Kamke differential equations. Mathematica 12 and Maple 2019

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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 12 and Maple 2019 on windows 10, 64 bit OS. PC with 64 GB RAM, using Intel I7-8086K at 4GHz.

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

```
t0 := time[real]():
timeOut := 60*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	82.78	1.75	2690.99	46.97	4321725
Maple	92.11	0.53	207.35	15.78	370541

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 47, 48, 49, 50, 55, 56, 74, 79, 82, 87, 110, 121, 188, 202, 203, 205, 206, 219, 234, 237, 250, 253, 265, 266, 269, 331, 340, 367, 370, 394, 395, 413, 427, 428, 451, 460, 461, 465, 480, 482, 485, 489, 503, 506, 507, 510, 524, 531, 532, 537, 562, 572, 575, 576, 638, 639, 640, 730, 743, 746, 752, 759, 769, 807, 835, 837, 854, 855, 862, 885, 889, 894, 909, 916, 917, 919, 953, 996, 1015, 1019, 1026, 1027, 1028, 1029, 1030, 1031, 1032, 1038, 1072, 1073, 1074, 1075, 1076, 1077, 1080, 1081, 1082, 1083, 1084, 1085, 1099, 1126, 1157, 1205, 1212, 1216, 1236, 1248, 1261, 1268, 1278, 1303, 1306, 1323, 1329, 1330, 1343, 1348, 1362, 1367, 1372, 1373, 1398, 1402, 1403, 1407, 1408, 1419, 1427, 1439, 1440, 1441, 1443, 1444, 1445, 1450, 1457, 1458, 1459, 1460, 1461, 1462, 1463, 1471, 1472, 1473, 1474, 1476, 1482, 1484, 1489, 1500, 1505, 1507, 1510, 1515, 1516, 1520, 1526, 1527, 1529, 1530, 1531, 1540,

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

1541, 1542, 1543, 1544, 1547, 1552, 1569, 1572, 1573, 1574, 1575, 1576, 1581, 1586, 1590, 1593, 1595, 1596, 1598, 1599, 1601, 1603, 1605, 1606, 1608, 1609, 1611, 1612, 1613, 1614, 1615, 1616, 1617, 1618, 1619, 1622, 1623, 1624, 1625, 1626, 1627, 1628, 1629, 1631, 1633, 1634, 1636, 1637, 1639, 1642, 1643, 1644, 1645, 1648, 1649, 1652, 1658, 1659, 1660, 1662, 1663, 1664, 1665, 1666, 1667, 1672, 1673, 1675, 1677, 1678, 1680, 1681, 1682, 1684, 1685, 1686, 1690, 1691, 1692, 1693, 1695, 1696, 1702, 1704, 1708, 1709, 1710, 1713, 1719, 1720, 1721, 1729, 1732, 1734, 1735, 1737, 1738, 1739, 1742, 1746, 1751, 1757, 1761, 1762, 1777, 1779, 1780, 1788, 1789, 1797, 1798, 1801, 1802, 1806, 1807, 1809, 1811, 1815, 1816, 1817, 1818, 1819, 1820, 1821, 1823, 1825, 1827, 1831, 1832, 1833, 1834, 1836, 1837, 1838, 1839, 1840, 1841, 1844, 1845, 1850, 1851, 1853, 1854, 1855, 1875, 1880, 1885, 1890, 1905, 1911, 1912, 1915, 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, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 51, 52, 53, 54, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 75, 76, 77, 78, 80, 81, 83, 84, 85, 86, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 204, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 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1281, 1282, 1283, 1284, 1285, 1286, 1287, 1288, 1289, 1290, 1291, 1292, 1293, 1294, 1295, 1296, 1297, 1298, 1299, 1300, 1301, 1302, 1304, 1305, 1307, 1308, 1309, 1310, 1311, 1312, 1313, 1314, 1315, 1316, 1317, 1318, 1319, 1320, 1321, 1322, 1324, 1325, 1326, 1327, 1328, 1331, 1332, 1333, 1334, 1335, 1336, 1337, 1338, 1339, 1340, 1341, 1342, 1344, 1345, 1346, 1347, 1349, 1350, 1351, 1352, 1353, 1354, 1355, 1356, 1357, 1358, 1359, 1360, 1361, 1363, 1364, 1365, 1366, 1368, 1369, 1370, 1371, 1374, 1375, 1376, 1377, 1378, 1379, 1380, 1381, 1382, 1383, 1384, 1385, 1386, 1387, 1388, 1389, 1390, 1391, 1392, 1393, 1394, 1395, 1396, 1397, 1399, 1400, 1401, 1404, 1405, 1406, 1409, 1410, 1411, 1412, 1413, 1414, 1415, 1416, 1417, 1418, 1420, 1421, 1422, 1423, 1424, 1425, 1426, 1428, 1429, 1430, 1431, 1432, 1433, 1434, 1435, 1436, 1437, 1438, 1442, 1446, 1447, 1448, 1449, 1451, 1452, 1453, 1454, 1455, 1456, 1464, 1465, 1466, 1467, 1468, 1469, 1470, 1475, 1477, 1478, 1479, 1480, 1481, 1483, 1485, 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2 Problems table lookup

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

Table 3: Breakdown of results for each Kamke differential equation

	Mathematica			Maple			
#	solved	cpu	leaf	solved	cpu	leaf	note on solution
Kamke 1	✓	0.424	1117	✓	0.032	1089	Linear first order, To Do
Kamke 2	✓	0.035	34	✓	0.013	25	Linear first order, integrating factor $y'(x) + ay(x) = f(x)$
Kamke 3	✓	0.055	40	✓	0.026	37	Linear first order, integrating factor $y'(x) + ay(x) = f(x)$
Kamke 4	✓	0.013	30	✓	0.004	18	Linear first order, integrating factor $y'(x) + g(x)y(x) = f(x)$
Kamke 5	✓	0.382	39	✓	0.081	21	Linear first order, integrating factor $y'(x) + g(x)y(x) = f(x)$
Kamke 6	✓	0.02	18	✓	0.02	15	Linear first order, integrating factor $y'(x) + g(x)y(x) = f(x)$
Kamke 7	✓	0.033	23	✓	0.007	13	Linear first order, integrating factor $y'(x) + g(x)y(x) = f(x)$
Kamke 8	✓	0.019	17	✓	0.007	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	✓	0.015	19	✓	0.013	14	Linear first order, integrating factor $y'(x) + g(x)y(x) = f(x)$
Kamke 10	✓	0.013	18	✓	0.01	15	Linear first order, integrating factor $y'(x) + g(x)y(x) = f(x)$
Kamke 11	✓	0.019	66	✓	0.018	24	Linear first order, integrating factor $y'(x) + g(x)y(x) = f(x)$
Kamke 12	✓	0.072	34	✓	0.033	8	Non-linear first order, Riccati, separable $y'(x) + y^2(x) = 1$
Kamke 13	✓	0.074	79	✓	0.132	79	Non-linear first order, Riccati, transform to second order Airy ODE using $y = -\frac{u'(x)}{uR(x)}$
Kamke 14	✓	0.085	254	✓	0.072	187	Non-linear first order, Riccati, transform to second order Airy ODE using $y = -\frac{u'(x)}{uR(x)}$
Kamke 15	✓	0.067	25	✓	0.136	35	Non-linear first order, Riccati, transform to separable first order
Kamke 16	✓	0.037	186	✓	0.068	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	✓	0.053	34	✓	0.092	24	Non-linear first order, Riccati, transform to second order standard ODE using $y = -\frac{u'(x)}{uR(x)}$
Kamke 18	✓	0.073	50	✓	0.052	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	✓	0.057	30	✓	0.034	16	Non-linear first order, Riccati, transform to first order separable
Kamke 20	✓	0.074	49	✓	0.05	34	Non-linear first order, Riccati, transform to Bernoulli first order non-linear first order then solve Bernoulli
Kamke 21	✓	0.322	7	✓	0.103	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	✓	0.425	113	✓	0.337	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	✓	0.063	43	✓	0.033	23	Non-linear first order, Riccati, Separable

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 24	✓	0.097	277	✓	0.05	214	Non-linear first order, Riccati, transform to second order Emden-Fowler ODE using $y = -\frac{u'(x)}{uR(x)}$ solution in terms of Bessel functions
Kamke 25	✓	0.306	1835	✓	0.258	348	Non-linear first order, Riccati. To do
Kamke 26	✓	0.182	68	✓	0.057	45	Non-Linear first order, Riccati, transform to second order standard ODE using $y = -\frac{u'(x)}{uR(x)}$
Kamke 27	✓	0.158	24	✓	0.138	72	Non-linear first order, Riccati, transform to Bernoulli first order non-linear first order then solve Bernoulli
Kamke 28	✓	0.102	96	✓	0.073	51	Non-linear first order, Riccati, transform to Bernoulli first order non-linear first order then solve Bernoulli
Kamke 29	✓	0.074	39	✓	0.01	19	Non-linear first order, Bernoulli
Kamke 30	✓	0.154	230	✓	0.06	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	✓	0.13	21	✓	0.036	23	Non-Linear first order, Riccati, separable
Kamke 32	✓	0.315	34	✓	0.224	28	Non-Linear first order, Riccati, has particular solution, solution using $y = y_p + \frac{1}{u}$ leads to first order solved using integrating factor
Kamke 33	✓	0.359	160	✓	0.359	58	Non-Linear first order, Riccati. Complicated algebra, will do later
Kamke 34	✓	0.093	54	✓	0.02	28	Non-Linear first order, Bernoulli. Standard method.
Kamke 35	✓	0.116	61	✓	0.037	35	Non-Linear first order, Riccati. Transform to second order ODE using $y(x) = -\frac{u'(x)}{u(x)R(x)}$
Kamke 36	✓	0.262	195	✓	0.068	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	✓	0.755	78	✓	0.066	50	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 38	✓	0.157	99	✓	0.02	34	Non-Linear first order. smart transformation makes it proper Abel first kind
Kamke 39	✓	0.121	54	✓	0.01	30	To Do
Kamke 40	✓	0.32	185	✓	0.051	48	To Do
Kamke 41	✓	0.163	103	✓	0.181	103	To Do
Kamke 42	✓	0.843	485	✓	0.02	40	To Do
Kamke 43	✓	5.718	490	✓	1.246	373	To Do
Kamke 44	✓	0.074	72	✓	0.014	53	Non-Linear first order Bernoulli. Solved using standard method of solving Bernoulli.
Kamke 45	✓	0.5	133	✓	0.096	123	To Do
Kamke 46	✓	0.254	228	✓	0.075	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	✓	1.542	355	✓	0.151	237	To Do
Kamke 52	✓	0.231	117	✓	0.322	61	To Do
Kamke 53	✓	0.414	96	✓	0.126	281	To Do
Kamke 54	✓	0.317	74	✓	0.129	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	✓	0.053	26	✓	0.062	31	To Do
Kamke 58	✓	0.223	118	✓	0.062	68	To Do
Kamke 59	✓	0.229	96	✓	0.059	26	To Do
Kamke 60	✓	0.116	173	✓	0.013	29	Non-Linear first order, separable.
Kamke 61	✓	0.197	75	✓	0.01	50	To Do
Kamke 62	✓	2.637	44	✓	0.29	34	Non-Linear first order, special transformation makes it exact differential.
Kamke 63	✓	0.19	48	✓	5.093	35	To Do
Kamke 64	✓	0.308	269	✓	0.073	124	To Do
Kamke 65	✓	0.954	312	✓	0.038	47	To Do
Kamke 66	✓	0.166	67	✓	0.087	40	To Do
Kamke 67	✓	0.126	14	✓	0.013	51	To Do
Kamke 68	✓	0.715	373	✓	0.048	77	To Do
Kamke 69	✓	7.756	1163	✓	0.108	111	To Do
Kamke 70	✓	12.691	81	✓	0.124	113	To Do
Kamke 71	✓	2.762	2237	✓	0.095	113	To Do
Kamke 72	✓	0.161	89	✓	0.009	64	To Do
Kamke 73	✓	1.339	733	✓	0.246	91	To Do
Kamke 74	✗	0	0	✗	0	0	To Do
Kamke 75	✓	0.153	20	✓	0.121	20	Non-Linear first order, Separable

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#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 76	✓	0.134	116	✓	0.036	41	Non-Linear first order, Separable, integral requires the tangent half-angle substitution (Weierstrass substitution)
Kamke 77	✓	0.295	124	✓	0.052	54	Non-Linear first order, transform to Separable, becomes same as problem 76 above. Transform back after soluion.
Kamke 78	✓	0.662	1317	✓	0.078	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	✓	0.057	72	✓	0.841	41	To Do
Kamke 81	✓	1.332	220	✓	0.839	78	To Do
Kamke 82	✗	0	0	✗	0	0	To Do
Kamke 83	✓	0.354	69	✓	0.283	44	To Do
Kamke 84	✓	0.185	248	✓	0.032	37	To Do
Kamke 85	✓	0.373	238	✓	0.348	152	To Do
Kamke 86	✓	0.456	184	✓	0.385	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	✓	0.478	2831	✓	0.18	256	Non-Linear first order, Riccati, Solved using $y = -\frac{u'}{uR(x)}$ substitution. Convert to second order Bessel ODE
Kamke 89	✓	0.012	42	✓	0.013	56	Linear first order, separable. Integration tricky. requires tangent half-angle substitution
Kamke 90	✓	0.013	24	✓	0.009	17	Linear first order, separable. integrating factor
Kamke 91	✓	0.011	15	✓	0.006	11	To Do
Kamke 92	✓	0.012	15	✓	0.004	12	Linear first order, separable. integrating factor
Kamke 93	✓	0.03	16	✓	0.011	12	To Do
Kamke 94	✓	0.016	25	✓	0.009	23	Linear first order, separable. integrating factor
Kamke 95	✓	0.065	32	✓	0.05	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	✓	0.066	33	✓	0.029	11	Non-Linear first order, Riccati, but it is separable, so easy to solve by direct integration

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 97	✓	0.101	46	✓	0.032	25	Non-Linear first order, Riccati, smart substitution transfer it to separable first order, so easy to solve by direct integration
Kamke 98	✓	0.164	442	✓	0.045	38	To Do
Kamke 99	✓	0.155	244	✓	0.089	171	To Do
Kamke 100	✓	0.076	157	✓	0.056	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	✓	0.071	18	✓	0.009	16	Non-Linear first order, Bernoulli, standard method of solving Bernoulli
Kamke 102	✓	0.085	36	✓	0.031	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	✓	0.146	90	✓	0.027	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	✓	0.11	43	✓	0.04	63	Non-Linear first order, Riccati, conversion using smart transformation to separable first order
Kamke 105	✓	0.218	473	✓	0.196	844	To Do
Kamke 106	✓	0.197	40	✓	0.038	41	To Do
Kamke 107	✓	0.326	1415	✓	0.194	174	To Do
Kamke 108	✓	0.066	15	✓	0.01	13	Non-Linear first order, Bernoulli, standard method of solving Bernoulli, leads to first order separable
Kamke 109	✓	0.069	17	✓	0.01	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	✓	0.362	55	✓	0.105	54	To Do
Kamke 112	✓	0.098	13	✓	0.03	27	Non-Linear first order, smart transformation $y(x) = xv(x)$ makes it separable
Kamke 113	✓	0.098	16	✓	0.023	33	Non-Linear first order, very similar to 112. Smart transformation $y(x) = xv(x)$ makes it separable
Kamke 114	✓	0.088	12	✓	2.004	28	Non-Linear first order, very similar to 113. Smart transformation $y(x) = xv(x)$ makes it separable
Kamke 115	✓	0.176	221	✓	0.171	49	Non-Linear first order, Smart transformation $y(x) = xv(x)$ makes it separable
Kamke 116	✓	0.35	121	✓	0.174	86	To Do
Kamke 117	✓	0.152	21	✓	0.089	20	To Do
Kamke 118	✓	0.063	13	✓	0.046	8	To Do
Kamke 119	✓	0.087	17	✓	0.05	14	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 120	✓	0.096	20	✓	0.143	17	To Do
Kamke 121	✗	0	0	✗	0	0	To Do
Kamke 122	✓	0.274	21	✓	0.296	16	To Do
Kamke 123	✓	0.105	19	✓	0.043	44	To Do
Kamke 124	✓	0.088	16	✓	0.023	12	To Do
Kamke 125	✓	0.182	16	✓	0.05	14	To Do
Kamke 126	✓	0.158	115	✓	0.018	29	To Do
Kamke 127	✓	0.238	186	✓	0.086	39	To Do
Kamke 128	✓	3.149	41	✓	0.21	33	To Do
Kamke 129	✓	0.174	44	✓	0.023	33	To Do
Kamke 130	✓	0.008	21	✓	0.006	15	To Do
Kamke 131	✓	0.173	21	✓	0.155	31	To Do
Kamke 132	✓	0.077	115	✓	0.025	153	To Do
Kamke 133	✓	0.008	27	✓	0.008	16	To Do
Kamke 134	✓	0.017	27	✓	0.007	17	To Do
Kamke 135	✓	0.008	14	✓	0.004	11	To Do
Kamke 136	✓	0.069	28	✓	0.014	18	To Do
Kamke 137	✓	0.065	16	✓	0.012	14	To Do
Kamke 138	✓	0.061	13	✓	0.026	11	To Do
Kamke 139	✓	0.203	821	✓	0.11	219	To Do
Kamke 140	✓	0.076	17	✓	0.034	20	To Do
Kamke 141	✓	0.122	67	✓	0.046	51	To Do
Kamke 142	✓	0.177	122	✓	0.065	52	To Do

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#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 143	✓	0.089	51	✓	0.04	41	To Do
Kamke 144	✓	0.22	1787	✓	0.086	219	To Do
Kamke 145	✓	0.476	267	✓	0.085	117	To Do
Kamke 146	✓	0.65	78	✓	0.118	84	To Do
Kamke 147	✓	0.648	343	✓	0.164	178	To Do
Kamke 148	✓	0.012	30	✓	0.008	16	To Do
Kamke 149	✓	0.012	27	✓	0.007	20	To Do
Kamke 150	✓	0.01	30	✓	0.005	23	To Do
Kamke 151	✓	0.476	203	✓	0.039	85	To Do
Kamke 152	✓	0.364	40	✓	0.55	25	To Do
Kamke 153	✓	0.012	21	✓	0.011	20	To Do
Kamke 154	✓	0.013	26	✓	0.007	16	To Do
Kamke 155	✓	0.124	46	✓	0.075	14	To Do
Kamke 156	✓	0.078	21	✓	0.013	20	To Do
Kamke 157	✓	0.184	158	✓	0.178	231	To Do
Kamke 158	✓	0.14	31	✓	0.011	22	To Do
Kamke 159	✓	0.096	22	✓	0.11	13	To Do
Kamke 160	✓	0.137	27	✓	0.022	21	To Do
Kamke 161	✓	0.014	53	✓	0.01	27	To Do
Kamke 162	✓	0.426	133	✓	0.151	58	To Do
Kamke 163	✓	0.094	43	✓	0.033	26	To Do
Kamke 164	✓	0.129	131	✓	0.151	102	To Do
Kamke 165	✓	0.111	22	✓	0.017	17	To Do

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#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 166	✓	0.141	71	✓	0.118	97	To Do
Kamke 167	✓	0.075	35	✓	0.026	20	To Do
Kamke 168	✓	0.173	234	✓	0.126	140	To Do
Kamke 169	✓	1.895	149	✓	0.119	153	To Do
Kamke 170	✓	0.073	43	✓	0.013	23	To Do
Kamke 171	✓	0.065	17	✓	0.007	15	To Do
Kamke 172	✓	0.076	35	✓	0.205	26	To Do
Kamke 173	✓	0.093	29	✓	0.033	27	To Do
Kamke 174	✓	0.008	17	✓	0.003	13	To Do
Kamke 175	✓	0.019	24	✓	0.014	20	To Do
Kamke 176	✓	0.187	82	✓	0.075	30	To Do
Kamke 177	✓	0.103	22	✓	0.019	17	To Do
Kamke 178	✓	0.149	49	✓	0.144	61	To Do
Kamke 179	✓	0.591	2833	✓	0.11	112	To Do
Kamke 180	✓	0.316	132	✓	0.047	58	To Do
Kamke 181	✓	0.091	347	✓	0.056	28	To Do
Kamke 182	✓	0.204	96	✓	0.102	18	To Do
Kamke 183	✓	0.014	22	✓	0.009	18	To Do
Kamke 184	✓	1.15	704	✓	0.302	493	To Do
Kamke 185	✓	0.372	123	✓	0.03	63	To Do
Kamke 186	✓	0.209	19	✓	0.032	17	To Do
Kamke 187	✓	0.2	328	✓	0.053	60	To Do
Kamke 188	✗	0	0	✓	0.018	32	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 189	✓	0.384	91	✓	0.271	60	To Do
Kamke 190	✓	0.122	173	✓	0.006	29	To Do
Kamke 191	✓	0.114	39	✓	0.013	16	To Do
Kamke 192	✓	0.691	168	✓	0.015	36	To Do
Kamke 193	✓	0.014	16	✓	0.006	14	To Do
Kamke 194	✓	0.166	98	✓	0.017	23	To Do
Kamke 195	✓	0.151	27	✓	0.089	28	To Do
Kamke 196	✓	0.204	53	✓	0.103	29	To Do
Kamke 197	✓	0.108	98	✓	0.079	237	To Do
Kamke 198	✓	0.021	15	✓	0.01	13	To Do
Kamke 199	✓	0.196	15	✓	0.142	102	To Do
Kamke 200	✓	0.107	77	✓	0.044	53	To Do
Kamke 201	✓	0.134	39	✓	0.034	23	To Do
Kamke 202	✗	0	0	✗	0	0	To Do
Kamke 203	✗	0	0	✗	0	0	To Do
Kamke 204	✓	0.071	70	✓	0.228	92	To Do
Kamke 205	✗	0	0	✗	0	0	To Do
Kamke 206	✗	0	0	✗	0	0	To Do
Kamke 207	✓	0.082	47	✓	0.016	37	To Do
Kamke 208	✓	0.192	118	✓	0.049	106	To Do
Kamke 209	✓	0.097	84	✓	0.009	21	To Do
Kamke 210	✓	0.077	47	✓	0.014	33	To Do
Kamke 211	✓	0.206	41	✓	0.027	31	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 212	✓	0.364	95	✓	0.095	30	To Do
Kamke 213	✓	0.097	71	✓	0.552	66	To Do
Kamke 214	✓	0.104	78	✓	0.139	48	To Do
Kamke 215	✓	0.106	80	✓	0.162	51	To Do
Kamke 216	✓	0.093	82	✓	0.153	51	To Do
Kamke 217	✓	0.016	29	✓	0.024	23	To Do
Kamke 218	✓	0.067	257	✓	0.162	57	To Do
Kamke 219	✗	0	0	✗	0	0	To Do
Kamke 220	✓	0.069	57	✓	0.017	43	To Do
Kamke 221	✓	0.016	35	✓	0.039	21	To Do
Kamke 222	✓	0.05	65	✓	0.052	32	To Do
Kamke 223	✓	0.019	55	✓	0.139	51	To Do
Kamke 224	✓	0.015	29	✓	0.041	35	To Do
Kamke 225	✓	0.015	33	✓	0.036	20	To Do
Kamke 226	✓	0.015	35	✓	0.034	21	To Do
Kamke 227	✓	0.012	107	✓	0.15	33	To Do
Kamke 228	✓	0.251	3357	✓	0.336	271	To Do
Kamke 229	✓	0.015	121	✓	0.152	32	To Do
Kamke 230	✓	0.157	98	✓	0.031	100	To Do
Kamke 231	✓	1.92	252	✓	0.194	178	To Do
Kamke 232	✓	0.068	56	✓	0.013	39	To Do
Kamke 233	✓	0.137	38	✓	0.018	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	✓	0.056	40	✓	0.037	30	To Do
Kamke 236	✓	0.115	114	✓	0.047	141	To Do
Kamke 237	✗	0	0	✗	0	0	To Do
Kamke 238	✓	0.237	192	✓	0.056	93	To Do
Kamke 239	✓	0.098	54	✓	0.149	59	To Do
Kamke 240	✓	0.096	41	✓	0.017	34	To Do
Kamke 241	✓	0.084	41	✓	0.01	33	To Do
Kamke 242	✓	0.071	60	✓	0.01	39	To Do
Kamke 243	✓	11.189	487	✓	0.109	391	To Do
Kamke 244	✓	11.123	484	✓	0.094	391	To Do
Kamke 245	✓	0.424	1453	✓	3.007	31	To Do
Kamke 246	✓	0.123	80	✓	0.05	63	To Do
Kamke 247	✓	11.192	693	✓	0.194	517	To Do
Kamke 248	✓	0.173	106	✓	0.015	75	To Do
Kamke 249	✓	3.527	115	✓	0.171	202	To Do
Kamke 250	✗	0	0	✗	0	0	To Do
Kamke 251	✓	0.12	60	✓	0.013	51	To Do
Kamke 252	✓	10.983	819	✓	0.636	1338	To Do
Kamke 253	✗	0	0	✗	0	0	To Do
Kamke 254	✓	0.124	99	✓	0.021	59	To Do
Kamke 255	✓	3.21	30	✓	0.19	74	To Do
Kamke 256	✓	0.018	21	✓	0.039	31	To Do
Kamke 257	✓	0.37	39	✓	0.079	98	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 258	✓	0.11	43	✓	0.016	33	To Do
Kamke 259	✓	0.23	50	✓	0.019	51	To Do
Kamke 260	✓	0.118	80	✓	0.023	59	To Do
Kamke 261	✓	0.762	32	✓	0.098	18	To Do
Kamke 262	✓	0.173	101	✓	0.243	65	To Do
Kamke 263	✓	0.09	181	✓	0.106	173	To Do
Kamke 264	✓	0.38	680	✓	0.753	574	To Do
Kamke 265	✗	0	0	✗	0	0	To Do
Kamke 266	✗	0	0	✓	1.374	65	To Do
Kamke 267	✓	0.282	36	✓	0.021	32	To Do
Kamke 268	✓	0.165	146	✓	0.044	118	To Do
Kamke 269	✗	0	0	✗	0	0	To Do
Kamke 270	✓	0.124	327	✓	0.02	319	To Do
Kamke 271	✓	0.174	370	✓	0.163	352	To Do
Kamke 272	✓	0.12	42	✓	0.125	43	To Do
Kamke 273	✓	0.174	297	✓	0.019	401	To Do
Kamke 274	✓	0.174	411	✓	0.029	657	To Do
Kamke 275	✓	0.118	18	✓	0.062	30	To Do
Kamke 276	✓	0.14	61	✓	0.046	47	To Do
Kamke 277	✓	0.11	53	✓	0.286	41	To Do
Kamke 278	✓	0.178	39	✓	0.04	28	To Do
Kamke 279	✓	0.604	107	✓	0.127	116	To Do
Kamke 280	✓	0.13	21	✓	0.041	24	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 281	✓	0.186	75	✓	0.051	55	To Do
Kamke 282	✓	0.21	2129	✓	0.263	71	To Do
Kamke 283	✓	0.338	477	✓	0.056	407	To Do
Kamke 284	✓	0.108	59	✓	0.129	21	To Do
Kamke 285	✓	0.175	402	✓	0.059	432	To Do
Kamke 286	✓	0.243	3501	✓	1.18	1337	To Do
Kamke 287	✓	1.492	77	✓	0.052	56	To Do
Kamke 288	✓	0.227	534	✓	0.026	579	To Do
Kamke 289	✓	0.178	115	✓	0.026	115	To Do
Kamke 290	✓	0.446	831	✓	0.082	1388	To Do
Kamke 291	✓	0.842	39	✓	0.121	50	To Do
Kamke 292	✓	36.246	1716	✓	0.032	115	To Do
Kamke 293	✓	0.163	661	✓	0.284	35	To Do
Kamke 294	✓	0.232	71	✓	0.066	112	To Do
Kamke 295	✓	0.207	31	✓	0.149	29	To Do
Kamke 296	✓	0.47	102	✓	0.59	135	To Do
Kamke 297	✓	0.141	216	✓	0.313	29	To Do
Kamke 298	✓	0.083	72	✓	0.014	73	To Do
Kamke 299	✓	0.107	371	✓	0.174	276	To Do
Kamke 300	✓	0.08	99	✓	0.014	83	To Do
Kamke 301	✓	0.13	64	✓	0.183	25	To Do
Kamke 302	✓	0.092	70	✓	0.104	133	To Do
Kamke 303	✓	0.114	25	✓	0.138	34	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 304	✓	0.333	44	✓	0.214	44	To Do
Kamke 305	✓	0.18	1277	✓	0.017	21	To Do
Kamke 306	✓	0.114	201	✓	0.299	231	To Do
Kamke 307	✓	0.229	149	✓	0.032	125	To Do
Kamke 308	✓	0.008	55	✓	0.009	37	To Do
Kamke 309	✓	0.099	151	✓	0.026	113	To Do
Kamke 310	✓	0.166	159	✓	0.088	125	To Do
Kamke 311	✓	0.224	2201	✓	0.067	50	To Do
Kamke 312	✓	0.617	204	✓	1.136	240	To Do
Kamke 313	✓	0.32	537	✓	0.155	748	To Do
Kamke 314	✓	0.147	188	✓	0.036	158	To Do
Kamke 315	✓	0.18	368	✓	0.075	376	To Do
Kamke 316	✓	0.125	48	✓	0.038	53	To Do
Kamke 317	✓	0.323	23	✓	0.104	29	To Do
Kamke 318	✓	0.227	4284	✓	0.016	28	To Do
Kamke 319	✓	0.143	302	✓	0.023	35	To Do
Kamke 320	✓	0.111	76	✓	0.07	78	To Do
Kamke 321	✓	0.327	47	✓	0.13	42	To Do
Kamke 322	✓	0.274	2077	✓	0.02	29	To Do
Kamke 323	✓	0.25	463	✓	0.092	630	To Do
Kamke 324	✓	0.115	723	✓	0.099	815	To Do
Kamke 325	✓	0.19	139	✓	0.469	124	To Do
Kamke 326	✓	3.015	13289	✓	0.388	160	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 327	✓	0.33	669	✓	0.123	583	To Do
Kamke 328	✓	0.235	42	✓	0.145	33	To Do
Kamke 329	✓	0.671	102	✓	0.269	71	To Do
Kamke 330	✓	0.102	52	✓	0.024	22	To Do
Kamke 331	✗	0	0	✗	0	0	To Do
Kamke 332	✓	0.207	34	✓	0.011	33	To Do
Kamke 333	✓	0.311	72	✓	0.073	32	To Do
Kamke 334	✓	0.099	39	✓	0.021	19	To Do
Kamke 335	✓	0.196	75	✓	0.008	50	To Do
Kamke 336	✓	0.257	53	✓	0.024	41	To Do
Kamke 337	✓	0.225	161	✓	0.054	28	To Do
Kamke 338	✓	62.98	17681	✓	0.517	129	To Do
Kamke 339	✓	0.338	27	✓	0.134	27	To Do
Kamke 340	✗	0	0	✗	0	0	To Do
Kamke 341	✓	0.228	33	✓	0.049	33	To Do
Kamke 342	✓	0.443	163	✓	0.032	17	To Do
Kamke 343	✓	0.131	35	✓	0.049	27	To Do
Kamke 344	✓	0.189	23	✓	0.023	19	To Do
Kamke 345	✓	0.165	35	✓	0.056	36	To Do
Kamke 346	✓	0.359	24	✓	0.204	19	To Do
Kamke 347	✓	0.287	32	✓	0.132	16	To Do
Kamke 348	✓	0.179	17	✓	0.072	15	To Do
Kamke 349	✓	0.224	15	✓	0.026	17	To Do

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#	Mathematica			Maple			note on solution
	solved	cpu	leaf	solved	cpu	leaf	
Kamke 350	✓	0.548	53	✓	0.677	226	To Do
Kamke 351	✓	0.469	61	✓	0.333	55	To Do
Kamke 352	✓	0.527	43	✓	0.35	33	To Do
Kamke 353	✓	0.075	14	✓	0.066	12	To Do
Kamke 354	✓	0.134	145	✓	0.05	108	To Do
Kamke 355	✓	0.16	17	✓	0.069	15	To Do
Kamke 356	✓	0.227	21	✓	0.084	19	To Do
Kamke 357	✓	0.504	35	✓	0.378	13	To Do
Kamke 358	✓	0.144	29	✓	0.076	11	To Do
Kamke 359	✓	0.3	45	✓	0.046	28	To Do
Kamke 360	✓	4.334	369	✓	0.25	48	To Do
Kamke 361	✓	0.632	31	✓	0.165	22	To Do
Kamke 362	✓	0.356	23	✓	0.184	23	To Do
Kamke 363	✓	0.335	33	✓	0.063	35	To Do
Kamke 364	✓	0.456	31	✓	0.076	23	To Do
Kamke 365	✓	0.347	156	✓	0.261	42	To Do
Kamke 366	✓	0.269	91	✓	0.066	45	To Do
Kamke 367	✗	0	0	✗	0	0	To Do
Kamke 368	✓	1.377	795	✗	0	0	To Do
Kamke 369	✓	0.058	107	✓	0.098	68	To Do
Kamke 370	✗	0	0	✗	0	0	To Do
Kamke 371	✓	0.04	37	✓	0.059	20	To Do
Kamke 372	✓	0.003	27	✓	0.04	232	To Do

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#	Mathematica			Maple			note on solution
	solved	cpu	leaf	solved	cpu	leaf	
Kamke 373	✓	0.181	185	✓	0.183	49	To Do
Kamke 374	✓	0.068	73	✓	0.023	85	To Do
Kamke 375	✓	0.031	71	✓	0.018	49	To Do
Kamke 376	✓	0.23	110	✓	0.524	219	To Do
Kamke 377	✓	0.003	19	✓	0.013	24	To Do
Kamke 378	✓	0.003	18	✓	0.013	20	To Do
Kamke 379	✓	0.003	18	✓	0.013	22	To Do
Kamke 380	✓	0.379	1757	✓	0.032	619	To Do
Kamke 381	✓	0.381	1757	✓	0.024	579	To Do
Kamke 382	✓	0.177	201	✓	0.025	146	To Do
Kamke 383	✓	5.475	1118	✗	0	0	To Do
Kamke 384	✓	1.324	183	✓	0.018	50	To Do
Kamke 385	✓	0.683	6217	✓	0.576	169	To Do
Kamke 386	✓	0.154	119	✓	0.769	27	To Do
Kamke 387	✓	1.186	190	✓	1.402	115	To Do
Kamke 388	✓	0.493	53	✓	0.162	223	To Do
Kamke 389	✓	0.059	57	✓	2.641	71	To Do
Kamke 390	✓	1.481	142	✓	1.32	281	To Do
Kamke 391	✓	0.007	29	✓	0.052	22	To Do
Kamke 392	✓	0.194	27	✓	2.165	50	To Do
Kamke 393	✓	0.085	31	✓	0.246	77	To Do
Kamke 394	✗	0	0	✓	6.714	109	To Do
Kamke 395	✗	0	0	✗	0	0	To Do

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#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 396	✓	0.045	29	✓	0.031	20	To Do
Kamke 397	✓	0.419	143	✓	0.824	128	To Do
Kamke 398	✓	1.502	258	✓	2.255	138	To Do
Kamke 399	✓	0.003	20	✓	0.013	22	To Do
Kamke 400	✓	0.259	135	✓	0.332	74	To Do
Kamke 401	✓	0.308	1093	✓	0.112	580	To Do
Kamke 402	✓	5.291	1211	✓	0.199	101	To Do
Kamke 403	✓	0.228	116	✓	3.888	197	To Do
Kamke 404	✓	2.705	795	✓	0.503	389	To Do
Kamke 405	✓	0.845	53	✓	0.507	378	To Do
Kamke 406	✓	0.627	49	✓	0.193	262	To Do
Kamke 407	✓	0.021	51	✓	0.042	39	To Do
Kamke 408	✓	0.151	97	✓	0.102	73	To Do
Kamke 409	✓	30.571	66	✓	0.179	63	To Do
Kamke 410	✓	31.234	80	✓	0.186	64	To Do
Kamke 411	✓	0.141	99	✓	0.117	65	To Do
Kamke 412	✓	0.409	3229	✓	0.161	146	To Do
Kamke 413	✗	0	0	✓	0.262	269	To Do
Kamke 414	✓	0.075	107	✓	0.273	269	To Do
Kamke 415	✓	0.308	25	✓	0.447	95	To Do
Kamke 416	✓	1.272	383	✓	0.134	136	To Do
Kamke 417	✓	0.356	48	✓	0.023	35	To Do
Kamke 418	✓	0.679	220	✓	0.072	42	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 419	✓	1.056	9073	✓	0.048	109	To Do
Kamke 420	✓	0.296	777	✓	0.182	689	To Do
Kamke 421	✓	0.038	27	✓	0.047	32	To Do
Kamke 422	✓	0.054	81	✓	0.049	30	To Do
Kamke 423	✓	0.063	59	✓	0.053	44	To Do
Kamke 424	✓	0.49	223	✓	0.285	193	To Do
Kamke 425	✓	0.192	59	✓	0.029	45	To Do
Kamke 426	✓	0.425	40	✓	0.029	51	To Do
Kamke 427	✗	0	0	✓	0.035	60	To Do
Kamke 428	✗	0	0	✓	0.07	66	To Do
Kamke 429	✓	0.032	26	✓	0.067	72	To Do
Kamke 430	✓	245.198	478	✓	1.983	1602	To Do
Kamke 431	✓	0.046	81	✓	0.296	62	To Do
Kamke 432	✓	1.151	64	✓	7.73	242	To Do
Kamke 433	✓	1.33	22	✓	0.343	34	To Do
Kamke 434	✓	0.038	27	✓	0.025	7	To Do
Kamke 435	✓	0.059	61	✓	0.54	22	To Do
Kamke 436	✓	0.055	26	✓	4.319	61	To Do
Kamke 437	✓	0.333	47	✓	0.089	36	To Do
Kamke 438	✓	0.011	21	✓	0.031	17	To Do
Kamke 439	✓	0.037	49	✓	0.119	33	To Do
Kamke 440	✓	0.01	19	✓	0.027	15	To Do
Kamke 441	✓	0.079	65	✓	5.179	83	To Do

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#	Mathematica			Maple			note on solution
	solved	cpu	leaf	solved	cpu	leaf	
Kamke 442	✓	0.014	28	✓	0.032	21	To Do
Kamke 443	✓	2.749	10121	✓	7.904	221	To Do
Kamke 444	✓	0.411	75	✓	4.934	120	To Do
Kamke 445	✓	0.052	49	✓	0.032	35	To Do
Kamke 446	✓	0.334	95	✓	0.037	57	To Do
Kamke 447	✓	0.009	89	✓	0.082	33	To Do
Kamke 448	✓	0.095	349	✓	300.181	166	To Do
Kamke 449	✓	0.014	27	✓	0.03	23	To Do
Kamke 450	✓	0.316	26	✓	0.676	51	To Do
Kamke 451	✗	0	0	✓	0.124	78	To Do
Kamke 452	✓	0.017	23	✓	1.358	37	To Do
Kamke 453	✓	0.583	327	✓	2.691	229	To Do
Kamke 454	✓	0.269	241	✓	0.26	106	To Do
Kamke 455	✓	0.969	123	✓	0.612	66	To Do
Kamke 456	✓	0.124	421	✓	0.72	33	To Do
Kamke 457	✓	0.252	118	✓	3.371	45	To Do
Kamke 458	✓	0.022	120	✓	0.123	90	To Do
Kamke 459	✓	2.772	271	✓	0.932	65	To Do
Kamke 460	✗	0	0	✗	0	0	To Do
Kamke 461	✗	0	0	✗	0	0	To Do
Kamke 462	✓	0.02	43	✓	0.058	27	To Do
Kamke 463	✓	0.031	47	✓	0.185	50	To Do
Kamke 464	✓	0.087	52	✓	1.424	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	✓	0.147	210	To Do
Kamke 466	✓	1.876	433	✓	1.201	71	To Do
Kamke 467	✓	0.246	226	✓	0.125	148	To Do
Kamke 468	✓	3.57	609	✓	0.146	181	To Do
Kamke 469	✓	0.278	157	✓	0.25	264	To Do
Kamke 470	✓	0.239	143	✓	0.661	87	To Do
Kamke 471	✓	0.008	47	✓	0.033	33	To Do
Kamke 472	✓	0.393	269	✓	1.371	121	To Do
Kamke 473	✓	0.267	165	✓	1.901	71	To Do
Kamke 474	✓	0.163	135	✓	1.726	152	To Do
Kamke 475	✓	0.096	57	✓	1.397	67	To Do
Kamke 476	✓	0.247	143	✓	0.634	87	To Do
Kamke 477	✓	0.214	146	✓	0.629	622	To Do
Kamke 478	✓	0.322	223	✓	0.348	88	To Do
Kamke 479	✓	9.049	552	✓	0.234	929	To Do
Kamke 480	✗	0	0	✗	0	0	To Do
Kamke 481	✓	0.012	49	✓	0.033	35	To Do
Kamke 482	✗	0	0	✗	0	0	To Do
Kamke 483	✓	0.177	71	✓	0.069	103	To Do
Kamke 484	✓	0.142	81	✓	0.052	115	To Do
Kamke 485	✗	0	0	✗	0	0	To Do
Kamke 486	✓	0.049	117	✓	0.228	54	To Do
Kamke 487	✓	0.286	157	✓	0.548	100	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 488	✓	0.29	85	✓	0.626	111	To Do
Kamke 489	✗	0	0	✓	2.747	551	To Do
Kamke 490	✓	0.421	70	✓	0.625	145	To Do
Kamke 491	✓	0.722	79	✓	0.925	195	To Do
Kamke 492	✓	0.08	97	✓	1.684	122	To Do
Kamke 493	✓	7.377	553	✓	1.194	111	To Do
Kamke 494	✓	0.113	49	✓	0.237	161	To Do
Kamke 495	✓	0.154	83	✓	2.276	61	To Do
Kamke 496	✓	19.584	17831	✓	0.464	130	To Do
Kamke 497	✓	0.144	76	✓	0.787	203	To Do
Kamke 498	✓	0.078	107	✓	1.002	99	To Do
Kamke 499	✓	0.383	212	✓	0.253	189	To Do
Kamke 500	✓	0.889	100	✓	1.02	220	To Do
Kamke 501	✓	21.821	913	✓	5.392	215	To Do
Kamke 502	✓	1.197	100	✓	0.69	195	To Do
Kamke 503	✗	0	0	✗	0	0	To Do
Kamke 504	✓	0.332	51	✓	1.107	247	To Do
Kamke 505	✓	0.079	73	✓	0.042	52	To Do
Kamke 506	✗	0	0	✗	0	0	To Do
Kamke 507	✗	0	0	✗	0	0	To Do
Kamke 508	✓	2.03	88	✓	1.753	60	To Do
Kamke 509	✓	0.276	34	✓	1.148	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	✓	1.44	229	✓	3.776	199	To Do
Kamke 512	✓	5.926	713	✓	4.408	137	To Do
Kamke 513	✓	0.075	81	✓	3.5	1138	To Do
Kamke 514	✓	9.975	605	✓	0.257	87	To Do
Kamke 515	✓	2.04	1922	✓	0.943	113	To Do
Kamke 516	✓	0.478	253	✓	0.822	70	To Do
Kamke 517	✓	0.493	283	✓	0.842	78	To Do
Kamke 518	✓	0.517	236	✓	0.156	126	To Do
Kamke 519	✓	0.615	353	✓	0.342	197	To Do
Kamke 520	✓	187.208	1590	✓	0.115	245	To Do
Kamke 521	✓	0.003	14	✓	0.02	33	To Do
Kamke 522	✓	0.004	20	✓	0.029	44	To Do
Kamke 523	✓	145.521	392	✓	0.037	231	To Do
Kamke 524	✗	0	0	✓	0.045	261	To Do
Kamke 525	✓	0.074	135	✓	0.035	122	To Do
Kamke 526	✓	0.048	45	✓	0.012	32	To Do
Kamke 527	✓	0.015	20	✓	0.518	43	To Do
Kamke 528	✓	0.624	398	✓	0.068	86	To Do
Kamke 529	✓	39.37	1758	✓	0.037	1251	To Do
Kamke 530	✓	7.976	648	✓	0.086	432	To Do
Kamke 531	✗	0	0	✗	0	0	To Do
Kamke 532	✗	0	0	✓	0.101	848	To Do
Kamke 533	✓	0.016	40	✓	0.025	76	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 534	✓	0.05	114	✓	0.049	84	To Do
Kamke 535	✓	0.036	49	✓	0.036	51	To Do
Kamke 536	✓	0.012	64	✓	0.029	52	To Do
Kamke 537	✗	0	0	✓	3.105	250	To Do
Kamke 538	✓	9.067	110	✓	0.82	1625	To Do
Kamke 539	✓	0.023	45	✓	0.034	32	To Do
Kamke 540	✓	0.031	69	✓	0.052	109	To Do
Kamke 541	✓	0.029	39	✓	0.404	103	To Do
Kamke 542	✓	0.029	20	✓	0.385	107	To Do
Kamke 543	✓	0.024	55	✓	1.089	277	To Do
Kamke 544	✓	0.073	22	✓	0.697	4201	To Do
Kamke 545	✓	0.665	323	✓	0.122	144	To Do
Kamke 546	✓	0.029	113	✓	0.094	171	To Do
Kamke 547	✓	2.446	490	✓	0.192	118	To Do
Kamke 548	✓	0.969	479	✓	0.226	250	To Do
Kamke 549	✓	0.257	216	✓	0.348	553	To Do
Kamke 550	✓	0.73	488	✓	0.221	60	To Do
Kamke 551	✓	0.113	86	✓	0.309	55	To Do
Kamke 552	✓	0.031	41	✓	0.059	43	To Do
Kamke 553	✓	0.256	52	✓	0.042	36	To Do
Kamke 554	✓	0.097	49	✓	0.309	32	To Do
Kamke 555	✓	0.311	119	✓	0.019	15	To Do
Kamke 556	✓	4.464	60	✓	0.141	581	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 557	✓	0.024	39	✓	0.091	74	To Do
Kamke 558	✓	0.561	327	✓	0.112	223	To Do
Kamke 559	✓	0.379	212	✓	0.203	215	To Do
Kamke 560	✓	13.956	110	✓	0.722	1120	To Do
Kamke 561	✓	1.817	2138	✓	1.358	50	To Do
Kamke 562	✗	0	0	✓	0.12	3306	To Do
Kamke 563	✓	0.136	59	✓	0.129	66	To Do
Kamke 564	✓	0.053	28	✓	0.018	32	To Do
Kamke 565	✓	0.017	25	✓	0.102	17	To Do
Kamke 566	✓	0.031	31	✓	0.023	16	To Do
Kamke 567	✓	0.042	42	✓	0.029	18	To Do
Kamke 568	✓	0.052	28	✓	0.046	32	To Do
Kamke 569	✓	0.093	59	✓	0.306	147	To Do
Kamke 570	✓	1.423	51	✓	0.04	30	To Do
Kamke 571	✓	0.087	116	✓	0.418	169	To Do
Kamke 572	✗	0	0	✗	0	0	To Do
Kamke 573	✓	0.016	42	✓	0.097	24	To Do
Kamke 574	✓	0.024	102	✓	0.096	41	To Do
Kamke 575	✗	0	0	✗	0	0	To Do
Kamke 576	✗	0	0	✗	0	0	To Do
Kamke 577	✓	0.243	243	✓	0.025	28	To Do
Kamke 578	✓	0.158	100	✓	0.032	22	To Do
Kamke 579	✓	0.24	514	✓	0.035	35	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 580	✓	0.245	203	✓	0.045	31	To Do
Kamke 581	✓	0.232	144	✓	0.075	32	To Do
Kamke 582	✓	0.248	142	✓	0.181	30	To Do
Kamke 583	✓	0.211	126	✓	0.102	31	To Do
Kamke 584	✓	0.273	115	✓	0.047	35	To Do
Kamke 585	✓	0.21	205	✓	0.344	120	To Do
Kamke 586	✓	0.564	975	✓	0.197	39	To Do
Kamke 587	✓	0.223	123	✓	0.098	29	To Do
Kamke 588	✓	0.2	113	✓	0.089	53	To Do
Kamke 589	✓	0.228	245	✓	0.107	38	To Do
Kamke 590	✓	0.228	94	✓	0.105	28	To Do
Kamke 591	✓	0.471	253	✓	0.141	108	To Do
Kamke 592	✓	0.518	241	✓	0.138	33	To Do
Kamke 593	✓	0.36	221	✓	0.247	35	To Do
Kamke 594	✓	0.34	236	✓	0.099	67	To Do
Kamke 595	✓	0.306	204	✓	0.098	72	To Do
Kamke 596	✓	0.25	156	✓	0.072	26	To Do
Kamke 597	✓	0.38	130	✓	0.333	37	To Do
Kamke 598	✓	0.169	37	✓	0.016	29	To Do
Kamke 599	✓	0.154	95	✓	0.07	57	To Do
Kamke 600	✓	0.262	246	✓	0.108	38	To Do
Kamke 601	✓	0.241	190	✓	0.098	61	To Do
Kamke 602	✓	0.524	167	✓	0.099	33	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 603	✓	0.312	117	✓	0.108	27	To Do
Kamke 604	✓	0.388	143	✓	0.109	30	To Do
Kamke 605	✓	0.449	145	✓	0.158	29	To Do
Kamke 606	✓	0.538	361	✓	0.602	34	To Do
Kamke 607	✓	0.216	121	✓	0.075	22	To Do
Kamke 608	✓	0.414	274	✓	0.112	40	To Do
Kamke 609	✓	0.257	117	✓	0.121	22	To Do
Kamke 610	✓	0.089	25	✓	0.01	20	To Do
Kamke 611	✓	0.259	191	✓	0.065	28	To Do
Kamke 612	✓	0.331	199	✓	0.101	27	To Do
Kamke 613	✓	0.281	226	✓	0.078	23	To Do
Kamke 614	✓	0.358	177	✓	0.332	60	To Do
Kamke 615	✓	0.27	77	✓	0.148	26	To Do
Kamke 616	✓	0.457	177	✓	0.069	26	To Do
Kamke 617	✓	0.969	615	✓	0.207	47	To Do
Kamke 618	✓	0.249	25	✓	0.32	34	To Do
Kamke 619	✓	0.651	330	✓	0.323	81	To Do
Kamke 620	✓	0.759	210	✓	0.143	37	To Do
Kamke 621	✓	0.056	445	✓	0.237	59	To Do
Kamke 622	✓	0.27	140	✓	0.181	77	To Do
Kamke 623	✓	0.143	77	✓	0.227	49	To Do
Kamke 624	✓	28.927	9837	✓	1.898	46	To Do
Kamke 625	✓	0.295	56	✓	0.161	55	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 626	✓	0.152	88	✓	0.264	115	To Do
Kamke 627	✓	0.811	25	✓	0.153	35	To Do
Kamke 628	✓	0.154	38	✓	0.158	23	To Do
Kamke 629	✓	0.838	47	✓	0.152	62	To Do
Kamke 630	✓	0.37	101	✓	0.247	98	To Do
Kamke 631	✓	0.174	38	✓	0.174	23	To Do
Kamke 632	✓	0.146	65	✓	0.214	54	To Do
Kamke 633	✓	0.159	85	✓	0.76	52	To Do
Kamke 634	✓	0.201	33	✓	0.175	26	To Do
Kamke 635	✓	0.172	33	✓	0.143	22	To Do
Kamke 636	✓	0.1	24	✓	0.138	19	To Do
Kamke 637	✓	11.739	59	✓	0.136	84	To Do
Kamke 638	✗	0	0	✓	0.138	35	To Do
Kamke 639	✗	0	0	✓	0.185	48	To Do
Kamke 640	✗	0	0	✓	0.27	47	To Do
Kamke 641	✓	0.201	35	✓	0.159	26	To Do
Kamke 642	✓	0.164	105	✓	0.259	286	To Do
Kamke 643	✓	0.174	31	✓	0.143	22	To Do
Kamke 644	✓	0.347	34	✓	0.324	27	To Do
Kamke 645	✓	0.082	20	✓	0.07	14	To Do
Kamke 646	✓	0.288	35	✓	0.198	23	To Do
Kamke 647	✓	0.363	115	✓	0.207	460	To Do
Kamke 648	✓	0.53	128	✓	0.47	41	To Do

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#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 649	✓	0.255	37	✓	0.158	27	To Do
Kamke 650	✓	0.397	109	✓	0.182	28	To Do
Kamke 651	✓	0.1	16	✓	0.047	13	To Do
Kamke 652	✓	1.243	101	✓	0.146	27	To Do
Kamke 653	✓	0.51	94	✓	0.132	24	To Do
Kamke 654	✓	0.307	37	✓	0.182	23	To Do
Kamke 655	✓	15.253	82	✓	0.509	66	To Do
Kamke 656	✓	0.098	20	✓	0.048	15	To Do
Kamke 657	✓	0.248	37	✓	0.155	26	To Do
Kamke 658	✓	0.419	41	✓	0.232	28	To Do
Kamke 659	✓	0.689	164	✓	0.168	41	To Do
Kamke 660	✓	0.431	109	✓	0.169	29	To Do
Kamke 661	✓	0.685	164	✓	0.15	39	To Do
Kamke 662	✓	0.266	37	✓	0.161	26	To Do
Kamke 663	✓	1.541	101	✓	0.135	27	To Do
Kamke 664	✓	0.555	94	✓	0.128	25	To Do
Kamke 665	✓	0.449	41	✓	0.342	28	To Do
Kamke 666	✓	0.137	29	✓	0.129	24	To Do
Kamke 667	✓	0.927	90	✓	0.163	82	To Do
Kamke 668	✓	0.595	78	✓	0.549	58	To Do
Kamke 669	✓	0.654	264	✓	0.142	72	To Do
Kamke 670	✓	0.494	62	✓	0.25	70	To Do
Kamke 671	✓	0.329	192	✓	0.148	237	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 672	✓	2.294	4512	✓	0.149	36	To Do
Kamke 673	✓	0.31	23	✓	0.314	17	To Do
Kamke 674	✓	0.608	91	✓	0.217	27	To Do
Kamke 675	✓	0.328	48	✓	0.044	37	To Do
Kamke 676	✓	0.436	144	✓	0.305	43	To Do
Kamke 677	✓	0.176	80	✓	0.04	48	To Do
Kamke 678	✓	0.325	101	✓	0.236	37	To Do
Kamke 679	✓	0.149	59	✓	0.036	37	To Do
Kamke 680	✓	0.736	89	✓	0.23	28	To Do
Kamke 681	✓	0.204	84	✓	0.049	45	To Do
Kamke 682	✓	0.25	39	✓	0.303	28	To Do
Kamke 683	✓	1.108	84	✓	0.082	152	To Do
Kamke 684	✓	0.108	20	✓	2.668	30	To Do
Kamke 685	✓	0.148	87	✓	0.058	48	To Do
Kamke 686	✓	11.719	68	✓	0.098	85	To Do
Kamke 687	✓	0.155	130	✓	0.082	39	To Do
Kamke 688	✓	0.351	82	✓	0.068	42	To Do
Kamke 689	✓	0.318	60	✓	0.034	25	To Do
Kamke 690	✓	0.512	105	✓	0.263	40	To Do
Kamke 691	✓	0.298	21	✓	0.474	17	To Do
Kamke 692	✓	0.104	20	✓	2.174	30	To Do
Kamke 693	✓	0.291	146	✓	0.074	40	To Do
Kamke 694	✓	0.404	66	✓	0.24	30	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 695	✓	0.206	34	✓	0.034	39	To Do
Kamke 696	✓	0.682	51	✓	0.044	32	To Do
Kamke 697	✓	0.255	114	✓	0.076	40	To Do
Kamke 698	✓	0.254	108	✓	0.062	34	To Do
Kamke 699	✓	0.328	101	✓	0.235	36	To Do
Kamke 700	✓	0.151	76	✓	0.09	62	To Do
Kamke 701	✓	1.785	88	✓	4.746	71	To Do
Kamke 702	✓	2.54	37	✓	0.057	35	To Do
Kamke 703	✓	0.439	101	✓	0.178	44	To Do
Kamke 704	✓	9.778	66	✓	0.043	38	To Do
Kamke 705	✓	0.144	30	✓	0.137	24	To Do
Kamke 706	✓	40.219	610	✓	0.464	65	To Do
Kamke 707	✓	4.953	1391	✓	0.368	105	To Do
Kamke 708	✓	0.349	89	✓	13.651	229	To Do
Kamke 709	✓	2.778	217	✓	0.227	39	To Do
Kamke 710	✓	1.182	38	✓	1.887	31	To Do
Kamke 711	✓	0.203	28	✓	0.105	31	To Do
Kamke 712	✓	0.482	105	✓	0.274	38	To Do
Kamke 713	✓	0.086	649	✓	0.292	86	To Do
Kamke 714	✓	1.438	162	✓	0.139	96	To Do
Kamke 715	✓	0.482	104	✓	0.227	39	To Do
Kamke 716	✓	2.725	133	✓	0.25	37	To Do
Kamke 717	✓	0.593	106	✓	0.281	33	To Do

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#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 718	✓	0.296	127	✓	0.045	44	To Do
Kamke 719	✓	0.37	49	✓	0.094	34	To Do
Kamke 720	✓	2.929	314	✓	0.166	48	To Do
Kamke 721	✓	0.105	27	✓	0.066	19	To Do
Kamke 722	✓	41.867	490	✓	0.246	70	To Do
Kamke 723	✓	0.215	663	✓	0.056	856	To Do
Kamke 724	✓	43.173	422	✓	0.035	18	To Do
Kamke 725	✓	0.314	19	✓	0.707	25	To Do
Kamke 726	✓	0.057	625	✓	0.213	83	To Do
Kamke 727	✓	0.415	29	✓	0.193	25	To Do
Kamke 728	✓	0.35	72	✓	0.25	50	To Do
Kamke 729	✓	0.282	327	✓	0.086	404	To Do
Kamke 730	✗	0	0	✓	1.31	41	To Do
