}\_Y(x) + f(x)\frac{\mathrm{d}}{\mathrm{d}x}\_Y(x) + \left(\frac{\mathrm{d}}{\mathrm{d}x}f(x) + a\right)\_Y(x) - g(x)\right\}, \{\_Y(x)\}\right)\right\}$$

2.1077 ODE No. 1077

$$y'(x)(af(x)+b)+y(x)(cf(x)+d)+y''(x)=0$$

✗ **Mathematica** : cpu = 0.319134 (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] == (
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x)=DESol\left(\left\{\frac{d^2}{dx^2}\_Y(x)+(af(x)+b)\frac{d}{dx}\_Y(x)+(cf(x)+d)\_Y(x)\right\},\{\_Y(x)\}\right)\right\}$$

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 = 0.0692852 (sec), leaf count = 68

$$\left\{\left\{y(x)\to\frac{\left(2\sqrt{a}c_1-ic_2e^{2i\sqrt{a}x}\right)e^{-\frac{1}{2}\int_1^x f(K[1])\,dK[1]-i\sqrt{a}x}}{2\sqrt{a}}\right\}\right\}$$

✓ **Maple** : cpu = 0.048 (sec), leaf count = 33

$$\left\{y(x)=e^{-\frac{\int f(x)\,dx}{2}}\left(\sinh\left(\sqrt{-a}x\right)\_C1+\cosh\left(\sqrt{-a}x\right)\_C2\right)\right\}$$

2.1079 ODE No. 1079

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

✓ **Mathematica** : cpu = 0.26827 (sec), leaf count = 299

$$\left\{\left\{y(x)\to-\frac{\sqrt{c_1}\exp\left(-c_2-\int_1^x-i\sqrt{b}f(K[1])^a\,dK[1]\right)\left(-1+\exp\left(2\left(c_2+\int_1^x-i\sqrt{b}f(K[1])^a\,dK[1]\right)\right)\right)}{\sqrt{2}}\right.\right.$$

✓ **Maple** : cpu = 0.03 (sec), leaf count = 37

$$\left\{y(x)=\_C1\,e^{\int i(f(x))^a\sqrt{b}\,dx}+\_C2\,e^{-\int i(f(x))^a\sqrt{b}\,dx}\right\}$$

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 = 0.313091 (sec), leaf count = 0 , could not solve

```
DSolve[y[x]*(a^2 - b^2*f[x]^2 + (a*Derivative[1][f][x])/f[x]) - (2*a + Derivative[1][f
```

✓ **Maple** : cpu = 0.433 (sec), leaf count = 74

$$\left\{y(x)=\mathrm{e}^{\int -1\left(\frac{f(x)\left(\mathrm{e}^{\_C1\, b}\right)^2 b}{\left(\mathrm{e}^{b\int f(x)\,\mathrm{d}x}\right)^2}+bf(x)-\frac{\left(\mathrm{e}^{\_C1\, b}\right)^2 a}{\left(\mathrm{e}^{b\int f(x)\,\mathrm{d}x}\right)^2}+a\right)\left(\frac{\left(\mathrm{e}^{\_C1\, b}\right)^2}{\left(\mathrm{e}^{b\int f(x)\,\mathrm{d}x}\right)^2}-1\right)^{-1}\mathrm{d}x}\_C2\right\}$$

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 = 0.878538 (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[
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x)=DESol\left(\left\{\frac{\mathrm{d}^2}{\mathrm{d}x^2}\_Y(x)+\frac{f(x)\left(\frac{\mathrm{d}^3}{\mathrm{d}x^3}f(x)\right)\frac{\mathrm{d}}{\mathrm{d}x}\_Y(x)}{(f(x))^2+b^2}-\frac{\left(\frac{\mathrm{d}}{\mathrm{d}x}f(x)\right)^2a^2\_Y(x)}{(f(x))^2+b^2}\right\},\{\_Y(x)\}\right)\right\}$$

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 = 0.576896 (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]) - Deri
1 + 2*m)*Derivative[1][g][x])/g[x] + Derivative[2][g][x]/Derivative[1][g][x]) + Deriva
```

✓ **Maple** : cpu = 0.224 (sec), leaf count = 74

$$\left\{y(x)=(g(x))^{2m}\,\mathrm{e}^{-ig(x)}\left(U\left(\frac{i}{2}m^2-\frac{i}{2}v^2+m+\frac{1}{2},\,2m+1,\,2ig(x)\right)\_C2+M\left(\frac{i}{2}m^2-\frac{i}{2}v^2+m+\frac{1}{2},\,2\right.\right.\right.$$

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 = 0.909063 (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
```

✓ **Maple** : cpu = 0.144 (sec), leaf count = 31

$$\left\{y(x)=\sqrt{\frac{f(x)\,g(x)}{\frac{\mathrm{d}}{\mathrm{d}x}g(x)}}(Y_v(g(x))\_C2+J_v(g(x))\_C1)\right\}$$

2.1084 ODE No. 1084

$$-y'(x)\left(\frac{2f'(x)}{f(x)}-\frac{g'(x)}{g(x)}+\frac{g''(x)}{g'(x)}\right)+y(x)\left(-\frac{f''(x)}{f(x)}+\frac{f'(x)\left(\frac{2f'(x)}{f(x)}-\frac{g'(x)}{g(x)}+\frac{g''(x)}{g'(x)}\right)}{f(x)}-\frac{v^2g'(x)^2}{g(x)^2}+g'(x)^2\right)$$

✗ **Mathematica** : cpu = 0.933138 (sec), leaf count = 0 , could not solve

```
DSolve[-(Derivative[1][y][x]*((2*Derivative[1][f][x])/f[x] - Derivative[1][g][x]/g[x]
```

✓ **Maple** : cpu = 0.109 (sec), leaf count = 20

$$\{y(x)=f(x)\,(Y_v(g(x))\_C2+J_v(g(x))\_C1)\}$$

2.1085 ODE No. 1085

$$-y'(x)\left(\frac{(2v-1)g'(x)}{g(x)}+\frac{g''(x)}{g'(x)}+\frac{2h'(x)}{h(x)}\right)+y(x)\left(g'(x)^2+\frac{h'(x)\left(\frac{(2v-1)g'(x)}{g(x)}+\frac{g''(x)}{g'(x)}+\frac{2h'(x)}{h(x)}\right)}{h(x)}-\frac{h''(x)}{h(x)}\right)$$

✗ **Mathematica** : cpu = 0.967098 (sec), leaf count = 0 , could not solve

```
DSolve[-(Derivative[1][y][x]*(((-1 + 2*v)*Derivative[1][g][x])/g[x] + (2*Derivative[1]
1 + 2*v)*Derivative[1][g][x])/g[x] + (2*Derivative[1][h][x])/h[x] + Derivative[2][g][x
```

✓ **Maple** : cpu = 0.121 (sec), leaf count = 24

$$\{y(x)=h(x)\,(g(x))^v\,(Y_v(g(x))\_C2+J_v(g(x))\_C1)\}$$

2.1086 ODE No. 1086

$$4y''(x) + 9xy(x) = 0$$

✓ **Mathematica** : cpu = 0.00543749 (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 = 0.036 (sec), leaf count = 29

$$\left\{y(x) = \_C1 \text{ Ai}\left(-\frac{3^{\frac{2}{3}}\sqrt[3]{2}x}{2}\right) + \_C2 \text{ Bi}\left(-\frac{3^{\frac{2}{3}}\sqrt[3]{2}x}{2}\right)\right\}$$

2.1087 ODE No. 1087

$$4y''(x) - \left(a + x^2\right) y(x) = 0$$

✓ **Mathematica** : cpu = 0.0113038 (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 = 0.173 (sec), leaf count = 33

$$\left\{y(x) = 1\left(\_C2\, W_{-\frac{a}{8},\frac{1}{4}}\left(\frac{x^2}{2}\right) + \_C1\, M_{-\frac{a}{8},\frac{1}{4}}\left(\frac{x^2}{2}\right)\right)\frac{1}{\sqrt{x}}\right\}$$

2.1088 ODE No. 1088

$$4y''(x) + 4\tan(x)y'(x) + y(x)\left(-\left(5\tan^2(x) + 2\right)\right) = 0$$

✓ **Mathematica** : cpu = 0.117546 (sec), leaf count = 97

$$\left\{\left\{y(x) \to \frac{3\sqrt[8]{-1}c_2\sqrt[4]{-\cos^4(x)}\sqrt{1 + i\sqrt{-\cos^4(x)}} + 3(-1)^{7/8}c_2\sinh^{-1}\left(\frac{(1+i)\sqrt[4]{-\cos^4(x)}}{\sqrt{2}}\right) - 2(-1)^{7/8}c_1}{2\sqrt[8]{-\cos^4(x)}}\right\}\right\}$$

✓ **Maple** : cpu = 0.219 (sec), leaf count = 31

$$\left\{y(x) = (i\cos(x)\sin(x)\_C2 - \ln(\sin(x) + i\cos(x))\_C2 + \_C1)\frac{1}{\sqrt{\cos(x)}}\right\}$$

2.1089 ODE No. 1089

$$-y'(x)(ab+c+x)+ay''(x)+y(x)(b(c+x)+d)=0$$

✓ **Mathematica** : cpu = 0.0460108 (sec), leaf count = 63

$$\left\{\left\{y(x)\to e^{bx}\left(c_1 H_d\left(\frac{-ab+c+x}{\sqrt{2}\sqrt{a}}\right)+c_2\,{}_1F_1\left(-\frac{d}{2};\frac{1}{2};\frac{(-ab+c+x)^2}{2a}\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.086 (sec), leaf count = 58

$$\left\{y(x)=e^{bx}\left(U\left(-\frac{d}{2},\frac{1}{2},\frac{(ab-c-x)^2}{2\,a}\right)\_C2+M\left(-\frac{d}{2},\frac{1}{2},\frac{(ab-c-x)^2}{2\,a}\right)\_C1\right)\right\}$$

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 = 0.0338537 (sec), leaf count = 45

$$\left\{\left\{y(x)\to\frac{e^{-\frac{be^{-ax}}{a^2}-ax}\left(a^2c_1e^{ax}-bc_2\right)}{a^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.081 (sec), leaf count = 40

$$\left\{y(x)=e^{-\frac{a^3x+2\,be^{-ax}}{2\,a^2}}\left(\sinh\left(\frac{ax}{2}\right)\_C1+\cosh\left(\frac{ax}{2}\right)\_C2\right)\right\}$$

2.1091 ODE No. 1091

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

✓ **Mathematica** : cpu = 0.0289893 (sec), leaf count = 41

$$\left\{\left\{y(x)\to c_2\sin(x)+c_1\cos(x)+\frac{1}{2}(\mathrm{Ci}(2x)\sin(x)-\mathrm{Si}(2x)\cos(x)+\log(x)\sin(x))\right\}\right\}$$

✓ **Maple** : cpu = 0.059 (sec), leaf count = 35

$$\left\{y(x)=\frac{\sin(x)\,Ci(2\,x)}{2}-\frac{Si(2\,x)\cos(x)}{2}+\frac{(2\_C2+\ln(x))\sin(x)}{2}+\cos(x)\_C1\right\}$$

2.1092 ODE No. 1092

$$(a+x)y(x)+xy''(x)=0$$

✓ **Mathematica** : cpu = 0.0970979 (sec), leaf count = 53

$$\left\{\left\{y(x)\to e^{-ix}x\left(c_2\,{}_1F_1\left(\frac{ia}{2}+1;2;2ix\right)+c_1U\left(\frac{ia}{2}+1,2,2ix\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.089 (sec), leaf count = 29

$$\left\{y(x)=\_C1\ M_{-\frac{i}{2}a,\,\frac{1}{2}}(2\,ix)+\_C2\,W_{-\frac{i}{2}a,\,\frac{1}{2}}(2\,ix)\right\}$$

2.1093 ODE No. 1093

$$xy''(x)+y'(x)=0$$

✓ **Mathematica** : cpu = 0.00540069 (sec), leaf count = 13

$$\{\{y(x)\to c_1\log(x)+c_2\}\}$$

✓ **Maple** : cpu = 0.012 (sec), leaf count = 10

$$\{y(x)=\_C2\ \ln(x)+\_C1\}$$

2.1094 ODE No. 1094

$$ay(x)+xy''(x)+y'(x)=0$$

✓ **Mathematica** : cpu = 0.0223605 (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 = 0.013 (sec), leaf count = 29

$$\left\{y(x)=\_C1\ J_0\left(2\,\sqrt{a}\sqrt{x}\right)+\_C2\,Y_0\left(2\,\sqrt{a}\sqrt{x}\right)\right\}$$

2.1095 ODE No. 1095

$$lxy(x) + xy''(x) + y'(x) = 0$$

✓ **Mathematica** : cpu = 0.0101176 (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 = 0.072 (sec), leaf count = 23

$$\left\{y(x) = \_C1\ J_0\left(\sqrt{l}x\right) + \_C2\ Y_0\left(\sqrt{l}x\right)\right\}$$

2.1096 ODE No. 1096

$$(a + x)y(x) + xy''(x) + y'(x) = 0$$

✓ **Mathematica** : cpu = 0.013079 (sec), leaf count = 55

$$\left\{\left\{y(x) \to e^{-ix}\left(c_1 U\left(\frac{ia}{2} + \frac{1}{2}, 1, 2ix\right) + c_2 L_{-\frac{1}{2}i(a-i)}(2ix)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.153 (sec), leaf count = 39

$$\left\{y(x) = \mathrm{e}^{-ix}\left(U\left(\frac{1}{2} + \frac{i}{2}a,\ 1,\ 2\,ix\right)\_C2 + M\left(\frac{1}{2} + \frac{i}{2}a,\ 1,\ 2\,ix\right)\_C1\right)\right\}$$

2.1097 ODE No. 1097

$$ay(x) + xy''(x) - y'(x) = 0$$

✓ **Mathematica** : cpu = 0.0282559 (sec), leaf count = 45

$$\{\{y(x) \to 2ax(c_1 J_2(2\sqrt{a}\sqrt{x}) - c_2 Y_2(2\sqrt{a}\sqrt{x}))\}\}$$

✓ **Maple** : cpu = 0.014 (sec), leaf count = 31

$$\{y(x) = x(Y_2(2\,\sqrt{a}\sqrt{x})\_C2 + J_2(2\,\sqrt{a}\sqrt{x})\_C1)\}$$

2.1098 ODE No. 1098

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

✓ **Mathematica** : cpu = 0.00973359 (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 = 0.013 (sec), leaf count = 27

$$\left\{y(x) = \_C1 \sinh\left(\frac{x^2}{2}\sqrt{a}\right) + \_C2 \cosh\left(\frac{x^2}{2}\sqrt{a}\right)\right\}$$

2.1099 ODE No. 1099

$$x^3\left(e^{x^3} - v^2\right)y(x) + xy''(x) - y'(x) = 0$$

✗ **Mathematica** : cpu = 1.13889 (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]
```

✓ **Maple** : cpu = 0.119 (sec), leaf count = 25

$$\left\{y(x) = \_C1\, J_v\left(e^{\frac{x^2}{2}}\right) + \_C2\, Y_v\left(e^{\frac{x^2}{2}}\right)\right\}$$

2.1100 ODE No. 1100

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

✓ **Mathematica** : cpu = 0.0317127 (sec), leaf count = 37

$$\left\{\left\{y(x) \to \frac{e^{-x}(e^{2x}(2c_2 + 2x - 1) + 4c_1)}{4x}\right\}\right\}$$

✓ **Maple** : cpu = 0.099 (sec), leaf count = 23

$$\left\{y(x) = \frac{\sinh(x)\_C2}{x} + \frac{\cosh(x)\_C1}{x} + \frac{e^x}{2}\right\}$$

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)

$$\begin{aligned} (n-1+1)(2+(n-1))\, c_{n+1} - c_{n-1} &= 0 \\ n(1+n)\, c_{n+1} - c_{n-1} &= 0 \\ c_{n+1} &= \frac{c_{n-1}}{n(1+n)} \end{aligned}$$

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

$$\begin{aligned}
\frac{1}{x}e^{x}-\frac{1}{x}e^{-x} &= \left(\frac{1}{x}+1+\frac{1}{2}x+\frac{1}{6}x^{2}+\frac{1}{24}x^{3}+\frac{1}{120}x^{4}+\cdots\right)-\left(\frac{1}{x}-1+\frac{1}{2}x-\frac{1}{6}x^{2}+\frac{1}{24}x^{3}-\frac{1}{120}x^{4}+\cdot\right. \\
&= 2+2\frac{1}{6}x^{2}+2\frac{1}{120}x^{4}+\cdots \\
&= 2\left(1+\frac{1}{6}x^{2}+\frac{1}{120}x^{4}+\cdots\right)
\end{aligned}$$

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 $y_{1}^{\prime}=\frac{e^{x}}{x}-\frac{e^{x}}{x^{2}}$ 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

$$
u_2 = \int \frac{\frac{e^x}{x}}{x\left(-\frac{2}{x^2}\right)} e^x dx = -\int \frac{\frac{x}{x}}{\frac{2}{x}} e^x dx = -\frac{1}{2}\int e^{2x} dx = -\frac{1}{2}\frac{e^{2x}}{2} = \frac{-1}{4}e^{2x}
$$

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 = 0.0248756 (sec), leaf count = 52

$$\left\{\left\{y(x) \to \frac{2c_1 e^{-i\sqrt{a}x} - \frac{ic_2 e^{i\sqrt{a}x}}{\sqrt{a}}}{2x}\right\}\right\}$$

✓ **Maple** : cpu = 0.063 (sec), leaf count = 29

$$\left\{y(x) = \frac{1}{x}\left(\_C2\ \cosh\left(\sqrt{-a}x\right) + \_C1\ \sinh\left(\sqrt{-a}x\right)\right)\right\}$$

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

$$y = \frac{1}{x}\left(A\cos\left(\sqrt{a}x\right) + B\sin\left(\sqrt{a}x\right)\right)$$

Second method 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

$$\sum (n+r)\,(n+r-1)\,c_n x^{n+r-1} + \sum 2(n+r)\,c_n x^{n+r-1} + \sum ac_n x^{n+r+1} = 0$$

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

$$\begin{aligned}
(n+r+1)\,(n+r)\,c_{n+1} + 2(n+r+1)\,c_{n+1} + ac_{n-1} &= 0\\
(n+r+1)\,(2+(n+r))\,c_{n+1} + ac_{n-1} &= 0 \qquad (2)
\end{aligned}$$

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 $n = 3$

$$c_4 = \frac{-ac_2}{(3)(4)} = \frac{-a(-ac_0)}{(2)(3)(4)} = \frac{a^2 c_0}{(2)(3)(4)}$$

For $n = 4$

$$c_5 = \frac{-ac_3}{n(1+n)} = 0$$

For $n = 5$

$$c_6 = \frac{-ac_4}{(5)(6)} = \frac{-a(a^2 c_0)}{(2)(3)(4)(5)(6)} = \frac{-a^3 c_0}{(2)(3)(4)(5)(6)}$$

And so on. Hence solution is

$$\begin{aligned}
y_{r=-1} &= \frac{1}{x}\sum_{n=0}^{\infty} c_n x^n = \frac{1}{x}\left(c_0 - \frac{ac_0}{2}x^2 + \frac{a^2 c_0}{(2)(3)(4)}x^4 - \frac{a^3 c_0}{(2)(3)(4)(5)(6)}x^6 + \cdots\right) \\
&= \frac{B}{x}\left(1 - \frac{a}{2}x^2 + \frac{a^2}{24}x^4 - \frac{a^3}{720}x^6 + \cdots\right)
\end{aligned}$$

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

$$\begin{aligned}
y_h &= \frac{A}{\sqrt{ax}}\sqrt{ax}\left(1-\frac{1}{6}\left(\sqrt{ax}\right)^2+\frac{1}{120}\left(\sqrt{ax}\right)^4+\cdots\right)+\frac{B}{x}\cos\left(\sqrt{ax}\right)\\
&= \frac{A}{\sqrt{ax}}\left(\sqrt{ax}-\frac{1}{6}\left(\sqrt{ax}\right)^3+\frac{1}{120}\left(\sqrt{ax}\right)^5+\cdots\right)+\frac{B}{x}\cos\left(\sqrt{ax}\right)\\
&= \frac{A}{\sqrt{ax}}\sin\left(\sqrt{ax}\right)+\frac{B}{x}\cos\left(\sqrt{ax}\right)
\end{aligned}$$

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

$$\begin{aligned}
\mathcal{L}(xy''+2y'+axy)&=0\\
-\frac{d}{ds}(\mathcal{L}y'')+2\left(-\frac{d}{ds}(\mathcal{L}y')\right)+a\left(-\frac{d}{ds}Y\right)&=0\\
-\frac{d}{ds}\left(s^2Y-sA-B\right)+2\left(-\frac{d}{ds}(sY-A)\right)+a(-Y')&=0
\end{aligned}$$

Where $A=y(0)\,,B=y'(0)$. Simplifying gives

$$\begin{aligned}
-\left(2sY+s^2Y'-A\right)-2(Y+sY')-aY'&=0\\
Y'\left(-s^2-2s-a\right)+Y(-2s-2)+A&=0\\
Y'+Y\frac{2s+2}{s^2+2s+a}&=\frac{A}{s^2+2s+a}
\end{aligned}$$

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 = 0.00689022 (sec), leaf count = 36

$$\left\{\left\{y(x) \to \frac{c_1 \text{Ai}\left(\sqrt[3]{-a}x\right) + c_2 \text{Bi}\left(\sqrt[3]{-a}x\right)}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.086 (sec), leaf count = 33

$$\left\{y(x) = 1\left(\_C2\, Y_{\frac{1}{3}}\left(\frac{2}{3}\sqrt{a}x^{\frac{3}{2}}\right) + \_C1\, J_{\frac{1}{3}}\left(\frac{2}{3}\sqrt{a}x^{\frac{3}{2}}\right)\right)\frac{1}{\sqrt{x}}\right\}$$

Hand solution

$$xy'' + 2y' + ax^2y = 0 \tag{1}$$

Since there is a term $2y$, we can use $y = \frac{u(x)}{x}$, hence

$$\begin{aligned} y' &= \frac{u'}{x} - \frac{u}{x^2} \\ y'' &= \frac{u''}{x} - \frac{u'}{x^2} - \frac{u'}{x^2} + 2\frac{u}{x^3} \end{aligned}$$

And (1) becomes

$$\begin{aligned} x\left(\frac{u''}{x} - \frac{u'}{x^2} - \frac{u'}{x^2} + 2\frac{u}{x^3}\right) + 2\left(\frac{u'}{x} - \frac{u}{x^2}\right) + ax^2\left(\frac{u}{x}\right) &= 0 \\ u'' - 2\frac{u'}{x} + 2\frac{u}{x^2} + \frac{2u'}{x} - \frac{2u}{x^2} + axu &= 0 \\ u'' + axu &= 0 \end{aligned} \tag{2}$$

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 $n \geq 1$

$$
\begin{aligned}
(n+1)\,(n+2)\, c_{n+2} + a c_{n-1} &= 0 \\
c_{n+2} &= \frac{-a c_{n-1}}{(n+1)\,(n+2)} \qquad (3)
\end{aligned}
$$

For $n = 1$, from (3)

$$
c_3 = \frac{-a c_0}{(2)\,(3)}
$$

For $n = 2$, from (3)

$$
c_4 = \frac{-a c_1}{(3)\,(4)}
$$

For $n = 3$, from (3)

$$
c_5 = \frac{-a c_2}{(4)\,(5)} = 0
$$

For $n = 4$, from (3)

$$
c_6 = \frac{-a c_3}{(5)\,(6)} = \frac{-a}{(5)\,(6)} \left(\frac{-a c_0}{(2)\,(3)} \right) = \frac{a^2 c_0}{(2)\,(3)\,(5)\,(6)}
$$

For $n = 5$, from (3)

$$
c_7 = \frac{-a c_4}{(6)\,(7)} = \frac{-a}{(6)\,(7)} \left(\frac{-a c_1}{(3)\,(4)} \right) = \frac{a^2 c_1}{(3)\,(4)\,(6)\,(7)}
$$

For $n = 6$, from (3)

$$
c_8 = \frac{-a c_5}{(7)\,(8)} = 0
$$

For $n=7$, from (3)

$$c_9 = \frac{-ac_6}{(8)(9)} = \frac{-a}{(8)(9)}\left(\frac{a^2c_0}{(2)(3)(5)(6)}\right) = \frac{-a^3c_0}{(2)(3)(5)(6)(8)(9)}$$

For $n=8$, from (3)

$$c_{10} = \frac{-ac_7}{(9)(10)} = \frac{-a}{(9)(10)}\left(\frac{a^2c_1}{(3)(4)(6)(7)}\right) = \frac{-a^3c_1}{(3)(4)(6)(7)(9)(10)}$$

And so on. Hence,

$$\begin{aligned}
u &= \sum_{n=0}^{\infty} c_n x^n = c_0 + c_1x^1 + c_2x^2 + c_3x^3 + \cdots \\
&= c_0 + c_1x + 0 + c_3x^3 + c_4x^4 + 0 + c_6x^6 + c_7x^7 + 0 + c_9x^9 + \cdots \\
&= c_0 + c_1x - \frac{ac_0}{(2)(3)}x^3 - \frac{ac_1}{(3)(4)}x^4 + \frac{a^2c_0}{(2)(3)(5)(6)}x^6 + \frac{a^2c_1}{(3)(4)(6)(7)}x^7 - \frac{a^3c_0}{(2)(3)(5)(6)(8)(9)}x^9 - \frac{}{(3} \\
&= c_0\left(1 - \frac{a}{6}x^3 + \frac{a^2}{180}x^6 - \frac{a^3}{12\,960}x^9 + \cdots\right) + xc_1\left(1 - \frac{a}{12}x^3 + \frac{a^2}{504}x^6 - \frac{a^3}{45\,360}x^9 + \cdots\right) \\
&= c_0\left(1 - \frac{1}{6}\left(a^{\frac{1}{3}}x\right)^3 + \frac{1}{180}\left(a^{\frac{1}{3}}x\right)^6 - \frac{1}{12\,960}\left(a^{\frac{1}{3}}x\right)^9 + \cdots\right) + xc_1\left(1 - \frac{1}{12}\left(a^{\frac{1}{3}}x\right)^3 + \frac{1}{504}\left(a^{\frac{1}{3}}x\right)^6 - \frac{1}{45\,3}\right.
\end{aligned}$$

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 = 0.0308106 (sec), leaf count = 56

$$\left\{\left\{y(x) \to 2a^{3/2}x^{3/2}\left(3c_1 J_3\left(2\sqrt{a}\sqrt{x}\right) - ic_2 Y_3\left(2\sqrt{a}\sqrt{x}\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.013 (sec), leaf count = 33

$$\left\{y(x) = x^{\frac{3}{2}}\left(Y_3\left(2\sqrt{a}\sqrt{x}\right)\_C2 + J_3\left(2\sqrt{a}\sqrt{x}\right)\_C1\right)\right\}$$

2.1104 ODE No. 1104

$$ay(x) + vy'(x) + xy''(x) = 0$$

✓ **Mathematica** : cpu = 0.0369761 (sec), leaf count = 77

$$\left\{\left\{y(x) \to a^{\frac{1}{2}-\frac{v}{2}}x^{\frac{1}{2}-\frac{v}{2}}\left(c_2\Gamma(2-v)J_{1-v}\left(2\sqrt{a}\sqrt{x}\right) + c_1\Gamma(v)J_{v-1}\left(2\sqrt{a}\sqrt{x}\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.024 (sec), leaf count = 41

$$\left\{y(x) = x^{\frac{1}{2}-\frac{v}{2}}\left(Y_{v-1}\left(2\sqrt{a}\sqrt{x}\right)\_C2 + J_{v-1}\left(2\sqrt{a}\sqrt{x}\right)\_C1\right)\right\}$$

2.1105 ODE No. 1105

$$ay'(x) + bxy(x) + xy''(x) = 0$$

✓ **Mathematica** : cpu = 0.0219992 (sec), leaf count = 54

$$\left\{\left\{y(x) \to x^{\frac{1}{2}-\frac{a}{2}}\left(c_1 J_{\frac{a-1}{2}}\left(\sqrt{b}x\right) + c_2 Y_{\frac{a-1}{2}}\left(\sqrt{b}x\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.071 (sec), leaf count = 39

$$\left\{y(x) = x^{-\frac{a}{2}+\frac{1}{2}}\left(Y_{\frac{a}{2}-\frac{1}{2}}\left(\sqrt{b}x\right)\_C2 + J_{\frac{a}{2}-\frac{1}{2}}\left(\sqrt{b}x\right)\_C1\right)\right\}$$

2.1106 ODE No. 1106

$$ay'(x) + bx^{\mathrm{a1}}y(x) + xy''(x) = 0$$

✓ **Mathematica** : cpu = 0.0541039 (sec), leaf count = 165

$$\left\{\left\{y(x) \to \left(\frac{1}{\mathrm{a1}}+1\right)^{\frac{a-1}{\mathrm{a1}+1}} \mathrm{a1}^{\frac{a-1}{\mathrm{a1}+1}} b^{\frac{1-a}{2\mathrm{a1}+2}} \left(x^{\mathrm{a1}}\right)^{-\frac{a-1}{2\mathrm{a1}}} \left(c_2\Gamma\left(\frac{-a+\mathrm{a1}+2}{\mathrm{a1}+1}\right) J_{\frac{1-a}{\mathrm{a1}+1}}\left(\frac{2\sqrt{b}\left(x^{\mathrm{a1}}\right)^{\frac{\mathrm{a1}+1}{2\mathrm{a1}}}}{\mathrm{a1}+1}\right) + c_1\Gamma\left(\frac{a+}{\mathrm{a1}\ -}\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.213 (sec), leaf count = 71

$$\left\{y(x) = x^{-\frac{a}{2}+\frac{1}{2}}\left(Y_{\frac{a-1}{a1+1}}\left(2\,\frac{\sqrt{b}x^{a1/2+1/2}}{a1+1}\right)\_C2 + J_{\frac{a-1}{a1+1}}\left(2\,\frac{\sqrt{b}x^{a1/2+1/2}}{a1+1}\right)\_C1\right)\right\}$$

2.1107 ODE No. 1107

$$ay(x) + (b+x)y'(x) + xy''(x) = 0$$

✓ **Mathematica** : cpu = 0.0312772 (sec), leaf count = 36

$$\left\{\left\{y(x) \to e^{-x}\left(c_1U(b-a,b,x) + c_2L_{a-b}^{b-1}(x)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.156 (sec), leaf count = 30

$$\{y(x) = \mathrm{e}^{-x}(U(-a+b,\,b,\,x)\_C2 + M(-a+b,\,b,\,x)\_C1)\}$$

2.1108 ODE No. 1108

$$(a+b+x)y'(x) + ay(x) + xy''(x) = 0$$

✓ **Mathematica** : cpu = 0.0368769 (sec), leaf count = 33

$$\left\{\left\{y(x) \to e^{-x}\left(c_1U(b,a+b,x) + c_2L_{-b}^{a+b-1}(x)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.162 (sec), leaf count = 26

$$\{y(x) = \mathrm{e}^{-x}(U(b,\,a+b,\,x)\_C2 + M(b,\,a+b,\,x)\_C1)\}$$

2.1109 ODE No. 1109

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

✓ **Mathematica** : cpu = 0.0574256 (sec), leaf count = 45

$$\left\{\left\{y(x) \to -c_2(e^x x\text{Ei}(-x)+1) + c_1 e^x x + e^x\left(x^2 + x - x\log(-x) - 1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.063 (sec), leaf count = 33

$$\left\{y(x) = \mathrm{e}^x\left(-\_C1\, x Ei(1,x) + x^2 + \_C2\, x - x\ln(x) + \mathrm{e}^{-x}\_C1 - 1\right)\right\}$$

2.1110 ODE No. 1110

$$-ay(x) + xy''(x) - xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.0415973 (sec), leaf count = 36

$$\left\{\left\{y(x) \to c_2 G_{1,2}^{2,0}\left(-x \middle| \begin{array}{c} 1-a \\ 0,1 \end{array}\right) + c_1 x\, {}_1F_1(a+1;2;x)\right\}\right\}$$

✓ **Maple** : cpu = 0.111 (sec), leaf count = 23

$$\{y(x) = x(M(a+1,\, 2,\, x)\_C1 + U(a+1,\, 2,\, x)\_C2)\}$$

2.1111 ODE No. 1111

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

✓ **Mathematica** : cpu = 0.0199948 (sec), leaf count = 19

$$\{\{y(x) \to c_1 e^x - c_2(x+1)\}\}$$

✓ **Maple** : cpu = 0.088 (sec), leaf count = 13

$$\{y(x) = \_C2\,\mathrm{e}^x + \_C1\, x + \_C1\}$$

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

$$\begin{aligned}
\mathcal{L}(xy'') &= -\frac{d}{ds}\left(s^2Y - As - B\right) \\
&= -\left(2sY + s^2Y' - A\right)
\end{aligned}$$

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

$$\begin{aligned}
-\left(2sY + s^2Y' - A\right) - (-Y - sY' + sY - A) + Y &= 0 \\
-2sY - s^2Y' + A + Y + sY' - sY + A + Y &= 0 \\
Y'\left(s - s^2\right) + Y(-2s + 1 - s + 1) &= -2A \\
Y'\left(s^2 - s\right) + Y(3s - 2) &= 2A \\
Y' + \frac{(3s-2)}{s\,(s-1)}Y &= \frac{2A}{s\,(s-1)}
\end{aligned}$$

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

$$
\begin{aligned}
d\big((s-1)\,s^2Y\big) &= (s-1)\,s^2\frac{2A}{s\,(s-1)}\\
(s-1)\,s^2Y &= 2A\int sds + c_1\\
(s-1)\,s^2Y &= 2A\frac{s^2}{2} + c_1\\
Y &= \frac{As^2+c_1}{(s-1)\,s^2}
\end{aligned}
$$

Inverse Laplace transform gives

$$
\begin{aligned}
y(x) &= -c_1 + (A+c_1)\,e^x - c_1x\\
&= -c_1(1+x) + (A+c_1)\,e^x
\end{aligned}
$$

Let $-c_1 = A_0, A + c_1 + B_0$, hence

$$
y(x) = A_0(1+x) + B_0e^x
$$

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 = 0.029676 (sec), leaf count = 30

$$
\left\{\left\{y(x)\to c_1e^{2x} - \frac{1}{9}c_2e^{-x}(3x+1)\right\}\right\}
$$

✓ **Maple** : cpu = 0.079 (sec), leaf count = 22

$$
\{y(x) = \_C1\,\mathrm{e}^{2\,x} + \_C2\,\mathrm{e}^{-x}(3\,x+1)\}
$$

2.1113 ODE No. 1113

$$-ay(x) + (b-x)y'(x) + xy''(x) = 0$$

✓ **Mathematica** : cpu = 0.0235102 (sec), leaf count = 24

$$\{\{y(x) \to c_1 U(a,b,x) + c_2 L_{-a}^{b-1}(x)\}\}$$

✓ **Maple** : cpu = 0.137 (sec), leaf count = 17

$$\{y(x) = \_C1\, M(a,\, b,\, x) + \_C2\, U(a,\, b,\, x)\}$$

2.1114 ODE No. 1114

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

✓ **Mathematica** : cpu = 0.0431454 (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 = 0.098 (sec), leaf count = 34

$$\{y(x) = (\_C2\, K_1(-x) - \_C2\, K_0(-x) + \_C1\, (I_0(x) - I_1(x)))\, \mathrm{e}^x\}$$

2.1115 ODE No. 1115

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

✓ **Mathematica** : cpu = 0.0686772 (sec), leaf count = 63

$$\left\{\left\{y(x) \to e^{-\frac{1}{2}\left(\sqrt{17}-3\right)x}\left(c_2\, {}_1F_1\left(1 - \frac{6}{\sqrt{17}}; 2; \sqrt{17}x\right) + c_1 U\left(1 - \frac{6}{\sqrt{17}}, 2, \sqrt{17}x\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 2.3 (sec), leaf count = 47

$$\left\{y(x) = \mathrm{e}^{-\frac{x\left(-3+\sqrt{17}\right)}{2}}\left(M\left(1 - \frac{6\sqrt{17}}{17},\, 2,\, \sqrt{17}x\right)\_C1 + U\left(1 - \frac{6\sqrt{17}}{17},\, 2,\, \sqrt{17}x\right)\_C2\right)\right\}$$

2.1116 ODE No. 1116

$$y'(x)(ax+b+n)+any(x)+xy''(x)=0$$

✓ **Mathematica** : cpu = 0.063466 (sec), leaf count = 38

$$\left\{\left\{y(x)\to e^{-ax}\left(c_1U(b,b+n,ax)+c_2L_{-b}^{b+n-1}(ax)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.151 (sec), leaf count = 31

$$\left\{y(x)=\mathrm{e}^{-ax}(U(b,\,b+n,\,ax)\_C2+M(b,\,b+n,\,ax)\_C1)\right\}$$

2.1117 ODE No. 1117

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

✓ **Mathematica** : cpu = 0.0984111 (sec), leaf count = 87

$$\left\{\left\{y(x)\to e^{bx}x^{a+b+1}\left(c_1U\left(\frac{a^2+ba+a-b}{a-b},a+b+2,(a-b)x\right)+c_2L_{-\frac{a^2+ba+a-b}{a-b}}^{a+b+1}((a-b)x)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.189 (sec), leaf count = 82

$$\left\{y(x)=\mathrm{e}^{bx}x^{a+b+1}\left(M\left(\frac{a^2+ab+a-b}{a-b},\,a+b+2,\,x(a-b)\right)\_C1+U\left(\frac{a^2+ab+a-b}{a-b},\,a+b+2,\,x(a\right.\right.$$

2.1118 ODE No. 1118

$$y'(x)(x(a+b)+m+n)+y(x)(abx+an+bm)+xy''(x)=0$$

✓ **Mathematica** : cpu = 0.102392 (sec), leaf count = 46

$$\left\{\left\{y(x)\to e^{-ax}\left(c_1U(m,m+n,(a-b)x)+c_2L_{-m}^{m+n-1}((a-b)x)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.168 (sec), leaf count = 39

$$\left\{y(x)=\mathrm{e}^{-ax}(U(m,\,m+n,\,x(a-b))\_C2+M(m,\,m+n,\,x(a-b))\_C1)\right\}$$

2.1119 ODE No. 1119

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

✓ **Mathematica** : cpu = 0.179657 (sec), leaf count = 75

$$\left\{\left\{y(x)\to \frac{e^{ax}x^{b-\frac{1}{2}\sqrt{(2b+1)^2}+\frac{1}{2}}\left(c_2x^{\sqrt{(2b+1)^2}}+\sqrt{(2b+1)^2}c_1\right)}{\sqrt{(2b+1)^2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.075 (sec), leaf count = 20

$$\left\{y(x)=\mathrm{e}^{ax}\left(x^{2\,b+1}\_C2+\_C1\right)\right\}$$

2.1120 ODE No. 1120

$$(ax+b)y'(x)+y(x)(cx+d)+xy''(x)=0$$

✓ **Mathematica** : cpu = 0.0646185 (sec), leaf count = 135

$$\left\{\left\{y(x)\to e^{-\frac{1}{2}x\left(\sqrt{a^2-4c}+a\right)}\left(c_1U\left(\frac{ab+\sqrt{a^2-4c}b-2d}{2\sqrt{a^2-4c}},b,\sqrt{a^2-4c}x\right)+c_2L^{b-1}_{-\frac{ab+\sqrt{a^2-4c}b-2d}{2\sqrt{a^2-4c}}}\left(\sqrt{a^2-4c}x\right)\right.\right.\right.$$

✓ **Maple** : cpu = 0.286 (sec), leaf count = 109

$$\left\{y(x)=\mathrm{e}^{-\frac{x}{2}\left(a+\sqrt{a^2-4\,c}\right)}\left(M\left(\frac{1}{2}\left(b\sqrt{a^2-4\,c}+ab-2\,d\right)\frac{1}{\sqrt{a^2-4\,c}},\,b,\,\sqrt{a^2-4\,c}x\right)\_C1+U\left(\frac{1}{2}\left(b\sqrt{a^2-\right.\right.\right.\right.$$

2.1121 ODE No. 1121

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

✓ **Mathematica** : cpu = 11.7816 (sec), leaf count = 36

$$\left\{\left\{y(x)\to x\left(c_2\int_1^x\frac{e^{\frac{1}{2}(K[1]-2)K[1]}}{K[1]^2}\,dK[1]+c_1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.036 (sec), leaf count = 23

$$\left\{y(x)=\left(\int\frac{1}{x^2}\mathrm{e}^{\frac{x(x-2)}{2}}\,\mathrm{d}x\_C1+\_C2\right)x\right\}$$

2.1122 ODE No. 1122

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

✓ **Mathematica** : cpu = 11.4423 (sec), leaf count = 44

$$\left\{\left\{y(x)\to e^{\frac{x^2}{2}}\left(c_2\int_1^x\frac{e^{-\frac{1}{2}K[1](K[1]+2)}}{K[1]^2}\,dK[1]+c_1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.36 (sec), leaf count = 28

$$\left\{y(x)=\mathrm{e}^{\frac{x^2}{2}}\left(\int\frac{1}{x^2}\mathrm{e}^{-\frac{x(x+2)}{2}}\,\mathrm{d}x\_C2+\_C1\right)\right\}$$

2.1123 ODE No. 1123

$$-\left(2ax^2+1\right)y'(x)+bx^3y(x)+xy''(x)=0$$

✓ **Mathematica** : cpu = 0.012895 (sec), leaf count = 53

$$\left\{\left\{y(x)\to e^{-\frac{1}{2}x^2\left(\sqrt{a^2-b}-a\right)}\left(c_2e^{x^2\sqrt{a^2-b}}+c_1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.089 (sec), leaf count = 45

$$\left\{y(x)=\_C1\,\mathrm{e}^{\frac{x^2}{2}\left(\sqrt{a^2-b}+a\right)}+\_C2\,\mathrm{e}^{-\frac{x^2}{2}\left(\sqrt{a^2-b}-a\right)}\right\}$$

2.1124 ODE No. 1124

$$-2\left(x^2-a\right)y'(x)+2nxy(x)+xy''(x)=0$$

✓ **Mathematica** : cpu = 0.0798296 (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 = 0.154 (sec), leaf count = 29

$$\left\{y(x)=\_C1\,M\left(-\frac{n}{2},\,\frac{1}{2}+a,\,x^2\right)+\_C2\,U\left(-\frac{n}{2},\,\frac{1}{2}+a,\,x^2\right)\right\}$$

2.1125 ODE No. 1125

$$-4x^5 - 4x^3y(x) + (4x^2 - 1)\, y'(x) + xy''(x) = 0$$

✓ **Mathematica** : cpu = 0.243478 (sec), leaf count = 45

$$\left\{\left\{y(x) \to c_1 e^{\left(\sqrt{2}-1\right)x^2} + c_2 e^{-\left(1+\sqrt{2}\right)x^2} - x^2 - 2\right\}\right\}$$

✓ **Maple** : cpu = 0.079 (sec), leaf count = 36

$$\left\{y(x) = \mathrm{e}^{x^2\left(\sqrt{2}-1\right)}\_C2 + \mathrm{e}^{-x^2\left(1+\sqrt{2}\right)}\_C1 - x^2 - 2\right\}$$

2.1126 ODE No. 1126

$$(a^2x^3 + a)\, y(x) + (2ax^3 - 1)\, y'(x) + xy''(x) = 0$$

✗ **Mathematica** : cpu = 1.06041 (sec), leaf count = 0 , DifferentialRoot result

$$\{\{y(x) \to \text{DifferentialRoot}(\{y, x\}, \{(a^2x^3 + a)\, y(x) + (2x^3a - 1)\, y'(x) + xy''(x) = 0, y(1) = c_1, y'(1) =$$

✓ **Maple** : cpu = 0.055 (sec), leaf count = 19

$$\left\{y(x) = \mathrm{e}^{-\frac{ax^3}{3}}\left(\_C2\, x^2 + \_C1\right)\right\}$$

2.1127 ODE No. 1127

$$y(x)\left(a^2x\log^2(x) + a\log(x) + a\right) + (2ax\log(x) + 1)y'(x) + xy''(x) = 0$$

✓ **Mathematica** : cpu = 0.0423192 (sec), leaf count = 25

$$\{\{y(x) \to e^{ax}x^{-ax}(c_2\log(x) + c_1)\}\}$$

✓ **Maple** : cpu = 0.026 (sec), leaf count = 21

$$\{y(x) = x^{-ax}\mathrm{e}^{ax}(\ln(x)\_C2 + \_C1)\}$$

2.1128 ODE No. 1128

$$(xf(x)+2)y'(x)+f(x)y(x)+xy''(x)=0$$

✗ **Mathematica** : cpu = 0.249206 (sec), leaf count = 0 , could not solve

```
DSolve[f[x]*y[x] + (2 + x*f[x])*Derivative[1][y][x] + x*Derivative[2][y][x] == 0, y[x]
```

✓ **Maple** : cpu = 0.337 (sec), leaf count = 32

$$\left\{y(x)=\frac{1}{x}\left(\_C2\int \mathrm{e}^{\int \frac{-xf(x)-2}{x}\,\mathrm{d}x}x^{2}\,\mathrm{d}x+\_C1\right)\right\}$$

2.1129 ODE No. 1129

$$(x-3)y''(x)-(4x-9)y'(x)+(3x-6)y(x)=0$$

✓ **Mathematica** : cpu = 0.0429588 (sec), leaf count = 42

$$\left\{\left\{y(x)\to \frac{1}{8}c_2e^{3x-9}\left(4x^3-42x^2+150x-183\right)+c_1e^{x-3}\right\}\right\}$$

✓ **Maple** : cpu = 0.051 (sec), leaf count = 30

$$\left\{y(x)=\_C1\,\mathrm{e}^{x}+\_C2\,\mathrm{e}^{3\,x}\left(4\,x^{3}-42\,x^{2}+150\,x-183\right)\right\}$$

2.1130 ODE No. 1130

$$ay(x)+2xy''(x)+y'(x)=0$$

✓ **Mathematica** : cpu = 0.012617 (sec), leaf count = 46

$$\left\{\left\{y(x)\to c_2\sin\left(\sqrt{2}\sqrt{a}\sqrt{x}\right)+c_1\cos\left(\sqrt{2}\sqrt{a}\sqrt{x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.023 (sec), leaf count = 31

$$\left\{y(x)=\_C1\ \sin\left(\sqrt{x}\sqrt{2}\sqrt{a}\right)+\_C2\ \cos\left(\sqrt{x}\sqrt{2}\sqrt{a}\right)\right\}$$

2.1131 ODE No. 1131

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

✓ **Mathematica** : cpu = 0.0112135 (sec), leaf count = 48

$$\left\{\left\{y(x) \to \sqrt{x}\left(c_1 U\left(\frac{1}{2} - a, \frac{3}{2}, \frac{x}{2}\right) + c_2 L_{a-\frac{1}{2}}^{\frac{1}{2}}\left(\frac{x}{2}\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.155 (sec), leaf count = 33

$$\left\{y(x) = \sqrt{x}\left(U\left(-a + \frac{1}{2}, \frac{3}{2}, \frac{x}{2}\right)\_C2 + M\left(-a + \frac{1}{2}, \frac{3}{2}, \frac{x}{2}\right)\_C1\right)\right\}$$

2.1132 ODE No. 1132

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

✓ **Mathematica** : cpu = 0.0110753 (sec), leaf count = 44

$$\left\{\left\{y(x) \to \sqrt{x}\left(c_1 U\left(\frac{1-a}{2}, \frac{3}{2}, x\right) + c_2 L_{\frac{a-1}{2}}^{\frac{1}{2}}(x)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.155 (sec), leaf count = 29

$$\left\{y(x) = \sqrt{x}\left(U\left(-\frac{a}{2} + \frac{1}{2}, \frac{3}{2}, x\right)\_C2 + M\left(-\frac{a}{2} + \frac{1}{2}, \frac{3}{2}, x\right)\_C1\right)\right\}$$

2.1133 ODE No. 1133

$$(2x-1)y''(x) - (3x-4)y'(x) + (x-3)y(x) = 0$$

✓ **Mathematica** : cpu = 0.100317 (sec), leaf count = 78

$$\left\{\left\{y(x) \to 2^{5/8} c_1 e^{x-\frac{1}{2}} - \frac{2^{3/8} c_2 e^{\frac{x}{2}-\frac{1}{4}}}{\sqrt[4]{2x-1}} + \frac{c_2 e^{x-\frac{1}{2}} \Gamma\left(\frac{3}{4}, \frac{1}{4}(2x-1)\right)}{\sqrt[8]{2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.217 (sec), leaf count = 37

$$\left\{y(x) = 1 \mathrm{e}^{\frac{x}{2}}\left(U\left(1, \frac{3}{4}, \frac{x}{2} - \frac{1}{4}\right)\_C2 + M\left(1, \frac{3}{4}, \frac{x}{2} - \frac{1}{4}\right)\_C1\right)\frac{1}{\sqrt[4]{2\,x-1}}\right\}$$

2.1134 ODE No. 1134

$$4xy''(x) - (a + x)y(x) = 0$$

✓ **Mathematica** : cpu = 0.0989762 (sec), leaf count = 44

$$\left\{\left\{y(x) \to \frac{1}{4}e^{-x/2}x\left(c_2\,{}_1F_1\left(\frac{a}{4}+1;2;x\right) + c_1U\left(\frac{a}{4}+1,2,x\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.085 (sec), leaf count = 21

$$\left\{y(x) = \_C1\ M_{-\frac{a}{4},\frac{1}{2}}(x) + \_C2\ W_{-\frac{a}{4},\frac{1}{2}}(x)\right\}$$

2.1135 ODE No. 1135

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

✓ **Mathematica** : cpu = 0.010036 (sec), leaf count = 27

$$\left\{\left\{y(x) \to c_1 \cosh\left(\sqrt{x}\right) + ic_2 \sinh\left(\sqrt{x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.017 (sec), leaf count = 17

$$\left\{y(x) = \_C1\ \sinh\left(\sqrt{x}\right) + \_C2\ \cosh\left(\sqrt{x}\right)\right\}$$

2.1136 ODE No. 1136

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

✓ **Mathematica** : cpu = 0.0238564 (sec), leaf count = 23

$$\left\{\left\{y(x) \to e^{x/2}(c_2\mathrm{Ei}(-x) + c_1)\right\}\right\}$$

✓ **Maple** : cpu = 0.05 (sec), leaf count = 16

$$\left\{y(x) = \mathrm{e}^{\frac{x}{2}}\left(Ei(1,x)\_C2 + \_C1\right)\right\}$$

2.1137 ODE No. 1137

$$ly(x) + 4xy''(x) - (x + 2)y(x) + 4y(x) = 0$$

✓ **Mathematica** : cpu = 0.0996923 (sec), leaf count = 48

$$\left\{\left\{y(x) \to \frac{1}{4}e^{-x/2}x\left(c_2\, {}_1F_1\left(\frac{1}{2} - \frac{l}{4}; 2; x\right) + c_1U\left(\frac{1}{2} - \frac{l}{4}, 2, x\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.082 (sec), leaf count = 25

$$\left\{y(x) = \_C1\, M_{\frac{l}{4}+\frac{1}{2},\, \frac{1}{2}}(x) + \_C2\, W_{\frac{l}{4}+\frac{1}{2},\, \frac{1}{2}}(x)\right\}$$

2.1138 ODE No. 1138

$$y(x)(-(-2m - 4n + x)) + 4my'(x) + 4xy''(x) = 0$$

✓ **Mathematica** : cpu = 0.0335276 (sec), leaf count = 32

$$\left\{\left\{y(x) \to e^{-x/2}\left(c_1U(-n, m, x) + c_2L_n^{m-1}(x)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.135 (sec), leaf count = 26

$$\left\{y(x) = \mathrm{e}^{-\frac{x}{2}}\left(U(-n,\, m,\, x)\_C2 + M(-n,\, m,\, x)\_C1\right)\right\}$$

2.1139 ODE No. 1139

$$-(a + x)y(x) + 16xy''(x) + 8y'(x) = 0$$

✓ **Mathematica** : cpu = 0.0134585 (sec), leaf count = 59

$$\left\{\left\{y(x) \to e^{-x/4}\sqrt{x}\left(c_1U\left(\frac{a+6}{8}, \frac{3}{2}, \frac{x}{2}\right) + c_2L_{\frac{1}{8}(-a-6)}^{\frac{1}{2}}\left(\frac{x}{2}\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.162 (sec), leaf count = 37

$$\left\{y(x) = \sqrt{x}\mathrm{e}^{-\frac{x}{4}}\left(U\left(\frac{a}{8} + \frac{3}{4}, \frac{3}{2}, \frac{x}{2}\right)\_C2 + M\left(\frac{a}{8} + \frac{3}{4}, \frac{3}{2}, \frac{x}{2}\right)\_C1\right)\right\}$$

2.1140 ODE No. 1140

$$axy''(x) + by'(x) + cy(x) = 0$$

✓ **Mathematica** : cpu = 0.0522576 (sec), leaf count = 120

$$\left\{\left\{y(x) \to a^{\frac{1}{2}\left(\frac{b}{a}-1\right)} c^{\frac{a-b}{2a}} x^{\frac{a-b}{2a}} \left(c_1 \Gamma\left(\frac{b}{a}\right) J_{\frac{b}{a}-1}\left(\frac{2\sqrt{c}\sqrt{x}}{\sqrt{a}}\right) + c_2 \Gamma\left(2-\frac{b}{a}\right) J_{1-\frac{b}{a}}\left(\frac{2\sqrt{c}\sqrt{x}}{\sqrt{a}}\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.036 (sec), leaf count = 66

$$\left\{y(x) = x^{\frac{a-b}{2a}} \left(Y_{\frac{-a+b}{a}}\left(2\sqrt{\frac{c}{a}}\sqrt{x}\right)\_C2 + J_{\frac{-a+b}{a}}\left(2\sqrt{\frac{c}{a}}\sqrt{x}\right)\_C1\right)\right\}$$

2.1141 ODE No. 1141

$$(3a+bx)y'(x) + axy''(x) + 3by(x) = 0$$

✓ **Mathematica** : cpu = 0.112558 (sec), leaf count = 63

$$\left\{\left\{y(x) \to \frac{1}{2}\left(\frac{b^2 c_2 e^{-\frac{bx}{a}} \operatorname{Ei}\left(\frac{bx}{a}\right)}{a^2} - \frac{c_2(a+bx)}{ax^2} + 2c_1 e^{-\frac{bx}{a}}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.1 (sec), leaf count = 55

$$\left\{y(x) = \frac{1}{x^2}\left(Ei\left(1, -\frac{bx}{a}\right) e^{-\frac{bx}{a}} \_C2\, b^2 x^2 + \_C1\, e^{-\frac{bx}{a}} x^2 + a\_C2\,(bx+a)\right)\right\}$$

2.1142 ODE No. 1142

$$cy(x)\sqrt[5]{ax+b} + 5(ax+b)y''(x) + 8ay'(x) = 0$$

✓ **Mathematica** : cpu = 0.0472319 (sec), leaf count = 89

$$\left\{\left\{y(x) \to \frac{3a\left(c_2 \sin\left(\frac{\sqrt{5}\sqrt{c}(ax+b)^{3/5}}{3a}\right) + 2c_1 \cos\left(\frac{\sqrt{5}\sqrt{c}(ax+b)^{3/5}}{3a}\right)\right)}{\sqrt{5}\sqrt{c}(ax+b)^{3/5}}\right\}\right\}$$

✓ **Maple** : cpu = 0.253 (sec), leaf count = 53

$$\left\{y(x) = 1\left(\_C2\, \cosh\left(\frac{1}{3a}(ax+b)^{\frac{3}{5}}\sqrt{-5c}\right) + \_C1\, \sinh\left(\frac{1}{3a}(ax+b)^{\frac{3}{5}}\sqrt{-5c}\right)\right)(ax+b)^{-\frac{3}{5}}\right\}$$

2.1143 ODE No. 1143

$$(a+bx)y'(x)+2axy''(x)+cy(x)=0$$

✓ **Mathematica** : cpu = 0.0460051 (sec), leaf count = 70

$$\left\{\left\{y(x)\to\sqrt{x}e^{-\frac{bx}{2a}}\left(c_1U\left(1-\frac{c}{b},\frac{3}{2},\frac{bx}{2a}\right)+c_2L_{\frac{c}{b}-1}^{\frac{1}{2}}\left(\frac{bx}{2a}\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.282 (sec), leaf count = 57

$$\left\{y(x)=\sqrt{x}\mathrm{e}^{-\frac{bx}{2a}}\left(M\left(\frac{b-c}{b},\frac{3}{2},\frac{bx}{2a}\right)\_C1+U\left(\frac{b-c}{b},\frac{3}{2},\frac{bx}{2a}\right)\_C2\right)\right\}$$

2.1144 ODE No. 1144

$$(3a+bx)y'(x)+2axy''(x)+cy(x)=0$$

✓ **Mathematica** : cpu = 0.0460633 (sec), leaf count = 69

$$\left\{\left\{y(x)\to e^{-\frac{bx}{2a}}\left(c_1U\left(\frac{3}{2}-\frac{c}{b},\frac{3}{2},\frac{bx}{2a}\right)+c_2L_{\frac{c}{b}-\frac{3}{2}}^{\frac{1}{2}}\left(\frac{bx}{2a}\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.197 (sec), leaf count = 60

$$\left\{y(x)=\mathrm{e}^{-\frac{bx}{2a}}\left(U\left(\frac{3b-2c}{2b},\frac{3}{2},\frac{bx}{2a}\right)\_C2+M\left(\frac{3b-2c}{2b},\frac{3}{2},\frac{bx}{2a}\right)\_C1\right)\right\}$$

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 = 0.406984 (sec), leaf count = 301

$$\left\{\left\{y(x)\to e^{-\frac{x\left(\sqrt{\mathrm{a1}^2-4\mathrm{a0a2}}+\mathrm{a1}\right)}{2\mathrm{a2}}}(\mathrm{a2}x+\mathrm{b2})^{\frac{\mathrm{a1b2}+\mathrm{a2}^2-\mathrm{a2b1}}{\mathrm{a2}^2}}\left(c_1U\left(\frac{2\left(\sqrt{\mathrm{a1}^2-4\mathrm{a0a2}}-\mathrm{b0}\right)\mathrm{a2}^2+\left(\mathrm{a1b1}-\sqrt{\mathrm{a1}^2-}\right.}{2\mathrm{a2}^2\sqrt{}}\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.327 (sec), leaf count = 248

$$\left\{y(x)=(a2\,x+b2)^{\frac{a1\,b2+a2^2-a2\,b1}{a2^2}}\mathrm{e}^{-\frac{x}{2\,a2}\left(\sqrt{-4\,a0\,a2+a1^2}+a1\right)}\left(U\left(\frac{1}{2\,a2^2}\left(\left(a1\,b2+2\,a2^2-a2\,b1\right)\sqrt{-4\,a0\,a\right.\right.\right.\right.$$

2.1146 ODE No. 1146

$$x^2y''(x) - 6y(x) = 0$$

✓ **Mathematica** : cpu = 0.0256614 (sec), leaf count = 18

$$\left\{\left\{y(x) \to \frac{c_1x^5 + c_2}{x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.013 (sec), leaf count = 15

$$\left\{y(x) = \frac{\_C1\,x^5 + \_C2}{x^2}\right\}$$

2.1147 ODE No. 1147

$$x^2y''(x) - 12y(x) = 0$$

✓ **Mathematica** : cpu = 0.0169688 (sec), leaf count = 18

$$\left\{\left\{y(x) \to \frac{c_1x^7 + c_2}{x^3}\right\}\right\}$$

✓ **Maple** : cpu = 0.015 (sec), leaf count = 15

$$\left\{y(x) = \frac{\_C1\,x^7 + \_C2}{x^3}\right\}$$

2.1148 ODE No. 1148

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

✓ **Mathematica** : cpu = 0.0104388 (sec), leaf count = 42

$$\left\{\left\{y(x) \to x^{\frac{1}{2}-\frac{1}{2}\sqrt{1-4a}}\left(c_2x^{\sqrt{1-4a}} + c_1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.027 (sec), leaf count = 35

$$\left\{y(x) = \_C1\,x^{\frac{1}{2}+\frac{1}{2}\sqrt{1-4\,a}} + \_C2\,x^{\frac{1}{2}-\frac{1}{2}\sqrt{1-4\,a}}\right\}$$

2.1149 ODE No. 1149

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

✓ **Mathematica** : cpu = 0.0659737 (sec), leaf count = 95

$$\left\{\left\{y(x)\to \sqrt{a}\sqrt{x}\left(c_1\Gamma\left(1-\sqrt{1-4b}\right)J_{-\sqrt{1-4b}}(2\sqrt{a}\sqrt{x})+c_2\Gamma\left(\sqrt{1-4b}+1\right)J_{\sqrt{1-4b}}(2\sqrt{a}\sqrt{x})\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.019 (sec), leaf count = 45

$$\left\{y(x)=\sqrt{x}\left(Y_{\sqrt{1-4\,b}}(2\,\sqrt{a}\sqrt{x})\_C2+J_{\sqrt{1-4\,b}}(2\,\sqrt{a}\sqrt{x})\_C1\right)\right\}$$

2.1150 ODE No. 1150

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

✓ **Mathematica** : cpu = 0.00968688 (sec), leaf count = 42

$$\left\{\left\{y(x)\to -\frac{\sqrt{\frac{2}{\pi}}((c_2x-c_1)\sin(x)+(c_1x+c_2)\cos(x))}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.126 (sec), leaf count = 27

$$\left\{y(x)=\frac{(\_C1\,x+\_C2)\cos(x)+\sin(x)(\_C2\,x-\_C1)}{x}\right\}$$

2.1151 ODE No. 1151

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

✓ **Mathematica** : cpu = 0.0192093 (sec), leaf count = 88

$$\left\{\left\{y(x)\to -\frac{i\sqrt{\frac{2}{\pi}}\sqrt{x}\left(\left(c_1+i\sqrt{a}c_2x\right)\sinh\left(\sqrt{a}x\right)-\left(\sqrt{a}c_1x+ic_2\right)\cosh\left(\sqrt{a}x\right)\right)}{\left(-i\sqrt{a}x\right)^{3/2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.131 (sec), leaf count = 43

$$\left\{y(x)=\frac{1}{x}\left(\_C2\,\left(ax+\sqrt{a}\right)e^{-\sqrt{a}x}-\_C1\,e^{\sqrt{a}x}\left(ax-\sqrt{a}\right)\right)\right\}$$

2.1152 ODE No. 1152

$$(a^2x^2 - 6)\,y(x) + x^2y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0205839 (sec), leaf count = 79

$$\left\{\left\{y(x) \to -\frac{\sqrt{\frac{2}{\pi}}\sqrt{x}((c_1(a^2x^2-3)+3ac_2x)\sin(ax)+(-a^2c_2x^2+3ac_1x+3c_2)\cos(ax))}{(ax)^{5/2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.337 (sec), leaf count = 53

$$\left\{y(x) = \frac{(\_C1\ a^2x^2+3\_C2\ ax-3\_C1)\cos(ax)+\sin(ax)(\_C2\ a^2x^2-3\_C1\ ax-3\_C2)}{x^2}\right\}$$

2.1153 ODE No. 1153

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

✓ **Mathematica** : cpu = 0.0341823 (sec), leaf count = 44

$$\left\{\left\{y(x) \to \sqrt{x}\left(c_1J_{v-\frac{1}{2}}(\sqrt{a}x)+c_2Y_{v-\frac{1}{2}}(\sqrt{a}x)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.059 (sec), leaf count = 31

$$\left\{y(x) = \sqrt{x}\left(Y_{v-\frac{1}{2}}(\sqrt{a}x)\_C2 + J_{v-\frac{1}{2}}(\sqrt{a}x)\_C1\right)\right\}$$

2.1154 ODE No. 1154

$$y(x)\left(ax^2+bx+c\right)+x^2y''(x)=0$$

✓ **Mathematica** : cpu = 0.0217944 (sec), leaf count = 88

$$\left\{\left\{y(x) \to c_1M_{-\frac{ib}{2\sqrt{a}},-\frac{1}{2}i\sqrt{4c-1}}(2i\sqrt{a}x)+c_2W_{-\frac{ib}{2\sqrt{a}},-\frac{1}{2}i\sqrt{4c-1}}(2i\sqrt{a}x)\right\}\right\}$$

✓ **Maple** : cpu = 0.184 (sec), leaf count = 57

$$\left\{y(x) = \_C1\ M_{-\frac{i}{2}b\frac{1}{\sqrt{a}},\frac{1}{2}\sqrt{1-4c}}(2\,i\sqrt{a}x) + \_C2\ W_{-\frac{i}{2}b\frac{1}{\sqrt{a}},\frac{1}{2}\sqrt{1-4c}}(2\,i\sqrt{a}x)\right\}$$

2.1155 ODE No. 1155

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

✓ **Mathematica** : cpu = 0.05359 (sec), leaf count = 116

$$\left\{\left\{y(x)\to k^{-1/k}a^{\frac{1}{2}/k}\left(x^k\right)^{\frac{1}{2}/k}\left(c_1\Gamma\left(\frac{-2b+k+1}{k}\right)J_{\frac{1-2b}{k}}\left(\frac{2\sqrt{a}\sqrt{x^k}}{k}\right)+c_2\Gamma\left(\frac{2b+k-1}{k}\right)J_{\frac{2b-1}{k}}\left(\frac{2\sqrt{a}\sqrt{}}{k}\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.102 (sec), leaf count = 67

$$\left\{y(x)=\sqrt{x}\left(Y_{\frac{1}{k}\sqrt{(2b-1)^2}}\left(2\frac{\sqrt{a}x^{k/2}}{k}\right)\_C2+J_{\frac{1}{k}\sqrt{(2b-1)^2}}\left(2\frac{\sqrt{a}x^{k/2}}{k}\right)\_C1\right)\right\}$$

2.1156 ODE No. 1156

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

✗ **Mathematica** : cpu = 0.227286 (sec), leaf count = 0 , could not solve

```
DSolve[-(E^x*x*(2 + x*Log[x])) + y[x]/Log[x] + x^2*Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 0.221 (sec), leaf count = 71

$$\left\{y(x)=\ln(x)\_C2-(Ei(1,-\ln(x))\ln(x)+x)\_C1-\left(-\int\frac{(Ei(1,-\ln(x))\ln(x)+x)e^x(2+x\ln(x)}{x}\right.\right.$$

2.1157 ODE No. 1157

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

✗ **Mathematica** : cpu = 0.526593 (sec), leaf count = 0 , DifferentialRoot result

$$\left\{\left\{y(x)\to\text{DifferentialRoot}\left(\{y,x\},\left\{y''(x)x^2-y(x)x+ay'(x)=0,y(1)=c_1,y'(1)=c_2\right\}\right)(x)\right\}\right\}$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x)=DESol\left(\left\{\frac{d^2}{dx^2}\_Y(x)+\frac{a\frac{d}{dx}\_Y(x)}{x^2}-\frac{\_Y(x)}{x}\right\},\{\_Y(x)\}\right)\right\}$$

2.1158 ODE No. 1158

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

✓ **Mathematica** : cpu = 18.5256 (sec), leaf count = 37

$$\left\{\left\{y(x)\to e^{bx}\left(c_2\int_1^x e^{\frac{a}{K[1]}-2bK[1]}\,dK[1]+c_1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.558 (sec), leaf count = 178

$$\left\{y(x)=\sqrt{x}\left(\mathrm{e}^{bx}\mathit{HeunD}\left(-4\sqrt{2}\sqrt{ab},-1-4\sqrt{2}\sqrt{ab},8\sqrt{2}\sqrt{ab},-4\sqrt{2}\sqrt{ab}+1,1\left(\sqrt{2}\sqrt{ab}x-a\right)\left(\sqrt{2}\sqrt{a}\right.\right.\right.\right.$$

2.1159 ODE No. 1159

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

✓ **Mathematica** : cpu = 0.0161867 (sec), leaf count = 39

$$\left\{\left\{y(x)\to\frac{2ax^3+3c_1(x^2+1)+3ic_2(x^2-1)}{6x}\right\}\right\}$$

✓ **Maple** : cpu = 0.033 (sec), leaf count = 19

$$\left\{y(x)=x\_C2+\frac{ax^2}{3}+\frac{\_C1}{x}\right\}$$

2.1160 ODE No. 1160

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

✓ **Mathematica** : cpu = 0.00984495 (sec), leaf count = 30

$$\left\{\left\{y(x)\to c_2\sin\left(\sqrt{a}\log(x)\right)+c_1\cos\left(\sqrt{a}\log(x)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.023 (sec), leaf count = 23

$$\left\{y(x)=\_C1\ \sin\left(\sqrt{a}\ln(x)\right)+\_C2\ \cos\left(\sqrt{a}\ln(x)\right)\right\}$$

2.1161 ODE No. 1161

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

✓ **Mathematica** : cpu = 0.0515507 (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 = 0.016 (sec), leaf count = 31

$$\left\{y(x)=\_C1\ I_{2\sqrt{a}}\left(2\sqrt{x}\right)+\_C2\ K_{2\sqrt{a}}\left(2\sqrt{x}\right)\right\}$$

2.1162 ODE No. 1162

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

✓ **Mathematica** : cpu = 0.0647379 (sec), leaf count = 18

$$\{\{y(x)\to c_1J_v(x)+c_2Y_v(x)\}\}$$

✓ **Maple** : cpu = 0.016 (sec), leaf count = 15

$$\{y(x)=\_C1\ J_v(x)+\_C2\ Y_v(x)\}$$

2.1163 ODE No. 1163

$$-f(x)+\left(x^2-v^2\right)y(x)+x^2y''(x)+xy'(x)=0$$

✓ **Mathematica** : cpu = 0.361619 (sec), leaf count = 70

$$\left\{\left\{y(x)\to J_v(x)\int_1^x-\frac{\pi f(K[1])Y_v(K[1])}{2K[1]}\,dK[1]+Y_v(x)\int_1^x\frac{\pi f(K[2])J_v(K[2])}{2K[2]}\,dK[2]+c_1J_v(x)+c_2Y_v(x$$

✓ **Maple** : cpu = 0.099 (sec), leaf count = 49

$$\left\{y(x)=\frac{Y_v(x)\pi}{2}\int\frac{J_v(x)f(x)}{x}\,\mathrm{d}x-\frac{J_v(x)\pi}{2}\int\frac{Y_v(x)f(x)}{x}\,\mathrm{d}x+Y_v(x)\_C1+J_v(x)\_C2\right\}$$

2.1164 ODE No. 1164

$$y(x)\left(lx^2-v^2\right)+x^2y''(x)+xy'(x)=0$$

✓ **Mathematica** : cpu = 0.02218 (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 = 0.049 (sec), leaf count = 23

$$\left\{y(x)=\_C1\ J_v\left(\sqrt{l}x\right)+\_C2\ Y_v\left(\sqrt{l}x\right)\right\}$$

2.1165 ODE No. 1165

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

✓ **Mathematica** : cpu = 0.0804561 (sec), leaf count = 26

$$\left\{\left\{y(x)\to\frac{c_2(a+x)}{a^2}+c_1xe^{a/x}\right\}\right\}$$

✓ **Maple** : cpu = 0.03 (sec), leaf count = 19

$$\left\{y(x)=(x+a)\_C1+\_C2\ x\mathrm{e}^{\frac{a}{x}}\right\}$$

2.1166 ODE No. 1166

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

✓ **Mathematica** : cpu = 0.0147013 (sec), leaf count = 23

$$\left\{\left\{y(x)\to c_1x+c_2x\log(x)+\frac{3x^3}{4}\right\}\right\}$$

✓ **Maple** : cpu = 0.022 (sec), leaf count = 21

$$\left\{y(x)=\frac{x(4\ln(x)\_C1+3x^2+4\_C2)}{4}\right\}$$

2.1167 ODE No. 1167

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

✓ **Mathematica** : cpu = 0.0868936 (sec), leaf count = 130

$$\left\{\left\{y(x)\to m^{-2/m}a^{\frac{1}{m}}(x^m)^{\frac{1}{m}}\left(c_1\Gamma\left(1-\frac{2i\sqrt{b-1}}{m}\right)J_{-\frac{2i\sqrt{b-1}}{m}}\left(\frac{2\sqrt{a}\sqrt{x^m}}{m}\right)+c_2\Gamma\left(\frac{2i\sqrt{b-1}}{m}+1\right)J_{\frac{2i\sqrt{b-1}}{m}}\left(\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.069 (sec), leaf count = 63

$$\left\{y(x)=x\left(Y_{2\frac{\sqrt{1-b}}{m}}\left(2\frac{\sqrt{a}x^{m/2}}{m}\right)\_C2+J_{2\frac{\sqrt{1-b}}{m}}\left(2\frac{\sqrt{a}x^{m/2}}{m}\right)\_C1\right)\right\}$$

2.1168 ODE No. 1168

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

✓ **Mathematica** : cpu = 0.00561284 (sec), leaf count = 15

$$\left\{\left\{y(x)\to c_2-\frac{c_1}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.016 (sec), leaf count = 11

$$\left\{y(x)=\_C1+\frac{\_C2}{x}\right\}$$

2.1169 ODE No. 1169

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

✓ **Mathematica** : cpu = 0.0726469 (sec), leaf count = 103

$$\left\{\left\{y(x)\to\frac{c_1\Gamma\left(1-\sqrt{4b^2+1}\right)J_{-\sqrt{4b^2+1}}\left(2\sqrt{a}\sqrt{x}\right)+c_2\Gamma\left(\sqrt{4b^2+1}+1\right)J_{\sqrt{4b^2+1}}\left(2\sqrt{a}\sqrt{x}\right)}{\sqrt{a}\sqrt{x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.052 (sec), leaf count = 49

$$\left\{y(x)=1\left(\_C2\,Y_{\sqrt{4\,b^2+1}}\left(2\,\sqrt{a}\sqrt{x}\right)+\_C1\,J_{\sqrt{4\,b^2+1}}\left(2\,\sqrt{a}\sqrt{x}\right)\right)\frac{1}{\sqrt{x}}\right\}$$

2.1170 ODE No. 1170

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

✓ **Mathematica** : cpu = 0.0246327 (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 = 0.09 (sec), leaf count = 43

$$\left\{y(x)=1\left(\_C2\,Y_{\frac{1}{2}\sqrt{1-4\,b}}\left(\sqrt{a}x\right)+\_C1\,J_{\frac{1}{2}\sqrt{1-4\,b}}\left(\sqrt{a}x\right)\right)\frac{1}{\sqrt{x}}\right\}$$

2.1171 ODE No. 1171

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

✓ **Mathematica** : cpu = 0.0562692 (sec), leaf count = 92

$$\left\{\left\{y(x)\to e^{-i\sqrt{l}x}x^n\left(c_1U\left(\frac{ia}{2\sqrt{l}}+n+1,2n+2,2i\sqrt{l}x\right)+c_2L_{-\frac{ia}{2\sqrt{l}}-n-1}^{2n+1}\left(2i\sqrt{l}x\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.228 (sec), leaf count = 49

$$\left\{y(x)=\frac{1}{x}\left(\_C2\,W_{-\frac{i}{2}a\frac{1}{\sqrt{l}},n+\frac{1}{2}}\left(2\,i\sqrt{l}x\right)+\_C1\,M_{-\frac{i}{2}a\frac{1}{\sqrt{l}},n+\frac{1}{2}}\left(2\,i\sqrt{l}x\right)\right)\right\}$$

2.1172 ODE No. 1172

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

✓ **Mathematica** : cpu = 0.0712835 (sec), leaf count = 145

$$\left\{\left\{y(x)\to 2^{\frac{1}{2}-\frac{1}{2}\sqrt{1-4a}}\left(\frac{1}{x}\right)^{\frac{1}{2}-\frac{1}{2}\sqrt{1-4a}}\left(2^{\sqrt{1-4a}}c_2\left(\frac{1}{x}\right)^{\sqrt{1-4a}}\,{}_1F_1\left(\frac{1}{2}\left(\sqrt{1-4a}+1\right);\sqrt{1-4a}+1;-\frac{2}{x}\right)+c\right.\right.\right.$$

✓ **Maple** : cpu = 0.067 (sec), leaf count = 47

$$\left\{y(x)=e^{-x^{-1}}\sqrt{x^{-1}}\left(K_{\frac{1}{2}\sqrt{1-4\,a}}\left(x^{-1}\right)\_C2+I_{\frac{1}{2}\sqrt{1-4\,a}}\left(x^{-1}\right)\_C1\right)\right\}$$

2.1173 ODE No. 1173

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

✓ **Mathematica** : cpu = 0.106528 (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 = 0.192 (sec), leaf count = 37

$$\left\{y(x)=1\mathrm{e}^{\frac{a}{x}}\left(K_{b-\frac{1}{2}}\left(\frac{a}{x}\right)\_C2+I_{b-\frac{1}{2}}\left(\frac{a}{x}\right)\_C1\right)\frac{1}{\sqrt{x}}\right\}$$

2.1174 ODE No. 1174

$$x^5(-\log(x))+x^2y''(x)-2xy'(x)+2y(x)=0$$

✓ **Mathematica** : cpu = 0.0230001 (sec), leaf count = 32

$$\left\{\left\{y(x)\to c_2x^2+c_1x-\frac{7x^5}{144}+\frac{1}{12}x^5\log(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.134 (sec), leaf count = 25

$$\left\{y(x)=\frac{x^5\ln(x)}{12}-\frac{7x^5}{144}+\_C2\,x^2+\_C1\,x\right\}$$

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 = 0.186033 (sec), leaf count = 33

$$\left\{\left\{y(x)\to\frac{-(2a+1)\sin(x)-ax\cos(x)+c_2x^5+c_1}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.071 (sec), leaf count = 29

$$\left\{y(x)=\frac{(-2\,a-1)\sin(x)+x^5\_C2-ax\cos(x)+\_C1}{x}\right\}$$

2.1176 ODE No. 1176

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

✓ **Mathematica** : cpu = 0.0194797 (sec), leaf count = 33

$$\left\{\left\{y(x) \to c_1 e^{-ix} x - \frac{1}{2} i c_2 e^{ix} x\right\}\right\}$$

✓ **Maple** : cpu = 0.052 (sec), leaf count = 15

$$\{y(x) = x(\cos(x)\_C2 + \sin(x)\_C1)\}$$

2.1177 ODE No. 1177

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

✗ **Mathematica** : cpu = 299.999 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.101 (sec), leaf count = 34

$$\left\{y(x) = x\left(-\cos(x) \int \frac{\sin(x)}{\cos(x) x} dx + \cos(x)\_C1 + \sin(x)(\_C2 + \ln(x))\right)\right\}$$

2.1178 ODE No. 1178

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

✓ **Mathematica** : cpu = 0.0714364 (sec), leaf count = 63

$$\left\{\left\{y(x) \to \frac{1}{2} e^{-ix} x\left(-ic_2 e^{2ix} + 2c_1 + e^{2ix} \log\left(1 + e^{-2ix}\right) + \log\left(1 + e^{2ix}\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.041 (sec), leaf count = 23

$$\{y(x) = x(\cos(x)\ln(\cos(x)) + \cos(x)\_C1 + \sin(x)(x + \_C2))\}$$

2.1179 ODE No. 1179

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

✓ **Mathematica** : cpu = 0.0226504 (sec), leaf count = 38

$$\left\{\left\{y(x)\to c_1xe^{-iax}-\frac{ic_2xe^{iax}}{2a}\right\}\right\}$$

✓ **Maple** : cpu = 0.052 (sec), leaf count = 19

$$\{y(x)=x(\sin(ax)\_C1+\cos(ax)\_C2)\}$$

2.1180 ODE No. 1180

$$-f(x)+\left(-v^2+x^2+1\right)y(x)+x^2y''(x)+3xy'(x)=0$$

✓ **Mathematica** : cpu = 0.229584 (sec), leaf count = 66

$$\left\{\left\{y(x)\to\frac{J_v(x)\int_1^x-\frac{1}{2}\pi f(K[1])Y_v(K[1])\,dK[1]+Y_v(x)\int_1^x\frac{1}{2}\pi f(K[2])J_v(K[2])\,dK[2]+c_1J_v(x)+c_2Y_v(x}{x}\right.\right.$$