Kamke 731	✓	0.34	47	✓	0.148	42	To Do
Kamke 732	✓	0.712	116	✓	0.285	43	To Do
Kamke 733	✓	12.536	73	✗	0	0	To Do
Kamke 734	✓	0.233	37	✓	0.228	39	To Do
Kamke 735	✓	11.549	573	✓	0.066	78	To Do
Kamke 736	✓	0.21	31	✓	0.165	43	To Do
Kamke 737	✓	0.025	36	✓	0.089	29	To Do
Kamke 738	✓	0.484	1347	✓	0.861	1054	To Do
Kamke 739	✓	0.288	39	✓	0.152	35	To Do
Kamke 740	✓	0.115	74	✓	0.075	72	To Do

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#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 741	✓	2.178	175	✓	0.9	246	To Do
Kamke 742	✓	3.059	3913	✓	1.325	239	To Do
Kamke 743	✗	0	0	✓	0.322	296	To Do
Kamke 744	✓	0.163	510	✓	0.144	621	To Do
Kamke 745	✓	11.469	546	✓	0.047	78	To Do
Kamke 746	✗	0	0	✓	0.267	232	To Do
Kamke 747	✓	2.911	88	✓	0.283	75	To Do
Kamke 748	✓	0.292	285	✓	0.082	404	To Do
Kamke 749	✓	0.153	126	✓	0.095	192	To Do
Kamke 750	✓	0.32	72	✓	0.198	49	To Do
Kamke 751	✓	0.167	30	✓	0.069	26	To Do
Kamke 752	✗	0	0	✓	1.096	723	To Do
Kamke 753	✓	0.168	41	✓	0.102	38	To Do
Kamke 754	✓	0.109	47	✓	0.011	26	To Do
Kamke 755	✓	0.277	2633	✓	0.093	44	To Do
Kamke 756	✓	0.155	95	✓	0.022	37	To Do
Kamke 757	✓	0.023	36	✓	0.044	26	To Do
Kamke 758	✓	0.768	459	✓	0.165	41	To Do
Kamke 759	✗	0	0	✓	0.384	305	To Do
Kamke 760	✓	0.992	112	✓	0.785	136	To Do
Kamke 761	✓	0.022	33	✓	0.04	18	To Do
Kamke 762	✓	0.17	26	✓	0.086	22	To Do
Kamke 763	✓	0.151	22	✓	0.078	14	To Do

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#	Mathematica			Maple			note on solution
	solved	cpu	leaf	solved	cpu	leaf	
Kamke 764	✓	0.193	50	✓	0.08	36	To Do
Kamke 765	✓	0.342	138	✓	0.139	106	To Do
Kamke 766	✓	0.306	129	✓	0.109	89	To Do
Kamke 767	✓	0.024	38	✓	0.044	26	To Do
Kamke 768	✓	1.053	66	✓	0.059	26	To Do
Kamke 769	✗	0	0	✓	0.296	251	To Do
Kamke 770	✓	0.213	705	✓	0.105	1105	To Do
Kamke 771	✓	0.03	46	✓	0.076	84	To Do
Kamke 772	✓	0.155	21	✓	0.073	18	To Do
Kamke 773	✓	0.163	61	✓	0.159	48	To Do
Kamke 774	✓	0.026	45	✓	0.064	51	To Do
Kamke 775	✓	0.157	943	✓	0.059	44	To Do
Kamke 776	✓	0.376	133	✓	0.132	96	To Do
Kamke 777	✓	0.219	39	✓	0.142	51	To Do
Kamke 778	✓	0.148	95	✓	0.019	37	To Do
Kamke 779	✓	0.156	57	✓	0.079	50	To Do
Kamke 780	✓	0.155	15	✓	0.325	27	To Do
Kamke 781	✓	0.487	82	✓	0.234	61	To Do
Kamke 782	✓	4.142	115	✓	0.961	96	To Do
Kamke 783	✓	4.165	88	✓	0.122	75	To Do
Kamke 784	✓	19.904	27	✓	20.355	24	To Do
Kamke 785	✓	7.312	29	✓	66.315	24	To Do
Kamke 786	✓	3.621	61	✓	0.05	33	To Do

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#	Mathematica			Maple			note on solution
	solved	cpu	leaf	solved	cpu	leaf	
Kamke 787	✓	25.979	488	✓	0.267	191	To Do
Kamke 788	✓	28.549	348	✓	0.166	108	To Do
Kamke 789	✓	71.347	120	✗	0	0	To Do
Kamke 790	✓	86.116	127	✗	0	0	To Do
Kamke 791	✓	7.896	110	✓	13.26	306	To Do
Kamke 792	✓	3.032	157	✓	0.271	112	To Do
Kamke 793	✓	13.047	399	✓	0.115	32	To Do
Kamke 794	✓	0.192	67	✓	0.41	32	To Do
Kamke 795	✓	0.376	111	✓	0.019	37	To Do
Kamke 796	✓	12.283	102	✓	0.88	143	To Do
Kamke 797	✓	1.901	349	✓	0.258	168	To Do
Kamke 798	✓	0.584	27	✓	0.125	30	To Do
Kamke 799	✓	1.061	126	✓	0.236	147	To Do
Kamke 800	✓	0.409	128	✓	0.017	41	To Do
Kamke 801	✓	0.362	126	✓	0.043	63	To Do
Kamke 802	✓	0.122	101	✓	0.087	27	To Do
Kamke 803	✓	0.291	637	✓	0.299	65	To Do
Kamke 804	✓	0.609	43	✓	0.796	38	To Do
Kamke 805	✓	0.163	37	✓	0.539	42	To Do
Kamke 806	✓	0.432	22	✓	0.44	22	To Do
Kamke 807	✗	0	0	✓	0.45	43	To Do
Kamke 808	✓	1.469	149	✓	0.07	45	To Do
Kamke 809	✓	0.295	128	✓	0.014	41	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 810	✓	0.106	40	✓	0.039	16	To Do
Kamke 811	✓	1.754	33	✓	1.545	32	To Do
Kamke 812	✓	0.392	78	✓	0.197	30	To Do
Kamke 813	✓	0.548	93	✓	0.372	40	To Do
Kamke 814	✓	0.129	72	✓	0.028	38	To Do
Kamke 815	✓	12.919	99	✓	0.604	168	To Do
Kamke 816	✓	0.239	74	✓	0.444	190	To Do
Kamke 817	✓	0.552	63	✓	0.518	27	To Do
Kamke 818	✓	0.186	34	✓	0.149	34	To Do
Kamke 819	✓	0.285	65	✓	0.183	30	To Do
Kamke 820	✓	0.53	63	✓	0.482	27	To Do
Kamke 821	✓	0.234	2093	✓	0.122	27	To Do
Kamke 822	✓	0.301	32	✓	0.092	25	To Do
Kamke 823	✓	0.419	39	✓	0.137	38	To Do
Kamke 824	✓	0.201	68	✓	0.341	61	To Do
Kamke 825	✓	0.412	148	✓	0.075	48	To Do
Kamke 826	✓	0.558	70	✓	0.255	51	To Do
Kamke 827	✓	0.19	221	✓	0.169	49	To Do
Kamke 828	✓	0.408	56	✓	0.217	54	To Do
Kamke 829	✓	0.423	74	✓	0.231	34	To Do
Kamke 830	✓	0.447	37	✓	0.122	38	To Do
Kamke 831	✓	2.988	145	✓	0.286	35	To Do
Kamke 832	✓	2.179	2497	✓	0.143	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	✓	0.193	221	✓	0.124	49	To Do
Kamke 834	✓	0.651	90	✓	0.333	60	To Do
Kamke 835	✗	0	0	✗	0	0	To Do
Kamke 836	✓	10.852	379	✓	0.161	73	To Do
Kamke 837	✗	0	0	✗	0	0	To Do
Kamke 838	✓	0.155	31	✓	0.088	25	To Do
Kamke 839	✓	0.266	28	✓	0.052	19	To Do
Kamke 840	✓	0.286	30	✓	0.046	19	To Do
Kamke 841	✓	1.083	236	✓	0.217	97	To Do
Kamke 842	✓	0.21	186	✓	0.017	43	To Do
Kamke 843	✓	0.212	198	✓	0.02	43	To Do
Kamke 844	✓	13.021	386	✓	0.148	97	To Do
Kamke 845	✓	3.226	266	✓	0.184	44	To Do
Kamke 846	✓	0.892	365	✓	0.144	40	To Do
Kamke 847	✓	0.824	103	✓	0.215	34	To Do
Kamke 848	✓	0.205	157	✓	0.404	27	To Do
Kamke 849	✓	0.746	102	✓	0.211	33	To Do
Kamke 850	✓	0.228	1485	✓	0.783	32	To Do
Kamke 851	✓	0.343	145	✓	0.046	42	To Do
Kamke 852	✓	0.322	145	✓	0.047	42	To Do
Kamke 853	✓	0.156	76	✓	0.026	63	To Do
Kamke 854	✗	0	0	✓	0.158	51	To Do
Kamke 855	✗	0	0	✓	0.148	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	✓	0.555	103	✓	0.207	65	To Do
Kamke 857	✓	0.607	107	✓	0.213	32	To Do
Kamke 858	✓	0.344	145	✓	0.046	42	To Do
Kamke 859	✓	0.813	105	✓	0.198	63	To Do
Kamke 860	✓	0.364	33	✓	1.57	29	To Do
Kamke 861	✓	1.364	158	✓	0.119	26	To Do
Kamke 862	✗	0	0	✓	0.159	27	To Do
Kamke 863	✓	0.176	30	✓	6.227	38	To Do
Kamke 864	✓	0.281	137	✓	0.06	162	To Do
Kamke 865	✓	0.311	87	✓	0.144	23	To Do
Kamke 866	✓	0.684	117	✓	0.236	37	To Do
Kamke 867	✓	0.201	77	✓	0.048	30	To Do
Kamke 868	✓	0.169	79	✓	0.044	28	To Do
Kamke 869	✓	0.032	42	✓	0.063	37	To Do
Kamke 870	✓	1.514	35	✓	0.682	30	To Do
Kamke 871	✓	0.23	22	✓	0.069	26	To Do
Kamke 872	✓	0.041	215	✓	0.046	49	To Do
Kamke 873	✓	0.512	53	✓	0.216	50	To Do
Kamke 874	✓	0.229	101	✓	0.037	40	To Do
Kamke 875	✓	0.24	497	✓	0.174	73	To Do
Kamke 876	✓	0.166	135	✓	0.036	41	To Do
Kamke 877	✓	0.186	49	✓	0.032	73	To Do
Kamke 878	✓	0.345	130	✓	10.437	75	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 879	✓	0.243	239	✓	0.16	55	To Do
Kamke 880	✓	0.423	131	✓	0.049	41	To Do
Kamke 881	✓	0.17	75	✓	0.033	77	To Do
Kamke 882	✓	0.239	119	✓	0.047	41	To Do
Kamke 883	✓	1.135	164	✓	0.511	352	To Do
Kamke 884	✓	0.564	71	✓	0.296	107	To Do
Kamke 885	✗	0	0	✗	0	0	To Do
Kamke 886	✓	0.172	82	✓	0.023	42	To Do
Kamke 887	✓	0.225	106	✓	0.034	72	To Do
Kamke 888	✓	0.17	78	✓	0.043	79	To Do
Kamke 889	✗	0	0	✓	0.825	49	To Do
Kamke 890	✓	0.181	103	✓	0.519	34	To Do
Kamke 891	✓	0.175	135	✓	0.043	56	To Do
Kamke 892	✓	2.248	1283	✓	0.376	40	To Do
Kamke 893	✓	0.169	80	✓	0.019	41	To Do
Kamke 894	✗	0	0	✗	0	0	To Do
Kamke 895	✓	0.222	81	✓	0.044	79	To Do
Kamke 896	✓	0.295	106	✓	0.39	63	To Do
Kamke 897	✓	0.212	79	✓	0.056	87	To Do
Kamke 898	✓	0.176	106	✓	0.033	87	To Do
Kamke 899	✓	0.203	106	✓	0.023	47	To Do
Kamke 900	✓	0.169	381	✓	0.049	48	To Do
Kamke 901	✓	0.514	33	✓	0.414	30	To Do

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#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 902	✓	0.224	295	✓	0.18	183	To Do
Kamke 903	✓	0.117	19	✓	0.053	48	To Do
Kamke 904	✓	0.103	23	✓	0.035	64	To Do
Kamke 905	✓	0.239	85	✓	0.03	46	To Do
Kamke 906	✓	0.123	326	✓	0.244	37	To Do
Kamke 907	✓	0.272	22	✓	0.112	20	To Do
Kamke 908	✓	1.098	1269	✓	0.282	1742	To Do
Kamke 909	✗	0	0	✓	0.407	84	To Do
Kamke 910	✓	0.227	98	✓	0.022	42	To Do
Kamke 911	✓	0.732	106	✓	0.361	30	To Do
Kamke 912	✓	1.241	201	✗	0	0	To Do
Kamke 913	✓	0.78	716	✓	0.118	43	To Do
Kamke 914	✓	1.179	401	✓	3.299	71	To Do
Kamke 915	✓	0.865	724	✓	0.044	43	To Do
Kamke 916	✗	0	0	✓	0.293	73	To Do
Kamke 917	✗	0	0	✓	0.155	38	To Do
Kamke 918	✓	0.452	720	✓	0.961	41	To Do
Kamke 919	✗	0	0	✓	0.164	61	To Do
Kamke 920	✓	0.454	301	✗	0	0	To Do
Kamke 921	✓	0.232	92	✓	0.1	30	To Do
Kamke 922	✓	1.24	882	✓	0.102	47	To Do
Kamke 923	✓	1.394	432	✓	0.242	36	To Do
Kamke 924	✓	0.236	80	✓	0.107	46	To Do

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#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 925	✓	2.039	228	✓	0.18	38	To Do
Kamke 926	✓	0.185	128	✓	0.044	67	To Do
Kamke 927	✓	0.566	112	✓	0.083	68	To Do
Kamke 928	✓	1.23	23	✓	0.273	20	To Do
Kamke 929	✓	0.807	683	✓	0.03	42	To Do
Kamke 930	✓	1.414	39	✓	0.419	36	To Do
Kamke 931	✓	0.17	80	✓	0.032	73	To Do
Kamke 932	✓	4.539	4323	✓	0.101	54	To Do
Kamke 933	✓	0.236	99	✓	0.026	39	To Do
Kamke 934	✓	0.269	102	✓	0.051	39	To Do
Kamke 935	✓	27.544	248	✓	0.153	55	To Do
Kamke 936	✓	0.247	99	✓	0.053	39	To Do
Kamke 937	✓	0.271	124	✓	0.043	79	To Do
Kamke 938	✓	0.239	108	✓	0.026	39	To Do
Kamke 939	✓	0.529	136	✓	0.105	70	To Do
Kamke 940	✓	0.206	80	✓	0.035	63	To Do
Kamke 941	✓	0.453	53	✓	0.04	35	To Do
Kamke 942	✓	4.315	349	✓	0.427	43	To Do
Kamke 943	✓	0.505	53	✓	0.039	40	To Do
Kamke 944	✓	1.65	233	✓	0.058	47	To Do
Kamke 945	✓	1.289	213	✓	0.046	41	To Do
Kamke 946	✓	0.606	150	✓	0.109	85	To Do
Kamke 947	✓	0.412	30	✓	0.193	44	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 948	✓	0.603	39	✓	0.185	68	To Do
Kamke 949	✓	0.203	76	✓	0.037	81	To Do
Kamke 950	✓	0.496	141	✓	0.066	42	To Do
Kamke 951	✓	0.406	140	✓	0.054	41	To Do
Kamke 952	✓	0.335	341	✓	0.266	62	To Do
Kamke 953	✗	0	0	✓	0.273	145	To Do
Kamke 954	✓	0.334	115	✓	0.062	53	To Do
Kamke 955	✓	0.316	112	✓	0.075	101	To Do
Kamke 956	✓	1.147	28	✓	0.092	79	To Do
Kamke 957	✓	1.12	28	✓	0.049	79	To Do
Kamke 958	✓	0.433	82	✓	0.033	40	To Do
Kamke 959	✓	0.256	20	✓	0.059	15	To Do
Kamke 960	✓	0.16	14	✓	0.04	11	To Do
Kamke 961	✓	5.119	813	✓	0.264	45	To Do
Kamke 962	✓	4.464	1191	✓	1.214	79	To Do
Kamke 963	✓	0.523	108	✓	0.15	39	To Do
Kamke 964	✓	4.06	264	✓	2.166	80	To Do
Kamke 965	✓	0.287	29	✓	0.047	26	To Do
Kamke 966	✓	0.739	292	✓	0.523	50	To Do
Kamke 967	✓	0.51	151	✓	0.054	91	To Do
Kamke 968	✓	0.355	30	✓	0.062	22	To Do
Kamke 969	✓	0.281	19	✓	0.065	15	To Do
Kamke 970	✓	0.588	66	✓	0.605	181	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 971	✓	0.199	157	✓	0.221	86	To Do
Kamke 972	✓	0.023	32	✓	0.069	27	To Do
Kamke 973	✓	0.338	146	✓	0.297	136	To Do
Kamke 974	✓	0.083	39	✓	0.029	57	To Do
Kamke 975	✓	0.081	47	✓	0.028	59	To Do
Kamke 976	✓	0.163	101	✓	0.177	57	To Do
Kamke 977	✓	0.373	139	✓	0.155	122	To Do
Kamke 978	✓	0.139	60	✓	0.138	71	To Do
Kamke 979	✓	0.099	37	✓	0.033	57	To Do
Kamke 980	✓	0.114	43	✓	0.013	35	To Do
Kamke 981	✓	0.148	49	✓	0.017	41	To Do
Kamke 982	✓	0.348	132	✓	0.327	145	To Do
Kamke 983	✓	0.486	238	✓	0.34	188	To Do
Kamke 984	✓	5.841	428	✓	0.22	40	To Do
Kamke 985	✓	0.329	103	✓	0.027	43	To Do
Kamke 986	✓	0.127	44	✓	0.017	36	To Do
Kamke 987	✓	0.152	41	✓	0.039	22	To Do
Kamke 988	✓	0.204	107	✓	0.031	29	To Do
Kamke 989	✓	0.163	56	✓	0.033	29	To Do
Kamke 990	✓	0.203	58	✓	0.387	44	To Do
Kamke 991	✓	0.193	104	✓	0.027	29	To Do
Kamke 992	✓	0.116	43	✓	0.03	25	To Do
Kamke 993	✓	1.403	73	✓	0.02	35	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 994	✓	0.206	198	✓	0.017	43	To Do
Kamke 995	✓	0.164	17	✓	0.114	14	To Do
Kamke 996	✗	0	0	✓	0.047	15	To Do
Kamke 997	✓	0.099	18	✓	0.043	16	To Do
Kamke 998	✓	0.462	27	✓	0.273	27	To Do
Kamke 999	✓	0.183	24	✓	0.039	36	To Do
Kamke 1000	✓	0.958	351	✓	0.107	19	To Do
Kamke 1001	✓	0.003	12	✓	0.003	9	Linear second order, homogeneous, constant coefficient. First problem. Direct integration
Kamke 1002	✓	0.003	16	✓	0.005	13	Linear second order, homogeneous, constant coefficient. Direct method
Kamke 1003	✓	0.098	45	✓	0.039	26	Linear second order, Non-homogeneous, constant coefficient. variation of parameters
Kamke 1004	✓	0.089	47	✓	0.033	27	Linear second order, Non-homogeneous, constant coefficient. variation of parameters
Kamke 1005	✓	0.414	1163	✓	0.069	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	✓	0.003	20	✓	0.004	15	Linear second order, homogeneous, constant coefficient
Kamke 1007	✓	0.086	135	✓	0.014	26	Linear second order, Non-homogeneous, constant coefficient. variation of parameters
Kamke 1008	✓	0.035	48	✓	0.058	41	To Do
Kamke 1009	✓	0.004	28	✓	0.012	21	To Do
Kamke 1010	✓	0.005	46	✓	0.03	31	Linear second order, homogeneous, variable coefficient. Airy ODE with plus sign, series solution
Kamke 1011	✓	0.005	33	✓	0.02	17	Linear second order, homogeneous, variable coefficient. power series solution
Kamke 1012	✓	0.006	47	✓	0.072	29	To Do
Kamke 1013	✓	0.013	43	✓	0.027	22	To Do
Kamke 1014	✓	0.019	170	✓	0.078	63	To Do
Kamke 1015	✗	0	0	✗	0	0	To Do
Kamke 1016	✓	0.084	312	✓	0.15	91	To Do
Kamke 1017	✓	0.019	46	✓	0.03	17	To Do
Kamke 1018	✓	0.015	55	✓	0.039	39	To Do
Kamke 1019	✗	0	0	✗	0	0	To Do
Kamke 1020	✓	0.497	180	✓	0.141	58	To Do

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#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 1021	✓	0.024	44	✓	0.165	39	To Do
Kamke 1022	✓	0.019	28	✓	0.158	21	To Do
Kamke 1023	✓	0.01	44	✓	0.16	29	To Do
Kamke 1024	✓	0.11	84	✓	0.095	30	To Do
Kamke 1025	✓	0.656	615	✓	0.135	102	To Do
Kamke 1026	✗	0	0	✗	0	0	To Do
Kamke 1027	✗	0	0	✓	0.263	69	To Do
Kamke 1028	✗	0	0	✗	0	0	To Do
Kamke 1029	✗	0	0	✓	0.092	22	To Do
Kamke 1030	✗	0	0	✗	0	0	To Do
Kamke 1031	✗	0	0	✗	0	0	To Do
Kamke 1032	✗	0	0	✓	0.082	48	To Do
Kamke 1033	✓	0.012	37	✓	0.01	27	Linear second order, homogeneous, variable coefficient. smart substitution turns it to second order with constant coefficient
Kamke 1034	✓	0.008	20	✓	0.009	15	Linear second order, homogeneous, variable coefficient. smart substitution turns it to second order with constant coefficient
Kamke 1035	✓	0.004	58	✓	0.01	41	To Do
Kamke 1036	✓	0.126	209	✓	0.071	124	To Do

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#	Mathematica			Maple			note on solution
	solved	cpu	leaf	solved	cpu	leaf	
Kamke 1037	✓	0.02	101	✓	0.069	64	To Do
Kamke 1038	✗	0	0	✗	0	0	To Do
Kamke 1039	✓	0.009	47	✓	0.007	25	To Do
Kamke 1040	✓	0.03	53	✓	0.029	33	To Do
Kamke 1041	✓	0.007	55	✓	0.055	41	To Do
Kamke 1042	✓	0.006	61	✓	0.052	41	To Do
Kamke 1043	✓	0.099	69	✓	0.164	39	Linear second order, homogeneous, variable coefficient. power series solution
Kamke 1044	✓	0.006	39	✓	0.055	35	To Do
Kamke 1045	✓	0.028	39	✓	0.005	21	To Do
Kamke 1046	✓	0.006	31	✓	0.054	31	To Do
Kamke 1047	✓	0.01	27	✓	0.02	16	Linear second order, homogeneous, variable coefficient. power series solution
Kamke 1048	✓	0.008	45	✓	0.052	37	To Do
Kamke 1049	✓	0.049	109	✓	0.128	66	To Do
Kamke 1050	✓	0.009	23	✓	0.017	14	To Do
Kamke 1051	✓	0.017	44	✓	0.023	27	To Do
Kamke 1052	✓	0.015	78	✓	0.058	58	To Do
Kamke 1053	✓	0.023	57	✓	0.032	35	To Do
Kamke 1054	✓	0.033	172	✓	0.034	98	To Do
Kamke 1055	✓	0.139	421	✓	0.136	262	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1056	✓	0.025	41	✓	0.069	47	To Do
Kamke 1057	✓	0.034	56	✓	0.118	50	To Do
Kamke 1058	✓	0.033	56	✓	0.088	29	To Do
Kamke 1059	✓	0.027	39	✓	0.052	56	To Do
Kamke 1060	✓	0.026	83	✓	0.122	81	To Do
Kamke 1061	✓	0.058	70	✓	0.066	28	To Do
Kamke 1062	✓	0.019	35	✓	0.02	19	To Do
Kamke 1063	✓	0.04	28	✓	0.224	34	To Do
Kamke 1064	✓	0.477	1400	✓	0.22	125	To Do
Kamke 1065	✓	0.122	114	✓	0.158	60	To Do
Kamke 1066	✓	0.023	18	✓	0.049	15	To Do
Kamke 1067	✓	0.023	21	✓	0.033	17	To Do
Kamke 1068	✓	0.105	20	✓	0.153	45	To Do
Kamke 1069	✓	0.025	19	✓	0.064	15	To Do
Kamke 1070	✓	0.235	143	✓	0.118	60	To Do
Kamke 1071	✓	0.06	44	✓	0.046	24	To Do
Kamke 1072	✗	0	0	✗	0	0	To Do
Kamke 1073	✗	0	0	✗	0	0	To Do
Kamke 1074	✗	0	0	✓	0.017	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	✓	0.031	76	✓	0.023	33	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1079	✓	0.192	315	✓	0.015	37	To Do
Kamke 1080	✗	0	0	✓	0.24	74	To Do
Kamke 1081	✗	0	0	✗	0	0	To Do
Kamke 1082	✗	0	0	✓	0.103	74	To Do
Kamke 1083	✗	0	0	✓	0.072	31	To Do
Kamke 1084	✗	0	0	✓	0.059	20	To Do
Kamke 1085	✗	0	0	✓	0.058	24	To Do
Kamke 1086	✓	0.004	42	✓	0.018	29	To Do
Kamke 1087	✓	0.006	36	✓	0.062	33	To Do
Kamke 1088	✓	0.068	180	✓	0.098	31	To Do
Kamke 1089	✓	0.031	99	✓	0.036	58	To Do
Kamke 1090	✓	0.025	50	✓	0.033	40	To Do
Kamke 1091	✓	0.018	41	✓	0.032	35	To Do
Kamke 1092	✓	0.066	72	✓	0.05	29	To Do
Kamke 1093	✓	0.007	13	✓	0.004	10	To Do
Kamke 1094	✓	0.016	41	✓	0.007	29	To Do
Kamke 1095	✓	0.007	30	✓	0.022	23	To Do
Kamke 1096	✓	0.009	61	✓	0.055	39	To Do
Kamke 1097	✓	0.02	46	✓	0.007	31	To Do
Kamke 1098	✓	0.007	41	✓	0.007	27	To Do
Kamke 1099	✗	0	0	✓	0.038	25	To Do

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#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 1100	✓	0.014	44	✓	0.033	23	Linear second order, non-homogeneous, variable coefficient. Singularity, Frobenius series solution and also using smart transformation. Variation of parameters.
Kamke 1101	✓	0.018	52	✓	0.027	29	Linear second order, homogeneous, variable coefficient. Singularity, Frobenius series solution and also using smart transformation
Kamke 1102	✓	0.005	42	✓	0.028	33	Linear second order, homogeneous, variable coefficient. Use smart transformation to convert to Emden-Fowler then use Power series solution
Kamke 1103	✓	0.02	64	✓	0.008	33	To Do
Kamke 1104	✓	0.026	104	✓	0.01	41	To Do
Kamke 1105	✓	0.015	64	✓	0.027	39	To Do
Kamke 1106	✓	0.036	441	✓	0.072	71	To Do
Kamke 1107	✓	0.02	40	✓	0.054	30	To Do
Kamke 1108	✓	0.025	37	✓	0.056	26	To Do
Kamke 1109	✓	0.119	45	✓	0.02	33	To Do
Kamke 1110	✓	0.032	36	✓	0.039	23	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1111	✓	0.016	20	✓	0.016	13	Linear second order, homogeneous, variable coefficient. Solved using Laplace transform instead of series method
Kamke 1112	✓	0.021	30	✓	0.026	22	To Do
Kamke 1113	✓	0.015	24	✓	0.05	17	To Do
Kamke 1114	✓	0.035	39	✓	0.036	34	To Do
Kamke 1115	✓	0.047	76	✓	0.736	47	To Do
Kamke 1116	✓	0.041	43	✓	0.061	31	To Do
Kamke 1117	✓	0.062	107	✓	0.082	82	To Do
Kamke 1118	✓	0.061	51	✓	0.068	39	To Do
Kamke 1119	✓	0.113	77	✓	0.03	20	To Do
Kamke 1120	✓	0.041	168	✓	0.151	109	To Do
Kamke 1121	✓	0.177	41	✓	0.019	23	To Do
Kamke 1122	✓	0.18	57	✓	0.112	28	To Do
Kamke 1123	✓	0.009	91	✓	0.039	45	To Do
Kamke 1124	✓	0.053	65	✓	0.059	29	To Do
Kamke 1125	✓	0.102	84	✓	0.033	36	To Do
Kamke 1126	✗	0	0	✓	0.027	19	To Do
Kamke 1127	✓	0.027	36	✓	0.013	21	To Do
Kamke 1128	✓	0.018	40	✓	0.181	32	To Do
Kamke 1129	✓	0.055	42	✓	0.024	30	To Do
Kamke 1130	✓	0.008	46	✓	0.013	31	To Do

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#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 1131	✓	0.008	58	✓	0.058	33	To Do
Kamke 1132	✓	0.008	48	✓	0.059	29	To Do
Kamke 1133	✓	0.047	52	✓	0.075	37	To Do
Kamke 1134	✓	0.069	78	✓	0.033	21	To Do
Kamke 1135	✓	0.007	27	✓	0.007	17	To Do
Kamke 1136	✓	0.018	30	✓	0.022	16	To Do
Kamke 1137	✓	0.069	74	✓	0.036	25	To Do
Kamke 1138	✓	0.021	38	✓	0.054	26	To Do
Kamke 1139	✓	0.01	74	✓	0.059	37	To Do
Kamke 1140	✓	0.034	190	✓	0.017	66	To Do
Kamke 1141	✓	0.091	79	✓	0.034	55	To Do
Kamke 1142	✓	0.033	108	✓	0.078	53	To Do
Kamke 1143	✓	0.03	93	✓	0.075	57	To Do
Kamke 1144	✓	0.027	88	✓	0.062	60	To Do
Kamke 1145	✓	0.259	386	✓	0.122	248	To Do
Kamke 1146	✓	0.003	18	✓	0.005	15	To Do
Kamke 1147	✓	0.003	18	✓	0.006	15	To Do
Kamke 1148	✓	0.007	77	✓	0.009	35	To Do
Kamke 1149	✓	0.046	212	✓	0.012	45	To Do
Kamke 1150	✓	0.007	53	✓	0.05	27	To Do
Kamke 1151	✓	0.012	129	✓	0.06	43	To Do
Kamke 1152	✓	0.013	114	✓	0.159	53	To Do
Kamke 1153	✓	0.022	56	✓	0.02	31	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1154	✓	0.014	88	✓	0.094	57	To Do
Kamke 1155	✓	0.035	225	✓	0.036	67	To Do
Kamke 1156	✓	0.09	33	✓	0.093	71	To Do
Kamke 1157	✗	0	0	✗	0	0	To Do
Kamke 1158	✓	0.116	43	✓	0.174	178	To Do
Kamke 1159	✓	0.006	24	✓	0.009	19	To Do
Kamke 1160	✓	0.007	30	✓	0.01	23	To Do
Kamke 1161	✓	0.034	78	✓	0.009	31	To Do
Kamke 1162	✓	0.041	18	✓	0.007	15	To Do
Kamke 1163	✓	0.107	72	✓	0.024	49	To Do
Kamke 1164	✓	0.015	30	✓	0.02	23	To Do
Kamke 1165	✓	0.054	26	✓	0.01	19	To Do
Kamke 1166	✓	0.01	23	✓	0.01	21	To Do
Kamke 1167	✓	0.055	326	✓	0.02	63	To Do
Kamke 1168	✓	0.007	15	✓	0.007	11	To Do
Kamke 1169	✓	0.049	236	✓	0.02	49	To Do
Kamke 1170	✓	0.016	58	✓	0.026	43	To Do
Kamke 1171	✓	0.036	142	✓	0.096	49	To Do
Kamke 1172	✓	0.047	158	✓	0.023	47	To Do
Kamke 1173	✓	0.071	74	✓	0.057	37	To Do
Kamke 1174	✓	0.007	33	✓	0.017	25	To Do
Kamke 1175	✓	0.198	38	✓	0.036	29	To Do
Kamke 1176	✓	0.014	33	✓	0.02	15	To Do

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#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 1177	✓	0.751	141	✓	0.049	34	To Do
Kamke 1178	✓	0.037	74	✓	0.016	23	To Do
Kamke 1179	✓	0.017	38	✓	0.023	19	To Do
Kamke 1180	✓	0.059	75	✓	0.033	49	To Do
Kamke 1181	✓	0.031	37	✓	0.014	25	To Do
Kamke 1182	✓	0.011	24	✓	0.009	20	To Do
Kamke 1183	✓	0.007	27	✓	0.01	22	To Do
Kamke 1184	✓	0.007	38	✓	0.019	25	To Do
Kamke 1185	✓	0.026	67	✓	0.019	33	To Do
Kamke 1186	✓	0.014	42	✓	0.019	36	To Do
Kamke 1187	✓	0.008	99	✓	0.01	53	To Do
Kamke 1188	✓	0.108	266	✓	0.122	114	To Do
Kamke 1189	✓	0.049	445	✓	0.026	79	To Do
Kamke 1190	✓	0.022	122	✓	0.073	38	To Do
Kamke 1191	✓	0.007	110	✓	0.011	23	To Do
Kamke 1192	✓	0.062	40	✓	0.103	51	To Do
Kamke 1193	✓	0.194	44	✓	0.026	38	To Do
Kamke 1194	✓	0.092	65	✓	0.034	48	To Do
Kamke 1195	✓	0.021	80	✓	0.083	93	To Do
Kamke 1196	✓	0.026	37	✓	0.026	31	To Do
Kamke 1197	✓	0.013	78	✓	0.031	43	To Do
Kamke 1198	✓	0.034	41	✓	0.028	37	To Do
Kamke 1199	✓	0.013	41	✓	0.016	35	To Do

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#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 1200	✓	0.015	62	✓	0.012	27	To Do
Kamke 1201	✓	0.107	44	✓	0.015	34	To Do
Kamke 1202	✓	0.011	22	✓	0.023	14	To Do
Kamke 1203	✓	0.015	124	✓	0.015	28	To Do
Kamke 1204	✓	0.016	132	✓	0.036	35	To Do
Kamke 1205	✗	0	0	✗	0	0	To Do
Kamke 1206	✓	0.075	120	✓	0.044	76	To Do
Kamke 1207	✓	0.084	294	✓	0.159	110	To Do
Kamke 1208	✓	0.037	59	✓	0.033	35	To Do
Kamke 1209	✓	0.017	67	✓	0.036	40	To Do
Kamke 1210	✓	0.195	252	✓	0.146	81	To Do
Kamke 1211	✓	0.039	68	✓	0.039	36	To Do
Kamke 1212	✗	0	0	✗	0	0	To Do
Kamke 1213	✓	0.064	54	✓	0.038	53	To Do
Kamke 1214	✓	0.21	260	✓	0.112	71	To Do
Kamke 1215	✓	0.111	664	✓	0.114	148	To Do
Kamke 1216	✗	0	0	✗	0	0	To Do
Kamke 1217	✓	0.098	30	✓	0.026	24	To Do
Kamke 1218	✓	0.1	38	✓	0.027	30	To Do
Kamke 1219	✓	0.102	218	✓	0.066	69	To Do
Kamke 1220	✓	0.041	98	✓	0.013	40	To Do
Kamke 1221	✓	0.023	42	✓	0.016	35	To Do
Kamke 1222	✓	0.014	30	✓	0.013	23	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1223	✓	0.013	25	✓	0.011	19	To Do
Kamke 1224	✓	0.013	30	✓	0.01	23	To Do
Kamke 1225	✓	0.02	29	✓	0.027	23	To Do
Kamke 1226	✓	0.012	30	✓	0.029	25	To Do
Kamke 1227	✓	0.024	21	✓	0.01	16	To Do
Kamke 1228	✓	0.011	82	✓	0.063	53	To Do
Kamke 1229	✓	0.028	48	✓	0.012	31	To Do
Kamke 1230	✓	0.018	82	✓	0.079	36	To Do
Kamke 1231	✓	0.055	58	✓	0.036	52	To Do
Kamke 1232	✓	11.651	6628	✓	0.117	409	To Do
Kamke 1233	✓	0.549	6628	✓	0.098	409	To Do
Kamke 1234	✓	0.058	48	✗	0	0	To Do
Kamke 1235	✓	0.034	97	✓	0.059	45	To Do
Kamke 1236	✗	0	0	✗	0	0	To Do
Kamke 1237	✓	0.011	30	✓	0.026	20	To Do
Kamke 1238	✓	0.017	36	✓	0.019	26	To Do
Kamke 1239	✓	0.01	46	✓	0.058	35	To Do
Kamke 1240	✓	0.012	18	✓	0.033	15	To Do
Kamke 1241	✓	0.011	30	✓	0.036	24	To Do
Kamke 1242	✓	0.202	68	✓	0.066	41	To Do
Kamke 1243	✓	0.023	45	✓	0.046	21	To Do
Kamke 1244	✓	0.02	42	✓	0.055	27	To Do
Kamke 1245	✓	0.015	42	✓	0.033	27	To Do

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#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 1246	✓	0.014	42	✓	0.146	28	To Do
Kamke 1247	✓	0.155	128	✓	0.02	27	To Do
Kamke 1248	✗	0	0	✓	0.177	134	To Do
Kamke 1249	✓	0.116	193	✓	0.052	134	To Do
Kamke 1250	✓	0.037	41	✓	0.02	41	To Do
Kamke 1251	✓	0.025	25	✓	0.024	20	To Do
Kamke 1252	✓	0.107	151	✓	0.034	124	To Do
Kamke 1253	✓	0.019	34	✓	0.003	16	To Do
Kamke 1254	✓	0.139	69	✓	0.049	43	To Do
Kamke 1255	✓	0.635	360	✓	0.016	42	To Do
Kamke 1256	✓	0.017	26	✓	0.075	51	To Do
Kamke 1257	✓	0.029	33	✓	0.169	27	To Do
Kamke 1258	✓	0.117	146	✓	0.029	110	To Do
Kamke 1259	✓	0.1	120	✓	0.035	92	To Do
Kamke 1260	✓	0.202	65	✓	0.31	76	To Do
Kamke 1261	✗	0	0	✓	0.132	105	To Do
Kamke 1262	✓	0.227	88	✓	0.158	53	To Do
Kamke 1263	✓	0.373	276	✓	0.052	52	To Do
Kamke 1264	✓	0.053	23	✓	0.026	19	To Do
Kamke 1265	✓	0.032	64	✓	0.227	93	To Do
Kamke 1266	✓	0.022	22	✓	0.007	19	To Do
Kamke 1267	✓	0.345	166	✓	0.045	41	To Do
Kamke 1268	✗	0	0	✓	0.073	39	To Do

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#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 1269	✓	0.064	60	✓	0.049	40	To Do
Kamke 1270	✓	1.853	58	✓	0.107	46	To Do
Kamke 1271	✓	0.008	27	✓	0.004	14	To Do
Kamke 1272	✓	0.008	32	✓	0.031	23	To Do
Kamke 1273	✓	0.012	20	✓	0.058	17	To Do
Kamke 1274	✓	0.031	38	✓	0.009	19	To Do
Kamke 1275	✓	0.025	120	✓	0.103	53	To Do
Kamke 1276	✓	0.028	55	✓	0.049	31	To Do
Kamke 1277	✓	0.02	51	✓	0.038	27	To Do
Kamke 1278	✗	0	0	✗	0	0	To Do
Kamke 1279	✓	0.109	74	✓	0.13	32	To Do
Kamke 1280	✓	0.044	52	✓	0.033	40	To Do
Kamke 1281	✓	0.015	28	✓	0.028	15	To Do
Kamke 1282	✓	0.016	39	✓	0.026	21	To Do
Kamke 1283	✓	0.06	90	✓	0.091	48	To Do
Kamke 1284	✓	0.029	47	✓	0.012	41	To Do
Kamke 1285	✓	1.284	269	✓	0.066	52	To Do
Kamke 1286	✓	0.089	101	✓	0.013	32	To Do
Kamke 1287	✓	0.013	83	✓	0.017	27	To Do
Kamke 1288	✓	0.025	47	✓	0.02	21	To Do
Kamke 1289	✓	0.104	53	✓	0.062	33	To Do
Kamke 1290	✓	0.111	103	✓	0.018	29	To Do
Kamke 1291	✓	0.057	92	✓	0.046	50	To Do

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#	Mathematica			Maple			note on solution
	solved	cpu	leaf	solved	cpu	leaf	
Kamke 1292	✓	0.033	42	✓	0.036	31	To Do
Kamke 1293	✓	0.249	44	✓	0.038	33	To Do
Kamke 1294	✓	0.051	44	✓	0.036	33	To Do
Kamke 1295	✓	0.186	310	✓	0.196	106	To Do
Kamke 1296	✓	0.358	356	✓	0.224	150	To Do
Kamke 1297	✓	0.024	52	✓	0.017	63	To Do
Kamke 1298	✓	0.054	162	✓	0.083	124	To Do
Kamke 1299	✓	0.014	19	✓	0.01	27	To Do
Kamke 1300	✓	0.01	41	✓	0.029	31	To Do
Kamke 1301	✓	0.023	31	✓	0.012	19	To Do
Kamke 1302	✓	0.059	243	✓	0.043	98	To Do
Kamke 1303	✗	0	0	✓	0.133	501	To Do
Kamke 1304	✓	0.037	50	✓	0.035	38	To Do
Kamke 1305	✓	0.062	47	✓	0.044	44	To Do
Kamke 1306	✗	0	0	✓	0.11	69	To Do
Kamke 1307	✓	0.09	54	✓	0.034	36	To Do
Kamke 1308	✓	0.013	41	✓	0.012	40	To Do
Kamke 1309	✓	0.067	84	✓	0.059	85	To Do
Kamke 1310	✓	0.008	31	✓	0.007	20	To Do
Kamke 1311	✓	0.092	63	✓	0.098	52	To Do
Kamke 1312	✓	0.017	32	✓	0.013	19	To Do
Kamke 1313	✓	0.146	87	✓	0.052	35	To Do
Kamke 1314	✓	0.133	87	✓	0.045	33	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1315	✓	0.019	44	✓	0.013	45	To Do
Kamke 1316	✓	0.065	38	✓	0.026	18	To Do
Kamke 1317	✓	0.083	38	✓	0.024	13	To Do
Kamke 1318	✓	0.205	172	✓	0.067	122	To Do
Kamke 1319	✓	0.047	60	✓	0.072	31	To Do
Kamke 1320	✓	0.065	21	✓	0.027	17	To Do
Kamke 1321	✓	0.018	18	✓	0.014	15	To Do
Kamke 1322	✓	0.028	44	✓	0.016	44	To Do
Kamke 1323	✗	0	0	✓	0.01	17	To Do
Kamke 1324	✓	0.021	25	✓	0.017	18	To Do
Kamke 1325	✓	0.18	52	✓	0.07	86	To Do
Kamke 1326	✓	0.017	29	✓	0.017	22	To Do
Kamke 1327	✓	0.128	104	✓	0.197	81	To Do
Kamke 1328	✓	0.015	36	✓	0.016	27	To Do
Kamke 1329	✗	0	0	✓	0.184	64	To Do
Kamke 1330	✗	0	0	✓	0.707	1147	To Do
Kamke 1331	✓	0.032	55	✓	0.016	19	To Do
Kamke 1332	✓	0.018	26	✓	0.013	17	To Do
Kamke 1333	✓	0.076	70	✓	0.043	45	To Do
Kamke 1334	✓	0.142	114	✓	0.044	89	To Do
Kamke 1335	✓	0.226	893	✓	0.038	57	To Do
Kamke 1336	✓	0.035	70	✓	0.029	42	To Do
Kamke 1337	✓	0.052	62	✓	0.026	27	To Do

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#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 1338	✓	0.04	40	✓	0.023	27	To Do
Kamke 1339	✓	0.188	66	✓	0.074	76	To Do
Kamke 1340	✓	0.026	32	✓	0.017	20	To Do
Kamke 1341	✓	61.86	2924	✓	0.114	201	To Do
Kamke 1342	✓	0.052	52	✓	0.036	31	To Do
Kamke 1343	✗	0	0	✓	0.069	58	To Do
Kamke 1344	✓	0.447	173	✓	0.043	23	To Do
Kamke 1345	✓	0.033	52	✓	0.032	25	To Do
Kamke 1346	✓	0.063	37	✓	0.033	25	To Do
Kamke 1347	✓	0.084	31	✓	0.017	19	To Do
Kamke 1348	✗	0	0	✓	0.125	73	To Do
Kamke 1349	✓	0.084	76	✓	0.046	85	To Do
Kamke 1350	✓	0.008	25	✓	0.007	21	To Do
Kamke 1351	✓	0.018	50	✓	0.02	24	To Do
Kamke 1352	✓	0.01	89	✓	0.034	43	To Do
Kamke 1353	✓	0.872	119	✓	0.18	67	To Do
Kamke 1354	✓	0.226	108	✓	0.234	33	To Do
Kamke 1355	✓	0.236	51	✓	0.08	30	To Do
Kamke 1356	✓	0.22	90	✓	0.045	29	To Do
Kamke 1357	✓	0.5	288	✓	0.069	97	To Do
Kamke 1358	✓	0.046	89	✓	0.039	20	To Do
Kamke 1359	✓	0.077	86	✓	0.052	57	To Do
Kamke 1360	✓	0.07	68	✓	0.04	47	To Do

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#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 1361	✓	0.353	38	✓	0.022	33	To Do
Kamke 1362	✗	0	0	✓	0.136	109	To Do
Kamke 1363	✓	0.555	236	✓	0.076	161	To Do
Kamke 1364	✓	0.12	42	✓	0.065	25	To Do
Kamke 1365	✓	0.076	104	✓	0.04	59	To Do
Kamke 1366	✓	0.018	31	✓	0.007	17	To Do
Kamke 1367	✗	0	0	✓	0.14	88	To Do
Kamke 1368	✓	0.02	106	✓	0.05	71	To Do
Kamke 1369	✓	0.077	106	✓	0.033	55	To Do
Kamke 1370	✓	0.021	53	✓	0.007	19	To Do
Kamke 1371	✓	0.016	48	✓	0.031	37	To Do
Kamke 1372	✗	0	0	✓	0.174	110	To Do
Kamke 1373	✗	0	0	✓	0.127	84	To Do
Kamke 1374	✓	0.025	32	✓	0.033	23	To Do
Kamke 1375	✓	0.034	54	✓	0.039	29	To Do
Kamke 1376	✓	0.033	69	✓	0.026	73	To Do
Kamke 1377	✓	0.178	163	✓	0.084	83	To Do
Kamke 1378	✓	0.038	65	✓	0.03	48	To Do
Kamke 1379	✓	0.053	99	✓	0.043	59	To Do
Kamke 1380	✓	0.199	132	✓	0.056	67	To Do
Kamke 1381	✓	0.27	589	✓	0.126	175	To Do
Kamke 1382	✓	0.467	154	✓	0.076	104	To Do
Kamke 1383	✓	0.094	50	✓	0.029	39	To Do

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#	Mathematica			Maple			note on solution
	solved	cpu	leaf	solved	cpu	leaf	
Kamke 1384	✓	0.024	110	✓	0.167	73	To Do
Kamke 1385	✓	0.015	78	✓	0.042	55	To Do
Kamke 1386	✓	0.063	108	✓	0.048	58	To Do
Kamke 1387	✓	0.028	50	✓	0.018	28	To Do
Kamke 1388	✓	0.227	235	✓	0.04	76	To Do
Kamke 1389	✓	0.273	217	✓	0.04	68	To Do
Kamke 1390	✓	0.026	41	✓	0.023	25	To Do
Kamke 1391	✓	0.041	27	✓	0.017	20	To Do
Kamke 1392	✓	62.053	1763961	✓	0.125	561	To Do
Kamke 1393	✓	13.835	413606	✓	0.099	299	To Do
Kamke 1394	✓	0.033	115	✓	0.067	79	To Do
Kamke 1395	✓	0.057	59	✓	0.04	39	To Do
Kamke 1396	✓	0.941	211	✓	0.116	178	To Do
Kamke 1397	✓	0.028	38	✓	0.066	27	To Do
Kamke 1398	✗	0	0	✓	0.111	69	To Do
Kamke 1399	✓	0.036	72	✓	0.04	34	To Do
Kamke 1400	✓	0.059	60	✓	0.029	35	To Do
Kamke 1401	✓	0.01	93	✓	0.032	45	To Do
Kamke 1402	✗	0	0	✓	0.166	58	To Do
Kamke 1403	✗	0	0	✓	0.52	298	To Do
Kamke 1404	✓	0.017	33	✓	0.027	19	To Do
Kamke 1405	✓	0.051	77	✓	0.041	42	To Do
Kamke 1406	✓	2.07	258	✓	0.112	44	To Do

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#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 1407	✗	0	0	✓	1.261	2603	To Do
Kamke 1408	✗	0	0	✗	0	0	To Do
Kamke 1409	✓	0.019	43	✓	0.012	39	To Do
Kamke 1410	✓	0.093	481	✓	0.159	253	To Do
Kamke 1411	✓	0.272	42	✓	0.013	27	To Do
Kamke 1412	✓	0.011	29	✓	0.007	23	To Do
Kamke 1413	✓	0.046	16	✓	0.036	12	To Do
Kamke 1414	✓	0.781	231	✓	0.18	97	To Do
Kamke 1415	✓	0.671	273	✓	0.095	36	To Do
Kamke 1416	✓	0.152	46	✓	0.128	26	To Do
Kamke 1417	✓	0.124	52	✓	0.098	31	To Do
Kamke 1418	✓	0.121	15	✓	2.694	59	To Do
Kamke 1419	✗	0	0	✓	0.142	12	To Do
Kamke 1420	✓	0.328	134	✓	0.221	123	To Do
Kamke 1421	✓	0.15	81	✓	0.05	27	To Do
Kamke 1422	✓	0.077	58	✓	0.155	50	To Do
Kamke 1423	✓	0.055	70	✓	0.183	132	To Do
Kamke 1424	✓	0.128	90	✓	0.183	120	To Do
Kamke 1425	✓	1.254	385	✓	0.303	93	To Do
Kamke 1426	✓	4.25	4128	✓	0.37	549	To Do
Kamke 1427	✗	0	0	✓	1.004	203	To Do
Kamke 1428	✓	0.278	104	✓	0.202	183	To Do
Kamke 1429	✓	0.04	51	✓	0.024	25	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1430	✓	0.313	22	✓	0.23	101	To Do
Kamke 1431	✓	0.152	80	✓	0.155	30	To Do
Kamke 1432	✓	0.063	37	✓	0.026	22	To Do
Kamke 1433	✓	0.139	46	✓	0.069	28	To Do
Kamke 1434	✓	70.893	1596424	✓	0.405	517	To Do
Kamke 1435	✓	0.104	70	✓	0.092	38	To Do
Kamke 1436	✓	0.364	42	✓	0.174	113	To Do
Kamke 1437	✓	0.2	42	✓	0.112	29	To Do
Kamke 1438	✓	0.636	615	✓	0.131	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	✓	0.052	46	✓	0.039	30	To Do
Kamke 1443	✗	0	0	✗	0	0	To Do
Kamke 1444	✗	0	0	✓	0.016	37	To Do
Kamke 1445	✗	0	0	✓	0.133	20	To Do
Kamke 1446	✓	0.028	33	✓	0.03	22	To Do
Kamke 1447	✓	0.027	29	✓	0.027	20	To Do
Kamke 1448	✓	0.211	149	✓	0.065	77	To Do
Kamke 1449	✓	0.005	53	✓	0.013	47	To Do
Kamke 1450	✗	0	0	✓	0.174	1616	To Do
Kamke 1451	✓	0.014	168	✓	0.066	114	To Do
Kamke 1452	✓	0.006	54	✓	0.006	35	To Do

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#	Mathematica			Maple			note on solution
	solved	cpu	leaf	solved	cpu	leaf	
Kamke 1453	✓	1.101	128	✓	0.109	122	To Do
Kamke 1454	✓	0.007	79	✓	0.036	55	To Do
Kamke 1455	✓	0.02	127	✓	0.079	71	To Do
Kamke 1456	✓	0.025	183	✓	0.042	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	✓	0.005	34	✓	0.004	27	To Do
Kamke 1465	✓	0.086	95	✓	0.121	89	To Do
Kamke 1466	✓	0.008	46	✓	0.011	27	To Do
Kamke 1467	✓	0.005	84	✓	0.02	590	To Do
Kamke 1468	✓	0.057	57	✓	0.081	59	To Do
Kamke 1469	✓	0.012	72	✓	0.02	37	To Do
Kamke 1470	✓	2.713	64	✓	0.062	36	To Do
Kamke 1471	✗	0	0	✓	0.088	36	To Do
Kamke 1472	✗	0	0	✓	0.103	33	To Do
Kamke 1473	✗	0	0	✗	0	0	To Do
Kamke 1474	✗	0	0	✗	0	0	To Do
Kamke 1475	✓	0.025	38	✓	0.013	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	✓	0.128	48	✓	0.012	41	To Do
Kamke 1478	✓	0.024	104	✓	0.066	48	To Do
Kamke 1479	✓	0.107	153	✓	0.131	92	To Do
Kamke 1480	✓	0.175	93	✓	0.138	35	To Do
Kamke 1481	✓	0.393	432	✓	0.042	44	To Do
Kamke 1482	✗	0	0	✓	0.228	1614	To Do
Kamke 1483	✓	0.112	112	✓	0.145	37	To Do
Kamke 1484	✗	0	0	✗	0	0	To Do
Kamke 1485	✓	0.161	64	✓	0.207	51	To Do
Kamke 1486	✓	0.317	65	✓	0.144	51	To Do
Kamke 1487	✓	0.679	87	✓	0.062	38	To Do
Kamke 1488	✓	0.401	102	✓	0.326	132	To Do
Kamke 1489	✗	0	0	✗	0	0	To Do
Kamke 1490	✓	0.025	33	✓	0.035	18	To Do
Kamke 1491	✓	0.032	102	✓	0.054	88	To Do
Kamke 1492	✓	0.284	43	✓	0.071	39	To Do
Kamke 1493	✓	1.165	2585	✓	0.183	1033	To Do
Kamke 1494	✓	0.02	43	✓	0.01	32	To Do
Kamke 1495	✓	0.006	24	✓	0.007	16	To Do
Kamke 1496	✓	0.205	63	✓	0.014	57	To Do
Kamke 1497	✓	0.366	135	✓	0.152	77	To Do
Kamke 1498	✓	9.634	584	✓	0.141	53	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1499	✓	0.194	97	✓	0.146	25	To Do
Kamke 1500	✗	0	0	✓	0.126	55	To Do
Kamke 1501	✓	0.16	86	✓	0.127	37	To Do
Kamke 1502	✓	0.059	98	✓	0.27	103	To Do
Kamke 1503	✓	0.47	258	✓	0.014	67	To Do
Kamke 1504	✓	0.105	43	✓	0.11	18	To Do
Kamke 1505	✗	0	0	✓	0.087	79	To Do
Kamke 1506	✓	0.291	150	✓	0.035	43	To Do
Kamke 1507	✗	0	0	✓	0.415	1209	To Do
Kamke 1508	✓	0.639	143	✓	0.078	81	To Do
Kamke 1509	✓	0.008	34	✓	0.032	29	To Do
Kamke 1510	✗	0	0	✗	0	0	To Do
Kamke 1511	✓	0.049	51	✓	0.019	49	To Do
Kamke 1512	✓	0.033	29	✓	0.009	18	To Do
Kamke 1513	✓	0.077	25	✓	0.117	18	To Do
Kamke 1514	✓	0.551	102	✓	0.287	132	To Do
Kamke 1515	✗	0	0	✗	0	0	To Do
Kamke 1516	✗	0	0	✓	0.263	188	To Do
Kamke 1517	✓	0.303	30686	✓	0.326	866	To Do
Kamke 1518	✓	0.246	104	✓	0.24	60	To Do
Kamke 1519	✓	0.023	65	✓	0.082	19	To Do
Kamke 1520	✗	0	0	✓	0.298	288	To Do
Kamke 1521	✓	0.049	35	✓	0.237	28	To Do

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#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 1522	✓	0.014	44	✓	0.024	34	To Do
Kamke 1523	✓	0.28	74	✓	0.231	23	To Do
Kamke 1524	✓	0.133	96	✓	0.302	98	To Do
Kamke 1525	✓	0.341	102	✓	0.363	287	To Do
Kamke 1526	✗	0	0	✓	0.131	19	To Do
Kamke 1527	✗	0	0	✓	0.337	437	To Do
Kamke 1528	✓	0.886	72	✓	0.125	71	To Do
Kamke 1529	✗	0	0	✓	0.046	25	To Do
Kamke 1530	✗	0	0	✓	0.153	113	To Do
Kamke 1531	✗	0	0	✗	0	0	To Do
Kamke 1532	✓	0.012	103	✓	0.058	58	To Do
Kamke 1533	✓	0.012	113	✓	0.05	58	To Do
Kamke 1534	✓	0.004	24	✓	0.008	21	To Do
Kamke 1535	✓	0.349	223	✓	0.013	36	To Do
Kamke 1536	✓	0.004	76	✓	0.01	50	To Do
Kamke 1537	✓	1.003	1722	✓	0.09	67	To Do
Kamke 1538	✓	0.17	66	✓	0.359	51	To Do
Kamke 1539	✓	0.006	44	✓	0.019	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	✓	0.01	41	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1545	✓	0.726	40	✓	0.079	27	To Do
Kamke 1546	✓	0.539	300	✓	0.029	73	To Do
Kamke 1547	✗	0	0	✓	0.011	87	To Do
Kamke 1548	✓	0.082	50	✓	0.052	32	To Do
Kamke 1549	✓	0.012	34	✓	0.014	26	To Do
Kamke 1550	✓	3.082	270	✓	1.279	157	To Do
Kamke 1551	✓	0.303	110	✓	0.144	62	To Do
Kamke 1552	✗	0	0	✓	0.049	89	To Do
Kamke 1553	✓	0.009	29	✓	0.007	17	To Do
Kamke 1554	✓	0.009	29	✓	0.009	18	To Do
Kamke 1555	✓	0.047	156	✓	0.097	61	To Do
Kamke 1556	✓	0.009	30	✓	0.009	19	To Do
Kamke 1557	✓	0.051	146	✓	0.07	61	To Do
Kamke 1558	✓	0.113	319	✓	0.102	67	To Do
Kamke 1559	✓	0.203	100	✓	0.102	33	To Do
Kamke 1560	✓	0.007	29	✓	0.006	18	To Do
Kamke 1561	✓	2.98	400	✓	0.167	69	To Do
Kamke 1562	✓	0.831	140	✓	0.228	77	To Do
Kamke 1563	✓	1.511	232	✓	0.16	87	To Do
Kamke 1564	✓	1.009	230	✓	0.138	88	To Do
Kamke 1565	✓	0.385	242	✓	0.231	71	To Do
Kamke 1566	✓	0.454	238	✓	0.207	35	To Do
Kamke 1567	✓	0.009	30	✓	0.009	19	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1568	✓	0.009	122	✓	0.019	89	To Do
Kamke 1569	✗	0	0	✓	0.29	63	To Do
Kamke 1570	✓	0.102	470	✓	0.062	49	To Do
Kamke 1571	✓	0.063	390	✓	0.144	143	To Do
Kamke 1572	✗	0	0	✓	0.251	35	To Do
Kamke 1573	✗	0	0	✓	0.026	41	To Do
Kamke 1574	✗	0	0	✓	0.508	252	To Do
Kamke 1575	✗	0	0	✓	0.519	638	To Do
Kamke 1576	✗	0	0	✓	0.016	67	To Do
Kamke 1577	✓	0.057	46	✓	0.004	21	To Do
Kamke 1578	✓	47.296	141	✓	0.287	89	To Do
Kamke 1579	✓	0.911	80	✓	0.283	69	To Do
Kamke 1580	✓	2.39	234	✓	0.659	79	To Do
Kamke 1581	✗	0	0	✗	0	0	To Do
Kamke 1582	✓	0.117	787	✗	0	0	To Do
Kamke 1583	✓	0.094	92	✓	0.023	40	To Do
Kamke 1584	✓	2.138	216	✓	0.142	118	To Do
Kamke 1585	✓	0.161	214	✓	0.027	679	To Do
Kamke 1586	✗	0	0	✗	0	0	To Do
Kamke 1587	✓	0.269	492	✓	0.306	154	To Do
Kamke 1588	✓	10.084	114	✓	0.082	90	To Do
Kamke 1589	✓	0.033	670	✓	11.161	4355	To Do
Kamke 1590	✗	0	0	✓	1.386	553	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1591	✓	0.029	26	✓	0.015	12	To Do
Kamke 1592	✓	0.022	14	✓	0.008	10	To Do
Kamke 1593	✗	0	0	✗	0	0	To Do
Kamke 1594	✓	0.332	373	✓	0.079	59	To Do
Kamke 1595	✗	0	0	✗	0	0	To Do
Kamke 1596	✗	0	0	✗	0	0	To Do
Kamke 1597	✓	1.603	242	✓	0.017	21	To Do
Kamke 1598	✗	0	0	✗	0	0	To Do
Kamke 1599	✗	0	0	✗	0	0	To Do
Kamke 1600	✓	1.693	1017	✓	0.056	89	To Do
Kamke 1601	✗	0	0	✓	2.981	151	To Do
Kamke 1602	✓	0.125	47	✓	0.181	73	To Do
Kamke 1603	✗	0	0	✓	25.336	8427	To Do
Kamke 1604	✓	0.041	34	✓	0.18	23	To Do
Kamke 1605	✗	0	0	✓	0.942	107	To Do
Kamke 1606	✗	0	0	✗	0	0	To Do
Kamke 1607	✓	0.08	79	✓	0.109	49	To Do
Kamke 1608	✗	0	0	✗	0	0	To Do
Kamke 1609	✗	0	0	✗	0	0	To Do