✓ **Maple** : cpu = 0.128 (sec), leaf count = 49

$$\left\{y(x)=\frac{-J_v(x)\pi\int Y_v(x)f(x)\,dx+Y_v(x)\pi\int J_v(x)f(x)\,dx+2\,Y_v(x)\_C1+2\,J_v(x)\_C2}{2\,x}\right\}$$

2.1181 ODE No. 1181

$$x^2y''(x)+(3x-1)y'(x)+y(x)=0$$

✓ **Mathematica** : cpu = 0.0455817 (sec), leaf count = 27

$$\left\{\left\{y(x)\to\frac{e^{-1/x}\left(c_1-c_2\text{Ei}\left(\frac{1}{x}\right)\right)}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.03 (sec), leaf count = 25

$$\left\{y(x)=\frac{1}{e^{x^{-1}}x}\left(\_C1\,Ei\left(1,-x^{-1}\right)+\_C2\right)\right\}$$

2.1182 ODE No. 1182

$$x^2y''(x) - 3xy'(x) + 4y(x) - 5x = 0$$

✓ **Mathematica** : cpu = 0.0173771 (sec), leaf count = 20

$$\{\{y(x) \to x(c_1x + 2c_2x\log(x) + 5)\}\}$$

✓ **Maple** : cpu = 0.021 (sec), leaf count = 20

$$\{y(x) = \_C2\,x^2 + x^2\ln(x)\,\_C1 + 5\,x\}$$

2.1183 ODE No. 1183

$$x^2y''(x) + x^2(-\log(x)) - 3xy'(x) - 5y(x) = 0$$

✓ **Mathematica** : cpu = 0.029651 (sec), leaf count = 27

$$\left\{\left\{y(x) \to c_1x^5 + \frac{c_2}{x} - \frac{1}{9}x^2\log(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.023 (sec), leaf count = 22

$$\left\{y(x) = x^5\_C2 + \frac{\_C1}{x} - \frac{x^2\ln(x)}{9}\right\}$$

2.1184 ODE No. 1184

$$-x^4 + x^2y''(x) + x^2 - 4xy'(x) + 6y(x) = 0$$

✓ **Mathematica** : cpu = 0.0207026 (sec), leaf count = 30

$$\left\{\left\{y(x) \to \frac{1}{2}x^2\left(2c_2x + 2c_1 + x^2 + 2\log(x) + 2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.043 (sec), leaf count = 25

$$\left\{y(x) = \frac{x^2(2\,x\_C2 + x^2 + 2\,\ln(x) + 2\,\_C1 + 2)}{2}\right\}$$

2.1185 ODE No. 1185

$$-\left(2x^3-4\right)y(x)+x^2y''(x)+5xy'(x)=0$$

✓ **Mathematica** : cpu = 0.040029 (sec), leaf count = 65

$$\left\{\left\{y(x)\to\frac{6\sqrt[3]{3}c_2K_0\left(\frac{2}{3}\sqrt{2}x^{3/2}\right)-3\sqrt[3]{-3}c_1I_0\left(\frac{2}{3}\sqrt{2}x^{3/2}\right)}{2^{2/3}x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.045 (sec), leaf count = 33

$$\left\{y(x)=\frac{1}{x^2}\left(\_C2\,K_0\left(\frac{2\sqrt{2}}{3}x^{\frac{3}{2}}\right)+\_C1\,I_0\left(\frac{2\sqrt{2}}{3}x^{\frac{3}{2}}\right)\right)\right\}$$

2.1186 ODE No. 1186

$$x^3(-\sin(x))+x^2y''(x)-5xy'(x)+8y(x)=0$$

✓ **Mathematica** : cpu = 0.0363863 (sec), leaf count = 37

$$\left\{\left\{y(x)\to\frac{1}{2}x^2\left(2c_2x^2+2c_1+x^2\text{Ci}(x)-x\sin(x)+\cos(x)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.049 (sec), leaf count = 36

$$\left\{y(x)=\frac{x^4\,Ci(x)}{2}-\frac{\sin(x)\,x^3}{2}+\frac{x^2(2\_C1\,x^2+2\_C2+\cos(x))}{2}\right\}$$

2.1187 ODE No. 1187

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

✓ **Mathematica** : cpu = 0.0125575 (sec), leaf count = 57

$$\left\{\left\{y(x)\to x^{\frac{1}{2}\left(-\sqrt{a^2-2a-4b+1}-a+1\right)}\left(c_2x^{\sqrt{a^2-2a-4b+1}}+c_1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.029 (sec), leaf count = 53

$$\left\{y(x)=\_C1\,x^{-\frac{a}{2}+\frac{1}{2}+\frac{1}{2}\sqrt{a^2-2a-4b+1}}+\_C2\,x^{-\frac{a}{2}+\frac{1}{2}-\frac{1}{2}\sqrt{a^2-2a-4b+1}}\right\}$$

2.1188 ODE No. 1188

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

✓ **Mathematica** : cpu = 0.138515 (sec), leaf count = 243

$$\left\{\left\{y(x)\to -i^{-\sqrt{a^2-2a-4c+1}+a+1}b^{\frac{1}{2}\left(-\sqrt{a^2-2a-4c+1}+a-1\right)}\left(\frac{1}{x}\right)^{\frac{1}{2}\left(-\sqrt{a^2-2a-4c+1}+a-1\right)}\left(c_1\,{}_1F_1\left(\frac{1}{2}\left(a-\sqrt{a^2-2a\right.\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.266 (sec), leaf count = 114

$$\left\{y(x)=x^{-\frac{1}{2}\sqrt{a^2-2\,a-4\,c+1}-\frac{a}{2}+\frac{1}{2}}\left(U\left(-\frac{1}{2}+\frac{1}{2}\sqrt{a^2-2\,a-4\,c+1}+\frac{a}{2},1+\sqrt{a^2-2\,a-4\,c+1},\frac{b}{x}\right)\_C2+\right.\right.$$

2.1189 ODE No. 1189

$$axy'(x)+y(x)\left(bx^m+c\right)+x^2y''(x)=0$$

✓ **Mathematica** : cpu = 0.0737966 (sec), leaf count = 168

$$\left\{\left\{y(x)\to m^{\frac{a-1}{m}}b^{-\frac{a-1}{2m}}\left(x^m\right)^{-\frac{a-1}{2m}}\left(c_1\Gamma\left(1-\frac{\sqrt{a^2-2a-4c+1}}{m}\right)J_{-\frac{\sqrt{a^2-2a-4c+1}}{m}}\left(\frac{2\sqrt{b}\sqrt{x^m}}{m}\right)+c_2\Gamma\left(\frac{m+}{}\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.062 (sec), leaf count = 79

$$\left\{y(x)=x^{-\frac{a}{2}+\frac{1}{2}}\left(Y_{\frac{1}{m}\sqrt{a^2-2\,a-4\,c+1}}\left(2\,\frac{\sqrt{b}x^{m/2}}{m}\right)\_C2+J_{\frac{1}{m}\sqrt{a^2-2\,a-4\,c+1}}\left(2\,\frac{\sqrt{b}x^{m/2}}{m}\right)\_C1\right)\right\}$$

2.1190 ODE No. 1190

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

✓ **Mathematica** : cpu = 0.0333734 (sec), leaf count = 95

$$\left\{\left\{y(x)\to e^{-x}x^{\frac{1}{2}\left(\sqrt{1-4b}+1\right)}\left(c_1U\left(\frac{1}{2}\left(-2a+\sqrt{1-4b}+1\right),\sqrt{1-4b}+1,x\right)+c_2L_{a-\frac{1}{2}\sqrt{1-4b}-\frac{1}{2}}^{\sqrt{1-4b}}(x)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.165 (sec), leaf count = 38

$$\left\{y(x)=\mathrm{e}^{-\frac{x}{2}}\left(W_{a,\,\frac{1}{2}\sqrt{1-4\,b}}(x)\_C2+M_{a,\,\frac{1}{2}\sqrt{1-4\,b}}(x)\_C1\right)\right\}$$

2.1191 ODE No. 1191

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

✓ **Mathematica** : cpu = 0.0102353 (sec), leaf count = 72

$$\left\{\left\{y(x) \to \frac{e^{-x/2}\left(2(2c_1 + ic_2x)\sinh\left(\frac{x}{2}\right) - 2(c_1x + 2ic_2)\cosh\left(\frac{x}{2}\right)\right)}{\sqrt{\pi}\sqrt{-ix}\sqrt{x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.025 (sec), leaf count = 23

$$\left\{y(x) = \frac{\_C2\,(x+2)\,\mathrm{e}^{-x} + \_C1\,(x-2)}{x}\right\}$$

2.1192 ODE No. 1192

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

✓ **Mathematica** : cpu = 13.3919 (sec), leaf count = 34

$$\left\{\left\{y(x) \to e^{-x}\left(c_2\int_1^x e^{K[1]-\frac{1}{K[1]}}\,dK[1] + c_1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.339 (sec), leaf count = 51

$$\left\{y(x) = \sqrt{x}\left(\mathrm{e}^{-x}\mathit{HeunD}\left(4, 3, -8, 5, \frac{x-1}{1+x}\right)\_C1 + \mathrm{e}^{-x^{-1}}\mathit{HeunD}\left(-4, 3, -8, 5, \frac{x-1}{1+x}\right)\_C2\right)\right\}$$

2.1193 ODE No. 1193

$$x^2y''(x) + (x+1)xy'(x) + (x-9)y(x) = 0$$

✓ **Mathematica** : cpu = 0.051632 (sec), leaf count = 42

$$\left\{\left\{y(x) \to \frac{c_1((x-8)x+20) - c_2e^{-x}(x^3 + 9x^2 + 36x + 60)}{x^3}\right\}\right\}$$

✓ **Maple** : cpu = 0.059 (sec), leaf count = 38

$$\left\{y(x) = \frac{\_C2\,(x^3 + 9\,x^2 + 36\,x + 60)\,\mathrm{e}^{-x} + \_C1\,(x^2 - 8\,x + 20)}{x^3}\right\}$$

2.1194 ODE No. 1194

$$x^2y''(x) + (x+1)xy'(x) + (3x-1)y(x) = 0$$

✓ **Mathematica** : cpu = 0.0629693 (sec), leaf count = 66

$$\left\{\left\{y(x) \to \frac{e^{-x}(c_2(x-3)x^2\text{Ei}(x) + 6c_1x^3 - x^2(c_2e^x + 18c_1) + 2c_2e^x x + c_2e^x)}{6x}\right\}\right\}$$

✓ **Maple** : cpu = 0.081 (sec), leaf count = 48

$$\left\{y(x) = \frac{x^2\_C2\,\mathrm{e}^{-x}(x-3)\,Ei(1,-x) + x^2\_C1\,(x-3)\,\mathrm{e}^{-x} + \_C2\,(x^2-2\,x-1)}{x}\right\}$$

2.1195 ODE No. 1195

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

✓ **Mathematica** : cpu = 0.036666 (sec), leaf count = 63

$$\left\{\left\{y(x) \to e^{-x}x^{\sqrt{2}-1}\left(c_1U\left(2+\sqrt{2}, 1+2\sqrt{2}, x\right) + c_2L_{-2-\sqrt{2}}^{2\sqrt{2}}(x)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.197 (sec), leaf count = 93

$$\left\{y(x) = -1\mathrm{e}^{-\frac{x}{2}}\left(-\_C1\,\left(\sqrt{2}+x+1\right)I_{-\frac{1}{2}+\sqrt{2}}\left(\frac{x}{2}\right) - \_C1\,\left(-\sqrt{2}+x+1\right)I_{\frac{1}{2}+\sqrt{2}}\left(\frac{x}{2}\right) + \left(\left(-x-\sqrt{2}-\right.\right.\right.\right.$$

2.1196 ODE No. 1196

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

✓ **Mathematica** : cpu = 0.0320986 (sec), leaf count = 34

$$\left\{\left\{y(x) \to \frac{c_2(x^2\text{Ei}(x) - e^x(x+1))}{2x} + c_1x\right\}\right\}$$

✓ **Maple** : cpu = 0.123 (sec), leaf count = 31

$$\left\{y(x) = \frac{Ei(1,-x)\_C2\,x^2 + \_C2\,(1+x)\,\mathrm{e}^x + \_C1\,x^2}{x}\right\}$$

2.1197 ODE No. 1197

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

✓ **Mathematica** : cpu = 0.0205513 (sec), leaf count = 67

$$\left\{\left\{y(x)\to \frac{e^{x/2}\left(c_1 J_{\frac{1}{2}\sqrt{4a+1}}\left(-\frac{ix}{2}\right)+c_2 Y_{\frac{1}{2}\sqrt{4a+1}}\left(-\frac{ix}{2}\right)\right)}{\sqrt{x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.096 (sec), leaf count = 43

$$\left\{y(x)=1\mathrm{e}^{\frac{x}{2}}\left(K_{\frac{1}{2}\sqrt{4\,a+1}}\left(\frac{x}{2}\right)\_C2+I_{\frac{1}{2}\sqrt{4\,a+1}}\left(\frac{x}{2}\right)\_C1\right)\frac{1}{\sqrt{x}}\right\}$$

2.1198 ODE No. 1198

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

✓ **Mathematica** : cpu = 0.0329468 (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 = 0.064 (sec), leaf count = 37

$$\left\{y(x)=\frac{\mathrm{e}^x Ei(1,x)\_C2\,x^3+\_C1\,x^3\mathrm{e}^x-\_C2\left(x^2-x+2\right)}{x^2}\right\}$$

2.1199 ODE No. 1199

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

✓ **Mathematica** : cpu = 0.0134841 (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 = 0.033 (sec), leaf count = 35

$$\left\{y(x)=x\left(\mathrm{e}^x Ei(1,x)\_C2\,x^3+\_C1\,x^3\mathrm{e}^x-\_C2\left(x^2-x+2\right)\right)\right\}$$

2.1200 ODE No. 1200

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

✓ **Mathematica** : cpu = 0.0229387 (sec), leaf count = 45

$$\left\{\left\{y(x)\to e^{-x}\sqrt{x}\left(c_1J_{v-\frac{1}{2}}(-ix)+c_2Y_{v-\frac{1}{2}}(-ix)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.034 (sec), leaf count = 27

$$\left\{y(x)=\sqrt{x}\mathrm{e}^{-x}\left(K_{v-\frac{1}{2}}(x)\_C2+I_{v-\frac{1}{2}}(x)\_C1\right)\right\}$$

2.1201 ODE No. 1201

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

✓ **Mathematica** : cpu = 0.0590115 (sec), leaf count = 44

$$\left\{\left\{y(x)\to\frac{e^{-2x}\left(c_2e^{2x}\left(2x^2-4x+3\right)+c_1(4x+6)\right)}{4x^2}\right\}\right\}$$

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

$$\left\{y(x)=\frac{\_C1\,(2\,x^2-4\,x+3)}{x^2}+\frac{\_C2\,\mathrm{e}^{-2\,x}(2\,x+3)}{x^2}\right\}$$

2.1202 ODE No. 1202

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

✓ **Mathematica** : cpu = 0.0155941 (sec), leaf count = 21

$$\left\{\left\{y(x)\to x\left(\frac{1}{2}c_2e^{2x}+c_1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.065 (sec), leaf count = 14

$$\left\{y(x)=x\left(\mathrm{e}^{2\,x}\_C2+\_C1\right)\right\}$$

2.1203 ODE No. 1203

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

✓ **Mathematica** : cpu = 0.0231224 (sec), leaf count = 80

$$\left\{\left\{y(x) \to -\frac{ax^{3/2}e^{-\frac{ax}{2}}\left(2(2c_1 + iac_2x)\sinh\left(\frac{ax}{2}\right) - 2(ac_1x + 2ic_2)\cosh\left(\frac{ax}{2}\right)\right)}{\sqrt{\pi}(-iax)^{5/2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.035 (sec), leaf count = 28

$$\left\{y(x) = \frac{\_C2\,(ax+2)\,e^{-ax} + \_C1\,(ax-2)}{x}\right\}$$

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 = 0.0213637 (sec), leaf count = 84

$$\left\{\left\{y(x) \to -\frac{ax^{3/2}e^{-\frac{1}{2}x(a+2b)}\left(2(2c_1 + iac_2x)\sinh\left(\frac{ax}{2}\right) - 2(ac_1x + 2ic_2)\cosh\left(\frac{ax}{2}\right)\right)}{\sqrt{\pi}(-iax)^{5/2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.082 (sec), leaf count = 35

$$\left\{y(x) = \frac{\_C2\,(ax+2)\,e^{-(a+b)x} + \_C1\,e^{-bx}(ax-2)}{x}\right\}$$

2.1205 ODE No. 1205

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

✗ **Mathematica** : cpu = 0.222568 (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

$$\left\{y(x) = DESol\left(\left\{\frac{f(x)\_Y(x)}{x^2} + a\frac{d}{dx}\_Y(x) + \frac{d^2}{dx^2}\_Y(x)\right\}, \{\_Y(x)\}\right)\right\}$$

2.1206 ODE No. 1206

$$y(x)\left(abx+cx^2+d\right)+x(2ax+b)y'(x)+x^2y''(x)=0$$

✓ **Mathematica** : cpu = 0.116462 (sec), leaf count = 102

$$\left\{\left\{y(x)\to e^{-ax}x^{\frac{1}{2}-\frac{b}{2}}\left(c_1J_{\frac{1}{2}\sqrt{b^2-2b-4d+1}}\left(-i\sqrt{a^2-c}x\right)+c_2Y_{\frac{1}{2}\sqrt{b^2-2b-4d+1}}\left(-i\sqrt{a^2-c}x\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.117 (sec), leaf count = 76

$$\left\{y(x)=\mathrm{e}^{-ax}x^{-\frac{b}{2}+\frac{1}{2}}\left(Y_{\frac{1}{2}\sqrt{b^2-2\,b-4\,d+1}}\left(\sqrt{-a^2+c}x\right)\_C2+J_{\frac{1}{2}\sqrt{b^2-2\,b-4\,d+1}}\left(\sqrt{-a^2+c}x\right)\_C1\right)\right\}$$

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 = 0.130498 (sec), leaf count = 223

$$\left\{\left\{y(x)\to e^{-\frac{1}{2}x\left(\sqrt{a^2-4\mathrm{a1}}+a\right)}x^{\frac{1}{2}\left(\sqrt{b^2-2b-4\mathrm{c1}+1}-b+1\right)}\left(c_1U\left(\frac{ab-2\mathrm{b1}+\sqrt{a^2-4\mathrm{a1}}(\sqrt{b^2-2b-4\mathrm{c1}+1}+1)}{2\sqrt{a^2-4\mathrm{a1}}}\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.318 (sec), leaf count = 110

$$\left\{y(x)=\mathrm{e}^{-\frac{ax}{2}}x^{-\frac{b}{2}}\left(M_{-\frac{ab-2\,b1}{2}\frac{1}{\sqrt{a^2-4\,a1}},\frac{1}{2}\sqrt{b^2-2\,b-4\,c1+1}}\left(\sqrt{a^2-4\,a1}x\right)\_C1+W_{-\frac{ab-2\,b1}{2}\frac{1}{\sqrt{a^2-4\,a1}},\frac{1}{2}\sqrt{b^2-2\,b-4\,c1+1}}\right.\right.$$

2.1208 ODE No. 1208

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

✓ **Mathematica** : cpu = 0.0556318 (sec), leaf count = 49

$$\left\{\left\{y(x)\to\frac{\sqrt{2\pi}c_2\mathrm{erf}\left(\frac{x}{\sqrt{2}}\right)-2c_2e^{-\frac{x^2}{2}}x+2c_1}{2x}\right\}\right\}$$

✓ **Maple** : cpu = 0.067 (sec), leaf count = 36

$$\left\{y(x)=\frac{1}{x}\left(-Erf\left(\frac{\sqrt{2}x}{2}\right)\sqrt{\pi}\sqrt{2}\_C2+2\,\mathrm{e}^{-1/2\,x^2}\_C2\,x+\_C1\right)\right\}$$

2.1209 ODE No. 1209

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

✓ **Mathematica** : cpu = 0.0230977 (sec), leaf count = 59

$$\left\{\left\{y(x) \to \frac{e^{-\frac{x^2}{2}}\left(2\left(c_1 e^{\frac{x^2}{2}} x + c_2\right) - \sqrt{2\pi}c_1 \operatorname{erfi}\left(\frac{x}{\sqrt{2}}\right)\right)}{2x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.073 (sec), leaf count = 40

$$\left\{y(x) = \frac{1}{x^2}\left(\left(iErf\left(\frac{i}{2}\sqrt{2}x\right)\sqrt{\pi}\sqrt{2}\_C2 + \_C1\right)e^{-\frac{x^2}{2}} + 2\_C2\,x\right)\right\}$$

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 = 0.288948 (sec), leaf count = 231

$$\left\{\left\{y(x) \to i^{-a}(-1)^{\frac{1}{4}\left(1-\sqrt{4a^2-4a(-1)^n+1}\right)}x^{\frac{1}{2}\left(-\sqrt{4a^2-4a(-1)^n+1}-2a+1\right)}\left(c_1\,{}_1F_1\left(\frac{1}{4}\left(-2a-2n-\sqrt{4a^2-4(-1)^n\right.\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.926 (sec), leaf count = 81

$$\left\{y(x) = e^{\frac{x^2}{2}}x^{-\frac{1}{2}-a}\left(M_{\frac{n}{2}+\frac{a}{2}+\frac{1}{4},\,\frac{1}{4}\sqrt{1-4\,(-1)^n a+4\,a^2}}\left(x^2\right)\_C1 + W_{\frac{n}{2}+\frac{a}{2}+\frac{1}{4},\,\frac{1}{4}\sqrt{1-4\,(-1)^n a+4\,a^2}}\left(x^2\right)\_C2\right)\right\}$$

2.1211 ODE No. 1211

$$4x^3y'(x) + x^2y''(x) + \left(4x^4+2x^2+1\right)y(x) = 0$$

✓ **Mathematica** : cpu = 0.0618513 (sec), leaf count = 60

$$\left\{\left\{y(x) \to \frac{1}{3}e^{-x^2}x^{\frac{1}{2}-\frac{i\sqrt{3}}{2}}\left(3c_1 - i\sqrt{3}c_2x^{i\sqrt{3}}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.092 (sec), leaf count = 36

$$\left\{y(x) = e^{-x^2}\left(x^{\frac{1}{2}-\frac{i}{2}\sqrt{3}}\_C2 + x^{\frac{1}{2}+\frac{i}{2}\sqrt{3}}\_C1\right)\right\}$$

2.1212 ODE No. 1212

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

✗ **Mathematica** : cpu = 0.381742 (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
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x)=DESol\left(\left\{\frac{f(x)\_Y(x)}{x^2}+\frac{\left(ax^2+b\right)\frac{d}{dx}\_Y(x)}{x}+\frac{d^2}{dx^2}\_Y(x)\right\},\{\_Y(x)\}\right)\right\}$$

2.1213 ODE No. 1213

$$\left(x^3+1\right)xy'(x)+x^2y''(x)-y(x)=0$$

✓ **Mathematica** : cpu = 0.0895664 (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 = 0.116 (sec), leaf count = 53

$$\left\{y(x)=\left(\_C1\,I_{-\frac{1}{6}}\left(\frac{x^3}{6}\right)+\_C1\,I_{\frac{5}{6}}\left(\frac{x^3}{6}\right)-\_C2\left(K_{\frac{1}{6}}\left(\frac{x^3}{6}\right)-K_{\frac{5}{6}}\left(\frac{x^3}{6}\right)\right)\right)e^{-\frac{x^3}{6}}x^{\frac{3}{2}}\right\}$$

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 = 0.314773 (sec), leaf count = 191

$$\left\{\left\{y(x)\to\frac{e^{-\frac{x^2}{2}}2^{\frac{1}{4}\left(\sqrt{4a^2-4a(-1)^n+1}+2\right)}\left(x^2\right)^{\frac{1}{4}\left(\sqrt{4a^2-4a(-1)^n+1}+2\right)}\left(c_1U\left(\frac{1}{4}\left(-2a-2n+\sqrt{4a^2-4(-1)^na+1}\right.\right.\right.}{\sqrt{x}}\right.\right.$$

✓ **Maple** : cpu = 0.899 (sec), leaf count = 71

$$\left\{y(x)=1\left(\_C2\,W_{\frac{n}{2}+\frac{a}{2}+\frac{1}{4},\,\frac{1}{4}\sqrt{1-4(-1)^na+4a^2}}\left(x^2\right)+\_C1\,M_{\frac{n}{2}+\frac{a}{2}+\frac{1}{4},\,\frac{1}{4}\sqrt{1-4(-1)^na+4a^2}}\left(x^2\right)\right)\frac{1}{\sqrt{x}}\right\}$$

2.1215 ODE No. 1215

$$xy'(x)\left(ax^n+b\right)+y(x)\left(\mathrm{a1}x^{2n}+\mathrm{b1}x^n+\mathrm{c1}\right)+x^2y''(x)=0$$

✓ **Mathematica** : cpu = 0.165526 (sec), leaf count = 410

$$\left\{\left\{y(x)\to 2^{\frac{1}{2}\left(\frac{\sqrt{n^2\left(b^2-2b-4\mathrm{c1}+1\right)}}{n^2}+1\right)}x^{\frac{1}{2}(-b-n+1)}e^{-\frac{\left(\sqrt{a^2-4\mathrm{a1}}+a\right)x^n}{2n}}\left(x^n\right)^{\frac{1}{2}\left(\frac{\sqrt{n^2\left(b^2-2b-4\mathrm{c1}+1\right)}}{n^2}+1\right)}\left(c_1U\left(\frac{\left(n^2+\sqrt{(b^2\right.}}{}\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.371 (sec), leaf count = 148

$$\left\{y(x)=\mathrm{e}^{-\frac{ax^n}{2n}}x^{-\frac{b}{2}-\frac{n}{2}+\frac{1}{2}}\left(M_{-\frac{(b+n-1)a-2\,b1}{2\,n}\frac{1}{\sqrt{a^2-4\,a1}},\frac{1}{2\,n}\sqrt{b^2-2\,b-4\,c1+1}}\left(\frac{x^n}{n}\sqrt{a^2-4\,a1}\right)\_C1+W_{-\frac{(b+n-1)a-2\,b1}{2\,n}\frac{}{\sqrt{a}}}\right.\right.$$

2.1216 ODE No. 1216

$$xy'(x)\left(ax^{\mathrm{a1}}+b\right)+y(x)\left(Ax^{2\mathrm{a1}}+Bx^{\mathrm{a1}}+Cx^{\mathrm{b1}}+\mathrm{DD}\right)+x^2y''(x)=0$$

✗ **Mathematica** : cpu = 1.51967 (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] +
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x)=DESol\left(\left\{\frac{\mathrm{d}^2}{\mathrm{d}x^2}\_Y(x)+\frac{\left(ax^{a1}+b\right)\frac{\mathrm{d}}{\mathrm{d}x}\_Y(x)}{x}+\frac{\left(Ax^{2\,a1}+Bx^{a1}+Cx^{b1}+DD\right)\_Y(x)}{x^2}\right\},\{\_Y\right.\right.$$

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 = 0.157838 (sec), leaf count = 29

$$\left\{\left\{y(x)\to\sec(x)\left(c_1J_{\sqrt{a}}(x)+c_2Y_{\sqrt{a}}(x)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.059 (sec), leaf count = 24

$$\left\{y(x)=\frac{1}{\cos(x)}\left(\_C2\,Y_{\sqrt{a}}(x)+\_C1\,J_{\sqrt{a}}(x)\right)\right\}$$

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 = 0.157905 (sec), leaf count = 37

$$\left\{\left\{y(x) \to \csc(x)\left(c_1 J_{i\sqrt{a}}(x) + c_2 Y_{i\sqrt{a}}(x)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.065 (sec), leaf count = 30

$$\left\{y(x) = \frac{1}{\sin(x)}\left(\_C2\, Y_{i\sqrt{a}}(x) + \_C1\, J_{i\sqrt{a}}(x)\right)\right\}$$

2.1219 ODE No. 1219

$$y(x)\left(ax^2 + bx + c + xf'(x) + f(x)^2 - f(x)\right) + 2xf(x)y'(x) + x^2y''(x) = 0$$

✗ **Mathematica** : cpu = 300.032 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.181 (sec), leaf count = 69

$$\left\{y(x) = e^{-\int \frac{f(x)}{x}\,dx}\left(W_{-\frac{i}{2}b\frac{1}{\sqrt{a}},\,\frac{1}{2}\sqrt{1-4c}}(2i\sqrt{a}x)\_C2 + M_{-\frac{i}{2}b\frac{1}{\sqrt{a}},\,\frac{1}{2}\sqrt{1-4c}}(2i\sqrt{a}x)\_C1\right)\right\}$$

2.1220 ODE No. 1220

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

✓ **Mathematica** : cpu = 195.204 (sec), leaf count = 61

$$\left\{\left\{y(x) \to \left(c_1 J_{v-\frac{1}{2}}\left(\sqrt{a}x\right) + c_2 Y_{v-\frac{1}{2}}\left(\sqrt{a}x\right)\right) e^{\int_1^x \left(\frac{1}{2K[1]} - f(K[1])\right) dK[1]}\right\}\right\}$$

✓ **Maple** : cpu = 0.037 (sec), leaf count = 40

$$\left\{y(x) = \sqrt{x}e^{-\frac{\int 2f(x)\,dx}{2}}\left(Y_{v-\frac{1}{2}}\left(\sqrt{a}x\right)\_C2 + J_{v-\frac{1}{2}}\left(\sqrt{a}x\right)\_C1\right)\right\}$$

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 = 0.0752385 (sec), leaf count = 30

$$\left\{\left\{y(x)\to\left(c_1J_v(x)+c_2Y_v(x)\right)e^{\int_1^x f(K[1])\,dK[1]}\right\}\right\}$$

✓ **Maple** : cpu = 0.037 (sec), leaf count = 35

$$\left\{y(x)=\sqrt{x}\mathrm{e}^{-\frac{1}{2}\int\frac{-2\,xf(x)+1}{x}\,\mathrm{d}x}\left(Y_v(x)\_C2+J_v(x)\_C1\right)\right\}$$

2.1222 ODE No. 1222

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

✓ **Mathematica** : cpu = 0.0272966 (sec), leaf count = 30

$$\left\{\left\{y(x)\to c_2\sin\left(\sqrt{2}\sinh^{-1}(x)\right)+c_1\cos\left(\sqrt{2}\sinh^{-1}(x)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.034 (sec), leaf count = 23

$$\left\{y(x)=\_C1\ \sin\left(\sqrt{2}Arcsinh(x)\right)+\_C2\ \cos\left(\sqrt{2}Arcsinh(x)\right)\right\}$$

2.1223 ODE No. 1223

$$\left(x^2+1\right)y''(x)+xy'(x)-9y(x)=0$$

✓ **Mathematica** : cpu = 0.0227678 (sec), leaf count = 25

$$\left\{\left\{y(x)\to c_1\cosh\left(3\sinh^{-1}(x)\right)+ic_2\sinh\left(3\sinh^{-1}(x)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.026 (sec), leaf count = 39

$$\left\{y(x)=\_C1\ \sin\left(3\ \arctan\left(\frac{x}{\sqrt{-x^2-1}}\right)\right)+\_C2\ \cos\left(3\ \arctan\left(\frac{x}{\sqrt{-x^2-1}}\right)\right)\right\}$$

2.1224 ODE No. 1224

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

✓ **Mathematica** : cpu = 0.0209487 (sec), leaf count = 30

$$\{\{y(x) \to c_2 \sin(\sqrt{a} \sinh^{-1}(x)) + c_1 \cos(\sqrt{a} \sinh^{-1}(x))\}\}$$

✓ **Maple** : cpu = 0.029 (sec), leaf count = 23

$$\{y(x) = \_C1 \sin(\sqrt{a} Arcsinh(x)) + \_C2 \cos(\sqrt{a} Arcsinh(x))\}$$

2.1225 ODE No. 1225

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

✓ **Mathematica** : cpu = 0.0397497 (sec), leaf count = 29

$$\left\{\left\{y(x) \to -c_2 \sqrt{x^2+1} + c_1 x + c_2 x \sinh^{-1}(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.068 (sec), leaf count = 23

$$\left\{y(x) = -\sqrt{x^2+1}\_C2 + x(\_C2\ Arcsinh(x) + \_C1)\right\}$$

2.1226 ODE No. 1226

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

✓ **Mathematica** : cpu = 0.0247248 (sec), leaf count = 30

$$\{\{y(x) \to c_1 P_{v-1}(ix) + c_2 Q_{v-1}(ix)\}\}$$

✓ **Maple** : cpu = 0.095 (sec), leaf count = 25

$$\{y(x) = \_C1\ LegendreP(v-1, ix) + \_C2\ LegendreQ(v-1, ix)\}$$

2.1227 ODE No. 1227

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

✓ **Mathematica** : cpu = 0.035964 (sec), leaf count = 21

$$\left\{\left\{y(x)\to c_2x-c_1(x-i)^2\right\}\right\}$$

✓ **Maple** : cpu = 0.02 (sec), leaf count = 16

$$\left\{y(x)=\_C2\,x^2+\_C1\,x-\_C2\right\}$$

2.1228 ODE No. 1228

$$ay(x)+\left(x^2+1\right)y''(x)+3xy'(x)=0$$

✓ **Mathematica** : cpu = 0.0169537 (sec), leaf count = 66

$$\left\{\left\{y(x)\to\frac{c_1P_{\sqrt{1-a}-\frac{1}{2}}^{\frac{1}{2}}(ix)+c_2Q_{\sqrt{1-a}-\frac{1}{2}}^{\frac{1}{2}}(ix)}{\sqrt[4]{x^2+1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.188 (sec), leaf count = 53

$$\left\{y(x)=1\left(\_C2\left(x+\sqrt{x^2+1}\right)^{-\sqrt{1-a}}+\_C1\left(x+\sqrt{x^2+1}\right)^{\sqrt{1-a}}\right)\frac{1}{\sqrt{x^2+1}}\right\}$$

2.1229 ODE No. 1229

$$\left(x^2+1\right)y''(x)+4xy'(x)+2y(x)+2x-2\cos(x)=0$$

✓ **Mathematica** : cpu = 0.0491726 (sec), leaf count = 33

$$\left\{\left\{y(x)\to-\frac{-3c_2x-3c_1+x^3+6\cos(x)}{3x^2+3}\right\}\right\}$$

✓ **Maple** : cpu = 0.041 (sec), leaf count = 31

$$\left\{y(x)=\frac{-x^3+3\_C1\,x-6\,\cos(x)+3\_C2}{3\,x^2+3}\right\}$$

2.1230 ODE No. 1230

$$axy'(x) + (a-2)y(x) + (x^2+1)\,y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0297515 (sec), leaf count = 68

$$\left\{\left\{y(x) \to (x^2+1)^{\frac{1}{2}-\frac{a}{4}}\left(c_1 P_{\frac{a-4}{2}}^{\frac{a-2}{2}}(ix) + c_2 Q_{\frac{a-4}{2}}^{\frac{a-2}{2}}(ix)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.322 (sec), leaf count = 36

$$\left\{y(x) = \_C1\,(x^2+1)^{1-\frac{a}{2}} + \_C2\;{}_2\mathrm{F}_1(1, \frac{a}{2} - \frac{1}{2}; \frac{3}{2}; -x^2)x\right\}$$

2.1231 ODE No. 1231

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

✓ **Mathematica** : cpu = 0.078389 (sec), leaf count = 56

$$\left\{\left\{y(x) \to c_1\,{}_2F_1\left(-\frac{v}{2} - \frac{1}{2}, \frac{v}{2}; \frac{1}{2}; x^2\right) + ic_2 x\,{}_2F_1\left(-\frac{v}{2}, \frac{v+1}{2}; \frac{3}{2}; x^2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.109 (sec), leaf count = 52

$$\left\{y(x) = -(x-1)(1+x)\left({}_2\mathrm{F}_1(1-\frac{v}{2}, \frac{3}{2} + \frac{v}{2}; \frac{3}{2}; x^2)\_C2\,x + \_C1\;{}_2\mathrm{F}_1(1+\frac{v}{2}, \frac{1}{2} - \frac{v}{2}; \frac{1}{2}; x^2)\right)\right\}$$

2.1232 ODE No. 1232

$$\frac{nxP_n(x) - nP_{n-1}(x)}{x^2-1} - n(n+1)y(x) + (x^2-1)\,y''(x) = 0$$

✗ **Mathematica** : cpu = 299.998 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.514 (sec), leaf count = 409

$$\left\{y(x) = -3\left(-{}_2\mathrm{F}_1(n/2+1, -n/2+1/2; 1/2; x^2)(n+1)\int -1/3\,\frac{}{(x-1)^3(1+x)^3((_2\mathrm{F}_1(n/2+1, -n/2}\right.\right.$$

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 = 299.998 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.243 (sec), leaf count = 409

$$\left\{y(x) = -3\left(-{}_2F_1(n/2+1, -n/2+1/2;\, 1/2;\, x^2)(n+1)\int -1/3\,\frac{}{(x-1)^3\,(1+x)^3\,(({}_2F_1(n/2+1, -n/2\right.$$

2.1234 ODE No. 1234

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

✓ **Mathematica** : cpu = 0.0982297 (sec), leaf count = 97

$$\left\{\left\{y(x) \to c_1 \log\left(\sqrt{x^2-1} + x\right) + c_2 - \frac{1}{4}\log^2\left(1 - \frac{x}{\sqrt{x^2-1}}\right) - \frac{1}{4}\log^2\left(\frac{x}{\sqrt{x^2-1}} + 1\right) + \frac{1}{2}\log\left(\frac{x}{\sqrt{x^2-}}\right.\right.\right.$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , exception

`time expired`

2.1235 ODE No. 1235

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

✓ **Mathematica** : cpu = 0.0665848 (sec), leaf count = 97

$$\left\{\left\{y(x) \to c_1 \cos\left(\frac{1}{2}\sqrt{a}\left(\log\left(1 - \frac{x}{\sqrt{x^2-1}}\right) - \log\left(\frac{x}{\sqrt{x^2-1}} + 1\right)\right)\right) - c_2 \sin\left(\frac{1}{2}\sqrt{a}\left(\log\left(1 - \frac{x}{\sqrt{x^2-}}\right.\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.037 (sec), leaf count = 45

$$\left\{y(x) = 1\left(\_C1\left(\left(x + \sqrt{x^2-1}\right)^{i\sqrt{a}}\right)^2 + \_C2\right)\left(\left(x + \sqrt{x^2-1}\right)^{i\sqrt{a}}\right)^{-1}\right\}$$

2.1236 ODE No. 1236

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

✗ **Mathematica** : cpu = 0.382232 (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],
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

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

2.1237 ODE No. 1237

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

✓ **Mathematica** : cpu = 0.0112977 (sec), leaf count = 27

$$\left\{ \left\{ y(x) \to \frac{1}{2} c_1 (\log(1-x) - \log(x+1)) + c_2 \right\} \right\}$$

✓ **Maple** : cpu = 0.179 (sec), leaf count = 20

$$\left\{ y(x) = \_C1 - \frac{(\ln(1+x) - \ln(x-1))\_C2}{2} \right\}$$

2.1238 ODE No. 1238

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

✓ **Mathematica** : cpu = 0.0208399 (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 = 0.031 (sec), leaf count = 26

$$\left\{ y(x) = \frac{(a - \_C1) \ln(1+x)}{2} + \frac{(a + \_C1) \ln(x-1)}{2} + \_C2 \right\}$$

2.1239 ODE No. 1239

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

✓ **Mathematica** : cpu = 0.0144086 (sec), leaf count = 46

$$\left\{\left\{y(x) \to c_1 P_{\frac{1}{2}\left(\sqrt{4l+1}-1\right)}(x) + c_2 Q_{\frac{1}{2}\left(\sqrt{4l+1}-1\right)}(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.097 (sec), leaf count = 35

$$\left\{y(x) = \_C1\ LegendreP\left(\frac{1}{2}\sqrt{1+4\,l} - \frac{1}{2}, x\right) + \_C2\ LegendreQ\left(\frac{1}{2}\sqrt{1+4\,l} - \frac{1}{2}, x\right)\right\}$$

2.1240 ODE No. 1240

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

✓ **Mathematica** : cpu = 0.0187927 (sec), leaf count = 18

$$\{\{y(x) \to c_1 P_v(x) + c_2 Q_v(x)\}\}$$

✓ **Maple** : cpu = 0.083 (sec), leaf count = 15

$$\{y(x) = \_C1\ LegendreP(v, x) + \_C2\ LegendreQ(v, x)\}$$

2.1241 ODE No. 1241

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

✓ **Mathematica** : cpu = 0.0170152 (sec), leaf count = 26

$$\left\{\left\{y(x) \to (x^2 - 1)\left(c_1 P_v^2(x) + c_2 Q_v^2(x)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.09 (sec), leaf count = 24

$$\{y(x) = (x-1)\,(1+x)\,(\_C2\ LegendreQ(v, 2, x) + \_C1\ LegendreP(v, 2, x))\}$$

2.1242 ODE No. 1242

$$(x^2-1)\,y''(x)-(x^2-x)\,y(x)-(3x+1)y'(x)=0$$

✓ **Mathematica** : cpu = 0.0831143 (sec), leaf count = 50

$$\left\{\left\{y(x)\to e^{-x-2}\left(c_2(x+1)^2\text{Ei}(2(x+1))+e^2\left(c_1(x+1)^2-2c_2e^{2x}\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.107 (sec), leaf count = 41

$$\left\{y(x)=\_C2\,\mathrm{e}^{-x-2}(1+x)^2\,Ei(1,-2\,x-2)+\_C1\,\mathrm{e}^{-x}(1+x)^2+2\,\mathrm{e}^{x}\_C2\right\}$$

2.1243 ODE No. 1243

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

✓ **Mathematica** : cpu = 0.032408 (sec), leaf count = 41

$$\left\{\left\{y(x)\to\frac{e^{-ix}\left(2c_1-ic_2e^{2ix}\right)}{2\left(x^2-1\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.074 (sec), leaf count = 21

$$\left\{y(x)=\frac{\_C2\,\cos(x)+\_C1\,\sin(x)}{x^2-1}\right\}$$

2.1244 ODE No. 1244

$$-(v-n)(n+v+1)y(x)+2(n+1)xy'(x)+(x^2-1)\,y''(x)=0$$

✓ **Mathematica** : cpu = 0.0319056 (sec), leaf count = 32

$$\left\{\left\{y(x)\to\left(x^2-1\right)^{-n/2}\left(c_1P_v^n(x)+c_2Q_v^n(x)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.139 (sec), leaf count = 27

$$\left\{y(x)=\left(x^2-1\right)^{-\frac{n}{2}}\left(LegendreQ(v,n,x)\_C2+LegendreP(v,n,x)\_C1\right)\right\}$$

2.1245 ODE No. 1245

$$-(-n+v+1)(n+v)y(x)-2(n-1)xy'(x)+(x^2-1)\,y''(x)=0$$

✓ **Mathematica** : cpu = 0.0224229 (sec), leaf count = 32

$$\left\{\left\{y(x)\to (x^2-1)^{n/2}\left(c_1P_v^n(x)+c_2Q_v^n(x)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.105 (sec), leaf count = 27

$$\left\{y(x)=(x^2-1)^{\frac{n}{2}}\left(\mathit{LegendreQ}(v,n,x)\,\_C2+\mathit{LegendreP}(v,n,x)\,\_C1\right)\right\}$$

2.1246 ODE No. 1246

$$-2(v-1)xy'(x)-2vy(x)+(x^2-1)\,y''(x)=0$$

✓ **Mathematica** : cpu = 0.021653 (sec), leaf count = 32

$$\left\{\left\{y(x)\to (x^2-1)^{v/2}\left(c_1P_v^v(x)+c_2Q_v^v(x)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.291 (sec), leaf count = 28

$$\left\{y(x)=(x^2-1)^{v}\left({}_2\mathrm{F}_1(\frac{1}{2},v+1;\,\frac{3}{2};\,x^2)\_C2\,x+\_C1\right)\right\}$$

2.1247 ODE No. 1247

$$2axy'(x)+(a-1)ay(x)+(x^2-1)\,y''(x)=0$$

✓ **Mathematica** : cpu = 0.237442 (sec), leaf count = 87

$$\left\{\left\{y(x)\to \frac{\sqrt{1-x^2}(x^2-1)^{-a/2}\,e^{-\sqrt{(a-1)^2}\tanh^{-1}(x)}\left(c_2e^{2\sqrt{(a-1)^2}\tanh^{-1}(x)}+2\sqrt{(a-1)^2}c_1\right)}{2\sqrt{(a-1)^2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.038 (sec), leaf count = 27

$$\left\{y(x)=\_C1\,(1+x)^{1-a}+\_C2\,(x-1)^{1-a}\right\}$$

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 = 2.25297 (sec), leaf count = 0 , DifferentialRoot result

$$\{\{y(x) \to \text{DifferentialRoot}(\{y, x\}, \{\left(bx^2 + cx + d\right)y(x) + xay'(x) + \left(x^2 - 1\right)y''(x) = 0, y(0) = c_1, y'(0)$$

✓ **Maple** : cpu = 0.574 (sec), leaf count = 134

$$\left\{y(x) = \mathrm{e}^{\sqrt{-b}x}\left(x^2 - 1\right)^{-\frac{a}{4}}\left(\left(-\frac{1}{2} + \frac{x}{2}\right)^{\frac{a}{4}} HeunC\left(4\sqrt{-b}, 1 - \frac{a}{2}, \frac{a}{2} - 1, 2c, d - c - \frac{a^2}{8} + b + \frac{1}{2}, \frac{1}{2} + \frac{x}{2}\right)\right.\right.$$

2.1249 ODE No. 1249

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

✓ **Mathematica** : cpu = 0.183564 (sec), leaf count = 190

$$\left\{\left\{y(x) \to \frac{1}{2}(x - 1)^{\frac{1}{2}(-a-b)}\left(2c_1(x - 1)^{\frac{a+b}{2}}\,{}_2F_1\left(\frac{1}{2}\left(a - \sqrt{a^2 - 2a - 4c + 1} - 1\right), \frac{1}{2}\left(a + \sqrt{a^2 - 2a - 4c +\right.\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.141 (sec), leaf count = 134

$$\left\{y(x) = \_C1\,{}_2\mathrm{F}_1\left(-\frac{1}{2} + \frac{1}{2}\sqrt{a^2 - 2a - 4c + 1} + \frac{a}{2}, -\frac{1}{2} - \frac{1}{2}\sqrt{a^2 - 2a - 4c + 1} + \frac{a}{2}; \frac{a}{2} - \frac{b}{2}; \frac{1}{2} + \frac{x}{2}\right) + \_\right.$$

2.1250 ODE No. 1250

$$\left(x^2 - a^2\right)y''(x) + 8xy'(x) + 12y(x) = 0$$

✓ **Mathematica** : cpu = 0.0541896 (sec), leaf count = 38

$$\left\{\left\{y(x) \to \frac{\frac{c_2\left(a^2 + 3x^2\right)}{(a-x)^3} + 3c_1}{3(a + x)^3}\right\}\right\}$$

✓ **Maple** : cpu = 0.034 (sec), leaf count = 41

$$\left\{y(x) = \frac{3\_C2\,a^2x + \_C2\,x^3 + \_C1\,a^2 + 3\_C1\,x^2}{(a - x)^3(x + a)^3}\right\}$$

2.1251 ODE No. 1251

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

✓ **Mathematica** : cpu = 0.0388672 (sec), leaf count = 23

$$\{\{y(x)\to c_1(x-1)+c_2((x-1)\log(x)-4)\}\}$$

✓ **Maple** : cpu = 0.05 (sec), leaf count = 20

$$\{y(x)=\_C2\,(x-1)\ln(x)-4\_C2+\_C1\,(x-1)\}$$

2.1252 ODE No. 1252

$$(ax+b)y'(x)+cy(x)+x(x+1)y''(x)=0$$

✓ **Mathematica** : cpu = 0.173287 (sec), leaf count = 131

$$\left\{\left\{y(x)\to c_2x^{1-b}\,{}_2F_1\left(\frac{1}{2}\left(a-2b-\sqrt{a^2-2a-4c+1}+1\right),\frac{1}{2}\left(a-2b+\sqrt{a^2-2a-4c+1}+1\right);2-b;\right.\right.\right.$$

✓ **Maple** : cpu = 0.124 (sec), leaf count = 124

$$\left\{y(x)=\_C1\,{}_2\mathrm{F}_1(-\frac{1}{2}+\frac{1}{2}\sqrt{a^2-2\,a-4\,c+1}+\frac{a}{2},-\frac{1}{2}-\frac{1}{2}\sqrt{a^2-2\,a-4\,c+1}+\frac{a}{2};\,a-b;\,1+x)+\_C\right.$$

2.1253 ODE No. 1253

$$x(x+1)y''(x)+(3x+2)y'(x)+y(x)=0$$

✓ **Mathematica** : cpu = 0.0283023 (sec), leaf count = 28

$$\left\{\left\{y(x)\to\frac{c_2\log(2(x+1))+2c_1}{\sqrt{2}x}\right\}\right\}$$

✓ **Maple** : cpu = 0.011 (sec), leaf count = 16

$$\left\{y(x)=\frac{\_C1\,\ln(1+x)+\_C2}{x}\right\}$$

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 = 0.100072 (sec), leaf count = 52

$$\left\{\left\{y(x)\to 39c_2e^{2x-5}(x-1)\text{Ei}(5-5x)+c_1\left(-e^{2x}\right)(x-1)+\frac{1}{5}c_2e^{-3x}(x+44)\right\}\right\}$$

✓ **Maple** : cpu = 0.1 (sec), leaf count = 42

$$\left\{y(x)=-195\_C2\,e^{2x-5}(x-1)\,Ei(1,5x-5)+\_C2\,(x+44)\,e^{-3x}+\_C1\,e^{2x}(x-1)\right\}$$

2.1255 ODE No. 1255

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

✓ **Mathematica** : cpu = 0.224513 (sec), leaf count = 87

$$\left\{\left\{y(x)\to\frac{\left(a^2+a(2x-1)+2(x-1)x\right)\left(\frac{c_2x^{a+1}(1-x)^{1-a}}{(a-1)a(a+1)\left(a^2+a(2x-1)+2(x-1)x\right)}+c_1\right)}{a^2+3a+4}\right\}\right\}$$

✓ **Maple** : cpu = 0.03 (sec), leaf count = 42

$$\left\{y(x)=\_C1\,\left(a^2+a(2x-1)+2x^2-2x\right)+\frac{\_C2\,x^ax(x-1)}{(x-1)^a}\right\}$$

2.1256 ODE No. 1256

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

✓ **Mathematica** : cpu = 0.0242148 (sec), leaf count = 26

$$\{\{y(x)\to c_1P_v(2x-1)+c_2Q_v(2x-1)\}\}$$

✓ **Maple** : cpu = 0.265 (sec), leaf count = 51

$$\left\{y(x)=\_C1\,{}_2\text{F}_1(-v,-v;\,-2v;\,x^{-1})x^v+\_C2\,{}_2\text{F}_1(v+1,v+1;\,2v+2;\,x^{-1})x^{-v-1}\right\}$$

2.1257 ODE No. 1257

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

✓ **Mathematica** : cpu = 0.051687 (sec), leaf count = 33

$$\left\{\left\{y(x)\to \frac{c_1x^{b+1}\,{}_2F_1(b+1,a+b+1;b+2;x)}{b+1}+c_2\right\}\right\}$$

✓ **Maple** : cpu = 0.349 (sec), leaf count = 27

$$\left\{y(x)=\_C1+{}_2\mathrm{F}_1(b+1,a+b+1;\,b+2;\,x)x^{b+1}\_C2\right\}$$

2.1258 ODE No. 1258

$$(ax+b)y'(x)+cy(x)+(x-1)xy''(x)=0$$

✓ **Mathematica** : cpu = 0.173455 (sec), leaf count = 130

$$\left\{\left\{y(x)\to (-1)^{b+1}c_2x^{b+1}\,{}_2F_1\left(\frac{1}{2}\left(a+2b-\sqrt{a^2-2a-4c+1}+1\right),\frac{1}{2}\left(a+2b+\sqrt{a^2-2a-4c+1}+1\right)\right.\right.$$

✓ **Maple** : cpu = 0.119 (sec), leaf count = 110

$$\left\{y(x)=\_C1\,{}_2\mathrm{F}_1(-\frac{1}{2}+\frac{1}{2}\sqrt{a^2-2\,a-4\,c+1}+\frac{a}{2},-\frac{1}{2}-\frac{1}{2}\sqrt{a^2-2\,a-4\,c+1}+\frac{a}{2};\,-b;\,x)+\_C2\,x^{b+1}\right.$$

2.1259 ODE No. 1259

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

✓ **Mathematica** : cpu = 0.150648 (sec), leaf count = 112

$$\left\{\left\{y(x)\to (-1)^{b+1}c_2x^{b+1}\,{}_2F_1\left(\frac{1}{2}\left(a+2b-\sqrt{a^2+4l}+2\right),\frac{1}{2}\left(a+2b+\sqrt{a^2+4l}+2\right);b+2;x\right)+c_1\,{}_2F_1\right.\right.$$

✓ **Maple** : cpu = 0.125 (sec), leaf count = 92

$$\left\{y(x)=\_C1\,{}_2\mathrm{F}_1(\frac{a}{2}-\frac{1}{2}\sqrt{a^2+4\,l},\frac{a}{2}+\frac{1}{2}\sqrt{a^2+4\,l};\,-b;\,x)+\_C2\,x^{b+1}{}_2\mathrm{F}_1(\frac{a}{2}-\frac{1}{2}\sqrt{a^2+4\,l}+b+1,\frac{a}{2}+\right.$$

2.1260 ODE No. 1260

$$y'(x)(x(\mathrm{a1}+\mathrm{b1}+1)-\mathrm{d1})+\mathrm{a1b1d1}+(x-1)xy''(x)=0$$

✓ **Mathematica** : cpu = 0.188233 (sec), leaf count = 65

$$\left\{\left\{y(x)\to \mathrm{a1b1}x\Gamma(\mathrm{d1}+1)\,{}_3\tilde{F}_2(1,\mathrm{a1}+\mathrm{b1}+1,1;\mathrm{d1}+1,2;x)-\frac{c_1x^{1-\mathrm{d1}}\,{}_2F_1(1-\mathrm{d1},\mathrm{a1}+\mathrm{b1}-\mathrm{d1}+1;2-}{\mathrm{d1}-1}\right.\right.$$

✓ **Maple** : cpu = 0.905 (sec), leaf count = 76

$$\left\{y(x)=\int\left(-b1\,(signum(x-1))^{a1+b1-d1}\,(-signum(x-1))^{-a1-b1+d1}\,a1\,{}_2\mathrm{F}_1(d1,-a1-b1+d1;1+\right.\right.$$

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 = 2.55256 (sec), leaf count = 0 , DifferentialRoot result

$$\{\{y(x)\to \mathrm{DifferentialRoot}\left(\{y,x\},\{(-2xl-2xnl+2xpl+2pl+m)y(x)+2\left(-lx^2-2lx+nx+x+n\right.\right.\right.$$

✓ **Maple** : cpu = 0.458 (sec), leaf count = 105

$$\left\{y(x)=(x+2)^{-\frac{n}{2}-\frac{1}{2}}\left(-\frac{x}{2}-1\right)^{\frac{n}{2}+\frac{1}{2}}\left(HeunC\left(4\,l,-n,n,-4\,pl,\frac{(4\,n+4\,p+4)\,l}{2}-\frac{n^2}{2}+m-n,-\frac{x}{2}\right)x^{-}\right.\right.$$

2.1262 ODE No. 1262

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

✓ **Mathematica** : cpu = 49.6316 (sec), leaf count = 45

$$\left\{\left\{y(x)\to e^{-x}\left(c_2\int_1^x e^{\frac{K[1]^2+K[1]-1}{K[1]+1}}(K[1]+1)\,dK[1]+c_1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.493 (sec), leaf count = 53

$$\left\{y(x)=(1+x)\left(\_C1\,\mathrm{e}^{-x}HeunD\left(4,4,-8,12,\frac{x}{x+2}\right)+\_C2\,HeunD\left(-4,4,-8,12,\frac{x}{x+2}\right)\mathrm{e}^{\frac{x-1}{2+2\,x}}\right)\right\}$$

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 = 299.997 (sec), leaf count = 0 , timed out

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✓ **Maple** : cpu = 0.134 (sec), leaf count = 52

$$\left\{y(x)=1\left(\_C2+\int \frac{1}{x^2+3\,x}\left(\_C1+3\left(x^2+3\,x\right)^{7/3}x(x+3)\right)(x+3)^{\frac{7}{3}}x^{-\frac{4}{3}}\,\mathrm{d}x\right)x^{\frac{4}{3}}(x+3)^{-\frac{7}{3}}\right\}$$

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 = 0.0776137 (sec), leaf count = 23

$$\left\{\left\{y(x)\to c_2\left(x^2+x+3\right)+c_1e^{-x}\right\}\right\}$$

✓ **Maple** : cpu = 0.074 (sec), leaf count = 19

$$\left\{y(x)=\_C1\,\mathrm{e}^{-x}+\_C2\,\left(x^2+x+3\right)\right\}$$

2.1265 ODE No. 1265

$$(x-2)(x-1)y''(x)-(2x-3)y'(x)+y(x)=0$$

✓ **Mathematica** : cpu = 0.0464943 (sec), leaf count = 57

$$\left\{\left\{y(x)\to\left(x^2-3x+2\right)\left(c_1P_{\frac{1}{2}\left(-1+\sqrt{5}\right)}^2(2x-3)+c_2Q_{\frac{1}{2}\left(-1+\sqrt{5}\right)}^2(2x-3)\right)\right\}\right\}$$

✓ **Maple** : cpu = 9.507 (sec), leaf count = 93

$$\left\{y(x)=(x-2)^2\left(\_C1\,{}_2\mathrm{F}_1(\frac{1}{2}-\frac{\sqrt{5}}{2},\frac{5}{2}-\frac{\sqrt{5}}{2};-\sqrt{5}+1;\,(x-1)^{-1})(x-1)^{\frac{\sqrt{5}}{2}-\frac{1}{2}}+\_C2\,{}_2\mathrm{F}_1(\frac{1}{2}+\frac{\sqrt{5}}{2},\frac{5}{2}\right.\right.$$

2.1266 ODE No. 1266

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

✓ **Mathematica** : cpu = 0.0285672 (sec), leaf count = 22

$$\left\{\left\{y(x)\to c_1(x-2)^3+\frac{c_2}{x-2}\right\}\right\}$$

✓ **Maple** : cpu = 0.015 (sec), leaf count = 19

$$\left\{y(x)=\frac{\_C1\,(x-2)^4+\_C2}{x-2}\right\}$$

2.1267 ODE No. 1267

$$-\left(l+2x^2-5x\right)y'(x)+2x^2y''(x)-(4x-1)y(x)=0$$

✓ **Mathematica** : cpu = 0.440983 (sec), leaf count = 154

$$\left\{\left\{y(x)\to\frac{e^{x-\frac{l}{2x}}\left(\frac{\sqrt{2\pi}c_2e^{-\sqrt{2}\sqrt{-l}}l\left(e^{2\sqrt{2}\sqrt{-l}}\operatorname{erf}\left(\frac{\sqrt{-l}}{\sqrt{2}\sqrt{x}}+\sqrt{x}\right)+\operatorname{erf}\left(\frac{\sqrt{2}\sqrt{-l}-2x}{2\sqrt{x}}\right)-e^{2\sqrt{2}\sqrt{-l}}+1\right)}{(-l)^{3/2}}+2c_1\right)}{2\sqrt{x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.176 (sec), leaf count = 41

$$\left\{y(x)=\mathrm{e}^{x}\left(\_C1\int\frac{1}{2\,\mathrm{e}^{x}}\mathrm{e}^{\frac{l}{2\,x}}x^{-\frac{3}{2}}\,\mathrm{d}x+\_C2\right)\frac{1}{\sqrt{x}}\left(\mathrm{e}^{\frac{l}{2\,x}}\right)^{-1}\right\}$$

2.1268 ODE No. 1268

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

✗ **Mathematica** : cpu = 1.6191 (sec), leaf count = 0 , DifferentialRoot result

$$\{\{y(x)\to \text{DifferentialRoot}(\{y,x\},\{(xa+b)y(x)+(2x-1)y'(x)+2(x-1)xy''(x)=0,y(2)=c_1,y'(2)=$$

✓ **Maple** : cpu = 0.314 (sec), leaf count = 39

$$\left\{y(x)=\_C1\;\mathit{MathieuC}\left(-a-2\,b,\frac{a}{2},\arccos\left(\sqrt{x}\right)\right)+\_C2\;\mathit{MathieuS}\left(-a-2\,b,\frac{a}{2},\arccos\left(\sqrt{x}\right)\right)\right\}$$

2.1269 ODE No. 1269

$$((2v+5)x-2v-3)y'(x)+(v+1)y(x)+2(x-1)xy''(x)=0$$

✓ **Mathematica** : cpu = 0.0942167 (sec), leaf count = 59

$$\left\{\left\{y(x)\to c_1\,{}_2F_1\left(\frac{1}{2},v+1;v+\frac{3}{2};x\right)-ic_2i^{-2v}x^{-v-\frac{1}{2}}\,{}_2F_1\left(\frac{1}{2},-v;\frac{1}{2}-v;x\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.21 (sec), leaf count = 40

$$\left\{y(x)=\_C1\;{}_2\mathrm{F}_1(\frac{1}{2},v+1;\;\frac{3}{2}+v;\;x)+\_C2\;x^{-\frac{1}{2}-v}{}_2\mathrm{F}_1(\frac{1}{2},-v;\;\frac{1}{2}-v;\;x)\right\}$$

2.1270 ODE No. 1270

$$\left(2x^2+6x+4\right)y''(x)+\left(10x^2+21x+8\right)y'(x)+\left(12x^2+17x+8\right)y(x)=0$$

✗ **Mathematica** : cpu = 303.607 (sec), leaf count = 0 , timed out

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✓ **Maple** : cpu = 0.539 (sec), leaf count = 46

$$\left\{y(x)=\mathrm{e}^{-2x}(x+2)^4\left(\_C2\;HeunC\left(-1,\frac{5}{2},4,-\frac{7}{4},\frac{7}{2},-1-x\right)(1+x)^{\frac{5}{2}}+\_C1\;HeunC\left(-1,-\frac{5}{2},4,-\frac{7}{4},\right.\right.\right.$$

2.1271 ODE No. 1271

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

✓ **Mathematica** : cpu = 0.012 (sec), leaf count = 24

$$\left\{\left\{y(x)\to\frac{1}{2}\sqrt{x}(c_2\log(x)+2c_1)\right\}\right\}$$

✓ **Maple** : cpu = 0.013 (sec), leaf count = 14

$$\{y(x)=\sqrt{x}(\ln(x)\,\_C2+\_C1)\}$$

2.1272 ODE No. 1272

$$(4a^2x^2+1)\,y(x)+4x^2y''(x)=0$$

✓ **Mathematica** : cpu = 0.012896 (sec), leaf count = 28

$$\left\{\left\{y(x)\to\sqrt{x}(c_1J_0(ax)+c_2Y_0(ax))\right\}\right\}$$

✓ **Maple** : cpu = 0.066 (sec), leaf count = 23

$$\left\{y(x)=\sqrt{x}(Y_0(ax)\_C2+J_0(ax)\_C1)\right\}$$

2.1273 ODE No. 1273

$$4x^2y''(x)-y(x)\left(-4kx+4m^2+x^2-1\right)=0$$

✓ **Mathematica** : cpu = 0.0176465 (sec), leaf count = 20

$$\{\{y(x)\to c_1M_{k,m}(x)+c_2W_{k,m}(x)\}\}$$

✓ **Maple** : cpu = 0.141 (sec), leaf count = 17

$$\{y(x)=\_C1\,M_{k,m}(x)+\_C2\,W_{k,m}(x)\}$$

2.1274 ODE No. 1274

$$(x-v^2)\,y(x)+4x^2y''(x)+4xy'(x)=0$$

✓ **Mathematica** : cpu = 0.0439767 (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 = 0.014 (sec), leaf count = 19

$$\left\{y(x)=\_C1\,J_v\left(\sqrt{x}\right)+\_C2\,Y_v\left(\sqrt{x}\right)\right\}$$

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 = 0.0372548 (sec), leaf count = 97

$$\left\{\left\{y(x)\to e^{-x/2}x^{\frac{\sqrt{m^2-1}}{2}}\left(c_1U\left(\frac{1}{2}\left(-2l+m+\sqrt{m^2-1}\right),\sqrt{m^2-1}+1,x\right)+c_2L_{l-\frac{m}{2}-\frac{\sqrt{m^2-1}}{2}}^{\sqrt{m^2-1}}(x)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.264 (sec), leaf count = 53

$$\left\{y(x)=1\left(\_C1\,M_{l-\frac{m}{2}+\frac{1}{2},\,\frac{1}{2}\sqrt{m-1}\sqrt{m+1}}(x)+\_C2\,W_{l-\frac{m}{2}+\frac{1}{2},\,\frac{1}{2}\sqrt{m-1}\sqrt{m+1}}(x)\right)\frac{1}{\sqrt{x}}\right\}$$

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 = 0.0613003 (sec), leaf count = 55

$$\left\{\left\{y(x)\to\frac{c_1e^{-x}}{\sqrt{x}}+\frac{c_2e^x}{2\sqrt{x}}+\frac{e^x\sqrt{x^3}(2x-1)}{4x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.125 (sec), leaf count = 31

$$\left\{y(x)=\sinh(x)\_C2\frac{1}{\sqrt{x}}+\cosh(x)\_C1\frac{1}{\sqrt{x}}+\frac{e^x}{2\,x}\sqrt{x^3}\right\}$$

2.1277 ODE No. 1277

$$-\left(ax^2+1\right)y(x)+4x^2y''(x)+4xy'(x)=0$$

✓ **Mathematica** : cpu = 0.0292075 (sec), leaf count = 49

$$\left\{\left\{y(x)\to\frac{e^{-\frac{\sqrt{a}x}{2}}\left(c_2e^{\sqrt{a}x}+\sqrt{a}c_1\right)}{\sqrt{a}\sqrt{x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.114 (sec), leaf count = 27

$$\left\{y(x)=1\left(\_C2\,\cosh\left(\frac{x}{2}\sqrt{a}\right)+\_C1\,\sinh\left(\frac{x}{2}\sqrt{a}\right)\right)\frac{1}{\sqrt{x}}\right\}$$

2.1278 ODE No. 1278

$$f(x)y(x) + 4x^2y''(x) + 4xy'(x) = 0$$

✗ **Mathematica** : cpu = 0.259204 (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

$$\left\{y(x) = DESol\left(\left\{\frac{f(x)\_Y(x)}{4\,x^2} + \frac{\frac{d}{dx}\_Y(x)}{x} + \frac{d^2}{dx^2}\_Y(x)\right\}, \{\_Y(x)\}\right)\right\}$$

2.1279 ODE No. 1279

$$4x^2y''(x) + 5xy'(x) - y(x) - \log(x) = 0$$

✓ **Mathematica** : cpu = 0.208026 (sec), leaf count = 45

$$\left\{\left\{y(x) \to c_1 x^{\frac{1}{8}\left(\sqrt{17}-1\right)} + c_2 x^{-\frac{1}{8}-\frac{\sqrt{17}}{8}} - \log(x) - 1\right\}\right\}$$

✓ **Maple** : cpu = 0.544 (sec), leaf count = 32

$$\left\{y(x) = x^{-\frac{1}{8}+\frac{\sqrt{17}}{8}}\_C2 + x^{-\frac{1}{8}-\frac{\sqrt{17}}{8}}\_C1 - \ln(x) - 1\right\}$$

2.1280 ODE No. 1280

$$4x^2y''(x) - \left(4x^2 + 12x + 3\right)y(x) + 8xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.0408997 (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 = 0.087 (sec), leaf count = 40

$$\left\{y(x) = (4\,e^x Ei(1, 2\,x)\_C2\,x^2 + (-2\,x + 1)\_C2\,e^{-x} + \_C1\,x^2 e^x)x^{-\frac{3}{2}}\right\}$$

2.1281 ODE No. 1281

$$4x^2y''(x) + \left(4x^2 - 4x - 1\right)y(x) - 4(2x-1)xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.0203948 (sec), leaf count = 21

$$\left\{\left\{y(x) \to \frac{e^x(c_2x + c_1)}{\sqrt{x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.094 (sec), leaf count = 15

$$\left\{y(x) = \mathrm{e}^{x}(\_C2\,x + \_C1)\frac{1}{\sqrt{x}}\right\}$$

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 = 0.0229422 (sec), leaf count = 32

$$\left\{\left\{y(x) \to \frac{e^{-\frac{x^2}{4}}(c_2x^5 + 5c_1)}{5x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.089 (sec), leaf count = 21

$$\left\{y(x) = \frac{\_C2\,x^5 + \_C1}{x^2}\mathrm{e}^{-\frac{x^2}{4}}\right\}$$

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 = 0.110716 (sec), leaf count = 89

$$\left\{\left\{y(x) \to c_1e^{x/2}x^{-\frac{x}{2}-1} + \frac{1}{3}c_2e^{x/2}x^{2-\frac{x}{2}} - \frac{1}{9}\sqrt{e^xx^{-x}}x^2 + \frac{1}{3}\sqrt{e^xx^{-x}}x^2\log(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.185 (sec), leaf count = 48

$$\left\{y(x) = \frac{x^2}{3}\left(\ln(x) - \frac{1}{3}\right)\sqrt{x^{-x}\mathrm{e}^{x}} + \mathrm{e}^{\frac{x}{2}}\left(\_C1\,x^{-\frac{x}{2}+2} + \_C2\,x^{-\frac{x}{2}-1}\right)\right\}$$

2.1284 ODE No. 1284

$$(2x+1)^2y''(x) - 2(2x+1)y'(x) - 12y(x) - 3x - 1 = 0$$

✓ **Mathematica** : cpu = 0.044664 (sec), leaf count = 41

$$\left\{\left\{y(x) \to \frac{192c_1(2x+1)^4 + 192c_2 - 72x^2 - 56x - 7}{192(2x+1)}\right\}\right\}$$

✓ **Maple** : cpu = 0.034 (sec), leaf count = 41

$$\left\{y(x) = \frac{\_C1}{2\,x+1} + (2\,x+1)^3\,\_C2 + \frac{-72\,x^2 - 56\,x - 7}{384\,x + 192}\right\}$$

2.1285 ODE No. 1285

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

✓ **Mathematica** : cpu = 0.335652 (sec), leaf count = 119

$$\left\{\left\{y(x) \to \frac{\sqrt[4]{4x-1}\,x^{\frac{1}{2}-\frac{a}{2}}e^{-\sqrt{-(a-1)^2}\tan^{-1}\left(\sqrt{4x-1}\right)}\left(4\sqrt{-(a-1)^2}c_1e^{2\sqrt{-(a-1)^2}\tan^{-1}\left(\sqrt{4x-1}\right)} - c_2\right)}{2\sqrt{-(a-1)^2}\sqrt[4]{1-4x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.171 (sec), leaf count = 52

$$\left\{y(x) = \_C1\;{}_2\mathrm{F}_1\left(\frac{a}{2}, \frac{a}{2} - \frac{1}{2};\; a;\; 4\,x\right) + \_C2\;x^{1-a}{}_2\mathrm{F}_1\left(1 - \frac{a}{2}, -\frac{a}{2} + \frac{1}{2};\; -a+2;\; 4\,x\right)\right\}$$

2.1286 ODE No. 1286

$$(3x-1)^2y''(x) + 3(3x-1)y'(x) - 9y(x) - \log^2(3x-1) = 0$$

✓ **Mathematica** : cpu = 0.105471 (sec), leaf count = 80

$$\left\{\left\{y(x) \to \frac{-81c_1x^2 - 81ic_2x^2 + 54c_1x + 54ic_2x - 18c_1 - 12x + (2-6x)\log^2(3x-1) - 2\log(1-3x) + }{54x - 18}\right.\right.$$

✓ **Maple** : cpu = 0.031 (sec), leaf count = 32

$$\left\{y(x) = \frac{\_C1}{3\,x-1} + (3\,x-1)\,\_C2 - \frac{(\ln(3\,x-1))^2}{9} - \frac{2}{9}\right\}$$

2.1287 ODE No. 1287

$$9(x-1)xy''(x)+3(2x-1)y'(x)-20y(x)=0$$

✓ **Mathematica** : cpu = 0.0182602 (sec), leaf count = 51

$$\left\{\left\{y(x)\to c_2\sqrt[3]{-(x-1)x}Q_1^{\frac{2}{3}}(2x-1)+\frac{c_1x^{2/3}(6x-5)}{3\Gamma\left(\frac{4}{3}\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.034 (sec), leaf count = 27

$$\left\{y(x)=\_C1\,(6\,x-5)\,x^{\frac{2}{3}}+\_C2\,(6\,x-1)\,(x-1)^{\frac{2}{3}}\right\}$$

2.1288 ODE No. 1288

$$16x^2y''(x)+(4x+3)y(x)=0$$

✓ **Mathematica** : cpu = 0.0378675 (sec), leaf count = 43

$$\left\{\left\{y(x)\to e^{-i\sqrt{x}}\sqrt[4]{x}\left(c_1e^{2i\sqrt{x}}+ic_2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.038 (sec), leaf count = 21

$$\left\{y(x)=\sqrt[4]{x}\left(\cos\left(\sqrt{x}\right)\_C2+\sin\left(\sqrt{x}\right)\_C1\right)\right\}$$

2.1289 ODE No. 1289

$$16x^2y''(x)+32xy'(x)-(4x+5)y(x)=0$$

✓ **Mathematica** : cpu = 0.0851429 (sec), leaf count = 51

$$\left\{\left\{y(x)\to\frac{e^{-\sqrt{x}}\left(c_2\left(\sqrt{x}+1\right)-c_1e^{2\sqrt{x}}\left(\sqrt{x}-1\right)\right)}{x^{5/4}}\right\}\right\}$$

✓ **Maple** : cpu = 0.148 (sec), leaf count = 33

$$\left\{y(x)=1\left(\_C2\,\left(\sqrt{x}+1\right)\mathrm{e}^{-\sqrt{x}}+\_C1\,\mathrm{e}^{\sqrt{x}}\left(\sqrt{x}-1\right)\right)x^{-\frac{5}{4}}\right\}$$

2.1290 ODE No. 1290

$$\left(27x^2+4\right)y''(x)+27xy'(x)-3y(x)=0$$

✓ **Mathematica** : cpu = 0.163566 (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 = 47

$$\left\{y(x)=\_C1\ \sin\left(\frac{1}{3}\arctan\left(3\frac{\sqrt{3}x}{\sqrt{-27\,x^2-4}}\right)\right)+\_C2\ \cos\left(\frac{1}{3}\arctan\left(3\frac{\sqrt{3}x}{\sqrt{-27\,x^2-4}}\right)\right)\right\}$$

2.1291 ODE No. 1291

$$48(x-1)xy''(x)+(152x-40)y'(x)+53y(x)=0$$

✓ **Mathematica** : cpu = 0.081643 (sec), leaf count = 82

$$\left\{\left\{y(x)\to\sqrt[6]{-1}c_2\sqrt[6]{x}\,{}_2F_1\left(\frac{5}{4}-\frac{\sqrt{\frac{5}{2}}}{6},\frac{1}{12}\left(15+\sqrt{10}\right);\frac{7}{6};x\right)+c_1\,{}_2F_1\left(\frac{1}{12}\left(13-\sqrt{10}\right),\frac{1}{12}\left(13+\sqrt{10}\right);\right.\right.\right.$$

✓ **Maple** : cpu = 0.148 (sec), leaf count = 62

$$\left\{y(x)=\_C1\ {}_2\mathrm{F}_1(\frac{13}{12}-\frac{\sqrt{5}\sqrt{2}}{12},\frac{13}{12}+\frac{\sqrt{5}\sqrt{2}}{12};\ \frac{5}{6};\ x)+\_C2\ \sqrt[6]{x}{}_2\mathrm{F}_1(\frac{5}{4}-\frac{\sqrt{5}\sqrt{2}}{12},\frac{5}{4}+\frac{\sqrt{5}\sqrt{2}}{12};\ \frac{7}{6};\ x)\right\}$$

2.1292 ODE No. 1292

$$50(x-1)xy''(x)+25(2x-1)y'(x)-2y(x)=0$$

✓ **Mathematica** : cpu = 0.0401615 (sec), leaf count = 53

$$\left\{\left\{y(x)\to c_1\cosh\left(\frac{2}{5}\log\left(\sqrt{x-1}+\sqrt{x}\right)\right)+ic_2\sinh\left(\frac{2}{5}\log\left(\sqrt{x-1}+\sqrt{x}\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.155 (sec), leaf count = 31

$$\left\{y(x)=1\left(\_C1\left(\sqrt{x}+\sqrt{x-1}\right)^{\frac{4}{5}}+\_C2\right)\left(\sqrt{x}+\sqrt{x-1}\right)^{-\frac{2}{5}}\right\}$$

2.1293 ODE No. 1293

$$144(x-1)xy''(x)+(120x-48)y'(x)+y(x)=0$$

✓ **Mathematica** : cpu = 0.333703 (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 = 0.141 (sec), leaf count = 33

$$\left\{y(x)=\sqrt[3]{x}\left(LegendreQ\left(-\frac{1}{2},\frac{2}{3},\sqrt{1-x}\right)\_C2+LegendreP\left(-\frac{1}{2},\frac{2}{3},\sqrt{1-x}\right)\_C1\right)\right\}$$

2.1294 ODE No. 1294

$$144(x-1)xy''(x)+(168x-96)y'(x)+y(x)=0$$

✓ **Mathematica** : cpu = 0.106142 (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 = 0.137 (sec), leaf count = 33

$$\left\{y(x)=\sqrt[6]{x}\left(LegendreQ\left(-\frac{1}{2},\frac{1}{3},\sqrt{1-x}\right)\_C2+LegendreP\left(-\frac{1}{2},\frac{1}{3},\sqrt{1-x}\right)\_C1\right)\right\}$$

2.1295 ODE No. 1295

$$ax^2y''(x) + bxy'(x) + y(x)\left(cx^2 + dx + f\right) = 0$$

✓ **Mathematica** : cpu = 0.285405 (sec), leaf count = 229

$$\left\{\left\{y(x) \to e^{-\frac{i\sqrt{c}x}{\sqrt{a}}} x^{\frac{\sqrt{a^2-2a(b+2f)+b^2}+a-b}{2a}} \left(c_1 U\left(\frac{a + \frac{id\sqrt{a}}{\sqrt{c}} + \sqrt{a^2 - 2(b+2f)a + b^2}}{2a}, \frac{a + \sqrt{a^2 - 2(b+2f)a +}}{a}\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.422 (sec), leaf count = 106

$$\left\{y(x) = x^{-\frac{b}{2a}} \left(M_{-\frac{i}{2}d\frac{1}{\sqrt{c}}\frac{1}{\sqrt{a}}, \frac{1}{2a}\sqrt{a^2+(-2b-4f)a+b^2}}\left(2\,ix\sqrt{c}\frac{1}{\sqrt{a}}\right)\_C1 + W_{-\frac{i}{2}d\frac{1}{\sqrt{c}}\frac{1}{\sqrt{a}}, \frac{1}{2a}\sqrt{a^2+(-2b-4f)a+b^2}}\left(2\,ix\sqrt{\right.\right.\right.$$

2.1296 ODE No. 1296

$$y(x)\left(\text{a0}x^2 + \text{b0}x + \text{c0}\right) + \left(\text{a1}x^2 + \text{b1}x\right)y'(x) + \text{a2}x^2y''(x) = 0$$

✓ **Mathematica** : cpu = 0.557298 (sec), leaf count = 272

$$\left\{\left\{y(x) \to e^{-\frac{x\left(\sqrt{\text{a1}^2-4\text{a0a2}}+\text{a1}\right)}{2\text{a2}}} x^{\frac{\sqrt{\text{a2}^2-2\text{a2}(\text{b1}+2\text{c0})+\text{b1}^2}+\text{a2}-\text{b1}}{2\text{a2}}} \left(c_1 U\left(\frac{-\frac{2\text{b0a2}}{\sqrt{\text{a1}^2-4\text{a0a2}}} + \text{a2} + \frac{\text{a1b1}}{\sqrt{\text{a1}^2-4\text{a0a2}}} + \sqrt{\text{a2}^2 - 2(\text{b}}}{2\text{a2}}\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.444 (sec), leaf count = 150

$$\left\{y(x) = x^{-\frac{b1}{2\,a2}} \mathrm{e}^{-\frac{a1\,x}{2\,a2}} \left(M_{-\frac{a1\,b1-2\,a2\,b0}{2\,a2}\frac{1}{\sqrt{-4\,a0\,a2+a1^2}}, \frac{1}{2\,a2}\sqrt{a2^2+(-2\,b1-4\,c0)a2+b1^2}}\left(\frac{x}{a2}\sqrt{-4\,a0\,a2+a1^2}\right)\_C1 + W\right.\right.$$