Kamke 1610	✓	3.011	754	✓	0.183	92	To Do
Kamke 1611	✗	0	0	✓	0.526	57	To Do
Kamke 1612	✗	0	0	✓	0.983	57	To Do
Kamke 1613	✗	0	0	✓	0.017	27	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1614	✗	0	0	✓	0.052	33	To Do
Kamke 1615	✗	0	0	✓	3.733	91	To Do
Kamke 1616	✗	0	0	✓	0.85	63	To Do
Kamke 1617	✗	0	0	✗	0	0	To Do
Kamke 1618	✗	0	0	✓	1.241	56	To Do
Kamke 1619	✗	0	0	✗	0	0	To Do
Kamke 1620	✓	2.841	492	✓	0.086	253	To Do
Kamke 1621	✓	9.438	990	✓	1.922	1088	To Do
Kamke 1622	✗	0	0	✓	0.244	415	To Do
Kamke 1623	✗	0	0	✗	0	0	To Do
Kamke 1624	✗	0	0	✓	1.295	131	To Do
Kamke 1625	✗	0	0	✗	0	0	To Do
Kamke 1626	✗	0	0	✓	0.17	48	To Do
Kamke 1627	✗	0	0	✓	0.612	58	To Do
Kamke 1628	✗	0	0	✗	0	0	To Do
Kamke 1629	✗	0	0	✓	0.027	38	To Do
Kamke 1630	✓	7.461	3227	✓	0.424	783	To Do
Kamke 1631	✗	0	0	✓	0.04	38	To Do
Kamke 1632	✓	0.05	46	✓	0.075	23	To Do
Kamke 1633	✗	0	0	✓	0.231	97	To Do
Kamke 1634	✗	0	0	✗	0	0	To Do
Kamke 1635	✓	0.58	104	✓	0.154	79	To Do
Kamke 1636	✗	0	0	✓	0.667	59	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1637	✗	0	0	✓	0.401	58	To Do
Kamke 1638	✓	4.597	146	✓	0.161	115	To Do
Kamke 1639	✗	0	0	✓	2.365	56	To Do
Kamke 1640	✓	0.465	96	✓	0.171	70	To Do
Kamke 1641	✓	0.052	61	✓	0.026	29	To Do
Kamke 1642	✗	0	0	✗	0	0	To Do
Kamke 1643	✗	0	0	✗	0	0	To Do
Kamke 1644	✗	0	0	✓	0.381	56	To Do
Kamke 1645	✗	0	0	✗	0	0	To Do
Kamke 1646	✓	10.638	262	✓	0.149	94	To Do
Kamke 1647	✓	0.422	91	✓	0.432	60	To Do
Kamke 1648	✗	0	0	✓	1.137	205	To Do
Kamke 1649	✗	0	0	✗	0	0	To Do
Kamke 1650	✓	0.1	30	✓	0.224	16	To Do
Kamke 1651	✓	0.328	414	✓	0.135	31	To Do
Kamke 1652	✗	0	0	✓	0.226	36	To Do
Kamke 1653	✓	0.139	75	✓	0.104	41	To Do
Kamke 1654	✓	10.315	308	✓	0.181	38	To Do
Kamke 1655	✓	10.698	350	✓	0.197	84	To Do
Kamke 1656	✓	41.147	9706	✓	0.528	771	To Do
Kamke 1657	✓	0.299	192	✓	0.193	35	To Do
Kamke 1658	✗	0	0	✓	0.125	115	To Do
Kamke 1659	✗	0	0	✓	0.076	60	To Do

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#	Mathematica			Maple			note on solution
	solved	cpu	leaf	solved	cpu	leaf	
Kamke 1660	✗	0	0	✓	0.609	125	To Do
Kamke 1661	✓	0.069	92	✓	0.063	51	To Do
Kamke 1662	✗	0	0	✓	0.306	56	To Do
Kamke 1663	✗	0	0	✓	0.782	125	To Do
Kamke 1664	✗	0	0	✓	3.152	155	To Do
Kamke 1665	✗	0	0	✓	0.519	84	To Do
Kamke 1666	✗	0	0	✓	0.776	93	To Do
Kamke 1667	✗	0	0	✓	1.117	121	To Do
Kamke 1668	✓	0.055	60	✓	0.112	24	To Do
Kamke 1669	✓	0.453	160	✓	0.085	32	To Do
Kamke 1670	✓	7.363	51	✓	0.353	35	To Do
Kamke 1671	✓	0.101	59	✓	0.061	35	To Do
Kamke 1672	✗	0	0	✓	0.8	65	To Do
Kamke 1673	✗	0	0	✓	0.61	60	To Do
Kamke 1674	✓	0.042	106	✓	0.049	25	To Do
Kamke 1675	✗	0	0	✗	0	0	To Do
Kamke 1676	✓	0.302	134	✓	0.211	72	To Do
Kamke 1677	✗	0	0	✓	1.272	101	To Do
Kamke 1678	✗	0	0	✓	0.203	60	To Do
Kamke 1679	✓	0.161	33	✓	0.159	27	To Do
Kamke 1680	✗	0	0	✓	0.54	103	To Do
Kamke 1681	✗	0	0	✓	0.037	31	To Do
Kamke 1682	✗	0	0	✓	0.828	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	✓	0.068	26	✓	0.042	23	To Do
Kamke 1684	✗	0	0	✓	1.04	100	To Do
Kamke 1685	✗	0	0	✗	0	0	To Do
Kamke 1686	✗	0	0	✓	0.987	128	To Do
Kamke 1687	✓	0.07	262	✓	0.083	21	To Do
Kamke 1688	✓	0.513	189	✓	0.076	32	To Do
Kamke 1689	✓	0.251	104	✓	0.105	37	To Do
Kamke 1690	✗	0	0	✓	0.414	99	To Do
Kamke 1691	✗	0	0	✓	0.69	254	To Do
Kamke 1692	✗	0	0	✓	3.769	156	To Do
Kamke 1693	✗	0	0	✓	0.217	68	To Do
Kamke 1694	✓	0.113	115	✓	0.109	54	To Do
Kamke 1695	✗	0	0	✓	0.55	103	To Do
Kamke 1696	✗	0	0	✓	0.457	100	To Do
Kamke 1697	✓	0.163	94	✓	0.03	39	To Do
Kamke 1698	✓	0.03	72	✗	0	0	To Do
Kamke 1699	✓	0.113	40	✓	0.076	33	To Do
Kamke 1700	✓	0.155	44	✓	0.246	86	To Do
Kamke 1701	✓	0.17	80	✓	0.211	42	To Do
Kamke 1702	✗	0	0	✗	0	0	To Do
Kamke 1703	✓	0.291	77	✓	0.048	21	To Do
Kamke 1704	✗	0	0	✗	0	0	To Do
Kamke 1705	✓	0.269	252	✗	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	✓	0.502	308	✗	0	0	To Do
Kamke 1707	✓	0.057	31	✓	0.056	39	To Do
Kamke 1708	✗	0	0	✓	0.806	73	To Do
Kamke 1709	✗	0	0	✓	1.599	84	To Do
Kamke 1710	✗	0	0	✓	2.415	91	To Do
Kamke 1711	✓	22.093	9987	✓	0.385	81	To Do
Kamke 1712	✓	0.058	75	✓	0.067	61	To Do
Kamke 1713	✗	0	0	✓	0.223	54	To Do
Kamke 1714	✓	0.123	25	✓	0.05	68	To Do
Kamke 1715	✓	0.114	26	✓	0.042	25	To Do
Kamke 1716	✓	0.538	172	✓	0.167	68	To Do
Kamke 1717	✓	1.116	49	✓	0.21	107	To Do
Kamke 1718	✓	1.272	744	✓	0.207	133	To Do
Kamke 1719	✗	0	0	✓	0.405	70	To Do
Kamke 1720	✗	0	0	✓	0.287	173	To Do
Kamke 1721	✗	0	0	✗	0	0	To Do
Kamke 1722	✓	11.209	697	✓	0.325	98	To Do
Kamke 1723	✓	0.697	130	✓	0.092	16	To Do
Kamke 1724	✓	0.289	38	✓	0.467	21	To Do
Kamke 1725	✓	2.241	75	✓	0.438	105	To Do
Kamke 1726	✓	0.252	77	✓	0.082	39	To Do
Kamke 1727	✓	0.354	166	✓	0.322	823	To Do
Kamke 1728	✓	0.004	31	✓	0.026	24	To Do

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Table 3 – continued from previous page

#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 1729	✗	0	0	✗	0	0	To Do
Kamke 1730	✓	0.726	135	✓	0.063	53	To Do
Kamke 1731	✓	1.001	351	✓	0.085	61	To Do
Kamke 1732	✗	0	0	✗	0	0	To Do
Kamke 1733	✓	1.92	437	✓	0.069	71	To Do
Kamke 1734	✗	0	0	✗	0	0	To Do
Kamke 1735	✗	0	0	✗	0	0	To Do
Kamke 1736	✓	6.147	129	✓	0.069	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	✓	0.091	16	✓	0.029	13	To Do
Kamke 1741	✓	0.109	17	✓	0.056	34	To Do
Kamke 1742	✗	0	0	✓	0.158	60	To Do
Kamke 1743	✓	18.048	2761	✓	0.073	71	To Do
Kamke 1744	✓	0.533	155	✓	0.308	823	To Do
Kamke 1745	✓	0.704	251	✓	0.402	117	To Do
Kamke 1746	✗	0	0	✓	0.305	207	To Do
Kamke 1747	✓	0.099	20	✓	0.013	17	To Do
Kamke 1748	✓	0.179	43	✓	0.099	67	To Do
Kamke 1749	✓	0.457	153	✓	0.295	57	To Do
Kamke 1750	✓	3.565	2281	✓	0.313	87	To Do
Kamke 1751	✗	0	0	✗	0	0	To Do

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Table 3 – continued from previous page

#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 1752	✓	0.151	26	✓	0.074	33	To Do
Kamke 1753	✓	0.305	43	✓	0.105	147	To Do
Kamke 1754	✓	0.11	17	✓	0.032	15	To Do
Kamke 1755	✓	6.299	716	✓	0.217	418	To Do
Kamke 1756	✓	0.631	211	✓	0.115	75	To Do
Kamke 1757	✗	0	0	✗	0	0	To Do
Kamke 1758	✓	0.327	36	✓	0.05	42	To Do
Kamke 1759	✓	0.131	18	✓	0.023	31	To Do
Kamke 1760	✓	0.078	108	✓	0.056	114	To Do
Kamke 1761	✗	0	0	✗	0	0	To Do
Kamke 1762	✗	0	0	✓	0.703	108	To Do
Kamke 1763	✓	0.221	40	✓	0.045	148	To Do
Kamke 1764	✓	0.051	52	✓	0.135	18	To Do
Kamke 1765	✓	0.24	34	✓	0.025	27	To Do
Kamke 1766	✓	0.141	21	✓	0.029	64	To Do
Kamke 1767	✓	0.263	55	✓	0.276	50	To Do
Kamke 1768	✓	0.039	53	✓	0.04	43	To Do
Kamke 1769	✓	0.133	18	✓	0.033	21	To Do
Kamke 1770	✓	0.585	28	✓	0.045	26	To Do
Kamke 1771	✓	0.1	21	✓	0.128	22	To Do
Kamke 1772	✓	0.56	37	✓	0.116	37	To Do
Kamke 1773	✓	0.31	44	✓	0.026	30	To Do
Kamke 1774	✓	1.284	92	✓	0.191	136	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 1775	✓	0.108	29	✓	0.071	31	To Do
Kamke 1776	✓	8.099	1743	✓	0.233	49	To Do
Kamke 1777	✗	0	0	✓	0.507	79	To Do
Kamke 1778	✓	0.192	65	✓	0.426	245	To Do
Kamke 1779	✗	0	0	✓	0.4	112	To Do
Kamke 1780	✗	0	0	✓	0.44	160	To Do
Kamke 1781	✓	0.18	46	✓	0.042	11	To Do
Kamke 1782	✓	0.156	93	✓	0.04	33	To Do
Kamke 1783	✓	1.035	26	✓	0.125	23	To Do
Kamke 1784	✓	0.259	74	✓	0.639	82	To Do
Kamke 1785	✓	0.315	95	✓	0.279	83	To Do
Kamke 1786	✓	0.06	53	✓	0.138	42	To Do
Kamke 1787	✓	0.908	170	✓	0.244	80	To Do
Kamke 1788	✗	0	0	✗	0	0	To Do
Kamke 1789	✗	0	0	✗	0	0	To Do
Kamke 1790	✓	0.616	186	✓	0.229	119	To Do
Kamke 1791	✓	0.733	168	✓	0.246	90	To Do
Kamke 1792	✓	1.162	226	✓	0.351	194	To Do
Kamke 1793	✓	0.126	83	✓	0.049	40	To Do
Kamke 1794	✓	0.142	69	✓	0.062	46	To Do
Kamke 1795	✓	0.236	116	✓	1.019	529	To Do
Kamke 1796	✓	0.245	363	✓	0.185	51	To Do
Kamke 1797	✗	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 1798	✗	0	0	✓	0.179	166	To Do
Kamke 1799	✓	1.383	88	✓	0.099	46	To Do
Kamke 1800	✓	0.469	84	✓	0.036	60	To Do
Kamke 1801	✗	0	0	✗	0	0	To Do
Kamke 1802	✗	0	0	✗	0	0	To Do
Kamke 1803	✓	21.976	10387	✓	1.712	115620	To Do
Kamke 1804	✓	2.438	415	✓	0.026	31	To Do
Kamke 1805	✓	0.323	438	✓	0.033	34	To Do
Kamke 1806	✗	0	0	✓	2.356	733	To Do
Kamke 1807	✗	0	0	✗	0	0	To Do
Kamke 1808	✓	1.038	124	✓	0.105	72	To Do
Kamke 1809	✗	0	0	✓	0.342	336	To Do
Kamke 1810	✓	0.077	1677	✓	0.095	91	To Do
Kamke 1811	✗	0	0	✗	0	0	To Do
Kamke 1812	✓	0.264	29	✓	0.092	19	To Do
Kamke 1813	✓	31.532	176	✓	0.32	138	To Do
Kamke 1814	✓	0.345	120	✓	0.118	87	To Do
Kamke 1815	✗	0	0	✓	0.707	71	To Do
Kamke 1816	✗	0	0	✓	1.441	46	To Do
Kamke 1817	✗	0	0	✓	0.322	40	To Do
Kamke 1818	✗	0	0	✓	0.299	66	To Do
Kamke 1819	✗	0	0	✓	0.039	42	To Do
Kamke 1820	✗	0	0	✓	0.684	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	✓	2.261	54	To Do
Kamke 1822	✓	0.861	371	✓	1.137	291	To Do
Kamke 1823	✗	0	0	✓	0.382	289	To Do
Kamke 1824	✓	0.721	347	✓	0.667	96	To Do
Kamke 1825	✗	0	0	✓	0.793	49	To Do
Kamke 1826	✓	0.796	201	✓	0.305	173	To Do
Kamke 1827	✗	0	0	✓	2.044	81	To Do
Kamke 1828	✓	0.008	32	✓	0.498	59	To Do
Kamke 1829	✓	0.006	24	✓	0.256	36	To Do
Kamke 1830	✓	0.023	24	✓	0.403	308	To Do
Kamke 1831	✗	0	0	✓	1.269	163	To Do
Kamke 1832	✗	0	0	✓	0.852	117	To Do
Kamke 1833	✗	0	0	✓	6.394	162	To Do
Kamke 1834	✗	0	0	✓	0.424	92	To Do
Kamke 1835	✓	0.08	143	✗	0	0	To Do
Kamke 1836	✗	0	0	✓	1.033	116	To Do
Kamke 1837	✗	0	0	✓	0.487	95	To Do
Kamke 1838	✗	0	0	✓	0.593	73	To Do
Kamke 1839	✗	0	0	✓	0.998	116	To Do
Kamke 1840	✗	0	0	✓	0.885	129	To Do
Kamke 1841	✗	0	0	✓	0.363	60	To Do
Kamke 1842	✓	0.16	286	✓	0.569	190	To Do
Kamke 1843	✓	2.038	409	✓	0.251	77	To Do

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Table 3 – continued from previous page

#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 1844	✗	0	0	✓	0.197	17	To Do
Kamke 1845	✗	0	0	✓	0.135	22	To Do
Kamke 1846	✓	0.036	51	✓	0.008	28	To Do
Kamke 1847	✓	0.173	95	✓	0.148	49	To Do
Kamke 1848	✓	0.403	187	✓	1.139	789	To Do
Kamke 1849	✓	0.608	426	✓	0.115	197	To Do
Kamke 1850	✗	0	0	✓	1.495	164	To Do
Kamke 1851	✗	0	0	✗	0	0	To Do
Kamke 1852	✓	0.108	28	✓	0.128	28	To Do
Kamke 1853	✗	0	0	✓	0.589	110	To Do
Kamke 1854	✗	0	0	✗	0	0	To Do
Kamke 1855	✗	0	0	✗	0	0	To Do
Kamke 1856	✓	0.007	22	✓	0.029	19	To Do
Kamke 1857	✓	0.006	39	✓	0.038	35	To Do
Kamke 1858	✓	0.007	182	✓	0.04	64	To Do
Kamke 1859	✓	0.004	51	✓	0.029	38	To Do
Kamke 1860	✓	0.032	696	✓	0.057	177	To Do
Kamke 1861	✓	0.009	183	✓	0.077	152	To Do
Kamke 1862	✓	0.01	52	✓	0.027	39	To Do
Kamke 1863	✓	0.006	84	✓	0.024	35	To Do
Kamke 1864	✓	0.009	59	✓	0.029	44	To Do
Kamke 1865	✓	0.804	2062	✓	0.094	224	To Do
Kamke 1866	✓	0.037	132	✓	0.025	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	✓	0.088	124	✓	0.026	42	To Do
Kamke 1868	✓	0.077	162	✓	0.053	64	To Do
Kamke 1869	✓	0.084	118	✓	0.046	51	To Do
Kamke 1870	✓	0.138	122	✓	0.082	47	To Do
Kamke 1871	✓	0.317	180	✓	0.065	62	To Do
Kamke 1872	✓	0.114	162	✓	0.049	65	To Do
Kamke 1873	✓	0.091	322	✓	0.046	52	To Do
Kamke 1874	✓	0.007	115	✓	0.317	57	To Do
Kamke 1875	✗	0	0	✓	1.095	2606	To Do
Kamke 1876	✓	0.017	39	✓	0.105	18	To Do
Kamke 1877	✓	0.004	31	✓	0.024	31	To Do
Kamke 1878	✓	0.01	39	✓	0.042	39	To Do
Kamke 1879	✓	0.017	58	✓	0.035	54	To Do
Kamke 1880	✗	0	0	✓	0.059	23	To Do
Kamke 1881	✓	0.006	44	✓	0.021	48	To Do
Kamke 1882	✓	1.629	928	✓	0.062	99	To Do
Kamke 1883	✓	0.936	602	✓	0.086	80	To Do
Kamke 1884	✓	0.451	224	✓	0.073	69	To Do
Kamke 1885	✗	0	0	✓	0.075	47	To Do
Kamke 1886	✓	0.015	115	✓	0.041	49	To Do
Kamke 1887	✓	0.354	5748	✓	0.086	360	To Do
Kamke 1888	✓	16.103	35330	✓	0.141	457	To Do
Kamke 1889	✓	0.203	554	✓	0.033	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	✓	0.914	742	✓	0.033	64	To Do
Kamke 1892	✓	0.261	4815	✓	0.095	463	To Do
Kamke 1893	✓	0.443	5546	✓	0.711	1579	To Do
Kamke 1894	✓	0.45	3386	✓	0.506	1056	To Do
Kamke 1895	✓	0.295	7517	✓	0.151	1008	To Do
Kamke 1896	✓	0.496	1132	✓	0.039	67	To Do
Kamke 1897	✓	0.212	280	✓	0.118	86	To Do
Kamke 1898	✓	0.025	420	✓	0.046	71	To Do
Kamke 1899	✓	0.008	112	✓	0.056	52	To Do
Kamke 1900	✓	0.007	94	✓	0.058	50	To Do
Kamke 1901	✓	0.008	105	✓	0.049	43	To Do
Kamke 1902	✓	0.017	226	✓	0.047	51	To Do
Kamke 1903	✓	0.062	1304	✓	0.111	299	To Do
Kamke 1904	✓	0.046	1445	✓	0.071	257	To Do
Kamke 1905	✗	0	0	✗	0	0	To Do
Kamke 1906	✓	0.039	278	✓	0.055	120	To Do
Kamke 1907	✓	0.008	179	✓	0.046	66	To Do
Kamke 1908	✓	0.014	551	✓	0.417	1225	To Do
Kamke 1909	✓	0.041	1630	✓	14.222	33085	To Do
Kamke 1910	✓	0.007	39	✓	0.069	37	To Do
Kamke 1911	✗	0	0	✓	0.106	309	To Do
Kamke 1912	✗	0	0	✓	1.556	2956	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 1913	✓	0.019	64	✓	0.089	57	To Do
Kamke 1914	✓	0.249	204	✓	0.282	92	To Do
Kamke 1915	✗	0	0	✓	2.968	147	To Do
Kamke 1916	✓	0.34	557	✓	0.333	180	To Do
Kamke 1917	✓	213.617	3406	✓	0.696	109	To Do
Kamke 1918	✗	0	0	✓	1.627	184	To Do
Kamke 1919	✗	0	0	✓	2.577	203	To Do
Kamke 1920	✗	0	0	✓	2.559	205	To Do
Kamke 1921	✗	0	0	✗	0	0	To Do
Kamke 1922	✗	0	0	✗	0	0	To Do
Kamke 1923	✓	0.009	53	✓	0.03	35	To Do
Kamke 1924	✓	0.052	191	✓	0.24	180	To Do
Kamke 1925	✗	0	0	✓	0.207	194	To Do
Kamke 1926	✗	0	0	✓	0.105	96	To Do
Kamke 1927	✗	0	0	✗	0	0	To Do
Kamke 1928	✗	0	0	✗	0	0	To Do
Kamke 1929	✗	0	0	✓	2.447	116	To Do
Kamke 1930	✓	0.03	308	✓	0.04	45	To Do
Kamke 1931	✓	3.952	10101	✓	0.513	1117	To Do
Kamke 1932	✗	0	0	✓	0.741	383	To Do
Kamke 1933	✗	0	0	✓	1.892	17738	To Do
Kamke 1934	✗	0	0	✓	1.137	377	To Do
Kamke 1935	✗	0	0	✓	1.381	741	To Do

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Table 3 – continued from previous page

#	Mathematica			Maple			note on solution
	solved	cpu	leaf	solved	cpu	leaf	
Kamke 1936	✗	0	0	✓	0.565	704	To Do
Kamke 1937	✗	0	0	✓	0.5	242	To Do
Kamke 1938	✓	0.007	137	✓	0.093	101	To Do
Kamke 1939	✗	0	0	✓	1.106	899	To Do
Kamke 1940	✗	0	0	✗	0	0	To Do

2.1 ODE No. 1

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

✓ **Mathematica** : cpu = 0.424041 (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 = 0.032 (sec), leaf count = 1089

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

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 = 0.0352105 (sec), leaf count = 34

$$\left\{\left\{y(x) \to \frac{ce^{x(a+b)-ax}}{a+b} + c_1e^{-ax}\right\}\right\}$$

✓ **Maple** : cpu = 0.013 (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 = 0.0547595 (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 = 0.026 (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 = 0.0134691 (sec), leaf count = 30

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

✓ **Maple** : cpu = 0.004 (sec), leaf count = 18

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

Hand solution

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

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

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

Integrating both sides

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

2.5 ODE No. 5

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

✓ **Mathematica** : cpu = 0.381841 (sec), leaf count = 39

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

✓ **Maple** : cpu = 0.081 (sec), leaf count = 21

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

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 = 0.0197433 (sec), leaf count = 18

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

✓ **Maple** : cpu = 0.02 (sec), leaf count = 15

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

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

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

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 = 0.0329995 (sec), leaf count = 23

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

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

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

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

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

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 = 0.0186674 (sec), leaf count = 17

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

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

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

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 = 0.015432 (sec), leaf count = 19

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

✓ **Maple** : cpu = 0.013 (sec), leaf count = 14

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

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

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

Hence the integration factor is

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

Therefore (1) becomes

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

Integrating

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

2.10 ODE No. 10

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

✓ **Mathematica** : cpu = 0.0128871 (sec), leaf count = 18

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

✓ **Maple** : cpu = 0.01 (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 = 0.0191528 (sec), leaf count = 66

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

✓ **Maple** : cpu = 0.018 (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 = 0.0718015 (sec), leaf count = 34

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

✓ **Maple** : cpu = 0.033 (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 = 0.0743389 (sec), leaf count = 79

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

✓ **Maple** : cpu = 0.132 (sec), leaf count = 79

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

Hand solution

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

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

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

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

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

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 = 0.0853086 (sec), leaf count = 254

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

✓ **Maple** : cpu = 0.072 (sec), leaf count = 187

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

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

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

So we have new second order ODE

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

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

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

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

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

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

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

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

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

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

✓ **Mathematica** : cpu = 0.0665507 (sec), leaf count = 25

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

✓ **Maple** : cpu = 0.136 (sec), leaf count = 35

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

Hand solution

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

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

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

Hence

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

This is separable

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

Integrating both sides

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

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

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

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

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

Since $u = y - x^2$ then

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

To obtain same solution as Maple, we divide by C_1

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

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

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

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

2.16 ODE No. 16

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

✓ **Mathematica** : cpu = 0.0366519 (sec), leaf count = 186

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

✓ **Maple** : cpu = 0.068 (sec), leaf count = 49

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

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

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

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

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

Hence

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

Equating (1) and (2) gives

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

Hence

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

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

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

Integrating both sides

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

Hence

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

Hence

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

2.17 ODE No. 17

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

✓ **Mathematica** : cpu = 0.0525925 (sec), leaf count = 34

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

✓ **Maple** : cpu = 0.092 (sec), leaf count = 24

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

Hand solution

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

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

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

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

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

Hence

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

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

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

And

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

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

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

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

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

Dividing by e^{-x}

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

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

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

2.18 ODE No. 18

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

✓ **Mathematica** : cpu = 0.0728682 (sec), leaf count = 50

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

✓ **Maple** : cpu = 0.052 (sec), leaf count = 39

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

Hand solution

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

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

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

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

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

Hence

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

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

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

Integrating both sides

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

But

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

Hence

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

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

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

Or

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

2.19 ODE No. 19

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

✓ **Mathematica** : cpu = 0.0565716 (sec), leaf count = 30

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

✓ **Maple** : cpu = 0.034 (sec), leaf count = 16

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

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

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

Since $u = y + x$ then

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

2.20 ODE No. 20

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

✓ **Mathematica** : cpu = 0.074442 (sec), leaf count = 49

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

✓ **Maple** : cpu = 0.05 (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 = 0.322139 (sec), leaf count = 7

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

✓ **Maple** : cpu = 0.103 (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

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

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

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

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

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

2.22 ODE No. 22

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

✓ **Mathematica** : cpu = 0.424576 (sec), leaf count = 113

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

✓ **Maple** : cpu = 0.337 (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

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

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

$$y_p = \tan(x)$$

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

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

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

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

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

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

Equating this to (1) gives

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

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

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

Hence

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

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

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

And

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

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

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

Integrating both sides

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

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

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

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

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

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

a solution is

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

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

you can now set the other solution

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

2.23 ODE No. 23

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

✓ **Mathematica** : cpu = 0.062718 (sec), leaf count = 43

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

✓ **Maple** : cpu = 0.033 (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

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

✓ **Mathematica** : cpu = 0.0970147 (sec), leaf count = 277

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

✓ **Maple** : cpu = 0.05 (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

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

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

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

Hence

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

Therefore (1) becomes

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

Hence

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

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

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

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

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

$$
\begin{aligned}
J'_m(x) &= \frac{1}{2}(J_{m-1}(x) - J_{m+1}(x)) \\
Y'_m(x) &= \frac{1}{2}(Y_{m-1}(x) - Y_{m+1}(x)) \\
I'_m(x) &= \frac{1}{2}(I_{m-1}(x) + I_{m+1}(x)) \\
K'_m(x) &= -\frac{1}{2}(K_{m-1}(x) + K_{m+1}(x))
\end{aligned}
$$

Using these, then

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

Hence for $ab < 0$

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

Using derivatives the above becomes

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

Similar result can be found for $ab > 0$

2.25 ODE No. 25

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

✓ **Mathematica** : cpu = 0.305905 (sec), leaf count = 1835

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

✓ **Maple** : cpu = 0.258 (sec), leaf count = 348

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

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 = 0.181778 (sec), leaf count = 68

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

✓ **Maple** : cpu = 0.057 (sec), leaf count = 45

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

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 = 0.157792 (sec), leaf count = 24

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

✓ **Maple** : cpu = 0.138 (sec), leaf count = 72

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

Hand solution

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

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

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

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

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

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

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

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

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

But

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

Therefore

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

Hence

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

Since $u=y-x$ then

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

Verification

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

2.28 ODE No. 28

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

✓ **Mathematica** : cpu = 0.102271 (sec), leaf count = 96

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

✓ **Maple** : cpu = 0.073 (sec), leaf count = 51

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

Hand solution

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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 = 0.0736526 (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 = 0.01 (sec), leaf count = 19

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

Hand solution

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

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 = 0.154188 (sec), leaf count = 230

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

✓ **Maple** : cpu = 0.06 (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 $u=\sum_{n=0}^{\infty}c_nx^n$ is used when the expansion point is not singular point. (i.e. $p(x)$ and $q(x)$ are analytic there). Forbenius series $u=x^r\sum_{n=0}^{\infty}c_nx^n$ is used when there is a removable singular point (called also regular singular point), as in this case. Starting with

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

Hence

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

Substituting in (2) gives

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

Dividing out x^r

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

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

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

Expanding the second term

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

Hence for $n=0$

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

Since $c_0\neq 0$ then

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

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

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

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 = 0.129904 (sec), leaf count = 21

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

✓ **Maple** : cpu = 0.036 (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 = 0.31515 (sec), leaf count = 34

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

✓ **Maple** : cpu = 0.224 (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 = 0.358938 (sec), leaf count = 160

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

✓ **Maple** : cpu = 0.359 (sec), leaf count = 58

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

Hand solution

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

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 = 0.0927555 (sec), leaf count = 54

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

✓ **Maple** : cpu = 0.02 (sec), leaf count = 28

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

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 $e^{-\int gdx}$ hence

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

Hence

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

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 = 0.116346 (sec), leaf count = 61

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

✓ **Maple** : cpu = 0.037 (sec), leaf count = 35

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

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

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

Therefore

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

Verification

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

2.36 ODE No. 36

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

✓ **Mathematica** : cpu = 0.262492 (sec), leaf count = 195

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

✓ **Maple** : cpu = 0.068 (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

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

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 = 0.755059 (sec), leaf count = 78

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

✓ **Maple** : cpu = 0.066 (sec), leaf count = 50

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

2.38 ODE No. 38

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

✓ **Mathematica** : cpu = 0.15699 (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 = 0.02 (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 = 0.121109 (sec), leaf count = 54

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

✓ **Maple** : cpu = 0.01 (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 = 0.320318 (sec), leaf count = 185

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

✓ **Maple** : cpu = 0.051 (sec), leaf count = 48

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

2.41 ODE No. 41

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

✓ **Mathematica** : cpu = 0.163278 (sec), leaf count = 103

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

✓ **Maple** : cpu = 0.181 (sec), leaf count = 103

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

2.42 ODE No. 42

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

✓ **Mathematica** : cpu = 0.842533 (sec), leaf count = 485

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

✓ **Maple** : cpu = 0.02 (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 = 5.71825 (sec), leaf count = 490

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

✓ **Maple** : cpu = 1.246 (sec), leaf count = 373

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

2.44 ODE No. 44

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

✓ **Mathematica** : cpu = 0.0735979 (sec), leaf count = 72

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

✓ **Maple** : cpu = 0.014 (sec), leaf count = 53

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

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 $e^{-4\int xdx} = e^{-2x^2}$ 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

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

Hence

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

Or

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

Verification

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

2.45 ODE No. 45

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

✓ **Mathematica** : cpu = 0.499621 (sec), leaf count = 133

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

✓ **Maple** : cpu = 0.096 (sec), leaf count = 123

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

2.46 ODE No. 46

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

✓ **Mathematica** : cpu = 0.254204 (sec), leaf count = 228

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

✓ **Maple** : cpu = 0.075 (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

$$-a\left(x^{n}-x\right)y(x)^{3}+y'(x)-y(x)^{2}=0$$

✗ **Mathematica** : cpu = 28.2865 (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

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

✗ **Mathematica** : cpu = 30.3707 (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

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

✗ **Mathematica** : cpu = 25.6358 (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 = 300.075 (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 = 1.54225 (sec), leaf count = 355

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

✓ **Maple** : cpu = 0.151 (sec), leaf count = 237

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

2.52 ODE No. 52

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

✓ **Mathematica** : cpu = 0.23076 (sec), leaf count = 117

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

✓ **Maple** : cpu = 0.322 (sec), leaf count = 61

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

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 = 0.413774 (sec), leaf count = 96

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

✓ **Maple** : cpu = 0.126 (sec), leaf count = 281

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

2.54 ODE No. 54

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

✓ **Mathematica** : cpu = 0.316594 (sec), leaf count = 74

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

✓ **Maple** : cpu = 0.129 (sec), leaf count = 38

$$\left\{\frac{a y(x)}{n f(x)} \mathit{LerchPhi}\left(-\left(\frac{a y(x)}{f(x)}\right)^n, 1, n^{-1}\right) - a g(x) + \_C1 = 0\right\}$$

2.55 ODE No. 55

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

✗ **Mathematica** : cpu = 3.82748 (sec), leaf count = 0 , could not solve