2.1297 ODE No. 1297

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

✓ **Mathematica** : cpu = 0.0347205 (sec), leaf count = 52

$$\left\{\left\{y(x) \to c_2 \sin\left(\frac{\sqrt{b}\sinh^{-1}\left(\sqrt{a}x\right)}{\sqrt{a}}\right) + c_1 \cos\left(\frac{\sqrt{b}\sinh^{-1}\left(\sqrt{a}x\right)}{\sqrt{a}}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.04 (sec), leaf count = 63

$$\left\{y(x)=1\left(\_C1\left(\left(\sqrt{a}x+\sqrt{ax^2+1}\right)^{i\sqrt{b}\frac{1}{\sqrt{a}}}\right)^2+\_C2\right)\left(\left(\sqrt{a}x+\sqrt{ax^2+1}\right)^{i\sqrt{b}\frac{1}{\sqrt{a}}}\right)^{-1}\right\}$$

2.1298 ODE No. 1298

$$(ax^2+1)\,y''(x)+bxy'(x)+cy(x)=0$$

✓ **Mathematica** : cpu = 0.0799461 (sec), leaf count = 135

$$\left\{\left\{y(x)\to\left(ax^2+1\right)^{\frac{1}{2}-\frac{b}{4a}}\left(c_1P_{\frac{\sqrt{a^2-2(b+2c)a+b^2}-a}{2a}}^{\frac{b}{2a}-1}\left(i\sqrt{a}x\right)+c_2Q_{\frac{\sqrt{a^2-2(b+2c)a+b^2}-a}{2a}}^{\frac{b}{2a}-1}\left(i\sqrt{a}x\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.224 (sec), leaf count = 124

$$\left\{y(x)=\left(ax^2+1\right)^{\frac{2a-b}{4a}}\left(LegendreP\left(\frac{1}{2a}\left(\sqrt{a^2+(-2b-4c)a+b^2}-a\right),\frac{2a-b}{2a},\sqrt{-a}x\right)\_C1+Legen\right.$$

2.1299 ODE No. 1299

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

✓ **Mathematica** : cpu = 0.0142492 (sec), leaf count = 19

$$\left\{\left\{y(x)\to c_2-\frac{c_1\tanh^{-1}(ax)}{a}\right\}\right\}$$

✓ **Maple** : cpu = 0.025 (sec), leaf count = 27

$$\left\{y(x)=\_C1-\frac{(\ln(ax+1)-\ln(ax-1))\_C2}{2a}\right\}$$

2.1300 ODE No. 1300

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

✓ **Mathematica** : cpu = 0.0183556 (sec), leaf count = 39

$$\left\{\left\{y(x)\to ac_1x-\frac{1}{2}c_2(ax\log(1-ax)-ax\log(ax+1)+2)\right\}\right\}$$

✓ **Maple** : cpu = 0.067 (sec), leaf count = 31

$$\left\{y(x)=-\frac{\_C2\,a\ln(ax+1)\,x}{2}+\frac{\_C2\,a\ln(ax-1)\,x}{2}+\_C1\,x+\_C2\right\}$$

2.1301 ODE No. 1301

$$(ax^2+bx)\,y''(x)-2ay(x)+2by'(x)=0$$

✓ **Mathematica** : cpu = 0.0330121 (sec), leaf count = 30

$$\left\{\left\{y(x)\to\frac{\frac{c_2(ax+b)^3}{a}+3c_1}{3x}\right\}\right\}$$

✓ **Maple** : cpu = 0.035 (sec), leaf count = 19

$$\left\{y(x)=\frac{\_C1+\_C2\,(ax+b)^3}{x}\right\}$$

2.1302 ODE No. 1302

$$\mathrm{A0}y(x)(ax+b)+\mathrm{A1}(ax+b)y'(x)+\mathrm{A2}(ax+b)^2y''(x)=0$$

✓ **Mathematica** : cpu = 0.0841241 (sec), leaf count = 165

$$\left\{\left\{y(x)\to(-1)^{-\frac{\mathrm{A1}}{a\mathrm{A2}}}\left(\frac{b}{a}+x\right)^{\frac{\mathrm{A1}}{2a\mathrm{A2}}}(\mathrm{A2}(ax+b))^{-\frac{\mathrm{A1}}{2a\mathrm{A2}}}\left(-\frac{\mathrm{A0}(ax+b)}{a^2\mathrm{A2}}\right)^{\frac{1}{2}-\frac{\mathrm{A1}}{2a\mathrm{A2}}}\left(c_1(-1)^{\frac{\mathrm{A1}}{a\mathrm{A2}}}I_{\frac{\mathrm{A1}}{a\mathrm{A2}}-1}\left(2\sqrt{-\frac{\mathrm{A}}{}}\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.143 (sec), leaf count = 98

$$\left\{y(x)=(ax+b)^{-\frac{-aA2+A1}{2\,aA2}}\left(Y_{\frac{aA2-A1}{aA2}}\left(2\sqrt{A0}\sqrt{\frac{ax+b}{a^2A2}}\right)\_C2+J_{\frac{aA2-A1}{aA2}}\left(2\sqrt{A0}\sqrt{\frac{ax+b}{a^2A2}}\right)\_C1\right)\right\}$$

2.1303 ODE No. 1303

$$y''(x)\left(ax^2+bx+c\right)+(dx+f)y'(x)+gy(x)=0$$

✗ **Mathematica** : cpu = 14.5262 (sec), leaf count = 0 , DifferentialRoot result

$$\{\{y(x)\to \text{DifferentialRoot}(\{y,x\},\{gy(x)+(xd+f)y'(x)+\left(ax^2+bx+c\right)y''(x)=0,y(0)=c_1,y'(0)=$$

✓ **Maple** : cpu = 0.379 (sec), leaf count = 501

$$\left\{y(x)=\_C1\ {}_2\mathrm{F}_1\left(\frac{1}{2\,a}\left(-a+d+\sqrt{a^2+(-2\,d-4\,g)\,a+d^2}\right),-\frac{1}{2\,a}\left(a-d+\sqrt{a^2+(-2\,d-4\,g)\,a+d^2}\right)\right.\right.$$

2.1304 ODE No. 1304

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

✓ **Mathematica** : cpu = 0.0516278 (sec), leaf count = 50

$$\left\{\left\{y(x)\to\frac{c_2e^{\frac{1}{x}}\mathrm{Ei}\left(-\frac{1}{x}\right)+c_2x(2x^2-x+1)+6c_1e^{\frac{1}{x}}}{6x}\right\}\right\}$$

✓ **Maple** : cpu = 0.066 (sec), leaf count = 38

$$\left\{y(x)=\frac{1}{x}\left(Ei\left(1,x^{-1}\right)\mathrm{e}^{x^{-1}}\_C2+\_C1\ \mathrm{e}^{x^{-1}}-2\_C2\ x\left(x^2-x/2+1/2\right)\right)\right\}$$

2.1305 ODE No. 1305

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

✓ **Mathematica** : cpu = 0.0841337 (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 = 0.099 (sec), leaf count = 44

$$\left\{y(x)=\left(\_C2\ K_1\left(-x^{-1}\right)-\_C2\ K_0\left(-x^{-1}\right)+\_C1\ \left(I_0\left(x^{-1}\right)-I_1\left(x^{-1}\right)\right)\right)\mathrm{e}^{x^{-1}}\right\}$$

2.1306 ODE No. 1306

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

✗ **Mathematica** : cpu = 1.04927 (sec), leaf count = 0 , DifferentialRoot result

$$\left\{\left\{y(x)\to \text{DifferentialRoot}\left(\{y,x\},\left\{y''(x)x^3+y'(x)x^2+\left(ax^2+bx+a\right)y(x)=0,y(1)=c_1,y'(1)=c_2\right\}\right)\right.\right.$$

✓ **Maple** : cpu = 0.7 (sec), leaf count = 69

$$\left\{y(x)=HeunD\left(0,8\,a+4\,b,0,8\,a-4\,b,\frac{1+x}{x-1}\right)\left(\int\frac{1}{x}\left(HeunD\left(0,8\,a+4\,b,0,8\,a-4\,b,\frac{1+x}{x-1}\right)\right)^{-2}\mathrm{d}x\_\right.\right.$$

2.1307 ODE No. 1307

$$x^3y''(x)+(x+1)xy'(x)-2y(x)=0$$

✓ **Mathematica** : cpu = 0.108154 (sec), leaf count = 44

$$\left\{\left\{y(x)\to\frac{-c_2e^{\frac{1}{x}}(x+1)\text{Ei}\left(-\frac{1}{x}\right)+c_1e^{\frac{1}{x}}(x+1)-c_2x}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.099 (sec), leaf count = 36

$$\left\{y(x)=\frac{\_C2\,\mathrm{e}^{x^{-1}}(1+x)\,Ei(1,x^{-1})+\_C1\,(1+x)\,\mathrm{e}^{x^{-1}}-\_C2\,x}{x}\right\}$$

2.1308 ODE No. 1308

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

✓ **Mathematica** : cpu = 0.0215749 (sec), leaf count = 41

$$\left\{\left\{y(x)\to c_1x+c_2x\log(x)+\frac{2\log^3(x)+6\log^2(x)+9\log(x)+6}{8x}\right\}\right\}$$

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

$$\left\{y(x)=\frac{2\,(\ln(x))^3+6\,(\ln(x))^2+(8\_C1\,x^2+9)\ln(x)+8\_C2\,x^2+6}{8\,x}\right\}$$

2.1309 ODE No. 1309

$$x^3y''(x) - (x^2-1)\,y'(x) + xy(x) = 0$$

✓ **Mathematica** : cpu = 0.0976665 (sec), leaf count = 77

$$\left\{\left\{y(x)\to c_2 G_{1,2}^{2,0}\left(-\frac{1}{2x^2}\middle|\begin{array}{c}1\\-\frac{1}{2},-\frac{1}{2}\end{array}\right)+\frac{c_1 e^{\frac{1}{4x^2}}\left((2x^2-1)\,I_0\left(\frac{1}{4x^2}\right)+I_1\left(\frac{1}{4x^2}\right)\right)}{\sqrt{2}x}\right\}\right\}$$

✓ **Maple** : cpu = 0.199 (sec), leaf count = 85

$$\left\{y(x)=\frac{\_C1}{x}e^{\frac{1}{4\,x^2}}\left(2\,x^2I_0(1/4\,x^{-2})+I_1\left(\frac{1}{4\,x^2}\right)-I_0\left(\frac{1}{4\,x^2}\right)\right)+\frac{\_C2}{x}e^{\frac{1}{4\,x^2}}\left(2\,K_0(-1/4\,x^{-2})x^2+K_1\left(-\right.\right.\right.$$

2.1310 ODE No. 1310

$$x^3y''(x) + 3x^2y'(x) + xy(x) - 1 = 0$$

✓ **Mathematica** : cpu = 0.0122448 (sec), leaf count = 27

$$\left\{\left\{y(x)\to\frac{2c_2\log(x)+2c_1+\log^2(x)}{2x}\right\}\right\}$$

✓ **Maple** : cpu = 0.04 (sec), leaf count = 20

$$\left\{y(x)=\frac{1}{x}\left(\frac{(\ln(x))^2}{2}+\ln(x)\,\_C1+\_C2\right)\right\}$$

2.1311 ODE No. 1311

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

✓ **Mathematica** : cpu = 0.139569 (sec), leaf count = 61

$$\left\{\left\{y(x)\to c_2 G_{2,2}^{2,0}\left(-x^2\middle|\begin{array}{c}\frac{1-v}{2},\frac{v+2}{2}\\0,0\end{array}\right)+c_1\,{}_2F_1\left(-\frac{v}{2},\frac{v+1}{2};1;-x^2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.353 (sec), leaf count = 52

$$\left\{y(x)=\_C1\,{}_2\mathrm{F}_1(-\frac{v}{2},\frac{1}{2}+\frac{v}{2};\frac{1}{2};x^2+1)+\_C2\,\sqrt{x^2+1}{}_2\mathrm{F}_1(1+\frac{v}{2},\frac{1}{2}-\frac{v}{2};\frac{3}{2};x^2+1)\right\}$$

2.1312 ODE No. 1312

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

✓ **Mathematica** : cpu = 0.0240737 (sec), leaf count = 26

$$\left\{\left\{y(x)\to \frac{c_2x^3+3c_1}{3x^2+3}\right\}\right\}$$

✓ **Maple** : cpu = 0.032 (sec), leaf count = 19

$$\left\{y(x)=\frac{\_C2\,x^3+\_C1}{x^2+1}\right\}$$

2.1313 ODE No. 1313

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

✓ **Mathematica** : cpu = 0.216798 (sec), leaf count = 75

$$\left\{\left\{y(x)\to c_1\,{}_2F_1\left(\frac{n-v}{2},\frac{1}{2}(n+v+1);n+1;-x^2\right)+c_2x^{-2n}\,{}_2F_1\left(\frac{1}{2}(-n-v),\frac{1}{2}(-n+v+1);1-n;-x\right.\right.$$

✓ **Maple** : cpu = 0.237 (sec), leaf count = 35

$$\left\{y(x)=x^{-n}\left(\mathit{LegendreQ}\left(v,n,\sqrt{x^2+1}\right)\_C2+\mathit{LegendreP}\left(v,n,\sqrt{x^2+1}\right)\_C1\right)\right\}$$

2.1314 ODE No. 1314

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

✓ **Mathematica** : cpu = 0.197329 (sec), leaf count = 75

$$\left\{\left\{y(x)\to c_1\,{}_2F_1\left(\frac{1}{2}(-n-v),\frac{1}{2}(-n+v+1);1-n;-x^2\right)+c_2x^{2n}\,{}_2F_1\left(\frac{n-v}{2},\frac{1}{2}(n+v+1);n+1;-x^2\right.\right.$$

✓ **Maple** : cpu = 0.197 (sec), leaf count = 33

$$\left\{y(x)=x^{n}\left(\mathit{LegendreQ}\left(v,n,\sqrt{x^2+1}\right)\_C2+\mathit{LegendreP}\left(v,n,\sqrt{x^2+1}\right)\_C1\right)\right\}$$

2.1315 ODE No. 1315

$$ax^3y(x) + (x^2 - 1)\,xy''(x) + y'(x) = 0$$

✓ **Mathematica** : cpu = 0.0281039 (sec), leaf count = 44

$$\left\{\left\{y(x) \to c_2 \sin\left(\sqrt{a}\sqrt{x^2-1}\right) + c_1 \cos\left(\sqrt{a}\sqrt{x^2-1}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.029 (sec), leaf count = 45

$$\left\{y(x) = \_C1\ \sin\left((x-1)(1+x)\sqrt{a}\frac{1}{\sqrt{x^2-1}}\right) + \_C2\ \cos\left((x-1)(1+x)\sqrt{a}\frac{1}{\sqrt{x^2-1}}\right)\right\}$$

2.1316 ODE No. 1316

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

✓ **Mathematica** : cpu = 0.0943882 (sec), leaf count = 38

$$\left\{\left\{y(x) \to c_2 G_{2,2}^{2,0}\left(x^2 \middle| \begin{array}{c} \frac{1}{2}, \frac{3}{2} \\ 0, 0 \end{array}\right) + \frac{2c_1 E(x^2)}{\pi}\right\}\right\}$$

✓ **Maple** : cpu = 0.097 (sec), leaf count = 18

$$\{y(x) = \_C1\ \mathit{EllipticE}(x) + \_C2\ (\mathit{EllipticCE}(x) - \mathit{EllipticCK}(x))\}$$

2.1317 ODE No. 1317

$$x(x^2-1)\,y''(x) + (3x^2-1)\,y'(x) + xy(x) = 0$$

✓ **Mathematica** : cpu = 0.115716 (sec), leaf count = 38

$$\left\{\left\{y(x) \to c_2 G_{2,2}^{2,0}\left(x^2 \middle| \begin{array}{c} \frac{1}{2}, \frac{1}{2} \\ 0, 0 \end{array}\right) + \frac{2c_1 K(x^2)}{\pi}\right\}\right\}$$

✓ **Maple** : cpu = 0.108 (sec), leaf count = 13

$$\{y(x) = \_C1\ \mathit{EllipticK}(x) + \_C2\ \mathit{EllipticCK}(x)\}$$

2.1318 ODE No. 1318

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

✓ **Mathematica** : cpu = 0.302886 (sec), leaf count = 146

$$\left\{\left\{y(x) \to c_1\, {}_2F_1\left(\frac{1}{4}\left(a - \sqrt{a^2 - 2a - 4c + 1} - 1\right), \frac{1}{4}\left(a + \sqrt{a^2 - 2a - 4c + 1} - 1\right); \frac{1-b}{2}; x^2\right) + i^{b+1} c_2 x\right.\right.$$

✓ **Maple** : cpu = 0.282 (sec), leaf count = 122

$$\left\{y(x) = \_C1\, {}_2\mathrm{F}_1(-\frac{1}{4} + \frac{a}{4} + \frac{1}{4}\sqrt{a^2 - 2\,a - 4\,c + 1}, -\frac{1}{4} + \frac{a}{4} - \frac{1}{4}\sqrt{a^2 - 2\,a - 4\,c + 1}; -\frac{b}{2} + \frac{1}{2}; x^2) + \_C\right.$$

2.1319 ODE No. 1319

$$x(x^2 + 2) y''(x) - y'(x) - 6xy(x) = 0$$

✓ **Mathematica** : cpu = 0.116766 (sec), leaf count = 69

$$\left\{\left\{y(x) \to c_1 x^{3/2}(x^2 + 2)^{3/4} - \frac{1}{3} c_2\left(\sqrt[4]{2}(x^2 + 2)^{3/4} x^2\, {}_2F_1\left(\frac{1}{4}, \frac{3}{4}; \frac{5}{4}; -\frac{x^2}{2}\right) + x^2 + 1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.182 (sec), leaf count = 31

$$\left\{y(x) = (x^2 + 2)^{\frac{3}{4}}\left(x^{\frac{3}{2}}\_C1 + {}_2\mathrm{F}_1(-\frac{3}{4}, \frac{7}{4}; \frac{1}{4}; -\frac{x^2}{2})\_C2\right)\right\}$$

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 = 0.0859208 (sec), leaf count = 21

$$\{\{y(x) \to c_1 e^x x^2 + c_2(x - 1)\}\}$$

✓ **Maple** : cpu = 0.117 (sec), leaf count = 17

$$\{y(x) = \_C1\,(x - 1) + \_C2\, x^2 \mathrm{e}^x\}$$

2.1321 ODE No. 1321

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

✓ **Mathematica** : cpu = 0.027677 (sec), leaf count = 17

$$\{\{y(x) \to x(c_2(x + \log(x)) + c_1)\}\}$$

✓ **Maple** : cpu = 0.033 (sec), leaf count = 15

$$\{y(x) = x(\_C2\ \ln(x) + \_C2\ x + \_C1)\}$$

2.1322 ODE No. 1322

$$(x+1)x^2y''(x) + 2(3x+2)xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.0354174 (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 = 0.039 (sec), leaf count = 44

$$\left\{y(x) = \_C1 + \left(-4\ \ln(x) + 4\ \ln(1+x) - \frac{12\,x^3 + 6\,x^2 - 2\,x + 1}{3\,x^3\,(1+x)}\right)\_C2\right\}$$

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 = 0.740787 (sec), leaf count = 0 , DifferentialRoot result

$$\{\{y(x) \to \text{DifferentialRoot}(\{y,x\},\{(-2x-2)y(x) + (2x-4)y'(x) + (x-1)xy''(x) = 0, y(2) = c_1, y'(2)$$

✓ **Maple** : cpu = 0.028 (sec), leaf count = 17

$$\left\{y(x) = \frac{\_C1 + \_C2\,(x-1)^3}{x^2}\right\}$$

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 = 0.0298254 (sec), leaf count = 24

$$\{\{y(x) \to x^2(c_1 x - c_2(x\log(x)+1))\}\}$$

✓ **Maple** : cpu = 0.038 (sec), leaf count = 18

$$\{y(x) = x^2(\ln(x)\_C2\, x + \_C1\, x + \_C2)\}$$

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 = 0.269081 (sec), leaf count = 52

$$\{\{y(x) \to (-1)^\alpha c_1 x^\alpha\, {}_2F_1(a+\alpha,\alpha+b;\alpha-\beta+1;x) + (-1)^\beta c_2 x^\beta\, {}_2F_1(a+\beta,b+\beta;-\alpha+\beta+1;x)\}\}$$

✓ **Maple** : cpu = 0.275 (sec), leaf count = 86

$$\Big\{y(x) = (x-1)^{1-a-\alpha-b-\beta}\left(x^\beta {}_2\mathrm{F}_1(1-a-\alpha, 1-\alpha-b;\ 1-\alpha+\beta;\ x)\_C2 + x^\alpha {}_2\mathrm{F}_1(1-b-\beta, 1-a-\beta$$

2.1326 ODE No. 1326

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

✓ **Mathematica** : cpu = 0.0258502 (sec), leaf count = 26

$$\left\{\left\{y(x) \to \frac{c_1 x + c_2 x\log(x) - c_2}{x+1}\right\}\right\}$$

✓ **Maple** : cpu = 0.04 (sec), leaf count = 22

$$\left\{y(x) = \frac{\ln(x)\_C2\, x + \_C1\, x - \_C2}{1+x}\right\}$$

2.1327 ODE No. 1327

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

✓ **Mathematica** : cpu = 0.18375 (sec), leaf count = 105

$$\left\{\left\{y(x) \to \left(-\frac{1}{2}\right)^{-\frac{1}{\sqrt{2}}} x^{-\frac{1}{\sqrt{2}}} \left(\left(-\frac{1}{2}\right)^{\sqrt{2}} c_2 x^{\sqrt{2}} {}_2F_1\left(\frac{1}{\sqrt{2}}, -1+\frac{1}{\sqrt{2}}; 1+\sqrt{2}; \frac{x}{2}\right) + c_1\, {}_2F_1\left(-\frac{1}{\sqrt{2}}, -1-\frac{1}{\sqrt{2}}\right.\right.\right.\right.$$

✓ **Maple** : cpu = 1.518 (sec), leaf count = 81

$$\left\{y(x) = (x-2)^2 \left(\_C1\, {}_2\mathrm{F}_1(2-\frac{\sqrt{2}}{2}, 1-\frac{\sqrt{2}}{2}; 1-\sqrt{2}; \frac{x}{2})x^{-\frac{\sqrt{2}}{2}} + \_C2\, {}_2\mathrm{F}_1(2+\frac{\sqrt{2}}{2}, 1+\frac{\sqrt{2}}{2}; 1+\sqrt{2}; \frac{x}{2}\right.\right.$$

2.1328 ODE No. 1328

$$y''(x) = \frac{2y(x)}{(x-1)^2 x}$$

✓ **Mathematica** : cpu = 0.0223029 (sec), leaf count = 33

$$\left\{\left\{y(x) \to \frac{-c_2x^2 - c_1x + 2c_2x\log(x) + c_2}{x-1}\right\}\right\}$$

✓ **Maple** : cpu = 0.03 (sec), leaf count = 27

$$\left\{y(x) = \frac{2\ln(x)\_C2\, x - \_C2\, x^2 + \_C1\, x + \_C2}{x-1}\right\}$$

2.1329 ODE No. 1329

$$y''(x) = -\frac{y'(x)\left(-x(a(\delta+\mathrm{gamma1})+\alpha+\beta-\delta+1)+a\mathrm{gamma1}+x^2(\alpha+\beta+1)\right)}{(x-1)x(x-a)} - \frac{y(x)(\alpha\beta x-q)}{(x-1)x(x-a)}$$

✗ **Mathematica** : cpu = 6.3241 (sec), leaf count = 0 , DifferentialRoot result

$$\{\{y(x) \to \mathrm{DifferentialRoot}(\{y,x\}, \{(x\alpha\beta-q)y(x) + (\alpha x^2+\beta x^2+x^2-\alpha x-\beta x-a\delta x+\delta x-a\mathrm{gamma}$$

✓ **Maple** : cpu = 0.777 (sec), leaf count = 64

$$\{y(x) = \_C1\ HeunG(a, q, \alpha, \beta, \gamma 1, \delta, x) + \_C2\ x^{1-\gamma 1} HeunG(a, q - (-1 + \gamma 1)(\delta (a-1) + \alpha + \beta - \gamma 1 +$$

2.1330 ODE No. 1330

$$y''(x) = -\frac{y'(x)(Ax^2 + Bx + C)}{(x-a)(x-b)(x-c)} - \frac{(\mathrm{DD}x + e)y(x)}{(x-a)(x-b)(x-c)}$$

✗ **Mathematica** : cpu = 174.032 (sec), leaf count = 0 , DifferentialRoot result

$$\{\{y(x) \to \mathrm{DifferentialRoot}(\{y, x\}, \{(x\mathrm{DD} + e)y(x) + (Ax^2 + Bx + C)\, y'(x) - (a-x)(b-x)(c-x)y''($$

✓ **Maple** : cpu = 9.907 (sec), leaf count = 1147

$$\left\{y(x) = \_C1\ HeunG\left(\frac{a-c}{a-b}, \frac{DD\, a + E}{a-b}, \frac{A}{2} - \frac{1}{2} + \frac{1}{2}\sqrt{A^2 - 2A - 4DD + 1}, 1\left((A(b-c)\, a - Abc - Bc -\right.\right.\right.$$

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 = 0.0453433 (sec), leaf count = 41

$$\left\{\left\{y(x) \to \frac{\sqrt[4]{x-2}\sqrt{x}(2c_2\sqrt{x-2} + c_1)}{\sqrt[4]{2-x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.035 (sec), leaf count = 19

$$\left\{y(x) = \_C1\ \sqrt{x} + \_C2\ \sqrt{x(x-2)}\right\}$$

2.1332 ODE No. 1332

$$y''(x) = \frac{y'(x)}{x+1} - \frac{(3x+1)y(x)}{4x^2(x+1)}$$

✓ **Mathematica** : cpu = 0.0253245 (sec), leaf count = 21

$$\left\{\left\{y(x) \to \sqrt{x}(c_2(x+\log(x))+c_1)\right\}\right\}$$

✓ **Maple** : cpu = 0.032 (sec), leaf count = 17

$$\left\{y(x) = \sqrt{x}(\_C2\ \ln(x) + \_C2\ x + \_C1)\right\}$$

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 = 0.117293 (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 = 0.186 (sec), leaf count = 45

$$\left\{y(x) = \_C1\ x^{-\frac{v}{2}}{}_2\mathrm{F}_1(\frac{1}{2}, -v;\ \frac{1}{2}-v;\ x) + \_C2\ x^{\frac{1}{2}+\frac{v}{2}}{}_2\mathrm{F}_1(\frac{1}{2}, v+1;\ \frac{3}{2}+v;\ x)\right\}$$

2.1334 ODE No. 1334

$$y''(x) = -\frac{y(x)\left(x(a^2-b^2)+c^2\right)}{4(x-1)x^2} - \frac{((a+1)x-1)y'(x)}{(x-1)x}$$

✓ **Mathematica** : cpu = 0.213831 (sec), leaf count = 89

$$\left\{\left\{y(x) \to i^{-c} x^{-c/2}\left(c_1\,{}_2F_1\left(\frac{1}{2}(a-b-c), \frac{1}{2}(a+b-c); 1-c; x\right) + i^{2c} c_2 x^c\,{}_2F_1\left(\frac{1}{2}(a-b+c), \frac{1}{2}(a+b+c\right.\right.\right.$$

✓ **Maple** : cpu = 0.219 (sec), leaf count = 89

$$\left\{y(x) = (x-1)^{1-a}\left(x^{-\frac{c}{2}}{}_2\mathrm{F}_1(-\frac{a}{2}-\frac{b}{2}-\frac{c}{2}+1, -\frac{a}{2}+\frac{b}{2}-\frac{c}{2}+1;\ 1-c;\ x)\_C2 + x^{\frac{c}{2}}{}_2\mathrm{F}_1(-\frac{a}{2}-\frac{b}{2}+\frac{c}{2}+\right.\right.$$

2.1335 ODE No. 1335

$$y''(x) = -\frac{y(x)(ax+b)}{4(x-1)^2 x} - \frac{(3x-1)y'(x)}{2(x-1)x}$$

✓ **Mathematica** : cpu = 0.343651 (sec), leaf count = 510

$$\left\{\left\{y(x) \to \frac{(x-1)^{\frac{2a\sqrt{-4\sqrt{(4a-1)(a+b)}-8a-4b+1}+2b\left(\sqrt{-4\sqrt{(4a-1)(a+b)}-8a-4b+1}+2\right)-\sqrt{(4a-1)(a+b)}\sqrt{-4\sqrt{(4a-1)(a+b)}-8a-4b+1}+1}{8b+2}}\left(c_1\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.153 (sec), leaf count = 57

$$\left\{y(x) = \_C1\ LegendreP\left(\frac{1}{2}\sqrt{1-4\,a}-\frac{1}{2}, \sqrt{-a-b}, \sqrt{x}\right) + \_C2\ LegendreQ\left(\frac{1}{2}\sqrt{1-4\,a}-\frac{1}{2}, \sqrt{-a-b},\right.\right.$$

2.1336 ODE No. 1336

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

✓ **Mathematica** : cpu = 0.0570058 (sec), leaf count = 51

$$\left\{\left\{y(x) \to -\sqrt{1-2x}\left(c_1 x + 2c_2(x-1)\log(x-1) - 2c_2(x-1)\log(2x-1) - c_1 + c_2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.066 (sec), leaf count = 42

$$\left\{y(x) = \sqrt{2\,x-1}\left(-2\,\_C2\,(x-1)\ln(2\,x-1) + 2\,\_C2\,(x-1)\ln(x-1) + \_C1\,x - \_C1 + \_C2\right)\right\}$$

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 = 0.0874097 (sec), leaf count = 53

$$\left\{\left\{y(x) \to \frac{c_1\sqrt{a-b} + c_2\sqrt{b+x}}{\sqrt{a-b}\sqrt{\frac{a+x}{a-b}}}\right\}\right\}$$

✓ **Maple** : cpu = 0.059 (sec), leaf count = 27

$$\left\{y(x) = 1\left(\sqrt{x+b}\_C1 + \_C2\right)\frac{1}{\sqrt{\frac{x+a}{a-b}}}\right\}$$

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 = 0.0731394 (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 = 0.049 (sec), leaf count = 27

$$\left\{y(x) = \_C2\,(x-2)^{\frac{17}{6}}\sqrt[6]{x} + 18\left(x^2 - \frac{17\,x}{3} + \frac{187}{18}\right)x\_C1\right\}$$

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 = 0.277463 (sec), leaf count = 66

$$\left\{\left\{y(x) \to c_1 a^{-c} x^{-c} {}_2F_1(1-c, b-c; -c-d+1; -ax) + c_2 a^d x^d {}_2F_1(d+1, b+d; c+d+1; -ax)\right\}\right\}$$

✓ **Maple** : cpu = 0.268 (sec), leaf count = 76

$$\left\{y(x) = (ax+1)^{-b+c-d}\left(x^{-c}{}_2\mathrm{F}_1(-d, 1-b-d;\ 1-c-d;\ -ax)\_C2 + x^d{}_2\mathrm{F}_1(c, 1-b+c;\ 1+c+d;\ -a$$

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 = 0.0378845 (sec), leaf count = 23

$$\left\{\left\{y(x) \to \frac{x^2(c_2x+c_1)}{ax+b}\right\}\right\}$$

✓ **Maple** : cpu = 0.041 (sec), leaf count = 20

$$\left\{y(x) = \frac{x^2(\_C2\,x + \_C1)}{ax+b}\right\}$$

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 = 300. (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.326 (sec), leaf count = 201

$$\left\{y(x) = \frac{1}{a^2(v+6)(v+2)(v+12)}\left(x^{-\frac{1}{2}+\frac{1}{2}\sqrt{1-4v}}a^2\_C2\,(v+6)(v+2)(v+12)\,{}_2\mathrm{F}_1(\frac{3}{2}-\frac{1}{2}\sqrt{1-4v}, -\frac{1}{2}$$

2.1342 ODE No. 1342

$$y''(x) = -\frac{ay(x)}{x^4}$$

✓ **Mathematica** : cpu = 0.0761156 (sec), leaf count = 52

$$\left\{\left\{y(x)\to c_1 x e^{\frac{i\sqrt{a}}{x}} - \frac{i c_2 x e^{-\frac{i\sqrt{a}}{x}}}{2\sqrt{a}}\right\}\right\}$$

✓ **Maple** : cpu = 0.047 (sec), leaf count = 31

$$\left\{y(x) = x\left(\sinh\left(\frac{1}{x}\sqrt{-a}\right)\_C1 + \cosh\left(\frac{1}{x}\sqrt{-a}\right)\_C2\right)\right\}$$

2.1343 ODE No. 1343

$$y''(x) = -\frac{y(x)\left((1-a)ax^2 - b(b+x)\right)}{x^4}$$

✗ **Mathematica** : cpu = 0.71146 (sec), leaf count = 0 , DifferentialRoot result

$$\{\{y(x)\to \text{DifferentialRoot}(\{y,x\},\{y''(x)x^4 + \left(-a^2x^2 + ax^2 - bx - b^2\right)y(x) = 0, y(1) = c_1, y'(1) = c_2\})$$

✓ **Maple** : cpu = 0.22 (sec), leaf count = 58

$$\left\{y(x) = I_{a+1}\left(\frac{b}{x}\right)\_C1\, b - K_{a+1}\left(\frac{b}{x}\right)\_C2\, b + 2\left(ax + b/2\right)\left(\_C1\, I_a\left(\frac{b}{x}\right) + \_C2\, K_a\left(\frac{b}{x}\right)\right)\right\}$$

2.1344 ODE No. 1344

$$y''(x) = -\frac{\left(e^{2/x} - v^2\right)y(x)}{x^4}$$

✓ **Mathematica** : cpu = 0.60771 (sec), leaf count = 100

$$\left\{\left\{y(x)\to \frac{(-1)^{-v}2^{\frac{3v}{2}+\frac{1}{2}}\left(-e^{2/x}\right)^{-v/2}\left(e^{2/x}\right)^{v/2}\left(c_1(-1)^v I_v\left(\sqrt{-e^{2/x}}\right) + c_2 K_v\left(\sqrt{-e^{2/x}}\right)\right)}{\log\left(e^{2/x}\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.104 (sec), leaf count = 23

$$\left\{y(x) = x\left(Y_v\left(\mathrm{e}^{x^{-1}}\right)\_C2 + J_v\left(\mathrm{e}^{x^{-1}}\right)\_C1\right)\right\}$$

2.1345 ODE No. 1345

$$y''(x) = \frac{2y(x)}{x^4} - \frac{y'(x)}{x^3}$$

✓ **Mathematica** : cpu = 0.0464281 (sec), leaf count = 45

$$\left\{\left\{y(x) \to \frac{1}{2} e^{\frac{1}{2x^2}} x \left(2c_1 - \sqrt{2\pi} c_2 \operatorname{erf}\left(\frac{1}{\sqrt{2}x}\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.086 (sec), leaf count = 25

$$\left\{y(x) = x e^{\frac{1}{2x^2}} \left(\mathit{Erf}\left(\frac{\sqrt{2}}{2x}\right) \_C2 + \_C1\right)\right\}$$

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 = 0.0889671 (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 = 0.082 (sec), leaf count = 25

$$\left\{y(x) = x\left(e^{-\frac{b}{x}} \_C2 + e^{-\frac{a}{x}} \_C1\right)\right\}$$

2.1347 ODE No. 1347

$$y''(x) = -\frac{y(x)}{x^4} - \frac{y'(x)}{x}$$

✓ **Mathematica** : cpu = 0.107169 (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 = 0.061 (sec), leaf count = 19

$$\left\{y(x) = \_C1\, J_0\left(x^{-1}\right) + \_C2\, Y_0\left(x^{-1}\right)\right\}$$

2.1348 ODE No. 1348

$$y''(x) = -\frac{y(x)\left(a(x^4+1)+bx^2\right)}{x^4} - \frac{y'(x)}{x}$$

✗ **Mathematica** : cpu = 1.42682 (sec), leaf count = 0 , DifferentialRoot result

$$\{\{y(x) \to \text{DifferentialRoot}(\{y,x\}, \{y''(x)x^4 + y'(x)x^3 + (ax^4+bx^2+a)\,y(x) = 0, y(1) = c_1, y'(1) = c_2\}$$

✓ **Maple** : cpu = 0.561 (sec), leaf count = 73

$$\left\{y(x) = \mathit{HeunD}\left(0, 2\,a+b, 0, 2\,a-b, \frac{x^2+1}{x^2-1}\right)\left(\int \frac{1}{x}\left(\mathit{HeunD}\left(0, 2\,a+b, 0, 2\,a-b, \frac{x^2+1}{x^2-1}\right)\right)^{-2} \mathrm{d}x\_C2\right.$$

2.1349 ODE No. 1349

$$y''(x) = -\frac{y(x)}{x^4} - \frac{(x^2+1)\,y'(x)}{x^3}$$

✓ **Mathematica** : cpu = 0.116106 (sec), leaf count = 73

$$\left\{\left\{y(x) \to c_2 G_{1,2}^{2,0}\left(-\frac{1}{2x^2}\middle|\begin{array}{c}\frac{3}{2}\\0,0\end{array}\right) + \frac{c_1 e^{\frac{1}{4x^2}}\left((2x^2-1)\,I_0\left(\frac{1}{4x^2}\right) + I_1\left(\frac{1}{4x^2}\right)\right)}{2x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.134 (sec), leaf count = 85

$$\left\{y(x) = \frac{\_C1}{x^2}\mathrm{e}^{\frac{1}{4\,x^2}}\left(2\,x^2 I_0(1/4\,x^{-2}) + I_1\left(\frac{1}{4\,x^2}\right) - I_0\left(\frac{1}{4\,x^2}\right)\right) + \frac{\_C2}{x^2}\mathrm{e}^{\frac{1}{4\,x^2}}\left(2\,K_0(-1/4\,x^{-2})x^2 + K_1\left(-\right.\right.\right.$$

2.1350 ODE No. 1350

$$y''(x) = -\frac{a^2 y(x)}{x^4} - \frac{2y'(x)}{x}$$

✓ **Mathematica** : cpu = 0.0103857 (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 = 0.02 (sec), leaf count = 21

$$\left\{y(x) = \_C1\ \sin\left(\frac{a}{x}\right) + \_C2\ \cos\left(\frac{a}{x}\right)\right\}$$

2.1351 ODE No. 1351

$$y''(x) = \frac{y(x)}{x^4} - \frac{(2x^2+1)\,y'(x)}{x^3}$$

✓ **Mathematica** : cpu = 0.0438458 (sec), leaf count = 44

$$\left\{\left\{y(x)\to \frac{1}{2}e^{\frac{1}{2x^2}}\left(2c_1-\sqrt{2\pi}c_2\operatorname{erf}\left(\frac{1}{\sqrt{2}x}\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.051 (sec), leaf count = 24

$$\left\{y(x) = \mathrm{e}^{\frac{1}{2\,x^2}}\left(\mathit{Erf}\left(\frac{\sqrt{2}}{2\,x}\right)\_C2+\_C1\right)\right\}$$

2.1352 ODE No. 1352

$$y''(x) = -\frac{2(a+x)y'(x)}{x^2} - \frac{by(x)}{x^4}$$

✓ **Mathematica** : cpu = 0.0143855 (sec), leaf count = 51

$$\left\{\left\{y(x)\to e^{\frac{a-\sqrt{a^2-b}}{x}}\left(c_1e^{\frac{2\sqrt{a^2-b}}{x}}+c_2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.061 (sec), leaf count = 43

$$\left\{y(x) = \_C1\,\mathrm{e}^{\frac{1}{x}\left(a-\sqrt{a^2-b}\right)}+\_C2\,\mathrm{e}^{\frac{1}{x}\left(a+\sqrt{a^2-b}\right)}\right\}$$

2.1353 ODE No. 1353

$$y''(x) = \frac{(2x^2-1)\,y'(x)}{x^3} - \frac{y(x)}{x^4}$$

✓ **Mathematica** : cpu = 0.131363 (sec), leaf count = 77

$$\left\{\left\{y(x)\to \frac{-\sqrt{2\pi}c_2(x^4+2x^2-1)\operatorname{erfi}\left(\frac{1}{\sqrt{2}x}\right)+2c_2e^{\frac{1}{2x^2}}x(x^2-1)+16c_1(x^4+2x^2-1)}{16x}\right\}\right\}$$

✓ **Maple** : cpu = 0.32 (sec), leaf count = 67

$$\left\{y(x)=\frac{1}{x}\left(-\_C1\,\sqrt{2}\sqrt{\pi}\left(x^4+2\,x^2-1\right)\mathit{erfi}\left(\frac{\sqrt{2}}{2\,x}\right)+\left(2\_C1\,x^3-2\_C1\,x\right)\mathrm{e}^{\frac{1}{2\,x^2}}+\_C2\,\left(x^4+2\,x^2-\right.\right.\right.$$

2.1354 ODE No. 1354

$$y''(x)=\frac{(2x^2-1)\,y'(x)}{x^3}-\frac{2y(x)}{x^4}$$

✓ **Mathematica** : cpu = 0.0926114 (sec), leaf count = 78

$$\left\{\left\{y(x)\to\frac{5\sqrt{2\pi}c_2(1-5x^2)\,\mathrm{erfi}\left(\frac{1}{\sqrt{2}x}\right)+12c_1(5x^2-1)+10c_2e^{\frac{1}{2x^2}}x(2x^4+4x^2-1)}{60x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.404 (sec), leaf count = 33

$$\left\{y(x)=\frac{1}{x^2}\left(\_C2\;{}_1\mathrm{F}_1(-\frac{5}{2};\,-\frac{1}{2};\,\frac{1}{2\,x^2})x^5+5\_C1\,x^2-\_C1\right)\right\}$$

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 = 0.147011 (sec), leaf count = 57

$$\left\{\left\{y(x)\to-\frac{1}{2}c_2\sqrt[3]{x^3+1}x^2\,{}_2F_1\left(\frac{1}{3},\frac{2}{3};\frac{5}{3};-x^3\right)+c_1\sqrt[3]{x^3+1}+c_2x^2\right\}\right\}$$

✓ **Maple** : cpu = 0.216 (sec), leaf count = 30

$$\left\{y(x)=\sqrt[3]{x^3+1}\left({}_2\mathrm{F}_1(\frac{2}{3},\frac{4}{3};\,\frac{5}{3};\,-x^3)\_C1\,x^2+\_C2\right)\right\}$$

2.1356 ODE No. 1356

$$y''(x) = -\frac{y(x)\left(-n^2 - v(v+1)x^2\right)}{x^2\left(x^2+1\right)} - \frac{\left(2x^2+1\right)y'(x)}{x\left(x^2+1\right)}$$

✓ **Mathematica** : cpu = 0.317065 (sec), leaf count = 78

$$\left\{\left\{y(x) \to c_1 x^{-n}\,{}_2F_1\left(\frac{1}{2}(-n-v), \frac{1}{2}(-n+v+1); 1-n; -x^2\right) + c_2 x^n\,{}_2F_1\left(\frac{n-v}{2}, \frac{1}{2}(n+v+1); n+1; -\right.\right.$$

✓ **Maple** : cpu = 0.18 (sec), leaf count = 29

$$\left\{y(x) = \_C1\ \mathit{LegendreP}\left(v, n, \sqrt{x^2+1}\right) + \_C2\ \mathit{LegendreQ}\left(v, n, \sqrt{x^2+1}\right)\right\}$$

2.1357 ODE No. 1357

$$y''(x) = -\frac{\left(ax^2+a-1\right)y'(x)}{x\left(x^2+1\right)} - \frac{y(x)\left(bx^2+c\right)}{x^2\left(x^2+1\right)}$$

✓ **Mathematica** : cpu = 0.738378 (sec), leaf count = 264

$$\left\{\left\{y(x) \to x^{-\frac{1}{2}\sqrt{a^2-4a-4c+4}-\frac{a}{2}+1}\left(c_1\,{}_2F_1\left(\frac{1}{4}\left(-\sqrt{a^2-2a-4b+1} - \sqrt{a^2-4a-4c+4}+1\right), \frac{1}{4}\left(\sqrt{a^2-2a\right.\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.247 (sec), leaf count = 97

$$\left\{y(x) = x^{1-\frac{a}{2}}\left(\mathit{LegendreQ}\left(-\frac{1}{2}+\frac{1}{2}\sqrt{a^2-2\,a-4\,b+1}, \frac{1}{2}\sqrt{a^2-4\,a-4\,c+4}, \sqrt{x^2+1}\right)\_C2 + \mathit{Legendr}\right.\right.$$

2.1358 ODE No. 1358

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

✓ **Mathematica** : cpu = 0.0680011 (sec), leaf count = 71

$$\left\{\left\{y(x) \to \frac{x\sqrt[4]{x^2-1}\left(-c_2\log\left(1-\frac{x}{\sqrt{x^2-1}}\right)+c_2\log\left(\frac{x}{\sqrt{x^2-1}}+1\right)+2c_1\right)}{2\sqrt[4]{1-x^2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.068 (sec), leaf count = 20

$$\left\{y(x) = x\left(\ln\left(x+\sqrt{x^2-1}\right)\_C2 + \_C1\right)\right\}$$

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 = 0.120506 (sec), leaf count = 84

$$\left\{\left\{y(x) \to c_1 i^{-v} x^{-v} {}_2F_1\left(\frac{1}{2}-\frac{v}{2}, -\frac{v}{2}; \frac{1}{2}-v; x^2\right) + c_2 i^{v+1} x^{v+1} {}_2F_1\left(\frac{v+1}{2}, \frac{v+2}{2}; v+\frac{3}{2}; x^2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.201 (sec), leaf count = 57

$$\left\{y(x) = \_C1\ {}_2\mathrm{F}_1(-\frac{v}{2}, \frac{1}{2}-\frac{v}{2};\ \frac{1}{2}-v;\ x^2)x^{-v} + \_C2\ {}_2\mathrm{F}_1(1+\frac{v}{2}, \frac{1}{2}+\frac{v}{2};\ \frac{3}{2}+v;\ x^2)x^{v+1}\right\}$$

2.1360 ODE No. 1360

$$y''(x) = \frac{v(v+1)y(x)}{x^2} - \frac{2xy'(x)}{x^2-1}$$

✓ **Mathematica** : cpu = 0.100684 (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 = 0.188 (sec), leaf count = 47

$$\left\{y(x) = \_C1\ {}_2\mathrm{F}_1(\frac{1}{2}, -v;\ \frac{1}{2}-v;\ x^2)x^{-v} + \_C2\ {}_2\mathrm{F}_1(\frac{1}{2}, v+1;\ \frac{3}{2}+v;\ x^2)x^{v+1}\right\}$$

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 = 0.541194 (sec), leaf count = 36

$$\{\{y(x) \to c_1 x^{-a} - c_2 x^{a+1}(2a(x^2-1) + x^2 - 3)\}\}$$

✓ **Maple** : cpu = 0.042 (sec), leaf count = 33

$$\{y(x) = \_C1\, x^{-a} + \_C2\, (2\,ax^2 + x^2 - 2\,a - 3)\, x^{a+1}\}$$

2.1362 ODE No. 1362

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

✗ **Mathematica** : cpu = 15.2803 (sec), leaf count = 0 , DifferentialRoot result

$$\{\{y(x) \to \text{DifferentialRoot}(\{y,x\},\{-2y'(x)x^3 + (a^2x^4 - n^2x^4 + ax^4 - nx^4 - a^2x^2 + 2n^2x^2 + ax^2 + 2nx$$

✓ **Maple** : cpu = 0.545 (sec), leaf count = 109

$$\left\{y(x) = \_C1\ HeunC\left(0, -n - \frac{1}{2}, -2, -\frac{a^2}{4} + \frac{n^2}{4} - \frac{a}{4} + \frac{n}{4}, -\frac{n^2}{4} - \frac{n}{4} + \frac{3}{4} + \frac{a^2}{4} - \frac{a}{4}, x^2\right) x^{-n} + \_C2\ Heu\right.$$

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 = 0.813319 (sec), leaf count = 211

$$\left\{\left\{y(x) \to (-1)^{\frac{1}{4}\left(-\sqrt{a^2-2a-4b+1}+a+7\right)} x^{\frac{1}{2}\left(-\sqrt{a^2-2a-4b+1}+a-1\right)} \left(c_1\, {}_2F_1\left(\frac{a-1}{2}, \frac{1}{2}\left(a - \sqrt{a^2-2a-4b+1} - 1\right.\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.227 (sec), leaf count = 161

$$\left\{y(x) = (x^2-1)^{-a+2}\left(x^{\frac{a}{2}-\frac{1}{2}-\frac{1}{2}\sqrt{a^2-2\,a-4\,b+1}}\,{}_2\mathrm{F}_1(-\frac{a}{2} + \frac{3}{2}, -\frac{a}{2} + \frac{3}{2} - \frac{1}{2}\sqrt{a^2-2\,a-4\,b+1};\ 1 - \frac{1}{2}\sqrt{a^2-2\right.\right.$$

2.1364 ODE No. 1364

$$y''(x) = \frac{y'(x)\left(2(a-1)x^2 - 2a + 2bc\left(x^2-1\right)x^c\right)}{x\left(x^2-1\right)} - \frac{y(x)\left(bc(2a-c-1)x^{c+2} - bc(2a-c+1)x^c + x^2((a-\right.}{x^2\left(x^2-\right.}$$

✓ **Mathematica** : cpu = 0.171844 (sec), leaf count = 29

$$\left\{\left\{y(x)\to x^a e^{bx^c}\left(c_1 P_v(x) + c_2 Q_v(x)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.148 (sec), leaf count = 25

$$\left\{y(x) = x^a \mathrm{e}^{bx^c}\left(\mathit{LegendreQ}(v,x)\_C2 + \mathit{LegendreP}(v,x)\_C1\right)\right\}$$

2.1365 ODE No. 1365

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

✓ **Mathematica** : cpu = 0.101317 (sec), leaf count = 66

$$\left\{\left\{y(x)\to \frac{1}{2}\sqrt{x^2+1}e^{-i\sqrt{a+1}\tan^{-1}(x)}\left(2c_1 e^{2i\sqrt{a+1}\tan^{-1}(x)} + \frac{ic_2}{\sqrt{a+1}}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.077 (sec), leaf count = 59

$$\left\{y(x) = \sqrt{x^2+1}\left(\left(\frac{x+i}{-x+i}\right)^{-\frac{1}{2}\sqrt{a+1}}\_C2 + \left(\frac{x+i}{-x+i}\right)^{\frac{1}{2}\sqrt{a+1}}\_C1\right)\right\}$$

2.1366 ODE No. 1366

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

✓ **Mathematica** : cpu = 0.0245546 (sec), leaf count = 22

$$\left\{\left\{y(x)\to \frac{c_2 x + c_1}{\sqrt{x^2+1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.016 (sec), leaf count = 17

$$\left\{y(x) = (\_C1\, x + \_C2)\frac{1}{\sqrt{x^2+1}}\right\}$$

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 = 2.24208 (sec), leaf count = 0 , DifferentialRoot result

$$\left\{\left\{y(x) \to \text{DifferentialRoot}\left(\{y,x\}, \left\{y''(x)\left(x^2+1\right)^2 + 2xy'(x)\left(x^2+1\right) + \left(a^2x^4 + 2a^2x^2 - n^2x^2 - nx^2 +\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.512 (sec), leaf count = 88

$$\left\{y(x) = \left(x^2+1\right)^{\frac{m}{2}}\left(HeunC\left(0, \frac{1}{2}, m, -\frac{a^2}{4}, \frac{1}{4} + \frac{a^2}{4} + \frac{m^2}{4} - \frac{n^2}{4} - \frac{n}{4}, -x^2\right)\_C2\, x + HeunC\left(0, -\frac{1}{2}, m, -\right.\right.\right.$$

2.1368 ODE No. 1368

$$y''(x) = -\frac{axy'(x)}{x^2+1} - \frac{by(x)}{(x^2+1)^2}$$

✓ **Mathematica** : cpu = 0.0277109 (sec), leaf count = 92

$$\left\{\left\{y(x) \to \left(x^2+1\right)^{\frac{1}{2}-\frac{a}{4}}\left(c_1 P_{\frac{a-2}{2}}^{\frac{1}{2}\sqrt{a^2-4a+4b+4}}(ix) + c_2 Q_{\frac{a-2}{2}}^{\frac{1}{2}\sqrt{a^2-4a+4b+4}}(ix)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.154 (sec), leaf count = 71

$$\left\{y(x) = \left(x^2+1\right)^{\frac{1}{2}-\frac{a}{4}}\left(LegendreQ\left(\frac{a}{2}-1, \frac{1}{2}\sqrt{a^2-4\,a+4\,b+4}, ix\right)\_C2 + LegendreP\left(\frac{a}{2}-1, \frac{1}{2}\sqrt{a^2-\right.\right.\right.$$

2.1369 ODE No. 1369

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

✓ **Mathematica** : cpu = 0.110455 (sec), leaf count = 67

$$\left\{\left\{y(x) \to \frac{1}{2}\sqrt{1-x^2}e^{-\sqrt{1-a}\tanh^{-1}(x)}\left(\frac{c_2 e^{2\sqrt{1-a}\tanh^{-1}(x)}}{\sqrt{1-a}} + 2c_1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.083 (sec), leaf count = 55

$$\left\{y(x)=\sqrt{x^2-1}\left(\left(\frac{x-1}{1+x}\right)^{-\frac{1}{2}\sqrt{1-a}}\_C2+\left(\frac{x-1}{1+x}\right)^{\frac{1}{2}\sqrt{1-a}}\_C1\right)\right\}$$

2.1370 ODE No. 1370

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

✓ **Mathematica** : cpu = 0.0302903 (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 = 0.019 (sec), leaf count = 19

$$\{y(x)=\_C1\ \sinh\left(aArtanh(x)\right)+\_C2\ \cosh\left(aArtanh(x)\right)\}$$

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 = 0.0219263 (sec), leaf count = 48

$$\left\{\left\{y(x)\to c_1P_{\frac{1}{2}\left(\sqrt{4\lambda+1}-1\right)}^{a}(x)+c_2Q_{\frac{1}{2}\left(\sqrt{4\lambda+1}-1\right)}^{a}(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.105 (sec), leaf count = 37

$$\left\{y(x)=\_C1\ LegendreP\left(\frac{1}{2}\sqrt{1+4\,\lambda}-\frac{1}{2},a,x\right)+\_C2\ LegendreQ\left(\frac{1}{2}\sqrt{1+4\,\lambda}-\frac{1}{2},a,x\right)\right\}$$

2.1372 ODE No. 1372

$$y''(x) = -\frac{y(x)\left((x^2-1)\left(ax^2+bx+c\right)-k^2\right)}{(x^2-1)^2} - \frac{2xy'(x)}{x^2-1}$$

✗ **Mathematica** : cpu = 4.41111 (sec), leaf count = 0 , DifferentialRoot result

$$\left\{\left\{y(x) \to \text{DifferentialRoot}\left(\{y,x\},\left\{\left(ax^4+bx^3-ax^2+cx^2-bx-k^2-c\right)y(x)+\left(2x^3-2x\right)y'(x)+(x\right.\right.\right.$$

✓ **Maple** : cpu = 0.572 (sec), leaf count = 110

$$\left\{y(x) = e^{\sqrt{-a}x}\left(\sqrt{2x-2}(1+x)^{-\frac{k}{2}}(x-1)^{\frac{k}{2}-\frac{1}{2}}\mathit{HeunC}\left(4\sqrt{-a},-k,k,2b,\frac{k^2}{2}+a-b+c,\frac{1}{2}+\frac{x}{2}\right)\_C2\right.\right.$$

2.1373 ODE No. 1373

$$y''(x) = -\frac{y(x)\left(-a^2(x^2-1)^2-m^2-n(n+1)\left(x^2-1\right)\right)}{(x^2-1)^2} - \frac{2xy'(x)}{x^2-1}$$

✗ **Mathematica** : cpu = 2.3136 (sec), leaf count = 0 , DifferentialRoot result

$$\left\{\left\{y(x) \to \text{DifferentialRoot}\left(\{y,x\},\left\{\left(-a^2x^4+2a^2x^2-n^2x^2-nx^2-a^2-m^2+n^2+n\right)y(x)+\left(2x^3-2\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.517 (sec), leaf count = 84

$$\left\{y(x) = \left(x^2-1\right)^{\frac{m}{2}}\left(\mathit{HeunC}\left(0,\frac{1}{2},m,-\frac{a^2}{4},\frac{1}{4}+\frac{a^2}{4}+\frac{m^2}{4}-\frac{n^2}{4}-\frac{n}{4},x^2\right)\_C2\,x+\mathit{HeunC}\left(0,-\frac{1}{2},m,-\right.\right.\right.$$

2.1374 ODE No. 1374

$$y''(x) = \frac{2(2a-1)xy'(x)}{x^2-1} - \frac{y(x)\left(x^2(2a(2a-1)-v(v+1))+2a+v(v+1)\right)}{(x^2-1)^2}$$

✓ **Mathematica** : cpu = 0.0370497 (sec), leaf count = 26

$$\left\{\left\{y(x) \to \left(x^2-1\right)^a\left(c_1P_v(x)+c_2Q_v(x)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.104 (sec), leaf count = 23

$$\left\{y(x) = \left(x^2-1\right)^a\left(\mathit{LegendreQ}(v,x)\_C2+\mathit{LegendreP}(v,x)\_C1\right)\right\}$$

2.1375 ODE No. 1375

$$y''(x) = -\frac{y(x)\left(4ax^2(a-n) - (x^2-1)\left(2a+(v-n)(n+v+1)\right)\right)}{(x^2-1)^2} - \frac{2x(-2a+n+1)y'(x)}{x^2-1}$$

✓ **Mathematica** : cpu = 0.0499386 (sec), leaf count = 34

$$\left\{\left\{y(x) \to (x^2-1)^{a-\frac{n}{2}}\left(c_1 P_v^n(x) + c_2 Q_v^n(x)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.121 (sec), leaf count = 29

$$\left\{y(x) = (x^2-1)^{a-\frac{n}{2}}\left(\mathit{LegendreQ}(v,n,x)\_C2 + \mathit{LegendreP}(v,n,x)\_C1\right)\right\}$$

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 = 0.101798 (sec), leaf count = 82

$$\left\{\left\{y(x) \to c_2 \sin\left(\frac{\sqrt{b}\left(\log(x) - \log\left(\sqrt{a}\sqrt{a+x^2}+a\right)\right)}{\sqrt{a}}\right) + c_1 \cos\left(\frac{\sqrt{b}\left(\log(x) - \log\left(\sqrt{a}\sqrt{a+x^2}+a\right)\right)}{\sqrt{a}}\right.\right.$$

✓ **Maple** : cpu = 0.049 (sec), leaf count = 73

$$\left\{y(x) = 1\left(\_C2\left(\left(\frac{1}{x}\left(2\,a+2\,\sqrt{a}\sqrt{x^2+a}\right)\right)^{i\sqrt{b}\frac{1}{\sqrt{a}}}\right)^2 + \_C1\right)\left(\left(\frac{1}{x}\left(2\,a+2\,\sqrt{a}\sqrt{x^2+a}\right)\right)^{i\sqrt{b}\frac{1}{\sqrt{a}}}\right)^{-1}\right.$$

2.1377 ODE No. 1377

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

✓ **Mathematica** : cpu = 0.261805 (sec), leaf count = 97

$$\left\{\left\{y(x) \to \frac{1}{2}\sqrt{a^2+x^2}\,e^{-i\sqrt{\frac{b^2}{a^2}+1}\tan^{-1}\left(\frac{x}{a}\right)}\left(2c_1 e^{2i\sqrt{\frac{b^2}{a^2}+1}\tan^{-1}\left(\frac{x}{a}\right)} + \frac{ic_2}{a\sqrt{\frac{b^2}{a^2}+1}}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.187 (sec), leaf count = 83

$$\left\{y(x)=\sqrt{a^2+x^2}\left(\left(\frac{ix-a}{ix+a}\right)^{-\frac{1}{2a}\sqrt{a^2+b^2}}\_C2+\left(\frac{ix-a}{ix+a}\right)^{\frac{1}{2a}\sqrt{a^2+b^2}}\_C1\right)\right\}$$

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 = 0.0573155 (sec), leaf count = 56

$$\left\{\left\{y(x)\to-\frac{x(c_1x^2-c_1x-2c_2x-2c_2(x-1)x\log(1-x)+2c_2(x-1)x\log(x)+c_2)}{(x-1)^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.06 (sec), leaf count = 48

$$\left\{y(x)=\frac{x}{(x-1)^2}\left(-\_C2\,x(x-1)\ln(x-1)+\_C2\,x(x-1)\ln(x)+\_C1\,x^2+(-\_C1-\_C2)\,x+\right.$$

2.1379 ODE No. 1379

$$y''(x)=\frac{12y(x)}{(x+1)^2\,(x^2+2x+3)}$$

✓ **Mathematica** : cpu = 0.0904419 (sec), leaf count = 71

$$\left\{\left\{y(x)\to\frac{2c_1(x^2+2x+3)-3\sqrt{2}c_2(x^2+2x+3)\tan^{-1}\left(\frac{x+1}{\sqrt{2}}\right)+2c_2(x^3+2x^2+4x+1)}{2(x+1)^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.083 (sec), leaf count = 60

$$\left\{y(x)=\frac{1}{(1+x)^2}\left(3\_C2\,(x^2+2\,x+3)\arctan\left(1/2\,(1+x)\sqrt{2}\right)-\_C2\,(x^3+2\,x^2+4\,x+1)\sqrt{2}+\_C\right.$$

2.1380 ODE No. 1380

$$y''(x) = -\frac{by(x)}{x^2(x-a)^2}$$

✓ **Mathematica** : cpu = 0.32225 (sec), leaf count = 121

$$\left\{\left\{y(x)\to\frac{x^{\frac{1}{2}-\frac{1}{2}\sqrt{1-\frac{4b}{a^2}}}(x-a)^{\frac{1}{2}-\frac{1}{2}\sqrt{1-\frac{4b}{a^2}}}\left(ac_1\sqrt{1-\frac{4b}{a^2}}x^{\sqrt{1-\frac{4b}{a^2}}}+c_2(x-a)^{\sqrt{1-\frac{4b}{a^2}}}\right)}{a\sqrt{1-\frac{4b}{a^2}}}\right\}\right\}$$

✓ **Maple** : cpu = 0.116 (sec), leaf count = 67

$$\left\{y(x)=\sqrt{x(a-x)}\left(\left(\frac{x}{a-x}\right)^{\frac{1}{2a}\sqrt{a^2-4b}}\_C2+\left(\frac{a-x}{x}\right)^{\frac{1}{2a}\sqrt{a^2-4b}}\_C1\right)\right\}$$

2.1381 ODE No. 1381

$$y''(x) = c-\frac{by(x)}{x^2(x-a)^2}$$

✓ **Mathematica** : cpu = 0.779387 (sec), leaf count = 371

$$\left\{\left\{y(x)\to\frac{acx^2(a-x)\left(1-\frac{x}{a}\right)^{-\frac{1}{2}\sqrt{1-\frac{4b}{a^2}}-\frac{1}{2}}\left(\left(\sqrt{1-\frac{4b}{a^2}}-3\right)\left(1-\frac{x}{a}\right)^{\sqrt{1-\frac{4b}{a^2}}}{}_2F_1\left(\frac{1}{2}\sqrt{1-\frac{4b}{a^2}}-\frac{1}{2},\frac{1}{2}\sqrt{1-\right.\right.\right.}{2\left(2a^2\right.}\right.\right.$$

✓ **Maple** : cpu = 0.299 (sec), leaf count = 175

$$\left\{y(x)=1\sqrt{x(a-x)}\left(\left(\_C2\sqrt{a^2-4b}-\int\sqrt{x(a-x)}\left(\frac{a-x}{x}\right)^{-\frac{1}{2a}\sqrt{a^2-4b}}dxc\right)\left(\frac{a-x}{x}\right)^{\frac{1}{2a}\sqrt{a^2-4b}}+\right.\right.$$

2.1382 ODE No. 1382

$$y''(x) = \frac{cy(x)}{(x-a)^2(x-b)^2}$$

✓ **Mathematica** : cpu = 0.757229 (sec), leaf count = 141

$$\left\{\left\{y(x)\to (x-a)^{\frac{1}{2}\left(1-\sqrt{\frac{4c}{(a-b)^2}+1}\right)}(x-b)^{\frac{1}{2}\left(1-\sqrt{\frac{4c}{(a-b)^2}+1}\right)}\left(c_1(x-a)^{\sqrt{\frac{4c}{(a-b)^2}+1}}-\frac{c_2(x-b)^{\sqrt{\frac{4c}{(a-b)^2}+1}}}{(a-b)\sqrt{\frac{4c}{(a-b)^2}+1}}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.179 (sec), leaf count = 104

$$\left\{y(x)=\sqrt{(a-x)(b-x)}\left(\left(\frac{a-x}{b-x}\right)^{\frac{1}{2a-2b}\sqrt{a^2-2ab+b^2+4c}}\_C1+\left(\frac{a-x}{b-x}\right)^{-\frac{1}{2a-2b}\sqrt{a^2-2ab+b^2+4c}}\_C2\right)\right\}$$

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 = 0.144098 (sec), leaf count = 44

$$\left\{\left\{y(x)\to c_1(x-a)^{\alpha}(x-b)^{-\alpha}+c_2(x-a)^{\beta}(x-b)^{-\beta}\right\}\right\}$$

✓ **Maple** : cpu = 0.071 (sec), leaf count = 39

$$\left\{y(x)=\_C1\left(\frac{a-x}{b-x}\right)^{\beta}+\_C2\left(\frac{a-x}{b-x}\right)^{\alpha}\right\}$$

2.1384 ODE No. 1384

$$y''(x) = -\frac{y(x)\left(-(a^2-1)x^2+2(a+3)bx-b^2\right)}{4x^2}$$

✓ **Mathematica** : cpu = 0.0342588 (sec), leaf count = 106

$$\left\{\left\{y(x)\to c_1M_{\frac{(a+3)b}{2\sqrt{a^2-1}},\frac{\sqrt{b^3+b}}{2\sqrt{b}}}\left(\sqrt{a^2-1}x\right)+c_2W_{\frac{(a+3)b}{2\sqrt{a^2-1}},\frac{\sqrt{b^3+b}}{2\sqrt{b}}}\left(\sqrt{a^2-1}x\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.332 (sec), leaf count = 73

$$\left\{y(x) = \_C1\ M_{\frac{b(a+3)}{2}\frac{1}{\sqrt{a^2-1}},\frac{1}{2}\sqrt{b^2+1}}\left(\sqrt{a^2-1}x\right) + \_C2\ W_{\frac{b(a+3)}{2}\frac{1}{\sqrt{a^2-1}},\frac{1}{2}\sqrt{b^2+1}}\left(\sqrt{a^2-1}x\right)\right\}$$

2.1385 ODE No. 1385

$$y''(x) = -\frac{(ax^2+a-3)\,y(x)}{4\,(x^2+1)^2}$$

✓ **Mathematica** : cpu = 0.0202838 (sec), leaf count = 70

$$\left\{\left\{y(x) \to \sqrt{x^2+1}\left(c_1 P_{\frac{1}{2}\left(\sqrt{1-a}-1\right)}^{\frac{1}{2}}(ix) + c_2 Q_{\frac{1}{2}\left(\sqrt{1-a}-1\right)}^{\frac{1}{2}}(ix)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.103 (sec), leaf count = 55

$$\left\{y(x) = \sqrt[4]{x^2+1}\left(\left(x+\sqrt{x^2+1}\right)^{-\frac{1}{2}\sqrt{1-a}}\_C2 + \left(x+\sqrt{x^2+1}\right)^{\frac{1}{2}\sqrt{1-a}}\_C1\right)\right\}$$

2.1386 ODE No. 1386

$$y''(x) = \frac{18y(x)}{(2x+1)^2\,(x^2+x+1)}$$

✓ **Mathematica** : cpu = 0.105172 (sec), leaf count = 68

$$\left\{\left\{y(x) \to \frac{c_1(x^2+x+1) - 12\sqrt{3}c_2(x^2+x+1)\tan^{-1}\left(\frac{2x+1}{\sqrt{3}}\right) + c_2(16x^3+24x^2+30x+11)}{(2x+1)^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.083 (sec), leaf count = 58

$$\left\{y(x) = \frac{1}{(2\,x+1)^2}\left(-36\_C2\,\left(x^2+x+1\right)\arctan\left(1/3\,(2\,x+1)\sqrt{3}\right) + 16\_C2\,\left(x^3+x^2+\frac{11\,x}{8}+3/16\right.\right.$$

2.1387 ODE No. 1387

$$y''(x) = \frac{3y(x)}{4\left(x^2+x+1\right)^2}$$

✓ **Mathematica** : cpu = 0.0395254 (sec), leaf count = 45

$$\left\{\left\{y(x)\to \frac{1}{3}\sqrt{x^2+x+1}\left(2\sqrt{3}c_2\tan^{-1}\left(\frac{2x+1}{\sqrt{3}}\right)+3c_1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.039 (sec), leaf count = 28

$$\left\{y(x) = \sqrt{x^2+x+1}\left(\arctan\left(\frac{(2\,x+1)\sqrt{3}}{3}\right)\_C2+\_C1\right)\right\}$$

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 = 0.324649 (sec), leaf count = 109

$$\left\{\left\{y(x)\to \frac{(-1)^{-v}(x-1)^{\frac{a+1}{2}}x^{-v/2}\left(c_1(-1)^v x^{v+\frac{1}{2}}\,{}_2F_1\left(\frac{1}{2}(a+v+1),\frac{1}{2}(a+v+2);v+\frac{3}{2};x\right)-ic_2\,{}_2F_1\left(\frac{a-v}{2}\right.\right.}{\sqrt{1-x}}$$

✓ **Maple** : cpu = 0.159 (sec), leaf count = 76

$$\left\{y(x) = (x-1)^{-\frac{a}{2}}\left(x^{-\frac{v}{2}}{}_2\mathrm{F}_1(-\frac{v}{2}-\frac{a}{2},\frac{1}{2}-\frac{v}{2}-\frac{a}{2};\frac{1}{2}-v;\,x)\_C1+x^{\frac{1}{2}+\frac{v}{2}}{}_2\mathrm{F}_1(1+\frac{v}{2}-\frac{a}{2},\frac{1}{2}+\frac{v}{2}-\frac{a}{2};\frac{3}{2}+\right.\right.$$

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 = 0.406542 (sec), leaf count = 91

$$\left\{\left\{y(x)\to \frac{(-1)^{-v}(x-1)^{n+\frac{1}{2}}x^{-v/2}\left(c_1(-1)^v x^{v+\frac{1}{2}}\,{}_2F_1\left(n+\frac{1}{2},n+v+1;v+\frac{3}{2};x\right)-ic_2\,{}_2F_1\left(n+\frac{1}{2},n-v;\right.\right.}{\sqrt{1-x}}$$

✓ **Maple** : cpu = 0.151 (sec), leaf count = 68

$$\left\{y(x) = (x-1)^{-n}\left(x^{-\frac{v}{2}}{}_2\mathrm{F}_1(-v-n, -n+\frac{1}{2}; \frac{1}{2}-v; x)\_C1 + x^{\frac{1}{2}+\frac{v}{2}}{}_2\mathrm{F}_1(v-n+1, -n+\frac{1}{2}; \frac{3}{2}+v; x)\_\right.\right.$$

2.1390 ODE No. 1390

$$y''(x) = -\frac{3y(x)}{16(x-1)^2x^2}$$

✓ **Mathematica** : cpu = 0.0423432 (sec), leaf count = 49

$$\left\{\left\{y(x) \to \frac{(1-x)^{3/4}\sqrt[4]{x}\left(c_1\sqrt{-(x-1)x} + 2c_2x\right)}{\sqrt{-(x-1)x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.046 (sec), leaf count = 25

$$\left\{y(x) = \_C1\ \sqrt[4]{x-1}x^{\frac{3}{4}} + \_C2\ (x-1)^{\frac{3}{4}}\ \sqrt[4]{x}\right\}$$

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 = 0.0636663 (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 = 0.033 (sec), leaf count = 20

$$\left\{y(x) = \_C1\ x^5 + 2\,\_C2\ ax^3 + \_C2\ x\right\}$$

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 = 96.1275 (sec), leaf count = 1763961

Too large to show

✓ **Maple** : cpu = 0.402 (sec), leaf count = 561

$$\left\{y(x) = \left(-\frac{1}{2}+\frac{x}{2}\right)^{\frac{1}{4a}\left(2a+\sqrt{4a^2+(-4b-4c-4d-4e)a+b^2}\right)} (x^2-1)^{-\frac{b}{4a}} \left({}_2F_1(-\frac{1}{4a}\left(-\sqrt{4a^2+(-4b-4c-4\right.\right.\right.$$

2.1393 ODE No. 1393

$$y''(x) = -\frac{y(x)(bx^2+cx+d)}{a(x-1)^2x^2}$$

✓ **Mathematica** : cpu = 22.3544 (sec), leaf count = 413606

Too large to show

✓ **Maple** : cpu = 0.281 (sec), leaf count = 299

$$\left\{y(x) = \_C1\,(x-1)^{\frac{1}{2}\left(\sqrt{a}-\sqrt{a-4b-4c-4d}\right)\frac{1}{\sqrt{a}}} x^{\frac{1}{2}\left(\sqrt{a-4d}+\sqrt{a}\right)\frac{1}{\sqrt{a}}} {}_2F_1(\frac{1}{2}\left(-\sqrt{a-4b-4c-4d}+\sqrt{a}+\sqrt{a-4\right.\right.$$

2.1394 ODE No. 1394

$$y''(x) = -\frac{cy(x)}{x^2(ax+b)^2} - \frac{2y'(x)}{x}$$

✓ **Mathematica** : cpu = 0.0571699 (sec), leaf count = 73

$$\left\{\left\{y(x) \to \left(c_2 e^{\frac{\sqrt{b^2-4c}(\log(x)-\log(ax+b))}{b}} + c_1\right)\exp\left(-\frac{\left(\sqrt{b^2-4c}+b\right)(\log(x)-\log(ax+b))}{2b}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.168 (sec), leaf count = 79

$$\left\{y(x)=\sqrt{\frac{ax+b}{x}}\left(\left(\frac{x}{ax+b}\right)^{-\frac{a}{2b}\sqrt{\frac{b^2-4c}{a^2}}}\_C2+\left(\frac{x}{ax+b}\right)^{\frac{a}{2b}\sqrt{\frac{b^2-4c}{a^2}}}\_C1\right)\right\}$$

2.1395 ODE No. 1395

$$y''(x)=-\frac{y(x)}{(ax+b)^4}$$

✓ **Mathematica** : cpu = 0.158422 (sec), leaf count = 49

$$\left\{\left\{y(x)\to e^{-\frac{i}{a(ax+b)}}(ax+b)\left(c_2+c_1e^{\frac{2i}{a(ax+b)}}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.102 (sec), leaf count = 39

$$\left\{y(x)=(ax+b)\left(\_C2\,\cos\left(\frac{1}{a\,(ax+b)}\right)+\_C1\,\sin\left(\frac{1}{a\,(ax+b)}\right)\right)\right\}$$

2.1396 ODE No. 1396

$$y''(x)=-\frac{Ay(x)}{(ax^2+bx+c)^2}$$

✓ **Mathematica** : cpu = 1.55402 (sec), leaf count = 199

$$\left\{\left\{y(x)\to\sqrt{x(ax+b)+c}\exp\left(-\frac{\sqrt{4ac-b^2}\sqrt{1-\frac{4A}{b^2-4ac}}\tan^{-1}\left(\frac{2ax+b}{\sqrt{4ac-b^2}}\right)}{\sqrt{b^2-4ac}}\right)\left(c_1\exp\left(\frac{2\sqrt{4ac-b^2}\sqrt{1}}{\sqrt{}}\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.232 (sec), leaf count = 178

$$\left\{y(x)=\sqrt{ax^2+bx+c}\left(\left(1\left(i\sqrt{4\,ac-b^2}-2\,ax-b\right)\left(2\,ax+b+i\sqrt{4\,ac-b^2}\right)^{-1}\right)^{\frac{a}{2}\sqrt{\frac{-4\,ac+b^2-4\,A}{a^2}}\frac{1}{\sqrt{-4\,ac+b^2}}}\right.\right.$$

2.1397 ODE No. 1397

$$y''(x) = \frac{y(x)}{x^5} - \frac{y'(x)}{x^4}$$

✓ **Mathematica** : cpu = 0.0438033 (sec), leaf count = 38

$$\left\{\left\{y(x) \to \frac{c_2 \Gamma\left(\frac{1}{3}, -\frac{1}{3x^3}\right)}{3^{2/3} \sqrt[3]{-\frac{1}{x^3}}} + c_1 x\right\}\right\}$$

✓ **Maple** : cpu = 0.152 (sec), leaf count = 29

$$\left\{y(x) = -\frac{x}{2}\left(\_C2\,\sqrt{3}\Gamma\left(\frac{2}{3}\right)\Gamma\left(\frac{1}{3}, -\frac{1}{3\,x^3}\right) - 2\_C2\,\pi - 2\_C1\right)\right\}$$

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 = 1.42224 (sec), leaf count = 0 , DifferentialRoot result

$$\{\{y(x) \to \text{DifferentialRoot}(\{y, x\}, \{x\left(x^2 - 4v^2 - 4v - 2\right) y(x) + \left(3x^4 - 4x^2 + 1\right) y'(x) + \left(x^5 - 2x^3 + x\right)$$

✓ **Maple** : cpu = 0.375 (sec), leaf count = 69

$$\left\{y(x) = \_C1\,\left(x^2-1\right)^{-v-\frac{1}{2}}\,{}_2F_1(-v, -v;\, -2\,v;\, -x^2+1) + \_C2\,\left(x^2-1\right)^{v+\frac{1}{2}}\,{}_2F_1(v+1, v+1;\, 2\,v+2;\, -$$

2.1399 ODE No. 1399

$$y''(x) = \frac{(3x+1)y'(x)}{(x-1)(x+1)} - \frac{36(x+1)^2 y(x)}{(x-1)^2(3x+5)^2}$$

✓ **Mathematica** : cpu = 0.0549246 (sec), leaf count = 51

$$\left\{\left\{y(x) \to \frac{1}{2}(1-x)^{3/2}\sqrt{3x+5}(3c_2 \log(1-x) + c_2 \log(3x+5) + 2c_1)\right\}\right\}$$

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

$$\left\{y(x) = (x-1)^{\frac{3}{2}}\,\sqrt{3\,x+5}(3\_C2\,\ln(x-1) + \_C2\,\ln(3\,x+5) + \_C1)\right\}$$

2.1400 ODE No. 1400

$$y''(x) = \frac{y'(x)}{x} - \frac{ay(x)}{x^6}$$

✓ **Mathematica** : cpu = 0.0822026 (sec), leaf count = 58

$$\left\{\left\{y(x) \to \frac{1}{2}x^2 e^{-\frac{i\sqrt{a}}{2x^2}}\left(2c_1 e^{\frac{i\sqrt{a}}{x^2}} - \frac{ic_2}{\sqrt{a}}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.084 (sec), leaf count = 35

$$\left\{y(x) = x^2\left(\cosh\left(\frac{1}{2\,x^2}\sqrt{-a}\right)\_C2 + \sinh\left(\frac{1}{2\,x^2}\sqrt{-a}\right)\_C1\right)\right\}$$

2.1401 ODE No. 1401

$$y''(x) = -\frac{(a+3x^2)\,y'(x)}{x^3} - \frac{by(x)}{x^6}$$

✓ **Mathematica** : cpu = 0.0137593 (sec), leaf count = 56

$$\left\{\left\{y(x) \to e^{\frac{a-\sqrt{a^2-4b}}{4x^2}}\left(c_1 e^{\frac{\sqrt{a^2-4b}}{2x^2}} + c_2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.09 (sec), leaf count = 45

$$\left\{y(x) = \_C1\,\mathrm{e}^{-\frac{1}{4\,x^2}\left(-a+\sqrt{a^2-4\,b}\right)} + \_C2\,\mathrm{e}^{\frac{1}{4\,x^2}\left(a+\sqrt{a^2-4\,b}\right)}\right\}$$

2.1402 ODE No. 1402

$$y''(x) = -\frac{y(x)\left(4a(a+1)x^4 - 2a(x^2-1)\,x^2 + (x^2-1)^2\,(x^2-v^2)\right)}{x^2\,(x^2-1)^2} - \frac{((1-4a)x^2-1)\,y'(x)}{x\,(x^2-1)}$$

✗ **Mathematica** : cpu = 5.38436 (sec), leaf count = 0 , DifferentialRoot result

$$\{\{y(x) \to \text{DifferentialRoot}(\{y,x\},\{(x^6+4a^2x^4-v^2x^4+2ax^4-2x^4+2v^2x^2+2ax^2+x^2-v^2)\,y(x)+$$

✓ **Maple** : cpu = 0.688 (sec), leaf count = 58

$$\left\{y(x) = (x^2-1)^a\,(x^2-1)\left(\_C1\,x^v\,HeunC\left(0,v,1,\frac{1}{4},\frac{1}{4}+\frac{a}{2},x^2\right) + \_C2\,x^{-v}\,HeunC\left(0,-v,1,\frac{1}{4},\frac{1}{4}+\frac{a}{2}\right.\right.$$

2.1403 ODE No. 1403

$$y''(x) = -y'(x)\left(\frac{-\mathrm{a1}-\mathrm{b1}+1}{x-\mathrm{c1}} + \frac{-\mathrm{a2}-\mathrm{b2}+1}{x-\mathrm{c2}} + \frac{-\mathrm{a3}-\mathrm{b3}+1}{x-\mathrm{c3}}\right) - \frac{y(x)\left(\frac{\mathrm{a1b1(c1-c2)(c1-c3)}}{x-\mathrm{c1}} + \frac{\mathrm{a2b2(c2-c1)(c}}{x-\mathrm{c2}}\right.}{(x-\mathrm{c1})(x-\mathrm{c2})(x}$$

✗ **Mathematica** : cpu = 99.6509 (sec), leaf count = 0 , DifferentialRoot result

$$\{\{y(x) \to \mathrm{DifferentialRoot}(\{y,x\},\{(\mathrm{c1}-x)^2(\mathrm{c2}-x)^2 y''(x)(\mathrm{c3}-x)^2 + (\mathrm{c1}-x)(\mathrm{c2}-x)\left(\mathrm{a1}x^2+\mathrm{a2}x^2+\right.$$

✓ **Maple** : cpu = 1.26 (sec), leaf count = 298

$$\left\{y(x) = (x-c2)^{a2}(x-c3)^{b3}\left(HeunG\left(\frac{c1-c3}{c1-c2}, \frac{((-2\,a1-a3-b2+2)\,c1+(a1+a3-1)\,c2+c3}{}\right.\right.\right.$$

2.1404 ODE No. 1404

$$y''(x) = -\frac{(1-2x^2)\,y(x)}{4x^6} - \frac{(2x^2+1)\,y'(x)}{x^3}$$

✓ **Mathematica** : cpu = 0.0247728 (sec), leaf count = 25

$$\left\{\left\{y(x) \to \frac{e^{\frac{1}{4x^2}}(c_2x+c_1)}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.076 (sec), leaf count = 19

$$\left\{y(x) = \frac{\_C1\;x+\_C2}{x}\mathrm{e}^{\frac{1}{4\,x^2}}\right\}$$

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 = 0.0787605 (sec), leaf count = 70

$$\left\{\left\{y(x) \to \frac{e^{-\frac{1}{4x^2}}x^{\frac{3}{2}-\frac{\sqrt{9-a}}{2}}\left(c_2x^{\sqrt{9-a}}+\sqrt{9-a}c_1\right)}{\sqrt{9-a}}\right\}\right\}$$

✓ **Maple** : cpu = 0.119 (sec), leaf count = 42

$$\left\{y(x)=\mathrm{e}^{-\frac{1}{4x^2}}\left(x^{\frac{3}{2}-\frac{1}{2}\sqrt{-a+9}}\_C2+x^{\frac{3}{2}+\frac{1}{2}\sqrt{-a+9}}\_C1\right)\right\}$$

2.1406 ODE No. 1406

$$y''(x)=-\frac{27xy(x)}{16\left(x^3-1\right)^2}$$

✗ **Mathematica** : cpu = 299.998 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.19 (sec), leaf count = 44

$$\left\{y(x)=\sqrt{x}\sqrt[4]{x^3-1}\left(\mathit{LegendreQ}\left(-\frac{1}{6},\frac{1}{3},\sqrt{-x^3+1}\right)\_C2+\mathit{LegendreP}\left(-\frac{1}{6},\frac{1}{3},\sqrt{-x^3+1}\right)\_C1\right)\right\}$$

2.1407 ODE No. 1407

$$y''(x)=-y'(x)\left(\frac{\mathrm{b1}(-\mathrm{al1}-\mathrm{bl1}+1)}{\mathrm{b1}x-\mathrm{a1}}+\frac{\mathrm{b2}(-\mathrm{al2}-\mathrm{bl2}+1)}{\mathrm{b2}x-\mathrm{a2}}+\frac{\mathrm{b3}(-\mathrm{al3}-\mathrm{bl3}+1)}{\mathrm{b3}x-\mathrm{a3}}\right)-\frac{y(x)\left(\frac{\mathrm{al1bl1(a1b2-a2b}}{\mathrm{b1}x-}\right.}{}$$

✗ **Mathematica** : cpu = 299.996 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 2.709 (sec), leaf count = 2597

$$\left\{y(x)=(b2\,x-a2)^{\frac{al2}{2}+\frac{bl2}{2}+\frac{1}{2}\sqrt{al2^2+6\,al2\,bl2+bl2^2}}\,(b3\,x-a3)^{\frac{1}{2}\left((al3+bl3)\sqrt{(2\,al1+2\,al2+2\,al3+2\,bl1+2\,bl2+2\,bl3-4)\sqrt{al3}}\right.}\right.$$

2.1408 ODE No. 1408

$$y''(x) = -\frac{y(x)\left(Ax^2+B\right)}{x\left(x^2-\text{a1}\right)\left(x^2-\text{a2}\right)\left(x^2-\text{a3}\right)} - \frac{y'(x)\left(x^2\left(\left(x^2-\text{a1}\right)\left(x^2-\text{a2}\right)+\left(x^2-\text{a1}\right)\left(x^2-\text{a3}\right)+\left(x^2-\text{a2}\right.\right.\right.}{x\left(x^2-\text{a1}\right)\left(x^2-\text{a2}\right)\left(x^2\right.}$$

✗ **Mathematica** : cpu = 75.4823 (sec), leaf count = 0 , DifferentialRoot result

$$\left\{\left\{y(x)\to \text{DifferentialRoot}\left(\{y,x\},\left\{\left(Ax^2+B\right)y(x)+\left(2x^6-\text{a1}x^4-\text{a2}x^4-\text{a3}x^4+\text{a1a2a3}\right)y'(x)-x(\right.\right.\right.\right.$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x) = DESol\left(\left\{\frac{d^2}{dx^2}\_Y(x) + \frac{\left(x^2\left(\left(x^2-a1\right)\left(x^2-a2\right)+\left(x^2-a2\right)\left(x^2-a3\right)+\left(x^2-a3\right)\left(x^2-a1\right)\right)\right.}{\left(x^2-a1\right)\left(x^2-a2\right)x\left(x^2-a\right.}\right.\right.\right.$$

2.1409 ODE No. 1409

$$y''(x) = -b^2x^{-2a}y(x) - \frac{ay'(x)}{x}$$

✓ **Mathematica** : cpu = 0.0265388 (sec), leaf count = 44

$$\left\{\left\{y(x)\to c_2\sin\left(\frac{bx^{1-a}}{1-a}\right)+c_1\cos\left(\frac{bx^{1-a}}{a-1}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.029 (sec), leaf count = 39

$$\left\{y(x) = \_C1\ \sin\left(\frac{x^{1-a}b}{a-1}\right)+\_C2\ \cos\left(\frac{x^{1-a}b}{a-1}\right)\right\}$$

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 = 0.145655 (sec), leaf count = 405

$$\left\{\left\{y(x)\to c_1 i^{\frac{-\sqrt{q^2+2q+4s+1}+q+1}{b}} a^{\frac{-\sqrt{q^2+2q+4s+1}+q+1}{2b}}\left(x^b\right)^{\frac{-\sqrt{q^2+2q+4s+1}+q+1}{2b}}\ {}_2F_1\left(\frac{p+q-\sqrt{p^2-2p-4r+1}-\sqrt{q\ldots}}{2b}\right.\right.\right.$$

✓ **Maple** : cpu = 0.464 (sec), leaf count = 253

$$\left\{y(x) = \_C1\ {}_2\mathrm{F}_1(\frac{1}{2\,b}\left(p+q+\sqrt{q^2+2\,q+4\,s+1}-\sqrt{p^2-2\,p-4\,r+1}\right), \frac{1}{2\,b}\left(p+q+\sqrt{q^2+2\,q+4\,s\right.\right.$$

2.1411 ODE No. 1411

$$y''(x) = \frac{y(x)}{e^x+1}$$

✓ **Mathematica** : cpu = 0.386123 (sec), leaf count = 36

$$\left\{\left\{y(x) \to e^{-x}(c_1(e^x+1)+c_2(e^x+1)\log\left(e^x+1\right)+c_2)\right\}\right\}$$

✓ **Maple** : cpu = 0.027 (sec), leaf count = 27

$$\left\{y(x) = \frac{\_C1\ (\mathrm{e}^x+1)\ln\left(\mathrm{e}^x+1\right)+\_C2\ \mathrm{e}^x+\_C1+\_C2}{\mathrm{e}^x}\right\}$$

2.1412 ODE No. 1412

$$y''(x) = \frac{y'(x)}{x\log(x)}+y(x)\log^2(x)$$

✓ **Mathematica** : cpu = 0.0169323 (sec), leaf count = 29

$$\{\{y(x) \to c_1\cosh(x(\log(x)-1))+ic_2\sinh(x(\log(x)-1))\}\}$$

✓ **Maple** : cpu = 0.013 (sec), leaf count = 23

$$\{y(x) = \_C1\ \sinh\left(\left(\ln\left(x\right)-1\right)x\right)+\_C2\ \cosh\left(\left(\ln\left(x\right)-1\right)x\right)\}$$

2.1413 ODE No. 1413

$$y''(x) = \frac{y'(x)}{x(\log(x) - 1)} - \frac{y(x)}{x^2(\log(x) - 1)}$$

✗ **Mathematica** : cpu = 0.405921 (sec), leaf count = 0 , could not solve

```
DSolve[Derivative[2][y][x] == -(y[x]/(x^2*(-1 + Log[x]))) + Derivative[1][y][x]/(x*(-
1 + Log[x])), y[x], x]
```

✓ **Maple** : cpu = 0.083 (sec), leaf count = 12

$$\{y(x) = \_C1\ x + \_C2\ \ln(x)\}$$

2.1414 ODE No. 1414

$$y''(x) = y(x)\left(-\operatorname{csch}^2(x)\right)\left(-a^2\sinh^2(x) - (n-1)n\right)$$

✓ **Mathematica** : cpu = 1.2269 (sec), leaf count = 127

$$\left\{\left\{y(x) \to \frac{(-1)^{-n}\left(-\operatorname{sech}^2(x)\right)^{a/2}\tanh^2(x)^{-\frac{n}{2}-\frac{1}{4}}\left(c_1(-1)^n\tanh^2(x)^{n+\frac{1}{2}}\,{}_2F_1\left(\frac{a+n}{2}, \frac{1}{2}(a+n+1); n+\frac{1}{2}; \tan\right.\right.}{\sqrt{\tanh(x)}}\right.\right.$$

✓ **Maple** : cpu = 0.448 (sec), leaf count = 97

$$\left\{y(x) = \_C1\ (\sinh(x))^n\,{}_2\mathrm{F}_1\left(\frac{a}{2} + \frac{n}{2}, -\frac{a}{2} + \frac{n}{2}; \frac{1}{2}; \frac{\cosh(2x)}{2} + \frac{1}{2}\right) + \_C2\ (\sinh(x))^n\,(2\cosh(2x) + 2)^{\frac{3}{4}}\,{}_2\right.$$

2.1415 ODE No. 1415

$$y''(x) = -\left(n^2 - a^2\right)y(x) - 2n\coth(x)y'(x)$$

✓ **Mathematica** : cpu = 0.924229 (sec), leaf count = 145

$$\left\{\left\{y(x) \to (-1)^{-n}\left(-\operatorname{sech}^2(x)\right)^{\frac{a+1}{2}}\tanh^{-n-\frac{1}{2}}(x)\tanh^2(x)^{-\frac{n}{2}-\frac{1}{4}}\operatorname{sech}^2(x)^{\frac{n-1}{2}}\left(c_1(-1)^n\tanh^2(x)^{n+\frac{1}{2}}\,{}_2F_1\left(\frac{a}{\ }\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.227 (sec), leaf count = 36

$$\left\{y(x) = (\sinh(x))^{-n+\frac{1}{2}}\left(\mathit{LegendreQ}\left(a - \frac{1}{2}, n - \frac{1}{2}, \cosh(x)\right)\_C2 + \mathit{LegendreP}\left(a - \frac{1}{2}, n - \frac{1}{2}, \cosh(x)\right.\right.\right.$$

2.1416 ODE No. 1416

$$y''(x) = -(v-n)(n+v+1)y(x) - (2n+1)\cot(x)y'(x)$$

✓ **Mathematica** : cpu = 0.204612 (sec), leaf count = 35

$$\left\{\left\{y(x) \to \left(-\sin^2(x)\right)^{-n/2}\left(c_1 P_v^n(\cos(x)) + c_2 Q_v^n(\cos(x))\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.352 (sec), leaf count = 26

$$\left\{y(x) = (\sin(x))^{-n}\left(\mathit{LegendreP}(v,n,\cos(x))\_C1 + \mathit{LegendreQ}(v,n,\cos(x))\_C2\right)\right\}$$

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 = 0.15895 (sec), leaf count = 45

$$\left\{\left\{y(x) \to e^{\frac{\cos(x)}{2}}\left(c_1\cos\left(\frac{1}{2}\sqrt{3}\cos(x)\right) + c_2\sin\left(\frac{1}{2}\sqrt{3}\cos(x)\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.218 (sec), leaf count = 31

$$\left\{y(x) = \mathrm{e}^{\frac{\cos(x)}{2}}\left(\cos\left(\frac{\sqrt{3}\cos(x)}{2}\right)\_C2 + \sin\left(\frac{\sqrt{3}\cos(x)}{2}\right)\_C1\right)\right\}$$

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 = 1.33343 (sec), leaf count = 0 , could not solve

```
DSolve[Derivative[2][y][x] == (Sin[x]*y[x])/(x*Cos[x] - Sin[x]) - (x*Sin[x]*Derivative
```

✓ **Maple** : cpu = 3.908 (sec), leaf count = 59

$$\left\{y(x) = \sin(x)\left(\int \mathrm{e}^{\int \frac{-2(\cos(x))^3 x + 3(\cos(x))^2\sin(x) - \sin(x)}{\cos(x)(\cos(x)x - \sin(x))\sin(x)}\,\mathrm{d}x}\cos(x)\,\mathrm{d}x\_C2 + \_C1\right)\right\}$$

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 = 1.19226 (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 = 0.28 (sec), leaf count = 12

$$\{y(x) = x(\sin(x)\_C2 + \_C1)\}$$

2.1420 ODE No. 1420

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

✓ **Mathematica** : cpu = 0.471739 (sec), leaf count = 126

$$\left\{\left\{y(x) \to c_1 i^{1-n}\cos^{1-n}(x)\,{}_2F_1\left(\frac{1}{2}(-n - i\sqrt{a} + 1), \frac{1}{2}(-n + i\sqrt{a} + 1); \frac{3}{2} - n; \cos^2(x)\right) + c_2 i^n \cos^n(x)\,{}_2F\right.\right.$$

✓ **Maple** : cpu = 0.582 (sec), leaf count = 123

$$\left\{y(x) = \_C1\ \sin(2x)(\cos(x))^{-n}\,{}_2\mathrm{F}_1(1 + \frac{i}{2}\sqrt{a} - \frac{n}{2}, 1 - \frac{i}{2}\sqrt{a} - \frac{n}{2}; \frac{3}{2} - n; \frac{\cos(2x)}{2} + \frac{1}{2}) + \_C2\ (\cos(x\right.$$

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 = 0.248441 (sec), leaf count = 65

$$\left\{\left\{y(x) \to \frac{2^{-n}\left(2ac_1 - ic_2e^{2iax}\right)\left(e^{-iax} + e^{iax}\right)^n}{a\left(1 + e^{2iax}\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.087 (sec), leaf count = 27

$$\left\{y(x) = \_C1\ (\cos(ax))^n + \_C2\ \sin(ax)(\cos(ax))^{n-1}\right\}$$

2.1422 ODE No. 1422

$$y''(x) = 2y(x)\csc^2(x)$$

✓ **Mathematica** : cpu = 0.089944 (sec), leaf count = 43

$$\left\{\left\{y(x)\to \frac{\cos(x)\left(c_2\log\left(\sqrt{-\sin^2(x)}+\cos(x)\right)+c_1\right)}{\sqrt{-\sin^2(x)}}-c_2\right\}\right\}$$

✓ **Maple** : cpu = 0.33 (sec), leaf count = 50

$$\left\{y(x) = \frac{-i\sin(2x)\ln(\cos(2x)+i\sin(2x))\_C2 + \_C1\ \sin(2x)+2\_C2\,(\cos(2x)-1)}{\cos(2x)-1}\right\}$$

2.1423 ODE No. 1423

$$y''(x) = -ay(x)\csc^2(x)$$

✓ **Mathematica** : cpu = 0.0774697 (sec), leaf count = 61

$$\left\{\left\{y(x)\to \sqrt[4]{-\sin^2(x)}\left(c_1P_{-\frac{1}{2}}^{\frac{1}{2}\sqrt{1-4a}}(\cos(x))+c_2Q_{-\frac{1}{2}}^{\frac{1}{2}\sqrt{1-4a}}(\cos(x))\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.486 (sec), leaf count = 132

$$\left\{y(x) = 1\sqrt{-2\cos(2x)+2}\sqrt[4]{2\cos(2x)+2}\left(\frac{\cos(2x)}{2}-\frac{1}{2}\right)^{\frac{1}{4}\sqrt{1-4a}}\left(\sqrt{2\cos(2x)+2}{}_2\mathrm{F}_1(\frac{1}{4}\sqrt{1-4a}+\right.$$

2.1424 ODE No. 1424

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

✓ **Mathematica** : cpu = 0.175481 (sec), leaf count = 65

$$\left\{\left\{y(x)\to \sqrt[4]{-\sin^2(x)}\left(c_1P_{i\sqrt{a}-\frac{1}{2}}^{n-\frac{1}{2}}(\cos(x))+c_2Q_{i\sqrt{a}-\frac{1}{2}}^{n-\frac{1}{2}}(\cos(x))\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.499 (sec), leaf count = 120

$$\left\{y(x) = 1\left(\frac{\cos(2x)}{2}-\frac{1}{2}\right)^{\frac{n}{2}}\left({}_2\mathrm{F}_1(\frac{1}{2}+\frac{i}{2}\sqrt{a}+\frac{n}{2},\frac{1}{2}-\frac{i}{2}\sqrt{a}+\frac{n}{2};\ \frac{3}{2};\ \frac{\cos(2x)}{2}+\frac{1}{2})(2\cos(2x)+2)^{\frac{3}{4}}\sqrt[4]{-\right.$$

2.1425 ODE No. 1425

$$y''(x) = y(x)\csc^2(x)\left(-\left(-a^2\cos^2(x) - (3-2a)\cos(x) + 3a - 3\right)\right)$$

✓ **Mathematica** : cpu = 1.94028 (sec), leaf count = 341

$$\left\{\left\{y(x) \to (1-\cos(x))^{\frac{a-2}{2}}(\cos(x)+1)^{a/2}(-2a\cos(x)+\cos(x)+2)\left(c_1 - \frac{}{(1-2a)^2 a(\cos(x)+1)\left((3-\right.}\right.\right.\right.$$

✓ **Maple** : cpu = 0.683 (sec), leaf count = 91

$$\left\{y(x) = 1\sqrt[4]{2\cos(x)+2}\left(\_C2\ {}_2F_1(a-\frac{1}{2}, -\frac{1}{2}-a; \frac{3}{2}-a; \frac{\cos(x)}{2}+\frac{1}{2})(\cos(x)+1)^{-\frac{1}{4}-\frac{a}{2}}\sqrt{2\cos(x)+\right.\right.$$

2.1426 ODE No. 1426

$$\sin^2(x)y''(x) - y(x)\left(a^2\cos^2(x) + \frac{b^2}{(2a-3)^2} + 3a + b\cos(x) + 2\right) = 0$$

✓ **Mathematica** : cpu = 6.54202 (sec), leaf count = 1362

$$\left\{\left\{y(x) \to \frac{(-1)^{-\frac{(2a+3)^2}{(3-2a)^2}} 2^{-\frac{\sqrt{(3-2a)^2\left(16a^4+8(2b-9)a^2-48ba+(2b+9)^2\right)}}{2(3-2a)^2}}(1-\cos(x))^{\frac{-4a^2-9}{(3-2a)^2}}(\cos(x)-1)^{-\frac{-8a^2+24a+\sqrt{(3-2a)^2\left(\right.}}{}}}{}\right.\right.$$

✓ **Maple** : cpu = 0.817 (sec), leaf count = 549

$$\left\{y(x) = 1\left(\frac{\cos(x)}{2}-\frac{1}{2}\right)^{\frac{1}{8a-12}\left(4a-6+\sqrt{4b^2+16(a-3/2)^2 b+16a^4-72a^2+81}\right)}\left({}_2F_1(\frac{1}{8a-12}\left(8a^2-\sqrt{4b^2-16(a\right.\right.\right.$$

2.1427 ODE No. 1427

$$y''(x) = y(x)\left(-\csc^2(x)\right)\left(-\left(a^2b^2-(a+1)^2\right)\sin^2(x) - a(a+1)b\sin(2x) - (a-1)a\right)$$

✗ **Mathematica** : cpu = 200.569 (sec), leaf count = 0 , could not solve

```
DSolve[Derivative[2][y][x] == -(Csc[x]^2*(-((-1 + a)*a) - (-(1 + a)^2 + a^2*b^2)*Sin[x
```

✓ **Maple** : cpu = 1.767 (sec), leaf count = 203

$$\left\{y(x) = 1e^{\int \frac{\left(ab^2-a-2\right)(\cos(2x))^2+(-2b(a+1)\sin(2x)-2a-1)\cos(2x)+(-2a-1)b\sin(2x)-ab^2-a+1}{(\cos(2x)+1)(b\cos(2x)-\sin(2x)-b)}dx}\left(\int -2e^{-2\int \frac{\left(ab^2-a-2\right)(\cos(2x))^2+(-2}{}}\right.\right.$$

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 = 0.413331 (sec), leaf count = 87

$$\left\{\left\{y(x) \to \sqrt[4]{-\sin^2(x)}\left(c_1 P_{\sqrt{b-a}-\frac{1}{2}}^{\frac{1}{2}\sqrt{-4a-4c+1}}(\cos(x)) + c_2 Q_{\sqrt{b-a}-\frac{1}{2}}^{\frac{1}{2}\sqrt{-4a-4c+1}}(\cos(x))\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.522 (sec), leaf count = 183

$$\left\{y(x) = 1\sqrt[4]{2\cos(2x)+2}\left(\frac{\cos(2x)}{2}-\frac{1}{2}\right)^{\frac{1}{4}\sqrt{-4a+1-4c}}\sqrt{-2\cos(2x)+2}\left({}_2F_1\left(\frac{1}{4}\sqrt{-4a+1-4c}+\frac{1}{2}\sqrt{\right.\right.\right.$$

2.1429 ODE No. 1429

$$y''(x) = y(x)\csc^2(x) - \cot(x)y'(x)$$

✓ **Mathematica** : cpu = 0.06058 (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 = 0.038 (sec), leaf count = 25

$$\left\{y(x) = \frac{\sin(x)\_C1}{-1+\cos(x)} + \frac{(-1+\cos(x))\_C2}{\sin(x)}\right\}$$

2.1430 ODE No. 1430

$$y''(x) = y(x)\csc^2(x)\left(-\left(v(v+1)\sin^2(x)-n^2\right)\right)-\cot(x)y'(x)$$

✓ **Mathematica** : cpu = 0.489114 (sec), leaf count = 22

$$\{\{y(x)\to c_1P_v^n(\cos(x))+c_2Q_v^n(\cos(x))\}\}$$

✓ **Maple** : cpu = 0.542 (sec), leaf count = 101

$$\left\{y(x)=1\left(\frac{\cos(2x)}{2}-\frac{1}{2}\right)^{\frac{n}{2}}\left(\sin(2x)\,{}_2\mathrm{F}_1(1+\frac{v}{2}+\frac{n}{2},\frac{1}{2}-\frac{v}{2}+\frac{n}{2};\frac{3}{2};\frac{\cos(2x)}{2}+\frac{1}{2})\_C1+{}_2\mathrm{F}_1(-\frac{v}{2}+\frac{n}{2}\right.\right.$$

2.1431 ODE No. 1431

$$y''(x) = \cot(2x)y'(x)-2y(x)$$

✓ **Mathematica** : cpu = 0.207969 (sec), leaf count = 64

$$\left\{\left\{y(x)\to-\frac{2}{3}c_2\cos(2x)\cos^{\frac{3}{2}}(x)\,{}_2F_1\left(\frac{1}{4},\frac{3}{4};\frac{7}{4};\cos^2(x)\right)+\frac{1}{2}c_1\cos(2x)-2c_2\sin^2(x)^{3/4}\cos^{\frac{3}{2}}(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.445 (sec), leaf count = 30

$$\left\{y(x)=(\sin(2x))^{\frac{3}{4}}\left(\mathit{LegendreQ}\left(\frac{1}{4},\frac{3}{4},\cos(2x)\right)\_C2+\mathit{LegendreP}\left(\frac{1}{4},\frac{3}{4},\cos(2x)\right)\_C1\right)\right\}$$

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 = 0.101408 (sec), leaf count = 33

$$\left\{\left\{y(x)\to\frac{e^{-2x}(c_2e^{4x}+4c_1)}{4\sqrt{\sin(x)}}\right\}\right\}$$

✓ **Maple** : cpu = 0.054 (sec), leaf count = 22

$$\left\{y(x)=(\_C2\cosh(2x)+\_C1\sinh(2x))\frac{1}{\sqrt{\sin(x)}}\right\}$$

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 = 0.259416 (sec), leaf count = 35

$$\left\{\left\{y(x) \to \frac{(4c_2x^5 + 20c_1 - 5x^4)\sqrt{\cos(x)}}{20x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.118 (sec), leaf count = 28

$$\left\{y(x) = \frac{4\_C1\,x^5 - x^4 + 4\_C2}{4\,x^2}\sqrt{\cos(x)}\right\}$$

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 = 110.112 (sec), leaf count = 1596424

Too large to show

✓ **Maple** : cpu = 1.013 (sec), leaf count = 517

$$\left\{y(x) = \left(\frac{\cos(x)}{2} - \frac{1}{2}\right)^{\frac{1}{4a}\left(2a+\sqrt{a^2+(-2b-4c-4d-4e)a+b^2}\right)}(\sin(x))^{-\frac{a+b}{2a}}\left({}_2F_1(-\frac{1}{4a}\left(2i\sqrt{4ac-b^2} + \sqrt{a^2 +\right.\right.\right.$$

2.1435 ODE No. 1435

$$y''(x) = -4y(x)\sin(3x)\csc^3(x)$$

✓ **Mathematica** : cpu = 0.16028 (sec), leaf count = 61

$$\left\{\left\{y(x) \to \sqrt[4]{-\sin^2(x)}\left(c_1P^{\frac{i\sqrt{47}}{2}}_{-\frac{1}{2}+4i}(\cos(x)) + c_2Q^{\frac{i\sqrt{47}}{2}}_{-\frac{1}{2}+4i}(\cos(x))\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.231 (sec), leaf count = 38

$$\left\{y(x) = \sqrt{\sin(x)}\left(\mathit{LegendreQ}\left(-\frac{1}{2} + 4i, \frac{i}{2}\sqrt{47}, \cos(x)\right)\_C2 + \mathit{LegendreP}\left(-\frac{1}{2} + 4i, \frac{i}{2}\sqrt{47}, \cos(x)\right)\_\right.\right.$$

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 = 0.563147 (sec), leaf count = 33

$$\left\{\left\{y(x) \to \sqrt[4]{-\sin^2(x)}\left(c_1 P_v^n(\cos(x)) + c_2 Q_v^n(\cos(x))\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.512 (sec), leaf count = 113

$$\left\{y(x) = 1\left(\frac{\cos(2x)}{2} - \frac{1}{2}\right)^{\frac{n}{2}}\sqrt{-2\cos(2x)+2}\sqrt[4]{2\cos(2x)+2}\left({}_2\mathrm{F}_1(1 + \frac{v}{2} + \frac{n}{2}, \frac{1}{2} - \frac{v}{2} + \frac{n}{2}; \frac{3}{2}; \frac{\cos(2x}{2}\right.$$

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 = 0.297067 (sec), leaf count = 36

$$\left\{\left\{y(x) \to \cos^{-\frac{3}{2}-\frac{\sqrt{13}}{2}}(x)\left(c_1\cos^{\sqrt{13}}(x) + c_2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.261 (sec), leaf count = 29

$$\left\{y(x) = \_C1\,(\cos(x))^{-\frac{3}{2}+\frac{\sqrt{13}}{2}} + \_C2\,(\cos(x))^{-\frac{3}{2}-\frac{\sqrt{13}}{2}}\right\}$$

2.1438 ODE No. 1438

$$y''(x) = y(x)\left(-\csc^2(x)\right)\sec^2(x)\left(-a\sin^2(x)\cos^2(x) - (m-1)m\sin^2(x) - (n-1)n\cos^2(x)\right)$$

✓ **Mathematica** : cpu = 0.987077 (sec), leaf count = 158

$$\left\{\left\{y(x) \to \frac{(-1)^{-m}\cos^2(x)^{-\frac{m}{2}-\frac{1}{4}}\left(-\sin^2(x)\right)^{n/2}\left(c_1(-1)^m\cos^2(x)^{m+\frac{1}{2}}\,{}_2F_1\left(\frac{1}{2}\left(m+n-\sqrt{-a}\right), \frac{1}{2}(m+n+\right.\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.346 (sec), leaf count = 102

$$\left\{y(x) = (\sin(x))^n\left((\cos(x))^{-m+1}\,{}_2\mathrm{F}_1(\frac{n}{2} - \frac{m}{2} + \frac{i}{2}\sqrt{a} + \frac{1}{2}, \frac{n}{2} - \frac{m}{2} - \frac{i}{2}\sqrt{a} + \frac{1}{2}; \frac{3}{2} - m; (\cos(x))^2)\_C2\right.\right.$$

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 = 0.86219 (sec), leaf count = 0 , could not solve

```
DSolve[Derivative[2][y][x] == (Derivative[1][phi][x]*Derivative[1][y][x])/(-
phi[a] + phi[x]) - (y[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

$$\left\{y(x) = DESol\left(\left\{\frac{d^2}{dx^2}\_Y(x) - \frac{\left(\frac{d}{dx}\phi(x)\right)\frac{d}{dx}\_Y(x)}{\phi(x)-\phi(a)} + \frac{\left(-n(n+1)\left(\phi(x)-\phi(a)\right)^2 + \frac{d^2}{da^2}\phi(a)\right)\_Y(x)}{\phi(x)-\phi(a)}\right\}\right.\right.$$

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 = 0.883245 (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]^2*Derivative[1][phi][x]) + Derivative[1][phi][x]^2 - phi[x]*Derivative[2][phi]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x) = DESol\left(\left\{\frac{\left(\left(\frac{d}{dx}\phi(x)\right)^2 - (\phi(x))^2\frac{d}{dx}\phi(x) - \phi(x)\frac{d^2}{dx^2}\phi(x)\right)\_Y(x)}{\frac{d}{dx}\phi(x) + (\phi(x))^2} + \frac{\left(\phi(x^3) - \phi(x)\frac{d}{dx}\phi(x) - \frac{d^2}{dx^2}\right.}{\frac{d}{dx}\phi(x) + (\phi(x\right.}\right.\right.$$

2.1441 ODE No. 1441

$$y''(x) = -\frac{y'(x)(-\mathrm{cn}(x|k)\mathrm{dn}(x|k)-2\mathrm{sn}(x|k))}{\mathrm{sn}(x|k)^2-\mathrm{sn}(a|k)^2} - \frac{y(x)\left(6k^2\mathrm{sn}(a|k)^4-4(k^2+1)\,\mathrm{sn}(a|k)^2+2\right)}{\mathrm{sn}(x|k)^2-\mathrm{sn}(a|k)^2} - \frac{1}{\mathrm{sn}(x|k)^2-\mathrm{s}}$$

✗ **Mathematica** : cpu = 1.56967 (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^2)*JacobiSN[a, k]^2 + 6*k^2*JacobiSN[a, k]^4)*y[x])/(-
JacobiSN[a, k]^2 + JacobiSN[x, k]^2) - ((-(JacobiCN[x, k]*JacobiDN[x, k]) - 2*JacobiSN
JacobiSN[a, k]^2 + JacobiSN[x, k]^2), y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x) = DESol\left(\left\{\frac{d^2}{dx^2}\_Y(x) - 2\frac{JacobiSN(x,k)\, JacobiCN(x,k)\, JacobiDN(x,k)\, \frac{d}{dx}\_Y(x)}{(JacobiSN(x,k))^2 - JacobiSN(a,k)} - \frac{(-2+4(\right.\right.\right.$$

2.1442 ODE No. 1442

$$y''(x) = \frac{y(x)}{f(x)} - \frac{xy'(x)}{f(x)}$$

✗ **Mathematica** : cpu = 0.216389 (sec), leaf count = 0 , could not solve

```
DSolve[Derivative[2][y][x] == y[x]/f[x] - (x*Derivative[1][y][x])/f[x], y[x], x]
```

✓ **Maple** : cpu = 0.066 (sec), leaf count = 30

$$\left\{y(x) = x\left(\_C1\int e^{\int \frac{1}{x}\left(-2-\frac{x^2}{f(x)}\right)dx}\,dx + \_C2\right)\right\}$$

2.1443 ODE No. 1443

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

✗ **Mathematica** : cpu = 0.282453 (sec), leaf count = 0 , could not solve

```
DSolve[Derivative[2][y][x] == -((g[x]*y[x])/f[x]) - (Derivative[1][f][x]*Derivative[1]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x) = DESol\left(\left\{\frac{g(x)\_Y(x)}{f(x)} + \frac{\left(\frac{d}{dx}f(x)\right)\frac{d}{dx}\_Y(x)}{2f(x)} + \frac{d^2}{dx^2}\_Y(x)\right\}, \{\_Y(x)\}\right)\right\}$$

2.1444 ODE No. 1444

$$y''(x) = -by(x)f(x)^{2a} - \frac{af'(x)y'(x)}{f(x)}$$

✗ **Mathematica** : cpu = 1.50015 (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
```

✓ **Maple** : cpu = 0.018 (sec), leaf count = 37

$$\left\{y(x) = \_C1\, e^{\int i(f(x))^a\sqrt{b}\,dx} + \_C2\, e^{-\int i(f(x))^a\sqrt{b}\,dx}\right\}$$

2.1445 ODE No. 1445

$$y''(x) = -\frac{y'(x)\left(2f(x)g(x)g'(x)^2 - \left(g(x)^2-1\right)\left(2f'(x)g'(x) + f(x)g''(x)\right)\right)}{f(x)\left(g(x)^2-1\right)g'(x)} - \frac{y(x)\left(\left(g(x)^2-1\right)\left(f'(x)\left(2f'(\right.\right.\right.}{}$$

✗ **Mathematica** : cpu = 1.47123 (sec), leaf count = 0 , could not solve

```
DSolve[Derivative[2][y][x] == -((Derivative[1][y][x]*(2*f[x]*g[x]*Derivative[1][g][x]^
1 + g[x]^2)*(2*Derivative[1][f][x]*Derivative[1][g][x] + f[x]*Derivative[2][g][x])))/(
1 + g[x]^2)*Derivative[1][g][x])) - (y[x]*(-(f[x]*Derivative[1][g][x]^2*(2*g[x]*Deriva
1 + g[x]^2)*(-(f[x]*Derivative[1][g][x]*Derivative[2][f][x]) + Derivative[1][f][x]*(2*
1 + g[x]^2)*Derivative[1][g][x]), y[x], x]
```

✓ **Maple** : cpu = 0.406 (sec), leaf count = 20

$$\{y(x) = f(x)\left(LegendreQ(v, g(x))\_C2 + LegendreP(v, g(x))\_C1\right)\}$$

2.1446 ODE No. 1446

$$y''(x) = -\frac{(x-1)y(x)}{x^4} - \frac{y'(x)}{x}$$

✓ **Mathematica** : cpu = 0.0454864 (sec), leaf count = 26

$$\left\{\left\{y(x) \to e^{-1/x}\left(c_1 - c_2\text{Ei}\left(\frac{2}{x}\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.059 (sec), leaf count = 22

$$\left\{y(x) = e^{-x^{-1}}\left(Ei\left(1, -2x^{-1}\right)\_C2 + \_C1\right)\right\}$$

2.1447 ODE No. 1447

$$y''(x) = -\frac{(-x-1)y(x)}{x^4} - \frac{y'(x)}{x}$$

✓ **Mathematica** : cpu = 0.0375322 (sec), leaf count = 24

$$\left\{\left\{y(x) \to e^{\frac{1}{x}}\left(c_1 - c_2\text{Ei}\left(-\frac{2}{x}\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.061 (sec), leaf count = 20

$$\left\{y(x) = e^{x^{-1}}\left(Ei\left(1, 2x^{-1}\right)\_C2 + \_C1\right)\right\}$$

2.1448 ODE No. 1448

$$y''(x) = -\frac{b^2 y(x)}{(x^2-a^2)^2}$$

✓ **Mathematica** : cpu = 0.374982 (sec), leaf count = 142

$$\left\{\left\{y(x)\to \frac{(x-a)^{\frac{1}{2}-\frac{1}{2}\sqrt{1-\frac{b^2}{a^2}}}(a+x)^{\frac{1}{2}-\frac{1}{2}\sqrt{1-\frac{b^2}{a^2}}}\left(2ac_1\sqrt{1-\frac{b^2}{a^2}}(x-a)^{\sqrt{1-\frac{b^2}{a^2}}}-c_2(a+x)^{\sqrt{1-\frac{b^2}{a^2}}}\right)}{2a\sqrt{1-\frac{b^2}{a^2}}}\right\}\right\}$$

✓ **Maple** : cpu = 0.14 (sec), leaf count = 77

$$\left\{y(x)=\sqrt{(a-x)(x+a)}\left(\left(\frac{a-x}{x+a}\right)^{-\frac{1}{2a}\sqrt{a^2-b^2}}\_C2+\left(\frac{a-x}{x+a}\right)^{\frac{1}{2a}\sqrt{a^2-b^2}}\_C1\right)\right\}$$

2.1449 ODE No. 1449

$$y^{(3)}(x)-\lambda y(x)=0$$

✓ **Mathematica** : cpu = 0.0678997 (sec), leaf count = 53

$$\left\{\left\{y(x)\to c_1e^{(-1)^{2/3}\sqrt[3]{\lambda}x}+c_2e^{-\sqrt[3]{-1}\sqrt[3]{\lambda}x}+c_3e^{\sqrt[3]{\lambda}x}\right\}\right\}$$

✓ **Maple** : cpu = 0.063 (sec), leaf count = 47

$$\left\{y(x)=\_C1\,\mathrm{e}^{-\frac{\left(i\sqrt{3}+1\right)x}{2}\sqrt[3]{\lambda}}+\_C2\,\mathrm{e}^{\frac{\left(i\sqrt{3}-1\right)x}{2}\sqrt[3]{\lambda}}+\_C3\,\mathrm{e}^{\sqrt[3]{\lambda}x}\right\}$$

2.1450 ODE No. 1450

$$ax^3y(x)-bx+y^{(3)}(x)=0$$

✗ **Mathematica** : cpu = 300.004 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.577 (sec), leaf count = 1616

$$\left\{y(x)=\int -11211200\,bx^3\left(\left(-5/8\,x^6{}_0\mathrm{F}_2(\;;\frac{13}{6},7/3;-\frac{ax^6}{216})a+35\,{}_0\mathrm{F}_2(\;;7/6,4/3;-\frac{ax^6}{216})\right){}_0\mathrm{F}_2(\;;5/6,7/\right.\right.$$

2.1451 ODE No. 1451

$$y^{(3)}(x) - ax^b y(x) = 0$$

✓ **Mathematica** : cpu = 0.0225387 (sec), leaf count = 164

$$\left\{\left\{y(x) \to (-1)^{\frac{1}{b+3}}(b+3)^{-\frac{6}{b+3}}xa^{\frac{1}{b+3}}\left((-1)^{\frac{1}{b+3}}c_3xa^{\frac{1}{b+3}}\,{}_0F_2\left(;1+\frac{1}{b+3},1+\frac{2}{b+3};\frac{ax^{b+3}}{(b+3)^3}\right)+(b+3)^{\frac{3}{b+3}}c\right.\right.$$

✓ **Maple** : cpu = 0.235 (sec), leaf count = 114

$$\left\{y(x) = \_C1\,{}_0\mathrm{F}_2(\ ;\ \frac{b+1}{b+3},\frac{b+2}{b+3};\ \frac{x^{b+3}a}{(b+3)^3}) + \_C2\,x{}_0\mathrm{F}_2(\ ;\ \frac{4+b}{b+3},\frac{b+2}{b+3};\ \frac{x^{b+3}a}{(b+3)^3}) + \_C3\,x^2{}_0\mathrm{F}_2(\ ;\ \frac{b+5}{b+3}\right.$$

2.1452 ODE No. 1452

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

✓ **Mathematica** : cpu = 0.00886836 (sec), leaf count = 52

$$\left\{\left\{y(x) \to e^{-x/2}\left(c_3e^{3x/2} + c_1\sin\left(\frac{\sqrt{15}x}{2}\right) + c_2\cos\left(\frac{\sqrt{15}x}{2}\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.013 (sec), leaf count = 35

$$\left\{y(x) = \_C1\,\mathrm{e}^{x} + \_C2\,\mathrm{e}^{-\frac{x}{2}}\sin\left(\frac{\sqrt{15}x}{2}\right) + \_C3\,\mathrm{e}^{-\frac{x}{2}}\cos\left(\frac{\sqrt{15}x}{2}\right)\right\}$$

2.1453 ODE No. 1453

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

✓ **Mathematica** : cpu = 0.803776 (sec), leaf count = 128

$$\left\{\left\{y(x) \to \frac{e^{-ax}\left(-9(a^2-4)\,a^4e^{3ax}\cos(2x) - 3(11a^2-4)\,a^3e^{3ax}\sin(2x) + (9a^6+49a^4+56a^2+16)\,(12a^2\right.}{12a^3\,(9a^6+49a^4+56a^2+16)}\right.\right.$$

✓ **Maple** : cpu = 0.156 (sec), leaf count = 122

$$\left\{y(x) = \frac{1}{108\,a^9+588\,a^7+672\,a^5+192\,a^3}\left(\left(\left(-9\,a^6+36\,a^4\right)\cos(2\,x) + \left(-33\,a^5+12\,a^3\right)\sin(2\,x) + 9\,a^6\right.\right.\right.$$

2.1454 ODE No. 1454

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

✓ **Mathematica** : cpu = 0.010354 (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 = 0.069 (sec), leaf count = 55

$$\left\{y(x)=\_C1\left(\text{Ai}\left(-\frac{2^{\frac{2}{3}}x}{2}\sqrt[3]{a}\right)\right)^2+\_C2\left(\text{Bi}\left(-\frac{2^{\frac{2}{3}}x}{2}\sqrt[3]{a}\right)\right)^2+\_C3\,\text{Ai}\left(-\frac{2^{\frac{2}{3}}x}{2}\sqrt[3]{a}\right)\text{Bi}\left(-\frac{2^{\frac{2}{3}}x}{2}\sqrt[3]{a}\right)\right\}$$

2.1455 ODE No. 1455

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

✓ **Mathematica** : cpu = 0.0289653 (sec), leaf count = 127

$$\left\{\left\{y(x)\to\sqrt[3]{-\frac{1}{3}}c_2x\,{}_2F_2\left(\frac{1}{3}-\frac{a}{3},\frac{1}{3}-\frac{b}{3};\frac{2}{3},\frac{4}{3};\frac{x^3}{3}\right)+c_1\,{}_2F_2\left(-\frac{a}{3},-\frac{b}{3};\frac{1}{3},\frac{2}{3};\frac{x^3}{3}\right)+\left(-\frac{1}{3}\right)^{2/3}c_3x^2\,{}_2F_2\left(\frac{2}{3}\right.\right.\right.$$

✓ **Maple** : cpu = 0.211 (sec), leaf count = 71

$$\left\{y(x)=\_C1\,{}_2\text{F}_2(-\frac{a}{3},-\frac{b}{3};\frac{1}{3},\frac{2}{3};\frac{x^3}{3})+\_C2\,x^2{}_2\text{F}_2(-\frac{a}{3}+\frac{2}{3},-\frac{b}{3}+\frac{2}{3};\frac{4}{3},\frac{5}{3};\frac{x^3}{3})+\_C3\,{}_2\text{F}_2(\frac{1}{3}-\frac{a}{3},\frac{1}{3}-\right.$$

2.1456 ODE No. 1456

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

✓ **Mathematica** : cpu = 0.0368737 (sec), leaf count = 183

$$\left\{\left\{y(x)\to c_1\,{}_1F_2\left(\frac{1}{2}-\frac{1}{2c};1-\frac{1}{c},1-\frac{1}{2c};-\frac{x^{2c}}{4c^2}\right)+4^{-1/c}c_3c^{-2/c}\left(x^{2c}\right)^{\frac{1}{c}}\,{}_1F_2\left(\frac{1}{2}+\frac{1}{2c};1+\frac{1}{2c},1+\frac{1}{c};-\frac{x^{2c}}{4c^2}\right.\right.\right.$$

✓ **Maple** : cpu = 0.108 (sec), leaf count = 73

$$\left\{y(x) = x\left(\left(Y_{\frac{1}{2c}}\left(\frac{x^c}{2c}\right)\right)^2 \_C2 + Y_{\frac{1}{2c}}\left(\frac{x^c}{2c}\right)J_{\frac{1}{2c}}\left(\frac{x^c}{2c}\right)\_C3 + \left(J_{\frac{1}{2c}}\left(\frac{x^c}{2c}\right)\right)^2 \_C1\right)\right\}$$

2.1457 ODE No. 1457

$$-3y'(x)(a + 2\wp(x; \mathrm{g2}, \mathrm{g3})) + by(x) + y^{(3)}(x) = 0$$

✗ **Mathematica** : cpu = 0.0715327 (sec), leaf count = 0 , could not solve

```
DSolve[b*y[x] - 3*(a + 2*WeierstrassP[x, {g2, g3}])*Derivative[1][y][x] + Derivative[3
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x) = \mathit{DESol}\left(\left\{\frac{d^3}{dx^3}\_Y(x) + (-6\,\mathit{WeierstrassP}(x, g2, g3) - 3\,a)\frac{d}{dx}\_Y(x) + b\_Y(x)\right\}, \{\_Y(x)\}\right)\right.$$

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 = 0.0198665 (sec), leaf count = 0 , could not solve

```
DSolve[((-a + (1 - n^2)*WeierstrassPPrime[x, {g2, g3}])*y[x])/2 + (1 - n^2)*Weierstras
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x) = \mathit{DESol}\left(\left\{\frac{d^3}{dx^3}\_Y(x) + \left(-n^2\,\mathit{WeierstrassP}(x, g2, g3) + \mathit{WeierstrassP}(x, g2, g3)\right)\frac{d}{dx}\_Y(x) + \right.\right.\right.$$

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 = 0.0193331 (sec), leaf count = 0 , could not solve

```
DSolve[-2*n*(1 + n)*WeierstrassPPrime[x, {g2, g3}]*y[x] - (a + 4*n*(1 + n)*Weierstrass
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x) = \left(\mathit{DESol}\left(\left\{\frac{d^2}{dx^2}\_Y(x) + \left(-n^2\,\mathit{WeierstrassP}(x, g2, g3) - n\,\mathit{WeierstrassP}(x, g2, g3) - \frac{a}{4}\right)\_Y(x\right.\right.\right.$$

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 = 0.0137894 (sec), leaf count = 0 , could not solve

```
DSolve[B*WeierstrassPPrime[x, {g2, g3}]*y[x] + (a + A*WeierstrassP[x, {g2, g3}])*Deriv
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x) = DESol\left(\left\{\frac{d^3}{dx^3}\_Y(x) + (A\,WeierstrassP(x, g2, g3) + a)\frac{d}{dx}\_Y(x) + B\,WeierstrassPPrime(x, g2\right.\right.$$

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 = 0.0320458 (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
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x) = DESol\left(\left\{\frac{d^3}{dx^3}\_Y(x) + \left(-3\,k^2(JacobiSN(z, x))^2 - a\right)\frac{d}{dx}\_Y(x) + \left(b + c(JacobiSN(z, x))^2 - 3\right.\right.\right.$$

2.1462 ODE No. 1462

$$-y'(x)\left(a + 6k^2\sin^2(x)\right) + by(x) + y^{(3)}(x) = 0$$

✗ **Mathematica** : cpu = 0.0236484 (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
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x) = DESol\left(\left\{\frac{d^3}{dx^3}\_Y(x) + \left(-6\,k^2(\sin(x))^2 - a\right)\frac{d}{dx}\_Y(x) + b\_Y(x)\right\}, \{\_Y(x)\}\right)\right\}$$

2.1463 ODE No. 1463

$$y(x)f'(x) + 2f(x)y'(x) + y^{(3)}(x) = 0$$

✗ **Mathematica** : cpu = 0.0730264 (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] ==
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x) = \left(DESol\left(\left\{\frac{d^2}{dx^2}\_Y(x) + \frac{f(x)\_Y(x)}{2}\right\}, \{\_Y(x)\}\right)\right)^2\right\}$$

2.1464 ODE No. 1464

$$y^{(3)}(x) - 2y''(x) - 3y'(x) + 10y(x) = 0$$

✓ **Mathematica** : cpu = 0.00634784 (sec), leaf count = 34

$$\{\{y(x) \to e^{-2x}(c_1e^{4x}\sin(x) + c_2e^{4x}\cos(x) + c_3)\}\}$$

✓ **Maple** : cpu = 0.012 (sec), leaf count = 27

$$\{y(x) = \_C1\, e^{-2x} + \_C2\, e^{2x}\sin(x) + \_C3\, e^{2x}\cos(x)\}$$

2.1465 ODE No. 1465

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

✓ **Mathematica** : cpu = 0.106596 (sec), leaf count = 52

$$\left\{\left\{y(x) \to \frac{e^{-x} - 3e^x}{6 - 6a^2} + c_1e^{-ax} + c_3e^{ax} + c_2e^{2x}\right\}\right\}$$

✓ **Maple** : cpu = 0.095 (sec), leaf count = 214

$$\left\{y(x) = \frac{1}{12\,a^5 - 60\,a^3 + 48\,a}\left(-3\left((a-2)\,e^{-ax} + e^{ax}(a+2)\right)(a+1)\cosh\left((a-1)\,x\right) + 3\left((a-2)\,e^{-ax} + e\right.\right.$$

2.1466 ODE No. 1466

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

✓ **Mathematica** : cpu = 0.0171841 (sec), leaf count = 34

$$\left\{\left\{y(x) \to \frac{1}{6}e^{ax}\left(6c_3x^2 + 6c_2x + 6c_1 + x^3\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.027 (sec), leaf count = 27

$$\left\{y(x) = \frac{\mathrm{e}^{ax}(6\_C3\, x^2 + x^3 + 6\_C2\, x + 6\_C1)}{6}\right\}$$

2.1467 ODE No. 1467

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

✓ **Mathematica** : cpu = 0.0061021 (sec), leaf count = 84

$$\left\{\left\{y(x) \to c_1 e^{x\mathrm{Root}[\#1^3+\#1^2\mathrm{a2}+\#1\mathrm{a1}+\mathrm{a0}\&,1]} + c_2 e^{x\mathrm{Root}[\#1^3+\#1^2\mathrm{a2}+\#1\mathrm{a1}+\mathrm{a0}\&,2]} + c_3 e^{x\mathrm{Root}[\#1^3+\#1^2\mathrm{a2}+\#1\mathrm{a1}+\mathrm{a0}\&,3]}\right.\right.$$

✓ **Maple** : cpu = 0.04 (sec), leaf count = 590

$$\left\{y(x) = \_C1\, \mathrm{e}^{-x\left(\left(\frac{i}{12}\sqrt{3}+\frac{1}{12}\right)\left(36\, a1\ a2 - 108\, a0 - 8\, a2^3 + 12\sqrt{12\, a0\ a2^3 - 3\, a1^2 a2^2 - 54\, a1\ a2\ a0 + 12\, a1^3 + 81\, a0^2}\right)^{\frac{2}{3}} + \frac{a2}{3}\sqrt[3]{36\, a1\ a2 -\right.}\right.$$

2.1468 ODE No. 1468

$$2\left(2a + 4x^2 - 1\right)y'(x) - 8axy(x) + y^{(3)}(x) - 6xy''(x) = 0$$

✓ **Mathematica** : cpu = 0.0865646 (sec), leaf count = 57

$$\left\{\left\{y(x) \to c_2 H_{\frac{a}{2}}(x)\,{}_1F_1\left(-\frac{a}{4};\frac{1}{2};x^2\right) + c_1 H_{\frac{a}{2}}(x)^2 + c_3\,{}_1F_1\left(-\frac{a}{4};\frac{1}{2};x^2\right)^2\right\}\right\}$$

✓ **Maple** : cpu = 0.148 (sec), leaf count = 59

$$\left\{y(x) = x^2\left(\left(U\left(\frac{1}{2}-\frac{a}{4},\frac{3}{2},x^2\right)\right)^2 \_C2 + U\left(\frac{1}{2}-\frac{a}{4},\frac{3}{2},x^2\right)M\left(\frac{1}{2}-\frac{a}{4},\frac{3}{2},x^2\right)\_C3 + \left(M\left(\frac{1}{2}-\frac{a}{4},\frac{3}{2}\right.\right.\right.\right.$$

2.1469 ODE No. 1469

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

✓ **Mathematica** : cpu = 0.0189821 (sec), leaf count = 68

$$\left\{\left\{y(x) \to e^{-\frac{ax^2}{2}-\sqrt{3}\sqrt{ax}}\left(c_1e^{\sqrt{3}\sqrt{ax}} + c_3e^{2\sqrt{3}\sqrt{ax}} + c_2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.051 (sec), leaf count = 37

$$\left\{y(x) = \mathrm{e}^{-\frac{ax^2}{2}}\left(\_C1 + \_C2\,\mathrm{e}^{\sqrt{3}\sqrt{ax}} + \_C3\,\mathrm{e}^{-\sqrt{3}\sqrt{ax}}\right)\right\}$$

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 = 300.05 (sec), leaf count = 0 , timed out

```
$Aborted
```

✓ **Maple** : cpu = 0.102 (sec), leaf count = 36

$$\left\{y(x) = \left(\_C3 + \int\left(2\,\_C1\,x + \_C2 - \frac{3\,x^2}{4} + \frac{x^2\ln(x)}{2}\right)\mathrm{e}^{\cos(x)}\,\mathrm{d}x\right)\mathrm{e}^{-\cos(x)}\right\}$$

2.1471 ODE No. 1471

$$f(x)y''(x) + f(x)y(x) + y^{(3)}(x) + y'(x) = 0$$

✗ **Mathematica** : cpu = 0.0761786 (sec), leaf count = 0 , could not solve

```
DSolve[f[x]*y[x] + Derivative[1][y][x] + f[x]*Derivative[2][y][x] + Derivative[3][y][x
```

✓ **Maple** : cpu = 0.199 (sec), leaf count = 36

$$\left\{y(x) = \mathrm{e}^{ix}\left(\int\mathrm{e}^{-2\,ix}\left(\int\_C3\,\mathrm{e}^{\int i-f(x)\,\mathrm{d}x}\,\mathrm{d}x + \_C2\right)\mathrm{d}x + \_C1\right)\right\}$$

2.1472 ODE No. 1472

$$f(x)\left(x^2y''(x)-2xy'(x)+2y(x)\right)+y^{(3)}(x)=0$$

✗ **Mathematica** : cpu = 0.0789714 (sec), leaf count = 0 , could not solve

```
DSolve[f[x]*(2*y[x] - 2*x*Derivative[1][y][x] + x^2*Derivative[2][y][x]) + Derivative[
```

✓ **Maple** : cpu = 0.257 (sec), leaf count = 33

$$\left\{y(x)=\left(\int \_C1+\_C2\int e^{-\int x^2f(x)+3x^{-1}\,dx}\,dx\,dx+\_C3\right)x\right\}$$

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 = 0.0137347 (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]*Deriva
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x)=DESol\left(\left\{\frac{d^3}{dx^3}\_Y(x)+f(x)\frac{d^2}{dx^2}\_Y(x)+g(x)\frac{d}{dx}\_Y(x)+\left(f(x)\,g(x)+\frac{d}{dx}g(x)\right)\_Y(x)\right\},\{$$

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 = 0.0156395 (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]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x)=\left(DESol\left(\left\{\frac{d^2}{dx^2}\_Y(x)+f(x)\frac{d}{dx}\_Y(x)+g(x)\_Y(x)\right\},\{\_Y(x)\}\right)\right)^2\right\}$$

2.1475 ODE No. 1475

$$4y^{(3)}(x) - 8y''(x) - 11y'(x) - 3y(x) + 18e^x = 0$$

✓ **Mathematica** : cpu = 0.0284056 (sec), leaf count = 37

$$\left\{\left\{y(x) \to e^{-x/2}\left(c_2x + c_3e^{7x/2} + c_1 + e^{3x/2}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.028 (sec), leaf count = 23

$$\left\{y(x) = \left(\_C3\,x + \_C2\right)e^{-\frac{x}{2}} + \_C1\,e^{3\,x} + e^{x}\right\}$$

2.1476 ODE No. 1476

$$-36n^2y'(x)\wp(x; \text{g2}, \text{g3}) - 2(n+3)(4n-3)ny(x)\phi'(x) + 27y^{(3)}(x) = 0$$

✗ **Mathematica** : cpu = 0.125615 (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
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x) = DESol\left(\left\{27\,\frac{d^3}{dx^3}\_Y(x) - 36\,n^2\,WeierstrassP(x, g2, g3)\,\frac{d}{dx}\_Y(x) + (-8\,WeierstrassPPrime(x$$

2.1477 ODE No. 1477

$$xy^{(3)}(x) + 3y''(x) + xy(x) = 0$$

✓ **Mathematica** : cpu = 0.18475 (sec), leaf count = 43

$$\left\{\left\{y(x) \to \frac{c_1e^{-x} + c_2e^{\sqrt[3]{-1}x} + c_3e^{-(-1)^{2/3}x}}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.029 (sec), leaf count = 41

$$\left\{y(x) = \frac{1}{x}\left(\_C1\,e^{-x} + \_C2\,e^{\frac{x}{2}}\sin\left(\frac{\sqrt{3}x}{2}\right) + \_C3\,e^{\frac{x}{2}}\cos\left(\frac{\sqrt{3}x}{2}\right)\right)\right\}$$

2.1478 ODE No. 1478

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

✓ **Mathematica** : cpu = 0.0345176 (sec), leaf count = 90

$$\left\{\left\{y(x) \to \frac{(2-2i)c_1\,{}_0F_2\left(;\frac{1}{2},\frac{3}{4};\frac{ax^4}{64}\right)}{\sqrt[4]{a}x} + c_2\,{}_0F_2\left(;\frac{3}{4},\frac{5}{4};\frac{ax^4}{64}\right) + \left(\frac{1}{4}+\frac{i}{4}\right)\sqrt[4]{a}c_3x\,{}_0F_2\left(;\frac{5}{4},\frac{3}{2};\frac{ax^4}{64}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.179 (sec), leaf count = 48

$$\left\{y(x) = \_C1\,{}_0\mathrm{F}_2(\,;\frac{3}{4},\frac{5}{4};\frac{ax^4}{64}) + \frac{\_C2}{x}{}_0\mathrm{F}_2(\,;\frac{1}{2},\frac{3}{4};\frac{ax^4}{64}) + \_C3\,x{}_0\mathrm{F}_2(\,;\frac{5}{4},\frac{3}{2};\frac{ax^4}{64})\right\}$$

2.1479 ODE No. 1479

$$(a+b)y''(x) - ay(x) + xy^{(3)}(x) - xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.153698 (sec), leaf count = 153

$$\left\{\left\{y(x) \to \frac{1}{2}ic_2x\,{}_1F_2\left(\frac{a}{2}+\frac{1}{2};\frac{3}{2},\frac{a}{2}+\frac{b}{2}+\frac{1}{2};\frac{x^2}{4}\right) + c_1\,{}_1F_2\left(\frac{a}{2};\frac{1}{2},\frac{a}{2}+\frac{b}{2};\frac{x^2}{4}\right) + c_3\left(\frac{i}{2}\right)^{-a-b+2}x^{-a-b+2}\,{}_1F$$

✓ **Maple** : cpu = 0.314 (sec), leaf count = 92

$$\left\{y(x) = \_C1\,{}_1\mathrm{F}_2(\frac{a}{2};\frac{1}{2},\frac{a}{2}+\frac{b}{2};\frac{x^2}{4}) + \_C2\,x{}_1\mathrm{F}_2(\frac{1}{2}+\frac{a}{2};\frac{3}{2},\frac{a}{2}+\frac{b}{2}+\frac{1}{2};\frac{x^2}{4}) + \_C3\,x^{-a-b+2}{}_1\mathrm{F}_2(1-\frac{b}{2};2$$

2.1480 ODE No. 1480

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

✓ **Mathematica** : cpu = 0.249597 (sec), leaf count = 91

$$\left\{\left\{y(x) \to \frac{1}{4}e^x\left(\frac{4c_3x^{2v+2}\Gamma\left(v+\frac{3}{2}\right)\,{}_1\tilde{F}_1\left(v+\frac{3}{2};2v+3;-2x\right)}{\Gamma\left(\frac{1}{2}-v\right)} + c_24^{-v}G_{2,3}^{2,1}\left(2x\middle|\begin{array}{c}1,v+\frac{3}{2}\\1,2(v+1),0\end{array}\right) + 4c_1\right)\right\}$$

✓ **Maple** : cpu = 0.348 (sec), leaf count = 35

$$\{y(x) = \_C1\,\mathrm{e}^x + \_C2\,x^{v+1}I_{-v-1}(x) + \_C3\,x^{v+1}K_{v+1}(x)\}$$

2.1481 ODE No. 1481

$$-f(x)+\left(x^2-3\right)y''(x)+xy^{(3)}(x)+4xy'(x)+2y(x)=0$$

✓ **Mathematica** : cpu = 1.18487 (sec), leaf count = 340

$$\left\{\left\{y(x)\to\frac{1}{240}\left(240e^{-\frac{x^2}{2}}x^5\left(\int_1^x\frac{f(K[1])\left(8\sqrt{2\pi}K[1]^5\text{erfi}\left(\frac{K[1]}{\sqrt{2}}\right)-15K[1]^4\text{Ei}\left(\frac{K[1]^2}{2}\right)+2e^{\frac{K[1]^2}{2}}(-8K[1]^4\right.}{240K[1]^4}\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.071 (sec), leaf count = 44

$$\left\{y(x)=\left(\_C3+\int\frac{2\_C1\,x+\_C2-\iint-f(x)\,\mathrm{d}x\,\mathrm{d}x}{x^6}\mathrm{e}^{\frac{x^2}{2}}\,\mathrm{d}x\right)\mathrm{e}^{-\frac{x^2}{2}}x^5\right\}$$

2.1482 ODE No. 1482

$$axy(x)-b+2xy^{(3)}(x)+3y''(x)=0$$

✗ **Mathematica** : cpu = 300.021 (sec), leaf count = 0 , timed out

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✓ **Maple** : cpu = 0.454 (sec), leaf count = 1614

$$\left\{y(x)=\int-2802800\,bx\left(\left(-5/8\,{}_0\mathrm{F}_2(\,;\frac{13}{6},7/3;\,-\frac{ax^3}{54})ax^3+\frac{35}{4}{}_0\mathrm{F}_2(\,;7/6,4/3;\,-\frac{ax^3}{54})\right){}_0\mathrm{F}_2(\,;5/6,7/6\right.\right.$$

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 = 0.154394 (sec), leaf count = 105

$$\left\{\left\{y(x)\to e^x\left(\frac{2c_3\Gamma\left(\frac{5}{2}-3\nu\right)\left(\Gamma(2-2\nu)\,{}_1\tilde{F}_1\left(\frac{3}{2}-3\nu;1-2\nu;-x\right)+2\nu-1\right)}{3(2\nu-1)\Gamma(2-2\nu)\Gamma\left(\frac{3}{2}-\nu\right)}+c_2G_{2,3}^{2,1}\left(x\middle|\begin{array}{c}1,3\nu-\frac{1}{2}\\1,2\nu,0\end{array}\right)+\right.\right.\right.$$

✓ **Maple** : cpu = 0.366 (sec), leaf count = 37

$$\left\{y(x)=\_C1\,\mathrm{e}^x+\_C2\,\mathrm{e}^{\frac{x}{2}}x^\nu I_\nu\left(\frac{x}{2}\right)+\_C3\,\mathrm{e}^{\frac{x}{2}}x^\nu K_\nu\left(\frac{x}{2}\right)\right\}$$

2.1484 ODE No. 1484

$$6y'(x)(ak+bx)+3(2ax+k)y''(x)+y(x)(3bk+2cx)+2xy^{(3)}(x)=0$$

✗ **Mathematica** : cpu = 63.3421 (sec), leaf count = 0 , DifferentialRoot result

$$\{\{y(x)\to \text{DifferentialRoot}(\{y,x\},\{(2xc+3bk)y(x)+(6xb+6ak)y'(x)+(6xa+3k)y''(x)+2xy^{(3)}(x)=$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x)=DESol\left(\left\{(3\,bk+2\,cx)\_Y(x)+(6\,ak+6\,bx)\frac{\mathrm{d}}{\mathrm{d}x}\_Y(x)+(6\,ax+3\,k)\frac{\mathrm{d}^2}{\mathrm{d}x^2}\_Y(x)+2\,x\frac{\mathrm{d}^3}{\mathrm{d}x^3}\_Y\right.\right.\right.$$

2.1485 ODE No. 1485

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

✓ **Mathematica** : cpu = 0.153288 (sec), leaf count = 59

$$\left\{\left\{y(x)\to \frac{1}{4}c_3\left(-4e^{x-2}\text{Ei}(2-x)+x^2\log(2-x)-x^2\log(x)+2x+2\right)+c_1x^2+c_2e^x\right\}\right\}$$

✓ **Maple** : cpu = 0.48 (sec), leaf count = 51

$$\left\{y(x)=\_C3\;Ei(1,x-2)\,\mathrm{e}^{x-2}+\frac{\_C3\;x^2\ln(x-2)}{4}+\_C2\,\mathrm{e}^x-\frac{\_C3\;\ln(x)\,x^2}{4}+\frac{(2+2\,x)\_C3}{4}+\_C1\right.$$

2.1486 ODE No. 1486

$$(2x-1)y^{(3)}(x)-8xy'(x)+8y(x)=0$$

✓ **Mathematica** : cpu = 0.19111 (sec), leaf count = 63

$$\left\{\left\{y(x)\to \frac{1}{4}\left(c_3e^{2x-2}\text{Ei}(2-4x)-\frac{2c_3x\text{Ei}(1-2x)}{e}+4c_1x-4c_2e^{2x}-c_3e^{-2x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.353 (sec), leaf count = 51

$$\left\{y(x)=\_C1\;x+\_C2\;\mathrm{e}^{2\,x}-\frac{\_C3\;\left(2\,x\mathrm{e}^{-1}Ei(1,2\,x-1)-Ei(1,4\,x-2)\,\mathrm{e}^{2\,x-2}-\mathrm{e}^{-2\,x}\right)}{4}\right\}$$

2.1487 ODE No. 1487

$$(2x-1)y^{(3)}(x)+(x+4)y''(x)+2y'(x)=0$$

✗ **Mathematica** : cpu = 299.997 (sec), leaf count = 0 , timed out

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✓ **Maple** : cpu = 0.113 (sec), leaf count = 38

$$\left\{y(x)=1\left(\_C3+\int(2\_C1\,x+\_C2)\mathrm{e}^{\frac{x}{2}}(2\,x-1)^{-\frac{3}{4}}\,\mathrm{d}x\right)\mathrm{e}^{-\frac{x}{2}}\frac{1}{\sqrt[4]{2\,x-1}}\right\}$$

2.1488 ODE No. 1488

$$ax^2y(x)+x^2y^{(3)}(x)-6y'(x)=0$$

✓ **Mathematica** : cpu = 0.637796 (sec), leaf count = 97

$$\left\{\left\{y(x)\to\frac{c_1e^{-\sqrt[3]{a}x}\left(\sqrt[3]{a}x+2\right)+c_2e^{\sqrt[3]{-1}\sqrt[3]{a}x}\left(\sqrt[3]{a}x+2(-1)^{2/3}\right)+c_3e^{-(-1)^{2/3}\sqrt[3]{a}x}\left(\sqrt[3]{a}x-2\sqrt[3]{-1}\right)}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.787 (sec), leaf count = 135

$$\left\{y(x)=\frac{1}{x}\left(-\left(\left(-\sqrt{3}-i\right)\left(-a^4\right)^{\frac{2}{3}}+ia^3x\right)\_C3\,\mathrm{e}^{\frac{\frac{i}{2}\left(-\sqrt{3}+i\right)x}{a}\sqrt[3]{-a^4}}-\left(\left(\sqrt{3}-i\right)\left(-a^4\right)^{\frac{2}{3}}+ia^3x\right)\_C2\,\mathrm{e}^{\frac{i}{2}(\sqrt{}}\right.$$

2.1489 ODE No. 1489

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

✗ **Mathematica** : cpu = 0.929377 (sec), leaf count = 0 , DifferentialRoot result

$$\{\{y(x)\to\text{DifferentialRoot}(\{y,x\},\{y^{(3)}(x)x^2-y(x)+(x+1)y''(x)=0,y(1)=c_1,y'(1)=c_2,y''(1)=c_3$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x)=\mathit{DESol}\left(\left\{-\_Y(x)+(1+x)\frac{\mathrm{d}^2}{\mathrm{d}x^2}\_Y(x)+x^2\frac{\mathrm{d}^3}{\mathrm{d}x^3}\_Y(x)\right\},\{\_Y(x)\}\right)\right\}$$

2.1490 ODE No. 1490

$$x^2y^{(3)}(x) + (x^2+1)\,y'(x) - xy''(x) = 0$$

✓ **Mathematica** : cpu = 0.0522128 (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 = 0.091 (sec), leaf count = 18

$$\{y(x) = \_C1 + \_C2\,xJ_1(x) + \_C3\,xY_1(x)\}$$

2.1491 ODE No. 1491

$$(-4a^2\nu^2 + 4a^2x^{2a} + 1)\,y'(x) + x^2y^{(3)}(x) + 3xy''(x) = 4a^3x^{2a-1}y(x)$$

✓ **Mathematica** : cpu = 0.0482254 (sec), leaf count = 102

$$\left\{\left\{y(x) \to c_2\left(x^{2a}\right)^{-\nu}\,{}_1F_2\left(-\nu-\frac{1}{2};1-2\nu,1-\nu;-x^{2a}\right) + c_3\left(x^{2a}\right)^{\nu}\,{}_1F_2\left(\nu-\frac{1}{2};\nu+1,2\nu+1;-x^{2a}\right) + c\right.\right.$$

✓ **Maple** : cpu = 0.12 (sec), leaf count = 88

$$\left\{y(x) = \_C1\,{}_1\mathrm{F}_2(-\frac{1}{2};\ \nu+1,-\nu+1;\ -x^{2\,a}) + \_C2\,x^{-2\,a\nu}{}_1\mathrm{F}_2(-\frac{1}{2}-\nu;\ 1-2\,\nu,-\nu+1;\ -x^{2\,a}) + \_C3\,x\right.$$

2.1492 ODE No. 1492

$$(4x(n-m) + m(2m-1) + 2x^2)\,y'(x) - 2n(-2m+2x+1)y(x) - 3x(x-m)y''(x) + x^2y^{(3)}(x) = 0$$

✓ **Mathematica** : cpu = 0.430867 (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 = 0.155 (sec), leaf count = 39

$$\left\{y(x) = \_C1\,(M(-n,\,m,\,x))^2 + \_C2\,(U(-n,\,m,\,x))^2 + \_C3\,M(-n,\,m,\,x)U(-n,\,m,\,x)\right\}$$

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 = 8.21965 (sec), leaf count = 868

$$\left\{\left\{y(x)\to J_0(x)c_1+2Y_0(x)c_2+J_0(x)\int_1^x-\frac{}{K[1]\left(2\left(8(J_1(K[1])Y_0(K[1])-J_0(K[1])Y_1(K[1]))\,{}_1F_2\left(3;\frac{5}{2},\right.\right.\right.}\right.\right.$$

✓ **Maple** : cpu = 0.446 (sec), leaf count = 1033

$$\left\{y(x)=\frac{1}{x}\left(-\int-18\frac{}{((-18\,x^2J_0\,(x)-72\,xJ_1\,(x)+54\,J_0\,(x))\,{}_1\mathrm{F}_2(1;\;1/2,1/2;\;-1/4\,x^2)+8\,x^2\,(9/4\,J_0\,(x\right.\right.$$

2.1494 ODE No. 1494

$$x^2y^{(3)}(x)+5xy''(x)+4y'(x)-\log(x)=0$$

✓ **Mathematica** : cpu = 0.032664 (sec), leaf count = 43

$$\left\{\left\{y(x)\to\frac{(x^2-8c_2)\log(x)-2(-2c_3x+2c_1+4c_2+x^2)}{4x}\right\}\right\}$$

✓ **Maple** : cpu = 0.03 (sec), leaf count = 32

$$\left\{y(x)=\frac{(x^2+4\_C2)\ln(x)-2\,x^2+4\_C1\,x+4\_C3}{4\,x}\right\}$$

2.1495 ODE No. 1495

$$x^2y^{(3)}(x)+6xy''(x)+6y'(x)=0$$

✓ **Mathematica** : cpu = 0.0218175 (sec), leaf count = 24

$$\left\{\left\{y(x)\to-\frac{c_2}{2x^2}-\frac{c_1}{x}+c_3\right\}\right\}$$

✓ **Maple** : cpu = 0.016 (sec), leaf count = 16

$$\left\{y(x)=\_C1+\frac{\_C2}{x^2}+\frac{\_C3}{x}\right\}$$

2.1496 ODE No. 1496

$$ax^2y(x) + x^2y^{(3)}(x) + 6xy''(x) + 6y'(x) = 0$$

✓ **Mathematica** : cpu = 0.292636 (sec), leaf count = 58

$$\left\{\left\{y(x) \to \frac{c_1e^{-\sqrt[3]{a}x} + c_2e^{\sqrt[3]{-1}\sqrt[3]{a}x} + c_3e^{-(-1)^{2/3}\sqrt[3]{a}x}}{x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.035 (sec), leaf count = 57

$$\left\{y(x) = \frac{1}{x^2}\left(\_C1\,\mathrm{e}^{\frac{(i\sqrt{3}-1)x}{2}\sqrt[3]{-a}} + \_C2\,\mathrm{e}^{-\frac{(i\sqrt{3}+1)x}{2}\sqrt[3]{-a}} + \_C3\,\mathrm{e}^{\sqrt[3]{-a}x}\right)\right\}$$

2.1497 ODE No. 1497

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

✓ **Mathematica** : cpu = 0.55115 (sec), leaf count = 127

$$\left\{\left\{y(x) \to c_1\,{}_0F_2\left(;\frac{2}{3}-p,\frac{1}{3}-q;\frac{x^3}{27}\right) + c_2(-1)^{p+\frac{1}{3}}3^{-3p-1}x^{3p+1}\,{}_0F_2\left(;p+\frac{4}{3},p-q+\frac{2}{3};\frac{x^3}{27}\right) + c_3(-1)^{q+\frac{2}{3}}$$

✓ **Maple** : cpu = 0.295 (sec), leaf count = 77

$$\left\{y(x) = \_C1\,{}_0\mathrm{F}_2(\ ;\ -q+\frac{1}{3},-p+\frac{2}{3};\ \frac{x^3}{27}) + \_C2\,x^{3\,p+1}{}_0\mathrm{F}_2(\ ;\ p+\frac{4}{3},\frac{2}{3}-q+p;\ \frac{x^3}{27}) + \_C3\,x^{3\,q+2}{}_0\mathrm{F}_2(\ ;\ $$

2.1498 ODE No. 1498

$$\left(ax^2+6n\right)y'(x) - 2axy(x) - 2(n+1)xy''(x) + x^2y^{(3)}(x) = 0$$

✓ **Mathematica** : cpu = 13.1618 (sec), leaf count = 353

$$\left\{\left\{y(x) \to 2^{-n-\frac{3}{2}}\left(\pi c_3 4^n x^4 \sec(\pi n)\Gamma\left(\frac{3}{2}-n\right)\left(\sqrt{a}x\right)^{-n-\frac{1}{2}} J_{n+\frac{1}{2}}\left(\sqrt{a}x\right)\,{}_1\tilde{F}_2\left(\frac{3}{2}-n;\frac{1}{2}-n,\frac{5}{2}-n;-\frac{ax^2}{4}\right)\right.\right.\right.$$

✓ **Maple** : cpu = 0.313 (sec), leaf count = 53

$$\left\{y(x) = \_C1\,x^{n+\frac{1}{2}}J_{-n-\frac{1}{2}}(\sqrt{a}x) + \_C2\,x^{n+\frac{1}{2}}Y_{-n-\frac{1}{2}}(\sqrt{a}x) + \_C3\left(ax^2+4\,n-2\right)\right\}$$

2.1499 ODE No. 1499

$$-\left(\nu^2+x^2-\frac{1}{4}\right)y'(x)+\left(\nu^2+x^2-2x-\frac{1}{4}\right)y(x)+x^2y^{(3)}(x)-\left(x^2-2x\right)y''(x)=0$$

✓ **Mathematica** : cpu = 0.250491 (sec), leaf count = 91

$$\left\{\left\{y(x)\to e^x\left(\frac{c_3x^{\nu+\frac{1}{2}}\Gamma\left(\nu+\frac{1}{2}\right)\,{}_1\tilde{F}_1\left(\nu+\frac{1}{2};2\nu+1;-2x\right)}{\Gamma\left(\frac{3}{2}-\nu\right)}+c_2 2^{-\nu-\frac{1}{2}}G_{2,3}^{2,1}\left(2x\middle|\begin{array}{c}1,0\\ \frac{1}{2}-\nu,\nu+\frac{1}{2},0\end{array}\right)+c_1\right)\right\}\right.$$

✓ **Maple** : cpu = 0.314 (sec), leaf count = 25

$$\{y(x)=\_C1\,\mathrm{e}^x+\_C2\,\sqrt{x}I_\nu(x)+\_C3\,\sqrt{x}K_\nu(x)\}$$

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 = 51.7498 (sec), leaf count = 0 , DifferentialRoot result

$$\{\{y(x)\to \text{DifferentialRoot}(\{y,x\},\{y^{(3)}(x)x^2-(x+v)y''(x)x-(x+1)\nu y(x)+(2x\nu+\nu)y'(x)=0,y(1)$$

✓ **Maple** : cpu = 0.264 (sec), leaf count = 55

$$\left\{y(x)=\_C1\,\mathrm{e}^x+\_C2\,x^{\frac{\nu}{2}+\frac{1}{2}}J_{-\nu-1}\left(2\sqrt{\nu}\sqrt{x}\right)+\_C3\,x^{\frac{\nu}{2}+\frac{1}{2}}Y_{-\nu-1}\left(2\sqrt{\nu}\sqrt{x}\right)\right\}$$

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 = 0.199928 (sec), leaf count = 80

$$\left\{\left\{y(x)\to e^x\left(\frac{c_3x^{\nu+\frac{1}{2}}\Gamma\left(\nu+\frac{1}{2}\right)\,{}_1\tilde{F}_1\left(\nu+\frac{1}{2};2\nu+1;-x\right)}{\Gamma\left(\frac{3}{2}-\nu\right)}+c_2G_{2,3}^{2,1}\left(x\middle|\begin{array}{c}1,0\\ \frac{1}{2}-\nu,\nu+\frac{1}{2},0\end{array}\right)+c_1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.327 (sec), leaf count = 37

$$\left\{y(x)=\_C1\,\mathrm{e}^x+\_C2\,\mathrm{e}^{\frac{x}{2}}\sqrt{x}I_\nu\left(\frac{x}{2}\right)+\_C3\,\mathrm{e}^{\frac{x}{2}}\sqrt{x}K_\nu\left(\frac{x}{2}\right)\right\}$$

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 = 0.0760704 (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 = 0.658 (sec), leaf count = 103

$$\left\{y(x)=\frac{1}{x^2}\left(\_C3\int e^{\frac{x^3}{6}}\sqrt{x}\left(K_{\frac{5}{6}}\left(-\frac{x^3}{6}\right)x^3-K_{\frac{1}{6}}\left(-\frac{x^3}{6}\right)x^3+2\,K_{1/6}(-1/6\,x^3)\right)\,dx+\_C2\int e^{\frac{x^3}{6}}\sqrt{x}\left(\right.\right.$$

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 = 0.121101 (sec), leaf count = 62

$$\left\{\left\{y(x)\to c_3-\frac{100(3c_2-1)x^3+900c_2x+225c_1+36x^5-60(3x^4+10x^2+15)x\log(x)}{900\left(x^2+1\right)^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.036 (sec), leaf count = 67

$$\left\{y(x)=\frac{(45\,x^5+150\,x^3+225\,x)\ln(x)-9\,x^5+225\,\_C1\,x^4+(225\,\_C2-50)\,x^3+450\,\_C1\,x^2+(675\,\_}{225\,\left(x^2+1\right)^2}\right.$$

2.1504 ODE No. 1504

$$\left(x^2+2\right)y^{(3)}(x)+\left(x^2+2\right)y'(x)-2xy''(x)-2xy(x)=0$$

✓ **Mathematica** : cpu = 1.30536 (sec), leaf count = 65

$$\left\{\left\{y(x)\to\frac{1}{4}x\left(2c_1x-\frac{ie^{-ix}\sqrt{\frac{4}{x^2}+1}(2c_2e^{2ix}-ic_3)}{\sqrt{x^2+4}}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.275 (sec), leaf count = 18

$$\left\{y(x)=\_C1\,x^2+\_C2\,\cos(x)+\_C3\,\sin(x)\right\}$$

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 = 62.3559 (sec), leaf count = 0 , DifferentialRoot result

$$\{\{y(x)\to \text{DifferentialRoot}(\{y,x\},\{ay(x)+(2xa+b)y'(x)+(6x-3)y''(x)+2(x-1)xy^{(3)}(x)=0,y(2)$$

✓ **Maple** : cpu = 0.319 (sec), leaf count = 79

$$\left\{y(x)=\_C1\left(MathieuC\left(-\frac{a}{2}-\frac{b}{2}+1,\frac{a}{4},\arccos\left(\sqrt{x}\right)\right)\right)^2+\_C2\left(MathieuS\left(-\frac{a}{2}-\frac{b}{2}+1,\frac{a}{4},\arccos\right.\right.\right.$$

2.1506 ODE No. 1506

$$4x^2y^{(3)}(x)+\left(x^2+14x-1\right)y''(x)+4(x+1)y'(x)+2y(x)=0$$

✗ **Mathematica** : cpu = 300.065 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.074 (sec), leaf count = 43

$$\left\{y(x)=\left(\_C3+\int\frac{2\_C1\,x+\_C2}{4}\mathrm{e}^{\frac{x}{4}}\mathrm{e}^{\frac{1}{4x}}x^{-\frac{5}{2}}\,\mathrm{d}x\right)\mathrm{e}^{-\frac{x}{4}}\sqrt{x}\mathrm{e}^{-\frac{1}{4x}}\right\}$$

2.1507 ODE No. 1507

$$xy^{(3)}(x)(ax+b)+(\alpha x+\beta)y''(x)-f(x)+xy'(x)+y(x)=0$$

✗ **Mathematica** : cpu = 2.57794 (sec), leaf count = 0 , could not solve

`DSolve[-f[x] + y[x] + x*Derivative[1][y][x] + (beta + alpha*x)*Derivative[2][y][x] + x`

✓ **Maple** : cpu = 0.905 (sec), leaf count = 1210

$$\left\{y(x)=(ax+b)^{\frac{(2b+\beta)a-\alpha b}{ab}}\left(HeunC\left(0,\frac{2b-\beta}{b},\frac{(2b+\beta)a-\alpha b}{ab},-\frac{b}{a^2},\frac{(4a-\alpha)b^2-\alpha\beta b+a\beta^2}{2ab^2},-\frac{ax}{b}\right)\right.\right.$$

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 = 0.994875 (sec), leaf count = 143

$$\left\{\left\{y(x)\to 3^{-\nu-1}xa^{-\nu/3}\left(a^{\frac{\nu+1}{3}}\left(c_3a^{\nu/3}x^\nu\,{}_0F_2\left(;\frac{\nu}{3}+1,\frac{2\nu}{3}+1;-\frac{ax^3}{27}\right)+c_13^\nu\,{}_0F_2\left(;1-\frac{\nu}{3},\frac{\nu}{3}+1;-\frac{ax^3}{27}\right)\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.197 (sec), leaf count = 81

$$\left\{y(x)=\_C1\,x\,{}_0\mathrm{F}_2(\,;-\frac{\nu}{3}+1,\frac{\nu}{3}+1;-\frac{ax^3}{27})+\_C2\,x^{-\nu+1}{}_0\mathrm{F}_2(\,;-\frac{\nu}{3}+1,1-\frac{2\,\nu}{3};-\frac{ax^3}{27})+\_C3\,x^{\nu+1}{}_0\mathrm{F}\right.$$

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 = 0.0107777 (sec), leaf count = 33

$$\left\{\left\{y(x)\to x\left(c_1J_\nu(x)^2+c_3Y_\nu(x)^2+c_2J_\nu(x)Y_\nu(x)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.068 (sec), leaf count = 29

$$\left\{y(x)=x\left((Y_\nu(x))^2\_C2+Y_\nu(x)J_\nu(x)\_C3+(J_\nu(x))^2\_C1\right)\right\}$$

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 = 0.0896915 (sec), leaf count = 0 , could not solve