```
DSolve[-h[x] - g[x]*y[x] - f[x]*y[x]^n + Derivative[1][y][x] == 0, y[x], x]
```

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

```
dsolve(diff(y(x),x)-f(x)*y(x)^n-g(x)*y(x)-h(x) = 0,y(x))
```

2.56 ODE No. 56

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

✗ **Mathematica** : cpu = 1.5787 (sec), leaf count = 0 , could not solve

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

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

```
dsolve(diff(y(x),x)-f(x)*y(x)^a-g(x)*y(x)^b = 0,y(x))
```

2.57 ODE No. 57

$$y'(x) - \sqrt{|y(x)|} = 0$$

✓ **Mathematica** : cpu = 0.0525326 (sec), leaf count = 26

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[\int_1^{\#1} \frac{1}{\sqrt{|K[1]|}} dK[1]\&\right][c_1 + x]\right\}\right\}$$

✓ **Maple** : cpu = 0.062 (sec), leaf count = 31

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

2.58 ODE No. 58

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

✓ **Mathematica** : cpu = 0.222643 (sec), leaf count = 118

$$\text{Solve}\left[\frac{a^2\left(-\log\left(a^2\left(\sqrt{\frac{a^2y(x)}{b^2x^2}} + 1\right) - \frac{2a^2y(x)}{bx^2}\right) - \frac{2a\tanh^{-1}\left(\frac{a\left(1 - \frac{4b\sqrt{\frac{a^2y(x)}{b^2x^2}}}{a^2}\right)}{\sqrt{a^2+8b}}\right)}{\sqrt{a^2+8b}}\right)}{2b} = \frac{a^2\log(x)}{b} + c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.062 (sec), leaf count = 68

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

2.59 ODE No. 59

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

✓ **Mathematica** : cpu = 0.229127 (sec), leaf count = 96

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

✓ **Maple** : cpu = 0.059 (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 = 0.11609 (sec), leaf count = 173

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

✓ **Maple** : cpu = 0.013 (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 = 0.197434 (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 = 0.01 (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 = 2.63674 (sec), leaf count = 44

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

✓ **Maple** : cpu = 0.29 (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

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

Hence

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

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

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

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

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

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

From (3)

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

From (4)

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

Therefore

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

From (5) we find

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

Since $dU = 0$ then

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

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

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

Hence

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

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 = 0.189875 (sec), leaf count = 48

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[\int_1^{\#1} \frac{\left|K[1] + \sqrt{K[1]+1}\right|}{K[1]^2+1} dK[1]\&\right]\left[c_1 - \frac{2}{\sqrt{x+1}}\right]\right\}\right\}$$

✓ **Maple** : cpu = 5.093 (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 = 0.307698 (sec), leaf count = 269

$$\left\{\left\{y(x) \to \frac{e^{-\sqrt{a}c_1}\left(8a^{3/2}ce^{2\sqrt{a}c_1}\sqrt{ax^2+bx+c} - 8a^{3/2}c\sqrt{ax^2+bx+c} + 8a^2cxe^{2\sqrt{a}c_1} + 8a^2cx + 2b^3e^{\sqrt{a}c_1} \right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.073 (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 = 0.953975 (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 = 0.038 (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 = 0.166086 (sec), leaf count = 67

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[\int_1^{\#1}\frac{1}{\sqrt{|(1-K[1])K[1](1-aK[1])|}}dK[1]\&\right]\left[\int_1^{x}\frac{1}{\sqrt{|(1-K[2])K[2](1-a\right.}}\right.\right.$$

✓ **Maple** : cpu = 0.087 (sec), leaf count = 40

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

2.67 ODE No. 67

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

✓ **Mathematica** : cpu = 0.125916 (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 = 0.013 (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 = 0.714945 (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 = 0.048 (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 = 7.75649 (sec), leaf count = 1163

$$\mathrm{Solve}\left[-\frac{2F\left(\sin^{-1}\left(\sqrt{\frac{(\mathrm{Root}[\mathrm{b4}\#1^4+\mathrm{b3}\#1^3+\mathrm{b2}\#1^2+\mathrm{b1}\#1+\mathrm{b0}\&,2]-\mathrm{Root}[\mathrm{b4}\#1^4+\mathrm{b3}\#1^3+\mathrm{b2}\#1^2+\mathrm{b1}\#1+\mathrm{b0}\&,4])(y(x)-\mathrm{Root}[\mathrm{b4}}{(\mathrm{Root}[\mathrm{b4}\#1^4+\mathrm{b3}\#1^3+\mathrm{b2}\#1^2+\mathrm{b1}\#1+\mathrm{b0}\&,1]-\mathrm{Root}[\mathrm{b4}\#1^4+\mathrm{b3}\#1^3+\mathrm{b2}\#1^2+\mathrm{b1}\#1+\mathrm{b0}\&,4])(y(x)-\mathrm{Root}[\mathrm{b4}}}\right.\right.}{}\right.$$

✓ **Maple** : cpu = 0.108 (sec), leaf count = 111

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

2.70 ODE No. 70

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

✓ **Mathematica** : cpu = 12.6908 (sec), leaf count = 81

$$\left\{\left\{y(x)\to\mathrm{InverseFunction}\left[\int_1^{\#1}\sqrt{\mathrm{b4}K[1]^4+\mathrm{b3}K[1]^3+\mathrm{b2}K[1]^2+\mathrm{b1}K[1]+\mathrm{b0}}dK[1]\&\right]\left[\int_1^{x}\sqrt{\mathrm{a4}K[2\right.\right.\right.$$

✓ **Maple** : cpu = 0.124 (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 = 2.76243 (sec), leaf count = 2237

$$\text{Solve}\left[-\frac{2F\left(\sin^{-1}\left(\sqrt{\frac{(\text{Root}[\text{b4}\#1^4+\text{b3}\#1^3+\text{b2}\#1^2+\text{b1}\#1+\text{b0}\&,2]-\text{Root}[\text{b4}\#1^4+\text{b3}\#1^3+\text{b2}\#1^2+\text{b1}\#1+\text{b0}\&,4])(y(x)-\text{Root}[\text{b4}}{(\text{Root}[\text{b4}\#1^4+\text{b3}\#1^3+\text{b2}\#1^2+\text{b1}\#1+\text{b0}\&,1]-\text{Root}[\text{b4}\#1^4+\text{b3}\#1^3+\text{b2}\#1^2+\text{b1}\#1+\text{b0}\&,4])(y(x)-\text{Root}[\text{b4}}}\right.\right.}{}\right.$$

✓ **Maple** : cpu = 0.095 (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 = 0.160829 (sec), leaf count = 89

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

✓ **Maple** : cpu = 0.009 (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 = 1.33889 (sec), leaf count = 733

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

✓ **Maple** : cpu = 0.246 (sec), leaf count = 91

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

2.74 ODE No. 74

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

✗ **Mathematica** : cpu = 2.14211 (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 = 0.15306 (sec), leaf count = 20

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

✓ **Maple** : cpu = 0.121 (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

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

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

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

Hence

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

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 = 0.13375 (sec), leaf count = 116

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

✓ **Maple** : cpu = 0.036 (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.

$$\begin{aligned} \frac{dy}{a\cos y + b} &= dx \\ \int \frac{dy}{a\cos y + b} &= x + C \end{aligned} \tag{1}$$

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

$$
\begin{aligned}
\int \frac{dy}{a\cos y + b} &= \int \frac{2}{1+t^2}\frac{1}{\left(a\frac{1-t^2}{1+t^2}+b\right)}dt \\
&= 2\int \frac{1+t^2}{(1+t^2)\left(a\left(1-t^2\right)+b\left(1+t^2\right)\right)}dt \\
&= 2\int \frac{dt}{a-at^2+b+bt^2} \\
&= 2\int \frac{dt}{(a+b)+t^2\left(b-a\right)} \\
&= 2\int \frac{dt}{(a+b)\left(1+\frac{t^2(b-a)}{(a+b)}\right)} \\
&= \frac{2}{a+b}\int \frac{dt}{\left(1+\frac{t^2(b-a)}{(a+b)}\right)}
\end{aligned}
$$

Let $z^2 = \frac{t^2(b-a)}{(a+b)}$, or $z = \frac{t\sqrt{b-a}}{\sqrt{a+b}}$, then $\frac{dz}{dt} = \frac{\sqrt{b-a}}{\sqrt{a+b}}$ and the above integral becomes

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

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

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

But $t = \tan\frac{y}{2}$ therefore

$$\frac{2}{\sqrt{b^2-a^2}}\arctan\left(\frac{t\sqrt{b-a}}{\sqrt{a+b}}\right)=\frac{2}{\sqrt{b^2-a^2}}\arctan\left(\frac{\tan\left(\frac{y}{2}\right)\sqrt{b-a}}{\sqrt{a+b}}\right)$$

Going back to (1)

$$\begin{aligned}
\int\frac{dy}{a\cos y+b}&=x+C\\
\frac{2}{\sqrt{b^2-a^2}}\arctan\left(\frac{\tan\left(\frac{y}{2}\right)\sqrt{b-a}}{\sqrt{a+b}}\right)&=x+C\\
\arctan\left(\frac{\tan\left(\frac{y}{2}\right)\sqrt{b-a}}{\sqrt{a+b}}\right)&=\frac{1}{2}\sqrt{b^2-a^2}(x+C)\\
\frac{\tan\left(\frac{y}{2}\right)\sqrt{b-a}}{\sqrt{a+b}}&=\tan\left(\frac{1}{2}\sqrt{b^2-a^2}(x+C)\right)\\
\tan\left(\frac{y}{2}\right)&=\frac{\sqrt{a+b}}{\sqrt{b-a}}\tan\left(\frac{1}{2}\sqrt{b^2-a^2}(x+C)\right)\\
\frac{y}{2}&=\arctan\left(\frac{(a+b)}{\sqrt{(a+b)(b-a)}}\tan\left(\frac{1}{2}\sqrt{b^2-a^2}(x+C)\right)\right)\\
&=\arctan\left(\frac{(a+b)}{\sqrt{b^2-a^2}}\tan\left(\frac{1}{2}\sqrt{b^2-a^2}(x+C)\right)\right)\\
y&=2\arctan\left(\frac{a+b}{\sqrt{b^2-a^2}}\tan\left(\frac{1}{2}\sqrt{b^2-a^2}(x+C)\right)\right)
\end{aligned}$$

Verification

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

2.77 ODE No. 77

$$y'(x) - \cos(ay(x) + bx) = 0$$

✓ **Mathematica** : cpu = 0.295221 (sec), leaf count = 124

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

✓ **Maple** : cpu = 0.052 (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

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

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

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

This is the same as Kamke 76 (the problem before this), which we solved using half angle tan transformation, and the answer is

$$u = 2\arctan\left(\frac{a+b}{\sqrt{b^2-a^2}}\tan\left(\frac{1}{2}\sqrt{b^2-a^2}(x+C)\right)\right)$$

Since $u = ay+bx$ then $y = \frac{u-bx}{a}$, hence

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

Verification

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

2.78 ODE No. 78

$$a\sin(\alpha y(x)+\beta x)+b+y'(x)=0$$

✓ **Mathematica** : cpu = 0.662485 (sec), leaf count = 1317

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

✓ **Maple** : cpu = 0.078 (sec), leaf count = 89

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

Hand solution

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

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

$$\frac{1}{\alpha}(u'-\beta)=-a\sin\left(u\right)-b$$
$$u'=-\alpha(a\sin\left(u\right)+b)+\beta$$
$$\frac{du}{\beta-\alpha\left(a\sin\left(u\right)+b\right)}=dx \tag{1}$$

Using half angle tan transformation where $\tan\left(\frac{u}{2}\right)=t, \sin(u)=\frac{2t}{t^2+1}, du=\frac{2}{1+t^2}dt$ then

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

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 = 24.6085 (sec), leaf count = 0 , could not solve

`DSolve[Cos[a*y[x]]*f[x] + h[x] + g[x]*Sin[a*y[x]] + Derivative[1][y][x] == 0, y[x], x]`

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

`dsolve(diff(y(x),x)+f(x)*cos(a*y(x))+g(x)*sin(a*y(x))+h(x) = 0,y(x))`

2.80 ODE No. 80

$$(1 - f'(x)) \cos(y(x)) - f'(x) + f(x) \sin(y(x)) + y'(x) - 1 = 0$$

✓ **Mathematica** : cpu = 0.0574641 (sec), leaf count = 72

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

✓ **Maple** : cpu = 0.841 (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 = 1.33152 (sec), leaf count = 220

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

✓ **Maple** : cpu = 0.839 (sec), leaf count = 78

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

2.82 ODE No. 82

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

✗ **Mathematica** : cpu = 46.2651 (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 = 0.354255 (sec), leaf count = 69

$$\text{Solve}\left[\frac{1}{2}\sqrt{\frac{\pi}{2}}e^{\frac{x^2}{2}}\left(\text{erfi}\left(\frac{y(x)-ix}{\sqrt{2}}\right)+\text{erfi}\left(\frac{y(x)+ix}{\sqrt{2}}\right)\right)=c_1e^{\frac{x^2}{2}},y(x)\right]$$

✓ **Maple** : cpu = 0.283 (sec), leaf count = 44

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

2.84 ODE No. 84

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

✓ **Mathematica** : cpu = 0.184785 (sec), leaf count = 248

$$\text{Solve}\left[\int_1^{y(x)}-\frac{f(ax+bK[2])\int_1^x\left(\frac{b^2f'(aK[1]+bK[2])}{a+bf(aK[1]+bK[2])}-\frac{b^3f(aK[1]+bK[2])f'(aK[1]+bK[2])}{(a+bf(aK[1]+bK[2]))^2}\right)dK[1]b+b+a\int_1^x\left(\frac{b^2f'(\cdots}{a+bf(\cdots}\right.}{a+bf(ax+bK[2])}\right.$$

✓ **Maple** : cpu = 0.032 (sec), leaf count = 37

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

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 = 0.37336 (sec), leaf count = 238

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

✓ **Maple** : cpu = 0.348 (sec), leaf count = 152

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

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 = 0.455508 (sec), leaf count = 184

$$\text{Solve}\left[\int_1^{y(x)}\left(\frac{-f(x^2+aK[2]^2)\,K[2]a^2 - xa}{x^2+aK[2]^2} - \int_1^x\left(\frac{a-2a^2K[1]K[2]f'(K[1]^2+aK[2]^2)}{K[1]^2+aK[2]^2} - \frac{2aK[2]\,(aK[\right.\right.\right.$$

✓ **Maple** : cpu = 0.385 (sec), leaf count = 52

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

2.87 ODE No. 87

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

✗ **Mathematica** : cpu = 12.11 (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 = 0.478008 (sec), leaf count = 2831

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

✓ **Maple** : cpu = 0.18 (sec), leaf count = 256

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

Hand solution

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

This is of the form $y' = f_0 + f_1 y + f_2 y^2$ with $f_0 = \frac{1}{2}b + \frac{1}{2}ce^{-2ax}$, $f_1 = 2a$, $f_3 = \frac{3}{2}$. Hence it is Riccati non-linear first order. Transforming to second order ODE using

$$\begin{aligned} y &= -\frac{u'}{uf_2} \\ &= \frac{-2}{3}\frac{u'}{u} \end{aligned}$$

Hence $y' = \frac{-2}{3}\left(\frac{u''}{u} - \frac{(u')^2}{u^2}\right)$ and equating this to RHS of the ODE gives

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

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

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

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

But

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

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 = 0.0124099 (sec), leaf count = 42

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

✓ **Maple** : cpu = 0.013 (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 = 0.0127658 (sec), leaf count = 24

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

✓ **Maple** : cpu = 0.009 (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

$$\begin{aligned} xy &= -x\cos x + \sin x + C \\ y &= \frac{\sin x}{x} - \cos x + \frac{C}{x} \end{aligned}$$

Verification

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

2.91 ODE No. 91

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

✓ **Mathematica** : cpu = 0.0114882 (sec), leaf count = 15

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

✓ **Maple** : cpu = 0.006 (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 = 0.0119997 (sec), leaf count = 15

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

✓ **Maple** : cpu = 0.004 (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 = 0.0297642 (sec), leaf count = 16

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

✓ **Maple** : cpu = 0.011 (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 = 0.0162264 (sec), leaf count = 25

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

✓ **Maple** : cpu = 0.009 (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

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

Verification

```
restart;
ode:=x*diff(y(x),x)+a*y(x)+b*x^n=0;
s1:=x^(-a)*(_C1-b*ln(x));
s2:=-b*(x^n/(a+n))+_C1*x^(-a);
odetest(y(x)=s2,ode);
0
```

2.95 ODE No. 95

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

✓ **Mathematica** : cpu = 0.065443 (sec), leaf count = 32

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

✓ **Maple** : cpu = 0.05 (sec), leaf count = 27

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

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

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

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 $y = \frac{-u'}{u f_2}$ 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 = 0.0659587 (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 = 0.029 (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 = 0.100914 (sec), leaf count = 46

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

✓ **Maple** : cpu = 0.032 (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

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

✓ **Mathematica** : cpu = 0.164148 (sec), leaf count = 442

$$\left\{\left\{y(x) \to -\frac{\sqrt{-a}\sqrt{-c}x^b \left(\frac{\sqrt{\frac{2}{\pi}} c_1 \sin\left(\frac{\sqrt{-a}\sqrt{-c}x^b}{b}\right)}{\sqrt{\frac{\sqrt{-a}\sqrt{-c}x^b}{b}}} - \frac{\sqrt{\frac{2}{\pi}} c_1 \left(-\sin\left(\frac{\sqrt{-a}\sqrt{-c}x^b}{b}\right) - \frac{\sqrt{-a} b \sqrt{-c} x^{-b} \cos\left(\frac{\sqrt{-a}\sqrt{-c}x^b}{b}\right)}{ac}\right)}{\sqrt{\frac{\sqrt{-a}\sqrt{-c}x^b}{b}}} - \frac{2\sqrt{\frac{2}{\pi}} \cos}{\sqrt{}}\right.}{2a\left(\frac{\sqrt{\frac{2}{\pi}} c_1 \cos\left(\frac{\sqrt{-a}\sqrt{-c}x^b}{b}\right)}{\sqrt{\frac{\sqrt{-a}\sqrt{-c}x^b}{b}}} + \frac{\sqrt{\frac{2}{\pi}} \sin\left(\frac{\sqrt{-a}\sqrt{-c}x^b}{b}\right)}{\sqrt{\frac{\sqrt{-a}\sqrt{-c}x^b}{b}}}\right)}\right.\right.$$

✓ **Maple** : cpu = 0.045 (sec), leaf count = 38

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

2.99 ODE No. 99

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

✓ **Mathematica** : cpu = 0.155337 (sec), leaf count = 244

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

✓ **Maple** : cpu = 0.089 (sec), leaf count = 171

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

2.100 ODE No. 100

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

✓ **Mathematica** : cpu = 0.0755735 (sec), leaf count = 157

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

✓ **Maple** : cpu = 0.056 (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

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

But

$$\frac{d}{dx}\text{BesselJ}\left(1, 2\sqrt{ax}\right) = \frac{\sqrt{a}}{\sqrt{x}}\left(\text{BesselJ}\left(0, 2\sqrt{ax}\right) - \frac{1}{2}\frac{1}{\sqrt{ax}}\text{BesselJ}\left(1, 2\sqrt{ax}\right)\right)$$

And

$$\frac{d}{dx}\operatorname{BesselY}\left(1,2\sqrt{ax}\right)=\frac{\sqrt{a}}{\sqrt{x}}\left(\operatorname{BesselY}\left(0,2\sqrt{ax}\right)-\frac{1}{2}\frac{1}{\sqrt{ax}}\operatorname{BesselY}\left(1,2\sqrt{ax}\right)\right)$$

Therefore,

$$\begin{aligned}u'=C_1&\left(\frac{1}{2\sqrt{x}}\operatorname{BesselJ}\left(1,2\sqrt{a}\sqrt{x}\right)+\sqrt{x}\frac{\sqrt{a}}{\sqrt{x}}\left(\operatorname{BesselJ}\left(0,2\sqrt{a}\sqrt{x}\right)-\frac{1}{2}\frac{1}{\sqrt{ax}}\operatorname{BesselJ}\left(1,2\sqrt{a}\sqrt{x}\right)\right)\right)\\&+C_2\left(\frac{1}{2\sqrt{x}}\operatorname{BesselY}\left(1,2\sqrt{a}\sqrt{x}\right)+\sqrt{x}\frac{\sqrt{a}}{\sqrt{x}}\left(\operatorname{BesselY}\left(0,2\sqrt{ax}\right)-\frac{1}{2}\frac{1}{\sqrt{ax}}\operatorname{BesselY}\left(1,2\sqrt{a}\sqrt{x}\right)\right)\right)\end{aligned}$$

Which is simplified to

$$u'=C_1\sqrt{a}\operatorname{BesselJ}\left(0,2\sqrt{a}\sqrt{x}\right)+C_2\sqrt{a}\operatorname{BesselY}\left(0,2\sqrt{a}\sqrt{x}\right)$$

Therefore, from $y=\frac{u'}{u}$, the solution is

$$y=\frac{C_1\sqrt{a}\operatorname{BesselJ}\left(0,2\sqrt{a}\sqrt{x}\right)+C_2\sqrt{a}\operatorname{BesselY}\left(0,2\sqrt{a}\sqrt{x}\right)}{C_1\sqrt{x}\operatorname{BesselJ}\left(1,2\sqrt{a}\sqrt{x}\right)+C_2\sqrt{x}\operatorname{BesselY}\left(1,2\sqrt{a}\sqrt{x}\right)}$$

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

$$y=\frac{C\sqrt{a}\operatorname{BesselJ}\left(0,2\sqrt{a}\sqrt{x}\right)+\sqrt{a}\operatorname{BesselY}\left(0,2\sqrt{a}\sqrt{x}\right)}{C\sqrt{x}\operatorname{BesselJ}\left(1,2\sqrt{a}\sqrt{x}\right)+\sqrt{x}\operatorname{BesselY}\left(1,2\sqrt{a}\sqrt{x}\right)}$$

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 = 0.0707184 (sec), leaf count = 18

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

✓ **Maple** : cpu = 0.009 (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 $y'=f_0+f_1y+f_2y^2$ 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 = 0.0847245 (sec), leaf count = 36

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

✓ **Maple** : cpu = 0.031 (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 = 0.146263 (sec), leaf count = 90

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

✓ **Maple** : cpu = 0.027 (sec), leaf count = 29

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

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

$$xy' - xy^2 - (2x^2 + 1)\, y - x^3 = 0$$

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 $y = -\frac{u'}{u f_2} = -\frac{u'}{u}$, therefore

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

Equating the above to RHS of (1) gives

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

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

$$x u'' - (2x^2 + 1)\, u' + u x^3 = 0 \tag{2}$$

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 = 0.109763 (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 = 0.04 (sec), leaf count = 63

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

Hand solution

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

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

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 = 0.217699 (sec), leaf count = 473

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

✓ **Maple** : cpu = 0.196 (sec), leaf count = 844

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

2.106 ODE No. 106

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

✓ **Mathematica** : cpu = 0.196936 (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 = 0.038 (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 = 0.326367 (sec), leaf count = 1415

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

✓ **Maple** : cpu = 0.194 (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 = 0.0656555 (sec), leaf count = 15

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

✓ **Maple** : cpu = 0.01 (sec), leaf count = 13

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

Hand solution

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

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

$$\begin{aligned}y'&=-\frac{1}{x}y+y^2\frac{\ln x}{x}\\&=f_0+f_1y+f_2y^2\end{aligned}$$

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

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

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

$$\begin{aligned}-u' &= -\frac{1}{x}u + \frac{\ln x}{x} \\ u' - \frac{1}{x}u &= -\frac{\ln x}{x}\end{aligned}$$

Integrating factor is $\mu = e^{\int -\frac{1}{x}dx} = e^{-\ln x} = \frac{1}{x}$, hence

$$d(\mu u) = -\mu\frac{\ln x}{x}$$

Integrating

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

Therefore

$$u = \ln x + 1 + Cx$$

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

$$y = \frac{1}{\ln x + 1 + Cx}$$

Verification

```
restart;
ode:=x*diff(y(x),x)-y(x)^2*ln(x)+y(x)=0;
my_solution:=1/(ln(x)+1+_C1*x);
odetest(y(x)=my_solution,ode);
0
```

2.109 ODE No. 109

$$xy'(x) - y(x)(2y(x)\log(x) - 1) = 0$$

✓ **Mathematica** : cpu = 0.0685779 (sec), leaf count = 17

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

✓ **Maple** : cpu = 0.01 (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

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

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

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

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

$$\begin{aligned} -u' &= -\frac{1}{x}u + 2\frac{\ln x}{x} \\ -u' + \frac{1}{x}u &= 2\frac{\ln x}{x} \\ u' - \frac{1}{x}u &= -2\frac{\ln x}{x} \end{aligned}$$

Integrating factor is $\mu = e^{\int -\frac{1}{x}dx} = e^{-\ln x} = \frac{1}{x}$, hence

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

Integrating

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

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 = 11.582 (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

$$xy' + f(x)\left(y^2 - x^2\right) - y = 0$$
$$xy' = -f\left(y^2 - x^2\right) + y$$
$$y' = -\frac{f}{x}y^2 + fx + \frac{1}{x}y \tag{1}$$

This is Riccati non-linear first order oder. There are two particular solutions $y_p = \pm x$. Using $y_p = x$, then using the transformation $y = y_p + \frac{1}{u}$, gives $y' = 1 - \frac{u'}{u^2}$ and (1) becomes

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

Hence

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

Integrating factor is $\mu = e^{\int \frac{1}{x} - 2f} = e^{\ln x} e^{-2\int f dx} = xe^{-2\int f dx}$, hence

$$
\begin{aligned}
d(\mu u) &= -\mu \frac{f}{x} \\
d\left(xe^{-2\int f dx} u\right) &= -\left(xe^{-2\int f dx}\right)\frac{f}{x} \\
d\left(xe^{-2\int f dx} u\right) &= -f\left(e^{-2\int f dx}\right)
\end{aligned}
$$

Integrating

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

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

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

Verification (Maple does not verify it, need to look more into this)