```
DSolve[(-1 + nu^2 + a*(-1 + nu)*x^(2*nu) + b*x^(3*nu))*y[x] + x*(1 - nu^2 + a*x^(2*nu)
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x)=DESol\left(\left\{x^3\frac{\mathrm{d}^3}{\mathrm{d}x^3}\_Y(x)+\left(x^{2\,\nu}ax-\nu^2x+x\right)\frac{\mathrm{d}}{\mathrm{d}x}\_Y(x)+\left(x^{2\,\nu}a\nu-ax^{2\,\nu}+bx^{3\,\nu}+\nu^2-1\right)\_Y\right.\right.\right.$$

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 = 0.0398617 (sec), leaf count = 52

$$\left\{\left\{y(x) \to \frac{c_1}{x^2} + \left(c_3x + \frac{x^4}{9} - \frac{3x^3}{10}\right)\log(x) + c_2x - \frac{x^4}{9} - \frac{x^3}{25}\right\}\right\}$$

✓ **Maple** : cpu = 0.04 (sec), leaf count = 49

$$\left\{y(x) = \frac{(50\,x^6 - 135\,x^5 + 450\,\_C3\,x^3)\ln(x) - 50\,x^6 - 18\,x^5 + 450\,\_C1\,x^3 + 450\,\_C2}{450\,x^2}\right\}$$

2.1512 ODE No. 1512

$$\left(1-a^2\right)xy'(x) + x^3y^{(3)}(x) + 3x^2y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0412251 (sec), leaf count = 29

$$\left\{\left\{y(x) \to \frac{-c_1x^{-a} + c_2x^a + ac_3}{a}\right\}\right\}$$

✓ **Maple** : cpu = 0.017 (sec), leaf count = 18

$$\left\{y(x) = \_C1 + \_C2\,x^a + \_C3\,x^{-a}\right\}$$

2.1513 ODE No. 1513

$$x^3y^{(3)}(x) - 4x^2y''(x) + \left(x^2+8\right)xy'(x) - 2\left(x^2+4\right)y(x) = 0$$

✓ **Mathematica** : cpu = 0.0872292 (sec), leaf count = 23

$$\{\{y(x) \to x(c_1x - c_2\sin(x) + c_3\cos(x))\}\}$$

✓ **Maple** : cpu = 0.318 (sec), leaf count = 18

$$\{y(x) = x(\cos(x)\,\_C3 + \sin(x)\,\_C2 + \_C1\,x)\}$$

2.1514 ODE No. 1514

$$\left(ax^3-12\right)y(x)+x^3y^{(3)}(x)+6x^2y''(x)=0$$

✓ **Mathematica** : cpu = 0.806662 (sec), leaf count = 97

$$\left\{\left\{y(x)\to\frac{c_1e^{-\sqrt[3]{a}x}\left(\sqrt[3]{a}x+2\right)+c_2e^{\sqrt[3]{-1}\sqrt[3]{a}x}\left(\sqrt[3]{a}x+2(-1)^{2/3}\right)+c_3e^{-(-1)^{2/3}\sqrt[3]{a}x}\left(\sqrt[3]{a}x-2\sqrt[3]{-1}\right)}{x^3}\right\}\right\}$$

✓ **Maple** : cpu = 0.645 (sec), leaf count = 135

$$\left\{y(x)=\frac{1}{x^3}\left(-\left(\left(-\sqrt{3}-i\right)\left(-a^4\right)^{\frac{2}{3}}+ia^3x\right)\_C2\,\mathrm{e}^{\frac{\frac{i}{2}\left(-\sqrt{3}+i\right)x}{a}\sqrt[3]{-a^4}}-\_C3\left(\left(\sqrt{3}-i\right)\left(-a^4\right)^{\frac{2}{3}}+ia^3x\right)\mathrm{e}^{\frac{i}{2}(}\right.\right.$$

2.1515 ODE No. 1515

$y(x)\left(a\left(4c^2\nu^2-a^2\right)+4b^2c^2(c-a)x^{2c}\right)+y'(x)\left(3(a-1)ax+4b^2c^2x^{2c+1}-4c^2\nu^2+1\right)+3(1-a)x^2y''(x)+x^3$

✗ **Mathematica** : cpu = 0.220843 (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][
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x)=DESol\left(\left\{x^3\frac{d^3}{dx^3}\_Y(x)+\left(-3\,ax^2+3\,x^2\right)\frac{d^2}{dx^2}\_Y(x)+\left(4\,b^2c^2x^{2\,c+1}-4\,\nu^2c^2+3\,a^2x-3\,ax+1\right.\right.\right.$$

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 = 300.044 (sec), leaf count = 0 , timed out

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✓ **Maple** : cpu = 0.536 (sec), leaf count = 188

$$\left\{y(x)=\frac{\_C3\,\mathrm{e}^{-x}(x^8+28\,x^7+450\,x^6+5100\,x^5+42900\,x^4+267120\,x^3+1179360\,x^2+3326400\,x+453}{}\right.$$

2.1517 ODE No. 1517

$$x^3 y^{(3)}(x) - 2x^3 + x^2 y''(x) + 2xy'(x) - y(x) + \log(x) = 0$$

✓ **Mathematica** : cpu = 0.432555 (sec), leaf count = 1656

$$\left\{\left\{y(x) \to c_3 x^{\text{Root}[\#1^3-2\#1^2+3\#1-1\&,3]} + c_2 x^{\text{Root}[\#1^3-2\#1^2+3\#1-1\&,2]} + c_1 x^{\text{Root}[\#1^3-2\#1^2+3\#1-1\&,1]} + \frac{\left(-24\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.658 (sec), leaf count = 866

$$\left\{y(x) = -\int -\frac{\left(-\ln(x) + 2x^3\right)\sqrt[3]{44+12\sqrt{69}}\left(3\sqrt{69}\sqrt[3]{44+12\sqrt{69}} - 11\sqrt[3]{44+12\sqrt{69}} + 100\right)\left(x^{\frac{(11-}{}}\right.}{13800\,x^3}\right.$$

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 = 0.270538 (sec), leaf count = 96

$$\left\{\left\{y(x) \to \frac{4c_1x^3 + 2c_2\sqrt{x^2+1}x^2 + 3c_3x^2 + 3c_3\sqrt{x^2+1}x^2\log(x) - 3c_3\sqrt{x^2+1}x^2\log\left(\sqrt{x^2+1}+1\right) + 2c}{6x}\right.\right.$$

✓ **Maple** : cpu = 0.519 (sec), leaf count = 60

$$\left\{y(x) = \frac{1}{x}\left(3\sqrt{x^2+1}Artanh\left(\frac{1}{\sqrt{x^2+1}}\right)\_C2\,x^2 + \_C1\,\sqrt{x^2+1}x^2 + 2\,\_C3\,x^3 - 3\,\_C2\,x^2 + \_C3\,x -\right.\right.$$

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 = 0.0335186 (sec), leaf count = 58

$$\left\{\left\{y(x)\to \frac{1}{8}\left(2c_1\left(x^3-3x^2+3x+3\right)-(x-1)\left(4c_2\left(x^2-2x-1\right)+c_3\left(-3x^2+2x+1\right)\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.174 (sec), leaf count = 19

$$\left\{y(x)=\_C2\,x^3+\_C1\,x^2+\_C3\,x+\_C3\right\}$$

2.1520 ODE No. 1520

$$y''(x)\left(-6x(\mathrm{a1}+\mathrm{a2}+\mathrm{a3})+3\mathrm{a1a2}+3\mathrm{a1a3}+3\mathrm{a2a3}+9x^2\right)+2(x-\mathrm{a1})(x-\mathrm{a2})(x-\mathrm{a3})y^{(3)}(x)-2\left(b+\left(n^2+\right.\right.$$

✗ **Mathematica** : cpu = 72.442 (sec), leaf count = 0 , DifferentialRoot result

$$\{\{y(x)\to \mathrm{DifferentialRoot}\left(\{y,x\},\left\{-n(n+1)y(x)-2\left(xn^2+xn-3x+b\right)y'(x)+3\left(3x^2-2\mathrm{a1}x-2\mathrm{a2}\right.\right.\right.$$

✓ **Maple** : cpu = 0.764 (sec), leaf count = 288

$$\left\{y(x)=-\_C2\,(x-a1)\left(HeunG\left(\frac{-a3+a1}{-a2+a1},\frac{(-n^2-n+3)\,a1-b}{-4\,a2+4\,a1},\frac{n}{2}+1,-\frac{n}{2}+\frac{1}{2},\frac{3}{2},\frac{1}{2},\frac{-x+a1}{-a2+a1}\right)\right.\right.$$

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 = 0.0681457 (sec), leaf count = 29

$$\left\{\left\{y(x)\to x^2\left(c_3\left(x+\frac{1}{x}+\log^2(x)\right)+c_2\log(x)+c_1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.516 (sec), leaf count = 28

$$\left\{y(x)=x\left((\ln(x))^2\,\_C3\,x+\_C2\,x\ln(x)+\_C3\,x^2+\_C1\,x+\_C3\right)\right\}$$

2.1522 ODE No. 1522

$$4x^4y^{(3)}(x)-4x^3y''(x)+4x^2y'(x)-1=0$$

✓ **Mathematica** : cpu = 0.0217612 (sec), leaf count = 42

$$\left\{\left\{y(x)\to \frac{1}{4}(2c_1-c_2)\,x^2+\frac{1}{2}c_2x^2\log(x)+c_3-\frac{1}{36x}\right\}\right\}$$

✓ **Maple** : cpu = 0.058 (sec), leaf count = 34

$$\left\{y(x)=\frac{18\,x^3\_C1\,\ln(x)-1+(-9\_C1+18\_C2)\,x^3+36\_C3\,x}{36\,x}\right\}$$

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 = 0.127766 (sec), leaf count = 46

$$\left\{\left\{y(x)\to \frac{1}{2}x\left(c_2x^2-2c_1\left(x^2-3x+1\right)-2c_2x+c_3x+c_3x\log(x)+c_2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.524 (sec), leaf count = 23

$$\left\{y(x)=x\left(\ln(x)\_C2\,x+\_C3\,x^2+(\_C1+\_C2)\,x+\_C3\right)\right\}$$

2.1524 ODE No. 1524

$$x^6y^{(3)}(x)+x^2y''(x)-2y(x)=0$$

✓ **Mathematica** : cpu = 0.178923 (sec), leaf count = 96

$$\left\{\left\{y(x)\to -\frac{\left(-\frac{1}{3}\right)^{2/3}c_2x\Gamma\left(\frac{1}{3}\right)\,{}_2F_2\left(-\frac{2}{3},\frac{1}{3};\frac{2}{3},\frac{4}{3};\frac{1}{3x^3}\right)}{3\Gamma\left(\frac{4}{3}\right)}+\frac{c_3\Gamma\left(\frac{2}{3}\right)\,{}_2F_2\left(-\frac{1}{3},\frac{2}{3};\frac{4}{3},\frac{5}{3};\frac{1}{3x^3}\right)}{9\Gamma\left(\frac{5}{3}\right)}+c_1x^2\right\}\right\}$$

✓ **Maple** : cpu = 0.615 (sec), leaf count = 98

$$\left\{y(x)=x^2\left(\int 1\mathrm{e}^{\frac{1}{6\,x^3}}\left(2\,x^3I_{1/6}(-1/6\,x^{-3})-I_{\frac{1}{6}}\left(-\frac{1}{6\,x^3}\right)-I_{-\frac{5}{6}}\left(-\frac{1}{6\,x^3}\right)\right)x^{-\frac{11}{2}}\,\mathrm{d}x\_C2+\int 1\mathrm{e}^{\frac{1}{6\,x^3}}\left(2\,x^3I\right.\right.$$

2.1525 ODE No. 1525

$$ay(x) + x^6y^{(3)}(x) + 6x^5y''(x) = 0$$

✓ **Mathematica** : cpu = 0.509404 (sec), leaf count = 101

$$\left\{\left\{y(x) \to c_1\left(-e^{\frac{\sqrt[3]{a}}{x}}\right)\left(\sqrt[3]{a} - 2x\right) + c_2e^{\frac{(-1)^{2/3}\sqrt[3]{a}}{x}}\left(x - \frac{1}{2}(-1)^{2/3}\sqrt[3]{a}\right) + c_3e^{-\frac{\sqrt[3]{-1}\sqrt[3]{a}}{x}}\left(\frac{1}{2}\sqrt[3]{-1}\sqrt[3]{a} + x\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.658 (sec), leaf count = 291

$$\left\{y(x) = \_C1\left(-8x^3 + a\right)^4 e^{-\frac{1}{ax}\sqrt[3]{-a^4}}\left(2ax + \sqrt[3]{-a^4}\right)^{-3}\left(4a^2x^2 - 2x\sqrt[3]{-a^4}a + \left(-a^4\right)^{\frac{2}{3}}\right)^{-4} + \_C2\left(-8x^3\right.$$

2.1526 ODE No. 1526

$$\left(x^4 + 2x^2 + 2x + 1\right)x^2y^{(3)}(x) - \left(2x^6 + 3x^4 - 6x^2 - 6x - 1\right)y''(x) + \left(x^6 - 6x^3 - 15x^2 - 12x - 2\right)y'(x) + (x$$

✗ **Mathematica** : cpu = 300.065 (sec), leaf count = 0 , timed out

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✓ **Maple** : cpu = 0.274 (sec), leaf count = 19

$$\left\{y(x) = \_C2\, e^{x^{-1}} + e^x(\_C3\, x + \_C1)\right\}$$

2.1527 ODE No. 1527

$$(x-a)^3(x-b)^3y^{(3)}(x) - cy(x) = 0$$

✗ **Mathematica** : cpu = 135.25 (sec), leaf count = 0 , DifferentialRoot result

$$\left\{\left\{y(x) \to \text{DifferentialRoot}\left(\{y, x\}, \left\{(a-x)^3(b-x)^3y^{(3)}(x) - cy(x) = 0, y(0) = c_1, y'(0) = c_2, y''(0) = c_3\right.\right.\right.$$

✓ **Maple** : cpu = 0.612 (sec), leaf count = 437

$$\left\{y(x) = (x-a)^{-2\frac{b}{a-b}}(x-b)^{2\frac{a}{a-b}}\left((b-x)^{-\frac{RootOf\left(\_Z^3+(-3a-3b)\_Z^2+\left(2a^2+8ab+2b^2\right)\_Z-4a^2b-4ab^2-c,index=1\right)}{a-b}}(a-x)^{-\ldots}\right.\right.$$

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 = 0.682495 (sec), leaf count = 56

$$\left\{\left\{y(x)\to -\frac{c_2 x}{\sqrt{2}} - \frac{\cot\left(\frac{x}{2}\right)(c_2\log(2(\cos(x)+1))+2c_1)}{\sqrt{2}} + c_3 + \cot\left(\frac{x}{2}\right)\sin^{-1}(\cos(x))\right\}\right\}$$

✓ **Maple** : cpu = 0.231 (sec), leaf count = 71

$$\left\{y(x) = \frac{1}{\sin(x)(-1+\cos(x))}\left(\ln\left(\frac{1-\cos(x)}{\sin(x)}\right)(\sin(x))^2\_C1 - \ln(\sin(x))(\sin(x))^2\_C1 + (\sin(x))^2\right.$$

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 = 0.0809 (sec), leaf count = 0 , could not solve

```
DSolve[Sin[x] - Cos[x]*y[x] - 3*Sin[x]*Derivative[1][y][x] + 3*(1 + Cos[x])*Derivative
```

✓ **Maple** : cpu = 0.091 (sec), leaf count = 25

$$\left\{y(x) = \frac{\_C3 + \_C1\, x^2 + \_C2\, x - \cos(x)}{\sin(x) + x}\right\}$$

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 = 0.173305 (sec), leaf count = 0 , could not solve

```
DSolve[2*nu*(1 + nu)*Sin[2*x]*y[x] + (Cos[2*x] + 4*nu*(1 + nu)*Sin[x]^2)*Derivative[1]
```

✓ **Maple** : cpu = 0.347 (sec), leaf count = 113

$$\left\{y(x) = \_C1\left({}_2F_1(-\frac{\nu}{2},\frac{\nu}{2}+\frac{1}{2};\frac{1}{2};\frac{\cos(2x)}{2}+\frac{1}{2})\right)^2 + \_C2(\cos(2x)+1)\left({}_2F_1(1+\frac{\nu}{2},\frac{1}{2}-\frac{\nu}{2};\frac{3}{2};\frac{\cos(2\right.\right.$$

2.1531 ODE No. 1531

$A(x)\left(f(x)y''(x)+g(x)y'(x)+h(x)y(x)\right)+f'(x)y''(x)+f(x)y^{(3)}(x)+g'(x)y'(x)+g(x)y''(x)+y(x)h'(x)+h($

✗ **Mathematica** : cpu = 0.0332937 (sec), leaf count = 0 , could not solve

```
DSolve[y[x]*Derivative[1][h][x] + h[x]*Derivative[1][y][x] + Derivative[1][g][x]*Deriv
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x)=DESol\left(\left\{f(x)\frac{\mathrm{d}^3}{\mathrm{d}x^3}\_Y(x)+\left(\frac{\mathrm{d}}{\mathrm{d}x}f(x)+g(x)+A(x)\,f(x)\right)\frac{\mathrm{d}^2}{\mathrm{d}x^2}\_Y(x)+\left(\frac{\mathrm{d}}{\mathrm{d}x}g(x)+h(x)+A\right.\right.\right.$$

2.1532 ODE No. 1532

$$ny(x)+y^{(3)}(x)+xy'(x)=0$$

✓ **Mathematica** : cpu = 0.0175191 (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 = 0.114 (sec), leaf count = 58

$$\left\{y(x)=\_C1\,{}_1\mathrm{F}_2\left(\frac{n}{3};\frac{1}{3},\frac{2}{3};-\frac{x^3}{9}\right)+\_C2\,x\,{}_1\mathrm{F}_2\left(\frac{1}{3}+\frac{n}{3};\frac{2}{3},\frac{4}{3};-\frac{x^3}{9}\right)+\_C3\,x^2\,{}_1\mathrm{F}_2\left(\frac{2}{3}+\frac{n}{3};\frac{4}{3},\frac{5}{3};-\frac{x^3}{9}\right)\right\}$$

2.1533 ODE No. 1533

$$-ny(x)+y^{(3)}(x)-xy'(x)=0$$

✓ **Mathematica** : cpu = 0.0197517 (sec), leaf count = 106

$$\left\{\left\{y(x)\to\frac{1}{9}\left(3\sqrt[3]{-3}c_2x\,{}_1F_2\left(\frac{n}{3}+\frac{1}{3};\frac{2}{3},\frac{4}{3};\frac{x^3}{9}\right)+9c_1\,{}_1F_2\left(\frac{n}{3};\frac{1}{3},\frac{2}{3};\frac{x^3}{9}\right)+(-3)^{2/3}c_3x^2\,{}_1F_2\left(\frac{n}{3}+\frac{2}{3};\frac{4}{3},\frac{5}{3};\right.\right.\right.$$

✓ **Maple** : cpu = 0.134 (sec), leaf count = 58

$$\left\{y(x)=\_C1\,{}_1\mathrm{F}_2\left(\frac{n}{3};\frac{1}{3},\frac{2}{3};\frac{x^3}{9}\right)+\_C2\,x\,{}_1\mathrm{F}_2\left(\frac{1}{3}+\frac{n}{3};\frac{2}{3},\frac{4}{3};\frac{x^3}{9}\right)+\_C3\,x^2\,{}_1\mathrm{F}_2\left(\frac{2}{3}+\frac{n}{3};\frac{4}{3},\frac{5}{3};\frac{x^3}{9}\right)\right\}$$

2.1534 ODE No. 1534

$$y^{(4)}(x) = 0$$

✓ **Mathematica** : cpu = 0.00432874 (sec), leaf count = 22

$$\{\{y(x) \to x(x(c_4x + c_3) + c_2) + c_1\}\}$$

✓ **Maple** : cpu = 0.048 (sec), leaf count = 21

$$\left\{y(x) = \frac{\_C1\, x^3}{6} + \frac{\_C2\, x^2}{2} + \_C3\, x + \_C4\right\}$$

2.1535 ODE No. 1535

$$-f(x) + y^{(4)}(x) + 4y(x) = 0$$

✓ **Mathematica** : cpu = 1.40022 (sec), leaf count = 168

$$\left\{\left\{y(x) \to e^{-x}\left(\cos(x)\left(\int_1^x \frac{1}{8}e^{K[1]}f(K[1])(\cos(K[1]) - \sin(K[1]))\, dK[1]\right) + e^{2x}\cos(x)\left(\int_1^x -\frac{1}{8}e^{-K[4]}f(\right.\right.\right.$$

✓ **Maple** : cpu = 0.039 (sec), leaf count = 36

$$\left\{y(x) = \frac{f}{4} + \_C1\, e^{x}\cos(x) + \_C2\, e^{x}\sin(x) + \_C3\, e^{-x}\cos(x) + \_C4\, e^{-x}\sin(x)\right\}$$

2.1536 ODE No. 1536

$$\lambda y(x) + y^{(4)}(x) = 0$$

✓ **Mathematica** : cpu = 0.00560836 (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 = 0.019 (sec), leaf count = 50

$$\left\{y(x) = \_C1\, e^{-i\sqrt[4]{-\lambda}x} + \_C2\, e^{i\sqrt[4]{-\lambda}x} + \_C3\, e^{-\sqrt[4]{-\lambda}x} + \_C4\, e^{\sqrt[4]{-\lambda}x}\right\}$$

2.1537 ODE No. 1537

$$-16e^{x^2}x^4 + y^{(4)}(x) - 12y''(x) + 12y(x) = 0$$

✓ **Mathematica** : cpu = 1.29941 (sec), leaf count = 93

$$\left\{\left\{y(x) \to c_1 e^{\sqrt{6-2\sqrt{6}}x} + c_2 e^{-\sqrt{6-2\sqrt{6}}x} + c_3 e^{\sqrt{2\left(3+\sqrt{6}\right)}x} + c_4 e^{-\sqrt{2\left(3+\sqrt{6}\right)}x} + e^{x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.181 (sec), leaf count = 67

$$\left\{y(x) = \mathrm{e}^{x^2} + \_C1\, \mathrm{e}^{\sqrt{6-2\sqrt{6}}x} + \_C2\, \mathrm{e}^{\sqrt{6+2\sqrt{6}}x} + \_C3\, \mathrm{e}^{-\sqrt{6-2\sqrt{6}}x} + \_C4\, \mathrm{e}^{-\sqrt{6+2\sqrt{6}}x}\right\}$$

2.1538 ODE No. 1538

$$a^4y(x) + 2a^2y''(x) - \cosh(ax) + y^{(4)}(x) = 0$$

✓ **Mathematica** : cpu = 0.278678 (sec), leaf count = 41

$$\left\{\left\{y(x) \to \frac{\cosh(ax)}{4a^4} + (c_4x + c_3)\sin(ax) + (c_2x + c_1)\cos(ax)\right\}\right\}$$

✓ **Maple** : cpu = 0.553 (sec), leaf count = 51

$$\left\{y(x) = \frac{\mathrm{e}^{-ax} + (8\_C3\, x + 8\_C1)\, a^4 \cos(ax) + (8\_C4\, x + 8\_C2)\, a^4 \sin(ax) + \mathrm{e}^{ax}}{8\, a^4}\right\}$$

2.1539 ODE No. 1539

$$a^4\lambda y(x) + a^2(\lambda + 1)y''(x) + y^{(4)}(x) = 0$$

✓ **Mathematica** : cpu = 0.00731323 (sec), leaf count = 44

$$\left\{\left\{y(x) \to c_2 \sin\left(a\sqrt{\lambda}x\right) + c_1 \cos\left(a\sqrt{\lambda}x\right) + c_4 \sin(ax) + c_3 \cos(ax)\right\}\right\}$$

✓ **Maple** : cpu = 0.043 (sec), leaf count = 35

$$\left\{y(x) = \_C1\ \sin(ax) + \_C2\ \cos(ax) + \_C3\ \sin\left(a\sqrt{\lambda}x\right) + \_C4\ \cos\left(a\sqrt{\lambda}x\right)\right\}$$

2.1540 ODE No. 1540

$$a(bx-1)y''(x)+aby'(x)+\lambda y(x)+y^{(4)}(x)=0$$

✗ **Mathematica** : cpu = 0.404733 (sec), leaf count = 0 , DifferentialRoot result

$$\{\{y(x)\to \text{DifferentialRoot}(\{y,x\},\{\lambda y(x)+aby'(x)+a(xb-1)y''(x)+y^{(4)}(x)=0,y(0)=c_1,y'(0)=c_2$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x)=DESol\left(\left\{\lambda\_Y(x)+ab\frac{\mathrm{d}}{\mathrm{d}x}\_Y(x)+a(bx-1)\frac{\mathrm{d}^2}{\mathrm{d}x^2}\_Y(x)+\frac{\mathrm{d}^4}{\mathrm{d}x^4}\_Y(x)\right\},\{\_Y(x)\}\right)\right\}$$

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 = 80.245 (sec), leaf count = 0 , DifferentialRoot result

$$\{\{y(x)\to \text{DifferentialRoot}(\{y,x\},\{\left(ax^2+\beta\lambda+\gamma\right)y(x)+\left(ax^2+c+b\lambda\right)y''(x)+y^{(4)}(x)=0,y(0)=c_1$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x)=DESol\left(\left\{\left(ax^2+\beta\lambda+\gamma\right)\_Y(x)+\left(ax^2+b\lambda+c\right)\frac{\mathrm{d}^2}{\mathrm{d}x^2}\_Y(x)+\frac{\mathrm{d}^4}{\mathrm{d}x^4}\_Y(x)\right\},\{\_Y(x)\}\right)\right\}$$

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 = 0.029634 (sec), leaf count = 0 , could not solve

```
DSolve[(d + c*(-g2/2 + 6*WeierstrassP[x, {g2, g3}]^2))*y[x] + b*WeierstrassPPrime[x, {
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x)=DESol\left(\left\{\frac{\mathrm{d}^4}{\mathrm{d}x^4}\_Y(x)+a\,WeierstrassP(x,g2,g3)\frac{\mathrm{d}^2}{\mathrm{d}x^2}\_Y(x)+b\,WeierstrassPPrime(x,g2,g3)\right.\right.$$

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 = 0.108514 (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*Jaco
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x)=DESol\left(\left\{\frac{\mathrm{d}^4}{\mathrm{d}x^4}\_Y(x)+\left(-12\,k^2(JacobiSN(z,x))^2-a\right)\frac{\mathrm{d}^2}{\mathrm{d}x^2}\_Y(x)+b\frac{\mathrm{d}}{\mathrm{d}x}\_Y(x)+\left(\alpha\,(JacobiS\right.\right.\right.$$

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 = 0.0153282 (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
```

✓ **Maple** : cpu = 0.02 (sec), leaf count = 41

$$\left\{y(x)=\sum_{\_a=1}^{4}\mathrm{e}^{RootOf\left(\_Z^4+10\,f\,\_Z^2+10\,df\,\_Z+3\,f^2+3\,ddf,index=\_a\right)x}\_C\_a\right\}$$

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 = 0.19865 (sec), leaf count = 40

$$\left\{\left\{y(x)\to e^{-2x}\left(c_2x+c_3e^{3x}+c_4e^{3x}x+c_1\right)+\sin(2x)\right\}\right\}$$

✓ **Maple** : cpu = 0.103 (sec), leaf count = 27

$$\left\{y(x)=(\_C4\,x+\_C2)\,\mathrm{e}^{-2\,x}+\sin\left(2\,x\right)+(\_C3\,x+\_C1)\,\mathrm{e}^{x}\right\}$$

2.1546 ODE No. 1546

$$a^4x^4y(x) + 4a^3x^3y'(x) + 6a^2x^2y''(x) + 4axy^{(3)}(x) + y^{(4)}(x) = 0$$

✓ **Mathematica** : cpu = 0.875055 (sec), leaf count = 139

$$\left\{\left\{y(x) \to e^{-\frac{1}{2}x\left(ax+2\sqrt{-\left(\sqrt{6}-3\right)a}\right)}\left(c_2e^{2\sqrt{-\left(\sqrt{6}-3\right)}ax} + \frac{\sqrt{\frac{1}{2}-\frac{1}{\sqrt{6}}}e^{-\frac{\left(-3+\sqrt{3}+\sqrt{6}\right)ax}{\sqrt{-\left(\sqrt{6}-3\right)a}}}\left(c_4e^{\frac{2ax}{\sqrt{a-\sqrt{\frac{2}{3}}a}}} + c_3\right)}{\sqrt{a}} + c_1\right)\right.\right.$$

✓ **Maple** : cpu = 0.067 (sec), leaf count = 73

$$\left\{y(x) = e^{-\frac{ax^2}{2}}\left(\_C2\, e^{\sqrt{-a\left(-3+\sqrt{6}\right)}x} + \_C4\, e^{\sqrt{\left(3+\sqrt{6}\right)a}x} + \_C1\, e^{-\sqrt{-a\left(-3+\sqrt{6}\right)}x} + \_C3\, e^{-\sqrt{\left(3+\sqrt{6}\right)a}x}\right)\right\}$$

2.1547 ODE No. 1547

$$3y(x)\left(2g(x)f'(x) + 5f(x)g'(x) + 6f(x)^2g(x) + g''(x) + 3g(x)^2\right) + y''(x)\left(4f'(x) + 11f(x)^2 + 10g(x)\right) + y'($$

✗ **Mathematica** : cpu = 0.0333615 (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*
```

✓ **Maple** : cpu = 0.024 (sec), leaf count = 87

$$\left\{y(x) = \sum_{\_a=1}^{4} e^{RootOf(\_Z^4+6\,f\_Z^3+(11\,f^2+4\,df+10\,g)\_Z^2+(6\,f^3+7\,df\,f+30\,fg+ddf+10\,dg)\_Z+18\,f^2g+6\,df\,g+15\,dg\,f+9\,g^2+3\,ddg,}\right.$$

2.1548 ODE No. 1548

$$4y^{(4)}(x) - 12y^{(3)}(x) + 11y''(x) - 3y'(x) - 4\cos(x) = 0$$

✓ **Mathematica** : cpu = 0.108153 (sec), leaf count = 50

$$\left\{\left\{y(x) \to 2c_1e^{x/2} + \frac{2}{3}c_2e^{3x/2} + c_3e^x + c_4 + \frac{18\sin(x)}{65} - \frac{14\cos(x)}{65}\right\}\right\}$$

✓ **Maple** : cpu = 0.086 (sec), leaf count = 32

$$\left\{y(x) = \_C1\, e^x + 2\,\_C2\, e^{x/2} + \frac{2\,\_C3}{3}e^{\frac{3x}{2}} + \frac{18\sin(x)}{65} - \frac{14\cos(x)}{65} + \_C4\right\}$$

2.1549 ODE No. 1549

$$xy^{(4)}(x) + 5y^{(3)}(x) - 24 = 0$$

✓ **Mathematica** : cpu = 0.0140239 (sec), leaf count = 34

$$\left\{\left\{y(x) \to c_4x^2 - \frac{c_1}{24x^2} + c_3x + c_2 + \frac{4x^3}{5}\right\}\right\}$$

✓ **Maple** : cpu = 0.034 (sec), leaf count = 26

$$\left\{y(x) = \frac{\_C2\,x^2}{2} + \frac{4\,x^3}{5} - \frac{\_C1}{24\,x^2} + \_C3\,x + \_C4\right\}$$

2.1550 ODE No. 1550

$$12x^3y''(x) - \left(6x^2+1\right)y^{(3)}(x) - \left(9x^2-7\right)x^2y'(x) + 2\left(x^2-3\right)x^3y(x) + xy^{(4)}(x) = 0$$

✓ **Mathematica** : cpu = 5.55429 (sec), leaf count = 214

$$\left\{\left\{y(x) \to e^{\frac{x^2}{2}}\left(c_3\int_1^x \frac{e^{\frac{K[1]^2}{2}}K[1]\left(\int \frac{e^{-\frac{1}{4}\left(1+\sqrt{5}\right)K[1]^2}\left(K[1]^2\right)^{3/4}U\left(\frac{1}{20}\left(-5-9\sqrt{5}\right),-\frac{1}{2},\frac{1}{2}\sqrt{5}K[1]^2\right)}{K[1]^{7/2}}\,dK[1]\right)}{\sqrt[4]{2}}\,dK[1] + c_4 \int\right.\right.$$

✓ **Maple** : cpu = 4.686 (sec), leaf count = 157

$$\left\{y(x) = -\mathrm{e}^{x^2}\int 1W_{\frac{9\sqrt{5}}{20},\frac{3}{4}}\left(\frac{\sqrt{5}x^2}{2}\right)\mathrm{e}^{-\frac{x^2}{4}}x^{-\frac{3}{2}}\,\mathrm{d}x\_C4 - \mathrm{e}^{x^2}\int 1M_{\frac{9\sqrt{5}}{20},\frac{3}{4}}\left(\frac{\sqrt{5}x^2}{2}\right)\mathrm{e}^{-\frac{x^2}{4}}x^{-\frac{3}{2}}\,\mathrm{d}x\_C3 + \mathrm{e}^{\frac{x^2}{2}}\int\right.$$

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 = 0.455113 (sec), leaf count = 84

$$\left\{\left\{y(x)\to \frac{e^{-\nu x}(c_3(-\nu^2x^3+\nu^2-6\nu x^2+6\nu-15x+15)+e^{2\nu x}(c_4(-\nu^2x^3+\nu^2+6\nu x^2-6\nu-15x+15)}{x}\right.\right.$$

✓ **Maple** : cpu = 0.291 (sec), leaf count = 62

$$\left\{y(x)=\frac{(\_C4\,\nu^2x^3+6\,\_C4\,\nu\,x^2+15\,\_C4\,x+\_C2)\,\mathrm{e}^{-\nu\,x}+\mathrm{e}^{\nu\,x}(\_C3\,\nu^2x^3-6\,\_C3\,\nu\,x^2+15\,\_C3\,x+}{x}\right.$$

2.1552 ODE No. 1552

$$ay(x)-bx^2+x^2y^{(4)}(x)+2xy^{(3)}(x)=0$$

✗ **Mathematica** : cpu = 300. (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.096 (sec), leaf count = 89

$$\left\{y(x)=\frac{bx^2}{a}+\_C1\,\sqrt{x}J_1\left(2\sqrt[4]{-a}\sqrt{x}\right)+\_C2\,\sqrt{x}Y_1\left(2\sqrt[4]{-a}\sqrt{x}\right)+\_C3\,\sqrt{x}J_1\left(2\sqrt{-\sqrt{-a}}\sqrt{x}\right)+\_C4\right.$$

2.1553 ODE No. 1553

$$x^2y^{(4)}(x)+4xy^{(3)}(x)+2y''(x)=0$$

✓ **Mathematica** : cpu = 0.0249764 (sec), leaf count = 29

$$\{\{y(x)\to(c_4-c_1)\,x+(c_1x-c_2)\log(x)+c_3\}\}$$

✓ **Maple** : cpu = 0.016 (sec), leaf count = 17

$$\{y(x)=(\_C2\,x+\_C4)\ln(x)+\_C1\,x+\_C3\}$$

2.1554 ODE No. 1554

$$x^2 y^{(4)}(x) + 6xy^{(3)}(x) + 6y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0261059 (sec), leaf count = 27

$$\left\{\left\{y(x)\to \frac{c_2}{2x} + c_4 x - c_1 \log(x) + c_3\right\}\right\}$$

✓ **Maple** : cpu = 0.016 (sec), leaf count = 18

$$\left\{y(x) = \_C1 + \_C2\ \ln(x) + \_C3\ x + \frac{\_C4}{x}\right\}$$

2.1555 ODE No. 1555

$$\lambda^2(-y(x)) + x^2 y^{(4)}(x) + 6xy^{(3)}(x) + 6y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0656297 (sec), leaf count = 156

$$\left\{\left\{y(x)\to c_4 G_{0,4}^{2,0}\left(\frac{\lambda^2 x^2}{16}\middle|\ -\tfrac{1}{2},\tfrac{1}{2},0,0\right) + c_2 G_{0,4}^{2,0}\left(\frac{\lambda^2 x^2}{16}\middle|\ 0,0,-\tfrac{1}{2},\tfrac{1}{2}\right) + \frac{c_1\left(J_1\left(2\sqrt{\lambda}\sqrt{x}\right) + I_1\left(2\sqrt{\lambda}\sqrt{x}\right)\right)}{2\sqrt{\lambda}\sqrt{x}}\right.\right.$$

✓ **Maple** : cpu = 0.253 (sec), leaf count = 61

$$\left\{y(x) = 1\left(\_C2\ Y_1\left(2\sqrt{\lambda}\sqrt{x}\right) + \_C1\ J_1\left(2\sqrt{\lambda}\sqrt{x}\right) + \_C4\ Y_1\left(2\sqrt{-\lambda}\sqrt{x}\right) + \_C3\ J_1\left(2\sqrt{-\lambda}\sqrt{x}\right)\right)\frac{1}{\sqrt{x}}\right.$$

2.1556 ODE No. 1556

$$x^2 y^{(4)}(x) + 8xy^{(3)}(x) + 12y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0236612 (sec), leaf count = 27

$$\left\{\left\{y(x)\to \frac{3c_2 x + c_1}{6x^2} + c_4 x + c_3\right\}\right\}$$

✓ **Maple** : cpu = 0.017 (sec), leaf count = 19

$$\left\{y(x) = \_C1 + \frac{\_C2}{x^2} + \_C3\ x + \frac{\_C4}{x}\right\}$$

2.1557 ODE No. 1557

$$\lambda^2(-y(x)) + x^2y^{(4)}(x) + 8xy^{(3)}(x) + 12y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0746737 (sec), leaf count = 146

$$\left\{\left\{y(x) \to c_4 G_{0,4}^{2,0}\left(\frac{\lambda^2 x^2}{16} \middle| \begin{array}{c} -1,0,-\frac{1}{2},\frac{1}{2} \end{array}\right) + c_2 G_{0,4}^{2,0}\left(\frac{\lambda^2 x^2}{16} \middle| \begin{array}{c} -\frac{1}{2},\frac{1}{2},-1,0 \end{array}\right) - \frac{3ic_1\left(I_2\left(2\sqrt{\lambda}\sqrt{x}\right) - J_2\left(2\sqrt{\lambda}\right.\right.}{4\lambda x}\right.\right.$$

✓ **Maple** : cpu = 0.154 (sec), leaf count = 61

$$\left\{y(x) = \frac{1}{x}\left(\_C4\, Y_2\left(2\sqrt{-\lambda}\sqrt{x}\right) + \_C3\, J_2\left(2\sqrt{-\lambda}\sqrt{x}\right) + \_C2\, Y_2\left(2\sqrt{\lambda}\sqrt{x}\right) + \_C1\, J_2\left(2\sqrt{\lambda}\sqrt{x}\right)\right)\right\}$$

2.1558 ODE No. 1558

$$-\frac{1}{16}b^4y(x) + x(2n-2\nu+4)y^{(3)}(x) + (n-\nu+1)(n-\nu+2)y''(x) + x^2y^{(4)}(x) = 0$$

✓ **Mathematica** : cpu = 0.167891 (sec), leaf count = 222

$$\left\{\left\{y(x) \to i^{-n}2^{n-3\nu-3}b^{\nu-n}x^{\frac{\nu-n}{2}}\left(i^n4^\nu(4c_1\Gamma(n-\nu+1) - ic_2\Gamma(n-\nu+2))\, J_{n-\nu}\left(b\sqrt{x}\right) + i^n4^\nu(4c_1\Gamma(n-\nu+\right.\right.\right.$$

✓ **Maple** : cpu = 0.223 (sec), leaf count = 67

$$\left\{y(x) = x^{-\frac{n}{2}+\frac{\nu}{2}}\left(Y_{n-\nu}\left(b\sqrt{x}\right)\_C4 + J_{n-\nu}\left(b\sqrt{x}\right)\_C2 + K_{n-\nu}\left(b\sqrt{x}\right)\_C3 + I_{n-\nu}\left(b\sqrt{x}\right)\_C1\right)\right\}$$

2.1559 ODE No. 1559

$$a^4\left(-x^3\right)y(x) + x^3y^{(4)}(x) + 2x^2y^{(3)}(x) - xy''(x) + y'(x) = 0$$

✓ **Mathematica** : cpu = 0.299168 (sec), leaf count = 100

$$\left\{\left\{y(x) \to c_4 G_{0,4}^{2,0}\left(\frac{a^4x^4}{256} \middle| \begin{array}{c} 0,0,\frac{1}{2},\frac{1}{2} \end{array}\right) + c_2 G_{0,4}^{2,0}\left(\frac{a^4x^4}{256} \middle| \begin{array}{c} \frac{1}{2},\frac{1}{2},0,0 \end{array}\right) + \frac{1}{8}ic_1(I_0(ax) - J_0(ax)) + \frac{1}{2}c_3(J_0(ax)\right.\right.$$

✓ **Maple** : cpu = 0.207 (sec), leaf count = 33

$$\{y(x) = \_C1\, I_0(ax) + \_C2\, J_0(ax) + \_C3\, K_0(ax) + \_C4\, Y_0(ax)\}$$

2.1560 ODE No. 1560

$$x^3y^{(4)}(x) + 6x^2y^{(3)}(x) + 6xy''(x) = 0$$

✓ **Mathematica** : cpu = 0.0281672 (sec), leaf count = 27

$$\left\{\left\{y(x) \to \frac{c_2}{2x} + c_4x - c_1\log(x) + c_3\right\}\right\}$$

✓ **Maple** : cpu = 0.018 (sec), leaf count = 18

$$\left\{y(x) = \_C1 + \_C2\ \ln(x) + \_C3\ x + \frac{\_C4}{x}\right\}$$

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 = 4.80461 (sec), leaf count = 310

$$\left\{\left\{y(x) \to \sqrt[8]{a}2^{-n-\frac{7}{2}}\sqrt{x}\left(2^{2n+1}\mathrm{ber}_{-n-\frac{1}{2}}\left(\sqrt[4]{a}x\right)\left(4c_2\cos\left(\frac{3}{8}\pi(2n+1)\right)\Gamma\left(\frac{1}{2}-n\right) - c_1\cos\left(\frac{3}{8}\pi(2n-3)\right)\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.289 (sec), leaf count = 69

$$\left\{y(x) = \sqrt{x}\left(J_{n+\frac{1}{2}}\left(\sqrt[4]{-a}x\right)\_C1 + Y_{n+\frac{1}{2}}\left(\sqrt[4]{-a}x\right)\_C2 + Y_{n+\frac{1}{2}}\left(\sqrt{-\sqrt{-a}}x\right)\_C4 + J_{n+\frac{1}{2}}\left(\sqrt{-\sqrt{-a}}x\right)\_\right.\right.$$

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 = 1.246 (sec), leaf count = 140

$$\left\{\left\{y(x) \to c_1\,{}_0F_3\left(;\frac{1}{2},1-\frac{n}{2},\frac{n}{2}+1;\frac{x^4}{64}\right) + \frac{1}{8}ic_2x^2\,{}_0F_3\left(;\frac{3}{2},\frac{3}{2}-\frac{n}{2},\frac{n}{2}+\frac{3}{2};\frac{x^4}{64}\right) + c_3\left(\frac{i}{2}\right)^{-n}\Gamma(1-n)^2\left(\mathrm{b}\right.\right.\right.$$

✓ **Maple** : cpu = 0.448 (sec), leaf count = 77

$$\left\{y(x) = \left(Y_n\left(\left(\frac{1}{2}-\frac{i}{2}\right)\sqrt{2}x\right)\_C3 + \_C1\ J_n\left(\left(\frac{1}{2}-\frac{i}{2}\right)\sqrt{2}x\right)\right)J_n\left(\left(\frac{1}{2}+\frac{i}{2}\right)\sqrt{2}x\right) + Y_n\left(\left(\frac{1}{2}+\frac{i}{2}\right)\right.\right.$$

2.1563 ODE No. 1563

$$(4n^2-4x^4-1)\,y(x)-(4n^2-1)\,x^2y''(x)-(4n^2-1)\,xy'(x)+x^4y^{(4)}(x)+4x^3y^{(3)}(x)=0$$

✓ **Mathematica** : cpu = 2.34916 (sec), leaf count = 187

$$\left\{\left\{y(x)\to\frac{\sqrt[4]{-1}\left(x^2\left(c_2\,{}_0F_3\left(;\frac{3}{2},1-\frac{n}{2},\frac{n}{2}+1;\frac{x^4}{64}\right)+c_3\left(\frac{i}{8}\right)^{-n}x^{-2n}\,{}_0F_3\left(;1-n,1-\frac{n}{2},\frac{3}{2}-\frac{n}{2};\frac{x^4}{64}\right)+c_4\left(\frac{i}{8}\right)^{n}\right.\right.}{2\sqrt{2}x}\right.\right.$$

✓ **Maple** : cpu = 0.398 (sec), leaf count = 87

$$\left\{y(x)=\frac{1}{x}\left(\_C4\,{}_0\mathrm{F}_3(\,;\frac{1}{2},-\frac{n}{2}+\frac{1}{2},\frac{n}{2}+\frac{1}{2};\frac{x^4}{64})+\left(\_C3\,{}_0\mathrm{F}_3(\,;\frac{3}{2},-\frac{n}{2}+1,\frac{n}{2}+1;\frac{x^4}{64})+\_C2\,(\mathrm{bei}_{-n}(x)\right.\right.\right.$$

2.1564 ODE No. 1564

$$-(12n^2+4x^4-3)\,y(x)-(4n^2+3)\,x^2y''(x)+(12n^2-3)\,xy'(x)+x^4y^{(4)}(x)+4x^3y^{(3)}(x)=0$$

✓ **Mathematica** : cpu = 1.5316 (sec), leaf count = 196

$$\left\{\left\{y(x)\to\frac{\left(\frac{1}{32}+\frac{i}{32}\right)\left(8c_1x^2\,{}_0F_3\left(;\frac{1}{2},\frac{3}{2}-\frac{n}{2},\frac{n}{2}+\frac{3}{2};\frac{x^4}{64}\right)+i\left(c_2x^4\,{}_0F_3\left(;\frac{3}{2},2-\frac{n}{2},\frac{n}{2}+2;\frac{x^4}{64}\right)-8^{2-n}e^{-\frac{1}{2}i\pi n}x\right.\right.\right.}{x}\right.\right.$$

✓ **Maple** : cpu = 0.324 (sec), leaf count = 88

$$\left\{y(x)=\frac{1}{x}\left(\_C4\,x^2{}_0\mathrm{F}_3(\,;\frac{1}{2},\frac{3}{2}-\frac{n}{2},\frac{n}{2}+\frac{3}{2};\frac{x^4}{64})+\_C3\,x^4{}_0\mathrm{F}_3(\,;\frac{3}{2},\frac{n}{2}+2,-\frac{n}{2}+2;\frac{x^4}{64})+\_C2\,(\mathrm{bei}_{-n}(x\right.\right.$$

2.1565 ODE No. 1565

$$(x(-\rho^2-\sigma^2+1)+16x^3)\,y'(x)+y(x)\,(\rho^2\sigma^2+8x^2)+(x^2(-\rho^2-\sigma^2+7)+4x^4)\,y''(x)+x^4y^{(4)}(x)+6x^3y^{(3)}$$

✓ **Mathematica** : cpu = 0.57702 (sec), leaf count = 242

$$\left\{\left\{y(x)\to c_1x^{-\rho}\,{}_2F_3\left(\frac{1}{2}-\frac{\rho}{2},1-\frac{\rho}{2};1-\rho,-\frac{\rho}{2}-\frac{\sigma}{2}+1,-\frac{\rho}{2}+\frac{\sigma}{2}+1;-x^2\right)+c_3x^{-\sigma}\,{}_2F_3\left(\frac{1}{2}-\frac{\sigma}{2},1-\frac{\sigma}{2};\right.\right.\right.$$

✓ **Maple** : cpu = 0.535 (sec), leaf count = 71

$$\left\{y(x)=\left(Y_{\frac{\rho}{2}+\frac{\sigma}{2}}(x)\_C3+\_C1\,J_{\frac{\rho}{2}+\frac{\sigma}{2}}(x)\right)J_{-\frac{\sigma}{2}+\frac{\rho}{2}}(x)+Y_{-\frac{\sigma}{2}+\frac{\rho}{2}}(x)\left(Y_{\frac{\rho}{2}+\frac{\sigma}{2}}(x)\_C4+\_C2\,J_{\frac{\rho}{2}+\frac{\sigma}{2}}(x)\right)\right\}$$

2.1566 ODE No. 1566

$$(x(-2\mu^2-2\nu^2+1)+16x^3)\,y'(x)+y(x)\left((\mu^2-\nu^2)^2+8x^2\right)+(x^2(-2\mu^2-2\nu^2+7)+4x^4)\,y''(x)+x^4y^{(4)}($$

✓ **Mathematica** : cpu = 0.692949 (sec), leaf count = 237

$$\left\{\left\{y(x)\to x^{-\mu-\nu}\left(c_1\,{}_2F_3\left(-\frac{\mu}{2}-\frac{\nu}{2}+\frac{1}{2},-\frac{\mu}{2}-\frac{\nu}{2}+1;1-\mu,1-\nu,-\mu-\nu+1;-x^2\right)+c_2x^{2\mu}\,{}_2F_3\left(\frac{\mu}{2}-\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.449 (sec), leaf count = 35

$$\{y(x)=(Y_\mu(x)\_C2+\_C1\,J_\mu(x))\,J_\nu(x)+Y_\nu(x)(Y_\mu(x)\_C4+\_C3\,J_\mu(x))\}$$

2.1567 ODE No. 1567

$$x^4y^{(4)}(x)+8x^3y^{(3)}(x)+12x^2y''(x)=0$$

✓ **Mathematica** : cpu = 0.026351 (sec), leaf count = 27

$$\left\{\left\{y(x)\to\frac{3c_2x+c_1}{6x^2}+c_4x+c_3\right\}\right\}$$

✓ **Maple** : cpu = 0.019 (sec), leaf count = 19

$$\left\{y(x)=\_C1+\frac{\_C2}{x^2}+\_C3\,x+\frac{\_C4}{x}\right\}$$

2.1568 ODE No. 1568

$$ay(x)+x^4y^{(4)}(x)+8x^3y^{(3)}(x)+12x^2y''(x)=0$$

✓ **Mathematica** : cpu = 0.0273794 (sec), leaf count = 116

$$\left\{\left\{y(x)\to\frac{c_1x^{-\frac{1}{2}\sqrt{5-4\sqrt{1-a}}}+c_2x^{\frac{1}{2}\sqrt{5-4\sqrt{1-a}}}+c_3x^{-\frac{1}{2}\sqrt{4\sqrt{1-a}+5}}+c_4x^{\frac{1}{2}\sqrt{4\sqrt{1-a}+5}}}{\sqrt{x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.041 (sec), leaf count = 89

$$\left\{y(x)=\_C1\,x^{-\frac{1}{2}-\frac{1}{2}\sqrt{5-4\sqrt{1-a}}}+\_C2\,x^{-\frac{1}{2}+\frac{1}{2}\sqrt{5-4\sqrt{1-a}}}+\_C3\,x^{-\frac{1}{2}-\frac{1}{2}\sqrt{5+4\sqrt{1-a}}}+\_C4\,x^{-\frac{1}{2}+\frac{1}{2}\sqrt{5+4\sqrt{1-a}}}\right\}$$

2.1569 ODE No. 1569

$$xy'(x)\left((2a-1)\mathrm{C0}+4b^2\mathrm{B0}c^2x^{2c}\right)+(6-4a)x^3y^{(3)}(x)+x^2y''(x)\left(\mathrm{A0}+4b^2c^2x^{2c}\right)+y(x)\left(4b^2c^2\mathrm{D0}x^{2c}+\mathrm{E0}\right)+$$

✗ **Mathematica** : cpu = 301.444 (sec), leaf count = 0 , timed out

```
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```

✓ **Maple** : cpu = 0.651 (sec), leaf count = 63

$$\{y(x)=((J_{\mu}(bx^c)\_C2+Y_{\mu}(bx^c)\_C3)\,J_{\nu}(bx^c)+Y_{\nu}(bx^c)(\_C4\,Y_{\mu}(bx^c)+\_C1\,J_{\mu}(bx^c)))\,x^a\}$$

2.1570 ODE No. 1570

$$y(x)\left(\left(a^2-c^2\nu^2\right)\left(a^2+4ac-c^2\nu^2+4c^2\right)-b^4c^4x^{4c}\right)+x^2\left(2a^2+4(a+c-1)^2+4(a-1)(c-1)-2c^2\nu^2-\right.$$

✓ **Mathematica** : cpu = 0.150844 (sec), leaf count = 213

$$\left\{\left\{y(x)\to b^{a/c}(-1)^{\frac{a-c\nu}{4c}}2^{-\frac{2a}{c}-\nu-3}\left(x^{4c}\right)^{\frac{a}{4c}}\left(4^{\nu}(4c_1\Gamma(1-\nu)-ic_2\Gamma(2-\nu))\,J_{-\nu}\left(b\sqrt[4]{x^{4c}}\right)+4^{\nu}(4c_1\Gamma(1-\nu)+\right.\right.\right.$$

✓ **Maple** : cpu = 0.112 (sec), leaf count = 49

$$\{y(x)=x^a(Y_{\nu}(ibx^c)\_C4+Y_{\nu}(bx^c)\_C2+J_{\nu}(ibx^c)\_C3+J_{\nu}(bx^c)\_C1)\}$$

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 = 0.0913721 (sec), leaf count = 389

$$\left\{\left\{y(x)\to c_1\,{}_0F_3\left(;1-\frac{v}{2},1-\frac{v}{2\nu},-\frac{v}{2\nu}-\frac{v}{2}+1;\frac{b^4v^4x^{2/v}}{256\nu^4}\right)+c_2\left(\frac{i}{16}\right)^{v}v^{2v}b^{2v}\nu^{-2v}\left(x^{2/v}\right)^{v/2}{}_0F_3\left(;\frac{v}{2}+1,\right.\right.\right.$$

✓ **Maple** : cpu = 0.4 (sec), leaf count = 143

$$\left\{y(x)=\sqrt{x}\left(J_{(\lfloor\nu^{-1}\rfloor)^{-1}}\left(\frac{1}{\lfloor\nu^{-1}\rfloor}\sqrt{\frac{b^2}{\nu^2}}x^{\frac{\lfloor\nu^{-1}\rfloor}{2}}\right)\_C1+Y_{(\lfloor\nu^{-1}\rfloor)^{-1}}\left(\frac{1}{\lfloor\nu^{-1}\rfloor}\sqrt{\frac{b^2}{\nu^2}}x^{\frac{\lfloor\nu^{-1}\rfloor}{2}}\right)\_C2+J_{(\lfloor\nu^{-1}\rfloor)^{-1}}\left(\frac{1}{\lfloor\nu^{-1}\right.\right.\right.$$

2.1572 ODE No. 1572

$$\left(-2\left(x^2-1\right)\left(\mu(\mu+1)+\nu(\nu+1)\right)+24x^3-8\right)y''(x)-6x(\mu(\mu+1)+\nu(\nu+1)-2)y'(x)+((\mu(\mu+1)-\nu(\nu+$$

✗ **Mathematica** : cpu = 95.3641 (sec), leaf count = 0 , DifferentialRoot result

$$\{\{y(x)\to \text{DifferentialRoot}(\{y,x\},\{(\mu-\nu-1)(\mu-\nu+1)(\mu+\nu)(\mu+\nu+2)y(x)-6x\left(\mu^2+\mu+\nu^2+\nu\right.$$

✓ **Maple** : cpu = 0.563 (sec), leaf count = 35

$$\{y(x)=(\mathit{LegendreQ}(\mu,x)\_C2+\_C1\ \mathit{LegendreP}(\mu,x))\ \mathit{LegendreP}(\nu,x)+\mathit{LegendreQ}(\nu,x)\ (\mathit{LegendreQ}($$

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 = 0.0721759 (sec), leaf count = 0 , could not solve

```
DSolve[-x^(-5) + E^x*y[x] + 4*E^x*Derivative[1][y][x] + 6*E^x*Derivative[2][y][x] + 4*
```

✓ **Maple** : cpu = 0.06 (sec), leaf count = 41

$$\left\{y(x)=\frac{24\_C1\ x^4+24\_C2\ x^3+24\_C3\ x^2+24\_C4\ x+1}{(24\,e^x+48\,x)\,x}\right\}$$

2.1574 ODE No. 1574

$$y(x)\left(a^4\sin^4(x)-3\right)+y^{(4)}(x)\sin^4(x)+2y^{(3)}(x)\sin^3(x)\cos(x)+\left(\sin^2(x)-3\right)\sin^2(x)y''(x)+\left(2\sin^2(x)+3\right)$$

✗ **Mathematica** : cpu = 0.22893 (sec), leaf count = 0 , could not solve

```
DSolve[(-3 + a^4*Sin[x]^4)*y[x] + Cos[x]*Sin[x]*(3 + 2*Sin[x]^2)*Derivative[1][y][x] +
3 + Sin[x]^2)*Derivative[2][y][x] + 2*Cos[x]*Sin[x]^3*Derivative[3][y][x] + Sin[x]^4*D
```

✓ **Maple** : cpu = 1.019 (sec), leaf count = 252

$$\left\{y(x)=\left({}_2\mathrm{F}_1\left(\frac{3}{4}-\frac{1}{4}\sqrt{-4\sqrt{-(a-1)(a+1)(a^2+1)}+5},\frac{3}{4}+\frac{1}{4}\sqrt{-4\sqrt{-(a-1)(a+1)(a^2+1)}+5};\right.\right.\right.$$

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 = 0.0676005 (sec), leaf count = 0 , could not solve

```
DSolve[-f[x] + Sin[x]^6*y[x] - 4*Cos[x]*Sin[x]^5*Derivative[1][y][x] - 6*Sin[x]^6*Deri
```

✓ **Maple** : cpu = 0.521 (sec), leaf count = 638

$$\left\{y(x)=\frac{1}{48\left(e^{2ix}-1\right)^4\sin(x)}\left(12\left(e^{2ix}-3/2\,e^{4ix}+e^{6ix}-1/4\,e^{8ix}-1/4\right)\left(x^2+\frac{20}{3}\right)fx\ln\left(1-e^{ix}\right)-\right.\right.$$

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 = 0.233726 (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]
```

✓ **Maple** : cpu = 0.036 (sec), leaf count = 67

$$\left\{y(x)=\_C1\,e^{ax}+\_C2\,e^{-ax}+\_C3\,e^{\frac{x}{f}\left(-df+\sqrt{a^2f^2+df^2}\right)}+\_C4\,e^{-\frac{x}{f}\left(df+\sqrt{a^2f^2+df^2}\right)}\right\}$$

2.1577 ODE No. 1577

$$f''(x)y''(x)+2y^{(3)}(x)f'(x)+f(x)y^{(4)}(x)=0$$

✓ **Mathematica** : cpu = 1.15442 (sec), leaf count = 39

$$\left\{\left\{y(x)\to\int_1^x\left(\int_1^{K[2]}\frac{c_2K[1]+c_1}{f(K[1])}\,dK[1]\right)dK[2]+c_4x+c_3\right\}\right\}$$

✓ **Maple** : cpu = 0.018 (sec), leaf count = 21

$$\left\{y(x)=\frac{\_C1\,x^3}{6}+\frac{\_C2\,x^2}{2}+\_C3\,x+\_C4\right\}$$

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 = 300.031 (sec), leaf count = 0 , timed out

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✓ **Maple** : cpu = 0.59 (sec), leaf count = 89

$$\left\{y(x) = e^{ax}\left(\int e^{-2\,ax}\left(\int e^{ax}\left(\mathrm{Bi}\left(-\frac{\lambda\,(ax-b)+a^2}{a\lambda}\sqrt[3]{-a\lambda}\right)\_C4 + \mathrm{Ai}\left(-\frac{\lambda\,(ax-b)+a^2}{a\lambda}\sqrt[3]{-a\lambda}\right)\_C3\right)\right.\right.\right.$$

2.1579 ODE No. 1579

$$-ax - b\sin(x) - c\cos(x) + y^{(n)}(x) + 2y^{(3)}(x) + y'(x) = 0$$

✓ **Mathematica** : cpu = 0.776686 (sec), leaf count = 80

$$\left\{\left\{y(x) \to \frac{1}{16}\left(8ax^2 + \sin(x)\left(-6bx + c\left(13-2x^2\right) + 16(c_2x + c_1 + c_4)\right) + \cos(x)\left(b\left(2x^2-9\right) - 2(5cx + 8\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.523 (sec), leaf count = 69

$$\left\{y(x) = \frac{\left(bx^2 + (-4\,c - 8\_C4)\,x - 6\,b - 8\_C2 + 8\_C3\right)\cos(x)}{8} + \frac{\left(-cx^2 + (-4\,b + 8\_C3)\,x + 6\,c + 8\right.}{8}\right.$$

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 = 1.19336 (sec), leaf count = 111

$$\left\{\left\{y(x) \to c_4e^{-\frac{\sqrt{3}x}{2}}\sin\left(\frac{x}{2}\right) + c_6e^{\frac{\sqrt{3}x}{2}}\sin\left(\frac{x}{2}\right) + c_5\sin(x) + e^{-\frac{\sqrt{3}x}{2}}\left(c_1e^{\sqrt{3}x} + c_3\right)\cos\left(\frac{x}{2}\right) + \left(c_2 + \frac{1}{4}\right)\cos(\right.\right.$$

✓ **Maple** : cpu = 0.841 (sec), leaf count = 147

$$\left\{y(x) = \frac{1}{504}\left(504\_C3\ \cos(x/2) + 504\_C4\ \sin(x/2)\right)e^{-\frac{\sqrt{3}x}{2}} + \frac{1}{504}\left(504\_C5\ \cos(x/2) + 504\_C6\ \sin(x\right.\right.$$

2.1581 ODE No. 1581

$$-axy(x) - b + y^{(5)}(x) = 0$$

✗ **Mathematica** : cpu = 0.195866 (sec), leaf count = 0 , DifferentialRoot result

$$\{\{y(x) \to \text{DifferentialRoot}(\{y, x\}, \{-b - xay(x) + y^{(5)}(x) = 0, y(0) = c_1, y'(0) = c_2, y''(0) = c_3, y^{(3)}(0) =$$

✗ **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 = 0.66111 (sec), leaf count = 528

$$\left\{\left\{y(x) \to \nu^{-\frac{16}{\nu+4}} \left(\frac{\nu+4}{\nu}\right)^{-\frac{16}{\nu+4}} a^{\frac{1}{\nu+4}} (x^{\nu})^{\frac{1}{\nu}} \left(a^{\frac{1}{\nu+4}} (x^{\nu})^{\frac{1}{\nu}} \left(a^{\frac{1}{\nu+4}} (x^{\nu})^{\frac{1}{\nu}} \left(c_5 a^{\frac{1}{\nu+4}} (x^{\nu})^{\frac{1}{\nu}} \, {}_1F_4\left(1; \frac{\nu}{\nu+4} + \frac{5}{\nu+4},\right.\right.\right.\right.\right.\right.$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x) = DESol\left(\left\{\frac{d^5}{dx^5}\_Y(x) + ax^{\nu}\frac{d}{dx}\_Y(x) + a\nu\, x^{\nu-1}\_Y(x)\right\}, \{\_Y(x)\}\right)\right\}$$

2.1583 ODE No. 1583

$$ay^{(4)}(x) - f(x) + y^{(5)}(x) = 0$$

✗ **Mathematica** : cpu = 300.036 (sec), leaf count = 0 , timed out

```
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```

✓ **Maple** : cpu = 0.052 (sec), leaf count = 40

$$\left\{y(x) = \frac{\_C3\,x^2}{2} + \frac{\_C2\,x^3}{6} + \frac{e^{-ax}\_C1}{a^4} + \frac{fx^4}{24\,a} + \_C4\,x + \_C5\right\}$$

2.1584 ODE No. 1584

$$axy(x) - 5my^{(4)}(x) + xy^{(5)}(x) = 0$$

✓ **Mathematica** : cpu = 3.11331 (sec), leaf count = 207

$$\left\{\left\{y(x) \to \frac{1}{625}x\left(x\left(5a^{3/5}c_4x\,{}_0F_4\left(;\frac{6}{5},\frac{7}{5},\frac{8}{5},\frac{4}{5}-m;-\frac{ax^5}{3125}\right)+25a^{2/5}c_3\,{}_0F_4\left(;\frac{4}{5},\frac{6}{5},\frac{7}{5},\frac{3}{5}-m;-\frac{ax^5}{3125}\right)+\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.288 (sec), leaf count = 118

$$\left\{y(x) = \_C1\,{}_0\mathrm{F}_4(\,;\frac{2}{5},\frac{3}{5},\frac{4}{5},\frac{1}{5}-m;\,-\frac{x^5a}{3125}) + \_C2\,x{}_0\mathrm{F}_4(\,;\frac{3}{5},\frac{4}{5},\frac{6}{5},\frac{2}{5}-m;\,-\frac{x^5a}{3125}) + \_C3\,x^2{}_0\mathrm{F}_4(\,;\frac{4}{5},\right.$$

2.1585 ODE No. 1585

$$xy(x)\left(ay'(x) + by''(x) + cy^{(3)}(x) + ey^{(4)}(x)\right) = 0$$

✓ **Mathematica** : cpu = 0.235625 (sec), leaf count = 214

$$\left\{\{y(x)\to 0\},\left\{y(x)\to \frac{c_1e^{x\mathrm{Root}\left[\#1^3+\frac{\#1^2c}{e}+\frac{\#1b}{e}+\frac{a}{e}\&,1\right]}}{\mathrm{Root}\left[\#1^3+\frac{\#1^2c}{e}+\frac{\#1b}{e}+\frac{a}{e}\&,1\right]}+\frac{c_2e^{x\mathrm{Root}\left[\#1^3+\frac{\#1^2c}{e}+\frac{\#1b}{e}+\frac{a}{e}\&,2\right]}}{\mathrm{Root}\left[\#1^3+\frac{\#1^2c}{e}+\frac{\#1b}{e}+\frac{a}{e}\&,2\right]}+\frac{c_3e}{\mathrm{Root}}\right.\right.$$

✓ **Maple** : cpu = 0.05 (sec), leaf count = 679

$$\left\{y(x) = 0, y(x) = \_C4\,\mathrm{e}^{\frac{x}{6e}\left(\left(12\sqrt{3}\sqrt{27a^2e^2+(-18abc+4b^3)e+4ac^3-b^2c^2}e-108ae^2+36bce-8c^3\right)^{\frac{2}{3}}-2c\sqrt[3]{12\sqrt{3}\sqrt{27a^2e^2+(-18}}\right.}\right.$$

2.1586 ODE No. 1586

$$-y^{(4)}(x)(x(aA(5)-A(4))+A(5))-y^{(3)}(x)(x(aA(4)-A(3))+A(4))-(x(aA(3)-A(2))+A(3))y''(x)-(x(aA($$

✗ **Mathematica** : cpu = 84.4858 (sec), leaf count = 0 , DifferentialRoot result

$$\{\{y(x)\to \text{DifferentialRoot}(\{y,x\},\{xA(0)-xaA(1)-A(1)+(xA(1)-xaA(2)-A(2))y'(x)+(xA(2)$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x)=\int DESol\left(\left\{-\frac{(axA_2-xA_1+A_2)\_Y(x)}{x}-\frac{(axA_3-xA_2+A_3)\frac{d}{dx}\_Y(x)}{x}-\frac{(axA_4-xA_3+A}{x}\right.\right.\right.$$

2.1587 ODE No. 1587

$$x^5y^{(10)}(x)-ay(x)=0$$

✓ **Mathematica** : cpu = 0.377714 (sec), leaf count = 492

$$\left\{\left\{y(x)\to\frac{(-1)^{4/5}a^{9/5}c_1x^9\,{}_0F_9\left(;\frac{6}{5},\frac{7}{5},\frac{8}{5},\frac{9}{5},2,\frac{11}{5},\frac{12}{5},\frac{13}{5},\frac{14}{5};\frac{ax^5}{9765625}\right)}{3814697265625}+\frac{(-1)^{3/5}a^{8/5}c_3x^8\,{}_0F_9\left(;\frac{4}{5},\frac{6}{5},\frac{7}{5},\frac{8}{5},\frac{9}{5},2\right.}{152587890625}\right.\right.$$

✓ **Maple** : cpu = 0.939 (sec), leaf count = 174

$$\left\{y(x)=x^{\frac{5}{2}}\left(\_C2\,Y_5\left(2\,ia^{\frac{1}{10}}\sqrt{x}\right)+\_C1\,I_5(2\,a^{1/10}\sqrt{x})+\_C6\,I_5(2\,e^{4/5\,i\pi}a^{1/10}\sqrt{x})+\_C3\,I_5(2\,e^{i/5\pi}a^{1/10}\right.\right.$$

2.1588 ODE No. 1588

$$x^{10}y^{(5)}(x)-ay(x)=0$$

✓ **Mathematica** : cpu = 15.9796 (sec), leaf count = 103

$$\left\{\left\{y(x)\to x^4\left(c_1e^{-\frac{\sqrt[5]{a}}{x}}+c_2e^{\frac{\sqrt[5]{-1}\sqrt[5]{a}}{x}}+c_3e^{-\frac{(-1)^{2/5}\sqrt[5]{a}}{x}}+c_4e^{\frac{(-1)^{3/5}\sqrt[5]{a}}{x}}+c_5e^{-\frac{(-1)^{4/5}\sqrt[5]{a}}{x}}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.176 (sec), leaf count = 90

$$\left\{y(x)=\_C1\,{}_0F_4(\,;\frac{6}{5},\frac{7}{5},\frac{8}{5},\frac{9}{5};-\frac{a}{3125\,x^5})+\_C2\,x\,{}_0F_4(\,;\frac{4}{5},\frac{6}{5},\frac{7}{5},\frac{8}{5};-\frac{a}{3125\,x^5})+\_C3\,x^2{}_0F_4(\,;\frac{3}{5},\frac{4}{5},\frac{6}{5}\right.$$

2.1589 ODE No. 1589

$$x^{11/2}y^{(11)}(x) - ay(x) = 0$$

✓ **Mathematica** : cpu = 0.0468409 (sec), leaf count = 662

$$\left\{\left\{y(x) \to \frac{4}{121}(-1)^{2/11}a^{2/11}c_2 x\,{}_0F_{10}\left(;-\frac{7}{11},-\frac{5}{11},-\frac{3}{11},-\frac{1}{11},\frac{1}{11},\frac{3}{11},\frac{5}{11},\frac{7}{11},\frac{9}{11},\frac{13}{11};\frac{2048ax^{11/2}}{285311670611}\right)+\right.\right.$$

✓ **Maple** : cpu = 10.189 (sec), leaf count = 4347

2.1590 ODE No. 1590

$$(x-a)^5(x-b)^5y^{(5)}(x) - cy(x) = 0$$

✗ **Mathematica** : cpu = 299.998 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 3.146 (sec), leaf count = 553

$$\left\{y(x) = ODESolStruc\left(e^{\int -4\frac{\left((-b-\_f/4)e^{\left(\int \_g(\_f)\,d\_f+\_C1\right)(a-b)}+a+\_f/4\right)\_g(\_f)}{e^{\left(\int \_g(\_f)\,d\_f+\_C1\right)(a-b)}-1}\,d\_f+\_C2},[\left\{\frac{1}{(\_g(\_f))^2}\left(\left(\frac{d^3}{d\_f^3}\_g(\right.\right.\right.\right.$$

2.1591 ODE No. 1591

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

✓ **Mathematica** : cpu = 0.0920194 (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 = 0.149 (sec), leaf count = 12

$$\{y(x) = 6\,WeierstrassP(\_C1 + x, 0, \_C2)\}$$

2.1592 ODE No. 1592

$$y''(x) - 6y(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.0307303 (sec), leaf count = 14

$$\{\{y(x) \to \wp(x + c_1; 0, c_2)\}\}$$

✓ **Maple** : cpu = 0.021 (sec), leaf count = 10

$$\{y(x) = \mathit{WeierstrassP}(\_C1 + x, 0, \_C2)\}$$

2.1593 ODE No. 1593

$$y''(x) - 6y(x)^2 - x = 0$$

✗ **Mathematica** : cpu = 0.169776 (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 = 0.521527 (sec), leaf count = 200

$$\left\{\left\{y(x) \to \left(\text{Root}\left[4\#1^3 - 4\#1^2 + c_1\&, 2\right] - \text{Root}\left[4\#1^3 - 4\#1^2 + c_1\&, 3\right]\right) \text{sn}\left(\sqrt{-(x + c_2)^2 \left(\text{Root}\left[4\#\right.\right.}\right.\right.\right.$$

✓ **Maple** : cpu = 0.314 (sec), leaf count = 59

$$\left\{\int^{y(x)} \frac{1}{\sqrt{4\_a^3 - 4\_a^2 + \_C1}} d\_a - x - \_C2 = 0, \int^{y(x)} -\frac{1}{\sqrt{4\_a^3 - 4\_a^2 + \_C1}} d\_a - x - \_C2 =\right.$$

2.1595 ODE No. 1595

$$ay(x)^2 + bx + c + y''(x) = 0$$

✗ **Mathematica** : cpu = 0.354305 (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 = 1.19992 (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 = 2.30253 (sec), leaf count = 131

$$\left\{\left\{y(x)\to -\frac{i\sqrt[4]{2}\,\mathrm{sn}\left(-\frac{(1-i)\sqrt{\sqrt{a}\sqrt{c_1}(x+c_2)^2}}{2^{3/4}}\middle|-1\right)}{\sqrt{\frac{i\sqrt{a}}{\sqrt{c_1}}}}\right\},\left\{y(x)\to \frac{i\sqrt[4]{2}\,\mathrm{sn}\left(-\frac{(1-i)\sqrt{\sqrt{a}\sqrt{c_1}(x+c_2)^2}}{2^{3/4}}\middle|-1\right)}{\sqrt{\frac{i\sqrt{a}}{\sqrt{c_1}}}}\right\}\right\}$$

✓ **Maple** : cpu = 0.054 (sec), leaf count = 21

$$\left\{y(x) = \_C2\ \mathit{JacobiSN}\left(\left(\frac{x}{2}\sqrt{-2\,a} + \_C1\right)\_C2, i\right)\right\}$$

2.1598 ODE No. 1598

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

✗ **Mathematica** : cpu = 3.82622 (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 = 3.52483 (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 = 2.61691 (sec), leaf count = 869

$$\text{Solve}\left[-\frac{24F\left(\sin^{-1}\left(\sqrt{\frac{\left(\text{Root}\left[3a\#1^4+4b\#1^3+6c\#1^2+12d\#1-6c_1\&,2\right]-\text{Root}\left[3a\#1^4+4b\#1^3+6c\#1^2+12d\#1-6c_1\&,4\right]\right)\left(\text{Root}\left[3a\#\right.\right.}{\left(\text{Root}\left[3a\#1^4+4b\#1^3+6c\#1^2+12d\#1-6c_1\&,1\right]-\text{Root}\left[3a\#1^4+4b\#1^3+6c\#1^2+12d\#1-6c_1\&,4\right]\right)\left(\text{Root}\left[3a\#\right.\right.}}\right.\right.}{}\right.$$

✓ **Maple** : cpu = 0.11 (sec), leaf count = 89

$$\left\{\int^{y(x)}-6\frac{1}{\sqrt{-18\,a\_a^4-24\,b\_a^3-36\_a^2c-72\_a\,d+36\_C1}}d\_a-x-\_C2=0,\int^{y(x)}6\frac{}{\sqrt{-18\,a\_a}}\right.$$

2.1601 ODE No. 1601

$$ax^r y(x)^n + y''(x) = 0$$

✗ **Mathematica** : cpu = 0.0396399 (sec), leaf count = 0 , could not solve