```
ode:=x*diff(y(x),x)+f(x)*(y(x)^2-x^2) =0;
dsolve(ode,y(x));
fint:=Int(f(x),x);
my_solution:=x*exp(-2*fint)/(-Int(f*exp(-2*fint),x)+_C1);
odetest(y(x)=my_solution,ode);
not zero
```

2.111 ODE No. 111

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

✓ **Mathematica** : cpu = 0.362089 (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 = 0.105 (sec), leaf count = 54

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

2.112 ODE No. 112

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

✓ **Mathematica** : cpu = 0.0981619 (sec), leaf count = 13

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

✓ **Maple** : cpu = 0.03 (sec), leaf count = 27

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

Hand solution

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

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

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

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 = 0.0978274 (sec), leaf count = 16

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

✓ **Maple** : cpu = 0.023 (sec), leaf count = 33

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

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 = 0.0878615 (sec), leaf count = 12

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

✓ **Maple** : cpu = 2.004 (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

$$\operatorname{arcsinh}(v) = x + C$$
$$v = \sinh(x + C)$$

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 = 0.175946 (sec), leaf count = 221

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

✓ **Maple** : cpu = 0.171 (sec), leaf count = 49

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

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.

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

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

$$-x\sqrt{(y(x)^2 - 4x^2)(y(x)^2 - x^2)} + xy'(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 0.350461 (sec), leaf count = 121

$$\text{Solve}\left[\frac{\sqrt{\frac{\frac{y(x)}{x}+2}{\frac{y(x)}{x}-1}}\sqrt{\frac{\frac{y(x)}{x}+1}{\frac{2y(x)}{x}+4}}F\left(\sin^{-1}\left(\sqrt{\frac{2}{3}}\sqrt{\frac{\frac{y(x)}{x}-2}{\frac{y(x)}{x}-1}}\right)|\frac{9}{8}\right)}{\sqrt{\frac{\frac{y(x)}{x}+1}{\frac{y(x)}{x}-1}}} = c_1 + \frac{x^2}{2}, y(x)\right]$$

✓ **Maple** : cpu = 0.174 (sec), leaf count = 86

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

2.117 ODE No. 117

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

✓ **Mathematica** : cpu = 0.152046 (sec), leaf count = 21

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

✓ **Maple** : cpu = 0.089 (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 = 0.0629596 (sec), leaf count = 13

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

✓ **Maple** : cpu = 0.046 (sec), leaf count = 8

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

2.119 ODE No. 119

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

✓ **Mathematica** : cpu = 0.087087 (sec), leaf count = 17

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

✓ **Maple** : cpu = 0.05 (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 = 0.0960763 (sec), leaf count = 20

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

✓ **Maple** : cpu = 0.143 (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 = 1.95426 (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 = 0.273764 (sec), leaf count = 21

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

✓ **Maple** : cpu = 0.296 (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 = 0.105019 (sec), leaf count = 19

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

✓ **Maple** : cpu = 0.043 (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 = 0.0876907 (sec), leaf count = 16

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

✓ **Maple** : cpu = 0.023 (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 = 0.18248 (sec), leaf count = 16

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

✓ **Maple** : cpu = 0.05 (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 = 0.158397 (sec), leaf count = 115

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

✓ **Maple** : cpu = 0.018 (sec), leaf count = 29

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

2.127 ODE No. 127

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

✓ **Mathematica** : cpu = 0.238335 (sec), leaf count = 186

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

✓ **Maple** : cpu = 0.086 (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 = 3.14882 (sec), leaf count = 41

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

✓ **Maple** : cpu = 0.21 (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 = 0.174285 (sec), leaf count = 44

$$\left\{\left\{y(x) \to -\frac{e^{x+1}}{-ec_1x - ec_1 - x\text{Ei}(x+1) - \text{Ei}(x+1) + e^{x+1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.023 (sec), leaf count = 33

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

2.130 ODE No. 130

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

✓ **Mathematica** : cpu = 0.0079278 (sec), leaf count = 21

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

✓ **Maple** : cpu = 0.006 (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 = 0.173295 (sec), leaf count = 21

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

✓ **Maple** : cpu = 0.155 (sec), leaf count = 31

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

2.132 ODE No. 132

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

✓ **Mathematica** : cpu = 0.0771371 (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 = 0.025 (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 = 0.0078546 (sec), leaf count = 27

$$\left\{\left\{y(x)\to c_1e^{\frac{1}{x}} - e^{\frac{1}{x}}\text{Ei}\left(-\frac{1}{x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.008 (sec), leaf count = 16

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

2.134 ODE No. 134

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

✓ **Mathematica** : cpu = 0.0171448 (sec), leaf count = 27

$$\left\{\left\{y(x)\to c_1e^{-1/x} - e^{x-\frac{1}{x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.007 (sec), leaf count = 17

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

2.135 ODE No. 135

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

✓ **Mathematica** : cpu = 0.0079896 (sec), leaf count = 14

$$\left\{\left\{y(x)\to c_1e^{\frac{1}{x}}x\right\}\right\}$$

✓ **Maple** : cpu = 0.004 (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 = 0.0688106 (sec), leaf count = 28

$$\left\{\left\{y(x) \to \frac{-c_1x - x + x\log(x)}{c_1 - \log(x)}\right\}\right\}$$

✓ **Maple** : cpu = 0.014 (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 = 0.0653976 (sec), leaf count = 16

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

✓ **Maple** : cpu = 0.012 (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 = 0.060511 (sec), leaf count = 13

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

✓ **Maple** : cpu = 0.026 (sec), leaf count = 11

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

2.139 ODE No. 139

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

✓ **Mathematica** : cpu = 0.202571 (sec), leaf count = 821

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

✓ **Maple** : cpu = 0.11 (sec), leaf count = 219

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

2.140 ODE No. 140

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

✓ **Mathematica** : cpu = 0.075577 (sec), leaf count = 17

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

✓ **Maple** : cpu = 0.034 (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 = 0.122099 (sec), leaf count = 67

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

✓ **Maple** : cpu = 0.046 (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 = 0.177342 (sec), leaf count = 122

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

✓ **Maple** : cpu = 0.065 (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 = 0.089394 (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 = 0.04 (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 = 0.21966 (sec), leaf count = 1787

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

✓ **Maple** : cpu = 0.086 (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 = 0.476149 (sec), leaf count = 267

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

✓ **Maple** : cpu = 0.085 (sec), leaf count = 117

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

2.146 ODE No. 146

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

✓ **Mathematica** : cpu = 0.649781 (sec), leaf count = 78

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

✓ **Maple** : cpu = 0.118 (sec), leaf count = 84

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

2.147 ODE No. 147

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

✓ **Mathematica** : cpu = 0.648232 (sec), leaf count = 343

$$\text{Solve}\left[\frac{\left(\frac{b^{2/3}}{2^{2/3}\sqrt[3]{a}x} + \frac{1}{2^{2/3}\sqrt[3]{a}\sqrt[3]{b}y(x)}\right)\text{Ai}\left(\left(\frac{b^{2/3}}{2^{2/3}\sqrt[3]{a}x} + \frac{1}{2^{2/3}\sqrt[3]{a}y(x)\sqrt[3]{b}}\right)^2 - \frac{\sqrt[3]{a}x}{\sqrt[3]{2}b^{2/3}}\right) + \text{Ai}'\left(\left(\frac{b^{2/3}}{2^{2/3}\sqrt[3]{a}x} + \frac{1}{2^{2/3}\sqrt[3]{a}y(x)\sqrt[3]{b}}\right)\right.}{\left(\frac{b^{2/3}}{2^{2/3}\sqrt[3]{a}x} + \frac{1}{2^{2/3}\sqrt[3]{a}\sqrt[3]{b}y(x)}\right)\text{Bi}\left(\left(\frac{b^{2/3}}{2^{2/3}\sqrt[3]{a}x} + \frac{1}{2^{2/3}\sqrt[3]{a}y(x)\sqrt[3]{b}}\right)^2 - \frac{\sqrt[3]{a}x}{\sqrt[3]{2}b^{2/3}}\right) + \text{Bi}'\left(\left(\frac{b^{2/3}}{2^{2/3}\sqrt[3]{a}x} + \frac{1}{2^{2/3}\sqrt[3]{a}y(x)\sqrt[3]{b}}\right)\right.}\right.$$

✓ **Maple** : cpu = 0.164 (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 = 0.0121163 (sec), leaf count = 30

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

✓ **Maple** : cpu = 0.008 (sec), leaf count = 16

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

2.149 ODE No. 149

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

✓ **Mathematica** : cpu = 0.0121177 (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 = 0.007 (sec), leaf count = 20

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

2.150 ODE No. 150

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

✓ **Mathematica** : cpu = 0.0097509 (sec), leaf count = 30

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

✓ **Maple** : cpu = 0.005 (sec), leaf count = 23

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

2.151 ODE No. 151

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

✓ **Mathematica** : cpu = 0.475523 (sec), leaf count = 203

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

✓ **Maple** : cpu = 0.039 (sec), leaf count = 85

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

2.152 ODE No. 152

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

✓ **Mathematica** : cpu = 0.363777 (sec), leaf count = 40

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

✓ **Maple** : cpu = 0.55 (sec), leaf count = 25

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

2.153 ODE No. 153

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

✓ **Mathematica** : cpu = 0.0123991 (sec), leaf count = 21

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

✓ **Maple** : cpu = 0.011 (sec), leaf count = 20

$$\left\{y(x)=\sqrt{1+x}\sqrt{x-1}\_C1+ax\right\}$$

2.154 ODE No. 154

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

✓ **Mathematica** : cpu = 0.013492 (sec), leaf count = 26

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

✓ **Maple** : cpu = 0.007 (sec), leaf count = 16

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

2.155 ODE No. 155

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

✓ **Mathematica** : cpu = 0.12385 (sec), leaf count = 46

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

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

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

2.156 ODE No. 156

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

✓ **Mathematica** : cpu = 0.0775226 (sec), leaf count = 21

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

✓ **Maple** : cpu = 0.013 (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 = 0.184251 (sec), leaf count = 158

$$\left\{\left\{y(x)\to \frac{\left(x^2-1\right)\left(c_1\left(ax(x^2-1)^{\frac{a}{2}-1}P_{a-1}(x)+(x^2-1)^{\frac{a}{2}-1}\left(aP_a(x)-axP_{a-1}(x)\right)\right)+ax(x^2-1)^{\frac{a}{2}-1}\right.}{a\left(c_1\left(x^2-1\right)^{a/2}P_{a-1}(x)+\left(x^2-1\right)^{a/2}Q_{a-1}(x)\right.}\right.\right.$$

✓ **Maple** : cpu = 0.178 (sec), leaf count = 231

$$\left\{y(x)=\frac{1}{4a(1+x)}\left(8\_C1\left((a-1/2)x-a/2+1/2\right)(1+x)\mathit{HeunC}\left(0,-2a+1,0,0,a^2-a+1/2,2(1\right.\right.\right.$$

2.158 ODE No. 158

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

✓ **Mathematica** : cpu = 0.139701 (sec), leaf count = 31

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

✓ **Maple** : cpu = 0.011 (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 = 0.0962497 (sec), leaf count = 22

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

✓ **Maple** : cpu = 0.11 (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 = 0.137486 (sec), leaf count = 27

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

✓ **Maple** : cpu = 0.022 (sec), leaf count = 21

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

2.161 ODE No. 161

$$\left(x^2-5x+6\right)y'(x)+x^2+3xy(x)-8y(x)=0$$

✓ **Mathematica** : cpu = 0.0141827 (sec), leaf count = 53

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

✓ **Maple** : cpu = 0.01 (sec), leaf count = 27

$$\left\{y(x)=\frac{1}{(x-3)\,(x-2)^2}\left(-\frac{x^4}{4}+\frac{2\,x^3}{3}+\_C1\right)\right\}$$

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 = 0.425524 (sec), leaf count = 133

$$\left\{\left\{y(x)\to\frac{1}{2}\sqrt{\frac{-a^2k^2+2abk^2-b^2k^2}{(k+1)^2}}\tan\left(\frac{(k+1)\sqrt{\frac{-a^2k^2+2abk^2-b^2k^2}{(k+1)^2}}(\log(x-b)-\log(x-a))}{2(a-b)}+c_1\right)-\right.\right.$$

✓ **Maple** : cpu = 0.151 (sec), leaf count = 58

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

2.163 ODE No. 163

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

✓ **Mathematica** : cpu = 0.0940973 (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 = 0.033 (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 = 0.129144 (sec), leaf count = 131

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

✓ **Maple** : cpu = 0.151 (sec), leaf count = 102

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

2.165 ODE No. 165

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

✓ **Mathematica** : cpu = 0.110846 (sec), leaf count = 22

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

✓ **Maple** : cpu = 0.017 (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 = 0.140976 (sec), leaf count = 71

$$\left\{\left\{y(x) \to \frac{2x\left(\frac{c_1(E(x)-K(x))}{\pi x} - G_{2,2}^{2,0}\left(x\middle|\begin{array}{c}-\frac{1}{2},\frac{1}{2}\\-1,0\end{array}\right)\right)}{G_{2,2}^{2,0}\left(x\middle|\begin{array}{c}\frac{1}{2},\frac{3}{2}\\0,0\end{array}\right) + \frac{2c_1E(x)}{\pi}}\right\}\right\}$$

✓ **Maple** : cpu = 0.118 (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 = 0.0746933 (sec), leaf count = 35

$$\left\{\left\{y(x)\to\frac{x\tan\left(\frac{1}{3}\left(3\sqrt{7}c_1+\sqrt{7}\log(x)\right)\right)}{\sqrt{7}}\right\}\right\}$$

✓ **Maple** : cpu = 0.026 (sec), leaf count = 20

$$\left\{y(x)=\frac{x\sqrt{7}}{7}\tan\left(\frac{\left(\ln(x)+\_C1\right)\sqrt{7}}{3}\right)\right\}$$

2.168 ODE No. 168

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

✓ **Mathematica** : cpu = 0.172918 (sec), leaf count = 234

$$\left\{\left\{y(x)\to\frac{3(x^2-4)\left(c_1\left(\frac{xP_{-\frac{1}{6}}^{\frac{1}{3}}\left(\frac{x}{2}\right)}{6(x^2-4)^{11/12}}+\frac{\sqrt[12]{x^2-4}\left(\frac{1}{2}P_{\frac{5}{6}}^{\frac{1}{3}}\left(\frac{x}{2}\right)-\frac{5}{12}xP_{-\frac{1}{6}}^{\frac{1}{3}}\left(\frac{x}{2}\right)\right)}{2\left(\frac{x^2}{4}-1\right)}\right)+\frac{xQ_{-\frac{1}{6}}^{\frac{1}{3}}\left(\frac{x}{2}\right)}{6(x^2-4)^{11/12}}+\frac{\sqrt[12]{x^2-4}\left(\frac{1}{2}Q_{\frac{5}{6}}^{\frac{1}{3}}\left(\frac{x}{2}\right)-\frac{5}{12}x\right.}{2\left(\frac{x^2}{4}-1\right)}\right.}{c_1\sqrt[12]{x^2-4}P_{-\frac{1}{6}}^{\frac{1}{3}}\left(\frac{x}{2}\right)+\sqrt[12]{x^2-4}Q_{-\frac{1}{6}}^{\frac{1}{3}}\left(\frac{x}{2}\right)}\right.\right.$$

✓ **Maple** : cpu = 0.126 (sec), leaf count = 140

$$\left\{y(x)=-3\left(x+2\right)\left(\mathit{HeunC}\left(0,4/3,-1/3,0,\frac{25}{36},4\left(x+2\right)^{-1}\right)\_C1-1/3\left(-x/4-1/2\right)^{4/3}\mathit{HeunC}\left(0,-\right.\right.\right.$$

2.169 ODE No. 169

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

✓ **Mathematica** : cpu = 1.89509 (sec), leaf count = 149

$$\text{Solve}\left[-\frac{c}{\sqrt{-a(ax+b)^2}}=\frac{2\exp\left(\frac{1}{2}\left(-\frac{c}{\sqrt{-a(ax+b)^2}}-\frac{\left(-a(ax+b)^2\right)^{3/2}}{ay(x)(ax+b)^3}\right)^2\right)}{\sqrt{2\pi}\text{erfi}\left(\frac{-\frac{c}{\sqrt{-a(ax+b)^2}}-\frac{\left(-a(ax+b)^2\right)^{3/2}}{ay(x)(ax+b)^3}}{\sqrt{2}}\right)+2c_1},y(x)\right]$$

✓ **Maple** : cpu = 0.119 (sec), leaf count = 153

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

2.170 ODE No. 170

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

✓ **Mathematica** : cpu = 0.072893 (sec), leaf count = 43

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

✓ **Maple** : cpu = 0.013 (sec), leaf count = 23

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

2.171 ODE No. 171

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

✓ **Mathematica** : cpu = 0.0649064 (sec), leaf count = 17

$$\left\{\left\{y(x)\to \frac{x^2}{c_1x+1}\right\}\right\}$$

✓ **Maple** : cpu = 0.007 (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 = 0.0762753 (sec), leaf count = 35

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

✓ **Maple** : cpu = 0.205 (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 = 0.093267 (sec), leaf count = 29

$$\left\{\left\{y(x)\to \frac{1}{x^3\left(c_1e^{4x}+\frac{1}{4}\right)} - \frac{3}{x^3}\right\}\right\}$$

✓ **Maple** : cpu = 0.033 (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

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

✓ **Mathematica** : cpu = 0.008127 (sec), leaf count = 17

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

✓ **Maple** : cpu = 0.003 (sec), leaf count = 13

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

2.175 ODE No. 175

$$a x^3+\left(x^2-1\right) x y'(x)-\left(2 x^2-1\right) y(x)=0$$

✓ **Mathematica** : cpu = 0.0186721 (sec), leaf count = 24

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

✓ **Maple** : cpu = 0.014 (sec), leaf count = 20

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

2.176 ODE No. 176

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

✓ **Mathematica** : cpu = 0.186903 (sec), leaf count = 82

$$\left\{\left\{y(x)\to \frac{x\left(\frac{2 c_1\left(E\left(x^2\right)-K\left(x^2\right)\right)}{\pi x}-2 x G_{2,2}^{2,0}\left(x^2\middle|\begin{array}{c}-\frac{1}{2},\frac{1}{2}\\ -1,0\end{array}\right)\right)}{G_{2,2}^{2,0}\left(x^2\middle|\begin{array}{c}\frac{1}{2},\frac{3}{2}\\ 0,0\end{array}\right)+\frac{2 c_1 E\left(x^2\right)}{\pi}}\right\}\right\}$$

✓ **Maple** : cpu = 0.075 (sec), leaf count = 30

$$\left\{y(x)=\frac{\_C1\ EllipticCE(x)+EllipticE(x)-EllipticK(x)}{\_C1\ EllipticCE\,(x)-\_C1\ EllipticCK\,(x)+EllipticE\,(x)}\right\}$$

2.177 ODE No. 177

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

✓ **Mathematica** : cpu = 0.103326 (sec), leaf count = 22

$$\left\{\left\{y(x)\to -\frac{x^2}{c_1x-c_1-1}\right\}\right\}$$

✓ **Maple** : cpu = 0.019 (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 = 0.149054 (sec), leaf count = 49

$$\left\{\left\{y(x)\to \frac{\sqrt{x}}{\sqrt{1-x^2}\left(c_1+2\sqrt{x}\,{}_2F_1\left(\frac{1}{4},\frac{1}{2};\frac{5}{4};x^2\right)\right)}+1\right\}\right\}$$

✓ **Maple** : cpu = 0.144 (sec), leaf count = 61

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

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 = 0.591139 (sec), leaf count = 2833

$$\left\{\left\{y(x)\to \frac{3(x^2-1)\left(c_1\left(\frac{e^{\int_1^x \text{Root}\left[125K[1]^8-164K[1]^6+70K[1]^4-20K[1]^2+\left(1296K[1]^{12}-5184K[1]^{10}+7776K[1]^8-5184K[1]^6+1296K[1]^4\right)\#1^4\right.}}{\vphantom{x}}\right.\right.}{\vphantom{x}}\right.\right.$$

✓ **Maple** : cpu = 0.11 (sec), leaf count = 112

$$\left\{y(x) = 35\,\frac{1}{\sqrt[3]{x}\,(8\,x^{2/3}{}_2\mathrm{F}_1(5/6,7/6;\ 4/3;\ x^2)\_C1 + 8\,{}_2\mathrm{F}_1(1/2,5/6;\ 2/3;\ x^2))}\left(\_C1\left(\frac{8\,x^2}{7} - \frac{16}{35}\right){}_2\mathrm{F}_1(5/\right.\right.$$

2.180 ODE No. 180

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

✓ **Mathematica** : cpu = 0.316472 (sec), leaf count = 132

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

✓ **Maple** : cpu = 0.047 (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 = 0.090572 (sec), leaf count = 347

$$\left\{\left\{y(x) \to -\frac{\frac{i\sqrt{\frac{2}{\pi}}c_1\sinh\left(\frac{\sqrt{-a}}{x}\right)}{\sqrt{-\frac{i\sqrt{-a}}{x}}} + \frac{i\sqrt{-a}\left(-\frac{\sqrt{\frac{2}{\pi}}c_1\cosh\left(\frac{\sqrt{-a}}{x}\right)}{\sqrt{-\frac{i\sqrt{-a}}{x}}} + \frac{\sqrt{\frac{2}{\pi}}c_1\left(-\frac{\sqrt{-a}x\sinh\left(\frac{\sqrt{-a}}{x}\right)}{a} - \cosh\left(\frac{\sqrt{-a}}{x}\right)\right)}{\sqrt{-\frac{i\sqrt{-a}}{x}}} - \frac{2\sqrt{\frac{2}{\pi}}\left(i\sinh\left(\frac{\sqrt{-a}}{x}\right) + \frac{i\sqrt{-a}}{\cdots}\right.}{\sqrt{-\frac{i\sqrt{-a}}{x}}}\right.}{x}}{2x\left(\frac{\sqrt{\frac{2}{\pi}}\cosh\left(\frac{\sqrt{-a}}{x}\right)}{\sqrt{-\frac{i\sqrt{-a}}{x}}} - \frac{i\sqrt{\frac{2}{\pi}}c_1\sinh\left(\frac{\sqrt{-a}}{x}\right)}{\sqrt{-\frac{i\sqrt{-a}}{x}}}\right)}\right.\right.$$

✓ **Maple** : cpu = 0.056 (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 = 0.20425 (sec), leaf count = 96

$$\left\{\left\{y(x)\to -\frac{\left(x^3-1\right)\left(\frac{2c_1x^2}{\left(1-x^3\right)^{5/3}}+\frac{x}{\left(1-x^3\right)^{2/3}}+\frac{x^4}{\left(1-x^3\right)^{5/3}}\right)}{2\left(\frac{c_1}{\left(1-x^3\right)^{2/3}}+\frac{x^2}{2\left(1-x^3\right)^{2/3}}\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.102 (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 = 0.0143799 (sec), leaf count = 22

$$\left\{\left\{y(x)\to \frac{c_1x^2}{\sqrt[3]{1-2x^3}}\right\}\right\}$$

✓ **Maple** : cpu = 0.009 (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 = 1.1501 (sec), leaf count = 704

$$\left\{\left\{y(x)\to -\frac{c_1\left(\frac{2a\sqrt{1-\frac{4A}{b^2-4ac}}\sqrt{x(ax+b)+c}\exp\left(\frac{\sqrt{4ac-b^2}\sqrt{1-\frac{4A}{b^2-4ac}}\tan^{-1}\left(\frac{2ax+b}{\sqrt{4ac-b^2}}\right)}{\sqrt{b^2-4ac}}\right)}{\sqrt{b^2-4ac}\left(\frac{(2ax+b)^2}{4ac-b^2}+1\right)}+\frac{(2ax+b)\exp\left(\frac{\sqrt{4ac-b^2}\sqrt{1-\frac{4A}{b^2-4ac}}\tan}{\sqrt{b^2-4ac}}\right.}{2\sqrt{x(ax+b)+c}}\right.}{c_1\sqrt{x(ax+b)+c}\left(-\exp\left(\frac{\sqrt{4ac-b^2}\sqrt{1-\frac{4A}{b^2-4ac}}\,\mathrm{ta}}{\sqrt{b^2-4a}}\right.\right.}\right.\right.$$

✓ **Maple** : cpu = 0.302 (sec), leaf count = 493

$$\left\{y(x) = 2\frac{a}{\sqrt{-4\,ac+b^2}\,\left(2\,ax+b+i\sqrt{4\,ac-b^2}\right)\left(i\sqrt{4\,ac-b^2}-2\,ax-b\right)}\left(\left(i\sqrt{\frac{-4\,ac+b^2-4\,A}{a^2}}a\sqrt{4\,ac\right.\right.\right.$$

2.185 ODE No. 185

$$x^7y'(x)+5x^3y(x)^2+2\left(x^2+1\right)y(x)^3=0$$

✓ **Mathematica** : cpu = 0.371992 (sec), leaf count = 123

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

✓ **Maple** : cpu = 0.03 (sec), leaf count = 63

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

2.186 ODE No. 186

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

✓ **Mathematica** : cpu = 0.209146 (sec), leaf count = 19

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

✓ **Maple** : cpu = 0.032 (sec), leaf count = 17

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

2.187 ODE No. 187

$$-ay(x)^2 - bx^{2n-2} + x^n y'(x) = 0$$

✓ **Mathematica** : cpu = 0.199822 (sec), leaf count = 328

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

✓ **Maple** : cpu = 0.053 (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 = 14.0019 (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 = 0.018 (sec), leaf count = 32

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

2.189 ODE No. 189

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

✓ **Mathematica** : cpu = 0.38383 (sec), leaf count = 91

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

✓ **Maple** : cpu = 0.271 (sec), leaf count = 60

$$\left\{\int_{\_b}^{y(x)} -\frac{x^{mn}x^n}{(bx^m x - (m+1)\_a)\,x^n x^{mn} + a\_a^n x^m x} d\_a + \ln(x) - \_C1 = 0\right\}$$

2.190 ODE No. 190

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

✓ **Mathematica** : cpu = 0.121696 (sec), leaf count = 173

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

✓ **Maple** : cpu = 0.006 (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 = 0.114155 (sec), leaf count = 39

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

✓ **Maple** : cpu = 0.013 (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 = 0.691221 (sec), leaf count = 168

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

✓ **Maple** : cpu = 0.015 (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 = 0.013579 (sec), leaf count = 16

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

✓ **Maple** : cpu = 0.006 (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 = 0.165834 (sec), leaf count = 98

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

✓ **Maple** : cpu = 0.017 (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 = 0.151458 (sec), leaf count = 27

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

✓ **Maple** : cpu = 0.089 (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 = 0.20444 (sec), leaf count = 53

$$\left\{\left\{y(x) \to c_1 e^{-2\tanh^{-1}\left(\tan\left(\frac{x}{2}\right)\right)} + e^{-2\tanh^{-1}\left(\tan\left(\frac{x}{2}\right)\right)}\left(\sin(x) + 4\log\left(\cos\left(\frac{x}{2}\right) - \sin\left(\frac{x}{2}\right)\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.103 (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 = 0.107937 (sec), leaf count = 98

$$\left\{\left\{y(x) \to \frac{1}{\sqrt[3]{c_1\cos^3(x) - \sin(x) - 2\sin(x)\cos^2(x)}}\right\}, \left\{y(x) \to -\frac{\sqrt[3]{-1}}{\sqrt[3]{c_1\cos^3(x) - \sin(x) - 2\sin(x)\cos^2(x}}\right.$$

✓ **Maple** : cpu = 0.079 (sec), leaf count = 237

$$\left\{y(x) = \frac{1}{\_C1\ (\sin(x))^4 + 2\cos(x)(\sin(x))^3 - 2\_C1\ (\sin(x))^2 - 3\sin(x)\cos(x) + \_C1}\sqrt[3]{\cos(x)(\_C}\right.$$

2.198 ODE No. 198

$$\sin(x)\cos(x)y'(x) - y(x) - \sin^3(x) = 0$$

✓ **Mathematica** : cpu = 0.0205003 (sec), leaf count = 15

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

✓ **Maple** : cpu = 0.01 (sec), leaf count = 13

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

2.199 ODE No. 199

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

✓ **Mathematica** : cpu = 0.196318 (sec), leaf count = 15

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

✓ **Maple** : cpu = 0.142 (sec), leaf count = 102

$$\left\{y(x) = \frac{1}{2}\arctan\left(2\frac{\_C1\,(2\sin(2x) + \sin(4x))}{-\_C1^2\cos(4x) + \_C1^2 + 4\cos(2x) + \cos(4x) + 3}, \frac{\_C1^2\cos(4x) - \_C1^2 + 4}{\_C1^2\cos(4x) - \_C1^2 - 4}\right.\right.$$

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 = 0.106725 (sec), leaf count = 77

$$\left\{\left\{y(x) \to \frac{\frac{1}{2}aAx^2 - \frac{1}{2}aAx\sin(2x) - \frac{1}{4}aA\cos(2x) + Acx^2}{a\cos(2x) - a - 2b} + \frac{c_1}{a\cos(2x) - a - 2b}\right\}\right\}$$

✓ **Maple** : cpu = 0.044 (sec), leaf count = 53

$$\left\{y(x) = \frac{-A\cos(2x)a - 2A\sin(2x)ax + 2x^2(a + 2c)A - 8\_C1}{4a\cos(2x) - 4a - 8b}\right\}$$

2.201 ODE No. 201

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

✓ **Mathematica** : cpu = 0.13359 (sec), leaf count = 39

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

✓ **Maple** : cpu = 0.034 (sec), leaf count = 23

$$\left\{y(x)=i\tan\left(-i\int\sqrt{f\left(x\right)}\,\mathrm{d}x+\_C1\right)\sqrt{f\left(x\right)}\right\}$$

2.202 ODE No. 202

$$f(x)y'(x)+g(x)\mathrm{tg}(y(x))+h(x)=0$$

✗ **Mathematica** : cpu = 20.3572 (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 = 2.01992 (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 = 0.0711729 (sec), leaf count = 70

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

✓ **Maple** : cpu = 0.228 (sec), leaf count = 92

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

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 = 15.5764 (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 = 25.9618 (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 = 0.0819105 (sec), leaf count = 47

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

✓ **Maple** : cpu = 0.016 (sec), leaf count = 37

$$\left\{y(x) = \sqrt{e^{-2x} \_C1 - 4x^2}, y(x) = -\sqrt{e^{-2x} \_C1 - 4x^2}\right\}$$

2.208 ODE No. 208

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

✓ **Mathematica** : cpu = 0.192063 (sec), leaf count = 118

$$\left\{\left\{y(x) \to -\frac{\sqrt{4a^2c_1e^{-2ax} + 4ab\cos(c+x) + c_1e^{-2ax} + 2b\sin(c+x)}}{\sqrt{4a^2+1}}\right\}, \left\{y(x) \to \frac{\sqrt{4a^2c_1e^{-2ax} + 4ab\cos}}{}\right.\right.$$

✓ **Maple** : cpu = 0.049 (sec), leaf count = 106

$$\left\{y(x) = \frac{1}{4a^2+1}\sqrt{16\_C1\ (a^2+1/4)^2 e^{-2ax} + 16\ (\cos(x+c)\,a + 1/2\sin(x+c))\,(a^2+1/4)\,b}, y(x) = -\right.$$

2.209 ODE No. 209

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

✓ **Mathematica** : cpu = 0.0968506 (sec), leaf count = 84

$$\left\{\left\{y(x) \to -\frac{\sqrt{2a^2c_1x + a^2c_1{}^2 + a^2x^2 - b}}{\sqrt{a}}\right\}, \left\{y(x) \to \frac{\sqrt{2a^2c_1x + a^2c_1{}^2 + a^2x^2 - b}}{\sqrt{a}}\right\}\right\}$$

✓ **Maple** : cpu = 0.009 (sec), leaf count = 21

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

2.210 ODE No. 210

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

✓ **Mathematica** : cpu = 0.0767036 (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 = 0.014 (sec), leaf count = 33

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

2.211 ODE No. 211

$$y(x)y'(x) - xe^{\frac{x}{y(x)}} = 0$$

✓ **Mathematica** : cpu = 0.20608 (sec), leaf count = 41

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

✓ **Maple** : cpu = 0.027 (sec), leaf count = 31

$$\left\{y(x) = \mathit{RootOf}\left(-\int^{\_Z} \frac{\_a}{-\_a^2 + \mathrm{e}^{\_a^{-1}}} d\_a + \ln(x) + \_C1\right) x\right\}$$

2.212 ODE No. 212

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

✓ **Mathematica** : cpu = 0.363581 (sec), leaf count = 95

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

✓ **Maple** : cpu = 0.095 (sec), leaf count = 30

$$\left\{\int_{\_b}^{y(x)} \frac{\_a}{f(\_a^2+x^2)} \,\mathrm{d}\_a + \int g(x)\,\mathrm{d}x - \_C1 = 0\right\}$$

2.213 ODE No. 213

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

✓ **Mathematica** : cpu = 0.0969976 (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 = 0.552 (sec), leaf count = 66

$$\left\{-\frac{1}{2}\ln\left(\frac{(y(x))^2+(-x+3)\,y(x)-x^2+x+1}{(x-1)^2}\right)-\frac{\sqrt{5}}{5}Artanh\left(\frac{(-2\,y(x)-3+x)\sqrt{5}}{5\,x-5}\right)-\ln(x-1)-$$

2.214 ODE No. 214

$$(y(x)+x-1)y'(x)-y(x)+2x+3=0$$

✓ **Mathematica** : cpu = 0.10375 (sec), leaf count = 78

$$\text{Solve}\left[2\sqrt{2}\tan^{-1}\left(\frac{-y(x)+2x+3}{\sqrt{2}(y(x)+x-1)}\right)=3c_1+2\log\left(\frac{6x^2+3y(x)^2-10y(x)+8x+11}{(3x+2)^2}\right)+4\log(3x+2$$

✓ **Maple** : cpu = 0.139 (sec), leaf count = 48

$$\left\{y(x)=\frac{5}{3}+\frac{(-3\,x-2)\sqrt{2}\tan\left(RootOf\left(\sqrt{2}\ln\left(2\left((\tan(\_Z))^2+1\right)(3\,x+2)^2\right)+2\sqrt{2}\_C1-2\_Z\right)\right)}{3}\right\}$$

2.215 ODE No. 215

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

✓ **Mathematica** : cpu = 0.106376 (sec), leaf count = 80

$$\text{Solve}\left[6\sqrt{3}\tan^{-1}\left(\frac{4-3y(x)}{\sqrt{3}(y(x)+2x-2)}\right)=2c_1+3\log\left(\frac{3x^2+3y(x)^2+3(x-3)y(x)-6x+7}{(1-3x)^2}\right)+6\log($$

✓ **Maple** : cpu = 0.162 (sec), leaf count = 51

$$\left\{y(x)=\frac{3}{2}-\frac{x}{2}+\frac{\sqrt{3}(3\,x-1)}{6}\tan\left(RootOf\left(\sqrt{3}\ln\left(\frac{\left(3(\tan(\_Z))^2+3\right)(3\,x-1)^2}{4}\right)+2\sqrt{3}\_C1+6\_\right.\right.\right.$$

2.216 ODE No. 216

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

✓ **Mathematica** : cpu = 0.0934687 (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 = 0.153 (sec), leaf count = 51

$$\left\{y(x)=\frac{(-3\,x+1)\sqrt{3}}{6}\tan\left(\mathit{RootOf}\left(\sqrt{3}\ln\left(\frac{\left(3\left(\tan\left(\_Z\right)\right)^2+3\right)(3\,x-1)^2}{4}\right)+2\sqrt{3}\_\mathit{C1}+6\_Z\right)\right)\right.$$

2.217 ODE No. 217

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

✓ **Mathematica** : cpu = 0.0159122 (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 = 0.024 (sec), leaf count = 23

$$\left\{y(x)=x^2+\frac{\mathit{lambertW}\left(-4\_\mathit{C1}\,\mathrm{e}^{-2\,x^2-1}\right)}{2}+\frac{1}{2}\right\}$$

2.218 ODE No. 218

$$\left(y(x)-x^2\right)y'(x)+4xy(x)=0$$

✓ **Mathematica** : cpu = 0.0673085 (sec), leaf count = 257

$$\left\{\left\{y(x)\to x^2+\frac{1}{-\frac{1}{2x^2}-\frac{\frac{1}{2}-\frac{i}{2}}{\sqrt{2}x^2\sqrt{x^2\sinh\left(\frac{2c_1}{9}\right)+x^2\cosh\left(\frac{2c_1}{9}\right)-i}}}\right\},\left\{y(x)\to x^2+\frac{1}{-\frac{1}{2x^2}+\frac{\frac{1}{2}-\frac{i}{2}}{\sqrt{2}x^2\sqrt{x^2\sinh\left(\frac{2c_1}{9}\right)+x^2\cosh\left(\right.}}}\right.\right.$$

✓ **Maple** : cpu = 0.162 (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 = 300.553 (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 = 0.0691999 (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 = 0.017 (sec), leaf count = 43

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

2.221 ODE No. 221

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

✓ **Mathematica** : cpu = 0.0162922 (sec), leaf count = 35

$$\left\{\left\{y(x)\to\frac{2}{3}\left(W\left(-e^{c_1+\frac{9x}{4}-1}\right)+1\right)+\frac{1}{2}(-x-1)\right\}\right\}$$

✓ **Maple** : cpu = 0.039 (sec), leaf count = 21

$$\left\{y(x)=-\frac{x}{2}+\frac{2}{3}lambertW\left(\frac{\mathrm{e}^{-\frac{1}{4}}\_C1}{4}\mathrm{e}^{\frac{9x}{4}}\right)+\frac{1}{6}\right\}$$

2.222 ODE No. 222

$$(2y(x) + x + 7)y'(x) - y(x) + 2x + 4 = 0$$

✓ **Mathematica** : cpu = 0.0503561 (sec), leaf count = 65

$$\text{Solve}\left[5c_1 + 2\log\left(\frac{4(x^2 + y(x)^2 + 4y(x) + 6x + 13)}{5(x+3)^2}\right) + 2\tan^{-1}\left(\frac{y(x) - 2(x+2)}{2y(x) + x + 7}\right) + 4\log(x+3) = 0, y\right.$$

✓ **Maple** : cpu = 0.052 (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 = 0.0190492 (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 = 0.139 (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 = 0.0152286 (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 = 0.041 (sec), leaf count = 35

$$\left\{y(x) = \frac{1}{5}e^{-\mathit{lambertW}\left(-\frac{e^{-1}}{2}e^{\frac{25\,x}{4}}e^{-\frac{25\_C1}{4}}\right) + \frac{25\,x}{4} - 1 - \frac{25\_C1}{4}} + 3\,x - \frac{2}{5}\right\}$$

2.225 ODE No. 225

$$(4y(x) + 2x + 3)y'(x) - 2y(x) - x - 1 = 0$$

✓ **Mathematica** : cpu = 0.0145789 (sec), leaf count = 33

$$\left\{\left\{y(x) \to \frac{1}{8}\left(W\left(-e^{c_1+8x-1}\right) + 1\right) + \frac{1}{4}(-2x - 3)\right\}\right\}$$

✓ **Maple** : cpu = 0.036 (sec), leaf count = 20

$$\left\{y(x) = -\frac{x}{2} + \frac{\mathit{lambertW}\left(e^5 (e^x)^8 \_C1\right)}{8} - \frac{5}{8}\right\}$$

2.226 ODE No. 226

$$(4y(x) - 2x - 3)y'(x) + 2y(x) - x - 1 = 0$$

✓ **Mathematica** : cpu = 0.0147693 (sec), leaf count = 35

$$\left\{\left\{y(x) \to \frac{1}{8}\left(-W\left(-e^{c_1+8x-1}\right) - 1\right) + \frac{1}{4}(2x + 3)\right\}\right\}$$

✓ **Maple** : cpu = 0.034 (sec), leaf count = 21

$$\left\{y(x) = \frac{x}{2} - \frac{\mathit{lambertW}\left(-e^5 (e^x)^8 \_C1\right)}{8} + \frac{5}{8}\right\}$$

2.227 ODE No. 227

$$(4y(x) - 3x - 5)y'(x) - 3y(x) + 7x + 2 = 0$$

✓ **Mathematica** : cpu = 0.0117344 (sec), leaf count = 107

$$\left\{\left\{y(x) \to \frac{1}{4}(3x + 5) - \frac{1}{2}i\sqrt{-4c_1 - 2\left(-\frac{7x^2}{2} - 2x\right) - \frac{1}{4}(3x + 5)^2}\right\}, \left\{y(x) \to \frac{1}{4}(3x + 5) + \frac{1}{2}i\sqrt{-4c_1 -}\right.\right.$$

✓ **Maple** : cpu = 0.15 (sec), leaf count = 33

$$\left\{y(x) = \frac{1}{76\_C1}\left(-\sqrt{4 - 6859\left(x - \frac{7}{19}\right)^2 \_C1^2} + (57x + 95)\_C1\right)\right\}$$

2.228 ODE No. 228

$$(4y(x) + 11x - 11)y'(x) - 25y(x) - 8x + 62 = 0$$

✓ **Mathematica** : cpu = 0.250611 (sec), leaf count = 3357

$$\left\{\left\{y(x) \to \frac{}{4\left(-\frac{}{81(9x-1)\left(81\cosh\left(\frac{3c_1}{8}\right)x^2+81\sinh\left(\frac{3c_1}{8}\right)x^2-18\cosh\left(\frac{3c_1}{8}\right)x-18\sinh\left(\frac{3c_1}{8}\right)x+\cosh\left(\frac{3c_1}{8}\right)+\sinh\left(\frac{3c_1}{8}\right)-1\right)\sqrt[3]{-258280}\right.}\right.}\right.\right.$$

✓ **Maple** : cpu = 0.336 (sec), leaf count = 271

$$\left\{y(x) = 1\left((-76\,x+28)\sqrt[3]{64-8748\,(9\,x-1)^2\_C1+108\sqrt{43046721}\sqrt{(x-1/9)^2\left(-\frac{32}{177147}+(x-\right.}}\right.\right.$$

2.229 ODE No. 229

$$(12y(x) - 5x - 8)y'(x) - 5y(x) + 2x + 3 = 0$$

✓ **Mathematica** : cpu = 0.01543 (sec), leaf count = 121

$$\left\{\left\{y(x) \to \frac{1}{12}(5x+8) - \frac{i\sqrt{-12c_1 - 24\left(-\frac{x^2}{12} - \frac{x}{4}\right) - \frac{1}{12}(5x+8)^2}}{2\sqrt{3}}\right\}, \left\{y(x) \to \frac{1}{12}(5x+8) + \frac{i\sqrt{-12c_1}}{}\right.\right.$$

✓ **Maple** : cpu = 0.152 (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 = 0.157378 (sec), leaf count = 98

$$\left\{\left\{y(x) \to -e^{-\frac{bx}{a}}\sqrt{2\int_1^x -\frac{e^{\frac{2bK[1]}{a}}f(K[1])}{a}dK[1] + c_1}\right\}, \left\{y(x) \to e^{-\frac{bx}{a}}\sqrt{2\int_1^x -\frac{e^{\frac{2bK[1]}{a}}f(K[1])}{a}dK[1] + c\right.\right.$$

✓ **Maple** : cpu = 0.031 (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 = 1.91958 (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 = 0.194 (sec), leaf count = 178

$$\left\{y(x) = \frac{1}{-a\beta + b\alpha}\left(-b\gamma + \beta\,c + \frac{x(a\beta - b\alpha) + a\gamma - \alpha\,c}{2\,a}\left(\sqrt{4\,a\beta - \alpha^2 - 2\,b\alpha - b^2}\tan\left(RootOf\left(\sqrt{4\,a\beta\right.\right.\right.\right.\right.$$

2.232 ODE No. 232

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

✓ **Mathematica** : cpu = 0.0683742 (sec), leaf count = 56

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

✓ **Maple** : cpu = 0.013 (sec), leaf count = 39

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

2.233 ODE No. 233

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

✓ **Mathematica** : cpu = 0.1374 (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 = 0.018 (sec), leaf count = 30

$$\left\{y(x) = \sqrt{-2\,a\sin(x) + \_C1}x, y(x) = -\sqrt{-2\,a\sin(x) + \_C1}x\right\}$$

2.234 ODE No. 234

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

✗ **Mathematica** : cpu = 25.5066 (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 = 0.0556297 (sec), leaf count = 40

$$\text{Solve}\left[x = c_1 e^{-\frac{y(x)}{b}} - \frac{ae^{-\frac{y(x)}{b}}\text{Ei}\left(\frac{y(x)}{b}\right)}{b}, y(x)\right]$$

✓ **Maple** : cpu = 0.037 (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 = 0.114607 (sec), leaf count = 114

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

✓ **Maple** : cpu = 0.047 (sec), leaf count = 141

$$\left\{y(x) = 1\left(-(x+4)^{\frac{3}{2}}\sqrt{\frac{\_C1\ (x+4)-4}{x+4}}x - 16\sqrt{x} - 4\,x^{3/2}\right)\left(-(x+4)^{\frac{3}{2}}\sqrt{\frac{\_C1\ (x+4)-4}{x+4}} + 4\sqrt{x}\right.$$

2.237 ODE No. 237

$$x(a+y(x))y'(x)+by(x)+cx=0$$

✗ **Mathematica** : cpu = 5.29817 (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 = 0.236927 (sec), leaf count = 192

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

✓ **Maple** : cpu = 0.056 (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 = 0.0977911 (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 = 0.149 (sec), leaf count = 59

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

2.240 ODE No. 240

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

✓ **Mathematica** : cpu = 0.0955371 (sec), leaf count = 41

$$\left\{\left\{y(x) \to -\sqrt{c_1 x - ax\log(x)}\right\}, \left\{y(x) \to \sqrt{c_1 x - ax\log(x)}\right\}\right\}$$

✓ **Maple** : cpu = 0.017 (sec), leaf count = 34

$$\left\{y(x) = \sqrt{-ax\ln(x) + \_C1\,x}, y(x) = -\sqrt{-x\,(a\ln(x) - \_C1)}\right\}$$

2.241 ODE No. 241

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

✓ **Mathematica** : cpu = 0.0837987 (sec), leaf count = 41

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

✓ **Maple** : cpu = 0.01 (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 = 0.071339 (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 = 0.01 (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 = 11.1893 (sec), leaf count = 487

$$\left\{\left\{y(x)\to -\frac{\sqrt[3]{2}x}{\sqrt[3]{-27c_1{}^2x^2+\sqrt{108c_1{}^3x^3+\left(27c_1{}^2x-27c_1{}^2x^2\right){}^2}+27c_1{}^2x}}+\frac{\sqrt[3]{-27c_1{}^2x^2+\sqrt{108c_1{}^3x^3+\left(\right.}}}{3\sqrt[3]{}}\right.\right.$$

✓ **Maple** : cpu = 0.109 (sec), leaf count = 391

$$\left\{y(x)=\frac{1}{80\_C1}\left(-3\left(x\left(\sqrt{5}\sqrt{\frac{80\ (x-1)^2\_C1-x}{\_C1}}+20\,x-20\right)\_C1^2\right)^{2/3}\left(1+i\sqrt{3}\right)\sqrt[3]{5}+3\left(x\left(\right.\right.\right.\right.$$

2.244 ODE No. 244

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

✓ **Mathematica** : cpu = 11.1231 (sec), leaf count = 484

$$\left\{\left\{y(x)\to -\frac{\sqrt[3]{2}x}{\sqrt[3]{27c_1{}^2x^2+\sqrt{\left(27c_1{}^2x^2+27c_1{}^2x\right){}^2-108c_1{}^3x^3}+27c_1{}^2x}}-\frac{\sqrt[3]{27c_1{}^2x^2+\sqrt{\left(27c_1{}^2x^2+27c_1\right.}}}{3\sqrt[3]{2}c_1}\right.\right.$$

✓ **Maple** : cpu = 0.094 (sec), leaf count = 391

$$\left\{y(x)=\frac{3}{80\_C1}\left(\left(\left(x\left(\sqrt{5}\sqrt{\frac{80\ (1+x)^2\_C1-x}{\_C1}}-20\,x-20\right)\_C1^2\right)^{\frac{2}{3}}\left(i\sqrt{3}-1\right)\sqrt[3]{5}-\left(x\left(1+i\sqrt{}\right.\right.\right.\right.\right.$$

2.245 ODE No. 245

$$\left(4x^3+2xy(x)\right)y'(x)+112x^2y(x)+y(x)^2=0$$

✓ **Mathematica** : cpu = 0.42394 (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 = 3.007 (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 = 0.122587 (sec), leaf count = 80

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

✓ **Maple** : cpu = 0.05 (sec), leaf count = 63

$$\left\{y(x)=\frac{1}{6\_C1\,x}\left(-4\_C1\,x^2-\sqrt{-2\,x^4\_C1^2+6}\right),y(x)=\frac{1}{6\_C1\,x}\left(-4\_C1\,x^2+\sqrt{-2\,x^4\_C1^2+6}\right)\right.$$

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 = 11.1923 (sec), leaf count = 693

$$\left\{\left\{y(x)\to \frac{\sqrt[3]{\sqrt{(-324e^{2c_1}x-216e^{2c_1}+1458x^3+2916x^2+1944x+432)^2+4\left(-81x^2-108x-36\right)^3}-}}{6\sqrt[3]{2}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.194 (sec), leaf count = 517

$$\left\{y(x)=-\frac{1}{3}+\frac{3x+2}{6}\left(7\left(-1/4\sqrt[3]{2\,(3x+2)\_C1-27\,(3x+2)^3\_C1^3+2\sqrt{-27\,(3x+2)^4\_C1^4+\right.\right.\right.$$

2.248 ODE No. 248

$$\left(x^2+6xy(x)+3\right)y'(x)+3y(x)^2+2xy(x)+2x=0$$

✓ **Mathematica** : cpu = 0.172945 (sec), leaf count = 106

$$\left\{\left\{y(x)\to-\frac{\sqrt{6c_1x-2x^3+\frac{1}{6}\left(x^2+3\right)^2}}{\sqrt{6}x}-\frac{x^2+3}{6x}\right\},\left\{y(x)\to\frac{\sqrt{6c_1x-2x^3+\frac{1}{6}\left(x^2+3\right)^2}}{\sqrt{6}x}-\frac{x^2+3}{6x}\right\}\right.$$

✓ **Maple** : cpu = 0.015 (sec), leaf count = 75

$$\left\{y(x)=\frac{1}{6x}\left(-x^2-3-\sqrt{x^4-12x^3-12\_C1\,x+6x^2+9}\right),y(x)=\frac{1}{6x}\left(-x^2-3+\sqrt{x^4-12x^3-12\right.\right.$$

2.249 ODE No. 249

$$y'(x)\left(axy(x)+bx^n\right)+\alpha y(x)^3+\beta y(x)^2=0$$

✓ **Mathematica** : cpu = 3.52738 (sec), leaf count = 115

$$\text{Solve}\left[\frac{(a(-n)+a+\alpha y(x))y(x)^{\frac{a-an}{\beta}-1}(\alpha y(x)+\beta)^{\frac{a(n-1)}{\beta}}}{a^2(n-1)^2(a(n-1)+\beta)}+\frac{x^{1-n}\exp\left(-\frac{a(n-1)(\log(y(x))-\log(\alpha y(x)+\beta))}{\beta}\right)}{ab(1-n)(n-1)}=c_1,\right.$$

✓ **Maple** : cpu = 0.171 (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 = 300.895 (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 = 0.120102 (sec), leaf count = 60

$$\left\{\left\{y(x)\to\frac{1}{x^2}-\frac{\sqrt{c_1x^2+2x^3+1}}{x^2}\right\},\left\{y(x)\to\frac{\sqrt{c_1x^2+2x^3+1}}{x^2}+\frac{1}{x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.013 (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 = 10.9833 (sec), leaf count = 819

$$\left\{\left\{y(x)\to\frac{6xc_1-x}{6c_1-1}+\frac{\sqrt[3]{-1944c_1{}^2x^3+648c_1x^3-54x^3+1944c_1{}^2-648c_1+\sqrt{4\left(54x^2c_1-9x^2\right)^3+(-1}}}{3\sqrt[3]{2}(6c_1-1)}\right.\right.$$

✓ **Maple** : cpu = 0.636 (sec), leaf count = 1338

$$\left\{y(x)=1\left(\left((-\_C1+80)\,x^7-160\,x^4+80\,x\right)\sqrt[3]{4}\sqrt[3]{\left(-\frac{1}{4}+\sqrt{\frac{-5\,x^6+10\,x^3-5}{-80+(\_C1-80)\,x^6+160\,x^3}}\right)(-80+}\right.\right.$$

2.253 ODE No. 253

$$\left(x^2y(x)-1\right)y'(x)+8xy(x)^2-8=0$$

✗ **Mathematica** : cpu = 12.1714 (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 = 0.123948 (sec), leaf count = 99

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

✓ **Maple** : cpu = 0.021 (sec), leaf count = 59

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

2.255 ODE No. 255

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

✓ **Mathematica** : cpu = 3.21031 (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 = 0.19 (sec), leaf count = 74

$$\left\{y(x)=-3\,\frac{lambertW\left(2/3\,\sqrt[3]{-1/8\,x^2}\_C1\right)}{x},y(x)=-3\,\frac{lambertW\left(-1/3\,\sqrt[3]{-1/8\,x^2}\_C1\,(1+i\sqrt{3})\right)}{x},y\right.$$

2.256 ODE No. 256

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

✓ **Mathematica** : cpu = 0.0176331 (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 = 0.039 (sec), leaf count = 31

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

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 = 0.370278 (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 = 0.079 (sec), leaf count = 98

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

2.258 ODE No. 258

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

✓ **Mathematica** : cpu = 0.110327 (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 = 0.016 (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 = 0.230071 (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 = 0.019 (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

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

✓ **Mathematica** : cpu = 0.118427 (sec), leaf count = 80

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

✓ **Maple** : cpu = 0.023 (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

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

✓ **Mathematica** : cpu = 0.76152 (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 = 0.098 (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

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

✓ **Mathematica** : cpu = 0.173331 (sec), leaf count = 101

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

✓ **Maple** : cpu = 0.243 (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 = 0.0901645 (sec), leaf count = 181

$$\left\{\left\{y(x)\to -\sqrt{c_1e^{-2x^3}+\frac{7\,2^{2/3}e^{-2x^3}x\Gamma\left(\frac{1}{3},-2x^3\right)}{3\sqrt[3]{-x^3}}-\frac{2^{2/3}e^{-2x^3}x\Gamma\left(\frac{4}{3},-2x^3\right)}{3\sqrt[3]{-x^3}}}\right\},\left\{y(x)\to \sqrt{c_1e^{-2x^3}+\frac{7\,2}{}\right.\right.$$

✓ **Maple** : cpu = 0.106 (sec), leaf count = 173

$$\left\{y(x)=-\frac{2^{\frac{2}{3}}}{18\,\Gamma(2/3)}\sqrt{-240\sqrt[3]{-x^3}\left(\frac{\left(-\frac{27\,\mathrm{e}^{-2\,x^3}\_C1}{2}+9\,x\right)\sqrt[3]{2}\Gamma(2/3)\sqrt[3]{-x^3}}{40}+\mathrm{e}^{-2\,x^3}x\left(\pi\sqrt{3}-3/2\,\Gamma(1\right.\right.}\right.$$

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 = 0.379675 (sec), leaf count = 680

$$\left\{\left\{y(x)\to \mathrm{Root}\left[81\#1^7e^{\frac{21c_1}{2}}x^{12}+756\#1^6e^{\frac{21c_1}{2}}x^9+2646\#1^5e^{\frac{21c_1}{2}}x^6+4116\#1^4e^{\frac{21c_1}{2}}x^3+2401\#1^3e^{\frac{21c_1}{2}}-\right.\right.\right.$$

✓ **Maple** : cpu = 0.753 (sec), leaf count = 574

$$\left\{y(x) = \frac{-40353607\left(RootOf\left(9\,x^7\_Z^{98} - 49\_C1\,\_Z^{42} + 14\_C1\,\_Z^{21} - \_C1\right)\right)^{91}\_C1 + 756315\,(Roo}{3\,x^3\left(RootOf\left(9\,x^7\_Z^{98} - 49\_C1\,\_Z^{42} + 14\_C1\,\_Z^{21} - \_C1\right)\right)^{7}\left(5764801\_C1\,\left(RootOf\right.\right.}\right.$$

2.265 ODE No. 265

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

✗ **Mathematica** : cpu = 285.003 (sec), leaf count = 0 , could not solve

```
DSolve[2*(1 + n)^2*x^(-1 + n)*(-1 + x^n^2*y[x]^2) + (-1 + x^(n*(1 + n))*y[x])*Derivati
```

✗ **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

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

✗ **Mathematica** : cpu = 300.012 (sec), leaf count = 0 , timed out

```
$Aborted
```

✓ **Maple** : cpu = 1.374 (sec), leaf count = 65

$$\left\{y(x) = \tan\left(RootOf\left(-\arctan(x) + \int^{-\arctan(x)+\_Z} \frac{1}{2\,a^2 + \cos(2\_a) - 1}\left(\sqrt{2}\sqrt{\frac{a^2}{\cos(2\_a)+1}}\sin(2\_\right.\right.\right.\right.$$

2.267 ODE No. 267

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

✓ **Mathematica** : cpu = 0.281698 (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 = 0.021 (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 = 0.165151 (sec), leaf count = 146

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

✓ **Maple** : cpu = 0.044 (sec), leaf count = 118

$$\left\{y(x) = 1\sqrt{e^{2\int\frac{g(x)}{f(x)}\,dx}\left(-2\int\frac{h(x)}{f(x)}\left(e^{\int\frac{g(x)}{f(x)}\,dx}\right)^2 dx + \_C1\right)}\left(e^{2\int\frac{g(x)}{f(x)}\,dx}\right)^{-1}, y(x) = -1\sqrt{e^{2\int\frac{g(x)}{f(x)}\,dx}\left(-2\int\right.}\right.$$

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 = 329.924 (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 = 0.124156 (sec), leaf count = 327

$$\left\{\left\{y(x) \to -\frac{3\sqrt[3]{2}x}{\sqrt[3]{\sqrt{(81c_1 + 27x^3)^2 - 2916x^3} + 81c_1 + 27x^3}} - \frac{\sqrt[3]{\sqrt{(81c_1 + 27x^3)^2 - 2916x^3} + 81c_1 + 27x}}{3\sqrt[3]{2}}\right.\right.$$

✓ **Maple** : cpu = 0.02 (sec), leaf count = 319

$$\left\{y(x) = \frac{1}{2}\left(\left(-4x^3 - 12\_C1 + 4\sqrt{x^6 + (6\_C1 - 4)x^3 + 9\_C1^2}\right)^{\frac{2}{3}} + 4x\right)\frac{}{\sqrt[3]{-4x^3 - 12\_C1 + 4\sqrt{}}}\right.$$

2.271 ODE No. 271

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

✓ **Mathematica** : cpu = 0.174085 (sec), leaf count = 370

$$\left\{\left\{y(x) \to \frac{\sqrt[3]{\sqrt{-8e^{3c_1}x^3 + e^{6c_1} + 20x^6} + e^{3c_1} - 4x^3}}{\sqrt[3]{2}} - \frac{\sqrt[3]{2}x^2}{\sqrt[3]{\sqrt{-8e^{3c_1}x^3 + e^{6c_1} + 20x^6} + e^{3c_1} - 4x^3}}\right\}, \left\{y(x\right.\right.$$

✓ **Maple** : cpu = 0.163 (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 = 0.120297 (sec), leaf count = 42

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

✓ **Maple** : cpu = 0.125 (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 = 0.174362 (sec), leaf count = 297

$$\left\{\left\{y(x) \to \frac{\sqrt[3]{\sqrt{2916\left(a + x^2\right)^3 + 6561c_1^2} + 81c_1}}{3\sqrt[3]{2}} - \frac{3\sqrt[3]{2}(a + x^2)}{\sqrt[3]{\sqrt{2916\left(a + x^2\right)^3 + 6561c_1^2} + 81c_1}}\right\}, \left\{y(x) \to -\right.\right.$$

✓ **Maple** : cpu = 0.019 (sec), leaf count = 401

$$\left\{ y(x) = \frac{1}{2}\left(\left(-12\_C1 + 4\sqrt{4x^6 + 12ax^4 + 12a^2x^2 + 4a^3 + 9\_C1^2}\right)^{\frac{2}{3}} - 4x^2 - 4a\right) \frac{}{\sqrt[3]{-12\_C1 + 4}}\right.$$

2.274 ODE No. 274

$$(a + x^2 + y(x)^2)\, y'(x) + b + x^2 + 2xy(x) = 0$$

✓ **Mathematica** : cpu = 0.1738 (sec), leaf count = 411

$$\left\{\left\{y(x) \to \frac{\sqrt[3]{\sqrt{2916\,(a+x^2)^3 + (-81bx + 81c_1 - 27x^3)^2} - 81bx + 81c_1 - 27x^3}}{3\sqrt[3]{2}} - \frac{}{\sqrt[3]{\sqrt{2916\,(a+x^2)^3 -}}}\right.\right.$$

✓ **Maple** : cpu = 0.029 (sec), leaf count = 657

$$\left\{ y(x) = \frac{1}{2}\left(\left(-4x^3 - 12bx - 12\_C1 + 4\sqrt{5x^6 + (12a + 6b)x^4 + 6x^3\_C1 + (12a^2 + 9b^2)x^2 + 18bx}\right.\right.\right.$$

2.275 ODE No. 275

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

✓ **Mathematica** : cpu = 0.118106 (sec), leaf count = 18

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

✓ **Maple** : cpu = 0.062 (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 = 0.140184 (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 = 0.046 (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 = 0.109954 (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 = 0.286 (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 = 0.177675 (sec), leaf count = 39

$$\text{Solve}\left[-\frac{1}{32}e^{-4y(x)}\left(8y(x)^2+4y(x)+1\right)-e^{-4y(x)}\sin(x)=c_1,y(x)\right]$$

✓ **Maple** : cpu = 0.04 (sec), leaf count = 28

$$\left\{\frac{\left(-8\left(y(x)\right)^2-4\,y(x)-32\,\sin(x)-1\right)\mathrm{e}^{-4\,y(x)}}{32}+\_C1=0\right\}$$

2.279 ODE No. 279

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

✓ **Mathematica** : cpu = 0.603734 (sec), leaf count = 107

$$\left\{\left\{y(x)\to\frac{-\sqrt{(-c_1x+x^2-1)^2+4(x-c_1)}+c_1x-x^2+1}{2(x-c_1)}\right\},\left\{y(x)\to\frac{\sqrt{(-c_1x+x^2-1)^2+4(x-c}}{2(x-c_1)}\right.\right.$$

✓ **Maple** : cpu = 0.127 (sec), leaf count = 116

$$\left\{y(x)=\frac{1}{-2\_C1+4x}\left(-2x^2+\_C1\,x+\sqrt{4x^4-4\_C1\,x^3+\left(\_C1^2-8\right)x^2+(4\_C1+16)x-8\_C}\right.\right.$$

2.280 ODE No. 280

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

✓ **Mathematica** : cpu = 0.130415 (sec), leaf count = 21

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

✓ **Maple** : cpu = 0.041 (sec), leaf count = 24

$$\{y(x)=a\mathit{RootOf}(\tan(\_Z)\,a-\_Z\,a+\_C1-x)-\_C1\}$$

2.281 ODE No. 281

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

✓ **Mathematica** : cpu = 0.186076 (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 = 0.051 (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

$$(y(x)+3x-1)^2y'(x)-(2y(x)-1)(4y(x)+6x-3)=0$$

✓ **Mathematica** : cpu = 0.20991 (sec), leaf count = 2129

$$\left\{\left\{y(x)\to \frac{1}{6}(12x+4e^{c_1}+1)-\frac{1}{6}\sqrt{36x^2+96e^{c_1}x-12x-16e^{c_1}+16e^{2c_1}+3\ 2^{2/3}\sqrt[3]{-7776e^{c_1}x^5+6480e}}\right.\right.$$

✓ **Maple** : cpu = 0.263 (sec), leaf count = 71

$$\left\{-\ln\left(\frac{-6\,y(x)+4-6\,x}{6\,x-1}\right)+3\,\ln\left(\frac{-6\,y(x)+3}{6\,x-1}\right)-3\,\ln\left(\frac{-6\,y(x)+18\,x}{6\,x-1}\right)-\ln(6\,x-1)-\_C1=0\right\}$$

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 = 0.33837 (sec), leaf count = 477

$$\left\{\left\{y(x)\to -\frac{e^{-2x}\sqrt[3]{\sqrt{(27c_1e^{4x}-27e^{7x})^2-2916e^{12x}x^6}+27c_1e^{4x}-27e^{7x}}}{3\sqrt[3]{2}}-\frac{3\sqrt[3]{2}}{\sqrt[3]{\sqrt{(27c_1e^{4x}-27e^{7x})^2-2}}}\right.\right.$$

✓ **Maple** : cpu = 0.056 (sec), leaf count = 407

$$\left\{y(x)=\frac{1}{4\,\mathrm{e}^{2\,x}}\left(-4\,x^2\left(1+i\sqrt{3}\right)\left(\mathrm{e}^{2\,x}\right)^2+\left(i\sqrt{3}-1\right)\left(\left(4\,\mathrm{e}^{3\,x}-4\,\_C1+4\,\sqrt{-4\,x^6\left(\mathrm{e}^{2\,x}\right)^2+\left(\mathrm{e}^{3\,x}\right)^2-2\,\mathrm{e}}\right.\right.\right.\right.$$

2.284 ODE No. 284

$$\left(x^2+4y(x)^2\right)y'(x)-xy(x)=0$$

✓ **Mathematica** : cpu = 0.108416 (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 = 0.129 (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 = 0.174751 (sec), leaf count = 402

$$\left\{\left\{y(x)\to \frac{\sqrt[3]{\sqrt{\left(432e^{3c_1}+54x^3\right)^2+3881196x^6}+432e^{3c_1}+54x^3}}{12\sqrt[3]{2}}-\frac{33x^2}{2\ 2^{2/3}\sqrt[3]{\sqrt{\left(432e^{3c_1}+54x^3\right)^2+3881}}}\right.\right.$$

✓ **Maple** : cpu = 0.059 (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 = 0.243073 (sec), leaf count = 3501

✓ **Maple** : cpu = 1.18 (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 = 1.49201 (sec), leaf count = 77

$$\text{Solve}\left[\frac{y(x)}{2} + \frac{1}{196}\left(14y(x) - \left(8 - 9\sqrt{2}\right)\log\left(-7y(x) + 14x + \sqrt{2} - 4\right) - \left(8 + 9\sqrt{2}\right)\log\left(7y(x) - 14x +\right.\right.\right.$$

✓ **Maple** : cpu = 0.052 (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 = 0.227309 (sec), leaf count = 534

$$\left\{\left\{ y(x) \to -\frac{\sqrt[3]{4\sqrt{3}\sqrt{-54c_1x^6 + 648c_1x^2 + 432c_1{}^2 - 27x^8 + 207x^4 + 32} + 144c_1 - 9x^6 + 108x^2}}{4\,3^{2/3}} + \frac{}{3\sqrt[3]{3}\sqrt[3]{}}\right.\right.$$

✓ **Maple** : cpu = 0.026 (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 = 0.178287 (sec), leaf count = 115

$$\left\{\left\{y(x) \to \frac{1}{6}\left(\sqrt[3]{-18ax + 18c_1 - x^3} + x\right)\right\}, \left\{y(x) \to \frac{x}{6} - \frac{1}{12}\left(1 - i\sqrt{3}\right)\sqrt[3]{-18ax + 18c_1 - x^3}\right\}, \left\{y(x)\right.\right.$$

✓ **Maple** : cpu = 0.026 (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 = 0.445511 (sec), leaf count = 831

$$\left\{\left\{\left\{y(x) \to -\frac{bx}{a} + \frac{\sqrt[3]{-54b^3x^3 + 81abcx^3 - 27a^2dx^3 + 27a^2e^{3c_1} + \sqrt{4\left(9acx^2 - 9b^2x^2\right)^3 + (-54b^3x^3 + 81a}}}{3\sqrt[3]{2}a}\right.\right.\right.$$

✓ **Maple** : cpu = 0.082 (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 = 0.842298 (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 = 0.121 (sec), leaf count = 50

$$\left\{y(x)=\frac{-ax+\mathrm{e}^{RootOf(\_C1\,a\beta\,x-\_C1\,\alpha\,bx-\_Z\,a\beta\,x+\_Z\,\alpha\,bx-\_C1\,\beta\,\mathrm{e}^{\_Z}+\mathrm{e}^{\_Z}\_Z\,\beta+b)}}{b}\right\}$$

2.292 ODE No. 292

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

✓ **Mathematica** : cpu = 36.2462 (sec), leaf count = 1716

$$\text{Solve}\left[(\alpha b-a\beta)\text{RootSum}\left[-cy(x)^2\alpha^3-b\#1y(x)^2\alpha^3+a\beta\#1y(x)^2\alpha^2+a\gamma y(x)^2\alpha^2-2b\beta\#1^2y(x)\alpha^2-2\beta\right.\right.$$

✓ **Maple** : cpu = 0.032 (sec), leaf count = 115

$$\left\{y(x)=\frac{1}{a\beta-b\alpha}\left(((bx+c)\,\alpha-a(\beta\,x+\gamma))\,RootOf\left(\int^{\_Z}\frac{(\_a\,a-b)^2}{\_a^3a^2-2\,\_a^2ab-\_a^2\alpha^2+2\,\_a\,\alpha\,\beta+\_a\,b\right.\right.\right.$$

2.293 ODE No. 293

$$x\left(y(x)^2-3x\right)y'(x)+2y(x)^3-5xy(x)=0$$

✓ **Mathematica** : cpu = 0.162976 (sec), leaf count = 661

$$\left\{\left\{y(x)\to\text{Root}\left[-\#1^{15}-\frac{25\#1^2e^{\frac{65c_1}{2}}}{x^{26}}+\frac{65e^{\frac{65c_1}{2}}}{x^{25}}\&,1\right]\right\},\left\{y(x)\to\text{Root}\left[-\#1^{15}-\frac{25\#1^2e^{\frac{65c_1}{2}}}{x^{26}}+\frac{65e^{\frac{65c}{2}}}{x^{25}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.284 (sec), leaf count = 35

$$\left\{\ln(x)-\_C1-\frac{2}{65}\ln\left(\frac{5\,(y(x))^2-13\,x}{x}\right)+\frac{6}{13}\ln\left(y(x)\,\frac{1}{\sqrt{x}}\right)=0\right\}$$

2.294 ODE No. 294

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

✓ **Mathematica** : cpu = 0.2323 (sec), leaf count = 71

$$\left\{\left\{y(x)\to\frac{1}{2}\left(c_1x-\sqrt{-4a+c_1{}^2x^2+4x^2}\right)\right\},\left\{y(x)\to\frac{1}{2}\left(\sqrt{-4a+c_1{}^2x^2+4x^2}+c_1x\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.066 (sec), leaf count = 112

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

2.295 ODE No. 295

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

✓ **Mathematica** : cpu = 0.206849 (sec), leaf count = 31

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

✓ **Maple** : cpu = 0.149 (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

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

✓ **Mathematica** : cpu = 0.469764 (sec), leaf count = 102

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

✓ **Maple** : cpu = 0.59 (sec), leaf count = 135

$$\left\{y(x)=-x\left(-x^3+\_C1\,x+x^2+\sqrt{-\_C1\,x^4+\_C1^2x^2+x^4}\right)\left(\_C1\,x-x^2+\sqrt{-\_C1\,x^4+\_C1^2x^2\right.\right.$$

2.297 ODE No. 297

$$2x(5x^2 + y(x)^2)\, y'(x) - x^2 y(x) + y(x)^3 = 0$$

✓ **Mathematica** : cpu = 0.140979 (sec), leaf count = 216

$$\left\{\left\{y(x) \to \text{Root}\left[-\#1^5 + \frac{\#1^2 e^{3c_1}}{x^{3/2}} + 3e^{3c_1}\sqrt{x}\&, 1\right]\right\}, \left\{y(x) \to \text{Root}\left[-\#1^5 + \frac{\#1^2 e^{3c_1}}{x^{3/2}} + 3e^{3c_1}\sqrt{x}\&, 2\right]\right\}$$

✓ **Maple** : cpu = 0.313 (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

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

✓ **Mathematica** : cpu = 0.0834763 (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 = 0.014 (sec), leaf count = 73

$$\left\{y(x) = \frac{1}{x}\sqrt[3]{(x^2 + \_C1)\, x^2}, y(x) = -\frac{1 + i\sqrt{3}}{2\,x}\sqrt[3]{(x^2 + \_C1)\, x^2}, y(x) = \frac{i\sqrt{3} - 1}{2\,x}\sqrt[3]{(x^2 + \_C1)\, x^2}\right\}$$

2.299 ODE No. 299

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

✓ **Mathematica** : cpu = 0.106773 (sec), leaf count = 371

$$\left\{\left\{y(x) \to -\frac{\sqrt[3]{\frac{2}{3}}x^2}{\sqrt[3]{9c_1x^2 + \sqrt{3}\sqrt{27c_1{}^2x^4 - 4x^9}}} - \frac{\sqrt[3]{9c_1x^2 + \sqrt{3}\sqrt{27c_1{}^2x^4 - 4x^9}}}{\sqrt[3]{2}3^{2/3}x}\right\}, \left\{y(x) \to \frac{(1}{2^{2/3}\sqrt[3]{3}\sqrt[3]{9c_1x}}\right.$$

✓ **Maple** : cpu = 0.174 (sec), leaf count = 276

$$\left\{y(x)=-\frac{12^{\frac{2}{3}}}{144\,x}\left(\left(-12\,ix^{3}+i\left(\left(12\,\sqrt{-12\,x^{5}+81\_C1^{2}}+108\_C1\right)x^{2}\right)^{\frac{2}{3}}\right)\sqrt{3}+12\,x^{3}+\left(\left(12\,\sqrt{-12\right.\right.\right.\right.$$

2.300 ODE No. 300

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

✓ **Mathematica** : cpu = 0.0796077 (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 = 0.014 (sec), leaf count = 83

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

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 = 0.129724 (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 = 0.183 (sec), leaf count = 25

$$\left\{y(x)=\frac{1}{x}\mathrm{e}^{-\frac{1}{2}lambertW\left(6\,\frac{\mathrm{e}^{3\_C1}}{x^{3}}\right)+\frac{3\_C1}{2}}\right\}$$

2.302 ODE No. 302

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

✓ **Mathematica** : cpu = 0.0916786 (sec), leaf count = 70

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

✓ **Maple** : cpu = 0.104 (sec), leaf count = 133

$$\left\{y(x)=-\frac{1}{2\_C1\,x}\sqrt{-2\,x\_C1\,\left(-2\_C1-x+\sqrt{x\,(4\_C1+x)}\right)},y(x)=\frac{1}{2\_C1\,x}\sqrt{-2\,x\_C1\,\left(-2\_\right.}\right.$$

2.303 ODE No. 303

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

✓ **Mathematica** : cpu = 0.113607 (sec), leaf count = 25

$$\text{Solve}\left[xy(x)-\frac{1}{xy(x)}-2\log(y(x))=c_1,y(x)\right]$$

✓ **Maple** : cpu = 0.138 (sec), leaf count = 34

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

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 = 0.333295 (sec), leaf count = 44

$$\text{Solve}\left[y(x)\sqrt{5x^2y(x)^2+2}e^{\frac{\tan^{-1}\left(\sqrt{\frac{5}{2}}xy(x)\right)}{\sqrt{10}}}=c_1,y(x)\right]$$

✓ **Maple** : cpu = 0.214 (sec), leaf count = 44

$$\left\{y(x)=\frac{\sqrt{10}}{5\,x}\tan\left(RootOf\left(\sqrt{10}\ln\left(\frac{4\left((\tan(\_Z))^2+1\right)(\tan(\_Z))^2}{5\,x^2}\right)+2\sqrt{10}\_C1+2\_Z\right)\right)\right\}$$

2.305 ODE No. 305

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

✓ **Mathematica** : cpu = 0.179901 (sec), leaf count = 1277

$$\left\{\left\{y(x) \to -\frac{1}{2}\sqrt{\frac{16\sqrt[3]{2}\left(x^3+3c_1\right)}{\sqrt[3]{104976x^2-\sqrt{11019960576x^4-4\left(144x^3+432c_1\right)^3}}}+\frac{\sqrt[3]{104976x^2-\sqrt{1101996057}}}{9\sqrt[3]{2}}}\right.\right.$$

✓ **Maple** : cpu = 0.017 (sec), leaf count = 21

$$\left\{\frac{x^3}{3} - 3\,xy(x) + \frac{(y(x))^4}{4} + \_C1 = 0\right\}$$

2.306 ODE No. 306

$$\left(y(x)^3 - x^3\right) y'(x) - x^2 y(x) = 0$$

✓ **Mathematica** : cpu = 0.113539 (sec), leaf count = 201

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

✓ **Maple** : cpu = 0.299 (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 = 0.228682 (sec), leaf count = 149

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

✓ **Maple** : cpu = 0.032 (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 = 0.0076606 (sec), leaf count = 55

$$\left\{\{y(x)\to 0\},\left\{y(x)\to -\frac{\sqrt{4c_1-x^2}}{\sqrt{2}}\right\},\left\{y(x)\to \frac{\sqrt{4c_1-x^2}}{\sqrt{2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.009 (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 = 0.0992953 (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 = 0.026 (sec), leaf count = 113

$$\left\{y(x)=-\frac{1}{2}\sqrt{-2-2\sqrt{4\,x^4+4\,x^2+8\_C1+1}},y(x)=\frac{1}{2}\sqrt{-2-2\sqrt{4\,x^4+4\,x^2+8\_C1+1}},y(x)=-\right.$$

2.310 ODE No. 310

$$x^3 + (5x^2y(x) + 2y(x)^3)\,y'(x) + 5xy(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.166148 (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 = 0.088 (sec), leaf count = 125

$$\left\{y(x) = -\frac{1}{2}\sqrt{-10\_C1\,x^2 - 2\sqrt{23\,x^4\_C1^2 + 2}\frac{1}{\sqrt{\_C1}}}, y(x) = \frac{1}{2}\sqrt{-10\_C1\,x^2 - 2\sqrt{23\,x^4\_C1^2 + 2}-}\right.$$

2.311 ODE No. 311

$$4x^3 + 9x^2y(x) + (3x^3 + 6x^2y(x) - 3xy(x)^2 + 20y(x)^3)\,y'(x) + 6xy(x)^2 - y(x)^3 = 0$$

✓ **Mathematica** : cpu = 0.22382 (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 = 0.067 (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 = 0.617385 (sec), leaf count = 204

$$\left\{\left\{y(x) \to -\frac{\sqrt{b}\sqrt{a^2 + 2a^2 W\left(\frac{c_1(a+b)e^{\frac{bx^2}{2a^2}-\frac{b}{2a}-\frac{x^2}{2b}-\frac{1}{2}}}{2a^3b^2}\right) + ab - ax^2 - bx^2}}{\sqrt{a}\sqrt{a+b}}\right\}, \left\{y(x) \to \frac{\sqrt{b}\sqrt{a^2 + 2a^2 W\left(\right.}}{}\right.\right.$$

✓ **Maple** : cpu = 1.136 (sec), leaf count = 240

$$\left\{y(x) = \frac{1}{a}\sqrt{a\left(e^{\frac{1}{2\,ba^2}\left(-2\,lambertW\left(1/2\,\frac{(a+b)e^{-1/2}}{ba^2}e^{-1/2\,\frac{x^2}{b}}e^{1/2\,\frac{bx^2}{a^2}}e^{-1/2\,\frac{b}{a}}\left(e^{-\frac{\_C1}{ab}}\right)^{-1}\right)ba^2+(-x^2-b)a^2+(-b^2-2\_C1)a+b^2x^2\right)}\right.}\right.$$

2.313 ODE No. 313

$$y'(x)\left(3axy(x)^2 + 2ay(x)^3 - bx^3 + cx^2\right) - ay(x)^3 + 2bx^3 + 3bx^2y(x) + cy(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.319681 (sec), leaf count = 537

$$\left\{\left\{y(x) \to \frac{\sqrt[3]{2}(3acx + 3ac_1)}{3a\sqrt[3]{\sqrt{(27a^2bx^3 + 27a^2c_1x)^2 + 4(3acx + 3ac_1)^3} + 27a^2bx^3 + 27a^2c_1x}} - \frac{\sqrt[3]{\sqrt{(27a^2bx^3 + 27a}}}{}\right.\right.$$

✓ **Maple** : cpu = 0.155 (sec), leaf count = 748

$$\left\{y(x) = \frac{1}{6\,a}\left((-12\,cx + 12\_C1)\,a + \left(\left(\left(-108\,bx^3 + 108\_C1\,x + 12\sqrt{\frac{81\,ab^2x^6 - 162\_C1\,abx^4 + 12\,c}{}}\right.\right.\right.\right.\right.$$

2.314 ODE No. 314

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

✓ **Mathematica** : cpu = 0.146554 (sec), leaf count = 188

$$\left\{\left\{y(x) \to -\frac{\sqrt[4]{c_1 - 4x^4\cos(x) + 16x^3\sin(x) + 48x^2\cos(x) - 96x\sin(x) - 96\cos(x)}}{x}\right\}, \left\{y(x) \to -\frac{i\sqrt[4]{c_1}}{}\right.\right.$$

✓ **Maple** : cpu = 0.036 (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 = 0.179613 (sec), leaf count = 368

$$\left\{\left\{y(x) \to \frac{\sqrt[3]{\frac{2}{3}}e^{c_1}x}{\sqrt[3]{\sqrt{3}\sqrt{27x^6 - 4e^{3c_1}x^3} - 9x^3}} + \frac{\sqrt[3]{\sqrt{3}\sqrt{27x^6 - 4e^{3c_1}x^3} - 9x^3}}{\sqrt[3]{2}3^{2/3}}\right\}, \left\{y(x) \to -\frac{(1+i}{2^{2/3}\sqrt[3]{3}\sqrt[3]{\sqrt{3}\sqrt{2}}}\right.\right.$$

✓ **Maple** : cpu = 0.075 (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 = 0.125444 (sec), leaf count = 48

$$\left\{\{y(x)\to 0\},\text{Solve}\left[x=c_1e^{-\frac{1}{2}y(x)^2}-\frac{1}{4}e^{-\frac{1}{2}y(x)^2}\text{Ei}\left(\frac{y(x)^2}{2}\right),y(x)\right]\right\}$$

✓ **Maple** : cpu = 0.038 (sec), leaf count = 53

$$\left\{y(x)=0,y(x)=\sqrt{-2\,RootOf\left(\mathrm{e}^{\_Z}Ei\left(1,\_Z\right)+4\,\mathrm{e}^{\_Z}\_C1-4\,x\right)},y(x)=-\sqrt{-2\,RootOf\left(\mathrm{e}^{\_Z}Ei\left(1,\_Z\right.\right.}$$

2.317 ODE No. 317

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

✓ **Mathematica** : cpu = 0.322883 (sec), leaf count = 23

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

✓ **Maple** : cpu = 0.104 (sec), leaf count = 29

$$\left\{y(x)=\mathrm{e}^{RootOf\left(-\left(\mathrm{e}^{\_Z}\right)^3-\mathrm{e}^{\_Z}\ln(x)+\mathrm{e}^{\_Z}\_C1-\_Z\,\mathrm{e}^{\_Z}+x\right)}\right\}$$

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 = 0.227473 (sec), leaf count = 4284

$$\left\{\{y(x)\to 0\},\left\{y(x)\to-\sqrt{\frac{4\sqrt[3]{2}x^2}{3\sqrt[3]{16x^6+24x^5-27c_1{}^2x^4+12x^4+2x^3+3\sqrt{3}\sqrt{-32c_1{}^2x^{10}-48c_1{}^2x^9+27c}}}}\right.\right.$$

✓ **Maple** : cpu = 0.016 (sec), leaf count = 28

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

2.319 ODE No. 319

$$\left(7xy(x)^3+y(x)-5x\right)y'(x)+y(x)^4-5y(x)=0$$

✓ **Mathematica** : cpu = 0.143065 (sec), leaf count = 302

$$\{\{y(x)\to \text{Root}[10\#1^7x+2\#1^5-100\#1^4x-25\#1^2+250\#1x-10c_1\&,1]\},\{y(x)\to \text{Root}[10\#1^7x+$$

✓ **Maple** : cpu = 0.023 (sec), leaf count = 35

$$\left\{x+\frac{2\,(y(x))^5-25\,(y(x))^2-10\_C1}{10\,\left((y\,(x))^3-5\right)^2 y\,(x)}=0\right\}$$

2.320 ODE No. 320

$$\left(x^2y(x)^3+xy(x)\right)y'(x)-1=0$$

✓ **Mathematica** : cpu = 0.110936 (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 = 0.07 (sec), leaf count = 78

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

2.321 ODE No. 321

$$\left(2x^2y(x)^3+x^2y(x)^2-2x\right)y'(x)-2y(x)-1=0$$

✓ **Mathematica** : cpu = 0.326769 (sec), leaf count = 47

$$\text{Solve}\left[\frac{1}{64}(-4y(x)^2+4y(x)-2\log(8y(x)+4)+3)-\frac{1}{4x(2y(x)+1)}=c_1,y(x)\right]$$

✓ **Maple** : cpu = 0.13 (sec), leaf count = 42

$$\left\{y(x)=\frac{\mathrm{e}^{RootOf\left(x\left(\mathrm{e}^{\_Z}\right)^{3}-4x\left(\mathrm{e}^{\_Z}\right)^{2}+8\_C1\,x\mathrm{e}^{\_Z}+2\_Z\,x\mathrm{e}^{\_Z}+3x\mathrm{e}^{\_Z}+16\right)}}{2}-\frac{1}{2}\right\}$$

2.322 ODE No. 322

$$\left(10x^2y(x)^3-3y(x)^2-2\right)y'(x)+5xy(x)^4+x=0$$

✓ **Mathematica** : cpu = 0.273817 (sec), leaf count = 2077

$$\left\{\left\{y(x)\to-\frac{1}{2}\sqrt{\frac{4\sqrt[3]{2}\left(5x^4-10c_1x^2-2\right)}{5x^2\sqrt[3]{2268x^2-216c_1+\sqrt{\left(2160x^2+108\left(x^2-2c_1\right)\right)^2-4\left(60x^4-120c_1x^2-24\right)^3}}}+\frac{\sqrt[3]{}}{}}\right.\right.$$

✓ **Maple** : cpu = 0.02 (sec), leaf count = 29

$$\left\{\frac{5x^2(y(x))^4}{2}-(y(x))^3+\frac{x^2}{2}-2y(x)+\_C1=0\right\}$$

2.323 ODE No. 323

$$xy'(x)\left(axy(x)^3+c\right)+y(x)\left(bx^3y(x)+c\right)=0$$

✓ **Mathematica** : cpu = 0.249687 (sec), leaf count = 463

$$\left\{\left\{y(x)\to\frac{\sqrt[3]{54a^2cx^2+\sqrt{2916a^4c^2x^4+108a^3x^3\left(bx^3-2c_1x\right)^3}}}{3\sqrt[3]{2}ax}-\frac{\sqrt[3]{2}(bx^3-2c_1x)}{\sqrt[3]{54a^2cx^2+\sqrt{2916a^4c^2x^4+108a^3x^3}}}\right.\right.$$

✓ **Maple** : cpu = 0.092 (sec), leaf count = 630

$$\left\{y(x)=-\frac{3^{\frac{2}{3}}}{18ax}\left(\left(\left(3i\left(bx^2-2\_C1\right)x^2a+i\left(\left(\left(27c+3\sqrt{\frac{3b^3x^8-18\_C1\,b^2x^6+36\_C1^2bx^4-24\_}{a}}\right.\right.\right.\right.\right.\right.\right.$$

2.324 ODE No. 324

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

✓ **Mathematica** : cpu = 0.115277 (sec), leaf count = 723

$$\left\{\left\{y(x) \to -\frac{2x^3 - c_1x^2}{6x^2} + \frac{\sqrt[3]{12c_1x^8 - 6c_1{}^2x^7 + c_1{}^3x^6 + 3\sqrt{3}\sqrt{-24c_1x^{12} + 12c_1{}^2x^{11} - 2c_1{}^3x^{10} + 16x^{13} +}}{6x^2}\right.\right.$$

✓ **Maple** : cpu = 0.099 (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 = 0.190086 (sec), leaf count = 139

$$\text{Solve}\left[\frac{1}{7}\text{RootSum}\left[\#1^4 + \#1^3 + 3\#1^2 + \#1 + 1\&, \frac{8\#1^3\log\left(\frac{y(x)}{x} - \#1\right) + 9\#1^2\log\left(\frac{y(x)}{x} - \#1\right) + 12\#}{4\#1^3 + 3\#1^2 + 6\#1}\right.\right.$$

✓ **Maple** : cpu = 0.469 (sec), leaf count = 124

$$\left\{\frac{1}{7}\ln\left(\frac{y(x) - x}{x}\right) - \frac{2}{7}\ln\left(\frac{4\,x^4 + 4\,x^3y(x) + 12\,x^2(y(x))^2 + 4\,x(y(x))^3 + 4\,(y(x))^4}{x^4}\right) - \frac{2\,\sqrt{3}}{7}\arctan\left(\frac{\sqrt{3}}{}\right.\right.$$

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 = 3.01471 (sec), leaf count = 13289

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✓ **Maple** : cpu = 0.388 (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 = 0.329989 (sec), leaf count = 669

$$\left\{\left\{y(x)\to\frac{\sqrt[3]{9c_1{}^2x^2+3\sqrt{3}\sqrt{-4c_1{}^3x^6-c_1{}^4x^4+18c_1{}^2x^4+4c_1{}^3x^2+27x^4}+2c_1{}^3+27x^2}}{3\sqrt[3]{2}x}-\frac{}{3x\sqrt[3]{9c_1{}^2x^2+}}\right.\right.$$

✓ **Maple** : cpu = 0.123 (sec), leaf count = 583

$$\left\{y(x)=\frac{1}{12\_C1\,x}\left(\left(\left(-12\,ix^2\_C1-i\left(108\_C1^3x^2+12\sqrt{3}\sqrt{27\_C1^4x^2+18\_C1^2x^2+(4\,x^4-4)\_C\right.\right.\right.\right.\right.$$

2.328 ODE No. 328

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

✓ **Mathematica** : cpu = 0.235148 (sec), leaf count = 42

$$\text{Solve}\left[\frac{n(\log(x)-\log(-axy(x)^n+n+2))}{n+2}-\frac{2n\log(y(x))}{n+2}=c_1,y(x)\right]$$

✓ **Maple** : cpu = 0.145 (sec), leaf count = 33

$$\left\{\frac{x^n}{\left((y(x))^n\,ax-n-2\right)^n\left((y(x))^n\right)^2}-\_C1=0\right\}$$

2.329 ODE No. 329

$$x^n y(x)^m (axy'(x) + by(x)) + \alpha xy'(x) + \beta y(x) = 0$$

✓ **Mathematica** : cpu = 0.671128 (sec), leaf count = 102

$$\text{Solve}\left[\frac{m((a\beta - \alpha b)\log(x^n y(x)^m(bm - an) - \alpha n + \beta m) + \beta\log(x)(bm - an))}{(bm - an)(\beta m - \alpha n)} + \frac{\alpha m \log(\beta m y(x) - \alpha n y($$

✓ **Maple** : cpu = 0.269 (sec), leaf count = 71

$$\left\{ \left((y(x))^m \right)^{\alpha\,(an-bm)} \left(x^n (an - bm) (y(x))^m - \beta\, m + \alpha\, n \right)^{-a\beta\, m + bm\alpha} x^{\beta\, m(an-bm)} - \_C1 = 0 \right\}$$

2.330 ODE No. 330

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

✓ **Mathematica** : cpu = 0.101989 (sec), leaf count = 52

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

✓ **Maple** : cpu = 0.024 (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 = 49.4735 (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 = 0.20701 (sec), leaf count = 34

$$\text{Solve}\left[\log(y(x))-\frac{y(x)\log(x)-\frac{2y(x)}{\sqrt{xy(x)}}}{y(x)}=c_1,y(x)\right]$$

✓ **Maple** : cpu = 0.011 (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 = 0.311406 (sec), leaf count = 72

$$\text{Solve}\left[\frac{2\sqrt{xy(x)}\log(y(x))}{\sqrt{x}\sqrt{y(x)}}-\frac{\sqrt{xy(x)}\left(3x^{3/2}y(x)^{3/2}\log(x)+6xy(x)-2\right)}{3x^2y(x)^2}=c_1,y(x)\right]$$

✓ **Maple** : cpu = 0.073 (sec), leaf count = 32

$$\left\{\ln(y(x))-1\frac{1}{\sqrt{x}}\frac{1}{\sqrt{y(x)}}+\frac{1}{3}(y(x))^{-\frac{3}{2}}x^{-\frac{3}{2}}-\frac{\ln(x)}{2}-\_C1=0\right\}$$

2.334 ODE No. 334

$$\left(\sqrt{y(x)+x}+1\right)y'(x)+1=0$$

✓ **Mathematica** : cpu = 0.0994207 (sec), leaf count = 39

$$\left\{\left\{y(x)\to-2\sqrt{c_1+x+1}+c_1+2\right\},\left\{y(x)\to2\sqrt{c_1+x+1}+c_1+2\right\}\right\}$$

✓ **Maple** : cpu = 0.021 (sec), leaf count = 19

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

2.335 ODE No. 335

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

✓ **Mathematica** : cpu = 0.196418 (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 = 0.008 (sec), leaf count = 50

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

2.336 ODE No. 336

$$\left(ax+\sqrt{y(x)^2+1}\right)y'(x)+ay(x)+\sqrt{x^2+1}=0$$

✓ **Mathematica** : cpu = 0.257103 (sec), leaf count = 53

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

✓ **Maple** : cpu = 0.024 (sec), leaf count = 41

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

2.337 ODE No. 337

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

✓ **Mathematica** : cpu = 0.225348 (sec), leaf count = 161

$$\left\{\left\{y(x)\to-\sqrt{-2ix\sinh(c_1)-2ix\cosh(c_1)-\sinh(2c_1)-\cosh(2c_1)}\right\},\left\{y(x)\to\sqrt{-2ix\sinh(c_1)-2ix\,\text{co}\right.\right.$$

✓ **Maple** : cpu = 0.054 (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 = 62.9797 (sec), leaf count = 17681

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✓ **Maple** : cpu = 0.517 (sec), leaf count = 129

$$\left\{y(x)=RootOf\left(-\ln(x)+\int^{\_Z}\frac{1}{(\_a^2+1)\left(\cos(2\alpha)\_a^2+2\_a\sin(2\alpha)+\_a^2-\cos(2\alpha)+1\right)}\left(-\cos\right.\right.\right.$$

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 = 0.338255 (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 = 0.134 (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 = 84.0191 (sec), leaf count = 0 , could not solve

```
DSolve[-(y[x]*(e2/((-a + x)^2 + y[x]^2)^(3/2) + e1/((a + x)^2 + y[x]^2)^(3/2))) + ((e2
a + x))/((-a + x)^2 + y[x]^2)^(3/2) + (e1*(a + x))/((a + x)^2 + y[x]^2)^(3/2))*Derivat
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , exception

```
time expired
```

2.341 ODE No. 341

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

✓ **Mathematica** : cpu = 0.227931 (sec), leaf count = 33

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

✓ **Maple** : cpu = 0.049 (sec), leaf count = 33

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

2.342 ODE No. 342

$$x\left(2e^{-xy(x)} + 3e^{xy(x)}\right)\left(xy'(x) + y(x)\right) + 1 = 0$$

✓ **Mathematica** : cpu = 0.443145 (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 = 0.032 (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 = 0.131187 (sec), leaf count = 35

$$\mathrm{Solve}\left[x = c_1 e^{y(x)} + e^{y(x)}\left(\mathrm{Ei}(-y(x)) - e^{-y(x)}\log(y(x))\right), y(x)\right]$$

✓ **Maple** : cpu = 0.049 (sec), leaf count = 27

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

2.344 ODE No. 344

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

✓ **Mathematica** : cpu = 0.188756 (sec), leaf count = 23

$$\left\{\left\{y(x) \to -\frac{W(-2c_1e^{-2x})}{2c_1}\right\}\right\}$$

✓ **Maple** : cpu = 0.023 (sec), leaf count = 19

$$\left\{y(x) = \mathrm{e}^{-\mathit{lambertW}(-2\,\mathrm{e}^{-2\,x}\_C1)-2\,x}\right\}$$

2.345 ODE No. 345

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

✓ **Mathematica** : cpu = 0.165102 (sec), leaf count = 35

$$\mathrm{Solve}\left[\frac{y(x)}{x^2} + 2\left(\frac{1}{2}y(x)^2\log(y(x)) - \frac{y(x)^2}{4}\right) = c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.056 (sec), leaf count = 36

$$\left\{y(x) = \mathrm{e}^{\mathit{RootOf}\left(2\_Z\,x^2(\mathrm{e}^{\_Z})^2 - x^2(\mathrm{e}^{\_Z})^2 + 2\_C1\,x^2 + 2\,\mathrm{e}^{\_Z}\right)}\right\}$$

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 = 0.358939 (sec), leaf count = 24

$$\mathrm{Solve}[ax\log(xy(x)) - y(x)\log(xy(x)) = c_1, y(x)]$$

✓ **Maple** : cpu = 0.204 (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 = 0.287271 (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 = 0.132 (sec), leaf count = 16

$$\{y(x)=\pi-\arccos(\sin(x)\_C1+\_C1-1)\}$$

2.348 ODE No. 348

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

✓ **Mathematica** : cpu = 0.179223 (sec), leaf count = 17

$$\text{Solve}[x\sin(y(x))+y(x)\sin(x)=c_1,y(x)]$$

✓ **Maple** : cpu = 0.072 (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 = 0.224452 (sec), leaf count = 15

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

✓ **Maple** : cpu = 0.026 (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 = 0.547628 (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 = 0.677 (sec), leaf count = 226

$$\left\{y(x) = \arctan\left(-2\frac{e^x}{e^x(\cos(x)+\sin(x)) + 2\_C1}, \frac{\sqrt{16}}{4\_C1^2 + 4e^x(\cos(x)+\sin(x))\_C1 + (e^x)^2(2\sin\right.\right.$$

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 = 0.468626 (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 = 0.333 (sec), leaf count = 55

$$\left\{y(x) = -\arcsin\left(\frac{1}{\sqrt{1 - \sqrt{\pi}\mathit{Erf}(x)e^{x^2} - 2\_C1e^{x^2}}}\right), y(x) = \arcsin\left(\frac{1}{\sqrt{1 - \sqrt{\pi}\mathit{Erf}(x)e^{x^2} - 2\_C1e^{x^2}}}\right.\right.$$

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 = 0.526993 (sec), leaf count = 43

$$\text{Solve}\left[4\sin(\alpha)\sin(x)\sin(y(x)) - 4\left(\frac{y(x)}{2} + \frac{1}{4}\sin(2y(x))\right) - 2x - \sin(2x) = c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.35 (sec), leaf count = 33

$$\left\{\frac{(-2\sin(\alpha)\sin(x) + \cos(y(x)))\sin(y(x))}{2} + \frac{\sin(x)\cos(x)}{2} + \frac{x}{2} + \_C1 + \frac{y(x)}{2} = 0\right\}$$

2.353 ODE No. 353

$$xy'(x)\cos(y(x)) + \sin(y(x)) = 0$$

✓ **Mathematica** : cpu = 0.0753412 (sec), leaf count = 14

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

✓ **Maple** : cpu = 0.066 (sec), leaf count = 12

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

2.354 ODE No. 354

$$y'(x)(x\sin(y(x)) - 1) + \cos(y(x)) = 0$$

✓ **Mathematica** : cpu = 0.134014 (sec), leaf count = 145

$$\left\{\left\{y(x)\to -\cos^{-1}\left(\frac{c_1x-\sqrt{c_1{}^2-x^2+1}}{c_1{}^2+1}\right)\right\},\left\{y(x)\to \cos^{-1}\left(\frac{c_1x-\sqrt{c_1{}^2-x^2+1}}{c_1{}^2+1}\right)\right\},\left\{y(x)\to -\mathrm{co}\right.\right.$$