```
DSolve[a*x^r*y[x]^n + Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 3.05 (sec), leaf count = 151

$$\left\{ y(x) = ODESolStruc\left(\_a\, e^{\int \_b(\_a)\, d\_a + \_C1}, [\left\{ \frac{d}{d\_a}\_b(\_a) = \frac{(\_b(\_a))^2 \left(\_b(\_a)\, a(n-1)^2 \_a^n + (\_a\right.}{(r} \right.\right.\right.$$

2.1602 ODE No. 1602

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

✓ **Mathematica** : cpu = 124.969 (sec), leaf count = 45

$$\text{Solve}\left[(c_2 + x)^2 = \left(\int_1^{y(x)} \frac{1}{\sqrt{a^{2n}\left(-K[1]^{2n+2}\right) + K[1]^2 + c_1}} dK[1]\right)^2, y(x)\right]$$

✓ **Maple** : cpu = 0.425 (sec), leaf count = 73

$$\left\{ \int^{y(x)} \frac{1}{\sqrt{-a^{2n}\_a^{2+2n} + \_a^2 + \_C1}} d\_a - x - \_C2 = 0, \int^{y(x)} -\frac{1}{\sqrt{-a^{2n}\_a^{2+2n} + \_a^2 + \_C1}} d\_a - x \right.$$

2.1603 ODE No. 1603

$$y''(x) - \frac{1}{(ay(x)^2 + bxy(x) + cx^2 + dy(x) + ex + k)^{3/2}} = 0$$

✗ **Mathematica** : cpu = 60.71 (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]
```

✓ **Maple** : cpu = 32.429 (sec), leaf count = 8411

2.1604 ODE No. 1604

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

✓ **Mathematica** : cpu = 0.0659986 (sec), leaf count = 32

$$\left\{\left\{y(x) \to \log\left(-\frac{1}{2}c_1 \text{sech}^2\left(\frac{1}{2}\sqrt{c_1 (c_2 + x)^2}\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.675 (sec), leaf count = 23

$$\left\{y(x) = \ln\left(\frac{1}{2\_C1^2}\left(\left(\tan\left(\frac{\_C2 + x}{2\_C1}\right)\right)^2 + 1\right)\right)\right\}$$

2.1605 ODE No. 1605

$$ae^x\sqrt{y(x)} + y''(x) = 0$$

✗ **Mathematica** : cpu = 0.513804 (sec), leaf count = 0 , could not solve

```
DSolve[a*E^x*Sqrt[y[x]] + Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 1.617 (sec), leaf count = 104

$$\left\{y(x) = ODESolStruc\left(\frac{\_a}{e^{-2\int \_b(\_a)\, d\_a - 2\_C1}}, [\left\{\frac{d}{d\_a}\_b(\_a) = (\_b(\_a))^2 (\_b(\_a)\sqrt{\_a}a + 4\_b(\_a)\_\right.\right.$$

2.1606 ODE No. 1606

$$y''(x) + e^x \sin(y(x)) = 0$$

✗ **Mathematica** : cpu = 1.24883 (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 = 0.115048 (sec), leaf count = 79

$$\left\{\left\{y(x)\to -2\text{am}\left(\frac{1}{2}\sqrt{(2a+c_1)(x+c_2)^2}|\frac{4a}{2a+c_1}\right)\right\},\left\{y(x)\to 2\text{am}\left(\frac{1}{2}\sqrt{(2a+c_1)(x+c_2)^2}|\frac{4a}{2a+c_1}\right)\right.$$

✓ **Maple** : cpu = 0.149 (sec), leaf count = 49

$$\left\{\int^{y(x)}\frac{1}{\sqrt{2a\cos(\_a)+\_C1}}d\_a - x - \_C2 = 0, \int^{y(x)} -\frac{1}{\sqrt{2a\cos(\_a)+\_C1}}d\_a - x - \_C2 = 0\right\}$$

2.1608 ODE No. 1608

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

✗ **Mathematica** : cpu = 0.0532575 (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 = 0.0367806 (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 = 300.161 (sec), leaf count = 0 , timed out

```
$Aborted
```

✓ **Maple** : cpu = 0.31 (sec), leaf count = 92

$$\left\{ y(x) = RootOf\left(-\ln(x) - 2\int^{\_Z} \frac{1}{\sqrt{\_C1 + 8\int h(\_g)\,\mathrm{d}\_g + \_g^2}} d\_g + 2\_C2 \right)\sqrt{x}, y(x) = RootOf\right.$$

2.1611 ODE No. 1611

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

✗ **Mathematica** : cpu = 5.50958 (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 = 0.855 (sec), leaf count = 57

$$\left\{ y(x) = ODESolStruc\left(\_a, \left[\left\{ \left(\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a)\right)\_b(\_a) - 3\_b(\_a) - \_a^2 - 2\_a = 0 \right\}, \left\{ \_a = y(x), \_\right.\right.\right.$$

2.1612 ODE No. 1612

$$y''(x) - 7y'(x) - y(x)^{3/2} + 12y(x) = 0$$

✗ **Mathematica** : cpu = 22.294 (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],
```

✓ **Maple** : cpu = 1.515 (sec), leaf count = 57

$$\left\{ y(x) = ODESolStruc\left(\_a, \left[\left\{ \left(\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a)\right)\_b(\_a) - 7\_b(\_a) - \_a^{\frac{3}{2}} + 12\_a = 0 \right\}, \left\{ \_a = y(x), \right.\right.\right.$$

2.1613 ODE No. 1613

$$6a^2y(x) + 5ay'(x) + y''(x) - 6y(x)^2 = 0$$

✗ **Mathematica** : cpu = 2.38402 (sec), leaf count = 0 , could not solve

```
DSolve[6*a^2*y[x] - 6*y[x]^2 + 5*a*Derivative[1][y][x] + Derivative[2][y][x] == 0, y[x
```

✓ **Maple** : cpu = 0.035 (sec), leaf count = 27

$$\left\{y(x) = \mathit{WeierstrassP}\left(-\frac{e^{-ax}}{a} + \_C1, 0, \_C2\right)\left(e^{-ax}\right)^2\right\}$$

2.1614 ODE No. 1614

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

✗ **Mathematica** : cpu = 1.55462 (sec), leaf count = 0 , could not solve

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

✓ **Maple** : cpu = 0.104 (sec), leaf count = 33

$$\left\{y(x) = \frac{\_C2}{e^{ax}}\mathit{JacobiSN}\left(\left(-\frac{1}{a}\sqrt{-e^{-2\,ax}} + \_C1\right)\_C2, i\right)\right\}$$

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 = 123.764 (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
```

✓ **Maple** : cpu = 4.678 (sec), leaf count = 91

$$\left\{y(x) = \mathit{ODESolStruc}\left(\_a, [\left\{\frac{1}{n^2}\left(-2\,(n+2)\,(n+1)\,\_a\,\_a^{\frac{n}{n+1}} + \left(\frac{d}{d\_a}\_b(\_a)\right)\_b(\_a)\,n^2 + \left(-3\,n^2\right.\right.\right.\right.$$

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 = 27.528 (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] ==
```

✓ **Maple** : cpu = 1.256 (sec), leaf count = 63

$$\left\{y(x)=ODESolStruc\left(\_a,[\left\{\left(\frac{d}{d\_a}\_b(\_a)\right)\_b(\_a)+a\_b(\_a)+b\_a^n+\frac{\_a\,a^2}{4}-\frac{\_a}{4}=0\right\},\left\{\_a=\right.$$

2.1617 ODE No. 1617

$$ay'(x)+bx^ry(x)^n+y''(x)=0$$

✗ **Mathematica** : cpu = 0.0490043 (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 = 31.0713 (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 = 1.695 (sec), leaf count = 56

$$\left\{y(x)=ODESolStruc\left(\_a,[\left\{\left(\frac{d}{d\_a}\_b(\_a)\right)\_b(\_a)+a\_b(\_a)+be^{-\_a}-2\,a=0\right\},\left\{\_a=y(x),\_b(\right.$$

2.1619 ODE No. 1619

$$ay'(x) + f(x)\sin(y(x)) + y''(x) = 0$$

✗ **Mathematica** : cpu = 0.0619857 (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 = 122.377 (sec), leaf count = 0 , could not solve

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

✓ **Maple** : cpu = 0.151 (sec), leaf count = 253

$$\left\{\int^{y(x)}\left(\frac{\_a^2}{2}+\frac{1}{2}\left(\sqrt[3]{\_C1+\sqrt{\_a^6+\_C1^2}}-\_a^2\frac{1}{\sqrt[3]{\_C1+\sqrt{\_a^6+\_C1^2}}}\right)^2\right)^{-1}d\_a-x-\_C2=$$

2.1621 ODE No. 1621

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

✗ **Mathematica** : cpu = 100.138 (sec), leaf count = 0 , could not solve

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

✓ **Maple** : cpu = 2.551 (sec), leaf count = 1088

$$\left\{\int^{y(x)}\frac{1}{-63\_a^2+63\,a}\left(\frac{\left(-\frac{1}{2}+\frac{i}{2}\sqrt{3}\right)^3}{2}\left(126\,\frac{1}{-\_a^6+3\,a\_a^4-3\_a^2a^2+80\_C1^3+a^3}\sqrt[3]{-4\left(\_C1\sqrt{\right.}}\right.\right.\right.$$

2.1622 ODE No. 1622

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

✗ **Mathematica** : cpu = 26.4484 (sec), leaf count = 0 , could not solve

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

✓ **Maple** : cpu = 0.444 (sec), leaf count = 415

$$\left\{ y(x) = \frac{1}{e^{ax}} RootOf\left(\int^{\_Z} \frac{1}{-\_f^6 + \_C1} \left(\_f^8 - \_C1\ \_f^2 + \left(\left(-\_f^6 + \_C1\right)^2 \left(\sqrt{\frac{\_C1}{-\_f^6 + \_C1}} - 1 \right.\right.\right.\right.\right.$$

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 = 0.474883 (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])*
```

✗ **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
```

2.1624 ODE No. 1624

$$y(x)\left(af(x)^2 - \frac{f''(x)}{f(x)} + 3f'(x) + \frac{3f'(x)^2}{f(x)^2}\right) + bf(x)^3 - \left(\frac{f'(x)}{f(x)} + f(x)\right)\left(3y'(x) + y(x)^2\right) + y''(x) + y(x)y'(x$$

✗ **Mathematica** : cpu = 1.58601 (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]
```

✓ **Maple** : cpu = 1.886 (sec), leaf count = 131

$$\left\{ y(x) = ODESolStruc\left(f\left(RootOf\left(\int \_b(\_a)\ d\_a + \_C1 - \int^{\_Z} f(\_f)\, d\_f \right)\right) \_a, [\left\{ \frac{d}{d\_a}\_b(\_a) = \right.\right.$$

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 = 1.06568 (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
```

✗ **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)/f(x)*y(x)^2+1/2*(f(x)+diff(f(x),x)^2/f(x)^2-diff(diff(f(x),x),x))/f(x
```

2.1626 ODE No. 1626

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

✗ **Mathematica** : cpu = 40.7391 (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
```

✓ **Maple** : cpu = 0.274 (sec), leaf count = 48

$$\left\{y(x)=ODESolStruc\left(\_b(\_a),[\left\{\frac{d}{d\_a}\_b(\_a)=-f(\_a)\_b(\_a)-(\_b(\_a))^2-\_C1\right\},\{\_a=x,\_$$

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 = 0.306068 (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]) + Deri
```

✓ **Maple** : cpu = 1.198 (sec), leaf count = 58

$$\left\{y(x)=ODESolStruc\left(\_b(\_a),[\left\{-\int e^{\int f(\_a)\,d\_a}g(\_a)\,d\_a+\left((\_b(\_a))^2+\frac{d}{d\_a}\_b(\_a)\right)e^{\int f(\_a)\,d\_a}$$

2.1628 ODE No. 1628

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

✗ **Mathematica** : cpu = 8.27316 (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] =
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x) = \frac{\frac{d}{dx}DESol\left(\left\{-g(x)\_Y(x) + f(x)\frac{d}{dx}\_Y(x) + \frac{d^3}{dx^3}\_Y(x)\right\}, \{\_Y(x)\}\right)}{DESol\left(\left\{-g(x)\_Y(x) + f(x)\frac{d}{dx}\_Y(x) + \frac{d^3}{dx^3}\_Y(x)\right\}, \{\_Y(x)\}\right)}\right\}$$

2.1629 ODE No. 1629

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

✗ **Mathematica** : cpu = 0.040909 (sec), leaf count = 0 , could not solve

```
DSolve[f[x]*y[x]^2 + y[x]^3 + (f[x] + 3*y[x])*Derivative[1][y][x] + Derivative[2][y][x
```

✓ **Maple** : cpu = 0.053 (sec), leaf count = 38

$$\left\{y(x) = \frac{\int \_C1\, e^{-\int f(x)\,dx}\,dx + \_C2}{\iint \_C1\, e^{-\int f(x)\,dx}\,dx\,dx + \_C2\,x + 1}\right\}$$

2.1630 ODE No. 1630

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

✓ **Mathematica** : cpu = 11.7527 (sec), leaf count = 1670

$$\left\{\left\{y(x) \to \frac{\sqrt{b}\sqrt{\frac{e^{-2ax}}{b}}\sqrt{c_1}\left(-i^{\frac{\sqrt{4a^3-3b}}{a^{3/2}}}\, 2^{\frac{3\sqrt{4a^6-3a^3b}}{2a^3}+\frac{1}{2}}\, 3^{\frac{1}{2}\left(\frac{\sqrt{4a^3-3b}}{a^{3/2}}-1\right)}\, a^{\frac{\sqrt{4a^6-3a^3b}}{a^3}}\, b^{\frac{1}{2}\left(\frac{\sqrt{4a^3-3b}}{a^{3/2}}-1\right)}\left(2a^3 - \sqrt{4a^3-3\right.\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.767 (sec), leaf count = 783

$$\left\{\int^{y(x)} -6\,a^2\left(-12\_a\,a^3 - 9\_a^2a^2 + \left(RootOf\left(2\,K_{1/2\,\frac{4\,a^3-3\,b}{\sqrt{4\,a^4-3\,aba}}}\left(-1/2\,\frac{\_Z}{a^2}\right)\_C1\,a^2 + 3\,K_{1/2\,\frac{4\,a^3-3\,b}{\sqrt{4\,a^4-3\,aba}}}\right.\right.\right.\right.$$

2.1631 ODE No. 1631

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

✗ **Mathematica** : cpu = 0.034332 (sec), leaf count = 0 , could not solve

```
DSolve[f[x]*y[x]^2 + y[x]^3 - (f[x] + 3*y[x])*Derivative[1][y][x] + Derivative[2][y][x
```

✓ **Maple** : cpu = 0.124 (sec), leaf count = 38

$$\left\{y(x)=\frac{-\int \_C1\,e^{\int f(x)\,dx}\,dx-\_C2}{\iint \_C1\,e^{\int f(x)\,dx}\,dx\,dx+\_C2\,x+1}\right\}$$

2.1632 ODE No. 1632

$$y''(x)-2ay(x)y'(x)=0$$

✓ **Mathematica** : cpu = 0.0636247 (sec), leaf count = 34

$$\left\{\left\{y(x)\to\frac{\sqrt{c_1}\tan\left(\sqrt{a}\sqrt{c_1}(c_2+x)\right)}{\sqrt{a}}\right\}\right\}$$

✓ **Maple** : cpu = 0.163 (sec), leaf count = 23

$$\left\{y(x)=\frac{1}{a}\tan\left(\sqrt{\_C1\,a}(\_C2+x)\right)\sqrt{\_C1\,a}\right\}$$

2.1633 ODE No. 1633

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

✗ **Mathematica** : cpu = 39.427 (sec), leaf count = 0 , could not solve

```
DSolve[b*y[x]^3 + a*y[x]*Derivative[1][y][x] + Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 0.377 (sec), leaf count = 97

$$\left\{\int^{y(x)}\left(RootOf\left(-2\,a\_a^2 Artanh\left(\frac{\_a^2a+4\_Z}{\sqrt{\_a^4\,(a^2-8\,b)}}\right)-\ln\left(\_a^4b+\_Z\,\_a^2a+2\,\_Z^2\right)\sqrt{\_a^4\,(a^2-8\,b)}\right.\right.\right.$$

2.1634 ODE No. 1634

$$y'(x)h(x,y(x)) + j(x,y(x)) + y''(x) = 0$$

✗ **Mathematica** : cpu = 0.167196 (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 = 101.912 (sec), leaf count = 0 , could not solve

```
DSolve[b*y[x] + a*Derivative[1][y][x]^2 + Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 0.244 (sec), leaf count = 79

$$\left\{\int^{y(x)} -2\frac{a}{\sqrt{4\,\mathrm{e}^{-2\_a\,a}\_C1\,a^2 - 4\,b\_a\,a + 2\,b}}d\_a - x - \_C2 = 0, \int^{y(x)} 2\frac{a}{\sqrt{4\,\mathrm{e}^{-2\_a\,a}\_C1\,a^2 - 4\,b\_a\,a +}}$$

2.1636 ODE No. 1636

$$ay'(x)\left|y'(x)\right| + by'(x) + cy(x) + y''(x) = 0$$

✗ **Mathematica** : cpu = 32.9081 (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
```

✓ **Maple** : cpu = 1.479 (sec), leaf count = 59

$$\left\{y(x) = ODESolStruc\left(\_a, [\left\{\left(\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a)\right)\_b(\_a) + a\_b(\_a)\left|\_b(\_a)\right| + \_b(\_a)\,b + \_a\,c = 0\right\}, \{$$

2.1637 ODE No. 1637

$$ay'(x)^2 + by'(x) + cy(x) + y''(x) = 0$$

✗ **Mathematica** : cpu = 30.925 (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]
```

✓ **Maple** : cpu = 0.614 (sec), leaf count = 58

$$\left\{y(x) = ODESolStruc\left(\_a, [\left\{\left(\frac{d}{d\_a}\_b(\_a)\right)\_b(\_a) + a(\_b(\_a))^2 + \_b(\_a)\, b + \_a\, c = 0\right\}, \left\{\_a =\right.\right.\right.$$

2.1638 ODE No. 1638

$$ay'(x)^2 + b\sin(y(x)) + y''(x) = 0$$

✗ **Mathematica** : cpu = 100.131 (sec), leaf count = 0 , could not solve

```
DSolve[b*Sin[y[x]] + a*Derivative[1][y][x]^2 + Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 0.219 (sec), leaf count = 115

$$\left\{\int^{y(x)} (-4\,a^2 - 1)\frac{1}{\sqrt{16\,(a^2 + 1/4)^2\,\_C1\,e^{-2\_a\,a} - 16\,(a^2 + 1/4)\,(a\sin(\_a) - 1/2\cos(\_a))\,b}}d\_a - x -\right.$$

2.1639 ODE No. 1639

$$ay'(x)\,|y'(x)| + b\sin(y(x)) + y''(x) = 0$$

✗ **Mathematica** : cpu = 41.0849 (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]
```

✓ **Maple** : cpu = 3.396 (sec), leaf count = 56

$$\left\{y(x) = ODESolStruc\left(\_a, [\left\{\left(\frac{d}{d\_a}\_b(\_a)\right)\_b(\_a) + a\_b(\_a)\,|\_b(\_a)| + b\sin(\_a) = 0\right\}, \left\{\_a =\right.\right.\right.$$

2.1640 ODE No. 1640

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

✗ **Mathematica** : cpu = 200.974 (sec), leaf count = 0 , could not solve

```
DSolve[b*y[x] + a*y[x]*Derivative[1][y][x]^2 + Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 0.255 (sec), leaf count = 70

$$\left\{\int^{y(x)} a\frac{1}{\sqrt{a\left(e^{-\_a^2 a}\_C1\, a - b\right)}} d\_a - x - \_C2 = 0, \int^{y(x)} -a\frac{1}{\sqrt{a\left(e^{-\_a^2 a}\_C1\, a - b\right)}} d\_a - x - \_C2 =$$

2.1641 ODE No. 1641

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

✓ **Mathematica** : cpu = 2.09564 (sec), leaf count = 57

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[\int_1^{\#1} e^{-\int_1^{K[4]} -h(K[1])\, dK[1]}\, dK[4]\&\right]\left[\int_1^{x} c_1\left(-e^{-\int_1^{K[5]} g(K[2])\, dK[2]}\right)\, dK[5] + c_2\right]\right.$$

✓ **Maple** : cpu = 0.062 (sec), leaf count = 29

$$\left\{\int^{y(x)} e^{\int h(\_b)\, d\_b} d\_b - \_C1 \int e^{-\int g(x)\, dx}\, dx - \_C2 = 0\right\}$$

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 = 1.0262 (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
```

✗ **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(
```

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 = 0.386713 (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 + Deriv
```

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

```
dsolve((1-D(j)(y(x)))/j(y(x))*diff(y(x),x)^2+f(x)*diff(y(x),x)+diff(diff(y(x),x),x)+g(
```

2.1644 ODE No. 1644

$$h(y(x))y'(x)^2 + j(y(x))y'(x) + k(y(x)) + y''(x) = 0$$

✗ **Mathematica** : cpu = 53.2452 (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 + Derivat
```

✓ **Maple** : cpu = 0.553 (sec), leaf count = 56

$$\left\{y(x) = ODESolStruc\left(\_a, [\left\{\left(\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a)\right)\_b(\_a) + h(\_a)\left(\_b(\_a)\right)^2 + \_b(\_a) + k(\_a) = 0\right\}, \left\{\right.\right.\right.$$

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 = 0.154704 (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) + Der
```

✗ **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(
```

2.1646 ODE No. 1646

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

✓ **Mathematica** : cpu = 11.0757 (sec), leaf count = 262

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[-\frac{\sqrt{\frac{\#1^2(-a)+2c_1+1}{2c_1+1}}\sqrt{2\#1^2a - 4c_1}E\left(\sin^{-1}\left(\sqrt{\frac{a}{2c_1+1}}\#1\right)|1 + \frac{1}{2c_1}\right)}{\sqrt{\frac{a}{2c_1+1}}\sqrt{\#1^2(-a) + 2c_1 + 1}\sqrt{2 - \frac{\#1^2a}{c_1}}}\&\right][c_2 + x\right.\right.$$

✓ **Maple** : cpu = 0.199 (sec), leaf count = 94

$$\left\{\int^{y(x)} a(\_a^2+2\_C1)\frac{1}{\sqrt{-(-1+a(\_a^2+2\_C1))\,a(\_a^2+2\_C1)}}d\_a - x - \_C2 = 0, \int^{y(x)} -a(\_$$

2.1647 ODE No. 1647

$$y''(x) - a(xy'(x) - y(x))^r = 0$$

✓ **Mathematica** : cpu = 52.4589 (sec), leaf count = 59

$$\left\{\left\{y(x) \to x\left(\int_1^x \left(\frac{1}{2}aK[2]^{2r} - \frac{1}{2}arK[2]^{2r} + c_1K[2]^{2r-2}\right)^{\frac{1}{1-r}} dK[2] + c_2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.785 (sec), leaf count = 60

$$\left\{y(x) = \left(\int -\frac{x^2(r-1)\,a - \_C1}{2\,x^2} 2^{\frac{r}{r-1}} \left(-\left(x^2(r-1)\,a - \_C1\right)^{-1}\right)^{\frac{r}{r-1}} \mathrm{d}x + \_C2\right) x\right\}$$

2.1648 ODE No. 1648

$$y''(x) - kx^a y(x)^b y'(x)^c = 0$$

✗ **Mathematica** : cpu = 0.0852348 (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 = 1.777 (sec), leaf count = 205

$$\left\{y(x) = ODESolStruc\left(\_a\,\mathrm{e}^{\int -\_b(\_a)\,\mathrm{d}\_a + \_C1}, [\left\{\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a) = \frac{(\_b(\_a))^2}{(a-c+2)^2}\left(-k\_a^b\_b(\_a)\,(b+c-1)^2\right.\right.\right.$$

2.1649 ODE No. 1649

$$h(x, y(x))\left(y'(x) - \frac{y(x)}{x}\right)^a + y''(x) = 0$$

✗ **Mathematica** : cpu = 2.77926 (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
```

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

```
dsolve(diff(diff(y(x),x),x)+(diff(y(x),x)-y(x)/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 = 0.0263299 (sec), leaf count = 19

$$\left\{\left\{y(x) \to \frac{\cosh(ax + c_1)}{a} + c_2\right\}\right\}$$

✓ **Maple** : cpu = 0.379 (sec), leaf count = 16

$$\left\{y(x) = \frac{\cosh(a(\_C1 + x))}{a} + \_C2\right\}$$

2.1651 ODE No. 1651

$$a\left(-\sqrt{y'(x)^2 + 1}\right) - b + y''(x) = 0$$

✓ **Mathematica** : cpu = 0.285934 (sec), leaf count = 414

$$\left\{\left\{y(x) \to \frac{a\text{InverseFunction}\left[\frac{\frac{b\tan^{-1}\left(\frac{\#1b}{\sqrt{\#1^2+1}\sqrt{a^2-b^2}}\right)}{\sqrt{a^2-b^2}} - \frac{b\tan^{-1}\left(\frac{\#1a}{\sqrt{a^2-b^2}}\right)}{\sqrt{a^2-b^2}} + \sinh^{-1}(\#1)}{a}\&\right][c_1 + x]^2 - b\sqrt{\text{InverseFu}\cdots}}{a^2 \cdots}\right.\right.$$

✓ **Maple** : cpu = 0.229 (sec), leaf count = 31

$$\left\{y(x) = \int RootOf\left(x - \int^{\_Z}\left(a\sqrt{\_f^2 + 1} + b\right)^{-1} d\_f + \_C1\right) dx + \_C2\right\}$$

2.1652 ODE No. 1652

$$y''(x) - a\sqrt{by(x)^2 + y'(x)^2} = 0$$

✗ **Mathematica** : cpu = 0.866666 (sec), leaf count = 0 , could not solve

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

✓ **Maple** : cpu = 0.395 (sec), leaf count = 36

$$\left\{y(x) = e^{\int RootOf\left(x - \int^{\_Z}\left(-\_f^2 + a\sqrt{\_f^2+b}\right)^{-1} d\_f + \_C1\right) dx + \_C2}\right\}$$

2.1653 ODE No. 1653

$$y''(x) - a\left(y'(x)^2 + 1\right)^{3/2} = 0$$

✓ **Mathematica** : cpu = 0.0690449 (sec), leaf count = 75

$$\left\{\left\{y(x) \to c_2 - \frac{i\sqrt{a^2x^2 + 2ac_1x + c_1^2 - 1}}{a}\right\}, \left\{y(x) \to c_2 + \frac{i\sqrt{a^2x^2 + 2ac_1x + c_1^2 - 1}}{a}\right\}\right\}$$

✓ **Maple** : cpu = 0.171 (sec), leaf count = 41

$$\left\{y(x) = \frac{1}{a}\left(\left(-1 + (\_C1 + x)^2 a^2\right)\sqrt{-\left(-1 + (\_C1 + x)^2 a^2\right)^{-1}} + a\_C2\right)\right\}$$

2.1654 ODE No. 1654

$$y''(x) - 2ax\left(y'(x)^2 + 1\right)^{3/2} = 0$$

✓ **Mathematica** : cpu = 0.287254 (sec), leaf count = 308

$$\left\{\left\{y(x) \to c_2 - \frac{\sqrt{\frac{ax^2+c_1-1}{c_1-1}}\sqrt{\frac{ax^2+c_1+1}{c_1+1}}\left(F\left(i\sinh^{-1}\left(x\sqrt{\frac{a}{c_1+1}}\right) | \frac{c_1+1}{c_1-1}\right) + (c_1-1)\,E\left(i\sinh^{-1}\left(x\sqrt{\frac{a}{c_1+1}}\right) | \frac{c_1}{c_1}\right.\right.}{\sqrt{\frac{a}{c_1+1}}\sqrt{a^2x^4 + 2ac_1x^2 + c_1^2 - 1}}\right.\right.$$

✓ **Maple** : cpu = 0.219 (sec), leaf count = 38

$$\left\{y(x) = \int\sqrt{-\left(-1 + \left(x^2 + 2\_C1\right)^2 a^2\right)^{-1}}a\left(x^2 + 2\_C1\right) dx + \_C2\right\}$$

2.1655 ODE No. 1655

$$y''(x) - ay(x)\left(y'(x)^2 + 1\right)^{3/2} = 0$$

✓ **Mathematica** : cpu = 0.871877 (sec), leaf count = 350

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[-\frac{\sqrt{\frac{\#1^2 a+2c_1-2}{c_1-1}}\sqrt{\frac{\#1^2 a+2c_1+2}{c_1+1}}\left(F\left(i\sinh^{-1}\left(\sqrt{\frac{a}{2c_1+2}}\#1\right)|\frac{c_1+1}{c_1-1}\right)+(c_1-1)E\left(\right.\right.}{\sqrt{\frac{a}{2c_1+2}}\sqrt{\#1^4 a^2+4\#1^2 ac_1+4c_1^2-4}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.275 (sec), leaf count = 84

$$\left\{\int^{y(x)} a(\_a^2+2\_C1)\frac{1}{\sqrt{4-a^2(\_a^2+2\_C1)^2}}d\_a - x - \_C2 = 0, \int^{y(x)} -a(\_a^2+2\_C1)\frac{}{\sqrt{4-a}}\right.$$

2.1656 ODE No. 1656

$$y''(x) - a\left(y'(x)^2 + 1\right)^{3/2}(bx + c + y(x)) = 0$$

✗ **Mathematica** : cpu = 100.329 (sec), leaf count = 0 , could not solve

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

✓ **Maple** : cpu = 0.789 (sec), leaf count = 771

$$\left\{y(x) = -bx + RootOf\left(-x + \int^{\_Z}\frac{1}{(\_f^4a^2+4\_f^3a^2c+4\_f^2a^2c^2-4\_C1\_f^2a^2-8\_C1\_f a^2c+4}\right.\right.$$

2.1657 ODE No. 1657

$$y''(x) + y(x)^3y'(x) - y(x)y'(x)\sqrt{4y'(x) + y(x)^4} = 0$$

✓ **Mathematica** : cpu = 0.172532 (sec), leaf count = 43

$$\left\{\left\{y(x) \to e^{c_1}\tan\left(e^{3c_1}(c_2+x)\right)\right\}, \left\{y(x) \to e^{c_1}\tanh\left(e^{3c_1}(c_2+x)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.331 (sec), leaf count = 35

$$\left\{y(x) = \frac{1}{\_C1}\tan\left(\left(\_C1^{-2}\right)^{\frac{3}{2}}(\_C2+x)\right), y(x) = \frac{1}{\_C1}\tanh\left(\left(\_C1^{-2}\right)^{\frac{3}{2}}(\_C2+x)\right)\right\}$$

2.1658 ODE No. 1658

$$y''(x) - h(y'(x), ax + by(x)) = 0$$

✗ **Mathematica** : cpu = 0.122161 (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 = 0.149 (sec), leaf count = 115

$$\left\{y(x) = ODESolStruc\left(-\frac{a\left(\int \_b(\_a)\,\mathrm{d}\_a + \_C1\right) - b\_a}{b}, [\left\{\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a) = -h\left(\frac{-a\_b(\_a) + b}{\_b\,(\_a)\,b}, b\_a\right.\right.\right.$$

2.1659 ODE No. 1659

$$y''(x) - y(x)h\left(x, \frac{y'(x)}{y(x)}\right) = 0$$

✗ **Mathematica** : cpu = 13.2109 (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 = 0.113 (sec), leaf count = 60

$$\left\{y(x) = ODESolStruc\left(\mathrm{e}^{\int \_b(\_a)\,\mathrm{d}\_a + \_C1}, [\left\{\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a) = -(\_b(\_a))^2 + h(\_a, \_b(\_a))\right\}, \left\{\_a = x, \right.\right.\right.$$

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 = 4.99804 (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]
```

✓ **Maple** : cpu = 0.854 (sec), leaf count = 125

$$\left\{y(x) = ODESolStruc\left(\frac{\_a}{\mathrm{e}^{-\left(\int \_b(\_a)\,\mathrm{d}\_a + \_C1\right)n}}, [\left\{\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a) = (\_b(\_a))^2\left(-h\left(\_a, \frac{\_b(\_a)\_a\,n + 1}{\_b\,(\_a)}\right.\right.\right.\right.\right.$$

2.1661 ODE No. 1661

$$8y''(x) + 9y'(x)^4 = 0$$

✓ **Mathematica** : cpu = 0.0362734 (sec), leaf count = 90

$$\left\{\left\{y(x) \to c_2 - \frac{1}{3}\sqrt[3]{-\frac{1}{3}}(9x - 8c_1)^{2/3}\right\}, \left\{y(x) \to \frac{(9x - 8c_1)^{2/3}}{3\sqrt[3]{3}} + c_2\right\}, \left\{y(x) \to \frac{1}{9}\left((-3)^{2/3}(9x - 8c_1)^{2\right.\right.$$

✓ **Maple** : cpu = 0.109 (sec), leaf count = 51

$$\left\{y(x) = (\_C1 + x)^{\frac{2}{3}} + \_C2, y(x) = \frac{i\sqrt{3} - 1}{2}(\_C1 + x)^{\frac{2}{3}} + \_C2, y(x) = -\frac{i\sqrt{3} + 1}{2}(\_C1 + x)^{\frac{2}{3}} + \_C2\right.$$

2.1662 ODE No. 1662

$$ay''(x) + cy(x) + h(y'(x)) = 0$$

✗ **Mathematica** : cpu = 1.40263 (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 = 0.419 (sec), leaf count = 56

$$\left\{y(x) = ODESolStruc\left(\_a, [\left\{\left(\frac{d}{d\_a}\_b(\_a)\right)\_b(\_a) + \frac{h(\_b(\_a)) + \_a\, c}{a} = 0\right\}, \left\{\_a = y(x), \_b(\_a\right.\right.\right.$$

2.1663 ODE No. 1663

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

✗ **Mathematica** : cpu = 0.0353406 (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 = 0.974 (sec), leaf count = 125

$$\left\{y(x) = ODESolStruc\left(\_a\, e^{\int -\_b(\_a)\, d\_a + \_C1}, [\left\{\frac{d}{d\_a}\_b(\_a) = -\frac{(\_b(\_a)(n-1)^2\_a^n + 2\_a(n-3)\_\right.\right.\right.}{4}$$

2.1664 ODE No. 1664

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

✗ **Mathematica** : cpu = 0.52236 (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 = 3.044 (sec), leaf count = 155

$$\left\{ y(x) = ODESolStruc\left(\_a\, e^{\int -\_b(\_a)\, d\_a + \_C1}, [\left\{ \frac{d}{d\_a}\_b(\_a) = \frac{(\_b(\_a)\, a(n-1)^2\, \_a^n + (\_a\,(m-n+}{(r} \right.\right.\right.$$

2.1665 ODE No. 1665

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

✗ **Mathematica** : cpu = 0.364971 (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 = 0.641 (sec), leaf count = 84

$$\left\{ y(x) = ODESolStruc\left(\_a - 2\int \_b(\_a)\, d\_a - 2\_C1, [\left\{ \frac{d}{d\_a}\_b(\_a) = (e^{-\_a} - 2)\,(\_b(\_a))^3 + (\_b(\right.\right.\right.$$

2.1666 ODE No. 1666

$$ay'(x) + bxe^{y(x)} + xy''(x) = 0$$

✗ **Mathematica** : cpu = 0.590026 (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 = 1.001 (sec), leaf count = 93

$$\left\{ y(x) = ODESolStruc\left(\_a - 2\int \_b(\_a)\, d\_a - 2\_C1, [\left\{ \frac{d}{d\_a}\_b(\_a) = (be^{-\_a} - 2a + 2)\,(\_b(\_a))^3 - \right.\right.\right.$$

2.1667 ODE No. 1667

$$bx^{5-2a}e^{y(x)} + ay'(x) + xy''(x) = 0$$

✗ **Mathematica** : cpu = 0.804634 (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]
```

✓ **Maple** : cpu = 1.495 (sec), leaf count = 121

$$\left\{ y(x) = ODESolStruc\left((2\,a-6)\int \_b(\_a)\,\mathrm{d}\_a + 2\,\_C1\,a + \_a - 6\,\_C1, [\left\{ \frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a) = \left(b\mathrm{e}^{-\_a} + 2\right.\right.\right.\right.$$

2.1668 ODE No. 1668

$$xy''(x) - (1-y(x))y'(x) = 0$$

✓ **Mathematica** : cpu = 0.0719346 (sec), leaf count = 46

$$\left\{ \left\{ y(x) \to 2 - \sqrt{2}\sqrt{c_1+2}\tanh\left(\frac{\sqrt{c_1+2}(2c_2 - \log(x))}{\sqrt{2}} \right) \right\} \right\}$$

✓ **Maple** : cpu = 0.201 (sec), leaf count = 24

$$\left\{ y(x) = \frac{1}{\_C1}\left(2\,\_C1 + \tanh\left(\frac{\ln(x) - \_C2}{2\,\_C1} \right) \right) \right\}$$

2.1669 ODE No. 1669

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

✓ **Mathematica** : cpu = 138.441 (sec), leaf count = 74

$$\text{Solve}\left[\int_1^x -\frac{c_1e^{K[2]} + K[2] + 1}{c_1e^{K[2]}K[2] + 2K[2]^2 + K[2]}\,dK[2] + c_2 = \int_1^{y(x)} -\frac{x}{c_1e^{xK[1]} + 2xK[1] + 1}\,dK[1], y(x) \right]$$

✓ **Maple** : cpu = 0.141 (sec), leaf count = 32

$$\left\{ y(x) = \frac{1}{x}RootOf\left(-\ln(x) + \_C2 + \int^{\_Z} -\left(\mathrm{e}^{\_f}\,\_C1 - 2\,\_f - 1\right)^{-1} d\_f \right) \right\}$$

2.1670 ODE No. 1670

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

✓ **Mathematica** : cpu = 121.907 (sec), leaf count = 49

$$\left\{\left\{y(x)\to x\left(\int_1^x \frac{\sqrt{-\frac{b}{a}}\tan\left(\frac{bK[2]}{\sqrt{-\frac{b}{a}}}+c_1\right)}{K[2]^2}dK[2]+c_2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.454 (sec), leaf count = 35

$$\left\{y(x) = \left(\int \frac{i}{x^2}\tan\left(-i\sqrt{a}\sqrt{b}x + \_C1\right)\sqrt{b}\frac{1}{\sqrt{a}}\,dx + \_C2\right)x\right\}$$

2.1671 ODE No. 1671

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

✓ **Mathematica** : cpu = 0.0389779 (sec), leaf count = 59

$$\left\{\left\{y(x)\to c_2 - 2ie^{c_1}\sqrt{e^{2c_1}-x}\right\},\left\{y(x)\to c_2 + 2ie^{c_1}\sqrt{e^{2c_1}-x}\right\}\right\}$$

✓ **Maple** : cpu = 0.111 (sec), leaf count = 35

$$\left\{y(x) = -2\frac{\sqrt{\_C1\,x-1}}{\_C1} + \_C2, y(x) = 2\frac{\sqrt{\_C1\,x-1}}{\_C1} + \_C2\right\}$$

2.1672 ODE No. 1672

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

✗ **Mathematica** : cpu = 18.6 (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 = 0.99 (sec), leaf count = 65

$$\left\{y(x) = ODESolStruc\left(\_a, [\left\{\frac{d}{d\_a}\_b(\_a) = (\_b(\_a))^2\left(\_a\,\_b(\_a)\,a - \_b(\_a)\,\_a^n a - 1\right)\right\}, \left\{\_a = \right.\right.\right.$$

2.1673 ODE No. 1673

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

✗ **Mathematica** : cpu = 31.5389 (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 = 0.803 (sec), leaf count = 60

$$\left\{y(x)=ODESolStruc\left(\_a,[\left\{\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a)=\left(-1+a(\mathrm{e}^{-\_a}-1)\_b(\_a)\right)\left(\_b(\_a)\right)^2\right\},\left\{\_a=y(x),\_b\right.\right.\right.$$

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 = 0.0625262 (sec), leaf count = 69

$$\left\{\left\{y(x)\to 2^{-\frac{a+b}{b}}c^{a/b}\left(x^{2b}\right)^{\frac{a}{2b}}\left(c_2\sin\left(c\sqrt{x^{2b}}\right)+2c_1\cos\left(c\sqrt{x^{2b}}\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.099 (sec), leaf count = 25

$$\left\{y(x)=x^a\left(\cos\left(x^bc\right)\_C2+\sin\left(x^bc\right)\_C1\right)\right\}$$

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 = 3.5192 (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
```

✗ **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
```

2.1676 ODE No. 1676

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

✓ **Mathematica** : cpu = 57.4683 (sec), leaf count = 117

$$\left\{\left\{y(x)\to x\left(c_2+\int_1^x \frac{i\sqrt{b}\left(Y_1\left(-i\sqrt{a}\sqrt{b}K[2]\right)-c_1J_1\left(i\sqrt{a}\sqrt{b}K[2]\right)\right)}{\sqrt{a}K[2]\left(c_1J_0\left(i\sqrt{a}\sqrt{b}K[2]\right)+Y_0\left(-i\sqrt{a}\sqrt{b}K[2]\right)\right)}dK[2]\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.324 (sec), leaf count = 72

$$\left\{y(x)=\left(\int-\frac{1}{ax}\sqrt{-ab}\left(\_C1\,Y_1\left(\sqrt{-ab}x\right)+J_1\left(\sqrt{-ab}x\right)\right)\left(\_C1\,Y_0\left(\sqrt{-ab}x\right)+J_0\left(\sqrt{-ab}x\right)\right)^{-1}\mathrm{d}x+\right.$$

2.1677 ODE No. 1677

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

✗ **Mathematica** : cpu = 105.534 (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 = 1.77 (sec), leaf count = 101

$$\left\{y(x)=ODESolStruc\left(\_a\,\mathrm{e}^{\int\_b(\_a)\,\mathrm{d}\_a+\_C1},[\left\{\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a)=\left(\_a^3a+b\right)\left(\_b(\_a)\right)^3+\left(2\,\_a^2a+1\right)\left(\_\right.\right.\right.\right.$$

2.1678 ODE No. 1678

$$x^2y''(x)-\sqrt{ax^2y'(x)^2+by(x)^2}=0$$

✗ **Mathematica** : cpu = 1.80123 (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
```

✓ **Maple** : cpu = 0.362 (sec), leaf count = 60

$$\left\{y(x)-\mathrm{e}^{\int^{\ln(x)}RootOf\left(\int^{\_Z}-y(x)\left(y(x)\_a^2-\_a\,y(x)-\sqrt{(y(x))^2(\_a^2a+b)}\right)^{-1}d\_a-\_b+\_C1\right)d\_b+\_C2}=0\right\}$$

2.1679 ODE No. 1679

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

✓ **Mathematica** : cpu = 0.121553 (sec), leaf count = 33

$$\left\{\left\{y(x)\to -x\cot\left(c_1\right)+\csc^2\left(c_1\right)\log\left(-x\sin\left(c_1\right)-\cos\left(c_1\right)\right)+c_2\right\}\right\}$$

✓ **Maple** : cpu = 0.229 (sec), leaf count = 27

$$\left\{y(x)=\frac{x}{\_C1}+\ln\left(\_C1\,x-1\right)+\frac{\ln\left(\_C1\,x-1\right)}{\_C1^2}+\_C2\right\}$$

2.1680 ODE No. 1680

$$x^4\left(-y'(x)^2\right)+4x^2y''(x)+4y(x)=0$$

✗ **Mathematica** : cpu = 11.1248 (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 = 0.816 (sec), leaf count = 103

$$\left\{y(x)=ODESolStruc\left(\frac{\_a}{\left(e^{\int \_b(\_a)\,\mathrm{d}\_a+\_C1}\right)^2},\left[\left\{\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a)=\left(-\_a^2+7\_a\right)\left(\_b(\_a)\right)^3+\left(\_a-5\right)\left(\_\right.\right.\right.\right.$$

2.1681 ODE No. 1681

$$ay(x)^3+9x^2y''(x)+2y(x)=0$$

✗ **Mathematica** : cpu = 3.55759 (sec), leaf count = 0 , could not solve

```
DSolve[2*y[x] + a*y[x]^3 + 9*x^2*Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 0.068 (sec), leaf count = 31

$$\left\{y(x)=\_C2\;JacobiSN\left(\left(\left(\frac{\sqrt{2}}{2\,x^3}\sqrt{x^{\frac{20}{3}}a}+\_C1\right)\_C2,i\right)\sqrt[3]{x}\right\}$$

2.1682 ODE No. 1682

$$x^3(y''(x) + y(x)y'(x) - y(x)^3) + 12xy(x) + 24 = 0$$

✗ **Mathematica** : cpu = 22.6828 (sec), leaf count = 0 , could not solve

```
DSolve[24 + 12*x*y[x] + x^3*(-y[x]^3 + y[x]*Derivative[1][y][x] + Derivative[2][y][x])
```

✓ **Maple** : cpu = 1.085 (sec), leaf count = 94

$$\left\{y(x) = ODESolStruc\left(\_a\,e^{\int -\_b(\_a)\,d\_a + \_C1}, [\left\{\frac{d}{d\_a}\_b(\_a) = -((\_a^3 + \_a^2 - 14\_a - 24)\_b(\_a) + \right.\right.\right.$$

2.1683 ODE No. 1683

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

✓ **Mathematica** : cpu = 0.081657 (sec), leaf count = 25

$$\left\{\left\{y(x) \to -\frac{x\log\left(-\frac{a(c_2x+c_1)}{x}\right)}{a}\right\}\right\}$$

✓ **Maple** : cpu = 0.073 (sec), leaf count = 23

$$\left\{y(x) = -\frac{x}{a}\ln\left(\frac{a(\_C1\,x - \_C2)}{x}\right)\right\}$$

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 = 61.5709 (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]
```

✓ **Maple** : cpu = 1.558 (sec), leaf count = 100

$$\left\{y(x) = ODESolStruc\left(\_a\,e^{\int -\_b(\_a)\,d\_a + \_C1}, [\left\{\frac{d}{d\_a}\_b(\_a) = \frac{((-2\_a^3 + \_a^2 + (a-5)\_a + b)\_b(\_}{2}\right.\right.\right.$$

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 = 6.09278 (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
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 = 0.0343573 (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 = 1.132 (sec), leaf count = 128

$$\left\{y(x)=ODESolStruc\left(\_a\,e^{\int \_b(\_a)\,d\_a+\_C1},\left[\left\{\frac{d}{d\_a}\_b(\_a)=\frac{\left(a^2\_b(\_a)\,(n-1)^2\,\_a^n-2\,\_a\,(n-3)\,\_\right.}{4}\right.\right.\right.$$

2.1687 ODE No. 1687

$$x^4y''(x)-x\left(x^2+2y(x)\right)y'(x)+4y(x)^2=0$$

✓ **Mathematica** : cpu = 0.0709014 (sec), leaf count = 83

$$\left\{\left\{y(x)\to\frac{x^2\left(\left(1-i\sqrt{-c_1-1}\right)x^{2i\sqrt{-c_1-1}}+\left(1+i\sqrt{-c_1-1}\right)c_2\right)}{c_2+x^{2i\sqrt{-c_1-1}}}\right\}\right\}$$

✓ **Maple** : cpu = 0.155 (sec), leaf count = 21

$$\left\{y(x)=x^2(\tanh\left(\_C1\left(\_C2-\ln\left(x\right)\right)\right)\_C1+1)\right\}$$

2.1688 ODE No. 1688

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

✗ **Mathematica** : cpu = 299.999 (sec), leaf count = 0 , timed out

```
$Aborted
```

✓ **Maple** : cpu = 0.135 (sec), leaf count = 32

$$\left\{y(x) = \mathit{RootOf}\left(-\ln(x) + \_C2 - \int^{\_Z} \left(e^{\_f}\_C1 + 4\_f + 2\right)^{-1} d\_f\right) x^2\right\}$$

2.1689 ODE No. 1689

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

✓ **Mathematica** : cpu = 0.733988 (sec), leaf count = 259

$$\left\{\left\{y(x) \to -ix\log\left(-\frac{\sqrt{-8ic_1x^2 - \sinh(2c_2) - \cosh(2c_2)} + i\sinh(c_2) + i\cosh(c_2)}{4c_1x}\right)\right\}, \left\{y(x) \to -ix\,\mathrm{l}\right.\right.$$

✓ **Maple** : cpu = 0.182 (sec), leaf count = 37

$$\left\{y(x) = \left(-\arctan\left(\frac{1}{\sqrt{\_C1\,x^2 - 1}}\right) + \_C2\right)x, y(x) = \left(\arctan\left(\frac{1}{\sqrt{\_C1\,x^2 - 1}}\right) + \_C2\right)x\right\}$$

2.1690 ODE No. 1690

$$\sqrt{x}y''(x) - y(x)^{3/2} = 0$$

✗ **Mathematica** : cpu = 22.8383 (sec), leaf count = 0 , could not solve

```
DSolve[-y[x]^(3/2) + Sqrt[x]*Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 1.108 (sec), leaf count = 99

$$\left\{y(x) = \mathit{ODESolStruc}\left(\frac{\_a}{\left(e^{\int \_b(\_a)\,d\_a + \_C1}\right)^3}, \left[\left\{\frac{d}{d\_a}\_b(\_a) = -(\_b(\_a))^3\,\_a^{\frac{3}{2}} + 12\,(\_b(\_a))^3\,\_a - 7\right.\right.\right.\right.$$

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 = 61.7971 (sec), leaf count = 0 , could not solve

```
DSolve[-f[y[x]/Sqrt[c + b*x + a*x^2]] + (c + b*x + a*x^2)^(3/2)*Derivative[2][y][x] ==
```

✓ **Maple** : cpu = 1.483 (sec), leaf count = 254

$$\left\{ y(x) = RootOf\left(-2\,a\arctan\left(\frac{2\,ax+b}{\sqrt{4\,ac-b^2}}\right) - 2\int^{\_Z} \frac{a}{\sqrt{4\_C1\,a^2 - 4\,c\_g^2a + b^2\_g^2 + 8\int F\left(\_g\right)\mathrm{d}\_g\right.$$

2.1692 ODE No. 1692

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

✗ **Mathematica** : cpu = 0.0985215 (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 = 4.372 (sec), leaf count = 156

$$\left\{ y(x) = ODESolStruc\left(\_a\left(\mathrm{e}^{\frac{\left(\int \_b(\_a)\,\mathrm{d}\_a + \_C1\right)(n+2)}{n}}\right)^{-1}, [\left\{\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a) = 2\,\frac{\left(\_b(\_a)\right)^2}{n^2}\left(-1/2\,\_b(\_a)\,\_a^{\frac{2\,n}{n+}}\right.\right.\right.$$

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 = 1.10995 (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][
```

✓ **Maple** : cpu = 0.326 (sec), leaf count = 68

$$\left\{ y(x) = ODESolStruc\left(\_a, [\left\{\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a) = -h\left(\_a, \left(\_b(\_a)\right)^{-1}\right)\left(\_b(\_a)\right)^3\right\}, \left\{\_a = y(x)\,, \_b(\_a)\right.\right.\right.$$

2.1694 ODE No. 1694

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

✓ **Mathematica** : cpu = 0.225601 (sec), leaf count = 111

$$\left\{\left\{y(x) \to \exp\left(-\frac{c_1 + 2a\text{erf}^{-1}\left(-i\sqrt{\frac{2}{\pi}}\sqrt{ae^{\frac{c_1}{a}}(c_2+x)^2}\right)^2}{2a}\right)\right\}, \left\{y(x) \to \exp\left(-\frac{c_1 + 2a\text{erf}^{-1}\left(i\sqrt{\frac{2}{\pi}}\sqrt{\right.}\right.}{2a}\right.\right.$$

✓ **Maple** : cpu = 0.242 (sec), leaf count = 54

$$\left\{\int^{y(x)} \frac{1}{\sqrt{2\,a\ln(\_a) - 2\,\_C1\,a}}d\_a - x - \_C2 = 0, \int^{y(x)} -\frac{1}{\sqrt{-2\,a\,(\_C1 - \ln(\_a))}}d\_a - x - \_C2 =\right.$$

2.1695 ODE No. 1695

$$y(x)y''(x) - ax = 0$$

✗ **Mathematica** : cpu = 26.3896 (sec), leaf count = 0 , could not solve

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

✓ **Maple** : cpu = 0.678 (sec), leaf count = 103

$$\left\{y(x) = ODESolStruc\left(\_a\left(e^{\int -\_b(\_a)\,d\_a + \_C1}\right)^{\frac{3}{2}}, [\left\{\frac{d}{d\_a}\_b(\_a) = \frac{(3\,\_a^2 - 4\,a)\,(\_b(\_a))^3}{4\,\_a} + 2\,(\_b(\_a\right.\right.\right.$$

2.1696 ODE No. 1696

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

✗ **Mathematica** : cpu = 24.8888 (sec), leaf count = 0 , could not solve

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

✓ **Maple** : cpu = 0.563 (sec), leaf count = 100

$$\left\{y(x) = ODESolStruc\left(\left(e^{\int -\_b(\_a)\,d\_a + \_C1}\right)^2 \_a, [\left\{\frac{d}{d\_a}\_b(\_a) = \frac{(2\,\_a^2 - a)\,(\_b(\_a))^3}{\_a} + 3\,(\_b(\_a))^{\right.\right.\right.$$

2.1697 ODE No. 1697

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

✓ **Mathematica** : cpu = 0.0755469 (sec), leaf count = 68

$$\left\{\left\{y(x)\to -\frac{\sqrt{a^2\left(c_2+x\right)^2-e^{2c_1}}}{\sqrt{a}}\right\},\left\{y(x)\to \frac{\sqrt{a^2\left(c_2+x\right)^2-e^{2c_1}}}{\sqrt{a}}\right\}\right\}$$

✓ **Maple** : cpu = 0.059 (sec), leaf count = 39

$$\left\{y(x)=\sqrt{ax^2-2\_C1\,x+2\_C2},y(x)=-\sqrt{ax^2-2\_C1\,x+2\_C2}\right\}$$

2.1698 ODE No. 1698

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

✓ **Mathematica** : cpu = 0.0505581 (sec), leaf count = 63

$$\left\{\left\{y(x)\to -\sqrt{\frac{ax^3}{3}+bx^2+c_2x+2c_1}\right\},\left\{y(x)\to \sqrt{\frac{ax^3}{3}+bx^2+c_2x+2c_1}\right\}\right\}$$

✗ **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 = 0.0476805 (sec), leaf count = 32

$$\left\{\left\{y(x)\to -c_1\left(W\left(-\frac{e^{-\frac{c_1+c_2+x}{c_1}}}{c_1}\right)+1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.14 (sec), leaf count = 33

$$\left\{y(x)=-\_C1\left(lambertW\left(-\frac{\mathrm{e}^{-1}}{\_C1}\left(\mathrm{e}^{\frac{\_C2}{\_C1}}\right)^{-1}\left(\mathrm{e}^{\frac{x}{\_C1}}\right)^{-1}\right)+1\right)\right\}$$

2.1700 ODE No. 1700

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

✓ **Mathematica** : cpu = 0.0942455 (sec), leaf count = 44

$$\left\{\left\{y(x)\to -e^{-c_1}\sinh\left(e^{c_1}(c_2+x)\right)\right\},\left\{y(x)\to e^{-c_1}\sinh\left(e^{c_1}(c_2+x)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.608 (sec), leaf count = 86

$$\left\{y(x)=\frac{1}{2}\left(-\_C1\left(e^{\frac{x}{\_C1}}\right)^2\left(e^{\frac{\_C2}{\_C1}}\right)^2+\_C1\right)\left(e^{\frac{\_C2}{\_C1}}\right)^{-1}\left(e^{\frac{x}{\_C1}}\right)^{-1},y(x)=\frac{1}{2}\left(\_C1\left(e^{\frac{x}{\_C1}}\right)^2\left(e^{\frac{\_C2}{\_C1}}\right)^2-\_\right.\right.$$

2.1701 ODE No. 1701

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

✓ **Mathematica** : cpu = 0.121314 (sec), leaf count = 80

$$\left\{\left\{y(x)\to -\frac{e^{-c_1}\tanh\left(e^{c_1}(c_2+x)\right)}{\sqrt{-\operatorname{sech}^2\left(e^{c_1}\left(c_2+x\right)\right)}}\right\},\left\{y(x)\to \frac{e^{-c_1}\tanh\left(e^{c_1}(c_2+x)\right)}{\sqrt{-\operatorname{sech}^2\left(e^{c_1}\left(c_2+x\right)\right)}}\right\}\right\}$$

✓ **Maple** : cpu = 0.55 (sec), leaf count = 42

$$\left\{y(x)=\frac{\_C1}{2}\left(\left(e^{\frac{\_C2}{\_C1}}\right)^2\left(e^{\frac{x}{\_C1}}\right)^2+1\right)\left(e^{\frac{\_C2}{\_C1}}\right)^{-1}\left(e^{\frac{x}{\_C1}}\right)^{-1}\right\}$$

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 = 7.84968 (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]
```

✗ **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
```

2.1703 ODE No. 1703

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

✓ **Mathematica** : cpu = 0.255674 (sec), leaf count = 73

$$\left\{\left\{y(x)\to \exp\left(-\frac{1}{2}\sqrt{c_1}e^{-c_2-x}\left(e^{2(c_2+x)}-1\right)\right)\right\},\left\{y(x)\to \exp\left(\frac{1}{2}\sqrt{c_1}e^{-c_2-x}\left(e^{2(c_2+x)}-1\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.107 (sec), leaf count = 25

$$\left\{y(x) = \mathrm{e}^{-\frac{\mathrm{e}^{2x}\_C1}{2\,\mathrm{e}^{x}}}\mathrm{e}^{\frac{\_C2}{2\,\mathrm{e}^{x}}}\right\}$$

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 = 21.7698 (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][x]^2/f[x]^2) + Derivative[2][f][x]/f[x]) + y[x]*Derivative[2][y][x]
```

✗ **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(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 = 0.26187 (sec), leaf count = 0 , could not solve

```
DSolve[-y[x]^3 - y[x]*Derivative[1][f][x] + f[x]*Derivative[1][y][x] - Derivative[1][y
```

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

```
dsolve(diff(diff(y(x),x),x)*y(x)-diff(y(x),x)^2+f(x)*diff(y(x),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 = 0.534443 (sec), leaf count = 0 , could not solve

```
DSolve[f[x]*y[x]^3 - y[x]^4 + Derivative[1][f][x]*Derivative[1][y][x] - Derivative[1][
```

✗ **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),x)*y(x)+f(x)*y(x)^3-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 = 0.0873601 (sec), leaf count = 28

$$\left\{\left\{y(x)\to c_2e^{-\frac{c_1e^{-ax}+bx}{a}}\right\}\right\}$$

✓ **Maple** : cpu = 0.108 (sec), leaf count = 39

$$\left\{y(x)=1\mathrm{e}^{\frac{\mathrm{e}^{-ax}\_C1}{a}}\mathrm{e}^{\frac{b}{a^2}}\left(\mathrm{e}^{\frac{bx}{a}}\right)^{-1}\left(\mathrm{e}^{\frac{\_C2}{a}}\right)^{-1}\right\}$$

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 = 47.1722 (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
```

✓ **Maple** : cpu = 1.039 (sec), leaf count = 73

$$\left\{y(x)=ODESolStruc\left(\_a,[\left\{\left(\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a)\right)\_b(\_a)-\frac{(\_b(\_a))^2-\_a\,\_b(\_a)\,a-b\_a^3+2\_a^2a}{\_a}=\right.\right.\right.$$

2.1709 ODE No. 1709

$$2a^2y(x)^2 - (ay(x)-1)y'(x) + ay(x) - 2b^2y(x)^3 + y(x)y''(x) - y'(x)^2 = 0$$

✗ **Mathematica** : cpu = 65.3099 (sec), leaf count = 0 , could not solve

```
DSolve[a*y[x] + 2*a^2*y[x]^2 - 2*b^2*y[x]^3 - (-1 + a*y[x])*Derivative[1][y][x] - Deri
```

✓ **Maple** : cpu = 1.917 (sec), leaf count = 84

$$\left\{ y(x) = ODESolStruc\left(\_a, [\left\{ \left(\frac{d}{d\_a}\_b(\_a)\right)\_b(\_a) - \frac{2\,b^2\_a^3 - 2\_a^2a^2 + \_a\_b(\_a)\,a + (\_b(\_a)\right.\right.\right.}{\_a}$$

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 = 117.349 (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] - De
```

✓ **Maple** : cpu = 2.572 (sec), leaf count = 91

$$\left\{ y(x) = ODESolStruc\left(\_a, [\left\{ \left(\frac{d}{d\_a}\_b(\_a)\right)\_b(\_a) - \frac{\_a^4b^2 + b^2\_a^3 - \_a^2a^2 - \_a\_b(\_a)\,a - \_a\right.\right.\right.}{\_a}$$

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 = 300.01 (sec), leaf count = 0 , timed out

```
$Aborted
```

✓ **Maple** : cpu = 0.709 (sec), leaf count = 81

$$\left\{ y(x) = 1e^{\frac{J_n(\sin(x))\_C1}{\sin(x)\left(J_{n+1}(\sin(x))Y_n(\sin(x)) - J_n(\sin(x))Y_{n+1}(\sin(x))\right)}}\left(e^{\frac{Y_n(\sin(x))\_C2}{\sin(x)\left(J_{n+1}(\sin(x))Y_n(\sin(x)) - J_n(\sin(x))Y_{n+1}(\sin(x))\right)}}\right)^{-1} \right\}$$

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 = 11.5169 (sec), leaf count = 57

$$\left\{\left\{y(x) \to c_2 \exp\left(\int_1^x e^{\int_1^{K[3]} f(K[1])\,dK[1]}\left(\int_1^{K[3]} g(K[2])e^{-\int_1^{K[2]} f(K[1])\,dK[1]}\,dK[2] + c_1\right)\,dK[3]\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.122 (sec), leaf count = 61

$$\left\{y(x) = \frac{\_C2}{\mathrm{e}^{\_C1\,\int \mathrm{e}^{\int f(x)\,\mathrm{d}x}\,\mathrm{d}x}}\mathrm{e}^{\int \mathrm{e}^{\int f(x)\,\mathrm{d}x}\,\mathrm{d}x\int \frac{g(x)}{\mathrm{e}^{\int f(x)\,\mathrm{d}x}}\,\mathrm{d}x}\left(\mathrm{e}^{\int \frac{g(x)\int \mathrm{e}^{\int f(x)\,\mathrm{d}x}\,\mathrm{d}x}{\mathrm{e}^{\int f(x)\,\mathrm{d}x}}\,\mathrm{d}x}\right)^{-1}\right\}$$

2.1713 ODE No. 1713

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

✗ **Mathematica** : cpu = 21.057 (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[
```

✓ **Maple** : cpu = 0.372 (sec), leaf count = 54

$$\left\{y(x) = ODESolStruc\left(\_b(\_a), [\left\{\frac{f(\_a)\left(\_b(\_a)\right)^2 + \_C1\,\_b(\_a) + \frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a) - g(\_a)}{\_b\left(\_a\right)} = 0\right\}, \{\_$$

2.1714 ODE No. 1714

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

✓ **Mathematica** : cpu = 0.0769562 (sec), leaf count = 25

$$\left\{\left\{y(x) \to \frac{c_2 e^x}{\sqrt{1 - 2e^{c_1 + x}}}\right\}\right\}$$

✓ **Maple** : cpu = 0.094 (sec), leaf count = 68

$$\left\{y(x) = \frac{\sqrt{2}}{2\,\_C1\,\mathrm{e}^x - 2\,\_C2}\sqrt{(\_C1\,\mathrm{e}^x - \_C2)\,\mathrm{e}^{2\,x}}, y(x) = -\frac{\sqrt{2}}{2\,\_C1\,\mathrm{e}^x - 2\,\_C2}\sqrt{(\_C1\,\mathrm{e}^x - \_C2)\,\mathrm{e}^{2\,x}}\right\}$$

2.1715 ODE No. 1715

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

✓ **Mathematica** : cpu = 0.0426184 (sec), leaf count = 26

$$\left\{\left\{y(x) \to c_2(-ax - c_1 + x)^{\frac{1}{1-a}}\right\}\right\}$$

✓ **Maple** : cpu = 0.08 (sec), leaf count = 25

$$\left\{y(x) = \left(\frac{1}{(1-a)\left(\_C1\, x + \_C2\right)}\right)^{(a-1)^{-1}}\right\}$$

2.1716 ODE No. 1716

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

✓ **Mathematica** : cpu = 0.772016 (sec), leaf count = 172

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[-\frac{\#1\sqrt{1-e^{2c_1}\#1^{-2a}}\,{}_2F_1\left(\frac{1}{2}, -\frac{1}{2a}; 1-\frac{1}{2a}; e^{2c_1}\#1^{-2a}\right)}{\sqrt{e^{2c_1}\#1^{-2a}-1}}\&\right][c_2 + x]\right\}, \left\{y(x) -\right.\right.$$

✓ **Maple** : cpu = 0.329 (sec), leaf count = 68

$$\left\{\int^{y(x)} \frac{1}{\_a^{-a}} \frac{1}{\sqrt{-\_a^{2\,a} + \_C1}} d\_a - x - \_C2 = 0, \int^{y(x)} -\frac{1}{\_a^{-a}} \frac{1}{\sqrt{-\_a^{2\,a} + \_C1}} d\_a - x - \_C2 = 0\right\}$$

2.1717 ODE No. 1717

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

✓ **Mathematica** : cpu = 2.10945 (sec), leaf count = 49

$$\left\{\left\{y(x) \to 0^{-\frac{1}{a+1}}\right\}, \left\{y(x) \to 2^{\frac{1}{-2a-3}}\left(\frac{b}{(2a+3)c_1}\right)^{\frac{1}{-2a-3}}\right\}\right\}$$

✓ **Maple** : cpu = 0.412 (sec), leaf count = 107

$$\left\{\int^{y(x)} (2\,a+3)\,\_a^{2\,a} \frac{1}{\sqrt{-(2\,a+3)\,\_a^{2\,a}\left(2\,\_a^{2\,a+3}b - \_C1\right)}} d\_a - x - \_C2 = 0, \int^{y(x)} (-2\,a-3)\,\_a^{2\,a}\right.$$

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 = 1.70501 (sec), leaf count = 396

$$\left\{\left\{y(x) \to \left(-\frac{\exp\left(-\frac{x\left(b\sqrt{b^2-4(a+1)c}-2(a+1)c+b^2\right)}{\sqrt{b^2-4(a+1)c}+b}\right)\left(b^2\left(de^{\frac{1}{2}x\left(\sqrt{b^2-4(a+1)c}+b\right)} - cc_2\exp\left(\frac{x\left(b\sqrt{b^2-4(a+1)c}-4(a\right.}{\sqrt{b^2-4(a+1)c}+\right.}\right.\right.\right)}{}\right.\right.\right.$$

✓ **Maple** : cpu = 0.356 (sec), leaf count = 133

$$\left\{y(x) = e^{-\frac{x}{2a+2}\sqrt{(-4a-4)c+b^2}}e^{-\frac{bx}{2a+2}}\left(\left((-4a-4)c^3+b^2c^2\right)\left(de^{\frac{x}{2}\left(b+\sqrt{(-4a-4)c+b^2}\right)}\sqrt{(-4a-4)c+b^2}+(a\right.\right.\right.$$

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 = 42.0878 (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]*De
```

✓ **Maple** : cpu = 0.628 (sec), leaf count = 70

$$\left\{y(x) = ODESolStruc\left(e^{\int \_b(\_a)\,d\_a+\_C1}, [\left\{\frac{d}{d\_a}\_b(\_a) = (-a-1)(\_b(\_a))^2 - f(\_a)\_b(\_a) - g(\_a\right.\right.\right.$$

2.1720 ODE No. 1720

$$ay'(x)^2 + by(x)^2y'(x) + cy(x)^4 + y(x)y''(x) = 0$$

✗ **Mathematica** : cpu = 106.943 (sec), leaf count = 0 , could not solve

```
DSolve[c*y[x]^4 + b*y[x]^2*Derivative[1][y][x] + a*Derivative[1][y][x]^2 + y[x]*Deriva
```

✓ **Maple** : cpu = 0.574 (sec), leaf count = 173

$$\left\{\int^{y(x)}(2a+4)\left(\tan\left(RootOf\left(2\_Z\,b\_a^2 - 2a\ln(\_a)\sqrt{4\_a^4ac - \_a^4b^2 + 8c\_a^4} - \sqrt{4\_a^4ac - \_a\right.\right.\right.\right.$$

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 = 1.1636 (sec), leaf count = 0 , could not solve

```
DSolve[(a*f[x]^2*y[x]^4)/(2 + a)^2 - (a*y[x]^3*Derivative[1][f][x])/(2 + a) - f[x]*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(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+
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 = 2.18898 (sec), leaf count = 797

$$\left\{\left\{y(x)\to \text{InverseFunction}\left[-\frac{\left(\left(4c_1a^2+\sqrt{8c_1a^2+1}+1\right)E\left(i\sinh^{-1}\left(\sqrt{2}\sqrt{\frac{a^2}{-4c_1a^2+\sqrt{8c_1a^2+1}-1}}\#1\right)|\frac{4c_1a^2}{4c_1a^2}\right.\right.}{}\right.\right.\right.$$

✓ **Maple** : cpu = 0.439 (sec), leaf count = 98

$$\left\{\int^{y(x)}(\_a^2a+\_C1)\frac{1}{\sqrt{-\_a^4a^2-2\_C1\_a^2a-\_C1^2+\_a^2}}d\_a-x-\_C2=0,\int^{y(x)}-(\_a^2a+\_C\right.$$

2.1723 ODE No. 1723

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

✓ **Mathematica** : cpu = 0.960935 (sec), leaf count = 227

$$\left\{\left\{y(x)\to-\frac{e^{-2c_1}\sqrt{e^{2c_1}\left(4e^{c_1}(x-c_2)+1\right)}}{\sqrt{2}}+\frac{e^{-c_1}}{2}-2c_2+x\right\},\left\{y(x)\to\frac{e^{-2c_1}\sqrt{e^{2c_1}\left(4e^{c_1}(x-c_2)+1\right)}}{\sqrt{2}}\right.\right.$$

✓ **Maple** : cpu = 0.151 (sec), leaf count = 16

$$\left\{y(x)=\sqrt{\_C1+2x\_C2+\_C1+x}\right\}$$

2.1724 ODE No. 1724

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

✓ **Mathematica** : cpu = 0.280902 (sec), leaf count = 24

$$\left\{\left\{y(x) \to -\frac{e^{-c_1}}{c_2 + x} - c_2\right\}\right\}$$

✓ **Maple** : cpu = 0.893 (sec), leaf count = 21

$$\left\{y(x) = \frac{\_C2^2 - \_C2\, x + \_C1}{\_C2 - x}\right\}$$

2.1725 ODE No. 1725

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

✓ **Mathematica** : cpu = 0.417677 (sec), leaf count = 59

$$\left\{\left\{y(x) \to -\sqrt{e^{2c_1} - (c_2 + x)^2} - c_2\right\}, \left\{y(x) \to \sqrt{e^{2c_1} - (c_2 + x)^2} - c_2\right\}\right\}$$

✓ **Maple** : cpu = 0.821 (sec), leaf count = 105

$$\left\{y(x) = x + RootOf\left(-x + \int^{\_Z} (\_C1^2\_f^2 - 1)\left(2 - \_C1^2\_f^2 + \_C1\sqrt{-\_C1^2\_f^2 + 2}\_f\right)^{-1} d\_f +\right.\right.$$

2.1726 ODE No. 1726

$$(x - y(x))y''(x) - h(y'(x)) = 0$$

✓ **Mathematica** : cpu = 0.844236 (sec), leaf count = 73

$$\text{Solve}\left[\left\{x = \int \frac{\exp\left(-\int_1^{\text{K\$22398859}} \frac{K[3]-1}{h(K[3])}\, dK[3] - c_1\right)}{h(\text{K\$22398859})}\, d\text{K\$22398859} + c_2, x = \exp\left(-\int_1^{\text{K\$22398859}} \frac{K[3] -}{h(K[3}\right.\right.\right.$$

✓ **Maple** : cpu = 0.168 (sec), leaf count = 39

$$\left\{y(x) = x + RootOf\left(-x + \int^{\_Z} \left(-1 + RootOf\left(\int^{\_Z} \frac{\_a - 1}{h(\_a)} d\_a + \ln(-\_g) + \_C1\right)\right)^{-1} d\_g + \_C2\right.\right.$$

2.1727 ODE No. 1727

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

✓ **Mathematica** : cpu = 0.203603 (sec), leaf count = 129

$$\left\{\left\{y(x)\to \text{InverseFunction}\left[e^{2c_1}\tan^{-1}\left(\frac{\sqrt{\#1}}{\sqrt{e^{2c_1}-\#1}}\right)-\sqrt{\#1}\sqrt{e^{2c_1}-\#1}\&\right][c_2+x]\right\},\left\{y(x)\to \text{Invers}\right.\right.$$

✓ **Maple** : cpu = 0.445 (sec), leaf count = 823

$$\left\{y(x) = \frac{\left(-RootOf\left((\tan(\_Z))^2\_C1^2\_Z^2 - 4(\tan(\_Z))^2\_C1\,\_C2\,\_Z - 4(\tan(\_Z))^2\_C1\,x\_Z + 4\right.\right.}{}\right.$$

2.1728 ODE No. 1728

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

✓ **Mathematica** : cpu = 0.0100427 (sec), leaf count = 31

$$\left\{\left\{y(x)\to \frac{x^2(c_1^2-a)}{4c_2}+c_1x+c_2\right\}\right\}$$

✓ **Maple** : cpu = 0.047 (sec), leaf count = 24

$$\left\{y(x) = \frac{(\_C1^2-a)\,x^2}{4\,\_C2}+\_C1\,x+\_C2\right\}$$

2.1729 ODE No. 1729

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

✗ **Mathematica** : cpu = 0.028212 (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]
```

✗ **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 = 0.55911 (sec), leaf count = 77

$$\left\{\left\{y(x) \to -\frac{1}{2}i\sqrt{c_1}\text{ns}\left(\left(-\frac{1}{2}+\frac{i}{2}\right)\sqrt[4]{c_1}(x+c_2)\middle| -1\right)^2\right\}, \left\{y(x) \to -\frac{1}{2}i\sqrt{c_1}\text{ns}\left(\left(-\frac{1}{2}+\frac{i}{2}\right)\sqrt[4]{c_1}(x+c_2\right.\right.$$

✓ **Maple** : cpu = 0.115 (sec), leaf count = 53

$$\left\{\int^{y(x)} \frac{1}{\sqrt{4\_a^3+\_a\_C1}}d\_a - x - \_C2 = 0, \int^{y(x)} -\frac{1}{\sqrt{4\_a^3+\_a\_C1}}d\_a - x - \_C2 = 0\right\}$$

2.1731 ODE No. 1731

$$2y(x)y''(x) - y'(x)^2 - 8y(x)^3 - 4y(x)^2 = 0$$

✓ **Mathematica** : cpu = 1.46584 (sec), leaf count = 351

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[-\frac{i\#1\sqrt{\frac{2c_1}{\#1-\#1\sqrt{1-c_1}}+4}\sqrt{\frac{c_1}{\#1\sqrt{1-c_1}+\#1}+2}F\left(i\sinh^{-1}\left(\frac{\sqrt{\frac{c_1}{2\sqrt{1-c_1}+2}}}{\sqrt{\#1}}\right)\middle|\frac{\sqrt{1-c_1}+}{1-\sqrt{1-c}}\right.}{\sqrt{\frac{c_1}{\sqrt{1-c_1}+1}}\sqrt{4\#1^2+4\#1+c_1}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.118 (sec), leaf count = 61

$$\left\{\int^{y(x)} \frac{1}{\sqrt{4\_a^3+\_a\_C1+4\_a^2}}d\_a - x - \_C2 = 0, \int^{y(x)} -\frac{1}{\sqrt{(4\_a^2+\_C1+4\_a)\_a}}d\_a - x -\right.$$

2.1732 ODE No. 1732

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

✗ **Mathematica** : cpu = 1.85424 (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] ==
```

✗ **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 = 2.90845 (sec), leaf count = 437

$$\left\{\left\{y(x)\to \text{InverseFunction}\left[-\frac{i\sqrt{2}\#1^{3/2}\sqrt{\frac{4c_1}{\#1\left(\sqrt{2ac_1+b^2}-b\right)}+2}\sqrt{1-\frac{2c_1}{\#1\left(\sqrt{2ac_1+b^2}+b\right)}}F\left(i\sinh^{-1}\left(\frac{\sqrt{2}\sqrt{\frac{}{\sqrt{b^2}}}}{\sqrt{}}\right.\right.}{\sqrt{\frac{c_1}{\sqrt{2ac_1+b^2}-b}}\sqrt{-\#1\left(\#1^2a+2\#1b-2c_1\right)}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.119 (sec), leaf count = 71

$$\left\{\int^{y(x)}-2\frac{1}{\sqrt{-2\_a^3a-4\_a^2b+4\_a\_C1}}d\_a-x-\_C2=0,\int^{y(x)}2\frac{1}{\sqrt{-2\_a^3a-4\_a^2b+4\_a\_C}}\right.$$

2.1734 ODE No. 1734

$$ay(x)^3+2y(x)y''(x)-y'(x)^2+2xy(x)^2+1=0$$

✗ **Mathematica** : cpu = 2.67558 (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]
```

✗ **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 = 1.5995 (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] == C
```

✗ **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 = 10.4062 (sec), leaf count = 285

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[-\frac{2i\#1^{3/2}\sqrt{(-1)^{5/6}\left(\frac{\sqrt[3]{-c_1}}{\#1}-1\right)}\sqrt{\frac{(-c_1)^{2/3}}{\#1^2}+\frac{\sqrt[3]{-c_1}}{\#1}+1}F\left(\sin^{-1}\left(\frac{\sqrt{-\frac{i\sqrt[3]{-c_1}}{\#1}-}}{\sqrt[4]{3}}\right.\right.}{\sqrt[4]{3}\sqrt[3]{-c_1}\sqrt{\#1^3+c_1}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.121 (sec), leaf count = 49

$$\left\{\int^{y(x)}\frac{1}{\sqrt{\_a^4+\_a\_C1}}d\_a - x - \_C2 = 0, \int^{y(x)}-\frac{1}{\sqrt{\_a^4+\_a\_C1}}d\_a - x - \_C2 = 0\right\}$$

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 = 1.44979 (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]
```