✓ **Maple** : cpu = 0.05 (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 = 0.160493 (sec), leaf count = 17

$$\mathrm{Solve}[x\sin(y(x)) + y(x)\cos(x) = c_1, y(x)]$$

✓ **Maple** : cpu = 0.069 (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 = 0.227113 (sec), leaf count = 21

$$\text{Solve}\left[x^2\sin(y(x))+y(x)^2\sin(x)=c_1,y(x)\right]$$

✓ **Maple** : cpu = 0.084 (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 = 0.503776 (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 = 0.378 (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 = 0.144335 (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 = 0.076 (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 = 0.300361 (sec), leaf count = 45

$$\left\{\left\{y(x) \to \text{SinIntegral}^{(-1)}\left(c_1 - \frac{5}{3}\left(\frac{5\cos(x)}{4} + \frac{1}{12}\cos(3x) + \log\left(\sin\left(\frac{x}{2}\right)\right) - \log\left(\cos\left(\frac{x}{2}\right)\right)\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.046 (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 = 4.3337 (sec), leaf count = 369

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[-\frac{i(\cos(\#1a)+1)\sqrt{\frac{2c\cos(\#1a)+\cos(2\#1a)-1}{(\cos(\#1a)+1)^2}}\sqrt{\frac{c\tan^2\left(\frac{\#1a}{2}\right)+\sqrt{c^2+4}+2}{\sqrt{c^2+4}+2}}\sqrt{1-\frac{c\tan^2\left(\#\cdots\right.}{\sqrt{c^2+4\cdots}}}\cdots}{a\left(c^2-1\right)\sqrt{\frac{\cdots}{4-2\sqrt{\cdots}}}\cdots}\right.\right.\right.$$

✓ **Maple** : cpu = 0.25 (sec), leaf count = 48

$$\left\{x + \int^{y(x)} 2\frac{\cos(\_a\,a)}{b(c\cos(\_a\,a) - 1)\sqrt{2\cos(2\_a\,a) - 2 + 4c\cos(\_a\,a)}}d\_a + \_C1 = 0\right\}$$

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 = 0.631822 (sec), leaf count = 31

$$\text{Solve}[\cos(y(x)) - \cos(xy(x)) + \sin(x)\cos(y(x)) + \cos(x)\sin(y(x)) + \sin(x) = c_1, y(x)]$$

✓ **Maple** : cpu = 0.165 (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 = 0.355899 (sec), leaf count = 23

$$\text{Solve}[-4\log(y(x))-\cos(xy(x))-\log(x)=c_1,y(x)]$$

✓ **Maple** : cpu = 0.184 (sec), leaf count = 23

$$\left\{y(x)=\frac{1}{x}\mathit{RootOf}\left(-\_Z+\mathrm{e}^{-\frac{\cos(\_Z)}{4}}\_C1\,x^{\frac{3}{4}}\right)\right\}$$

2.363 ODE No. 363

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

✓ **Mathematica** : cpu = 0.3346 (sec), leaf count = 33

$$\text{Solve}\left[\frac{y(x)}{2x}+\frac{1}{4}\sin\left(\frac{2y(x)}{x}\right)=c_1-\log(x),y(x)\right]$$

✓ **Maple** : cpu = 0.063 (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 = 0.456237 (sec), leaf count = 31

$$\text{Solve}\left[-\log\left(\frac{y(x)}{x}\right)-\log\left(\cos\left(\frac{y(x)}{x}\right)\right)=c_1+2\log(x),y(x)\right]$$

✓ **Maple** : cpu = 0.076 (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

$$(y(x)f(x^2+y(x)^2)-x)\,y'(x)+xf(x^2+y(x)^2)+y(x)=0$$

✓ **Mathematica** : cpu = 0.346849 (sec), leaf count = 156

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

✓ **Maple** : cpu = 0.261 (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 = 0.269191 (sec), leaf count = 91

$$\text{Solve}\left[\int_1^{y(x)}\left(x-af\left(x^2+aK[2]^2\right)K[2]-\int_1^x\left(1-2aK[1]K[2]f'\left(K[1]^2+aK[2]^2\right)\right)dK[1]\right)dK[2]+\int_1^{x}\right.$$

✓ **Maple** : cpu = 0.066 (sec), leaf count = 45

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

2.367 ODE No. 367

$$f(x^cy(x))\,(bxy'(x)-a)-x^ay(x)^b\,(cy(x)+xy'(x))=0$$

✗ **Mathematica** : cpu = 11.6919 (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 = 1.37749 (sec), leaf count = 795

$$\left\{\text{Solve}\left[\int_1^x \left(\frac{2\sqrt{-bK[1]^2 - ay(x)}y(x)}{bK[1]^4 + ay(x)K[1]^2 + 4y(x)^2} + \frac{bK[1]^3 + ay(x)K[1]}{bK[1]^4 + ay(x)K[1]^2 + 4y(x)^2}\right) dK[1] + \int_1^{y(x)} \left(-\frac{\sqrt{}}{bx^4 +}\right.\right.\right.$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , exception

```
time expired
```

2.369 ODE No. 369

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

✓ **Mathematica** : cpu = 0.0581839 (sec), leaf count = 107

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

✓ **Maple** : cpu = 0.098 (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 = 12.8881 (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 = 0.04002 (sec), leaf count = 37

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

✓ **Maple** : cpu = 0.059 (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 = 0.0030306 (sec), leaf count = 27

$$\{\{y(x) \to \wp(x - c_1; a, b)\}, \{y(x) \to \wp(x + c_1; a, b)\}\}$$

✓ **Maple** : cpu = 0.04 (sec), leaf count = 232

$$\left\{y(x) = -\frac{1}{12}\left(\left(i\left(27\,b + 3\sqrt{-3\,a^3 + 81\,b^2}\right)^{\frac{2}{3}} - 3\,ia\right)\sqrt{3} + \left(27\,b + 3\sqrt{-3\,a^3 + 81\,b^2}\right)^{\frac{2}{3}} + 3\,a\right)\frac{}{\sqrt[3]{27\,b +}}\right.$$

2.373 ODE No. 373

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

✓ **Mathematica** : cpu = 0.181003 (sec), leaf count = 185

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

✓ **Maple** : cpu = 0.183 (sec), leaf count = 49

$$\left\{y(x) = \left(e^{-\sin(a(x-\_C1))}\right)^{-1}, y(x) = e^{-\sin(a(x-\_C1))}, y(x) = e^{RootOf\left(a^2\left(e^{\_Z}\right)^2\left(\_Z^2-1\right)\right)}\right\}$$

2.374 ODE No. 374

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

✓ **Mathematica** : cpu = 0.068401 (sec), leaf count = 73

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

✓ **Maple** : cpu = 0.023 (sec), leaf count = 85

$$\left\{x - (y(x))^{-1} - \frac{1}{y(x)}\left((y(x))^2+1\right)^{\frac{3}{2}} + y(x)\sqrt{(y(x))^2+1} + Arcsinh(y(x)) - \_C1 = 0, x + \frac{1}{y(x)}((y(x)\right.$$

2.375 ODE No. 375

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

✓ **Mathematica** : cpu = 0.0310666 (sec), leaf count = 71

$$\left\{\left\{y(x) \to \frac{1}{2}\left(-\frac{(a^2-4bx)^{3/2}}{6b} - ax\right) + c_1\right\}, \left\{y(x) \to \frac{1}{2}\left(\frac{(a^2-4bx)^{3/2}}{6b} - ax\right) + c_1\right\}\right\}$$

✓ **Maple** : cpu = 0.018 (sec), leaf count = 49

$$\left\{y(x) = -\frac{ax}{2} - \frac{1}{12\,b}\left(a^2 - 4\,bx\right)^{\frac{3}{2}} + \_C1, y(x) = -\frac{ax}{2} + \frac{1}{12\,b}\left(a^2 - 4\,bx\right)^{\frac{3}{2}} + \_C1\right\}$$

2.376 ODE No. 376

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

✓ **Mathematica** : cpu = 0.229626 (sec), leaf count = 110

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[-\frac{\sqrt{a^2-4\#1b} + a\log\left(a - \sqrt{a^2-4\#1b}\right)}{2b}\&\right]\left[c_1 + \frac{x}{2}\right]\right\}, \left\{y(x) \to \text{InverseF}\right.\right.$$

✓ **Maple** : cpu = 0.524 (sec), leaf count = 219

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

2.377 ODE No. 377

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

✓ **Mathematica** : cpu = 0.0031425 (sec), leaf count = 19

$$\{\{y(x) \to c_1 x + c_1{}^2 - 2c_1 + 1\}\}$$

✓ **Maple** : cpu = 0.013 (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 = 0.0031092 (sec), leaf count = 18

$$\{\{y(x) \to ac_1 + c_1 x + c_1{}^2\}\}$$

✓ **Maple** : cpu = 0.013 (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 = 0.0030894 (sec), leaf count = 18

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

✓ **Maple** : cpu = 0.013 (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 = 0.378949 (sec), leaf count = 1757

$$\left\{\left\{y(x) \to -\frac{x^2}{4} - \frac{1}{4}\sqrt[3]{x^6 - 20\cosh(3c_1)x^3 - 20\sinh(3c_1)x^3 - 8\cosh(6c_1) - 8\sinh(6c_1) + 8\sqrt{-\cosh(3c_1}\right.\right.$$

✓ **Maple** : cpu = 0.032 (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 = 0.380686 (sec), leaf count = 1757

$$\left\{\left\{y(x) \to \frac{x^2}{4} + \frac{1}{4}\sqrt[3]{x^6 - 20\cosh(3c_1)x^3 - 20\sinh(3c_1)x^3 - 8\cosh(6c_1) - 8\sinh(6c_1) + 8\sqrt{-\cosh(3c_1)x}\right.\right.$$

✓ **Maple** : cpu = 0.024 (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 = 0.17664 (sec), leaf count = 201

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

✓ **Maple** : cpu = 0.025 (sec), leaf count = 146

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

2.383 ODE No. 383

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

✓ **Mathematica** : cpu = 5.47535 (sec), leaf count = 1118

$$\left\{\text{Solve}\left[\int_1^x\left(\frac{\sqrt{a^2K[1]^2-4cK[1]^2-4by(x)}y(x)}{cK[1]^4+2ay(x)K[1]^2+by(x)K[1]^2+4y(x)^2} + \frac{cK[1]^3+ay(x)K[1]+by(x)K[1]}{cK[1]^4+2ay(x)K[1]^2+by(x)K[1]^2+4y(\right.\right.\right.$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , exception

`time expired`

2.384 ODE No. 384

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

✓ **Mathematica** : cpu = 1.32355 (sec), leaf count = 183

$$\left\{\left\{y(x) \to \frac{-2\sqrt{-a^4e^{2c_1}x^2-2a^4e^{2c_1}x+a^4\left(-e^{2c_1}\right)}+2a^3x+a^3-2a^2bx-ab^2+4ac-ae^{2c_1}}{4a^2}\right\}, \left\{y(x) \to\right.\right.$$

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

$$\left\{y(x) = \frac{\_C1^2 + (ax+b)\_C1 + c}{a}, y(x) = \frac{-a^2x^2 - 2abx - b^2 + 4c}{4a}\right\}$$

2.385 ODE No. 385

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

✓ **Mathematica** : cpu = 0.682529 (sec), leaf count = 6217

$$\left\{\left\{y(x) \to -x^3 \left(\frac{1}{2}\sqrt{\frac{2\left(8e^{6c_1}x^{18} + e^{12c_1}x^{12}\right)}{9x^{24}\sqrt[3]{\frac{64\sqrt{e^{12c_1}x^{60}-3e^{18c_1}x^{54}+3e^{24c_1}x^{48}-e^{30c_1}x^{42}}}{x^{36}} + \frac{64e^{6c_1}}{x^6} + \frac{160e^{12c_1}}{x^{12}} - \frac{8e^{18c_1}}{x^{18}}}} + \frac{1}{18}\sqrt[3]{64\sqrt{e^{1}}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.576 (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 = 0.154064 (sec), leaf count = 119

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

✓ **Maple** : cpu = 0.769 (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 = 1.18554 (sec), leaf count = 190

$$\left\{\text{Solve}\left[\log(y(x)) - \frac{-e^{x/2}\sqrt{4y(x)+e^x} - \frac{4\sqrt{\frac{e^x}{y(x)}+4}y(x)^{3/2}\sinh^{-1}\left(\frac{e^{x/2}}{2\sqrt{y(x)}}\right)}{\sqrt{4y(x)+e^x}} + e^x}{2y(x)} = c_1, y(x)\right], \text{Solve}\left[\log(y(x))\right.\right.$$

✓ **Maple** : cpu = 1.402 (sec), leaf count = 115

$$\left\{\ln \left(y(x)\right)-\frac{1}{2\,y\left(x\right)}\sqrt{\mathrm{e}^{2\,x}+4\,y\left(x\right)\mathrm{e}^{x}}-2\,\mathit{Artanh}\left(\sqrt{\mathrm{e}^{2\,x}+4\,y\left(x\right)\mathrm{e}^{x}}\mathrm{e}^{-x}\right)-\frac{\mathrm{e}^{x}}{2\,y\left(x\right)}-\_C1=0,\ln \left(y(x)\right)\right.$$

2.388 ODE No. 388

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

✓ **Mathematica** : cpu = 0.493027 (sec), leaf count = 53

$$\text{Solve}\left[\left\{x=\frac{c_1\text{K\$305940}}{\sqrt{\text{K\$305940}^2+1}}+\frac{\text{K\$305940}\sinh^{-1}(\text{K\$305940})}{2\sqrt{\text{K\$305940}^2+1}},y(x)=\frac{\text{K\$305940}}{2}-\frac{x}{\text{K\$305940}}\right\},\{y(x),\right.$$

✓ **Maple** : cpu = 0.162 (sec), leaf count = 223

$$\left\{1\left(\left(-\frac{y(x)}{2}-\frac{1}{2}\sqrt{\left(y\left(x\right)\right)^{2}+2\,x}\right)\mathit{Arcsinh}\left(y(x)+\sqrt{\left(y\left(x\right)\right)^{2}+2\,x}\right)+x\sqrt{2\,\left(y\left(x\right)\right)^{2}+2\,x+2\,y\left(x\right)\sqrt{(}}\right.\right.$$

2.389 ODE No. 389

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

✓ **Mathematica** : cpu = 0.0585123 (sec), leaf count = 57

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

✓ **Maple** : cpu = 2.641 (sec), leaf count = 71

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

2.390 ODE No. 390

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

✓ **Mathematica** : cpu = 1.48113 (sec), leaf count = 142

$$\text{Solve}\left[\left\{x = e^{b\left(\frac{\log(\text{K\$306586})}{b} - \frac{\log\left(b - a\text{K\$306586}^2\right)}{2b}\right)}\left(\frac{\tan^{-1}\left(\frac{\sqrt{a}\text{K\$306586}}{\sqrt{b - a\text{K\$306586}^2}}\right)}{\sqrt{a}} - \frac{c\sqrt{b - a\text{K\$306586}^2}}{b\text{K\$306586}}\right) + c_1 e^{b\left(\frac{\log(\text{K\$}\right.}{}}\right.\right.$$

✓ **Maple** : cpu = 1.32 (sec), leaf count = 281

$$\left\{y(x) = 2\frac{\mathrm{e}^{RootOf\left(\sqrt{a}\_C1\, b\mathrm{e}^{2\_Z} - a\mathrm{e}^{2\_Z}bx + \sqrt{a}\_C1\, b^2 - \mathrm{e}^{2\_Z}\_Z\, b - a\mathrm{e}^{2\_Z}c + ab^2x - \_Z\, b^2 + abc\right)}\left(-1/4\left(\mathrm{e}^{2\,RootOf\left(\sqrt{a}\_C1\, b\mathrm{e}^{2\_Z}\right.}\right.\right.}{a^{3/2}\left(\mathrm{e}^{2\,RootOf\left(\sqrt{a}\_\right.}\right.}\right.$$

2.391 ODE No. 391

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

✓ **Mathematica** : cpu = 0.006914 (sec), leaf count = 29

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

✓ **Maple** : cpu = 0.052 (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 = 0.193659 (sec), leaf count = 27

$$\left\{\left\{y(x) \to \frac{e^{\frac{c_1x}{2} - \frac{c_1^2}{4}}}{a}\right\}\right\}$$

✓ **Maple** : cpu = 2.165 (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 = 0.0854382 (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 = 0.246 (sec), leaf count = 77

$$\left\{y(x) = \frac{\_C1}{\tan(x)}\left(1 + \sqrt{(\tan(x))^2 + 1}\right)\frac{1}{\sqrt{\frac{(\tan(x))^2}{(\tan(x))^2+1}}}, y(x) = \frac{\_C1\left((\tan(x))^2 + 1\right)}{\tan(x)}\sqrt{\frac{(\tan(x))^2}{(\tan(x))^2 + 1}}\left(1 +\right.\right.$$

2.394 ODE No. 394

$$-\left(g(x) - f(x)^2\right)e^{-2\int_a^x f(\mathrm{xp})\,d\mathrm{xp}} + 2f(x)y(x)y'(x) + g(x)y(x)^2 + y'(x)^2 = 0$$

✗ **Mathematica** : cpu = 87.1359 (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 = 6.714 (sec), leaf count = 109

$$\left\{y(x) = \tan\left(-\int\sqrt{\frac{g(x) - (f(x))^2}{\left(e^{\int_a^x f(xp)\,dxp}\right)^4}}\left(e^{\int_a^x f(xp)\,dxp}\right)^2 dx + \_C1\right)\sqrt{e^{-2\int_a^x f(xp)\,dxp}}\left(\left(\tan\left(-\int\sqrt{\frac{g(x)}{(e^{\int_a^x}}}\right.\right.\right.\right.$$

2.395 ODE No. 395

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

✗ **Mathematica** : cpu = 28.9063 (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 = 0.0448843 (sec), leaf count = 29

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

✓ **Maple** : cpu = 0.031 (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 = 0.419396 (sec), leaf count = 143

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

✓ **Maple** : cpu = 0.824 (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 = 1.50225 (sec), leaf count = 258

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

✓ **Maple** : cpu = 2.255 (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 = 0.0030674 (sec), leaf count = 20

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

✓ **Maple** : cpu = 0.013 (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 = 0.258605 (sec), leaf count = 135

$$\left\{\text{Solve}\left[\frac{1}{3}\log(y(x)) - \frac{2\sqrt{x^4 - 6xy(x)}\tanh^{-1}\left(\frac{x^{3/2}}{\sqrt{x^3-6y(x)}}\right)}{3\sqrt{x}\sqrt{x^3 - 6y(x)}} = c_1, y(x)\right], \text{Solve}\left[\frac{2\sqrt{x^4 - 6xy(x)}\tanh^{-1}\left(\right.}{3\sqrt{x}\sqrt{x^3 - 6y(x}}\right.\right.$$

✓ **Maple** : cpu = 0.332 (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 = 0.308421 (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 = 0.112 (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 = 5.2915 (sec), leaf count = 1211

$$\left\{\text{Solve}\left[\frac{1}{2}\left(\frac{\tanh^{-1}\left(\frac{1-3x}{2\sqrt{1-9y(x)}}\right)}{\sqrt{1-9y(x)}} + \log\left(-3x^2 + 2x - 12y(x) + 1\right) + \frac{9\tanh^{-1}\left(\frac{-2\sqrt{1-9y(x)}x+x+9y(x)}{\sqrt{-9y(x)-4\sqrt{1-9y(x)}+5}\sqrt{x^2+3y}}\right.}{\sqrt{1-9y(x)}\sqrt{-9y(x)-4\sqrt{1-9y}}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.199 (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 = 0.227671 (sec), leaf count = 116

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[\frac{\sqrt{4\#1a + b^2} + b\log\left(b - \sqrt{4\#1a + b^2}\right)}{2a}\&\right]\left[\frac{x}{2a} + c_1\right]\right\}, \left\{y(x) \to \text{InverseFu}\right.\right.$$

✓ **Maple** : cpu = 3.888 (sec), leaf count = 197

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

2.404 ODE No. 404

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

✓ **Mathematica** : cpu = 2.70508 (sec), leaf count = 795

$$\left\{\text{Solve}\left[\int_1^x\left(\frac{(3b+2c)K[1]^2}{2\left(3bK[1]^3+cK[1]^3+9ay(x)\right)}+\frac{3\sqrt{K[1]\left(b^2K[1]^3-4acy(x)\right)}}{2\left(3bK[1]^3+cK[1]^3+9ay(x)\right)}\right)dK[1]+\int_1^{y(x)}\left(\frac{9}{2(3b+}\right.\right.\right.$$

✓ **Maple** : cpu = 0.503 (sec), leaf count = 389

$$\left\{\int_{\_b}^{x}1\left(-b\_a^2-\sqrt{\_a^4b^2-4\_a\,acy\left(x\right)}\right)\left(b\_a^3+\sqrt{\_a^4b^2-4\_a\,acy\left(x\right)}\_a+6\,ay(x)\right)^{-1}\mathrm{d}\_a+\int^{y(x)}\right.$$

2.405 ODE No. 405

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

✓ **Mathematica** : cpu = 0.84483 (sec), leaf count = 53

$$\text{Solve}\left[\left\{x=\frac{a\text{K\$335905}\sin^{-1}(\text{K\$335905})}{\sqrt{1-\text{K\$335905}^2}}+\frac{c_1\text{K\$335905}}{\sqrt{1-\text{K\$335905}^2}},y(x)=\frac{x}{\text{K\$335905}}-a\text{K\$335905}\right\},\{y(x)\right.$$

✓ **Maple** : cpu = 0.507 (sec), leaf count = 378

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

2.406 ODE No. 406

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

✓ **Mathematica** : cpu = 0.6267 (sec), leaf count = 49

$$\text{Solve}\left[\left\{x = \frac{a\text{K\$336231}\sinh^{-1}(\text{K\$336231})}{\sqrt{\text{K\$336231}^2+1}} + \frac{c_1\text{K\$336231}}{\sqrt{\text{K\$336231}^2+1}}, y(x) = a\text{K\$336231} - \frac{x}{\text{K\$336231}}\right\}, \{y(x$$

✓ **Maple** : cpu = 0.193 (sec), leaf count = 262

$$\left\{1\left(\left(\left(y(x) - \sqrt{4\,ax + (y\,(x))^2}\right) \mathit{Arcsinh}\left(\frac{1}{2\,a}\left(-y(x) + \sqrt{4\,ax + (y\,(x))^2}\right)\right) + x\sqrt{-2\,\frac{y\,(x)\sqrt{4\,ax + (y}{}}\right.\right.\right.$$

2.407 ODE No. 407

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

✓ **Mathematica** : cpu = 0.0214657 (sec), leaf count = 51

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

✓ **Maple** : cpu = 0.042 (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 = 0.150539 (sec), leaf count = 97

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

✓ **Maple** : cpu = 0.102 (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 = 30.5713 (sec), leaf count = 66

$$\text{Solve}\left[\left\{x=\frac{y(\text{K\$337105})+2\text{K\$337105}}{\text{K\$337105}^2}, y(x)=c_1e^{2(\log(\text{K\$337105})-\log(1-\text{K\$337105}))}+e^{2(\log(\text{K\$337105})-\log(1-\text{K\$33}}\right.\right.$$

✓ **Maple** : cpu = 0.179 (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 = 31.2338 (sec), leaf count = 80

$$\text{Solve}\left[\left\{x=-\frac{2(2\text{K\$337610}-y(\text{K\$337610}))}{\text{K\$337610}^2}, y(x)=c_1e^{-4\left(\frac{1}{2}\log(2-\text{K\$337610})-\frac{\log(\text{K\$337610})}{2}\right)}+4e^{-4\left(\frac{1}{2}\log(2-\text{K\$33}\right.}\right.\right.$$

✓ **Maple** : cpu = 0.186 (sec), leaf count = 64

$$\left\{y(x)=\frac{x\mathrm{e}^{2\,RootOf\left(-x\mathrm{e}^{2\_Z}+4\,x\mathrm{e}^{\_Z}-4\,\mathrm{e}^{\_Z}+\_C1+8\_Z-4\,x\right)}}{2}+2\,\mathrm{e}^{RootOf\left(-x\mathrm{e}^{2\_Z}+4\,x\mathrm{e}^{\_Z}-4\,\mathrm{e}^{\_Z}+\_C1+8\_Z-4\,x\right)}\right\}$$

2.411 ODE No. 411

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

✓ **Mathematica** : cpu = 0.141181 (sec), leaf count = 99

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

✓ **Maple** : cpu = 0.117 (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 = 0.409039 (sec), leaf count = 3229

$$\left\{\left\{y(x) \to -\frac{1}{2}\sqrt{-\frac{16ax}{9} + \frac{\sqrt[3]{-131072a^6x^6 + 2560a^3e^{3c_1}x^3 + e^{6c_1} + \sqrt{-1073741824a^9e^{3c_1}x^9 + 3145728a}}}{18\ 2^{2/3}ax}}\right.\right.$$

✓ **Maple** : cpu = 0.161 (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 = 301.786 (sec), leaf count = 0 , timed out

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✓ **Maple** : cpu = 0.262 (sec), leaf count = 269

$$\left\{\int_{\_b}^{x} \frac{1}{\_a}\left(-y(x) - \sqrt{4\_a^3 + (y(x))^2}\right)\left(\sqrt{4\_a^3 + (y(x))^2} + 4\,y(x)\right)^{-1} \mathrm{d}\_a + \int^{y(x)} 1\left(-2 + \left(-48\_f\right.\right.\right.$$

2.414 ODE No. 414

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

✓ **Mathematica** : cpu = 0.0749663 (sec), leaf count = 107

$$\left\{\left\{y(x) \to x^2\text{InverseFunction}\left[\int_1^{\#1} \frac{1}{5K[1] + \sqrt{K[1]^2 - 4}} dK[1]\&\right]\left[\int_1^x -\frac{1}{2K[2]} dK[2] + c_1\right]\right\}, \left\{y(x) \to\right.\right.$$

✓ **Maple** : cpu = 0.273 (sec), leaf count = 269

$$\left\{\int_{\_b}^{x} \frac{1}{\_a}\left(-y(x) - \sqrt{-4\_a^4 + (y(x))^2}\right)\left(\sqrt{-4\_a^4 + (y(x))^2} + 5\,y(x)\right)^{-1} \mathrm{d}\_a + \int^{y(x)} 1\left(-2 + \left(80\_\right.\right.\right.$$

2.415 ODE No. 415

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

✓ **Mathematica** : cpu = 0.307596 (sec), leaf count = 25

$$\left\{\left\{y(x) \to \frac{2e^{\frac{c_1}{2}}}{e^{c_1} - 4x}\right\}\right\}$$

✓ **Maple** : cpu = 0.447 (sec), leaf count = 95

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

2.416 ODE No. 416

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

✓ **Mathematica** : cpu = 1.27176 (sec), leaf count = 383

$$\left\{\text{Solve}\left[\frac{1}{8}\left(\left(-\sqrt{\frac{\frac{y(x)}{x}-9}{\frac{y(x)}{x}-1}}\left(\frac{y(x)}{x}-1\right)+\sqrt{\frac{y(x)}{x}-9}\sqrt{\frac{y(x)}{x}-1}-3\log\left(\frac{y(x)}{x}\right)-\frac{10\sqrt{\frac{y(x)}{x}-9}\sin^{-1}\left(\sqrt{\right.}}{\sqrt{9-\frac{y(x)}{x}}}\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.134 (sec), leaf count = 136

$$\left\{-\frac{\_C1}{x}\left(-y(x)+5\,x+\sqrt{9\,x^2-10\,xy\,(x)+(y\,(x))^2}\right)\left(\frac{1}{x}\left(-y(x)+3\,x+\sqrt{9\,x^2-10\,xy\,(x)+(y\,(x))^2}\right.\right.\right.$$

2.417 ODE No. 417

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

✓ **Mathematica** : cpu = 0.356075 (sec), leaf count = 48

$$\left\{\left\{y(x) \to \frac{16a^2 - 8ae^{\frac{c_1}{2}} + 4ax + e^{c_1}}{2\left(e^{\frac{c_1}{2}} - 4a\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.023 (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 = 0.679103 (sec), leaf count = 220

$$\left\{\text{Solve}\left[-\frac{-\frac{4a^{3/2}\sqrt{4-\frac{y(x)}{ax}}\sin^{-1}\left(\frac{\sqrt{\frac{y(x)}{x}}}{2\sqrt{a}}\right)}{\sqrt{\frac{y(x)}{x}-4a}}+\sqrt{\frac{y(x)}{x}}\sqrt{\frac{y(x)}{x}-4a}+\frac{y(x)}{x}}{4a} = c_1 + \frac{\log(x)}{2}, y(x)\right], \text{Solve}\left[\frac{4a^{3/2}\sqrt{4-\frac{y(x}{ax}}}{\sqrt{y}}\right.\right.$$

✓ **Maple** : cpu = 0.072 (sec), leaf count = 42

$$\left\{y(x)=0, y(x)=-ax\left(lambertW\left(-\frac{xe}{\_C1\,a}\right)-1\right)^{2}\left(lambertW\left(-\frac{xe}{\_C1\,a}\right)\right)^{-1}\right\}$$

2.419 ODE No. 419

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

✓ **Mathematica** : cpu = 1.05555 (sec), leaf count = 9073

✓ **Maple** : cpu = 0.048 (sec), leaf count = 109

$$\left\{x+\frac{\_C1}{x}\left(y(x)-\sqrt{(y(x))^2+x^2}\right)\left(\frac{1}{x^2}\left(2x^2+6(y(x))^2-6y(x)\sqrt{(y(x))^2+x^2}\right)\right)^{-\frac{2}{3}}=0, \frac{\_C1}{x}\left(\sqrt{\right.\right.$$

2.420 ODE No. 420

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

✓ **Mathematica** : cpu = 0.296321 (sec), leaf count = 777

$$\left\{\left\{y(x)\to\frac{1}{4}a^2e^{-\frac{3c_1}{2}}x^2+\frac{1}{4}e^{-\frac{3c_1}{2}}\sqrt[3]{a^6x^6-20a^3e^{3c_1}x^3+8\sqrt{-a^9e^{3c_1}x^9+3a^6e^{6c_1}x^6-3a^3e^{9c_1}x^3+e^{12c_1}}-8\right.\right.$$

✓ **Maple** : cpu = 0.182 (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 = 0.0375557 (sec), leaf count = 27

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

✓ **Maple** : cpu = 0.047 (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 = 0.054299 (sec), leaf count = 81

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

✓ **Maple** : cpu = 0.049 (sec), leaf count = 30

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

2.423 ODE No. 423

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

✓ **Mathematica** : cpu = 0.0625016 (sec), leaf count = 59

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

✓ **Maple** : cpu = 0.053 (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 = 0.489811 (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 = 0.285 (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 = 0.191543 (sec), leaf count = 59

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

✓ **Maple** : cpu = 0.029 (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 = 0.424672 (sec), leaf count = 40

$$\left\{\left\{y(x)\to \frac{-28e^{\frac{c_1}{2}}+e^{c_1}+12x+196}{2\left(e^{\frac{c_1}{2}}-12\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.029 (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 = 300.091 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.035 (sec), leaf count = 60

$$\left\{y(x)=\frac{(3\,x+5)\_C1^{2}-\_C1\,x}{3\_C1\,-1},y(x)=\frac{x}{3}+\frac{10}{9}-\frac{2}{9}\sqrt{15\,x+25},y(x)=\frac{x}{3}+\frac{10}{9}+\frac{2}{9}\sqrt{15\,x+25}\right\}$$

2.428 ODE No. 428

$$y'(x)(-ay(x)+bx+c)+axy'(x)^2-by(x)=0$$

✗ **Mathematica** : cpu = 300.063 (sec), leaf count = 0 , timed out

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✓ **Maple** : cpu = 0.07 (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 = 0.0319439 (sec), leaf count = 26

$$\left\{\left\{y(x)\to\frac{c_1(a+b)}{ac_1-b}+c_1x\right\}\right\}$$

✓ **Maple** : cpu = 0.067 (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 = 245.198 (sec), leaf count = 478

$$\text{Solve}\left[\left\{x = (\mathrm{b0} + \mathrm{b1K\$363169})\exp\left(\frac{(\mathrm{b1}(\mathrm{b0}-\mathrm{a1}) + 2\mathrm{a2b0})\tan^{-1}\left(\frac{\mathrm{a1}+2\mathrm{K\$363169}(\mathrm{a2}+\mathrm{b1})+\mathrm{b0}}{\sqrt{4\mathrm{a0}(\mathrm{a2}+\mathrm{b1})-\mathrm{a1}^2-2\mathrm{a1b0}-\mathrm{b0}^2}}\right)}{(\mathrm{a2}+\mathrm{b1})\sqrt{4\mathrm{a0}(\mathrm{a2}+\mathrm{b1})-\mathrm{a1}^2-2\mathrm{a1b0}-\mathrm{b0}^2}} - \frac{(2\mathrm{a2}\right.\right.\right.$$

✓ **Maple** : cpu = 1.983 (sec), leaf count = 1602

$$\left\{\frac{1}{2\,a2\,x+2\,c2}\left(-2\left(\_C1 - 1/2\int \frac{-a1\,x-b1\,y(x)-c1+\sqrt{b1^2(y(x))^2+((2\,b1\,a1-4\,a2\,b0)x-4\,b0\,c2+2\,b1\,c1)y(x)+\left(-4\,a0\,a2+a1^2\right)x^2+(-4}}{2\,a2\,x+2\,c2}\right.\right.\right.$$

2.431 ODE No. 431

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

✓ **Mathematica** : cpu = 0.0458095 (sec), leaf count = 81

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

✓ **Maple** : cpu = 0.296 (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 = 1.15123 (sec), leaf count = 64

$$\text{Solve}\left[\left\{y(x) = \frac{a^2 + 2a\text{K\$365773}x + \text{K\$365773}^2x^2 + x^2}{2a}, x = \frac{c_1}{\sqrt{\text{K\$365773}^2+1}} - \frac{a\sinh^{-1}(\text{K\$365773})}{\sqrt{\text{K\$365773}^2+1}}\right\}\right.$$

✓ **Maple** : cpu = 7.73 (sec), leaf count = 242

$$\left\{y(x) = \frac{1}{2\,a\left(\left(RootOf\left(\left(Arcsinh\left(\_Z\right)\right)^2 a^2 - \_Z^2x^2 - 2\,Arcsinh\left(\_Z\right)\_C1\,a + \_C1^2 - x^2\right)\right)^2 + 1\right)}\left(-2\right.\right.$$

2.433 ODE No. 433

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

✓ **Mathematica** : cpu = 1.32983 (sec), leaf count = 22

$$\left\{\left\{y(x) \to \frac{-a - 2c_1x + c_1^2}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.343 (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 = 0.0384961 (sec), leaf count = 27

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

✓ **Maple** : cpu = 0.025 (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 = 0.0593743 (sec), leaf count = 61

$$\left\{\left\{y(x) \to \frac{1}{4}\left({c_1}^2x - 4ic_1\sqrt{x} + 4x - 4\right)\right\}, \left\{y(x) \to \frac{1}{4}\left({c_1}^2x + 4ic_1\sqrt{x} + 4x - 4\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.54 (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 = 0.0546411 (sec), leaf count = 26

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

✓ **Maple** : cpu = 4.319 (sec), leaf count = 61

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

2.437 ODE No. 437

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

✓ **Mathematica** : cpu = 0.333044 (sec), leaf count = 47

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

✓ **Maple** : cpu = 0.089 (sec), leaf count = 36

$$\left\{y(x) = -\frac{a}{4x}, y(x) = \_C1\,x - \sqrt{\_C1\,a}, y(x) = \_C1\,x + \sqrt{\_C1\,a}\right\}$$

2.438 ODE No. 438

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

✓ **Mathematica** : cpu = 0.0108685 (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 = 0.031 (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 = 0.037141 (sec), leaf count = 49

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

✓ **Maple** : cpu = 0.119 (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 = 0.0102833 (sec), leaf count = 19

$$\left\{\left\{y(x)\to \frac{c_1}{x^5}\right\},\{y(x)\to c_1x\}\right\}$$

✓ **Maple** : cpu = 0.027 (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 = 0.0792302 (sec), leaf count = 65

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

✓ **Maple** : cpu = 5.179 (sec), leaf count = 83

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

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 = 0.0135592 (sec), leaf count = 28

$$\left\{\left\{y(x)\to c_1e^{-x}x\right\},\left\{y(x)\to c_1x - x^2\right\}\right\}$$

✓ **Maple** : cpu = 0.032 (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 = 2.74856 (sec), leaf count = 10121

$$\left\{\left\{y(x)\to -\frac{1}{2}\sqrt{-\frac{4}{9}\cosh(6c_1)x^2 + \frac{4}{9}\sinh(6c_1)x^2 + \frac{\sqrt[3]{2}\sqrt[3]{-32\cosh(18c_1)x^{12} + 32\sinh(18c_1)x^{12} + 40\cos}}{}}\right.\right.$$

✓ **Maple** : cpu = 7.904 (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 = 0.411125 (sec), leaf count = 75

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

✓ **Maple** : cpu = 4.934 (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 = 0.0518717 (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 = 0.032 (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 = 0.333571 (sec), leaf count = 95

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

✓ **Maple** : cpu = 0.037 (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 = 0.0094949 (sec), leaf count = 89

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

✓ **Maple** : cpu = 0.082 (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 = 0.0950027 (sec), leaf count = 349

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

✓ **Maple** : cpu = 300.181 (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 = 0.014141 (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 = 0.03 (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 = 0.315843 (sec), leaf count = 26

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

✓ **Maple** : cpu = 0.676 (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 = 301.184 (sec), leaf count = 0 , timed out

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✓ **Maple** : cpu = 0.124 (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 = 0.017351 (sec), leaf count = 23

$$\left\{\left\{y(x)\to\frac{-c_1x+c_1{}^2+1}{c_1+x}\right\}\right\}$$

✓ **Maple** : cpu = 1.358 (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

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

✓ **Mathematica** : cpu = 0.582589 (sec), leaf count = 327

$$\left\{\text{Solve}\left[\frac{2i\tan^{-1}\left(\frac{y(x)}{x\sqrt{a^2-\frac{y(x)^2}{x^2}-1}}\right)+a\tanh^{-1}\left(\frac{-a^2-\frac{iy(x)}{x}+1}{a\sqrt{a^2-\frac{y(x)^2}{x^2}-1}}\right)-a\tanh^{-1}\left(\frac{-a^2+\frac{iy(x)}{x}+1}{a\sqrt{a^2-\frac{y(x)^2}{x^2}-1}}\right)+a\log\left(\frac{y(x)^2}{x^2}\right.}{2a^2-2}\right.\right.$$

✓ **Maple** : cpu = 2.691 (sec), leaf count = 229

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

2.454 ODE No. 454

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

✓ **Mathematica** : cpu = 0.268677 (sec), leaf count = 241

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

✓ **Maple** : cpu = 0.26 (sec), leaf count = 106

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

2.455 ODE No. 455

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

✓ **Mathematica** : cpu = 0.968694 (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 = 0.612 (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

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

✓ **Mathematica** : cpu = 0.123681 (sec), leaf count = 421

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

✓ **Maple** : cpu = 0.72 (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

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

✓ **Mathematica** : cpu = 0.251613 (sec), leaf count = 118

$$\left\{\text{Solve}\left[-\frac{x\sqrt{4x^2y(x)+1}\tanh^{-1}\left(\sqrt{4x^2y(x)+1}\right)}{\sqrt{4x^4y(x)+x^2}} - \frac{1}{2}\log(y(x)) = c_1, y(x)\right], \text{Solve}\left[\frac{x\sqrt{4x^2y(x)+1}\,\text{ta}}{\sqrt{4x^4}}\right.\right.$$

✓ **Maple** : cpu = 3.371 (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

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

✓ **Mathematica** : cpu = 0.0221442 (sec), leaf count = 120

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

✓ **Maple** : cpu = 0.123 (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

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

✓ **Mathematica** : cpu = 2.77165 (sec), leaf count = 271

$$\left\{\left\{y(x)\to\log\left(-\frac{e^{-c_1}\left(e^x+1\right)\left(e^{2c_1+x}-e^{2c_1}-e^x-1\right)}{\sqrt{8e^x+4e^{2x}+4}}\right)\right\},\left\{y(x)\to\log\left(\frac{e^{-c_1}\left(e^x+1\right)\left(e^{2c_1+x}-e^{2c_1}-e\right.}{\sqrt{8e^x+4e^{2x}+4}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.932 (sec), leaf count = 65

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

2.460 ODE No. 460

$$\cos^4(x)\left(y'(x)^2+y(x)^2\right)-a^2=0$$

✗ **Mathematica** : cpu = 49.7128 (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 = 300.046 (sec), leaf count = 0 , timed out

```
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```

✗ **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),
```

2.462 ODE No. 462

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

✓ **Mathematica** : cpu = 0.0203884 (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 = 0.058 (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 = 0.0307633 (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 = 0.185 (sec), leaf count = 50

$$\left\{-1\sqrt{y\left(x\right)\left(\mathrm{e}^{x}\right)^{2}}\frac{1}{\sqrt{y\left(x\right)}}+\frac{2}{3}(y(x))^{\frac{3}{2}}+\_C1=0,1\sqrt{y\left(x\right)\left(\mathrm{e}^{x}\right)^{2}}\frac{1}{\sqrt{y\left(x\right)}}+\frac{2}{3}(y(x))^{\frac{3}{2}}+\_C1=0\right\}$$

2.464 ODE No. 464

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

✓ **Mathematica** : cpu = 0.0869564 (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 = 1.424 (sec), leaf count = 70

$$\left\{y(x)=\sqrt{\_C1^{2}-2\,\_C1\,x},y(x)=\sqrt{\_C1^{2}+2\,\_C1\,x},y(x)=-ix,y(x)=ix,y(x)=-\sqrt{\_C1\,\left(2\,x+\right.}$$

2.465 ODE No. 465

$$y(x)y'(x)^2 + 2xy'(x) - 9y(x) = 0$$

✗ **Mathematica** : cpu = 300.448 (sec), leaf count = 0 , timed out

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✓ **Maple** : cpu = 0.147 (sec), leaf count = 210

$$\left\{\_C1\,x\left(x+\sqrt{x^{2}+9\,\left(y\left(x\right)\right)^{2}}\right)\left(\frac{1}{y\left(x\right)}\left(-x-\sqrt{x^{2}+9\,\left(y\left(x\right)\right)^{2}}\right)\right)^{\frac{2}{7}}\left(x\sqrt{x^{2}+9\,\left(y\left(x\right)\right)^{2}}+x^{2}+(y(x)\right.\right.$$

2.466 ODE No. 466

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

✓ **Mathematica** : cpu = 1.87605 (sec), leaf count = 433

$$\left\{\text{Solve}\left[-\frac{i\sqrt{\frac{y(x)^2}{x^2}-1}\tan^{-1}\left(\sqrt{\frac{y(x)^2}{x^2}-1}\right)}{\sqrt{\frac{y(x)}{x}-1}\sqrt{\frac{y(x)}{x}+1}} - i\sqrt{\frac{\frac{y(x)}{x}-1}{\frac{y(x)}{x}+1}}\left(\frac{y(x)}{x}+1\right) + i\sqrt{\frac{y(x)}{x}-1}\sqrt{\frac{y(x)}{x}+1} + \log\left(\right.\right.\right.$$

✓ **Maple** : cpu = 1.201 (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 = 0.245728 (sec), leaf count = 226

$$\left\{\left\{y(x) \to \sqrt{\frac{2^{2/3}c_1{}^3x}{\sqrt[3]{-40c_1{}^3x^3 + \sqrt{-4096c_1{}^3x^9 + 768c_1{}^6x^6 - 48c_1{}^9x^3 + c_1{}^{12}} - c_1{}^6 + 32x^6}} + \frac{\sqrt[3]{-40c_1{}^3x^3 + \sqrt{}}}{}}\right.\right.$$

✓ **Maple** : cpu = 0.125 (sec), leaf count = 148

$$\left\{-\frac{\_C1\,x}{y(x)}\frac{1}{\sqrt[3]{\frac{1}{y(x)}\left(2\,x - \sqrt{4\,x^2 - (y(x))^2}\right)}}\frac{1}{\sqrt[3]{\frac{1}{(y(x))^2}\left(8\,x^2 - 4\,(y(x))^2 - 4\,x\sqrt{4\,x^2 - (y(x))^2}\right)}} + x = 0,\right.$$

2.468 ODE No. 468

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

✓ **Mathematica** : cpu = 3.57039 (sec), leaf count = 609

$$\left\{\text{Solve}\left[\frac{-4\left(\frac{y(x)^2}{x^2}-4a^2\right)\tanh^{-1}\left(\frac{\sqrt{4a^2-\frac{y(x)^2}{x^2}}}{2a}\right)+2\left(\frac{y(x)^2}{x^2}-4a^2\right)\tanh^{-1}\left(\frac{\sqrt{4a^2-\frac{y(x)^2}{x^2}}}{a}\right)+\sqrt{2a-\frac{y(x)}{x}}\sqrt{4}}{6\sqrt{2a-}}\right.\right.$$

✓ **Maple** : cpu = 0.146 (sec), leaf count = 181

$$\left\{-\frac{\_C1\, x}{ay\left(x\right)}\frac{1}{\sqrt[3]{\frac{a^2}{\left(y\left(x\right)\right)^2}\left(2\,a^2x^2+\sqrt{4\,a^2x^2-\left(y\left(x\right)\right)^2}ax-\left(y\left(x\right)\right)^2\right)}}\frac{1}{\sqrt[3]{\frac{a}{y\left(x\right)}\left(2\,ax+\sqrt{4\,a^2x^2-\left(y\left(x\right)\right)^2}\right)}}+x\right.$$

2.469 ODE No. 469

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

✓ **Mathematica** : cpu = 0.278258 (sec), leaf count = 157

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

✓ **Maple** : cpu = 0.25 (sec), leaf count = 264

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

2.470 ODE No. 470

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

✓ **Mathematica** : cpu = 0.239065 (sec), leaf count = 143

$$\left\{\text{Solve}\left[\frac{1}{2}\log(y(x)) - \frac{\sqrt{x^6+4x^2y(x)^2}\tanh^{-1}\left(\frac{x^2}{\sqrt{x^4+4y(x)^2}}\right)}{2x\sqrt{x^4+4y(x)^2}} = c_1, y(x)\right], \text{Solve}\left[\frac{\sqrt{x^6+4x^2y(x)^2}\tanh^{-1}}{2x\sqrt{x^4+4y(}\right.\right.$$