✗ **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 = 0.605856 (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]
```

✗ **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+d
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 = 0.0794028 (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
```

✗ **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+
```

2.1740 ODE No. 1740

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

✓ **Mathematica** : cpu = 0.0345317 (sec), leaf count = 16

$$\left\{\left\{y(x) \to \frac{c_2}{(2c_1 + x)^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.054 (sec), leaf count = 13

$$\left\{y(x) = 4\left(\_C1\,x + \_C2\right)^{-2}\right\}$$

2.1741 ODE No. 1741

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

✓ **Mathematica** : cpu = 0.1122 (sec), leaf count = 17

$$\left\{\left\{y(x) \to c_2 \sec^2(2c_1 + x)\right\}\right\}$$

✓ **Maple** : cpu = 0.108 (sec), leaf count = 34

$$\left\{y(x) = 4\left(\left(\_C1^2 - \_C2^2\right)(\sin(x))^2 - 2\,\_C1\,\_C2\,\sin(x)\cos(x) + \_C2^2\right)^{-1}\right\}$$

2.1742 ODE No. 1742

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

✗ **Mathematica** : cpu = 12.2238 (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],
```

✓ **Maple** : cpu = 0.245 (sec), leaf count = 60

$$\left\{y(x) = ODESolStruc\left(e^{\int -\_b(\_a)\,d\_a + \_C1}, [\left\{\frac{d}{d\_a}\_b(\_a) = \frac{(\_b(\_a))^2}{2} - \frac{f(\_a)}{2}\right\}, \left\{\_a = x, \_b(\_a) =\right.\right.\right.$$

2.1743 ODE No. 1743

$$y(x)^2\left(ay(x)^3 + 1\right) + 2y(x)y''(x) - 6y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 23.3767 (sec), leaf count = 2761

$$\left\{\text{Solve}\left[\frac{4\left(F\left(\sin^{-1}\left(\sqrt{\frac{(\text{Root}[4c_1\#1^4+4a\#1^3+1\&,2]-\text{Root}[4c_1\#1^4+4a\#1^3+1\&,4])(\text{Root}[4c_1\#1^4+4a\#1^3+1\&,1]-y(x))}{(\text{Root}[4c_1\#1^4+4a\#1^3+1\&,1]-\text{Root}[4c_1\#1^4+4a\#1^3+1\&,4])(\text{Root}[4c_1\#1^4+4a\#1^3+1\&,2]-y(x))}}\right)\right|-\right.\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.133 (sec), leaf count = 71

$$\left\{\int^{y(x)} -2\frac{1}{\sqrt{4\_C1\,\_a^4 + 4\_a^3 a + 1}\_a}d\_a - x - \_C2 = 0, \int^{y(x)} 2\frac{1}{\sqrt{4\_C1\,\_a^4 + 4\_a^3 a + 1}\_a}d\_a\right.$$

2.1744 ODE No. 1744

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

✓ **Mathematica** : cpu = 1.13445 (sec), leaf count = 173

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[-ie^{-c_1}\left(\sqrt{\#1}\sqrt{\#1e^{2c_1}-1} - e^{-c_1}\log\left(\sqrt{\#1}e^{2c_1} + e^{c_1}\sqrt{\#1e^{2c_1}-1}\right)\right)\&\right][c_2\right.\right.$$

✓ **Maple** : cpu = 0.452 (sec), leaf count = 823

$$\left\{y(x) = \frac{\left(-RootOf\left((\tan(\_Z))^2\_C1^2\_Z^2 - 4(\tan(\_Z))^2\_C1\,\_C2\,\_Z - 4(\tan(\_Z))^2\_C1\,x\_Z + 4\right.\right.}{}\right.$$

2.1745 ODE No. 1745

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

✓ **Mathematica** : cpu = 0.369614 (sec), leaf count = 204

$$\left\{\left\{y(x)\to \text{InverseFunction}\left[-\sqrt{2}\left(\frac{1}{2}\sqrt{a-\#1}\sqrt{e^{2c_1}-2(a-\#1)}-\frac{e^{2c_1}\tan^{-1}\left(\frac{\sqrt{2}\sqrt{a-\#1}}{\sqrt{e^{2c_1}-2(a-\#1)}}\right)}{2\sqrt{2}}\right)\&\right][c$$

✓ **Maple** : cpu = 0.624 (sec), leaf count = 117

$$\left\{-\frac{\_C1}{2}\arctan\left(1\left(y(x)-a-\frac{\_C1}{2}\right)\frac{1}{\sqrt{-(-y(x)+a)(a+\_C1-y(x))}}\right)-x-\_C2+\sqrt{-(-y(x$$

2.1746 ODE No. 1746

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

✗ **Mathematica** : cpu = 0.0478507 (sec), leaf count = 0 , could not solve

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

✓ **Maple** : cpu = 0.968 (sec), leaf count = 207

$$\left\{y(x)=RootOf\left(-2\,b\arctan\left(\frac{2\,ax+b}{\sqrt{4\,ac-b^2}}\right)-2\int^{\_Z}\frac{b}{\sqrt{4\_f^{4/3}\_C1\,b^2-36\,c\_f^2a+9\,b^2\_f^2-2}}d\_f\sqrt{}$$

2.1747 ODE No. 1747

$$3y(x)y''(x)-5y'(x)^2=0$$

✓ **Mathematica** : cpu = 0.0331171 (sec), leaf count = 20

$$\left\{\left\{y(x)\to\frac{c_2}{(3c_1+2x)^{3/2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.026 (sec), leaf count = 17

$$\left\{-\frac{3}{2}(y(x))^{-\frac{2}{3}}-\_C1\,x-\_C2=0\right\}$$

2.1748 ODE No. 1748

$$4y(x)y''(x) - 3y'(x)^2 + 4y(x) = 0$$

✓ **Mathematica** : cpu = 0.103841 (sec), leaf count = 43

$$\left\{\left\{y(x) \to \frac{\left(c_1^2x^2 + 2c_2c_1^2x + c_2^2c_1^2 - 64\right)^2}{256c_1^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.182 (sec), leaf count = 67

$$\left\{-4\,\frac{\sqrt{\_C1\,\left(y\left(x\right)\right)^{3/2} + 4\,y\left(x\right)}}{\sqrt{y\left(x\right)}\_C1} - x - \_C2 = 0, 4\,\frac{\sqrt{\_C1\,\left(y\left(x\right)\right)^{3/2} + 4\,y\left(x\right)}}{\sqrt{y\left(x\right)}\_C1} - x - \_C2 = 0, y(x) = 0$$

2.1749 ODE No. 1749

$$4y(x)y''(x) - 3y'(x)^2 - 12y(x)^3 = 0$$

✓ **Mathematica** : cpu = 0.619231 (sec), leaf count = 181

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[-\frac{4\sqrt{\frac{4\#1^{3/2}}{c_1}+1}\sqrt{\#1^{3/2}c_1 + 4\#1^3}\,{}_2F_1\left(\frac{1}{6},\frac{1}{2};\frac{7}{6};-\frac{4\#1^{3/2}}{c_1}\right)}{4\#1^2 + \sqrt{\#1}c_1}\&\right][c_2 + x]\right\}, \left\{y(\right.\right.$$

✓ **Maple** : cpu = 0.548 (sec), leaf count = 57

$$\left\{\int^{y(x)} \frac{1}{\sqrt{\_C1\,\_a^{\frac{3}{2}} + 4\,\_a^3}}d\_a - x - \_C2 = 0, \int^{y(x)} -\frac{1}{\sqrt{\_C1\,\_a^{\frac{3}{2}} + 4\,\_a^3}}d\_a - x - \_C2 = 0\right\}$$

2.1750 ODE No. 1750

$$ay(x)^3 + by(x)^2 + cy(x) + 4y(x)y''(x) - 3y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 5.27449 (sec), leaf count = 2281

$$\left\{\text{Solve}\left[-\frac{4F\left(\sin^{-1}\left(\sqrt{\frac{(\text{Root}[a\#1^4+3b\#1^2-3c_1\#1-3c\&,2]-\text{Root}[a\#1^4+3b\#1^2-3c_1\#1-3c\&,4])\left(\text{Root}[a\#1^4+3b\#1^2-3c_1\#1-3\right.}{(\text{Root}[a\#1^4+3b\#1^2-3c_1\#1-3c\&,1]-\text{Root}[a\#1^4+3b\#1^2-3c_1\#1-3c\&,4])\left(\text{Root}[a\#1^4+3b\#1^2-3c_1\#1-3\right.}}\right.\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.467 (sec), leaf count = 87

$$\left\{\int^{y(x)} -3\frac{1}{\sqrt{9\_C1\_a^{3/2}-3\_a^3a-9\_a^2b+9\_a\,c}}d\_a-x-\_C2=0,\int^{y(x)}3\frac{1}{\sqrt{9\_C1\_a^{3/2}-3\_}}\right.$$

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 = 0.772959 (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 - (
```

✗ **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)
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 = 0.15636 (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 = 0.137 (sec), leaf count = 33

$$\left\{y(x)=16\frac{\left(e^{1/4\sqrt{a}x}\right)^4a^2}{\left(e^{1/2\sqrt{a}x}\_C1-\_C2\right)^4}\right\}$$

2.1753 ODE No. 1753

$$12y(x)y''(x) - 15y'(x)^2 + 8y(x)^3 = 0$$

✓ **Mathematica** : cpu = 0.371854 (sec), leaf count = 43

$$\left\{\left\{y(x) \to \frac{2304c_1^2}{(3c_1^2x^2 + 6c_2c_1^2x + 3c_2^2c_1^2 + 128)^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.196 (sec), leaf count = 147

$$\left\{-12\,\frac{y(x)\left(8\sqrt{y(x)} - \_C1\right)\sqrt{8\,y(x) - \sqrt{y(x)}\_C1}}{\sqrt{-24\,(y(x))^3 + 3\_C1\,(y(x))^{5/2}\_C1}\sqrt{\sqrt{y(x)}\left(8\sqrt{y(x)} - \_C1\right)}} - x - \_C2 = 0, 12\,\frac{}{\sqrt{-24\,(}}\right.$$

2.1754 ODE No. 1754

$$ny(x)y''(x) - (n-1)y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.0413103 (sec), leaf count = 17

$$\{\{y(x) \to c_2(x - c_1n)^n\}\}$$

✓ **Maple** : cpu = 0.062 (sec), leaf count = 15

$$\left\{y(x) = \left(\frac{\_C1\,x + \_C2}{n}\right)^n\right\}$$

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 = 104.679 (sec), leaf count = 0 , could not solve

```
DSolve[c0 + c1*y[x] + c2*y[x]^2 + c3*y[x]^3 + c4*y[x]^4 + b*Derivative[1][y][x]^2 + a*
```

✓ **Maple** : cpu = 0.393 (sec), leaf count = 418

$$\left\{\int^{y(x)}(2\,a+b)\,(3\,a+2\,b)\,(a+b)\,(a+2\,b)\,b\_a^{2\,\frac{b}{a}}\frac{}{\sqrt{-36\,\left(2/3\,(a+b)\,(a+b/2)\,c3\,(a+2\,b)\,b\_a^{\frac{3\,a+2\,b}{a}} + \right.}}\right.$$

2.1756 ODE No. 1756

$$a y(x) y''(x) + b y'(x)^2 - \frac{y(x) y'(x)}{\sqrt{c^2 + x^2}} = 0$$

✗ **Mathematica** : cpu = 300.027 (sec), leaf count = 0 , timed out

```
$Aborted
```

✓ **Maple** : cpu = 0.204 (sec), leaf count = 75

$$\left\{ y(x) = \left(\left(\left(\frac{a}{a+b} \left(\frac{\_C1 \sqrt[a]{2} a x^{1+a^{-1}}}{a+1} {}_2F_1(-\frac{1}{2a}, -\frac{1}{2a} - \frac{1}{2}; 1 - a^{-1}; -\frac{c^2}{x^2}) + \_C2 \right) \right)^{-1} \right)^{\frac{a}{a+b}} \right)^{-1} \right\}$$

2.1757 ODE No. 1757

$$(a+2) f(x) y(x)^2 y'(x) + a y(x) y''(x) + a y(x)^3 y'(x) - (a-1) y'(x)^2 + f(x)^2 y(x)^4 = 0$$

✗ **Mathematica** : cpu = 1.00537 (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
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
```

2.1758 ODE No. 1758

$$y''(x)(a y(x) + b) + c y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.0695904 (sec), leaf count = 31

$$\left\{ \left\{ y(x) \to \frac{(c_1 (a+c)(c_2 + x))^{\frac{a}{a+c}} - b}{a} \right\} \right\}$$

✓ **Maple** : cpu = 0.1 (sec), leaf count = 42

$$\left\{ y(x) = \frac{1}{a} \left((\_C1\, x + \_C2)(a+c) \left(\frac{1}{(a+c)(\_C1\, x + \_C2)} \right)^{\frac{c}{a+c}} - b \right) \right\}$$

2.1759 ODE No. 1759

$$xy(x)y''(x) + xy'(x)^2 - y(x)y'(x) = 0$$

✓ **Mathematica** : cpu = 0.0453865 (sec), leaf count = 18

$$\left\{\left\{y(x) \to c_2\sqrt{c_1 + x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.045 (sec), leaf count = 31

$$\left\{y(x) = \sqrt{\_C1\, x^2 + 2\_C2}, y(x) = -\sqrt{\_C1\, x^2 + 2\_C2}\right\}$$

2.1760 ODE No. 1760

$$ay(x)y'(x) + f(x) + xy(x)y''(x) + xy'(x)^2 = 0$$

✗ **Mathematica** : cpu = 300.131 (sec), leaf count = 0 , timed out

```
$Aborted
```

✓ **Maple** : cpu = 0.11 (sec), leaf count = 114

$$\left\{y(x) = \frac{\sqrt{2}}{a-1}\sqrt{(a-1)\left(x^{1-a}\int \frac{x^a f(x)}{x}\, dx + x^{1-a}\_C1 - \int f(x)\, dx - \_C2\right)}, y(x) = -\frac{\sqrt{2}}{a-1}\sqrt{(a-1$$

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 = 1.76806 (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*Derivati
```

✗ **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
```

2.1762 ODE No. 1762

$$ay(x)y'(x) + bxy(x)^3 + xy(x)y''(x) - xy'(x)^2 = 0$$

✗ **Mathematica** : cpu = 55.3361 (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]*Deri
```

✓ **Maple** : cpu = 0.926 (sec), leaf count = 108

$$\left\{y(x) = ODESolStruc\left(\frac{\_a}{\left(e^{\int \_b(\_a)\,d\_a+\_C1}\right)^2}, [\left\{\frac{d}{d\_a}\_b(\_a) = -2\,\frac{(1/2+\_a^2(-1/2\,b\_a+a-1)\,(\_b(\_$$

2.1763 ODE No. 1763

$$ay(x)y'(x) + xy(x)y''(x) + 2xy'(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.173984 (sec), leaf count = 33

$$\left\{\left\{y(x) \to c_2 x^{-a/3}\sqrt[3]{3x-(a-1)c_1 x^a}\right\}\right\}$$

✓ **Maple** : cpu = 0.085 (sec), leaf count = 148

$$\left\{y(x) = \frac{\sqrt[3]{3}}{(a-1)\,x^a}\sqrt[3]{(a-1)^2\,(x^a)^2\,(\_C2\,\,(a-1)\,x^a - \_C1\,\,x)}, y(x) = \frac{\sqrt[3]{3}(i\sqrt{3}-1)}{(2\,a-2)\,x^a}\sqrt[3]{(a-1)^2\,(x^a)^2\,(\_$$

2.1764 ODE No. 1764

$$xy(x)y''(x) - 2xy'(x)^2 + (y(x)+1)y'(x) = 0$$

✓ **Mathematica** : cpu = 0.0758346 (sec), leaf count = 37

$$\left\{\left\{y(x) \to \frac{\tan\left(\frac{\sqrt{c_1}(\log(x)-c_2)}{\sqrt{2}}\right)}{\sqrt{2}\sqrt{c_1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.24 (sec), leaf count = 18

$$\left\{y(x) = \_C1\,\tanh\left(\frac{\ln(x) - \_C2}{2\,\_C1}\right)\right\}$$

2.1765 ODE No. 1765

$$ay(x)y'(x) + xy(x)y''(x) - 2xy'(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.156152 (sec), leaf count = 24

$$\left\{\left\{y(x) \to \frac{c_2 x^a}{(a-1)c_1 x^a + x}\right\}\right\}$$

✓ **Maple** : cpu = 0.044 (sec), leaf count = 27

$$\left\{y(x) = -\frac{(a-1)\,x^a}{\_C2\ (a-1)\,x^a - \_C1\ x}\right\}$$

2.1766 ODE No. 1766

$$xy(x)y''(x) - 4xy'(x)^2 + 4y(x)y'(x) = 0$$

✓ **Mathematica** : cpu = 0.0567556 (sec), leaf count = 21

$$\left\{\left\{y(x) \to \frac{c_2 x}{\sqrt[3]{c_1 x^3 + 1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.058 (sec), leaf count = 64

$$\left\{y(x) = x\frac{1}{\sqrt[3]{-3\_C2\ x^3 + \_C1}}, y(x) = \frac{\left(i\sqrt{3}-1\right)x}{2}\frac{1}{\sqrt[3]{-3\_C2\ x^3 + \_C1}}, y(x) = -\frac{\left(i\sqrt{3}+1\right)x}{2}\frac{}{\sqrt[3]{-3\_}}\right.$$

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 = 0.0875358 (sec), leaf count = 54

$$\left\{\left\{y(x) \to c_2 e^{\frac{\sqrt{b^2-x^2}}{a}}\left(a\sqrt{b^2-x^2} - c_1\right)^{\frac{c_1}{a^2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.426 (sec), leaf count = 50

$$\left\{y(x) = \_C2\ \mathrm{e}^{\int -x\sqrt{b^2-x^2}\left(\_C1\ \sqrt{b^2-x^2} + a\left(b^2-x^2\right)\right)^{-1}\mathrm{d}x}\right\}$$

2.1768 ODE No. 1768

$$x(y(x)+x)y''(x)+xy'(x)^2+(x-y(x))y'(x)-y(x)=0$$

✓ **Mathematica** : cpu = 0.135202 (sec), leaf count = 79

$$\left\{\left\{y(x)\to -x-\sqrt{-e^{2c_2}\left(x^2-1\right)+\left(1-2ic_1\right)x^2}\right\},\left\{y(x)\to -x+\sqrt{-e^{2c_2}\left(x^2-1\right)+\left(1-2ic_1\right)x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.071 (sec), leaf count = 43

$$\left\{y(x)=-x-\sqrt{\left(-\_C1+1\right)x^2+\_C2},y(x)=-x+\sqrt{\left(-\_C1+1\right)x^2+\_C2}\right\}$$

2.1769 ODE No. 1769

$$2xy(x)y''(x)-xy'(x)^2+y(x)y'(x)=0$$

✓ **Mathematica** : cpu = 0.0578154 (sec), leaf count = 18

$$\left\{\left\{y(x)\to c_2\left(c_1+\sqrt{x}\right)^2\right\}\right\}$$

✓ **Maple** : cpu = 0.059 (sec), leaf count = 21

$$\left\{y(x)=\_C1\sqrt{x}\_C2+\_C1^2x+\frac{\_C2^2}{4}\right\}$$

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 = 0.931015 (sec), leaf count = 22

$$\left\{\left\{y(x)\to \frac{1}{c_2x^2-c_1x-1}+1\right\}\right\}$$

✓ **Maple** : cpu = 0.093 (sec), leaf count = 26

$$\left\{y(x)=\frac{x(\_C1\,x-\_C2)}{\_C1\,x^2-\_C2\,x-1}\right\}$$

2.1771 ODE No. 1771

$$x^2(y(x)+x)y''(x)-(xy'(x)-y(x))^2=0$$

✓ **Mathematica** : cpu = 0.0986428 (sec), leaf count = 20

$$\left\{\left\{y(x)\to x\left(c_2e^{\frac{c_1}{x}}-1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.311 (sec), leaf count = 22

$$\left\{y(x)=-\frac{x}{\_C1}\left(-e^{-1}e^{\frac{\_C2}{x}}+\_C1\right)\right\}$$

2.1772 ODE No. 1772

$$a(xy'(x)-y(x))^2+x^2(x-y(x))y''(x)=0$$

✓ **Mathematica** : cpu = 1.10877 (sec), leaf count = 36

$$\left\{\left\{y(x)\to x\left(\left(-\frac{(a-1)\left((-1)^ac_1+c_2x\right)}{x}\right)^{\frac{1}{1-a}}+1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.186 (sec), leaf count = 35

$$\left\{\left(-x^ay(x)+x^{a+1}\right)(x-y(x))^{-a}+x(a-1)\_C2+\_C1=0\right\}$$

2.1773 ODE No. 1773

$$2x^2y(x)y''(x)+x^2\left(-\left(y'(x)^2+1\right)\right)+y(x)^2=0$$

✓ **Mathematica** : cpu = 0.209464 (sec), leaf count = 44

$$\left\{\left\{y(x)\to\frac{x\left(c_1^2\log^2(x)-2c_2c_1^2\log(x)+c_2^2c_1^2+4\right)}{4c_1}\right\}\right\}$$

✓ **Maple** : cpu = 0.049 (sec), leaf count = 30

$$\left\{y(x)=\frac{x\left(4\_C2^2(\ln(x))^2+4\_C1\ \ln(x)\_C2+\_C1^2+1\right)}{4\_C2}\right\}$$

2.1774 ODE No. 1774

$$ax^2y(x)y''(x) + bx^2y'(x)^2 + cxy(x)y'(x) + dy(x)^2 = 0$$

✓ **Mathematica** : cpu = 1.55957 (sec), leaf count = 92

$$\left\{\left\{y(x)\to c_2 x^{-\frac{a\left(\sqrt{\frac{a^2-2a(c+2d)-4bd+c^2}{a^2}}-1\right)+c}{2(a+b)}}\left(x^{\sqrt{\frac{a^2-2a(c+2d)-4bd+c^2}{a^2}}}+c_1\right)^{\frac{a}{a+b}}\right\}\right\}$$

✓ **Maple** : cpu = 0.342 (sec), leaf count = 136

$$\left\{y(x) = x^{-\frac{1}{2\,b+2\,a}\sqrt{(-4\,a-4\,b)d+(a-c)^2}}x^{\frac{a}{2\,b+2\,a}}x^{-\frac{c}{2\,b+2\,a}}\left(\frac{a^2+(-2\,c-4\,d)\,a-4\,bd+c^2}{(a+b)^2}\left(x^{\frac{1}{a}\sqrt{(-4\,a-4\,b)d+(a-c)^2}}\_C\right.\right.$$

2.1775 ODE No. 1775

$$-a(x+2)y(x)^2 + x(x+1)^2y(x)y''(x) - x(x+1)^2y'(x)^2 + 2(x+1)^2y(x)y'(x) = 0$$

✓ **Mathematica** : cpu = 0.151319 (sec), leaf count = 24

$$\left\{\left\{y(x)\to c_2(x+1)^a e^{-\frac{a+c_1}{x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.132 (sec), leaf count = 31

$$\left\{y(x) = \frac{(1+x)^a}{\_C1\,\mathrm{e}^a}\mathrm{e}^{\frac{\_C2}{x}}\left(\mathrm{e}^{\frac{a}{x}}\right)^{-1}\right\}$$

2.1776 ODE No. 1776

$$8\left(1-x^3\right)y(x)y''(x) - 4\left(1-x^3\right)y'(x)^2 - 12x^2y(x)y'(x) + 3xy(x)^2 = 0$$

✗ **Mathematica** : cpu = 299.998 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.385 (sec), leaf count = 49

$$\left\{y(x) = \frac{x}{\_C1}\left(LegendreQ\left(-\frac{1}{6},\frac{1}{3},\sqrt{-(x-1)\left(x^2+x+1\right)}\right)\_C1 + \frac{\_C2}{2}LegendreP\left(-\frac{1}{6},\frac{1}{3},\sqrt{-(x-\right.\right.\right.$$

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 = 50.8152 (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 + f
```

✓ **Maple** : cpu = 0.717 (sec), leaf count = 79

$$\left\{y(x) = ODESolStruc\left(\mathrm{e}^{\int \_b(\_a)\,\mathrm{d}\_a + \_C1}, [\left\{\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a) = \frac{(-f0(\_a) - f1(\_a))\,(\_b(\_a))^2 - f2(\_a)\_}{f0\,(\_a)}\right.\right.\right.$$

2.1778 ODE No. 1778

$$y(x)^2y''(x) - a = 0$$

✓ **Mathematica** : cpu = 1.04521 (sec), leaf count = 75

$$\mathrm{Solve}\left[\frac{\left(\sqrt{c_1}y(x)\sqrt{c_1 - \frac{2a}{y(x)}} + a\log\left(y(x)\left(\sqrt{c_1}\sqrt{c_1 - \frac{2a}{y(x)}} + c_1\right) - a\right)\right)^2}{c_1^3} = (c_2 + x)^2, y(x)\right]$$

✓ **Maple** : cpu = 0.892 (sec), leaf count = 245

$$\left\{y(x) = \frac{\_C1\left(\_C1\,a + \mathrm{e}^{RootOf\left(csgn(\_C1^{-1})\_C1^4a^2 - 2\_Z\_C1^3a\mathrm{e}^{\_Z} - csgn(\_C1^{-1})(\mathrm{e}^{\_Z})^2\_C1^2 - 2\,csgn(\_C1^{-1})\mathrm{e}^{\_Z}\_C2\right.}\right.}{2\,\mathrm{e}^{RootOf\left(csgn(\_C1^{-1})\_C1^4a^2 - 2\_Z\_C1^3a\mathrm{e}^{\_Z} - csgn(\_C1^{-1})(\mathrm{e}^{\_Z})^2\_C1^2 - 2\,csgn(\_C1^{-1})\mathrm{e}^{\_Z}\_C2 - 2\,csgn(\right.}}\right.$$

2.1779 ODE No. 1779

$$ax + y(x)^2y''(x) + y(x)y'(x)^2 = 0$$

✗ **Mathematica** : cpu = 3.85548 (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 = 0.779 (sec), leaf count = 112

$$\left\{\ln(x) - \int^{\frac{y(x)}{x}} \frac{\_g^2}{2\_g^3 + 2a}\left(\sqrt[3]{\frac{a}{\_g^3}}\sqrt{3}\tan\left(RootOf\left(-2\_Z\sqrt{3} + \ln\left(\frac{(\tan(\_Z))^2 + 1}{3 + 2\sqrt{3}\tan(\_Z) + (\tan(\_Z))\right.}\right.\right.\right.\right.\right.$$

2.1780 ODE No. 1780

$$-ax - b + y(x)^2y''(x) + y(x)y'(x)^2 = 0$$

✗ **Mathematica** : cpu = 0.567168 (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],
```

✓ **Maple** : cpu = 0.836 (sec), leaf count = 160

$$\left\{ \frac{b\ln(ax+b)}{a} - \int^{\frac{y(x)}{ax+b}} -\frac{\_g^2b\sqrt{3}}{6\_g^3a^2-6}\left(-3\tan\left(RootOf\left(6b^2\int\frac{\_g^2}{\_g^3a^2-1}\left(-\frac{a}{b^3\_g^3}\right)^{2/3}d\_g - 2\_Z\sqrt{\right.\right.\right.\right.$$

2.1781 ODE No. 1781

$$\left(y(x)^2+1\right)y''(x) + (1-2y(x))y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.0993925 (sec), leaf count = 14

$$\{\{y(x)\to\tan(\log(c_1(c_2+x)))\}\}$$

✓ **Maple** : cpu = 0.078 (sec), leaf count = 11

$$\{y(x) = \tan(\ln(\_C1\,x + \_C2))\}$$

2.1782 ODE No. 1782

$$\left(y(x)^2+1\right)y''(x) - 3y(x)y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.103928 (sec), leaf count = 93

$$\left\{\left\{y(x)\to -\frac{ic_1(c_2+x)}{\sqrt{c_1^2x^2+2c_2c_1^2x+c_2^2c_1^2-1}}\right\},\left\{y(x)\to \frac{ic_1(c_2+x)}{\sqrt{c_1^2x^2+2c_2c_1^2x+c_2^2c_1^2-1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.072 (sec), leaf count = 33

$$\left\{y(x) = \sqrt{-\left(x^2\_C1^2 + 2\,x\_C2\_C1 + \_C2^2 - 1\right)^{-1}}(\_C1\,x + \_C2)\right\}$$

2.1783 ODE No. 1783

$$\left(y(x)^2+x\right)y''(x)-2\left(x-y(x)^2\right)y'(x)^3+\left(4y(x)y'(x)+1\right)y'(x)=0$$

✓ **Mathematica** : cpu = 1.6887 (sec), leaf count = 24

$$\text{Solve}\left[y(x)^2+x=c_2e^{e^{-c_1y(x)}},y(x)\right]$$

✓ **Maple** : cpu = 0.207 (sec), leaf count = 23

$$\left\{\frac{-\_C1\,y(x)+\ln\left(x+(y(x))^2\right)+\_C2+2}{y\left(x\right)}=0\right\}$$

2.1784 ODE No. 1784

$$\left(x^2+y(x)^2\right)y''(x)-\left(xy'(x)-y(x)\right)\left(y'(x)^2+1\right)=0$$

✓ **Mathematica** : cpu = 0.360279 (sec), leaf count = 72

$$\text{Solve}\left[\log(x)+\frac{1}{2}\left(i\cot\left(c_1\right)\left(\log\left(1-\frac{iy(x)}{x}\right)-\log\left(1+\frac{iy(x)}{x}\right)\right)+\log\left(1-\frac{iy(x)}{x}\right)+\log\left(1+\frac{iy(x)}{x}\right.\right.\right.$$

✓ **Maple** : cpu = 0.883 (sec), leaf count = 82

$$\left\{y(x)=\tan\left(RootOf\left(-\left(\mathrm{e}^{\frac{i\_C1\_Z}{-1+\_C1}}\right)^2\left(\mathrm{e}^{\frac{\_C2\_C1}{-1+\_C1}}\right)^2\left(x^{\frac{\_C1}{-1+\_C1}}\right)^2\left(\mathrm{e}^{\frac{i\_Z}{-1+\_C1}}\right)^2+\left(\cos\left(\_Z\right)\right)^2\left(\mathrm{e}^{\frac{\_C2}{-1+\_C1}}\right)^2\left(x^{(-1}\right.\right.\right.\right.$$

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 = 0.442594 (sec), leaf count = 95

$$\left\{\left\{y(x)\to\frac{1}{2}\left(-\sqrt{4x\left(e^{c_2}-x\right)+e^{2c_2}\cot^2\left(c_1\right)}-e^{c_2}\cot\left(c_1\right)\right)\right\},\left\{y(x)\to\frac{1}{2}\left(\sqrt{4x\left(e^{c_2}-x\right)+e^{2c_2}\cot^2\left(c\right.}\right.\right.\right.$$

✓ **Maple** : cpu = 0.489 (sec), leaf count = 83

$$\left\{y(x)=\frac{1}{2\_C2}\left(\_C1+1-\sqrt{\_C1^2+\left(4i\_C2\,x+2\right)\_C1-4\_C2^2x^2-4i\_C2\,x+1}\right),y(x)=\frac{1}{2\_C}\right.$$

2.1786 ODE No. 1786

$$f(x)(1-y(x))y(x)y'(x)+2(1-y(x))y(x)y''(x)-(1-2y(x))y'(x)^2=0$$

✓ **Mathematica** : cpu = 1.16483 (sec), leaf count = 87

$$\left\{\left\{y(x)\to \frac{1}{4}\exp\left(-i\left(\int_1^x c_1\left(-e^{-\int_1^{K[3]}\frac{1}{2}f(K[1])\,dK[1]}\right)\,dK[3]+c_2\right)\right)\left(1+\exp\left(i\left(\int_1^x c_1\left(-e^{-\int_1^{K[3]}\frac{1}{2}f(K[1])\right.\right.\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.34 (sec), leaf count = 42

$$\left\{y(x)=\frac{1}{8\_C2}\left(2\,e^{\_C1\,\int e^{-1/2\,\int f(x)\,dx}\,dx}\_C2+1\right)^2\left(e^{\_C1\,\int e^{-\frac{\int f(x)\,dx}{2}}\,dx}\right)^{-1}\right\}$$

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 = 100.315 (sec), leaf count = 0 , could not solve

```
DSolve[h[y[x]] - (1 - 3*y[x])*Derivative[1][y][x]^2 + 2*(1 - y[x])*y[x]*Derivative[2][
```

✓ **Maple** : cpu = 0.428 (sec), leaf count = 80

$$\left\{\int^{y(x)}\frac{1}{\_b-1}\frac{1}{\sqrt{\_b\left(\_C1+\int\frac{h(\_b)}{(\_b-1)^3\_b^2}\,d\_b\right)}}d\_b-x-\_C2=0,\int^{y(x)}-\frac{1}{\_b-1}\frac{1}{\sqrt{\_b\left(\_C1+\int\frac{}{(\_b}\right.}}\right.$$

2.1788 ODE No. 1788

$$-4(1-y(x))y(x)^2\left(-f'(x)-f(x)^2-g'(x)+g(x)^2\right)+4y(x)y'(x)(f(x)y(x)+g(x))-2(1-y(x))y(x)y''(x)+($$

✗ **Mathematica** : cpu = 1.74533 (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]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{\sqrt{y(x)}-2\frac{\frac{\partial}{\partial x}DESol\left(\left\{-1/4\,e^{2\,\int g(x)\,dx-2\,\int f(x)\,dx}\_C1^2\_Y(x)-2\,g(x)\,\frac{d}{dx}\_Y(x)+\frac{d^2}{dx^2}\_Y(x)\right.\right.}{DESol\left(\left\{-1/4\,e^{2\,\int g(x)\,dx-2\,\int f(x)\,dx}\_C1^2\_Y(x)-2\,g(x)\,\frac{d}{dx}\_Y(x)+\frac{d^2}{dx^2}\_Y(x)\right\},\{\_Y(x)\right.}\right.$$

2.1789 ODE No. 1789

$4y(x)^2(1-y(x))\left(-f'(x)+f(x)^2-g'(x)-g(x)^2\right)-4y(x)y'(x)(f(x)y(x)+g(x))+(1-y(x))^3\left(\mathrm{f0}(x)^2y(x)^2\right.$

✗ **Mathematica** : cpu = 11.685 (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
```

✗ **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
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 = 25.5404 (sec), leaf count = 182

$$\left\{\left\{y(x)\to \text{InverseFunction}\left[\int_1^{\#1}-\frac{1}{(1-K[2])^{2/3}K[2]^{2/3}\sqrt{2\int_1^{K[2]}-\frac{h(K[1])\exp\left(-2\left(\frac{2}{3}\log(1-K[1])+\frac{2}{3}\log(K[1])\right)\right)}{3(K[1]-1)K[1]}d\right.}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.405 (sec), leaf count = 119

$$\left\{\int^{y(x)}-\frac{\sqrt{9}}{3}\frac{1}{\sqrt{(\_b-1)\,\_b\left(\_C1-\frac{2}{3}\int\frac{h(\_b)}{\_b\,(\_b-1)}\left(\_b^2-\_b\right)^{-\frac{4}{3}}\mathrm{d}\_b\right)\sqrt[3]{\_b\,(\_b-1)}}}d\_b-x-\_C2=\right.$$

2.1791 ODE No. 1791

$$-h(y(x))+(1-y(x))y''(x)-3(1-2y(x))y'(x)^2=0$$

✓ **Mathematica** : cpu = 24.7768 (sec), leaf count = 164

$$\left\{\left\{y(x)\to \text{InverseFunction}\left[\int_1^{\#1}-\frac{e^{\frac{1}{2}(12-12K[2])}}{(K[2]-1)^3\sqrt{2\int_1^{K[2]}-\frac{h(K[1])\exp(-2(6(K[1]-1)+3\log(K[1]-1)))}{K[1]-1}dK[1]+c_1}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.436 (sec), leaf count = 90

$$\left\{\int^{y(x)} \frac{1}{(\_b-1)^3 (\mathrm{e}^{\_b})^6} \frac{1}{\sqrt{-2 \int \frac{h(\_b)}{(\mathrm{e}^{\_b})^{12} (\_b-1)^7} \mathrm{d}\_b + \_C1}} d\_b - x - \_C2 = 0, \int^{y(x)} -\frac{1}{(\_b-1)^3 (\mathrm{e}^{\_b})^6}$$

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 = 29.5157 (sec), leaf count = 222

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[\int_1^{\#1} -\frac{K[2]^{-\frac{c}{a}} (1-K[2])^{\frac{1}{2}\left(\frac{2b}{a}+\frac{2c}{a}\right)}}{\sqrt{2 \int_1^{K[2]} -\frac{h(K[1]) \exp\left(-\frac{2(c\log(K[1])-(b+c)\log(1-K[1]))}{a}\right)}{a(K[1]-1)K[1]} dK[1] + c_1}} dK[2]\&\right]\right.\right.$$

✓ **Maple** : cpu = 0.661 (sec), leaf count = 194

$$\left\{\int^{y(x)} a \frac{1}{\sqrt{a\left(\_C1\, a - 2 \int \frac{h(\_b)}{\_b\,(\_b-1)} \left((\_b-1)^{\frac{b}{a}}\right)^2 \left((\_b-1)^{\frac{c}{a}}\right)^2 \left(\_b^{\frac{c}{a}}\right)^{-2} \mathrm{d}\_b\right)}} \left(\_b^{\frac{c}{a}}\right)^{-1} \left((\_b-1)^{\frac{-b-}{a}}\right.\right.$$

2.1793 ODE No. 1793

$$a(y(x)-1)y(x)y''(x) - (a-1)(2y(x)-1)y'(x)^2 + f(x)(y(x)-1)y(x)y'(x) = 0$$

✓ **Mathematica** : cpu = 1.54278 (sec), leaf count = 113

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[-\frac{a(1-\#1)^{-1/a}(-(\#1-1)\#1)^{\frac{1}{a}} \left((a+1)\,{}_2F_1\left(-\frac{1}{a},\frac{1}{a};1+\frac{1}{a};\#1\right) + \#1\,{}_2F_1\left(\right.\right.}{a+1}\right.\right.\right.$$

✓ **Maple** : cpu = 0.081 (sec), leaf count = 40

$$\left\{\_C1\, \mathrm{e}^{-\frac{fx}{a}} - \_C2 + \int^{y(x)} \frac{\sqrt[a]{\_a\,(\_a-1)}}{\_a\,(\_a-1)} d\_a = 0\right\}$$

2.1794 ODE No. 1794

$$ab(y(x)-1)y(x)y''(x)+y'(x)^2(-((2ab-a-b)y(x)+(1-a)b))+f(x)(y(x)-1)y(x)y'(x)=0$$

✓ **Mathematica** : cpu = 1.46198 (sec), leaf count = 98

$$\left\{\left\{y(x)\to \text{InverseFunction}\left[-\frac{a\#1^{\frac{1}{a}}\left((a+1)\,{}_2F_1\left(\frac{1}{a},-\frac{1}{b};1+\frac{1}{a};\#1\right)+\#1\,{}_2F_1\left(1+\frac{1}{a},\frac{b-1}{b};2+\frac{1}{a};\#1\right)\right)}{a+1}\&\right]\right.\right.$$

✓ **Maple** : cpu = 0.106 (sec), leaf count = 46

$$\left\{\_C1\,\mathrm{e}^{-\frac{fx}{ab}}-\_C2+\int^{y(x)}\frac{\sqrt[a]{\_a}\sqrt[b]{\_a-1}}{\_a\,(\_a-1)}d\_a=0\right\}$$

2.1795 ODE No. 1795

$$xy(x)^2y''(x)-a=0$$

✓ **Mathematica** : cpu = 0.39131 (sec), leaf count = 103

$$\text{Solve}\left[2\sqrt{2}\sqrt{-\frac{y(x)\,(ax+c_1y(x))}{x^2}}+\frac{\sqrt{2}a\tan^{-1}\left(\frac{ax+2c_1y(x)}{2\sqrt{c_1}x\sqrt{-\frac{y(x)(ax+c_1y(x))}{x^2}}}\right)}{\sqrt{c_1}}+\frac{4c_1}{x}+4c_1c_2=0,y(x)\right]$$

✓ **Maple** : cpu = 1.811 (sec), leaf count = 529

$$\left\{y(x)=\frac{\_C1\left(9\_C1\,a+\mathrm{e}^{RootOf\left(243\,csgn(\_C1^{-1})\_C1^4a^2x-54\_Z\,\mathrm{e}^{-\_Z}ax\_C1^3-3\left(\mathrm{e}^{-\_Z}\right)^2csgn(\_C1^{-1})\_C1^2x-6\,\mathrm{e}^{-\_Z}csgn(\_\right.}\right.}{2\,\mathrm{e}^{RootOf\left(243\,csgn(\_C1^{-1})\_C1^4a^2x-54\_Z\,\mathrm{e}^{-\_Z}ax\_C1^3-3\left(\mathrm{e}^{-\_Z}\right)^2csgn(\_C1^{-1})\_C1^2x-6\,\mathrm{e}^{-\_Z}csgn(\_C1^{-1})\_\right.}}\right.$$

2.1796 ODE No. 1796

$$\left(a^2-x^2\right)\left(a^2-y(x)^2\right)y''(x)+\left(a^2-x^2\right)y(x)y'(x)^2-x\left(a^2-y(x)^2\right)y'(x)=0$$

✓ **Mathematica** : cpu = 0.40274 (sec), leaf count = 195

$$\left\{\left\{y(x)\to-\frac{1}{2}e^{-c_2}\left(\frac{a^2}{a^2-x^2}\right)^{-\frac{c_1}{2}}\sqrt{-a^2\left(\left(\frac{x}{\sqrt{x^2-a^2}}+1\right)^{c_1}-e^{2c_2}\left(1-\frac{x}{\sqrt{x^2-a^2}}\right)^{c_1}\right)^2}\right\},\left\{y(x)\to\right.\right.$$

✓ **Maple** : cpu = 0.354 (sec), leaf count = 51

$$\left\{y(x)=\frac{1}{2\_C2}\left(\left(\left(x+\sqrt{-a^2+x^2}\right)^{-\_C1}\right)^2\_C2^2+a^2\right)\left(\left(x+\sqrt{-a^2+x^2}\right)^{-\_C1}\right)^{-1}\right\}$$

2.1797 ODE No. 1797

$$(y(x)-1)^3\left(ay(x)^2+b\right)+cxy(x)^2(y(x)-1)+dx^2y(x)^2(y(x)+1)+2x^2y(x)(y(x)-1)y''(x)-x^2(3y(x)-1)y'(x)$$

✗ **Mathematica** : cpu = 14.9657 (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)
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
```

2.1798 ODE No. 1798

$$x^3y(x)^2y''(x)+(y(x)+x)\left(xy'(x)-y(x)\right)^3=0$$

✗ **Mathematica** : cpu = 40.7807 (sec), leaf count = 0 , could not solve

```
DSolve[(x + y[x])*(-y[x] + x*Derivative[1][y][x])^3 + x^3*y[x]^2*Derivative[2][y][x] =
```

✓ **Maple** : cpu = 0.274 (sec), leaf count = 166

$$\left\{y(x)=RootOf\left(-2\ln(x)-\int^{\_Z}1\left(i\sqrt{3}Y_{i\sqrt{3}}\left(2\sqrt{\_f}\right)\_C1\sqrt{\_f}+i\sqrt{3}J_{i\sqrt{3}}\left(2\sqrt{\_f}\right)\sqrt{\_f}+Y_{i\sqrt{3}}\left(2\sqrt{\right.\right.\right.\right.$$

2.1799 ODE No. 1799

$$y(x)^3y''(x) - a = 0$$

✓ **Mathematica** : cpu = 2.23105 (sec), leaf count = 58

$$\left\{\left\{y(x)\to -\frac{\sqrt{a+c_1^2\left(c_2+x\right){}^2}}{\sqrt{c_1}}\right\},\left\{y(x)\to \frac{\sqrt{a+c_1^2\left(c_2+x\right){}^2}}{\sqrt{c_1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.205 (sec), leaf count = 46

$$\left\{y(x)=\frac{1}{\_C1}\sqrt{\left(\left(\_C2+x\right)^2\_C1^2+a\right)\_C1},y(x)=-\frac{1}{\_C1}\sqrt{\left(\left(\_C2+x\right)^2\_C1^2+a\right)\_C1}\right\}$$

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 = 0.592297 (sec), leaf count = 78

$$\left\{\left\{y(x)\to -\frac{\sqrt{-2c_1x-2c_2c_1-1}}{\sqrt{2}\sqrt{c_1\left(c_2+x\right)}}\right\},\left\{y(x)\to \frac{\sqrt{-2c_1x-2c_2c_1-1}}{\sqrt{2}\sqrt{c_1\left(c_2+x\right)}}\right\}\right\}$$

✓ **Maple** : cpu = 0.072 (sec), leaf count = 60

$$\left\{y(x)=\frac{1}{2\_C1\,x+2\_C2}\sqrt{-4\left(\_C1\,x+\_C2\right)\left(\_C1\,x+\_C2+1/2\right)},y(x)=-\frac{1}{2\_C1\,x+2\_C2}\sqrt{-$$

2.1801 ODE No. 1801

$$-a^2xy(x)^2+2y(x)^3y''(x)+y(x)^4-1=0$$

✗ **Mathematica** : cpu = 50.1249 (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

$$-ax^2 - bx - c + 2y(x)^3 y''(x) + y(x)^2 y'(x)^2 = 0$$

✗ **Mathematica** : cpu = 0.415889 (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]
```

✗ **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

$$-\mathrm{a0}(a-y(x))^2(b-y(x))^2(c-y(x))^2 - \mathrm{a2}(a-y(x))^2(c-y(x))^2 - \mathrm{a3}(a-y(x))^2(b-y(x))^2 + 2(a-y(x))(b-y(x))($$

✓ **Mathematica** : cpu = 21.8029 (sec), leaf count = 9968

$$\left\{\text{Solve}\left[\frac{2F\left(\sin^{-1}\left(\sqrt{\frac{(\text{Root}\left[\mathrm{a0}\#1^4+(-a\mathrm{a0}-b\mathrm{a0}-c\mathrm{a0}-c_1)\#1^3+(-\mathrm{a1}-\mathrm{a2}-\mathrm{a3}+a\mathrm{a0}b+a\mathrm{a0}c+\mathrm{a0}bc+ac_1+bc_1+cc_1)\#1^2+(a\mathrm{a2}+c\mathrm{a2}+a\mathrm{a3}\right.}{(\text{Root}\left[\mathrm{a0}\#1^4+(-a\mathrm{a0}-b\mathrm{a0}-c\mathrm{a0}-c_1)\#1^3+(-\mathrm{a1}-\mathrm{a2}-\mathrm{a3}+a\mathrm{a0}b+a\mathrm{a0}c+\mathrm{a0}bc+ac_1+bc_1+cc_1)\#1^2+(a\mathrm{a2}+c\mathrm{a2}+a\mathrm{a3}\right.}}}{}\right.\right.$$

✓ **Maple** : cpu = 2.512 (sec), leaf count = 115620

result too large to display

2.1804 ODE No. 1804

$$y''(x)\left(-ay(x) - b + 4y(x)^3\right) - \left(6y(x)^2 - \frac{a}{2}\right)y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 3.15655 (sec), leaf count = 415

$$\text{Solve}\left[\frac{2\sqrt{\frac{y(x)-\text{Root}\left[4\#1^3-\#1a-b\&,1\right]}{\text{Root}\left[4\#1^3-\#1a-b\&,3\right]-\text{Root}\left[4\#1^3-\#1a-b\&,1\right]}}\sqrt{\frac{y(x)-\text{Root}\left[4\#1^3-\#1a-b\&,2\right]}{\text{Root}\left[4\#1^3-\#1a-b\&,3\right]-\text{Root}\left[4\#1^3-\#1a-b\&,2\right]}}\left(y(x)-\text{Root}\left[4\right.\right.}{c_1\sqrt{2ay(x)+2b-8y(x)}}\right.$$

✓ **Maple** : cpu = 0.043 (sec), leaf count = 31

$$\left\{\int^{y(x)}\frac{1}{\sqrt{4\_a^3-\_a\,a-b}}d\_a-\_C1\,x-\_C2=0\right\}$$

2.1805 ODE No. 1805

$$(-ay(x) - b + 4y(x)^3)(f(x)y'(x) + y''(x)) - \left(6y(x)^2 - \frac{a}{2}\right) y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 2.57858 (sec), leaf count = 436

$$\text{Solve}\left[\frac{2\sqrt{\frac{\text{Root}[4\#1^3-\#1a-b\&,1]-y(x)}{\text{Root}[4\#1^3-\#1a-b\&,1]-\text{Root}[4\#1^3-\#1a-b\&,3]}}\sqrt{\frac{\text{Root}[4\#1^3-\#1a-b\&,2]-y(x)}{\text{Root}[4\#1^3-\#1a-b\&,2]-\text{Root}[4\#1^3-\#1a-b\&,3]}}(y(x) - \text{Root}[4}{\sqrt{ay(x)+b-4y(x)^3}}\right.$$

✓ **Maple** : cpu = 0.06 (sec), leaf count = 34

$$\left\{\_C1\, e^{-fx} - \_C2 + \int^{y(x)} \frac{1}{\sqrt{4\_a^3 - \_a\, a - b}} d\_a = 0\right\}$$

2.1806 ODE No. 1806

$$-f(x)((y(x)-1)y(x)(y(x)-x))^{3/2} + 2(1-y(x))\left(x^2 - 2xy(x) + y(x)\right)y(x)y'(x) - 2(1-x)x(1-y(x))(x-y(x$$

✗ **Mathematica** : cpu = 20.2536 (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
```

✓ **Maple** : cpu = 3.917 (sec), leaf count = 733

$$\left\{-\frac{\_C1}{2}\, eval\left(\int \frac{1}{x-1} e^{\int \frac{1}{(x-1)x} EllipticE(\sqrt{x})(EllipticK(\sqrt{x}))^{-1}\, dx} \int 1 \int \frac{1}{(x-y)^2\, y\,(y-1)} \sqrt{-y\,(y-1)\,(x-y)}\, d\right.\right.$$

2.1807 ODE No. 1807

$$a(1-y(x))^2(x-y(x))^2y(x)^2 + bx(1-y(x))^2(x-y(x))^2 - c(1-x)(x-y(x))^2y(x)^2 - d(1-x)x(1-y(x))^2y(x)^2 + 2$$

✗ **Mathematica** : cpu = 28.0339 (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
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(2*x^2*y(x)*(1-x)^2*(1-y(x))*(x-y(x))*diff(diff(y(x),x),x)-x^2*(1-
x)^2*(x-2*x*y(x)-2*y(x)+3*y(x)^2)*diff(y(x),x)^2-2*x*y(x)*(1-x)*(1-y(x))*(x^2+y(x)-
2*x*y(x))*diff(y(x),x)+b*x*(1-y(x))^2*(x-y(x))^2-c*(1-x)*y(x)^2*(x-y(x))^2-
d*x*y(x)^2*(1-x)*(1-y(x))^2+a*y(x)^2*(x-y(x))^2*(1-y(x))^2=0,y(x))
```

2.1808 ODE No. 1808

$$b\sqrt{(1-y(x)^2)(1-a^2y(x)^2)}y'(x)^2+(y(x)^2-1)(a^2y(x)^2-1)y''(x)+y(x)(-2a^2y(x)^2+a^2+1)y'(x)^2=$$

✓ **Mathematica** : cpu = 104.718 (sec), leaf count = 155

$$\text{Solve}\left[2\left(\log\left(bc_1\sqrt{1-y(x)^2}\sqrt{1-a^2y(x)^2}+\sqrt{y(x)^2-1}\sqrt{a^2y(x)^2-1}\exp\left(\frac{b\sqrt{1-y(x)^2}\sqrt{1-a^2y(x)}}{\sqrt{y(x)^2-1}\sqrt{a^2}}\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.173 (sec), leaf count = 72

$$\left\{\int^{y(x)}e^{\int\frac{1}{(\_b^2-1)(\_b^2a^2-1)}\left(-2\_b^3a^2+\_b\,a^2+b\sqrt{(\_b^2-1)(\_b^2a^2-1)}+\_b\right)d\_b}d\_b-\_C1\,x-\_C2=0\right\}$$

2.1809 ODE No. 1809

$$y''(x)\left(ax^2+2bx+c+y(x)^2\right)^2+dy(x)=0$$

✗ **Mathematica** : cpu = 47.93 (sec), leaf count = 0 , could not solve

```
DSolve[d*y[x] + (c + 2*b*x + a*x^2 + y[x]^2)^2*Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 1.037 (sec), leaf count = 336

$$\left\{y(x)=RootOf\left(-\int^{\_Z}\frac{a}{-\_f^4ac+\_f^4b^2+\_C1\,\_f^2a^2-c\_f^2a+b^2\_f^2+\_C1\,a^2+d}\sqrt{(-\_f^4ac+\_}\right.\right.$$

2.1810 ODE No. 1810

$$\sqrt{y(x)}y''(x)-a=0$$

✓ **Mathematica** : cpu = 0.106993 (sec), leaf count = 1881

$$\left\{\left\{y(x)\to\frac{288c_1c_2^2a^4+288x^2c_1a^4+576xc_1c_2a^4+\left(\frac{10368x^4a^8+10368c_2^4a^8+41472xc_2^3a^8+62208x^2c_2^2a^8+41472x^3c_2a^8+48}{}\right.}{16a^4\sqrt[3]{10368}}\right.\right.$$

✓ **Maple** : cpu = 0.17 (sec), leaf count = 91

$$\left\{\frac{1}{12\,a^2}\left(-3\_C1\,\sqrt{4\,a\sqrt{y\left(x\right)}-\_C1}-\left(4\,a\sqrt{y\left(x\right)}-\_C1\right)^{\frac{3}{2}}\right)-x-\_C2=0,\frac{1}{12\,a^2}\left(3\_C1\,\sqrt{4\,a\sqrt{y}\right.\right.$$

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 = 300.045 (sec), leaf count = 0 , timed out

```
$Aborted
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , exception

```
time expired
```

2.1812 ODE No. 1812

$$y(x)y''(x)(1-\log(y(x)))+y'(x)^2(\log(y(x))+1)=0$$

✓ **Mathematica** : cpu = 0.0383318 (sec), leaf count = 29

$$\left\{\left\{y(x)\to e^{\frac{c_1x+c_2c_1-1}{c_1(c_2+x)}}\right\}\right\}$$

✓ **Maple** : cpu = 0.158 (sec), leaf count = 19

$$\left\{y\left(x\right)={{\rm e}^{{\frac{\_C1\,x+\_C2-1}{\_C1\,x+\_C2}}}}\right\}$$

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 = 103.094 (sec), leaf count = 0 , could not solve

```
DSolve[A*(c + a*Sin[y[x]]^2)*y[x] + a*Cos[y[x]]*Sin[y[x]]*Derivative[1][y][x]^2 + (b +
```

✓ **Maple** : cpu = 0.638 (sec), leaf count = 138

$$\left\{\int^{y\left(x\right)}\!\sqrt{2}\left(b+a\left(\sin\left(\_a\right)\right)^2\right)\frac{1}{\sqrt{-\left(b+a\left(\sin\left(\_a\right)\right)^2\right)\left(A\left(\sin\left(\_a\right)\right)^2a-2\,A\cos\left(\_a\right)\sin\left(\_a\right)\_a\,a+\_a^2\right.}}\right.$$

2.1814 ODE No. 1814

$$ah(y(x))y'(x)^2 + h(y(x))y''(x) + j(y(x)) = 0$$

✓ **Mathematica** : cpu = 13.1033 (sec), leaf count = 116

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[\int_1^{\#1} -\frac{e^{aK[2]}}{\sqrt{2\int_1^{K[2]} -\frac{e^{2aK[1]}j(K[1])}{h(K[1])}\,dK[1] + c_1}}\,dK[2]\&\right][c_2 + x]\right\}, \left\{y(x) \to \text{Inv}\right.\right.$$

✓ **Maple** : cpu = 0.262 (sec), leaf count = 87

$$\left\{\int^{y(x)} \frac{1}{(h(\_b))^{-a}} \frac{1}{\sqrt{-2\int \frac{((h(\_b))^a)^2}{h(\_b)}\,\mathrm{d}\_b + \_C1}} d\_b - x - \_C2 = 0, \int^{y(x)} -\frac{1}{(h(\_b))^{-a}} \frac{1}{\sqrt{-2\int 2\frac{((h(\_b))}{h(\_b)}}}\right.$$

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 = 1.19213 (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
```

✓ **Maple** : cpu = 1.066 (sec), leaf count = 71

$$\left\{y(x) = ODESolStruc\left(RootOf\left(\int \_b(\_a)\,\mathrm{d}\_a + \_C1 - \int^{\_Z} (h(\_f))^{-1}\,d\_f\right), [\left\{\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a) = 1\right\}\right.\right.$$

2.1816 ODE No. 1816

$$x^2(-y(x))y'(x) + y'(x)y''(x) - xy(x)^2 = 0$$

✗ **Mathematica** : cpu = 63.9528 (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][
```

✓ **Maple** : cpu = 2.084 (sec), leaf count = 46

$$\left\{y(x) = ODESolStruc\left(\_b(\_a), [\left\{-\_a^2(\_b(\_a))^2 + \left(\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a)\right)^2 + \_C1 = 0\right\}, \{\_a = x, \_b(\_a\right.\right.$$

2.1817 ODE No. 1817

$$4y'(x)^2 + (xy'(x) - y(x))\, y''(x) = 0$$

✗ **Mathematica** : cpu = 29.5538 (sec), leaf count = 0 , could not solve

```
DSolve[4*Derivative[1][y][x]^2 + (-y[x] + x*Derivative[1][y][x])*Derivative[2][y][x] =
```

✓ **Maple** : cpu = 0.334 (sec), leaf count = 40

$$\left\{ y(x) = \mathrm{e}^{\int^{\ln(x)} \mathrm{e}^{RootOf\left(\ln\left(\mathrm{e}^{\_Z}-1\right)\mathrm{e}^{\_Z}+\_C1\,\mathrm{e}^{\_Z}-\_Z\,\mathrm{e}^{\_Z}-\_b\,\mathrm{e}^{\_Z}+2\right)}-1 d\_b+\_C2} \right\}$$

2.1818 ODE No. 1818

$$(xy'(x) - y(x))\, y''(x) - \left(y'(x)^2 + 1\right)^2 = 0$$

✗ **Mathematica** : cpu = 1.46597 (sec), leaf count = 0 , could not solve

```
DSolve[-(1 + Derivative[1][y][x]^2)^2 + (-y[x] + x*Derivative[1][y][x])*Derivative[2][
```

✓ **Maple** : cpu = 0.47 (sec), leaf count = 66

$$\left\{ y(x) = RootOf\left(-\ln(x) + \int^{\_Z} \frac{-\_f + RootOf\left(-\tan\left(\_Z^{-1}\right)\_C1\,\_Z + \_f\,\_C1\,\tan\left(\_Z^{-1}\right) + \tan\left(\right.\right.}{\_f^2 + \cdots}\right.\right.$$

2.1819 ODE No. 1819

$$ax^3 y'(x) y''(x) + by(x)^2 = 0$$

✗ **Mathematica** : cpu = 90.7666 (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 = 0.087 (sec), leaf count = 42

$$\left\{ y(x) = \mathrm{e}^{\int^{\ln(x)} RootOf\left(-\int^{\_Z} \frac{\_a\_a}{\_a^3 a - \_a^2 a + b} d\_a - \_b + \_C1\right) d\_b + \_C2} \right\}$$

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 = 306.45 (sec), leaf count = 0 , timed out

```
$Aborted
```

✓ **Maple** : cpu = 1.229 (sec), leaf count = 88

$$\left\{y(x)=ODESolStruc\left(\mathrm{e}^{\int\_b(\_a)\,\mathrm{d}\_a+\_C1},[\left\{\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a)=\frac{-(\_b(\_a))^3 f1+(-f2-f3)(\_b(\_a))^2-f4}{\_b(\_a)\,f1+f2}\right.\right.\right.$$

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 = 42.6214 (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
```

✓ **Maple** : cpu = 3.211 (sec), leaf count = 54

$$\left\{y(x)=ODESolStruc\left(\_b(\_a),[\left\{(\_b(\_a))^2\left(\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a)\right)^2+\_a^2\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a)+\_a\,\_b(\_a)+\_C\right.\right.\right.$$

2.1822 ODE No. 1822

$$\left(y'(x)^2+y(x)^2\right)y''(x)+y(x)^3=0$$

✓ **Mathematica** : cpu = 1.25018 (sec), leaf count = 369

$$
\left\{\left\{y(x)\to \frac{c_2 \exp\left(-\frac{\tan^{-1}\left(\frac{1+2\,\mathrm{InverseFunction}\left[\frac{\left(\sqrt{3}-i\right)\tan^{-1}\left(\frac{\#1}{\sqrt{\frac{1}{2}\left(1-i\sqrt{3}\right)}}\right.}{\sqrt{6\left(1-i\sqrt{3}\right)}}\right.}{\sqrt{3}}\right.}{2\sqrt{3}}\right.}{\sqrt[4]{\mathrm{InverseFunction}\left[\frac{\left(\sqrt{3}-i\right)\tan^{-1}\left(\frac{\#1}{\sqrt{\frac{1}{2}\left(1-i\sqrt{3}\right)}}\right)}{\sqrt{6\left(1-i\sqrt{3}\right)}}+\frac{\left(\sqrt{3}+i\right)\tan^{-1}\left(\frac{\#1}{\sqrt{\frac{1}{2}\left(1+i\sqrt{3}\right)}}\right)}{\sqrt{6\left(1+i\sqrt{3}\right)}}\&\right][c_1-x]^4+\mathrm{Inverse}}}\right.\right.
$$

✓ **Maple** : cpu = 1.581 (sec), leaf count = 291

$$
\left\{y(x)=\left(\_C1+\tan\left(\sqrt{3}x\right)\right)^{\left(2\_C1^2+2\right)^{-1}}\_C2\left(1+\left(\tan\left(\sqrt{3}x\right)\right)^2\right)^{-\frac{\_C1^2}{4\_C1^2+4}}\left(\_C1+\tan\left(\sqrt{3}x\right)\right)^{\frac{\_C}{2\_C}}\right.
$$

2.1823 ODE No. 1823

$$y''(x)\left(a(xy'(x)-y(x))+y'(x)^2\right)-b=0$$

✗ **Mathematica** : cpu = 0.175706 (sec), leaf count = 0 , could not solve

```
DSolve[-b + (Derivative[1][y][x]^2 + a*(-y[x] + x*Derivative[1][y][x]))*Derivative[2][
```

✓ **Maple** : cpu = 0.405 (sec), leaf count = 289

$$\left\{y(x)=-\frac{ax^2}{4}+RootOf\left(-x-\int^{\_Z}\frac{1}{\_f^2a^2-4\_f\,b+2\_C1}\sqrt{\left(\_f^2a^2-4\_f\,b+2\_C1\right)\left(\_f\,a+\sqrt{4\right.}}\right.\right.$$

2.1824 ODE No. 1824

$$y''(x)\left(a\sqrt{y'(x)^2+1}-xy'(x)\right)-y'(x)^2-1=0$$

✓ **Mathematica** : cpu = 0.367579 (sec), leaf count = 347

$$\left\{\left\{y(x)\to\frac{-2\sqrt{x^2\left(a^2+c_1^2-x^2\right)}+c_1x\log\left(-c_1\left(\sqrt{x^2\left(a^2+c_1^2-x^2\right)}+c_1x\right)+a^2(-x)+ax^2\right)+c_1x\log}{}\right.\right.$$

✓ **Maple** : cpu = 0.855 (sec), leaf count = 96

$$\left\{y(x)=\int\frac{1}{a^3-ax^2}\left(-\_C1\,a^2-x\sqrt{a^2\left(\_C1^2+a^2-x^2\right)}\right)\mathrm{d}x+\_C2,y(x)=\int\frac{1}{a^3-ax^2}\left(-\_C1\,a^2+\right.\right.$$

2.1825 ODE No. 1825

$$f(x)+y''(x)h(y'(x))+j(y(x))y'(x)=0$$

✗ **Mathematica** : cpu = 0.046423 (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]
```

✓ **Maple** : cpu = 0.971 (sec), leaf count = 49

$$\left\{y(x)=ODESolStruc\left(\_f(\_b),[\left\{\int^{\_f(\_b)}1d\_a+\int^{\frac{\mathrm{d}}{\mathrm{d}\_b}\_f(\_b)}h(\_a)\,d\_a+\_b\,f+\_C1=0\right\},\{\_b=\right.\right.$$

2.1826 ODE No. 1826

$$-ay(x) - b + y''(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.912099 (sec), leaf count = 119

$$\left\{\text{Solve}\left[\frac{(ay(x)+b)^2\,{}_2F_1\left(\frac{1}{2},\frac{2}{3};\frac{5}{3};-\frac{4(b+ay(x))^{3/2}}{3ac_1}\right)^2}{a^2c_1} = (c_2+x)^2, y(x)\right], \text{Solve}\left[\frac{(ay(x)+b)^2\,{}_2F_1\left(\frac{1}{2},\frac{2}{3};\frac{5}{3};\frac{4(b}{}\right.}{a^2c_1}\right.\right.$$

✓ **Maple** : cpu = 2.407 (sec), leaf count = 173

$$\left\{\int^{y(x)} a\sqrt{3}\frac{1}{\sqrt{a\left(4\_a\sqrt{\_a\,a+b}a+4\sqrt{\_a\,a+b}b-\_C1\right)}}d\_a - x - \_C2 = 0, \int^{y(x)} -3\frac{}{\sqrt{-12\left((\_a\,a\right.}}\right.$$

2.1827 ODE No. 1827

$$a^2y''(x)^2 - 2axy''(x) + y'(x) = 0$$

✗ **Mathematica** : cpu = 0.996566 (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 ==
```

✓ **Maple** : cpu = 3.801 (sec), leaf count = 81

$$\left\{y(x) = \int RootOf\left(-\int_{\_g}^{\_Z}\left(x\sqrt{x^2-\_f}-x^2+2\_f\,a\right)^{-1}\mathrm{d}\_f+\_C1\right)\mathrm{d}x+\_C2, y(x) = \int RootOf\left(\right.\right.$$

2.1828 ODE No. 1828

$$2\left(x^2+1\right)y''(x)^2 + 2y'(x)\left(y'(x)+x\right) - x(4y'(x)+x)\,y''(x) - 2y(x) = 0$$

✓ **Mathematica** : cpu = 0.0101905 (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 = 0.811 (sec), leaf count = 59

$$\left\{y(x) = \frac{\_C1\,x^2}{2} + \_C2\,x + \_C1^2 + \_C2^2, y(x) = \frac{x}{2}\left(\_C1 + \frac{Arcsinh(x)}{4}\right)\sqrt{x^2+1} - \frac{3\,x^2}{16} + \_C1^2 + \right.$$

2.1829 ODE No. 1829

$$3x^2y''(x)^2 + 4y'(x)^2 - 2(3xy'(x) + y(x))\,y''(x) = 0$$

✓ **Mathematica** : cpu = 0.00669343 (sec), leaf count = 24

$$\left\{\left\{y(x) \to \frac{c_1^2x^2}{c_2} + c_1x + c_2\right\}\right\}$$

✓ **Maple** : cpu = 0.43 (sec), leaf count = 36

$$\left\{y(x) = 0, y(x) = x^{\frac{2\sqrt{3}}{3}}\_C1\,x, y(x) = \frac{\_C1^2x^2}{\_C2} + \_C1\,x + \_C2\right\}$$

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 = 0.0294689 (sec), leaf count = 24

$$\left\{\left\{y(x) \to \frac{c_1^2x^3}{c_2} + c_1x + c_2\right\}\right\}$$

✓ **Maple** : cpu = 0.634 (sec), leaf count = 308

$$\left\{y(x) = 0, y(x) = \frac{27\_C1\,\sqrt{5}\sqrt{4}x}{4}\left((9\,x-1)\,\sqrt{9} + 9\,\sqrt{9\,x^2-2\,x}\right)^{-\frac{2\sqrt{9}}{9}}\left((9\,x-1)\,\sqrt{9} + 9\,\sqrt{9\,x^2-2\,x}\right)^{-\cdots}\right.$$

2.1831 ODE No. 1831

$y(x)(xF(0,2)+xF(2,0))y''(x)+xF(2,2)y''(x)^2+xF(1,1)y''(x)+y'(x)\left((xF(1,2)+xF(2,1))y''(x)+y(x)(\cdots\right.$

✗ **Mathematica** : cpu = 299.998 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 1.764 (sec), leaf count = 163

$$\left\{y(x) = ODESolStruc\left(e^{\int \_b(\_a)\,d\_a + \_C1}, [\left\{\frac{d}{d\_a}\_b(\_a) = \frac{1}{2\,(F_{2,2})\,(\_a)}\left(\sqrt{(((F_{2,1})\,(\_a))^2 + 2\,(F_{2,1})\,(\cdots}\right.\right.\right.\right.$$

2.1832 ODE No. 1832

$$y(x)y''(x)^2 - ae^{2x} = 0$$

✗ **Mathematica** : cpu = 0.686677 (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 = 1.05 (sec), leaf count = 117

$$\left\{y(x) = ODESolStruc\left(\_a\left(e^{-\frac{2\int \_b(\_a)\,d\_a}{3} - \frac{2\_C1}{3}}\right)^{-1}, [\left\{\frac{d}{d\_a}\_b(\_a) = -\frac{(\_b(\_a))^3}{9\_a}(-4\_a^2 + 9\sqrt{\_a\,a})\right.\right.\right.$$

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 = 300.039 (sec), leaf count = 0 , timed out

```
$Aborted
```

✓ **Maple** : cpu = 3.744 (sec), leaf count = 162

$$\left\{y(x) = \_C1, y(x) = \frac{b}{a}, y(x) = b\left(e^{-\frac{\_C2+x}{b}\sqrt{\_C1^2a^2-1}} - \_C1\right)\frac{1}{\sqrt{\_C1^2a^2-1}}, y(x) = \frac{b}{a}\tan\left(\frac{-x+\_C1}{ab}\right.\right.$$

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 = 17.2924 (sec), leaf count = 0 , could not solve

```
DSolve[-4*x*y[x]*(-y[x] + x*Derivative[1][y][x])^3 + (y[x]^2 - x^2*Derivative[1][y][x
```

✓ **Maple** : cpu = 0.53 (sec), leaf count = 92

$$\left\{y(x) = 0, y(x) = \_C1\,x, y(x) = ODESolStruc\left(e^{\int \_b(\_a)\,d\_a + \_C1}, [\left\{\frac{d}{d\_a}\_b(\_a) = \frac{1}{\_a^2}\left(2\sqrt{\_a}\,(-1+\right.\right.\right.\right.$$

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 = 0.123695 (sec), leaf count = 131

$$\left\{\left\{y(x)\to\frac{1}{4}\left(-\frac{8c_1^3}{\sqrt[3]{3\sqrt{3}\sqrt{c_1^9c_2^9\left(27c_1c_2-64\right)}-27c_1^5c_2^5}}+\frac{c_1^2}{c_2}-\frac{2\sqrt[3]{\sqrt{3}\sqrt{c_1^9c_2^9\left(27c_1c_2-64\right)}-9c_1^5c_2^5}}{3^{2/3}c_2^3}\right)x^2+\right.\right.$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , exception

```
time expired
```

2.1836 ODE No. 1836

$$\sqrt{ay''(x)^2+by'(x)^2}+cy(x)y''(x)+dy'(x)^2=0$$

✗ **Mathematica** : cpu = 14.6593 (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]
```

✓ **Maple** : cpu = 1.397 (sec), leaf count = 116

$$\left\{y(x)=0,y(x)=\_C1,y(x)=\_C1\,x+\_C2,y(x)=ODESolStruc\left(\_a,[\left\{\frac{\_b(\_a)}{-c^2\_a^2+a}\left(\left(\frac{d}{d\_a}\_b(\_a\right.\right.\right.\right.$$

2.1837 ODE No. 1837

$$y^{(3)}(x)-a^2\left(y'(x)^5+2y'(x)^3+y'(x)\right)=0$$

✗ **Mathematica** : cpu = 10.9109 (sec), leaf count = 0 , could not solve

```
DSolve[-(a^2*(Derivative[1][y][x] + 2*Derivative[1][y][x]^3 + Derivative[1][y][x]^5))
```

✓ **Maple** : cpu = 0.418 (sec), leaf count = 95

$$\left\{y(x)=\int RootOf\left(-3\int^{\_Z}\frac{1}{\sqrt{3\,a^2\_f^6+9\,a^2\_f^4+9\,a^2\_f^2+9\_C1}}d\_f+x+\_C2\right)\mathrm{d}x+\_C3,y(x\right.$$

2.1838 ODE No. 1838

$$y^{(3)}(x) + y(x)y''(x) - y'(x)^2 + 1 = 0$$

✗ **Mathematica** : cpu = 0.0342364 (sec), leaf count = 0 , could not solve

```
DSolve[1 - Derivative[1][y][x]^2 + y[x]*Derivative[2][y][x] + Derivative[3][y][x] == C
```

✓ **Maple** : cpu = 0.842 (sec), leaf count = 73

$$\left\{ y(x) = ODESolStruc\left(\_a, [\left\{ \left(\frac{d^2}{d\_a^2}\_b(\_a) \right) (\_b(\_a))^2 + \left(\frac{d}{d\_a}\_b(\_a) \right)^2 \_b(\_a) + \left(\frac{d}{d\_a}\_b(\_a) \right. \right. \right. \right.$$

2.1839 ODE No. 1839

$$y^{(3)}(x) - y(x)y''(x) + y'(x)^2 = 0$$

✗ **Mathematica** : cpu = 0.0305425 (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[
```

✓ **Maple** : cpu = 0.921 (sec), leaf count = 116

$$\left\{ y(x) = ODESolStruc\left(e^{\int \_g(\_f) \, d\_f + \_C2}, [\left\{ \frac{d}{d\_f}\_g(\_f) = 6 \frac{\_g(\_f) (\_g(\_f) \_f + 1) (1/6 + (\_f - 1/6}{\_f} \right. \right. \right.$$

2.1840 ODE No. 1840

$$ay(x)y''(x) + y^{(3)}(x) = 0$$

✗ **Mathematica** : cpu = 0.0268214 (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 = 0.856 (sec), leaf count = 129

$$\left\{ y(x) = ODESolStruc\left(e^{\int \_g(\_f) \, d\_f + \_C2}, [\left\{ \frac{d}{d\_f}\_g(\_f) = \frac{\_g(\_f) \left(6 (\_g(\_f))^2 \_f^2 + 2 (\_g(\_f))^2 \_f a}{\_f} \right. \right. \right.$$

2.1841 ODE No. 1841

$$-f(x) + x^2 y^{(3)}(x) + xy''(x) + (2xy(x) - 1)y'(x) + y(x)^2 = 0$$

✗ **Mathematica** : cpu = 0.0874305 (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] +
```

✓ **Maple** : cpu = 0.531 (sec), leaf count = 60

$$\left\{ y(x) = ODESolStruc\left(\_b(\_a), [\left\{ \_a^2 \frac{\mathrm{d}^2}{\mathrm{d}\_a^2} \_b(\_a) + \_a(\_b(\_a))^2 - \left(\frac{\mathrm{d}}{\mathrm{d}\_a} \_b(\_a) \right) \_a - \int f(\_a)\right.\right.\right.$$

2.1842 ODE No. 1842

$$x^2 y^{(3)}(x) + x(y(x) - 1)y''(x) + xy'(x)^2 + (1 - y(x))y'(x) = 0$$

✓ **Mathematica** : cpu = 0.168842 (sec), leaf count = 282

$$\left\{ \left\{ y(x) \to \frac{2\left(c_3 \left(J_{\frac{\sqrt{c_2+2}}{\sqrt{2}}}\left(-\frac{1}{2} ix\sqrt{c_1}\right) - \frac{1}{4} i\sqrt{c_1} x \left(J_{\frac{\sqrt{c_2+2}}{\sqrt{2}}-1}\left(-\frac{1}{2} ix\sqrt{c_1}\right) - J_{\frac{\sqrt{c_2+2}}{\sqrt{2}}+1}\left(-\frac{1}{2} ix\sqrt{c_1}\right) \right) \right) + Y_{\frac{\sqrt{c_2+2}}{\sqrt{2}}} \right.}{c_3 J_{\frac{\sqrt{c_2+2}}{\sqrt{2}}}\left(-\frac{1}{2} ix\sqrt{c_1}\right) + Y_{\frac{\sqrt{c_2+2}}{\sqrt{2}}} (} \right. \right.$$

✓ **Maple** : cpu = 0.856 (sec), leaf count = 190

$$\left\{ \ln(x) + 2 \int^{y(x)} \left(2 \left(RootOf\left(-2\sqrt{4 + \_C1} Y_{1/2\sqrt{4+\_C1}} \left(1/2\sqrt{2}\_Z \right) \_C2 + 2 Y_{1/2\sqrt{4+\_C1}} \left(1/2\sqrt{2}\_Z \right) \right.\right.\right.\right.$$

2.1843 ODE No. 1843

$$y^{(3)}(x)y(x) + y(x)^3 y'(x) - y'(x)y''(x) = 0$$

✓ **Mathematica** : cpu = 2.9526 (sec), leaf count = 409

$$\left\{ \left\{ y(x) \to \text{InverseFunction}\left[-\frac{2i\sqrt{\frac{\#1^2}{2\left(\sqrt{c_2^2-c_1}-c_2\right)}+1}\sqrt{1-\frac{\#1^2}{2\left(c_2+\sqrt{c_2^2-c_1}\right)}} F\left(i\sinh^{-1}\left(\frac{\sqrt{\frac{1}{\sqrt{c_2^2-c_1}-c_2}}\#1}{\sqrt{2}} \right) | \frac{c_2}{c_2} \right.}{\sqrt{\frac{1}{\sqrt{c_2^2-c_1}-c_2}}\sqrt{-\frac{\#1^4}{2}+2\#1^2 c_2 - 2c_1}} \right. \right. \right.$$

✓ **Maple** : cpu = 0.394 (sec), leaf count = 77

$$\left\{\int^{y(x)} -2\frac{1}{\sqrt{-\_a^4+4\_C2\_a^2-4\_C2^2+4\_C1}}d\_a-x-\_C3=0, \int^{y(x)} 2\frac{1}{\sqrt{-\_a^4+4\_C2\_a^2}}\right.$$

2.1844 ODE No. 1844

$$4y(x)^2y^{(3)}(x)+15y'(x)^3-18y(x)y'(x)y''(x)=0$$

✗ **Mathematica** : cpu = 0.0766483 (sec), leaf count = 0 , could not solve

```
DSolve[15*Derivative[1][y][x]^3 - 18*y[x]*Derivative[1][y][x]*Derivative[2][y][x] + 4*
```

✓ **Maple** : cpu = 0.364 (sec), leaf count = 17

$$\left\{y(x)=\frac{\_C3}{\left(-4+(x+\_C2)^2\_C1\right)^2}\right\}$$

2.1845 ODE No. 1845

$$9y(x)^2y^{(3)}(x)+40y'(x)^3-45y(x)y'(x)y''(x)=0$$

✗ **Mathematica** : cpu = 0.0750347 (sec), leaf count = 0 , could not solve

```
DSolve[40*Derivative[1][y][x]^3 - 45*y[x]*Derivative[1][y][x]*Derivative[2][y][x] + 9*
```

✓ **Maple** : cpu = 0.281 (sec), leaf count = 17

$$\left\{y(x)=\_C3\left(-9+(x+\_C2)^2\_C1\right)^{-\frac{3}{2}}\right\}$$

2.1846 ODE No. 1846

$$2y^{(3)}(x)y'(x)-3y'(x)^2=0$$

✓ **Mathematica** : cpu = 0.0521398 (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

$$\left\{y(x)=\_C1, y(x)=\_C1+\_C2\,\mathrm{e}^{\frac{\sqrt{6}x}{2}}+\_C3\,\mathrm{e}^{-\frac{\sqrt{6}x}{2}}\right\}$$

2.1847 ODE No. 1847

$$y^{(3)}(x)\left(y'(x)^2+1\right)-3y'(x)y''(x)^2=0$$

✓ **Mathematica** : cpu = 0.124243 (sec), leaf count = 95

$$\left\{\left\{y(x)\to c_3-\frac{i\sqrt{c_1^2x^2+2c_2c_1^2x+c_2^2c_1^2-1}}{c_1}\right\},\left\{y(x)\to c_3+\frac{i\sqrt{c_1^2x^2+2c_2c_1^2x+c_2^2c_1^2-1}}{c_1}\right\}\right\}$$

✓ **Maple** : cpu = 0.282 (sec), leaf count = 49

$$\left\{y(x)=-\sqrt{-\_C2^2-2\_C2\,x-x^2+\_C1}+\_C3,y(x)=\sqrt{-\_C2^2-2\_C2\,x-x^2+\_C1}+\_C3\right\}$$

2.1848 ODE No. 1848

$$y^{(3)}(x)\left(y'(x)^2+1\right)-y''(x)^2\left(a+3y'(x)\right)=0$$

✗ **Mathematica** : cpu = 299.998 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 1.38 (sec), leaf count = 789

$$\left\{y(x)=\int\frac{\sin\left(RootOf\left(e^{2a\_Z}\_C1^2\_C2^2a^4+2e^{2a\_Z}\_C1^2\_C2\,a^4x+e^{2a\_Z}\_C1^2a^4x^2+2e^{2a\_Z}\_C1^2\right.\right.}{\cos\left(RootOf\left(e^{2a\_Z}\_C1^2\_C2^2a^4+2e^{2a\_Z}\_C1^2\_C2\,a^4x+e^{2a\_Z}\_C1^2a^4x^2+2e^{2a\_Z}\_C1^2\right.\right.}\right.$$

2.1849 ODE No. 1849

$$y^{(3)}(x)y''(x)-a\sqrt{b^2y''(x)^2+1}=0$$

✓ **Mathematica** : cpu = 0.72096 (sec), leaf count = 415

$$\left\{\left\{y(x)\to\frac{6a^2b^5c_3x+6a^2b^5c_2+\left(a^2b^4x^2+2ab^4c_1x+b^4c_1^2-1\right)^{3/2}+3\sqrt{a^2b^4x^2+2ab^4c_1x+b^4c_1^2-1}-3}{}\right.\right.$$

✓ **Maple** : cpu = 0.2 (sec), leaf count = 197

$$\left\{y(x)=\_C2\,x+\int\frac{1}{2\,b}\left(-1\ln\left(\sqrt{\left(-1+b^2\left(x+\_C1\right)a\right)\left(1+b^2\left(x+\_C1\right)a\right)}+\left(x+\_C1\right)b^4a^2\frac{1}{\sqrt{a^2b^4}}\right.\right.\right.$$

2.1850 ODE No. 1850

$$y^{(4)}(x)y'(x) - y^{(3)}(x)y''(x) + y^{(3)}(x)y'(x)^3 = 0$$

✗ **Mathematica** : cpu = 0.0852322 (sec), leaf count = 0 , could not solve

```
DSolve[Derivative[1][y][x]^3*Derivative[3][y][x] - Derivative[2][y][x]*Derivative[3][y
```

✓ **Maple** : cpu = 1.432 (sec), leaf count = 164

$$\left\{ y(x) = ODESolStruc\left(\int \frac{\_j(\_h)}{e^{\int \_j(\_h)\, d\_h + \_C2}\_h}\, d\_h + \_C3, [\left\{ \frac{d}{d\_h}\_j(\_h) = \frac{\_j(\_h)\left(12\left(\_j(\_h)\right)^2 \_h\right.}{}\right.\right.\right.$$

2.1851 ODE No. 1851

$$y'(x)^3\left(f'(x)y'(x) + f(x)y''(x)\right) - y''(x)\left(f''(x)y'(x) + 2f'(x)y''(x) + f(x)y^{(3)}(x)\right) + y'(x)\left(f^{(3)}(x)y'(x) + 3f\right.$$

✗ **Mathematica** : cpu = 0.855836 (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
(Derivative[1][q][x]*Derivative[1][y][x]) + q[x]*Derivative[2][y][x]) - Derivative[2][
```

✗ **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(diff(y(x),x),x)*f*diff(diff(diff(y(x),x),x),x)+diff(y(x),x)^3*(diff(f(x),x)*diff(
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 = 0.0351509 (sec), leaf count = 28

$$\left\{\left\{y(x) \to c_2\left(-\sqrt{3c_1 + 2x}\right) + c_4x + c_3\right\}\right\}$$

✓ **Maple** : cpu = 0.22 (sec), leaf count = 28

$$\left\{ y(x) = 3\left(\_C2 + x\right)\sqrt{6}\_C1\sqrt{-\frac{\_C1}{\_C2 + x}} + \_C3\, x + \_C4 \right\}$$

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 = 0.0738456 (sec), leaf count = 0 , could not solve

```
DSolve[40*Derivative[3][y][x]^3 - 45*Derivative[2][y][x]*Derivative[3][y][x]*Derivativ
```

✓ **Maple** : cpu = 0.846 (sec), leaf count = 110

$$\left\{y(x) = \iint RootOf\left(-\int^{\_Z}\left(RootOf\left(-20\ln(\_f) + \int^{\_Z}\_k\left(e^{RootOf(81\_k^2 e^{\_Z} - 40\,e^{\_Z}\ln(2) - 20\,e^{\_Z}\ln(5) + 20\,e\right.\right.\right.\right.\right.$$

2.1854 ODE No. 1854

$$y^{(n)}(x) - f\left(\frac{\partial^{n-1}y(x)}{\partial x^{n-1}}\right) = 0$$

✗ **Mathematica** : cpu = 0.037785 (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 = 0.0029045 (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 = 0.00522022 (sec), leaf count = 22

$$\{\{x(t) \to c_1 e^{at}, y(t) \to bt + c_2\}\}$$

✓ **Maple** : cpu = 0.067 (sec), leaf count = 19

$$\{\{x(t) = \_C1\ \mathrm{e}^{at}, y(t) = bt + \_C2\}\}$$

2.1857 ODE No. 1857

$$\{x'(t) = ay(t), y'(t) = -ax(t)\}$$

✓ **Mathematica** : cpu = 0.186864 (sec), leaf count = 39

$$\{\{x(t) \to c_2 \sin(at) + c_1 \cos(at), y(t) \to c_2 \cos(at) - c_1 \sin(at)\}\}$$

✓ **Maple** : cpu = 0.052 (sec), leaf count = 35

$$\{\{x(t) = \_C1\ \sin(at) + \_C2\ \cos(at), y(t) = \cos(at)\,\_C1 - \sin(at)\,\_C2\}\}$$

2.1858 ODE No. 1858

$$\{x'(t) = ay(t), y'(t) = bx(t)\}$$

✓ **Mathematica** : cpu = 0.0799506 (sec), leaf count = 158

$$\left\{\left\{x(t) \to \frac{e^{-\sqrt{a}\sqrt{b}t}\left(\sqrt{b}c_1\left(e^{2\sqrt{a}\sqrt{b}t}+1\right)+\sqrt{a}c_2\left(e^{2\sqrt{a}\sqrt{b}t}-1\right)\right)}{2\sqrt{b}}, y(t) \to \frac{e^{-\sqrt{a}\sqrt{b}t}\left(\sqrt{b}c_1\left(e^{2\sqrt{a}\sqrt{b}t}-1\right)+\sqrt{\right.}{2\sqrt{a}}\right.\right.$$

✓ **Maple** : cpu = 0.056 (sec), leaf count = 64

$$\left\{\left\{x(t) = \_C1\ \mathrm{e}^{\sqrt{a}\sqrt{b}t} + \_C2\ \mathrm{e}^{-\sqrt{a}\sqrt{b}t}, y(t) = 1\sqrt{b}\left(\_C1\ \mathrm{e}^{\sqrt{a}\sqrt{b}t} - \_C2\ \mathrm{e}^{-\sqrt{a}\sqrt{b}t}\right)\frac{1}{\sqrt{a}}\right\}\right\}$$

2.1859 ODE No. 1859

$$\{x'(t) = ax(t) - y(t), y'(t) = ay(t) + x(t)\}$$

✓ **Mathematica** : cpu = 0.00597858 (sec), leaf count = 43

$$\{\{x(t) \to e^{at}(c_1 \cos(t) - c_2 \sin(t)), y(t) \to e^{at}(c_1 \sin(t) + c_2 \cos(t))\}\}$$

✓ **Maple** : cpu = 0.037 (sec), leaf count = 38

$$\{\{x(t) = e^{at}(\_C2 \cos(t) + \_C1 \sin(t)), y(t) = -e^{at}(\cos(t)\_C1 - \sin(t)\_C2)\}\}$$

2.1860 ODE No. 1860

$$\{x'(t) = ax(t) + by(t), y'(t) = by(t) + cx(t)\}$$

✓ **Mathematica** : cpu = 0.0494356 (sec), leaf count = 362

$$\left\{\left\{x(t) \to \frac{e^{\frac{1}{2}t\left(-\sqrt{a^2-2ab+b^2+4bc}+a+b\right)}\left(ac_1\left(e^{t\sqrt{a^2-2ab+b^2+4bc}}-1\right)+c_1\sqrt{a^2-2ab+b^2+4bc}\left(e^{t\sqrt{a^2-2ab+b^2+4b}}\right.\right.}{2\sqrt{a^2-2ab+b(b+4c)}}\right.\right.$$

✓ **Maple** : cpu = 0.079 (sec), leaf count = 177

$$\left\{\left\{x(t) = \_C1\, e^{\frac{t}{2}\left(a+b+\sqrt{b^2+(-2a+4c)b+a^2}\right)} + \_C2\, e^{\frac{t}{2}\left(a+b-\sqrt{b^2+(-2a+4c)b+a^2}\right)}, y(t) = \frac{1}{2b}\left(-\_C2\left(a-b+\sqrt{}\right.\right.\right.\right.$$

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 = 0.0132966 (sec), leaf count = 145

$$\left\{\left\{x(t) \to e^{\frac{t(a\alpha+b\beta)}{a^2+b^2}}\left(c_2 \sin\left(\frac{t(a\beta-\alpha b)}{a^2+b^2}\right) + c_1 \cos\left(\frac{t(a\beta-\alpha b)}{a^2+b^2}\right)\right), y(t) \to e^{\frac{t(a\alpha+b\beta)}{a^2+b^2}}\left(c_2 \cos\left(\frac{t(a\beta-\alpha b)}{a^2+b^2}\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.12 (sec), leaf count = 152

$$\left\{\left\{x(t) = \_C1\, e^{\frac{t((i\beta+\alpha)a-(i\alpha-\beta)b)}{a^2+b^2}} + \_C2\, e^{-\frac{((i\beta-\alpha)a-b(i\alpha+\beta))t}{a^2+b^2}}, y(t) = i\left(\_C1\, e^{\frac{t((i\beta+\alpha)a-(i\alpha-\beta)b)}{a^2+b^2}} - \_C2\, e^{-\frac{((i\beta-\alpha)a-}{a^2+}}\right.\right.\right.$$

2.1862 ODE No. 1862

$$\{x'(t) = -y(t), y'(t) = 2x(t) + 2y(t)\}$$

✓ **Mathematica** : cpu = 0.117519 (sec), leaf count = 46

$$\{\{x(t) \to e^t(c_1 \cos(t) - (c_1 + c_2)\sin(t)), y(t) \to e^t(2c_1 \sin(t) + c_2(\sin(t) + \cos(t)))\}\}$$

✓ **Maple** : cpu = 0.036 (sec), leaf count = 39

$$\{\{x(t) = e^t(\cos(t)\_C2 + \sin(t)\_C1), y(t) = -e^t((\_C1 + \_C2)\cos(t) + \sin(t)(\_C1 - \_C2))\}\}$$

2.1863 ODE No. 1863

$$\{x'(t) + 3x(t) + 4y(t) = 0, 2x(t) + y'(t) + 5y(t) = 0\}$$

✓ **Mathematica** : cpu = 0.00746747 (sec), leaf count = 72

$$\left\{\left\{x(t) \to \frac{1}{3}e^{-7t}\left(c_1\left(2e^{6t} + 1\right) - 2c_2\left(e^{6t} - 1\right)\right), y(t) \to \frac{1}{3}e^{-7t}\left(c_2\left(e^{6t} + 2\right) - c_1\left(e^{6t} - 1\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.036 (sec), leaf count = 35

$$\left\{\left\{x(t) = \_C1\, e^{-t} + \_C2\, e^{-7t}, y(t) = -\frac{\_C1\, e^{-t}}{2} + \_C2\, e^{-7t}\right\}\right\}$$

2.1864 ODE No. 1864

$$\{x'(t) = -5x(t) - 2y(t), y'(t) = x(t) - 7y(t)\}$$

✓ **Mathematica** : cpu = 0.0136633 (sec), leaf count = 52

$$\{\{x(t) \to e^{-6t}((c_1 - 2c_2)\sin(t) + c_1 \cos(t)), y(t) \to e^{-6t}((c_1 - c_2)\sin(t) + c_2 \cos(t))\}\}$$

✓ **Maple** : cpu = 0.038 (sec), leaf count = 44

$$\left\{\left\{x(t) = e^{-6t}(\cos(t)\_C2 + \sin(t)\_C1), y(t) = -\frac{((\_C1 - \_C2)\cos(t) - \sin(t)(\_C1 + \_C2))\, e^{-6t}}{2}\right.\right.$$

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 = 1.30738 (sec), leaf count = 926

$$\left\{\left\{x(t) \to \frac{2e^{-\frac{1}{2}\left(\mathrm{a1}+\mathrm{b2}+\sqrt{\mathrm{a1}^2-2\mathrm{b2}\mathrm{a1}+\mathrm{b2}^2+4\mathrm{a2}\mathrm{b1}}\right)t}\left(\mathrm{a1}e^{(\mathrm{a1}+\mathrm{b2})t}\left(-1+e^{\sqrt{\mathrm{a1}^2-2\mathrm{b2}\mathrm{a1}+\mathrm{b2}^2+4\mathrm{a2}\mathrm{b1}}t}\right)c_1\mathrm{b2}^2+2\sqrt{\mathrm{a1}^2-\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.193 (sec), leaf count = 224

$$\left\{\left\{x(t) = e^{\frac{t}{2}\left(a1+b2+\sqrt{a1^2-2\,a1\,b2+4\,a2\,b1+b2^2}\right)}\_C2 + e^{\frac{t}{2}\left(a1+b2-\sqrt{a1^2-2\,a1\,b2+4\,a2\,b1+b2^2}\right)}\_C1 + \frac{c2\,b1 - c1\,b2}{a1\,b2 - a2\,b1}\right.\right.$$

2.1866 ODE No. 1866

$$\{x'(t) + 2y(t) = 3t, y'(t) - 2x(t) = 4\}$$

✓ **Mathematica** : cpu = 0.0356587 (sec), leaf count = 47

$$\left\{\left\{x(t) \to -c_2\sin(2t) + c_1\cos(2t) - \frac{5}{4}, y(t) \to c_1\sin(2t) + c_2\cos(2t) + \frac{3t}{2}\right\}\right\}$$

✓ **Maple** : cpu = 0.033 (sec), leaf count = 39

$$\left\{\left\{x(t) = \sin(2\,t)\_C2 + \cos(2\,t)\_C1 - \frac{5}{4}, y(t) = -\cos(2\,t)\_C2 + \sin(2\,t)\_C1 + \frac{3\,t}{2}\right\}\right\}$$

2.1867 ODE No. 1867

$$\{-t^2 + x'(t) + y(t) + 6t + 1 = 0, y'(t) - x(t) = -3t^2 + 3t + 1\}$$

✓ **Mathematica** : cpu = 0.0895095 (sec), leaf count = 45

$$\{\{x(t) \to -c_2\sin(t) + c_1\cos(t) + 3t^2 - t - 13, y(t) \to c_1\sin(t) + c_2\cos(t) + (t-12)t\}\}$$

✓ **Maple** : cpu = 0.036 (sec), leaf count = 42

$$\{\{x(t) = \sin(t)\_C2 + \cos(t)\_C1 + 3\,t^2 - t - 13, y(t) = t^2 - \cos(t)\_C2 + \sin(t)\_C1 - 12\,t\}\}$$

2.1868 ODE No. 1868

$$\left\{x'(t)+3x(t)-y(t)=e^{2t},x(t)+y'(t)+5y(t)=e^{t}\right\}$$

✓ **Mathematica** : cpu = 0.0482395 (sec), leaf count = 76

$$\left\{\left\{x(t)\to e^{-4t}(c_1(t+1)+c_2t)+\frac{e^t}{25}+\frac{7e^{2t}}{36},y(t)\to e^{-4t}(c_2-(c_1+c_2)\,t)+\frac{4e^t}{25}-\frac{e^{2t}}{36}\right\}\right\}$$

✓ **Maple** : cpu = 0.096 (sec), leaf count = 64

$$\left\{\left\{x(t)=\mathrm{e}^{-4\,t}\_C2+\mathrm{e}^{-4\,t}t\_C1+\frac{\mathrm{e}^{t}}{25}+\frac{7\,\mathrm{e}^{2\,t}}{36},y(t)=-\frac{\mathrm{e}^{2\,t}}{36}-\mathrm{e}^{-4\,t}\_C2-\mathrm{e}^{-4\,t}t\_C1+\mathrm{e}^{-4\,t}\_C1+\frac{4\,\mathrm{e}^{t}}{25}\right\}\right.$$

2.1869 ODE No. 1869

$$\left\{x'(t)+2x(t)+y'(t)+y(t)=t+e^{2t},x'(t)-x(t)+y'(t)+3y(t)=e^{t}-1\right\}$$

✓ **Mathematica** : cpu = 0.242172 (sec), leaf count = 84

$$\left\{\left\{x(t)\to\frac{5}{72}c_1e^{-7t/5}+\frac{3t}{7}-\frac{e^t}{6}+\frac{5e^{2t}}{17}-\frac{1}{49},y(t)\to\frac{5}{48}c_1e^{-7t/5}+\frac{t}{7}+\frac{e^t}{4}-\frac{e^{2t}}{17}-\frac{26}{49}\right\}\right\}$$

✓ **Maple** : cpu = 0.072 (sec), leaf count = 51

$$\left\{\left\{x(t)=\frac{3\,t}{7}-\frac{1}{49}-\frac{\mathrm{e}^{t}}{6}+\frac{5\,\mathrm{e}^{2\,t}}{17}+\mathrm{e}^{-\frac{7\,t}{5}}\_C1,y(t)=-\frac{\mathrm{e}^{2\,t}}{17}+\frac{t}{7}-\frac{26}{49}+\frac{\mathrm{e}^{t}}{4}+\frac{3\_C1}{2}\mathrm{e}^{-\frac{7\,t}{5}}\right\}\right\}$$

2.1870 ODE No. 1870

$$\left\{x'(t)+y'(t)-y(t)=e^{t},2x'(t)+y'(t)+2y(t)=\cos(t)\right\}$$

✓ **Mathematica** : cpu = 0.193649 (sec), leaf count = 71

$$\left\{\left\{x(t)\to-\frac{3}{4}c_2e^{4t}+c_1+\frac{3c_2}{4}+e^t+\frac{5\sin(t)}{17}-\frac{3\cos(t)}{17},y(t)\to c_2e^{4t}-\frac{2e^t}{3}-\frac{\sin(t)}{17}+\frac{4\cos(t)}{17}\right\}\right\}$$

✓ **Maple** : cpu = 0.133 (sec), leaf count = 47

$$\left\{\left\{x(t)=\frac{\mathrm{e}^{4\,t}\_C1}{4}+\frac{5\,\sin(t)}{17}-\frac{3\,\cos(t)}{17}+\mathrm{e}^{t}+\_C2,y(t)=-\frac{\mathrm{e}^{4\,t}\_C1}{3}+\frac{4\,\cos(t)}{17}-\frac{\sin(t)}{17}-\frac{2\,\mathrm{e}^{t}}{3}\right\}\right\}$$

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 = 0.215685 (sec), leaf count = 79

$$\left\{\left\{x(t) \to -(c_1 + c_2)\, e^{-4t} \sin(t) + c_1 e^{-4t} \cos(t) + \frac{31e^t}{26} - \frac{93}{17}, y(t) \to (2c_1 + c_2)\, e^{-4t} \sin(t) + c_2 e^{-4t} \cos(t) \right.\right.$$

✓ **Maple** : cpu = 0.078 (sec), leaf count = 62

$$\left\{\left\{x(t) = \mathrm{e}^{-4\,t} \sin(t)\_C2 + \mathrm{e}^{-4\,t} \cos(t)\_C1 - \frac{93}{17} + \frac{31\,\mathrm{e}^t}{26}, y(t) = \frac{((-221\_C1 - 221\_C2) \cos(t) + 22}{221}\right.\right.$$

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 = 0.0622097 (sec), leaf count = 76

$$\left\{\left\{x(t) \to -e^{-4t}(c_1(t-1) + c_2 t) + \frac{31e^t}{25} - \frac{49e^{2t}}{36}, y(t) \to e^{-4t}((c_1 + c_2)\, t + c_2) - \frac{11e^t}{25} + \frac{19e^{2t}}{36}\right\}\right\}$$

✓ **Maple** : cpu = 0.063 (sec), leaf count = 65

$$\left\{\left\{x(t) = \mathrm{e}^{-4\,t}\_C2 + \mathrm{e}^{-4\,t}t\_C1 + \frac{31\,\mathrm{e}^t}{25} - \frac{49\,\mathrm{e}^{2\,t}}{36}, y(t) = \frac{19\,\mathrm{e}^{2\,t}}{36} - \mathrm{e}^{-4\,t}\_C2 - \mathrm{e}^{-4\,t}t\_C1 - \mathrm{e}^{-4\,t}\_C1 - \right.\right.$$

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 = 0.0499636 (sec), leaf count = 104

$$\left\{\left\{x(t) \to \frac{1}{5}(4c_1 - c_2)\, e^{-t} + \frac{1}{5}(c_1 + c_2)\, e^{-6t} + \frac{1}{9}(57t - 56) - \frac{29e^t}{7}, y(t) \to \frac{1}{5}(c_2 - 4c_1)\, e^{-t} + \frac{4}{5}(c_1 + c_2)\, e^{\right.\right.$$

✓ **Maple** : cpu = 0.06 (sec), leaf count = 52

$$\left\{\left\{x(t) = \mathrm{e}^{-t}\_C2 + \mathrm{e}^{-6\,t}\_C1 - \frac{29\,\mathrm{e}^t}{7} + \frac{19\,t}{3} - \frac{56}{9}, y(t) = -\mathrm{e}^{-t}\_C2 + 4\,\mathrm{e}^{-6\,t}\_C1 + \frac{24\,\mathrm{e}^t}{7} + \frac{55}{9} - \frac{17\,t}{3}\right\}\right.$$

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 = 0.144869 (sec), leaf count = 105

$$\{\{x(t) \to e^{\text{Integrate}[f(K[2]),\{K[2],1,t\},\text{Assumptions}\to\text{True}]}(c_2 \sin(\text{Integrate}[g(K[1]), \{K[1], 1, t\}, \text{Assumptions} \to \text{Tr}$$

✓ **Maple** : cpu = 0.509 (sec), leaf count = 57

$$\left\{\left\{x(t) = e^{\int \tan(\_C1 - \int g(t)\,dt)g(t)+f(t)\,dt}\_C2, y(t) = e^{\int \tan(\_C1 - \int g(t)\,dt)g(t)+f(t)\,dt} \tan\left(\_C1 - \int g(t)\,dt\right)\_C2\right.\right.$$

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 = 0.00713852 (sec), leaf count = 0 , could not solve

```
DSolve[{f[t]*(a*x[t] + b*y[t]) + Derivative[1][x][t] == g[t], f[t]*(c*x[t] + d*y[t]) +
```

✓ **Maple** : cpu = 1.018 (sec), leaf count = 1361

$$\left\{\left\{x(t) = 1\left(-\int \frac{\left(\frac{d}{dt}f(t)\right)g(t) - f(t)\left(\frac{d}{dt}g(t) - f(t)\left(bh(t) - g(t)\,d\right)\right)}{(f(t))^2} e^{\frac{\int f(t)\,dt}{2}\left(-\sqrt{-ad+bc}\sqrt{\frac{-a^2+2ad-4bc-d^2}{ad-bc}}+a+\right.}\right.\right.\right.$$

2.1876 ODE No. 1876

$$\{x'(t) = x(t)\cos(t), y'(t) = x(t)e^{-\sin(t)}\}$$

✓ **Mathematica** : cpu = 0.117741 (sec), leaf count = 41

$$\{\{x(t) \to c_1 e^{\sin(t)}, y(t) \to c_1 \text{Integrate}\left[e^{\sin(K[1])-\sin(K[1])}, \{K[1], 1, t\}, \text{Assumptions} \to \text{True}\right] + c_2\}\}$$

✓ **Maple** : cpu = 0.138 (sec), leaf count = 18

$$\{\{x(t) = \_C2\, e^{\sin(t)}, y(t) = \_C2\, t + \_C1\}\}$$

2.1877 ODE No. 1877

$$\{tx'(t) + y(t) = 0, x(t) + ty'(t) = 0\}$$

✓ **Mathematica** : cpu = 0.0052503 (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 = 0.036 (sec), leaf count = 31

$$\left\{\left\{x(t) = \frac{\_C2\, t^2 + \_C1}{t}, y(t) = \frac{-\_C2\, t^2 + \_C1}{t}\right\}\right\}$$

2.1878 ODE No. 1878

$$\{tx'(t) + 2x(t) = t, -(t+2)x(t) + ty'(t) - ty(t) = -t\}$$

✓ **Mathematica** : cpu = 0.0125936 (sec), leaf count = 39

$$\left\{\left\{x(t) \to \frac{c_1}{t^2} + \frac{t}{3}, y(t) \to -\frac{c_1}{t^2} + c_2 e^t - \frac{t}{3}\right\}\right\}$$

✓ **Maple** : cpu = 0.052 (sec), leaf count = 39

$$\left\{\left\{x(t) = \frac{t}{3} + \frac{\_C2}{t^2}, y(t) = \frac{3\_C1\, \mathrm{e}^t t^2 - t^3 - 3\_C2}{3\, t^2}\right\}\right\}$$

2.1879 ODE No. 1879

$$\{tx'(t) + 2(x(t) - y(t)) = t, x(t) + ty'(t) + 5y(t) = t^2\}$$

✓ **Mathematica** : cpu = 0.121038 (sec), leaf count = 58

$$\left\{\left\{x(t) \to \frac{c_1}{t^4} + \frac{c_2}{t^3} + \frac{1}{30} t(2t+9), y(t) \to -\frac{30 c_2 t + 60 c_1 - 8t^6 + 3t^5}{60 t^4}\right\}\right\}$$

✓ **Maple** : cpu = 0.079 (sec), leaf count = 54

$$\left\{\left\{x(t) = \frac{2\, t^6 + 9\, t^5 + 30\_C2\, t + 30\_C1}{30\, t^4}, y(t) = \frac{8\, t^6 - 3\, t^5 - 30\_C2\, t - 60\_C1}{60\, t^4}\right\}\right\}$$

2.1880 ODE No. 1880

$\{t^2(1-\sin(t))x'(t) = t^2y(t) + tx(t)(1-2\sin(t)), t^2(1-\sin(t))y'(t) = x(t)(t\cos(t)-\sin(t)) + ty(t)(1-t$

✗ **Mathematica** : cpu = 0.0219378 (sec), leaf count = 0 , could not solve

```
DSolve[{t^2*(1 - Sin[t])*Derivative[1][x][t] == t*(1 - 2*Sin[t])*x[t] + t^2*y[t], t^2*
```

✓ **Maple** : cpu = 0.069 (sec), leaf count = 23

$$\{\{x(t) = t(\_C1\, t + \_C2)\, , y(t) = \sin(t)\, \_C2 + \_C1\, t\}\}$$

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 = 0.0772944 (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 = 0.027 (sec), leaf count = 48

$$\left\{\left\{x(t) = -\frac{\mathrm{d}}{\mathrm{d}t}f(t) + g(t) - f(t) - \frac{\mathrm{d}^2}{\mathrm{d}t^2}f(t) + \frac{\mathrm{d}}{\mathrm{d}t}g(t)\, , y(t) = f(t) + \frac{\mathrm{d}^2}{\mathrm{d}t^2}f(t) - \frac{\mathrm{d}}{\mathrm{d}t}g(t)\right\}\right\}$$

2.1882 ODE No. 1882

$$\{2x'(t) - 3x(t) + y'(t) = 0, x''(t) + y'(t) - 2y(t) = e^{2t}\}$$

✓ **Mathematica** : cpu = 0.594345 (sec), leaf count = 199

$$\left\{\left\{x(t) \to \frac{1}{276}e^{t/2}\left(23e^{t/2}(6c_1 + 2c_2 + 4c_3 + 3e^t) - 2\sqrt{23}(9c_1 - 11c_2 + 2c_3)\sin\left(\frac{\sqrt{23}t}{2}\right) + 46(3c_1 - c_2\right.\right.\right.$$

✓ **Maple** : cpu = 0.169 (sec), leaf count = 99

$$\left\{\left\{x(t) = \frac{\mathrm{e}^{2t}}{4} + \_C1\, \mathrm{e}^t + \_C2\, \mathrm{e}^{\frac{t}{2}}\cos\left(\frac{\sqrt{23}t}{2}\right) + \_C3\, \mathrm{e}^{\frac{t}{2}}\sin\left(\frac{\sqrt{23}t}{2}\right), y(t) = -\frac{7}{4}\left(\frac{\_C3\,\sqrt{23}}{7} + \_C2\right)\right.\right.$$

2.1883 ODE No. 1883

$$\{x'(t) + x(t) - y'(t) = 2t, x''(t) - 9x(t) + y'(t) + 3y(t) = \sin(2t)\}$$

✓ **Mathematica** : cpu = 0.666614 (sec), leaf count = 170

$$\left\{\left\{x(t) \to \frac{1}{16}e^{-3t}\left(e^{4t}(c_1(20t+7) + c_2(4t+3) + 3c_3(1-4t)) + 9c_1 - 3(c_2+c_3) + 32e^{3t}(t+2)\right) - \frac{36}{325}\sin\right.\right.$$

✓ **Maple** : cpu = 0.106 (sec), leaf count = 80

$$\left\{\left\{x(t) = -\frac{2\cos(2t)}{325} + 4 - \frac{36\sin(2t)}{325} + 2t + \_C1\, e^{t} + \_C2\, e^{-3t} + \_C3\, e^{t}t, y(t) = \frac{16\cos(2t)}{325} - \frac{37}{}\right.\right.$$

2.1884 ODE No. 1884

$$\{x'(t) - x(t) + 2y(t) = 0, x''(t) - 2y'(t) = 2t - \cos(2t)\}$$

✓ **Mathematica** : cpu = 0.314223 (sec), leaf count = 116

$$\left\{\left\{x(t) \to 8c_1e^{t/2} + 8c_2e^{t/2} - c_2 - t^2 - 4t + \frac{1}{34}\sin(2t) + \frac{2}{17}\cos(2t) - 8, y(t) \to 2c_1e^{t/2} + 2c_2e^{t/2} - \frac{c_2}{2} - \right.\right.$$

✓ **Maple** : cpu = 0.105 (sec), leaf count = 69

$$\left\{\left\{x(t) = 2\,e^{t/2}\_C1 - t^2 + \frac{\sin(2t)}{34} + \frac{2\cos(2t)}{17} - 4t + \_C2, y(t) = \frac{\_C1}{2}e^{\frac{t}{2}} - t + \frac{\cos(2t)}{34} + \frac{9\sin(2t}{68}\right.\right.$$

2.1885 ODE No. 1885

$$\{tx'(t) - ty'(t) - 2y(t) = 0, tx''(t) + 2x'(t) + tx(t) = 0\}$$

✗ **Mathematica** : cpu = 0.0222901 (sec), leaf count = 0 , could not solve

```
DSolve[{-2*y[t] + t*Derivative[1][x][t] - t*Derivative[1][y][t] == 0, t*x[t] + 2*Deriv
```

✓ **Maple** : cpu = 0.338 (sec), leaf count = 47

$$\left\{\left\{x(t) = \frac{\_C3\cos(t) + \sin(t)\_C2}{t}, y(t) = \frac{(\_C3\,t + 2\_C2)\cos(t) + (\_C2\,t - 2\_C3)\sin(t) + \_C1}{t^2}\right.\right.$$

2.1886 ODE No. 1886

$$\{ay(t) + x''(t) = 0, y''(t) - a^2 y(t) = 0\}$$

✓ **Mathematica** : cpu = 0.0210271 (sec), leaf count = 103

$$\left\{\left\{x(t) \to \frac{c_4(2at + e^{-at} - e^{at})}{2a^2} - \frac{c_3 e^{-at}(e^{at}-1)^2}{2a} + c_2 t + c_1, y(t) \to \frac{e^{-at}(ac_3(e^{2at}+1) + c_4(e^{2at}-1))}{2a}\right\}\right.$$

✓ **Maple** : cpu = 0.06 (sec), leaf count = 49

$$\left\{\left\{x(t) = \frac{-\_C3\, e^{-at} - \_C4\, e^{at} + a(\_C1\, t + \_C2)}{a}, y(t) = \_C3\, e^{-at} + \_C4\, e^{at}\right\}\right\}$$

2.1887 ODE No. 1887

$$\{x''(t) = ax(t) + by(t), y''(t) = cx(t) + dy(t)\}$$

✓ **Mathematica** : cpu = 0.550837 (sec), leaf count = 5647

$$\left\{\left\{x(t) \to \frac{e^{-\frac{\left(\sqrt{a+d-\sqrt{a^2-2da+d^2+4bc}}+\sqrt{a+d+\sqrt{a^2-2da+d^2+4bc}}\right)t}{\sqrt{2}}}\left(\sqrt{a^2-2da+d^2+4bc}\sqrt{a+d-\sqrt{a^2-2da+d^2}}\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.133 (sec), leaf count = 360

$$\left\{\left\{x(t) = \_C1\, e^{-\frac{t}{2}\sqrt{-2\sqrt{a^2-2ad+4bc+d^2}+2a+2d}} + \_C2\, e^{\frac{t}{2}\sqrt{-2\sqrt{a^2-2ad+4bc+d^2}+2a+2d}} + \_C3\, e^{-\frac{t}{2}\sqrt{2\sqrt{a^2-2ad+4}}}\right.\right.$$

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 = 27.0799 (sec), leaf count = 20302

Too large to show

✓ **Maple** : cpu = 0.24 (sec), leaf count = 457

$$\left\{\left\{x(t) = \_C4\, \mathrm{e}^{\frac{t}{2}\sqrt{2\sqrt{a1^2-2\,a1\,b2+4\,a2\,b1+b2^2}+2\,a1+2\,b2}} + \_C3\, \mathrm{e}^{-\frac{t}{2}\sqrt{2\sqrt{a1^2-2\,a1\,b2+4\,a2\,b1+b2^2}+2\,a1+2\,b2}} + \_C2\right.\right.$$

2.1889 ODE No. 1889

$$\{x''(t) + x(t) + y(t) = -5, -4x(t) + y''(t) - 3y(t) = -3\}$$

✓ **Mathematica** : cpu = 0.11181 (sec), leaf count = 151

$$\left\{\left\{x(t) \to \frac{1}{4}e^{-t}(2c_1(t+1) - 2c_2t + c_3t - c_4t + e^{2t}(-2c_1(t-1) - 2c_2(t-2) - c_3t - c_4t + c_4) - 4c_2 - c_4\right.\right.$$

✓ **Maple** : cpu = 0.049 (sec), leaf count = 60

$$\{\{x(t) = (\_C4\, t + \_C2)\, \mathrm{e}^{-t} + 18 + (\_C3\, t + \_C1)\, \mathrm{e}^{t}, y(t) = ((-2\,t+2)\_C4 - 2\_C2)\, \mathrm{e}^{-t} - 23 + ((-$$

2.1890 ODE No. 1890

$$\left\{x''(t) = c^2x(t)\left(3\cos^2(at+b) - 1\right) + \frac{3}{2}c^2y(t)\sin(2abt), y''(t) = \frac{3}{2}c^2x(t)\sin(2abt) + c^2y(t)\left(3\sin^2(at+b)\right)\right.$$

✗ **Mathematica** : cpu = 0.00911091 (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]*
1 + 3*Sin[b + a*t]^2)*y[t]}, {x[t], y[t]}, t]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{\left\{x(t) = DESol\left(\left\{\frac{\mathrm{d}^4}{\mathrm{d}t^4}\_Y(t) + \left(2\,\frac{ab\sin(atb)}{\cos(atb)} - 2\,\frac{ab\cos(atb)}{\sin(atb)}\right)\frac{\mathrm{d}^3}{\mathrm{d}t^3}\_Y(t) + \left(2\,c^2 - 3\,(\sin(at))^2\,c^2(\mathrm{si}\right.\right.\right.\right.\right.$$

2.1891 ODE No. 1891

$$\{x''(t) + 6x(t) + 7y(t) = 0, 3x(t) + y''(t) + 2y(t) = 2t\}$$

✓ **Mathematica** : cpu = 0.572168 (sec), leaf count = 200

$$\left\{\left\{x(t) \to \frac{1}{180}e^{-t}\left(27c_1e^{2t} + 27c_2e^{2t} - 63c_3e^{2t} - 63c_4e^{2t} + 42(c_2 + c_4)\,e^t\sin(3t) + 126(c_1 + c_3)\,e^t\cos(3t) +\right.\right.\right.$$

✓ **Maple** : cpu = 0.054 (sec), leaf count = 64

$$\left\{\left\{x(t) = \frac{14\,t}{9} + \_C1\,e^{t} + \_C2\,\cos(3\,t) + \_C3\,e^{-t} + \_C4\,\sin(3\,t)\,, y(t) = -\_C1\,e^{t} + \frac{3\_C2\,\cos(3\,t)}{7}\right.\right.$$

2.1892 ODE No. 1892

$$\{-ay'(t) + bx(t) + x''(t) = 0, ax'(t) + by(t) + y''(t) = 0\}$$

✓ **Mathematica** : cpu = 0.408204 (sec), leaf count = 3522

$$\left\{\left\{x(t) \to \frac{e^{-\frac{\left(\sqrt{-a^2-2b-\sqrt{a^4+4ba^2}}+\sqrt{-a^2-2b+\sqrt{a^4+4ba^2}}\right)t}{\sqrt{2}}}\left(\left(\left(\sqrt{-a^2 - 2b - \sqrt{a^4 + 4ba^2}}e^{\frac{\left(\sqrt{-a^2-2b-\sqrt{a^4+4ba^2}}+2\sqrt{-a^2-2b+}\right.}{\sqrt{2}}}\right.\right.\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.151 (sec), leaf count = 463

$$\left\{\left\{x(t) = \_C1\,e^{-\frac{t}{2}\sqrt{-2\,a^2-2\,\sqrt{a^2(a^2+4\,b)}-4\,b}} + \_C2\,e^{\frac{t}{2}\sqrt{-2\,a^2-2\,\sqrt{a^2(a^2+4\,b)}-4\,b}} + \_C3\,e^{-\frac{t}{2}\sqrt{-2\,a^2+2\,\sqrt{a^2(a^2+4\,b)}-4\,b}}\right.\right.$$

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 = 300.004 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 1.101 (sec), leaf count = 1579

$$\left\{\left\{x(t) = \frac{\left(a2\ a1\ \left(RootOf\left(a1\ a2\ \_Z^4 + (a1\ b2 + a2\ b1)\_Z^3 + (A^2 + c2\ a1 + a2\ c1 + b2\ b1)\_Z^2 + (\right.\right.\right.}{}\right.\right.$$

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 = 300. (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.795 (sec), leaf count = 1056

$$\left\{\left\{x(t) = \frac{(-\omega^2 c1 + i(c1 + c2)\,a\omega + c1\ b2)\,\mathrm{e}^{i\omega t}}{\omega^4 - 2\,ia\omega^3 + (-b1 - b2)\,\omega^2 + ia\,(b1 + b2)\,\omega + b2\ b1} + \_C1\ \mathrm{e}^{RootOf(\_Z^4 + 2\,a\_Z^3 + (b1 + b2)\_Z^2 + (a}\right.\right.$$

2.1895 ODE No. 1895

$$\{\mathrm{a11}x''(t) + \mathrm{a12}y''(t) + \mathrm{b11}x'(t) + \mathrm{b12}y'(t) + \mathrm{c11}x(t) + \mathrm{c12}y(t) = 0, \mathrm{a21}x''(t) + \mathrm{a22}y''(t) + \mathrm{b21}x'(t) + \mathrm{b2}$$

✓ **Mathematica** : cpu = 0.4648 (sec), leaf count = 6816

✓ **Maple** : cpu = 0.226 (sec), leaf count = 1008

$$\left\{\left\{x(t) = \sum_{\_a=1}^{4} \mathrm{e}^{RootOf((a22\ a11 - a21\ a12)\_Z^4 + (a11\ b22 - a12\ b21 - a21\ b12 + a22\ b11)\_Z^3 + (a11\ c22 - a12\ c21 - a21\ c12 + a22\ c11 +}\right.\right.$$

2.1896 ODE No. 1896

$$\{x''(t)-2x'(t)-y'(t)+y(t)=0,2x'(t)-x(t)+y^{(3)}(t)-y''(t)=t\}$$

✓ **Mathematica** : cpu = 0.213984 (sec), leaf count = 246

$$\left\{\left\{x(t)\to\frac{1}{8}e^{-t}\left(e^{2t}\left(-2c_3t^2+2c_5t^2+c_1\left(2t^2-6t+7\right)+c_2\left(2t^2+6t+1\right)-2c_3t+4c_4t-2c_5t+c_3-2c_4\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.058 (sec), leaf count = 67

$$\left\{\left\{x(t)=-\frac{2\,\mathrm{e}^{-t}\_C2}{3}+\frac{(-9\_C5\,t^2-6\_C4\,t-3\_C3-18\_C5)\,\mathrm{e}^{t}}{3}-t-2,y(t)=\mathrm{e}^{-t}\_C2-2+(\_\right.\right.$$

2.1897 ODE No. 1897

$$\{x''(t)+y''(t)+y'(t)=\sinh(2t),2x''(t)+y''(t)=2t\}$$

✓ **Mathematica** : cpu = 0.13438 (sec), leaf count = 118

$$\left\{\left\{x(t)\to\frac{1}{48}\left(2\left(6(4c_2+2c_4-1)\,t+24c_1-6c_4+4t^3+6t^2+3\right)-6e^{-2t}(-2c_4+2t+1)-3e^{2t}\right),y(t)\to\right.\right.$$

✓ **Maple** : cpu = 0.187 (sec), leaf count = 86

$$\left\{\left\{x(t)=\frac{(-12\,t+12\_C2-15)\,\mathrm{e}^{-2\,t}}{48}+\frac{t^3}{6}+\frac{t^2}{4}+\_C3\,t+\_C4-\frac{\cosh(2\,t)}{16}-\frac{\sinh(2\,t)}{16},y(t)=\frac{(4\,t-\right.\right.$$

2.1898 ODE No. 1898

$$\{x''(t)-x'(t)+y'(t)=0,x''(t)-x(t)+y''(t)=0\}$$

✓ **Mathematica** : cpu = 0.0396588 (sec), leaf count = 246

$$\left\{\left\{x(t)\to-\frac{1}{10}e^{\frac{1}{2}\left(t-\sqrt{5}t\right)}\left(2c_1\left(\sqrt{5}e^{\sqrt{5}t}-5e^{\frac{1}{2}\left(1+\sqrt{5}\right)t}-\sqrt{5}\right)-2\sqrt{5}c_2\left(e^{\sqrt{5}t}-1\right)+c_4\left(\left(5+\sqrt{5}\right)e^{\sqrt{5}t}-\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.068 (sec), leaf count = 71

$$\left\{\left\{x(t)=\frac{\_C4\,\left(\sqrt{5}-1\right)}{2}\mathrm{e}^{-\frac{\left(\sqrt{5}-1\right)t}{2}}-\frac{\_C3\,\left(\sqrt{5}+1\right)}{2}\mathrm{e}^{\frac{\left(\sqrt{5}+1\right)t}{2}}+\_C1\,\mathrm{e}^{t},y(t)=\_C2+\_C3\,\mathrm{e}^{\frac{\left(\sqrt{5}+1\right)t}{2}}+\_\right.\right.$$

2.1899 ODE No. 1899

$$\{x'(t) = 2x(t), y'(t) = 3x(t) - 2y(t), z'(t) = 2y(t) + 3z(t)\}$$

✓ **Mathematica** : cpu = 0.0133008 (sec), leaf count = 93

$$\left\{\left\{x(t) \to c_1 e^{2t}, y(t) \to \frac{1}{4}e^{-2t}\left(3c_1\left(e^{4t} - 1\right) + 4c_2\right), z(t) \to \frac{1}{10}e^{-2t}\left(c_1\left(-15e^{4t} + 12e^{5t} + 3\right) + 4c_2\left(e^{5t} - 1\right)\right.\right.$$

✓ **Maple** : cpu = 0.083 (sec), leaf count = 52

$$\left\{\left\{x(t) = \_C3\,e^{2t}, y(t) = \frac{3\_C3\,e^{2t}}{4} + e^{-2t}\_C2, z(t) = \_C1\,e^{3t} - \frac{3\_C3\,e^{2t}}{2} - \frac{2\,e^{-2t}\_C2}{5}\right\}\right\}$$

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 = 0.010266 (sec), leaf count = 88

$$\left\{\left\{x(t) \to c_1 e^{4t}, y(t) \to \frac{1}{6}e^{-2t}\left(c_1\left(e^{6t} - 1\right) + 6c_2\right), z(t) \to \frac{1}{9}e^{-2t}\left(c_1\left(e^{3t} + e^{6t} - 2\right) - 12c_2\left(e^{3t} - 1\right) + 9c_3e^{3\cdots}\right.\right.$$

✓ **Maple** : cpu = 0.072 (sec), leaf count = 50

$$\left\{\left\{x(t) = \_C3\,e^{4t}, y(t) = \frac{\_C3\,e^{4t}}{6} + e^{-2t}\_C2, z(t) = \frac{\_C3\,e^{4t}}{9} + \_C1\,e^{t} + \frac{4\,e^{-2t}\_C2}{3}\right\}\right\}$$

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 = 0.0109931 (sec), leaf count = 93

$$\{\{x(t) \to (c_2 - c_3)\left(e^t - 1\right) + c_1, y(t) \to c_1\left(e^t - 1\right) + c_2\left(e^t t + 1\right) - c_3\left(e^t(t-1) + 1\right), z(t) \to c_1\left(e^t - 1\right) +$$

✓ **Maple** : cpu = 0.063 (sec), leaf count = 43

$$\{\{x(t) = \_C2 + \_C3\,e^t, y(t) = (\_C3\,t + \_C1)\,e^t - \_C2, z(t) = ((t-1)\,\_C3 + \_C1)\,e^t - \_C2\}\}$$

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 = 0.0165057 (sec), leaf count = 109

$$\{\{x(t) \to (c_2 - c_3)(e^t - 1) + c_1, y(t) \to c_1(e^t - 1) + t((c_2 - c_3)e^t - 1) + c_3e^t + c_2 - c_3 - 1, z(t) \to c_1(e$$

✓ **Maple** : cpu = 0.056 (sec), leaf count = 51

$$\{\{x(t) = \_C2 + \_C3\, e^t, y(t) = (\_C3\, t + \_C1)\, e^t - t - \_C2 - 1, z(t) = ((t-1)\_C3 + \_C1)\, e^t - t -$$

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 = 0.0945998 (sec), leaf count = 736

$$\left\{\left\{x(t) \to \frac{e^{-it\sqrt{a^2+b^2+c^2}}\left(ab^2\left(c_1\left(1+e^{2it\sqrt{a^2+b^2+c^2}}\right) - c_2\left(-1+e^{it\sqrt{a^2+b^2+c^2}}\right)^2\right) + ac^2\left(c_1\left(1+e^{2it\sqrt{a^2+b^2+}}\right.\right.\right.}{2a(}\right.\right.$$

✓ **Maple** : cpu = 0.148 (sec), leaf count = 299

$$\left\{\left\{x(t) = \_C1 + \_C2\, \sin\left(\sqrt{a^2+b^2+c^2}t\right) + \_C3\, \cos\left(\sqrt{a^2+b^2+c^2}t\right), y(t) = \frac{1}{b(b^2+c^2)}\left(\_C1\, b^3 +\right.\right.\right.$$

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 = 0.0698042 (sec), leaf count = 1084

$$\left\{\left\{x(t) \to \frac{e^{-\sqrt{-a^2-b^2-c^2}t}\left(2e^{\sqrt{-a^2-b^2-c^2}t}c_1a^2 + b^2\left(1+e^{2\sqrt{-a^2-b^2-c^2}t}\right)c_1 + c^2\left(1+e^{2\sqrt{-a^2-b^2-c^2}t}\right)c_1 - c\left(-\right.\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.085 (sec), leaf count = 257

$$\left\{\left\{x(t) = \_C1 + \_C2\, \sin\left(\sqrt{a^2+b^2+c^2}t\right) + \_C3\, \cos\left(\sqrt{a^2+b^2+c^2}t\right), y(t) = \frac{1}{a(b^2+c^2)}\left(\left(-a^2b\_C\right.\right.\right.\right.$$

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 = 0.00693789 (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
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{\left\{x(t) = DESol\left(\left\{\frac{d^3}{dt^3}\_Y(t) + \left(-2\frac{h(t)\left(\frac{d}{dt}h(t)\right)f(t)}{(h(t))^2 f(t) + (g(t))^2 f(t) - h(t)\frac{d}{dt}g(t) + \left(\frac{d}{dt}h(t)\right)g(t)} - 2\frac{}{(h}\right.\right.\right.\right.\right.$$

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 = 0.0654115 (sec), leaf count = 177

$$\left\{\left\{x(t) \to \frac{1}{3}e^t\left(\sqrt{3}(c_2 - c_3)\sin\left(\sqrt{3}t\right) + (2c_1 - c_2 - c_3)\cos\left(\sqrt{3}t\right) + c_1 + c_2 + c_3\right), y(t) \to \frac{1}{3}e^t\left(-\sqrt{3}(c_1\right.\right.\right.$$

✓ **Maple** : cpu = 0.078 (sec), leaf count = 120

$$\left\{\left\{x(t) = e^t\left(\cos\left(\sqrt{3}t\right)\_C3 + \sin\left(\sqrt{3}t\right)\_C2 + \_C1\right), y(t) = \frac{e^t(\_C2\sqrt{3} - \_C3)\cos\left(\sqrt{3}t\right)}{2} + \frac{e^t(-}{}\right.\right.$$

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 = 0.013743 (sec), leaf count = 157

$$\{\{x(t) \to e^t\left(c_1\left(3 - 2e^{2t}\right) + 2\left(e^t - 1\right)\left(3c_2\left(3e^t + 5\right) - c_3\left(5e^t + 9\right)\right)\right), y(t) \to e^t\left(-2c_1\left(e^{2t} - 1\right) + c_2\left(3e^t +\right.\right.$$

✓ **Maple** : cpu = 0.063 (sec), leaf count = 66

$$\left\{\left\{x(t) = e^{2t}\_C1 + \_C2\,e^t + \_C3\,e^{3t}, y(t) = \frac{e^{2t}\_C1}{4} + \frac{2\_C2\,e^t}{3} + \_C3\,e^{3t}, z(t) = \frac{e^{2t}\_C1}{4} + \_C2\,e^\right.\right.$$

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 = 0.0229774 (sec), leaf count = 551

$$\left\{\left\{x(t) \to -36c_2\text{RootSum}\left[\#1^3 - 40\#1^2 + 1714\#1 + 1404\&, \frac{2\#1e^{\#1t} + e^{\#1t}}{3\#1^2 - 80\#1 + 1714}\&\right] + 4c_3\text{RootSum}\left[\right.\right.\right.$$

✓ **Maple** : cpu = 0.679 (sec), leaf count = 1213

$$\left\{\left\{x(t) = \_C2\, e^{\frac{\left(\left(263474+18\sqrt{351406311}\right)^{\frac{2}{3}}+80\sqrt[3]{263474+18\sqrt{351406311}}-3542\right)t}{6\sqrt[3]{263474+18\sqrt{351406311}}}} \sin\left(\frac{\sqrt{3}t\left(\sqrt[3]{4}\sqrt[3]{(131737+9\sqrt{351406311}}\right.}{6\sqrt[3]{263474+18\sqrt{3514063}}}\right.\right.\right.$$

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 = 0.0612376 (sec), leaf count = 1630

$$\left\{\left\{x(t) \to -c_2\text{RootSum}\left[\#1^3 - a\#1^2 - b\#1^2 - c\#1^2 - \alpha^2\#1 - \beta^2\#1 - g^2\#1 + ab\#1 + ac\#1 + bc\#1\right.\right.\right.$$

✓ **Maple** : cpu = 22.842 (sec), leaf count = 33085

Unable to generate Latez

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 = 0.0100619 (sec), leaf count = 39

$$\left\{\left\{x(t) \to t(c_3t + 1), y(t) \to c_2t + c_3, z(t) \to c_1t + \frac{c_3}{t} + c_2\right\}\right\}$$

✓ **Maple** : cpu = 0.082 (sec), leaf count = 37

$$\left\{\left\{x(t) = \_C3\, t^2 + t, y(t) = \_C2\, t + \_C3, z(t) = \frac{\_C1\, t^2 + \_C2\, t + \_C3}{t}\right\}\right\}$$

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 = 0.0316464 (sec), leaf count = 0 , could not solve

```
DSolve[{a*t*Derivative[1][x][t] == b*c*(y[t] - z[t]), b*t*Derivative[1][y][t] == a*c*(
x[t] + z[t]), c*t*Derivative[1][z][t] == a*b*(x[t] - y[t])}, {x[t], y[t], z[t]}, t]
```

✓ **Maple** : cpu = 0.144 (sec), leaf count = 309

$$\left\{\left\{x(t) = \_C1 + \_C2 \sin\left(\sqrt{a^2+b^2+c^2}\ln(t)\right) + \_C3 \cos\left(\sqrt{a^2+b^2+c^2}\ln(t)\right), y(t) = \frac{1}{b(b^2+c^2)}\left(\right.\right.\right.$$

2.1912 ODE No. 1912

$$\{\mathrm{x1}'(t) = a\mathrm{x2}(t) + b\mathrm{x3}(t)\cos(ct) + b\mathrm{x4}(t)\sin(ct), \mathrm{x2}'(t) = -a\mathrm{x1}(t) + b\mathrm{x3}(t)\sin(ct) - b\mathrm{x4}(t)\cos(ct), \mathrm{x3}'(t)$$

✗ **Mathematica** : cpu = 0.0112033 (sec), leaf count = 0 , could not solve

```
DSolve[{Derivative[1][x1][t] == a*x2[t] + b*Cos[c*t]*x3[t] + b*Sin[c*t]*x4[t], Derivat
(a*x1[t]) + b*Sin[c*t]*x3[t] - b*Cos[c*t]*x4[t], Derivative[1][x3][t] == -
(b*Cos[c*t]*x1[t]) - b*Sin[c*t]*x2[t] + a*x4[t], Derivative[1][x4][t] == -
(b*Sin[c*t]*x1[t]) + b*Cos[c*t]*x2[t] - a*x3[t]}, {x[t], y[t], z[t]}, t]
```

✓ **Maple** : cpu = 2.47 (sec), leaf count = 2956

$$\left\{\left\{x1(t) = \_C2 + \_C3 \sin(ct) + \_C4 \cos(ct), x2(t) = -\cos(ct)\_C3 + \sin(ct)\_C4 + \_C1, x3(t) =\right.\right.$$

2.1913 ODE No. 1913

$$\{x'(t) = -x(t)(x(t) + y(t)), y'(t) = y(t)(x(t) + y(t))\}$$

✓ **Mathematica** : cpu = 0.0621559 (sec), leaf count = 52

$$\{\{y(t) \to -\sqrt{c_1}\cot\left(\sqrt{c_1}(t-c_2)\right), x(t) \to -\sqrt{c_1}\tan\left(\sqrt{c_1}(t-c_2)\right)\}\}$$

✓ **Maple** : cpu = 0.148 (sec), leaf count = 57

$$\left\{[\{x(t) = 0\}, \{y(t) = (-t + \_C1)^{-1}\}], \left[\left\{x(t) = \frac{1}{\_C1}\tanh\left(\frac{\_C2 + t}{\_C1}\right)\right\}, \left\{y(t) = \frac{-(x(t))^2 - \frac{d}{dt}x(t)}{x(t)}\right.\right.\right.$$

2.1914 ODE No. 1914

$$\{x'(t) = x(t)(ay(t) + b), y'(t) = y(t)(cx(t) + d)\}$$

✓ **Mathematica** : cpu = 0.755558 (sec), leaf count = 198

$$\left\{\left\{y(t) \to \frac{bW\left(\frac{a\text{InverseFunction}\left[\int_1^{\#1} \frac{1}{K[1]\left(W\left(\frac{ae^{\frac{cK[1]}{b}+\frac{c_1}{b}}K[1]^{\frac{d}{b}}}{b}\right)+1\right)}dK[1]\&\right][bt+c_2]^{\frac{d}{b}}\exp\left(\frac{c\text{InverseFunction}\left[\int_1^{\#1} \frac{}{K[1]\left(W\left(\frac{ae^{\frac{cK[1}{b}}}{}\right.\right.}\right.}{b}\right.}{b}\right.}{a}\right.\right.$$

✓ **Maple** : cpu = 0.71 (sec), leaf count = 92

$$\left\{[\{x(t) = 0\}, \{y(t) = \_C1\, e^{dt}\}], \left[\left\{x(t) = RootOf\left(-\int^{\_Z} \frac{1}{b\_a}\left(lambertW\left(\frac{e^{-1}}{b}e^{-\frac{ac}{b}}\_a^{\frac{d}{b}}e^{-\frac{\_C1}{b}}\right)+1\right)^{-}\right.\right.\right.$$

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 = 300.068 (sec), leaf count = 0 , timed out

```
$Aborted
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✓ **Maple** : cpu = 9.801 (sec), leaf count = 147

$$\left\{[\{x(t)=0\}, \left\{y(t) = \frac{\beta}{e^{-\beta t}\_C1\,\beta - bq}\right\}], [\left\{x(t) = ODESolStruc\left(\_b(\_a), [\left\{\left(\left(\frac{d}{d\_a}\_b(\_a)\right)(\_b(\_\right.\right.\right.\right.\right.$$

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 = 250.04 (sec), leaf count = 0 , could not solve

```
DSolve[{Derivative[1][x][t] == h*(a - x[t])*(c - x[t] - y[t]), Derivative[1][y][t] ==
```

✓ **Maple** : cpu = 0.599 (sec), leaf count = 180

$$\left\{[\{x(t)=a\}, \left\{y(t) = \frac{(c-a)\,e^{k(t+\_C1)(-c+a+b)} - b}{-1 + e^{k(t+\_C1)(-c+a+b)}}\right\}], [\left\{x(t) = RootOf\left(-\int^{\_Z} \frac{1}{\_a - a}\left((\_a - a)^{-\frac{k}{h}} h\_\right.\right.\right.\right.$$

2.1917 ODE No. 1917

$$\{x'(t) = y(t)^2 - \cos(x(t)), y'(t) = y(t)(-\sin(x(t)))\}$$

✗ **Mathematica** : cpu = 250.054 (sec), leaf count = 0 , could not solve

```
DSolve[{Derivative[1][x][t] == -Cos[x[t]] + y[t]^2, Derivative[1][y][t] == -
(Sin[x[t]]*y[t])}, {x[t], y[t]}, t]
```

✓ **Maple** : cpu = 1.991 (sec), leaf count = 109

$$\left\{[\left\{x(t) = RootOf\left(2\int^{\_Z}\left(\tan\left(RootOf\left(-3\sqrt{-(\cos(\_f))^2}\ln\left(9/4\,\frac{(\cos(\_f))^2}{(\cos(\_Z))^2}\right) + 3\_C1\sqrt{-(\cos\right.\right.\right.\right.\right.\right.\right.$$

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 = 0.0939355 (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 = 2.405 (sec), leaf count = 184

$$\left\{[\{x(t) = 0\}, \{y(t) = 0\}], [\left\{x(t) = ODESolStruc\left(\_a, [\left\{\frac{1}{2\_a^2}\left(\sqrt{(4\_a^2 - 4\_a\_b(\_a) + 1)(\_a^3 + \right.\right.\right.\right.\right.$$

2.1919 ODE No. 1919

$$\{x'(t) = x(t)\left(-(x(t)^2 + y(t)^2)\right) + x(t) + y(t), y'(t) = -y(t)\left(x(t)^2 + y(t)^2\right) - x(t) + y(t)\}$$

✗ **Mathematica** : cpu = 0.111331 (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]
x[t] + y[t] - y[t]*(x[t]^2 + y[t]^2)}, {x[t], y[t]}, t]
```

✓ **Maple** : cpu = 4.011 (sec), leaf count = 203

$$\left\{[\{x(t) = 0\}, \{y(t) = 0\}], [\left\{x(t) = ODESolStruc\left(\_a, [\left\{\frac{1}{2\_a^3}\left(\sqrt{-(4\_a^4 + 4\_a\_b(\_a) - 4\_a^2 - \right.\right.\right.\right.\right.$$

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 = 0.0875275 (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
1 + x[t]^2 + y[t]^2)}, {x[t], y[t]}, t]
```

✓ **Maple** : cpu = 3.405 (sec), leaf count = 205

$$\left\{[\{x(t) = 0\}, \{y(t) = 0\}], [\left\{x(t) = ODESolStruc\left(\_a, [\left\{\frac{1}{2\_a^3}\left(\sqrt{-(4\_a^4 - 4\_a^2 - 4\_a\_b(\_a) - \right.\right.\right.\right.\right.$$

2.1921 ODE No. 1921

$$\left\{x'(t) = -y(t)\left(x(t)^2 + y(t)^2\right), y'(t) = \left(\left\{ \begin{array}{cc} x(t)^2 + y(t)^2 & x(t)^2 + y(t)^2 \geq 2x(t) \\ \left(x(t)^2 + y(t)^2\right)\left(\frac{x(t)}{2} - \frac{y(t)^2}{2x(t)}\right) & \text{True} \end{array} \right. \right)\right\}$$

✗ **Mathematica** : cpu = 2.49823 (sec), leaf count = 0 , could not solve

```
DSolve[{Derivative[1][x][t] == -(y[t]*(x[t]^2 + y[t]^2)), Derivative[1][y][t] == Piece
```

✗ **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)^
1/2*y(t)^2/x(t))*(x(t)^2+y(t)^2))})
```

2.1922 ODE No. 1922

$$\left\{x'(t) = \left(\left\{ \begin{array}{cc} \sin\left(\frac{1}{x(t)^2+y(t)^2}\right) x(t)\left(x(t)^2 + y(t)^2 - 1\right) & x(t)^2 + y(t)^2 \neq 1 \\ 0 & \text{True} \end{array} \right. \right) - y(t), y'(t) = \left(\left\{ \quad \sin \right. \right.$$

✗ **Mathematica** : cpu = 12.513 (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] == Piecew
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 , exception

```
time expired
```

2.1923 ODE No. 1923

$$\left\{\left(t^2+1\right)x'(t) = y(t) - tx(t), \left(t^2+1\right)y'(t) = -x(t) - ty(t)\right\}$$

✓ **Mathematica** : cpu = 0.0125315 (sec), leaf count = 39

$$\left\{\left\{x(t) \to \frac{c_2 t + c_1}{t^2+1}, y(t) \to \frac{c_2 - c_1 t}{t^2+1}\right\}\right\}$$

✓ **Maple** : cpu = 0.04 (sec), leaf count = 35

$$\left\{\left\{x(t) = \frac{\_C1\,t + \_C2}{t^2+1}, y(t) = \frac{-\_C2\,t + \_C1}{t^2+1}\right\}\right\}$$

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 = 0.0716262 (sec), leaf count = 179

$$\left\{\left\{y(t)\to -\frac{c_1\left(\sqrt{e^{2c_2}-4\left(c_1^2+1\right)t^2}-e^{c_2}\right)}{2\left(c_1^2+1\right)},x(t)\to \frac{e^{c_2}-\sqrt{e^{2c_2}-4\left(c_1^2+1\right)t^2}}{2\left(c_1^2+1\right)}\right\},\left\{y(t)\to \frac{c_1\left(\sqrt{e^{2c_2}-\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.309 (sec), leaf count = 180

$$\left\{[\{x(t)=0\},\left\{y(t)=\frac{1}{2\_C1}\left(1+\sqrt{-4\_C1^2t^2+1}\right),y(t)=\frac{1}{2\_C1}\left(1-\sqrt{-4\_C1^2t^2+1}\right)\right\}],[\{x(t)\right.$$

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 = 8.72384 (sec), leaf count = 0 , could not solve

```
DSolve[{-x[t] + t*Derivative[1][x][t] + a*Derivative[1][y][t] + Derivative[1][y][t]^2
y[t] + t*Derivative[1][y][t] + Derivative[1][x][t]*Derivative[1][y][t] == 0}, {x[t], y
```

✓ **Maple** : cpu = 0.312 (sec), leaf count = 194

$$\left\{[\left\{x(t)=-\frac{t^2}{3}\right\},\left\{y(t)=-\frac{t^3}{27a}\right\}],[\{x(t)=\_C1\,t+\_C2\},\left\{y(t)=-\frac{\left(\frac{d}{dt}x(t)+t\right)\left(\left(\frac{d}{dt}x(t)\right)^2+t\frac{d}{dt}x(\right.}{a}\right.\right.$$

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 = 0.0059757 (sec), leaf count = 0 , could not solve

```
DSolve[{x[t] == f[Derivative[1][x][t], Derivative[1][y][t]] + t*Derivative[1][x][t], y
```

✓ **Maple** : cpu = 0.333 (sec), leaf count = 96

$$\left\{[\left\{\int RootOf\left(t\frac{d}{dt}y(t)+g\left(\_Z,\frac{d}{dt}y(t)\right)-y(t)\right)\,dt+\_C1=tRootOf\left(t\frac{d}{dt}y(t)+g\left(\_Z,\frac{d}{dt}y(t)\right)-y\right.\right.\right.$$

2.1927 ODE No. 1927

$$\{x''(t) = ae^{2x(t)} + e^{-2x(t)}\cos^2(y(t)) - e^{-x(t)}, y''(t) = e^{-2x(t)}\sin(y(t))\cos(y(t)) - \tan(y(t))\sec^2(y(t))\}$$

✗ **Mathematica** : cpu = 0.00970096 (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]), Der
```

✗ **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
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 = 0.00687358 (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] =
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , exception

```
time expired
```

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 = 0.00865557 (sec), leaf count = 0 , could not solve

```
DSolve[{Derivative[2][x][t] == -((c*f[Sqrt[Derivative[1][x][t]^2 + Derivative[1][y][t]
g - (c*f[Sqrt[Derivative[1][x][t]^2 + Derivative[1][y][t]^2]]*y[t]*Derivative[1][y][t]
```

✓ **Maple** : cpu = 3.803 (sec), leaf count = 116

$$\left\{\left[\left\{y(t) = ODESolStruc\left(\_a, \left[\left\{\left(\frac{d}{d\_a}\_b(\_a)\right)\_b(\_a) + 1\left(C(\_a)\, f\left(\sqrt{(\_b(\_a))^2}\right)\_b(\_a) + g\sqrt{(\right.\right.\right.\right.\right.\right.$$

2.1930 ODE No. 1930

$$\left\{x'(t)=y(t)-z(t),y'(t)=x(t)^2+y(t),z'(t)=x(t)^2+z(t)\right\}$$

✓ **Mathematica** : cpu = 0.0523279 (sec), leaf count = 127

$$\left\{\left\{x(t)\to e^{t-c_3}+c_1,y(t)\to e^{2t-2c_3}+(c_1+c_2)\,e^{t-c_3}+2c_1e^{t-c_3}\log\left(e^{t-c_3}\right)-c_1^2,z(t)\to e^{2t-2c_3}+(c_1+c_2-\right.\right.$$

✓ **Maple** : cpu = 0.046 (sec), leaf count = 45

$$\left\{[\{x(t)=\_C2+\_C3\,\mathrm{e}^{t}\}\,,\left\{y(t)=\left(\int(x(t))^2\,\mathrm{e}^{-t}\,\mathrm{d}t+\_C1\right)\mathrm{e}^{t}\right\},\left\{z(t)=-\frac{\mathrm{d}}{\mathrm{d}t}x(t)+y(t)\right\}]\right\}$$

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 = 5.53857 (sec), leaf count = 1461

$$\left\{\left\{x(t)\to\frac{\sqrt{2}b\sqrt{a(a-c)}(c-b)c_1\mathrm{sn}\left(\frac{\sqrt{2}\sqrt{a-c}\sqrt{b-c}\sqrt{c_2}(c_3-t)}{\sqrt{a}\sqrt{b}}\middle|-\frac{(a-b)bc_1}{(a-c)cc_2}\right)}{a(c-a)\sqrt{b(b-c)c_1}},y(t)\to-\frac{\sqrt{2}\sqrt{-b(b-c)c_1\left(\mathrm{sn}\left(\right.\right.}}{}\right.\right.$$

✓ **Maple** : cpu = 0.81 (sec), leaf count = 1117

$$\left\{[\{x(t)=0\}\,,\{y(t)=0\}\,,\{z(t)=\_C1\}],[\{x(t)=0\}\,,\{y(t)=\_C1\}\,,\{z(t)=0\}],[\{x(t)=\_C1\}\,,\{y(t)\right.$$

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 = 2.33427 (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 = 1.076 (sec), leaf count = 383

$$\left\{[\{x(t)=0\},\{y(t)=0\},\{z(t)=\_C1\}],\left[\{x(t)=0\},\left\{y(t)=\frac{\_C1\,\mathrm{e}^{\_C2\,\_C1}\mathrm{e}^{\_C1\,t}}{-1+\mathrm{e}^{\_C2\,\_C1}\mathrm{e}^{\_C1\,t}}\right\},\left\{z(t)=\frac{\frac{\mathrm{d}}{\mathrm{d}t}y(t)}{y(t)}\right\}\right.\right.$$

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 = 126.977 (sec), leaf count = 0 , could not solve

```
DSolve[{Derivative[1][x][t] + Derivative[1][y][t] == x[t]*y[t], Derivative[1][y][t] +
```

✓ **Maple** : cpu = 2.971 (sec), leaf count = 17738

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 = 78.7206 (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]
y[t]^2/6 + 3*x[t]*z[t]}, {x[t], y[t], z[t]}, t]
```

✓ **Maple** : cpu = 1.372 (sec), leaf count = 377

$$\left\{[\{y(t)=0\},\{x(t)=-2(-2\_C1+t)^{-1}\},\{z(t)=0\}],\left[\{y(t)=256(\_C1\,t+\_C2)^{-4}\},\left\{x(t)=\frac{1}{6\,y(\right.\right.\right.$$

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 = 0.0545768 (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 = 1.955 (sec), leaf count = 741

$$\left\{[\{x(t)=0\},\{y(t)=0\},\{z(t)=\_C1\}],[\{x(t)=0\},\left\{y(t)=\frac{1}{(e^{\_C2\_C1})^2(e^{\_C1\,t})^2-1}\sqrt{((e^{\_C2\_C1})^2(\right.\right.$$

2.1936 ODE No. 1936

$$\left\{x'(t)=x(t)\left(y(t)^2-z(t)^2\right),y'(t)=-y(t)\left(x(t)^2+z(t)^2\right),z'(t)=z(t)\left(x(t)^2+y(t)^2\right)\right\}$$

✗ **Mathematica** : cpu = 0.0516633 (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],
```

✓ **Maple** : cpu = 0.71 (sec), leaf count = 704

$$\left\{[\{x(t)=0\},\{y(t)=0\},\{z(t)=\_C1\}],[\{x(t)=0\},\left\{y(t)=\frac{1}{(e^{\_C2\_C1})^2(e^{\_C1\,t})^2-1}\sqrt{-(e^{\_C1\,t})^4\_\right.\right.$$

2.1937 ODE No. 1937

$$\left\{x'(t)=-x(t)y(t)^2+x(t)+y(t),y'(t)=x(t)^2y(t)-x(t)-y(t),z'(t)=y(t)^2-x(t)^2\right\}$$

✗ **Mathematica** : cpu = 0.272555 (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]
```

✓ **Maple** : cpu = 0.789 (sec), leaf count = 242

$$\left\{[\{x(t)=0\},\{y(t)=0\},\{z(t)=\_C1\}],[\left\{x(t)=ODESolStruc\left(\_a,[\left\{\frac{1}{2\_a^2}\left(\sqrt{(4\_a^2-4\_a\_b(\_\right.\right.\right.\right.\right.$$

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 = 0.00978383 (sec), leaf count = 137

$$\left\{\left\{x(t)\to c_1e^{-\frac{t\sqrt{f'(r)}}{\sqrt{r}}}+c_2e^{\frac{t\sqrt{f'(r)}}{\sqrt{r}}},y(t)\to c_3e^{-\frac{t\sqrt{f'(r)}}{\sqrt{r}}}+c_4e^{\frac{t\sqrt{f'(r)}}{\sqrt{r}}},z(t)\to c_5e^{-\frac{t\sqrt{f'(r)}}{\sqrt{r}}}+c_6e^{\frac{t\sqrt{f'(r)}}{\sqrt{r}}}\right\}\right\}$$

✓ **Maple** : cpu = 0.127 (sec), leaf count = 101

$$\left\{\left\{x(t)=\_C5\,\mathrm{e}^{t\sqrt{\frac{\mathrm{d}}{\mathrm{d}r}F(r)}\frac{1}{\sqrt{r}}}+\_C6\,\mathrm{e}^{-t\sqrt{\frac{\mathrm{d}}{\mathrm{d}r}F(r)}\frac{1}{\sqrt{r}}},y(t)=\_C3\,\mathrm{e}^{t\sqrt{\frac{\mathrm{d}}{\mathrm{d}r}F(r)}\frac{1}{\sqrt{r}}}+\_C4\,\mathrm{e}^{-t\sqrt{\frac{\mathrm{d}}{\mathrm{d}r}F(r)}\frac{1}{\sqrt{r}}},z(t)=\_C\right.\right.$$

2.1939 ODE No. 1939

$\{(x(t)-y(t))(x(t)-z(t))x'(t)=f(t),(y(t)-x(t))(y(t)-z(t))y'(t)=f(t),(z(t)-x(t))(z(t)-y(t))z'($

✗ **Mathematica** : cpu = 0.0303713 (sec), leaf count = 0 , could not solve

```
DSolve[{(x[t] - y[t])*(x[t] - z[t])*Derivative[1][x][t] == f[t], (-x[t] + y[t])*(y[t]
x[t] + z[t])*(-y[t] + z[t])*Derivative[1][z][t] == f[t]}, {x[t], y[t], z[t]}, t]
```

✓ **Maple** : cpu = 1.524 (sec), leaf count = 899

$$\left\{[\left\{x(t)=\int -3\,\frac{f(t)}{\_C1^3+11664\,\_C2^2-23328\,\_C2\,\int f(t)\,\mathrm{d}t+11664\,\left(\int f(t)\,\mathrm{d}t\right)^2}\left(\left(-i\sqrt{3}+1\right)\left(\left(\left(1\right.\right.\right.\right.\right.\right.$$

2.1940 ODE No. 1940

$\{\mathrm{x1}'(t)\sin(\mathrm{x2}(t))=\mathrm{x4}(t)\sin(\mathrm{x3}(t))+\mathrm{x5}(t)\cos(\mathrm{x3}(t)),\mathrm{x2}'(t)=\mathrm{x4}(t)\cos(\mathrm{x3}(t))-\mathrm{x5}(t)\sin(\mathrm{x3}(t)),\mathrm{x1}'(t)\,c$

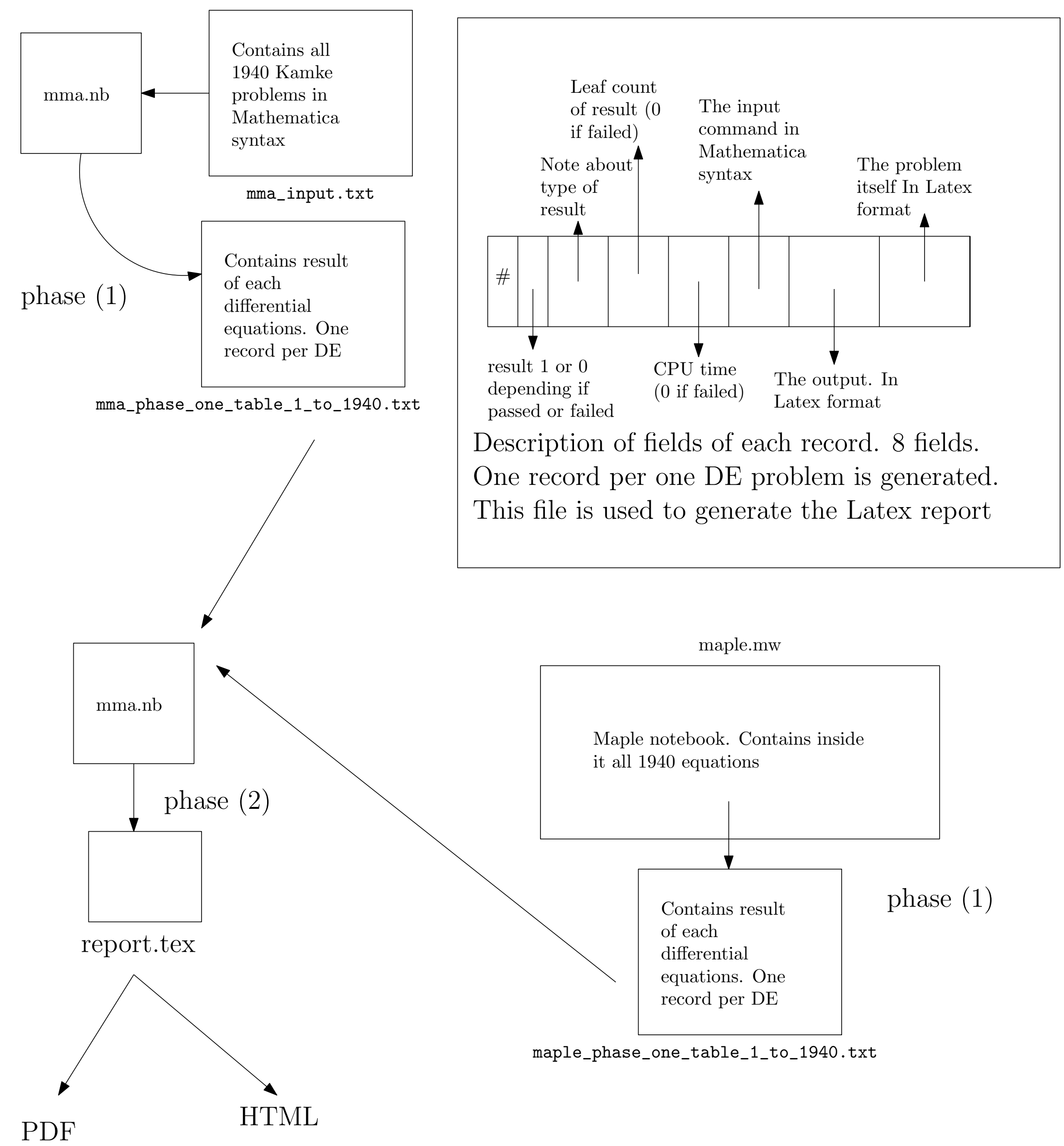
✗ **Mathematica** : cpu = 0.00897747 (sec), leaf count = 0 , could not solve

```
DSolve[{Sin[x2[t]]*Derivative[1][x1][t] == Sin[x3[t]]*x4[t] + Cos[x3[t]]*x5[t], Deriva
(a*(1 - lambda)*x5[t]) + Derivative[1][x4][t] == -(m*Cos[x3[t]]*Sin[x2[t]]), a*(1 - la
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , exception

```
time expired
```

3 Appendix



Kamke Differential equations build process

Nasser M. Abbasi (design.ipe)