✓ **Maple** : cpu = 0.661 (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 = 0.0084314 (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 = 0.033 (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 = 0.39306 (sec), leaf count = 269

$$\left\{\left\{y(x)\to -\frac{2\sqrt{-\sqrt{3}x\sinh(c_1)-\sqrt{3}x\cosh(c_1)+\sinh(2c_1)+\cosh(2c_1)}}{\sqrt{3}} - \frac{\sinh(c_1)}{\sqrt{3}} - \frac{\cosh(c_1)}{\sqrt{3}}\right\}, \left\{y(x\right.\right.$$

✓ **Maple** : cpu = 1.371 (sec), leaf count = 121

$$\left\{\ln(x) - \mathit{Artanh}\left(\frac{y(x)+2\,x}{2\,x}\frac{1}{\sqrt{\frac{(y(x))^2+xy(x)+x^2}{x^2}}}\right) + \ln\left(\frac{y(x)}{x}\right) - \_C1 = 0, \ln(x) + \mathit{Artanh}\left(\frac{y(x)+2\,x}{2\,x}\right.\right.$$

2.473 ODE No. 473

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

✓ **Mathematica** : cpu = 0.266758 (sec), leaf count = 165

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

✓ **Maple** : cpu = 1.901 (sec), leaf count = 71

$$\left\{y(x)=2+\_C1-\sqrt{\_C1\ (-\_C1+2\,x-2)},y(x)=2+\frac{\_C1}{2}-\frac{1}{2}\sqrt{\_C1\ (-\_C1+4\,x-4)},y(x)=$$

2.474 ODE No. 474

$$2y(x)y'(x)^2-(4x-5)y'(x)+2y(x)=0$$

✓ **Mathematica** : cpu = 0.163376 (sec), leaf count = 135

$$\left\{\left\{y(x)\to -i\sqrt{2}e^{\frac{c_1}{2}}\sqrt{8e^{c_1}+4x-5}\right\},\left\{y(x)\to i\sqrt{2}e^{\frac{c_1}{2}}\sqrt{8e^{c_1}+4x-5}\right\},\left\{y(x)\to -\frac{1}{4}ie^{\frac{c_1}{2}}\sqrt{e^{c_1}+8x-1\right.$$

✓ **Maple** : cpu = 1.726 (sec), leaf count = 152

$$\left\{\ln\left(x-\frac{5}{4}\right)-\frac{1}{2}\ln\left(4\,\frac{y(x)}{4\,x-5}-1\right)-\frac{1}{2}\ln\left(4\,\frac{y(x)}{4\,x-5}+1\right)+\ln\left(\frac{y(x)}{4\,x-5}\right)+\sqrt{-16\,\frac{(y\,(x))^2}{(4\,x-5)^2}+1-\right.$$

2.475 ODE No. 475

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

✓ **Mathematica** : cpu = 0.095783 (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 = 1.397 (sec), leaf count = 67

$$\left\{y(x)=\sqrt{\_C1^2-\_C1\,x},y(x)=\sqrt{\_C1^2+\_C1\,x},y(x)=-\frac{i}{2}x,y(x)=\frac{i}{2}x,y(x)=-\sqrt{\_C1\ (x+\_C\right.$$

2.476 ODE No. 476

$$4x^3y'(x) - 4x^2y(x) + 9y(x)y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.247332 (sec), leaf count = 143

$$\left\{\text{Solve}\left[\frac{1}{2}\log(y(x)) - \frac{\sqrt{x^6+9x^2y(x)^2}\tanh^{-1}\left(\frac{x^2}{\sqrt{x^4+9y(x)^2}}\right)}{2x\sqrt{x^4+9y(x)^2}} = c_1, y(x)\right], \text{Solve}\left[\frac{\sqrt{x^6+9x^2y(x)^2}\tanh^{-1}}{2x\sqrt{x^4+9y(}}\right.\right.$$

✓ **Maple** : cpu = 0.634 (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 = 0.213909 (sec), leaf count = 146

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

✓ **Maple** : cpu = 0.629 (sec), leaf count = 622

$$\left\{\int_{\_b}^{x} 1\left(-4\_a + 2b - 2\sqrt{4a(y(x))^2 + (b-2\_a)^2}\right)\left((-b+2\_a)\sqrt{4a(y(x))^2 + (b-2\_a)^2} + 4a(y(\right.\right.$$

2.478 ODE No. 478

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

✓ **Mathematica** : cpu = 0.322007 (sec), leaf count = 223

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[\frac{\frac{c\sqrt{-ac}\sqrt{\frac{\#1a+b}{c}}\sin^{-1}\left(\frac{a\sqrt{-\#1a-b+c}}{\sqrt{-a}\sqrt{-ac}}\right)}{\sqrt{-a}} - (\#1a+b)\sqrt{-\#1a-b+c}}{a\sqrt{\#1a+b}}\&\right][c_1 - x]\right\}, \left\{\right.\right.$$

✓ **Maple** : cpu = 0.348 (sec), leaf count = 88

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

2.479 ODE No. 479

$$\mathrm{a0}x+y'(x)(\mathrm{a1}x+\mathrm{b1}y(x)+\mathrm{c1})+y'(x)^2(\mathrm{a2}x+\mathrm{b2}y(x)+\mathrm{c2})+\mathrm{b0}y(x)+\mathrm{c0}=0$$

✓ **Mathematica** : cpu = 9.0486 (sec), leaf count = 552

$$\text{Solve}\left[\left[\left\{x=-\frac{-(\mathrm{b0}+\mathrm{K\$401181}(\mathrm{b1}+\mathrm{b2K\$401181}))\exp\left(\text{RootSum}\left[\#1^3\mathrm{b2}+\#1^2\mathrm{a2}+\#1^2\mathrm{b1}+\#1\mathrm{a1}\right.\right.\right.}{}\right.\right.\right.$$

✓ **Maple** : cpu = 0.234 (sec), leaf count = 929

$$\left\{x-\mathrm{e}^{\int\frac{1}{2\,b2\,y(x)+2\,a2\,x+2\,c2}\left(-a1\,x-b1\,y(x)-c1+\sqrt{-4\,a0\,a2\,x^2-4\,a0\,b2\,xy(x)+a1^2x^2+2\,a1\,b1\,xy(x)-4\,a2\,b0\,xy(x)-4\,b0\,b2\,(y(x))^2+b1^2(y(x))^2-4\,a0\,c2\,x}\right.}\right.$$

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 = 26.8121 (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 = 0.0117413 (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 = 0.033 (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 = 55.9359 (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 = 0.177428 (sec), leaf count = 71

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

✓ **Maple** : cpu = 0.069 (sec), leaf count = 103

$$\left\{y(x) = 0, y(x) = RootOf\left(-2\ln(x) + \int^{\_Z} \frac{1}{\_a\left(\_a^2 + 1\right)}\left(-2\_a^2 + \sqrt{2}\sqrt{\_a\left(\_a - 1\right)^2}\right)d\_a + 2\_C\right.$$

2.484 ODE No. 484

$$\left(2xy(x)-x^2\right)y'(x)^2-6xy(x)y'(x)-y(x)^2+2xy(x)=0$$

✓ **Mathematica** : cpu = 0.141932 (sec), leaf count = 81

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

✓ **Maple** : cpu = 0.052 (sec), leaf count = 115

$$\left\{y(x)=0,y(x)=RootOf\left(-2\ln(x)+\int^{\_Z}\frac{1}{\_a\left(\_a^2-4\_a+1\right)}\left(-2\_a^2+\sqrt{2}\sqrt{\_a\left(\_a+1\right)^2}+4\_\right.\right.\right.$$

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 = 300.024 (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 = 0.0488184 (sec), leaf count = 117

$$\left\{\left\{y(x)\to -\sqrt{a^2-2c_1x-c_1{}^2-x^2}\right\},\left\{y(x)\to \sqrt{a^2-2c_1x-c_1{}^2-x^2}\right\},\left\{y(x)\to -\sqrt{a^2+2c_1x-c_1{}^2\right.\right.$$

✓ **Maple** : cpu = 0.228 (sec), leaf count = 54

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

2.487 ODE No. 487

$$-6x^3y'(x) + 4x^2y(x) + y(x)^2y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.285889 (sec), leaf count = 157

$$\left\{\text{Solve}\left[\frac{3}{4}\log(y(x)) - \frac{\sqrt{9x^6 - 4x^2y(x)^3}\tanh^{-1}\left(\frac{3x^2}{\sqrt{9x^4-4y(x)^3}}\right)}{2x\sqrt{9x^4 - 4y(x)^3}} = c_1, y(x)\right], \text{Solve}\left[\frac{\sqrt{9x^6 - 4x^2y(x)^3}\tanh}{2x\sqrt{9x^4 -}}\right.\right.$$

✓ **Maple** : cpu = 0.548 (sec), leaf count = 100

$$\left\{y(x) = RootOf\left(-\ln(x) + \int^{\_Z} -\frac{3}{4\_a(4\_a^3 - 9)}\left(4\_a^3 + 3\sqrt{-4\_a^3 + 9} - 9\right)d\_a + \_C1\right)x^{\frac{4}{3}}, y(\right.$$

2.488 ODE No. 488

$$4a^2 - 4ay(x)y'(x) - 4ax + y(x)^2y'(x)^2 + y(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.290123 (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 = 0.626 (sec), leaf count = 111

$$\left\{y(x) = -2\sqrt{ax}, y(x) = 2\sqrt{ax}, y(x) = -\frac{1}{4a}\sqrt{-16a^4 + 32a^3x + (-16x^2 + 8\_C1)a^2 + 8\_C1\,ax - \_\right.$$

2.489 ODE No. 489

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

✗ **Mathematica** : cpu = 300.427 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 2.747 (sec), leaf count = 551

$$\left\{y(x) = -\frac{\sqrt{16}}{2a(a+1)}\sqrt{\left(a\left(ax - \frac{b}{2} + x\right)^2 (a+1)^2 RootOf\left(-b\ln(2ax - b + 2x) + 2\int^{\_Z} -1/4\frac{}{\_a(}\right.\right.}\right.$$

2.490 ODE No. 490

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

✓ **Mathematica** : cpu = 0.420531 (sec), leaf count = 70

$$\left\{\left\{y(x) \to -\frac{\sqrt{-a + 8c_1x - 4c_1{}^2 - 2x^2}}{\sqrt{2}}\right\}, \left\{y(x) \to \frac{\sqrt{-a + 8c_1x - 4c_1{}^2 - 2x^2}}{\sqrt{2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.625 (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 = 0.721782 (sec), leaf count = 79

$$\left\{\left\{y(x) \to -\sqrt{-2ac_1x + ac_1{}^2 + b + 2c_1x - c_1{}^2 - x^2}\right\}, \left\{y(x) \to \sqrt{-2ac_1x + ac_1{}^2 + b + 2c_1x - c_1{}^2 - x^2}\right\}\right.$$

✓ **Maple** : cpu = 0.925 (sec), leaf count = 195

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

2.492 ODE No. 492

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

✓ **Mathematica** : cpu = 0.0802164 (sec), leaf count = 97

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

✓ **Maple** : cpu = 1.684 (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

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

✓ **Mathematica** : cpu = 7.37684 (sec), leaf count = 553

$$\left\{\text{Solve}\left[\left\{y(x)=\frac{-\sqrt{-a\text{K\$414258}^2\left(a\text{K\$414258}^2-2\text{K\$414258}^2x-2x\right)}-a\text{K\$414258}}{\text{K\$414258}^2+1},x=\frac{ac_1{}^2\text{K\$4142}}{}\right.\right.\right.$$

✓ **Maple** : cpu = 1.194 (sec), leaf count = 111

$$\left\{\left[x(\_T)=\frac{1}{2\,a}\left(\sqrt{\_T^2+1}\left(Artanh\left(\frac{1}{\sqrt{\_T^2+1}}\right)\right)^2a^2+\left(-2\,a\_C1\,\sqrt{\_T^2+1}-2\,a^2\right)Artanh\left(\frac{}{\sqrt{}}\right.\right.\right.\right.$$

2.494 ODE No. 494

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

✓ **Mathematica** : cpu = 0.112739 (sec), leaf count = 49

$$\left\{\left\{y(x)\to ac_1-\sqrt{c_1{}^2-x^2}\right\},\left\{y(x)\to ac_1+\sqrt{c_1{}^2-x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.237 (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

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

✓ **Mathematica** : cpu = 0.154434 (sec), leaf count = 83

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

✓ **Maple** : cpu = 2.276 (sec), leaf count = 61

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

2.496 ODE No. 496

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

✓ **Mathematica** : cpu = 19.5841 (sec), leaf count = 17831

Too large to display

✓ **Maple** : cpu = 0.464 (sec), leaf count = 130

$$\left\{y(x)=x-\sqrt{2}a, y(x)=x+\sqrt{2}a, y(x)=x+RootOf\left(-x+\int^{\_Z}-\frac{1}{2\_a^2-4\,a^2}\left(\_a^2-2\,a^2+\sqrt{-\_a\right.\right.\right.$$

2.497 ODE No. 497

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

✓ **Mathematica** : cpu = 0.143917 (sec), leaf count = 76

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

✓ **Maple** : cpu = 0.787 (sec), leaf count = 203

$$\left\{\ln(x)-\frac{\sqrt{3}}{6}\sqrt{\frac{\left(\sqrt{3}x-3\,y(x)\right)\left(\sqrt{3}x+3\,y(x)\right)}{x^2}}+\frac{1}{2}\sqrt{\frac{x^2-3\,(y(x))^2}{x^2}}-Artanh\left(\frac{1}{2}\sqrt{\frac{x^2-3\,(y(x))^2}{x^2}}\right)\right.$$

2.498 ODE No. 498

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

✓ **Mathematica** : cpu = 0.0775503 (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 = 1.002 (sec), leaf count = 99

$$\left\{y(x)=1, y(x)=\frac{\sin\left(RootOf\left(-8\sqrt{3}\_C1\,\_Z+8\sqrt{3}x\_Z-(\cos(\_Z))^2+48\_C1^2-96\_C1\,x+48\,x\right.\right.}{6}\right.$$

2.499 ODE No. 499

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

✓ **Mathematica** : cpu = 0.382935 (sec), leaf count = 212

$$\left\{\left\{y(x)\to -\frac{\sqrt{a^6(-x^2)+3a^4x^2+2a^2xe^{a^2c_1-c_1}-2xe^{a^2c_1-c_1}+e^{2a^2c_1-2c_1}-3a^2x^2+x^2}}{\sqrt{a^6-3a^4+3a^2-1}}\right\},\left\{y(x)\to \frac{\sqrt{a^6}}{}\right.\right.$$

✓ **Maple** : cpu = 0.253 (sec), leaf count = 189

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

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 = 0.889223 (sec), leaf count = 100

$$\left\{\left\{y(x)\to -\frac{\sqrt{-ab-2ac_1x+ac_1{}^2+ax^2+b^2-bx^2}}{\sqrt{b-a}}\right\},\left\{y(x)\to \frac{\sqrt{-ab-2ac_1x+ac_1{}^2+ax^2+b^2-bx^2}}{\sqrt{b-a}}\right.\right.$$

✓ **Maple** : cpu = 1.02 (sec), leaf count = 220

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

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 = 21.8209 (sec), leaf count = 913

$$\left\{\text{Solve}\left[\left\{y(x) = \frac{b\text{K\$446980} - \sqrt{-\text{K\$446980}^2\left(-b^2+4a\text{K\$446980}^2xb+4dxb+4ac\text{K\$446980}^2+4cd\right)}}{2\left(a\text{K\$446980}^2+d\right)},\right.\right.\right.$$

✓ **Maple** : cpu = 5.392 (sec), leaf count = 215

$$\left\{\left[x(\_T) = -\frac{1}{4\,bd}\left(\left(\ln\left(\frac{1}{\_T}\left(\sqrt{d}\sqrt{\_T^2a+d}+d\right)\right)\right)^2\sqrt{\_T^2a+d}\,b^2 + \left(\left(2\ln(2)\,b^2+4\sqrt{d}\_C1\,b\right)\right.\right.\right.\right.$$

2.502 ODE No. 502

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

✓ **Mathematica** : cpu = 1.19749 (sec), leaf count = 100

$$\left\{\left\{y(x)\to\frac{bc_1}{a}-\frac{\sqrt{2b^2c_1x-b^2c_1{}^2+b^2\left(-x^2\right)+c^2}}{a}\right\},\left\{y(x)\to\frac{\sqrt{2b^2c_1x-b^2c_1{}^2+b^2\left(-x^2\right)+c^2}}{a}+\frac{bc_1}{a}\right\}\right.$$

✓ **Maple** : cpu = 0.69 (sec), leaf count = 195

$$\left\{y(x)=\frac{bx-\sqrt{2}c}{a},y(x)=\frac{bx+\sqrt{2}c}{a},y(x)=\frac{1}{a}\left(RootOf\left(-x+\int^{\_Z}\frac{a}{(2\_a^2a^2-4c^2)b}\left(-\_a^2a^2+2c^2\right.\right.\right.\right.$$

2.503 ODE No. 503

$$\mathrm{a0}+y'(x)(\mathrm{a1}x+\mathrm{b1}y(x)+\mathrm{c1})+y'(x)^2(\mathrm{a2}x+\mathrm{b2}y(x)+\mathrm{c2})^2+\mathrm{b0}y(x)+\mathrm{c0}=0$$

✗ **Mathematica** : cpu = 300.057 (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 = 0.332354 (sec), leaf count = 51

$$\left\{y(x)\to-\frac{\sqrt[3]{-\frac{1}{2}\sqrt[3]{2c_1+1}\sqrt[3]{2ac_1-a+2x^3}}}{\sqrt[3]{2c_1-1}}\right\}$$

✓ **Maple** : cpu = 1.107 (sec), leaf count = 247

$$\left\{\int_{\_b}^{y(x)}\_a^2\frac{1}{\sqrt{x^6+(-2\_a^3-2a)x^3+(-\_a^3+a)^2}}\mathrm{d}\_a-\frac{\ln(x)}{2}-\_C1=0,\int_{\_b}^{y(x)}\_a^2\frac{}{\sqrt{x^6+(-2\_a^3}}\right.$$

2.505 ODE No. 505

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

✓ **Mathematica** : cpu = 0.0785706 (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 = 0.042 (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 = 55.6069 (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 = 44.0017 (sec), leaf count = 0 , could not solve

```
DSolve[y[x]^2*(-a^2 + y[x]^2) + 2*a^2*x*y[x]*Derivative[1][y][x] + (-(a^2*x^2) + y[x]^
```

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

```
dsolve((y(x)^4-a^2*x^2)*diff(y(x),x)^2+2*a^2*x*y(x)*diff(y(x),x)+y(x)^2*(y(x)^2-
a^2)=0,y(x))
```

2.508 ODE No. 508

$$\left(x^2y(x)^2 - x^2 + y(x)^4\right) y'(x)^2 + 2xy(x)y'(x) - y(x)^2 = 0$$

✓ **Mathematica** : cpu = 2.02951 (sec), leaf count = 88

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

✓ **Maple** : cpu = 1.753 (sec), leaf count = 60

$$\left\{y(x) = -ix, y(x) = ix, y(x) = -\mathit{Artanh}\left(\mathit{RootOf}\left((\mathit{Artanh}(\_Z))^2\,\_Z^2 - 2\,\mathit{Artanh}(\_Z)\,\_C1\,\_Z^2 + \_C\right.\right.\right.$$

2.509 ODE No. 509

$$9\left(x^2-1\right) y(x)^4 y'(x)^2 - 4x^2 - 6xy(x)^5 y'(x) = 0$$

✓ **Mathematica** : cpu = 0.276089 (sec), leaf count = 34

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

✓ **Maple** : cpu = 1.148 (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

$$-\left(x^4y(x)^2-1\right) y(x)^2 + x^2\left(x^2y(x)^4-1\right) y'(x)^2 + 2x^3\left(y(x)^2-x^2\right) y(x)^3 y'(x) = 0$$

✗ **Mathematica** : cpu = 52.9533 (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 = 1.43967 (sec), leaf count = 229

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

✓ **Maple** : cpu = 3.776 (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 = 5.92611 (sec), leaf count = 713

$$\left\{\text{Solve}\left[\tan^{-1}\left(\frac{x}{y(x)}\right)-\frac{i\sqrt{a\left(\left(x^2+y(x)^2\right)^{5/2}-a\left(x^2+y(x)^2\right)^3\right)}\left(\sqrt{2}\left(\log\left(\frac{a^{3/2}\left(3i\sqrt{2}a\sqrt{x^2+y(x)^2}+4\sqrt{a}\sqrt{\sqrt{}}\right.}{4a\sqrt{x^2+y}}\right.\right.\right.}{}\right.\right.$$

✓ **Maple** : cpu = 4.408 (sec), leaf count = 137

$$\left\{y(x)=x\left(\tan\left(RootOf\left(-\_Z+\int^{\frac{x^2\left((\tan(\_Z))^2+1\right)}{(\tan(\_Z))^2}}-\frac{1}{2\_a^2\left(\_a\,a^2-1\right)}\left(a\sqrt{\_a}+1\right)\sqrt{-\_a^3a^2+\_a^{\frac{5}{2}}ad\_}\right.\right.\right.\right.$$

2.513 ODE No. 513

$$y'(x)^2\sin(y(x)) + 2xy'(x)\cos^3(y(x)) - \sin(y(x))\cos^4(y(x)) = 0$$

✓ **Mathematica** : cpu = 0.0750519 (sec), leaf count = 81

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

✓ **Maple** : cpu = 3.5 (sec), leaf count = 1138

$$\left\{[x(\_T)=\frac{1}{2\_T}\left(\left(\left(\cos\left(\frac{1}{2}\arctan\left(\frac{1}{3}\left(\_C1^2\_T^2-2\_C1\_T\sqrt[3]{\_C1^3\_T^3+54\_C1\_T+6\sqrt{3}\sqrt{}\right.\right.\right.\right.\right.\right.\right.$$

2.514 ODE No. 514

$$y'(x)^2(a\cos(y(x))+b) - c\cos(y(x)) + d = 0$$

✓ **Mathematica** : cpu = 9.97534 (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 = 0.257 (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

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

✓ **Mathematica** : cpu = 2.04037 (sec), leaf count = 1922

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

✓ **Maple** : cpu = 0.943 (sec), leaf count = 113

$$\left\{y(x)=x\left(\tan\left(\mathit{RootOf}\left(-\_Z+\int^{\frac{x^2\left((\tan(\_Z))^2+1\right)}{(\tan(\_Z))^2}}-\frac{1}{2\_a\left(f\left(\_a\right)-\_a\right)}\sqrt{-\left(f\left(\_a\right)-\_a\right)f\left(\_a\right)}d\_a\right.\right.\right.\right.$$

2.516 ODE No. 516

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

✓ **Mathematica** : cpu = 0.477517 (sec), leaf count = 253

$$\left\{\text{Solve}\left[\int_1^{\frac{y(x)}{x}}\frac{f\left(\frac{1}{\sqrt{K[1]^2+1}}\right)K[1]^2+f\left(\frac{1}{\sqrt{K[1]^2+1}}\right)-1}{\sqrt{f\left(\frac{1}{\sqrt{K[1]^2+1}}\right)}(K[1]-i)(K[1]+i)\left(\sqrt{f\left(\frac{1}{\sqrt{K[1]^2+1}}\right)}K[1]+i\sqrt{f\left(\frac{1}{\sqrt{K[1]^2+1}}\right)-1}\right)}dK[1]\right.\right.$$

✓ **Maple** : cpu = 0.822 (sec), leaf count = 70

$$\left\{y(x)=\mathit{RootOf}\left(-\ln(x)+\int^{\_Z}-\frac{1}{\_a^2+1}\left(\_a\,f\left(\frac{1}{\sqrt{\_a^2+1}}\right)+\sqrt{-\left(f\left(\frac{1}{\sqrt{\_a^2+1}}\right)\right)^2+f\left(\frac{1}{\sqrt{\_a\ldots}}\right.}\right.\right.\right.$$

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 = 0.492725 (sec), leaf count = 283

$$\left\{\text{Solve}\left[\int_1^{\frac{y(x)}{x}}\frac{f\left(\frac{K[1]}{\sqrt{K[1]^2+1}}\right)K[1]^2+f\left(\frac{K[1]}{\sqrt{K[1]^2+1}}\right)-1}{\sqrt{f\left(\frac{K[1]}{\sqrt{K[1]^2+1}}\right)(K[1]-i)(K[1]+i)}\left(\sqrt{f\left(\frac{K[1]}{\sqrt{K[1]^2+1}}\right)}K[1]+i\sqrt{f\left(\frac{K[1]}{\sqrt{K[1]^2+1}}\right)-1}\right)}dK[1]\right.\right.$$

✓ **Maple** : cpu = 0.842 (sec), leaf count = 78

$$\left\{y(x)=RootOf\left(-\ln(x)+\int^{\_Z}-\frac{1}{\_a^2+1}\left(\_a\,f\left(\_a\frac{1}{\sqrt{\_a^2+1}}\right)+\sqrt{-\left(f\left(\_a\frac{1}{\sqrt{\_a^2+1}}\right)\right)^2+f\right.}\right.\right.\right.$$

2.518 ODE No. 518

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

✓ **Mathematica** : cpu = 0.517174 (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 = 0.156 (sec), leaf count = 126

$$\left\{x-\int^{y(x)}\frac{1}{\sqrt[3]{(\_a-a)^2(\_a-b)^2}}d\_a-\_C1=0,x-\int^{y(x)}2\frac{1}{\left(i\sqrt{3}-1\right)\sqrt[3]{(-\_a+a)^2(-\_a+b)^2}}d\_a\right.$$

2.519 ODE No. 519

$$y'(x)^3 - f(x)\left(ay(x)^2 + by(x) + c\right)^2 = 0$$

✓ **Mathematica** : cpu = 0.614992 (sec), leaf count = 353

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[\frac{\sqrt[3]{2}(2\#1a+b)\left(\frac{a(\#1(\#1a+b)+c)}{4ac-b^2}\right)^{2/3} {}_2F_1\left(\frac{1}{2},\frac{2}{3};\frac{3}{2};\frac{(b+2a\#1)^2}{b^2-4ac}\right)}{a(\#1(\#1a+b)+c)^{2/3}}\&\right]\left[\int_1^x \sqrt[3]{f(K[1]\right.\right.\right.$$

✓ **Maple** : cpu = 0.342 (sec), leaf count = 197

$$\left\{\int^{y(x)} \left(\_a^2a + \_a\,b + c\right)^{-\frac{2}{3}} d\_a + \int^x -1\sqrt[3]{f\left(\_a\right)\left(a\left(y\left(x\right)\right)^2 + by\left(x\right) + c\right)^2}\left(a(y(x))^2 + by(x) + c\right)^{-\frac{2}{3}} d\_$$

2.520 ODE No. 520

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

✓ **Mathematica** : cpu = 187.208 (sec), leaf count = 1590

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[-\frac{\left(27\#1^2+4\right)\left(27\#1^2 - 3\sqrt{81\#1^2+12}\#1 + 4\,{}_2F_1\left(\frac{2}{3},1;\frac{5}{3};\frac{1}{12}\left(\sqrt{81\#1^2+\right.\right.\right.}{48\sqrt[3]{3}\left(27\#1^2\right.}\right.\right.\right.$$

✓ **Maple** : cpu = 0.115 (sec), leaf count = 245

$$\left\{x - \int^{y(x)} 6\,\frac{\sqrt[3]{108\,\_a + 12\,\sqrt{81\,\_a^2+12}}}{\left(108\,\_a + 12\,\sqrt{81\,\_a^2+12}\right)^{2/3} - 12} d\_a - \_C1 = 0, x - \int^{y(x)} -12\,\frac{}{\left(i\sqrt{3}-1\right)\left(-\sqrt[3]{108\_\right.}}\right.$$

2.521 ODE No. 521

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

✓ **Mathematica** : cpu = 0.0028396 (sec), leaf count = 14

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

✓ **Maple** : cpu = 0.02 (sec), leaf count = 33

$$\left\{y(x) = \_C1 \left(\_C1^2 + x\right), y(x) = -\frac{2x}{9}\sqrt{-3x}, y(x) = \frac{2x}{9}\sqrt{-3x}\right\}$$

2.522 ODE No. 522

$$y'(x)^3 - (x+5)y'(x) + y(x) = 0$$

✓ **Mathematica** : cpu = 0.0035051 (sec), leaf count = 20

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

✓ **Maple** : cpu = 0.029 (sec), leaf count = 44

$$\left\{y(x) = \_C1 \left(-\_C1^2 + x + 5\right), y(x) = -\frac{2x+10}{9}\sqrt{3x+15}, y(x) = \frac{2x+10}{9}\sqrt{3x+15}\right\}$$

2.523 ODE No. 523

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

✓ **Mathematica** : cpu = 145.521 (sec), leaf count = 392

$$\left\{\left\{y(x) \to \int_1^x \left(\frac{\sqrt[3]{\frac{2}{3}}aK[1]}{\sqrt[3]{\sqrt{3}\sqrt{27K[1]^6 - 4a^3K[1]^3} - 9K[1]^3}} + \frac{\sqrt[3]{\sqrt{3}\sqrt{27K[1]^6 - 4a^3K[1]^3} - 9K[1]^3}}{\sqrt[3]{2}3^{2/3}}\right) dK[1]\right.\right.$$

✓ **Maple** : cpu = 0.037 (sec), leaf count = 231

$$\left\{y(x) = \int i\left(\left(\frac{i}{12} - \frac{\sqrt{3}}{12}\right)\left(-108x^3 + 12\sqrt{-12a^3x^3 + 81x^6}\right)^{\frac{2}{3}} + a\left(\sqrt{3} + i\right)x\right)\frac{1}{\sqrt[3]{-108x^3 + 12\sqrt{-12}}}\right.$$

2.524 ODE No. 524

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

✗ **Mathematica** : cpu = 300.005 (sec), leaf count = 0 , timed out

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✓ **Maple** : cpu = 0.045 (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 = 0.0737801 (sec), leaf count = 135

$$\left\{\left\{y(x) \to c_1 \exp\left(\frac{1}{2}\left(\frac{ax^2}{2} + \frac{1}{2}\sqrt{a}x\sqrt{ax^2 - 8} - 4\log\left(\sqrt{a}\sqrt{ax^2 - 8} + ax\right)\right)\right)\right\}, \left\{y(x) \to c_1 \exp\left(\frac{1}{2}\left(\frac{ax}{2}\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.035 (sec), leaf count = 122

$$\left\{y(x) = \_C1\left(a^2x\frac{1}{\sqrt{a^2}} + \sqrt{a^2x^2 - 8a}\right)^{-2\frac{a}{\sqrt{a^2}}} e^{\frac{x}{4}\left(ax + \sqrt{a^2x^2 - 8a}\right)}, y(x) = \_C1\left(a^2x\frac{1}{\sqrt{a^2}} + \sqrt{a^2x^2 - 8a}\right)^{2}\right.$$

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 = 0.0477202 (sec), leaf count = 45

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

✓ **Maple** : cpu = 0.012 (sec), leaf count = 32

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

2.527 ODE No. 527

$$-xy(x)^4y'(x) + y'(x)^3 - y(x)^5 = 0$$

✓ **Mathematica** : cpu = 0.0147895 (sec), leaf count = 20

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

✓ **Maple** : cpu = 0.518 (sec), leaf count = 43

$$\left\{y(x) = \_C1 \sqrt{\frac{\_C1^{10}}{(\_C1^4 x - 1)^2}}, y(x) = -\frac{3\sqrt{3}}{2}x^{-\frac{3}{2}}, y(x) = \frac{3\sqrt{3}}{2}x^{-\frac{3}{2}}\right\}$$

2.528 ODE No. 528

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

✓ **Mathematica** : cpu = 0.623946 (sec), leaf count = 398

$$\text{Solve}\left[\left\{x = c_1 - \frac{-a\left(\frac{\sqrt[3]{-2a^3+\sqrt{(-2a^3-27abx-27by(x))^2-4a^6}-27abx-27by(x)}}{3\sqrt[3]{2}} + \frac{\sqrt[3]{2}a^2}{3\sqrt[3]{-2a^3+\sqrt{(-2a^3-27abx-27by(x))^2-4a^6-2}}}\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.068 (sec), leaf count = 86

$$\left\{y(x) = -ax - \frac{\left(e^{RootOf(-2\_Z a^2-3 e^{2\_Z}+8 a e^{\_Z}+2\_C1 b-5 a^2-2 bx)} - a\right)^2 e^{RootOf(-2\_Z a^2-3 e^{2\_Z}+8 a e^{\_Z}+2\_C1 b-5}}{b}\right.$$

2.529 ODE No. 529

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

✓ **Mathematica** : cpu = 39.3703 (sec), leaf count = 1758

$$\left\{\left\{y(x) \to \frac{1}{2}\left(\frac{4\ 2^{2/3}x^4}{3\left(-16x^3 - 72x^2 - 108x + 216c_1 + \sqrt{4\left(-4x^2 - 12x - 9\right)^3 + \left(-16x^3 - 72x^2 - 108x + 2\right.}\right.}\right.\right.\right.$$

✓ **Maple** : cpu = 0.037 (sec), leaf count = 1251

$$\left\{y(x) = 0, y(x) = 1\left(\left(4\,x - 6\right)\sqrt[3]{-36\,x^2 - 54\,x + 108\_C1 - 8\,x^3 + 27 + 6\,\sqrt{-6\,\left(1 + 2\_C1\right)\left(4\,x^3 + 18\right.}}\right.\right.$$

2.530 ODE No. 530

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

✓ **Mathematica** : cpu = 7.97625 (sec), leaf count = 648

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[\int_1^{\#1} \frac{\sqrt[3]{2K[1]^3 - 27K[1]^2 + 3\sqrt{3}\sqrt{-}}}{2\sqrt[3]{2}K[1]^2 + 2\sqrt[3]{2K[1]^3 - 27K[1]^2 + 3\sqrt{3}\sqrt{-K[1]^4(4K[1] - 27)}K[1]}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.086 (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 = 61.0335 (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 = 300.004 (sec), leaf count = 0 , timed out

```
$Aborted
```

✓ **Maple** : cpu = 0.101 (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 = 0.0163515 (sec), leaf count = 40

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

✓ **Maple** : cpu = 0.025 (sec), leaf count = 76

$$\left\{y(x)=\frac{x\_C1^3+a}{\_C1^2},y(x)=\frac{3\sqrt[3]{2}}{2}\sqrt[3]{ax^2},y(x)=\frac{3\sqrt[3]{2}(i\sqrt{3}-1)}{4}\sqrt[3]{ax^2},y(x)=-\frac{3\sqrt[3]{2}(i\sqrt{3}+1)}{4}\sqrt[3]{ax^2}\right\}$$

2.534 ODE No. 534

$$4xy'(x)^3 - 6y(x)y'(x)^2 + 3y(x) - x = 0$$

✓ **Mathematica** : cpu = 0.049745 (sec), leaf count = 114

$$\left\{\left\{y(x) \to \frac{-\sqrt{2}\sqrt{c_1x^3 + 3c_1{}^2x^2 + 3c_1{}^3x + c_1{}^4} - c_1{}^2}{3c_1}\right\}, \left\{y(x) \to \frac{\sqrt{2}\sqrt{c_1x^3 + 3c_1{}^2x^2 + 3c_1{}^3x + c_1{}^4} - c_1{}^2}{3c_1}\right.$$

✓ **Maple** : cpu = 0.049 (sec), leaf count = 84

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

2.535 ODE No. 535

$$8xy'(x)^3 - 12y(x)y'(x)^2 + 9y(x) = 0$$

✓ **Mathematica** : cpu = 0.0362683 (sec), leaf count = 49

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

✓ **Maple** : cpu = 0.036 (sec), leaf count = 51

$$\left\{y(x) = 0, y(x) = -\frac{3\,x}{2}, y(x) = \frac{3\,x}{2}, y(x) = -\frac{1}{3\_C1^2}(\_C1\ (3\_C1 + x))^{\frac{3}{2}}, y(x) = \frac{1}{3\_C1^2}(\_C1\ (3\_C\right.$$

2.536 ODE No. 536

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

✓ **Mathematica** : cpu = 0.0122029 (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 = 0.029 (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

$$\left(x^6+3xy(x)^2\right)y'(x)-2x^5y(x)+x^3y'(x)^3-3x^2y(x)y'(x)^2-y(x)^3=0$$

✗ **Mathematica** : cpu = 300.004 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 3.105 (sec), leaf count = 250

$$\left\{y(x)=\mathit{RootOf}\left(-\ln(x)+\int^{\_Z}\frac{2}{3\_a\,(27\_a^2+4)}\left(27\left(-4\frac{-9\_a+\sqrt{81\_a^2+12}}{(27\_a^2+4)\sqrt{81\_a^2+12}}\right)^{2/3}\_a^2-27\right.\right.\right.$$

2.538 ODE No. 538

$$2(xy'(x)+y(x))^3-y(x)y'(x)=0$$

✓ **Mathematica** : cpu = 9.06706 (sec), leaf count = 110

$$\left\{\left\{y(x)\to\frac{\int_1^x\frac{\text{InverseFunction}\left[-\frac{2\sqrt{\#1^2-8\#1^3}\tan^{-1}\left(\sqrt{8\#1-1}\right)}{\#1\sqrt{8\#1-1}}+\log(8\#1-1)+\log\left(1+\frac{1}{8\#1-1}\right)+\frac{3\sqrt{\#1^2-8\#1^3}}{\#1}\&\right][c_1+2\log(\text{K\$517620})]}{\text{K\$517620}}\,d\text{I}}{x}\right.\right.$$

✓ **Maple** : cpu = 0.82 (sec), leaf count = 1625

$$\left\{\int_{\_b}^{x}1\left(-6^{\frac{2}{3}}\left(-9\,y(x)\left(-1/9\sqrt{3}\sqrt{\frac{27\_a\,(y(x))^2-2\,y(x)}{\_a}}+y(x)\right)\_a^2\right)^{\frac{2}{3}}+6\_a\,y(x)\left(\sqrt[3]{6}\sqrt[3]{-9\,y(x}\right.\right.\right.$$

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 = 0.0233608 (sec), leaf count = 45

$$\left\{\{y(x)\to c_1e^x\},\{y(x)\to c_1-\cos(x)\},\left\{y(x)\to c_1-\log\left(\sin\left(\frac{x}{2}\right)\right)+\log\left(\cos\left(\frac{x}{2}\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.034 (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 = 0.0314972 (sec), leaf count = 69

$$\left\{\left\{y(x)\to c_1+\frac{x}{2}\right\},\left\{y(x)\to \frac{\left(3c_1-2ix^{3/2}\right)^{2/3}}{2^{2/3}}\right\},\left\{y(x)\to \frac{\left(3c_1+2ix^{3/2}\right)^{2/3}}{2^{2/3}}\right\}\right\}$$

✓ **Maple** : cpu = 0.052 (sec), leaf count = 109

$$\left\{x+\frac{x\_C1}{y\left(x\right)}\left(\frac{1}{y\left(x\right)}\left(-x-\sqrt{-xy\left(x\right)}+y(x)\right)\right)^{-\frac{2}{3}}\left(\frac{1}{y\left(x\right)}\left(\sqrt{-xy\left(x\right)}+y(x)\right)\right)^{-\frac{2}{3}}=0,x+\frac{x\_C1}{y\left(x\right)}\left(\frac{1}{y\left(x\right.}\right.\right.$$

2.541 ODE No. 541

$$y(x)^2y'(x)^3 + 2xy'(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 0.029067 (sec), leaf count = 39

$$\left\{\left\{y(x)\to -\sqrt{2c_1x+c_1{}^3}\right\},\left\{y(x)\to \sqrt{2c_1x+c_1{}^3}\right\}\right\}$$

✓ **Maple** : cpu = 0.404 (sec), leaf count = 103

$$\left\{y(x)=\sqrt{\_C1^3+2\,x\_C1},y(x)=-\frac{2\,i}{3}\sqrt[4]{2}\sqrt[4]{3}\sqrt[4]{-x^3},y(x)=\frac{2\,i}{3}\sqrt[4]{2}\sqrt[4]{3}\sqrt[4]{-x^3},y(x)=-\sqrt{\_C1^3+2\,x\_}\right.$$

2.542 ODE No. 542

$$16y(x)^2y'(x)^3 + 2xy'(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 0.0290756 (sec), leaf count = 20

$$\left\{\left\{y(x)\to \sqrt{c_1x+2c_1{}^3}\right\}\right\}$$

✓ **Maple** : cpu = 0.385 (sec), leaf count = 107

$$\left\{y(x)=\sqrt{16\_C1^3+2\,x\_C1},y(x)=-\frac{i}{3}\sqrt[4]{2}\sqrt[4]{3}\sqrt[4]{-x^3},y(x)=\frac{i}{3}\sqrt[4]{2}\sqrt[4]{3}\sqrt[4]{-x^3},y(x)=-\sqrt{16\_C1^3+2\,}\right.$$

2.543 ODE No. 543

$$x(x^2+1)\,y'(x)-x^2y(x)+y(x)^3\left(-y'(x)^2\right)+xy(x)^2y'(x)^3=0$$

✓ **Mathematica** : cpu = 0.0239505 (sec), leaf count = 55

$$\left\{\left\{y(x)\to -\sqrt{c_1x^2+\frac{c_1}{c_1{}^2+1}}\right\},\left\{y(x)\to \sqrt{c_1x^2+\frac{c_1}{c_1{}^2+1}}\right\}\right\}$$

✓ **Maple** : cpu = 1.089 (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 = 0.0727555 (sec), leaf count = 22

$$\left\{\left\{y(x)\to \sqrt[3]{c_1x^3+c_1{}^{2/3}}\right\}\right\}$$

✓ **Maple** : cpu = 0.697 (sec), leaf count = 4201

$$\left\{\int_{\_b}^{x}\frac{1}{\_a}\left(\left(-1-i\sqrt{3}\right)\left(-108\left(y\left(x\right)\right)^6\_a^{12}+12\sqrt{3}\sqrt{\frac{27\_a^6\left(y\left(x\right)\right)^3-4}{y\left(x\right)}}\left(y(x)\right)^5\_a^9+72\_a^6(y(x))^3-\right.\right.\right.$$

2.545 ODE No. 545

$$y'(x)^4-(y(x)-a)^3(y(x)-b)^2=0$$

✓ **Mathematica** : cpu = 0.664956 (sec), leaf count = 323

$$\left\{\left\{y(x)\to \text{InverseFunction}\left[-\frac{4\sqrt[4]{a-\#1}\sqrt{\frac{\#1-b}{a-b}}\,{}_2F_1\left(\frac{1}{4},\frac{1}{2};\frac{5}{4};\frac{a-\#1}{a-b}\right)}{\sqrt{b-\#1}}\&\right]\left[c_1-\sqrt[4]{-1}x\right]\right\},\left\{y(x)\to \text{Invers}\right.\right.$$

✓ **Maple** : cpu = 0.122 (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 = 0.0290142 (sec), leaf count = 113

$$\left\{\left\{y(x)\to\frac{1}{12}\left(-\sqrt{48c_1{}^2x^2+12c_1{}^4x+c_1{}^6+64x^3}-6c_1x-c_1{}^3+6c_1+6\right)\right\},\left\{y(x)\to\frac{1}{12}\left(\sqrt{48c_1{}^2x^2+\right.\right.\right.$$

✓ **Maple** : cpu = 0.094 (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 = 2.44581 (sec), leaf count = 490

$$\left\{\text{Solve}\left[\frac{\sqrt{\left(x^2-4\sqrt{y(x)}\right)y(x)}\log\left(\sqrt{x^2-4\sqrt{y(x)}}+x\right)}{\sqrt{x^2-4\sqrt{y(x)}}\sqrt{y(x)}}-\frac{\sqrt{x^2-4\sqrt{y(x)}}\sqrt{y(x)}\log(y(x))}{4\sqrt{\left(x^2-4\sqrt{y(x)}\right)y(x)}}+\frac{1}{4}\log(y\right.\right.$$

✓ **Maple** : cpu = 0.192 (sec), leaf count = 118

$$\left\{1\left(\sqrt{x^2-4\sqrt{y(x)}}-x\right)^{1\sqrt{x^2y(x)-4(y(x))^{3/2}}\frac{1}{\sqrt{x^2-4\sqrt{y(x)}}}\frac{1}{\sqrt{y(x)}}}\frac{1}{\sqrt{y(x)}}\left(\left(\sqrt{x^2-4\sqrt{y(x)}}+x\right)^{1\sqrt{x^2y(x)-4(y(\right.\right.\right.$$

2.548 ODE No. 548

$$y'(x)^6-(y(x)-a)^4(y(x)-b)^3=0$$

✓ **Mathematica** : cpu = 0.969213 (sec), leaf count = 479

$$\left\{\left\{y(x)\to \text{InverseFunction}\left[-\frac{3\sqrt[3]{a-\#1}\sqrt{\frac{\#1-b}{a-b}}\,{}_2F_1\left(\frac{1}{3},\frac{1}{2};\frac{4}{3};\frac{a-\#1}{a-b}\right)}{\sqrt{b-\#1}}\&\right][c_1-ix]\right\},\left\{y(x)\to \text{InverseFun}\right.\right.$$

✓ **Maple** : cpu = 0.226 (sec), leaf count = 250

$$\left\{x-\int^{y(x)}\frac{1}{\sqrt[6]{(\_a-a)^4(\_a-b)^3}}d\_a-\_C1=0,x-\int^{y(x)}\frac{-2\,i}{-\sqrt{3}+i}\frac{1}{\sqrt[6]{-(-\_a+a)^4(-\_a+b)^3}}d\_a\right.$$

2.549 ODE No. 549

$$x^2\left(y'(x)^2+1\right)^3-a^2=0$$

✓ **Mathematica** : cpu = 0.256686 (sec), leaf count = 216

$$\left\{\left\{y(x)\to c_1-x\left(\frac{a^{2/3}}{x^{2/3}}-1\right)^{3/2}\right\},\left\{y(x)\to x\left(\frac{a^{2/3}}{x^{2/3}}-1\right)^{3/2}+c_1\right\},\left\{y(x)\to c_1-x\left(-1-\frac{i\left(\sqrt{3}-i\right)}{2x^{2/3}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.348 (sec), leaf count = 553

$$\left\{y(x)=1\sqrt{-\frac{1}{a^4}\left(a^2x\right)^{\frac{4}{3}}\left(\left(a^2x\right)^{\frac{2}{3}}-a^2\right)}\left(a^2-\left(a^2x\right)^{\frac{2}{3}}\right)\left(a^2x\right)^{-\frac{2}{3}}+\_C1,y(x)=1\sqrt{-\frac{1}{a^4}\left(a^2x\right)^{\frac{4}{3}}\left(\left(a^2x\right)^{\frac{2}{3}}-\right.}\right.$$

2.550 ODE No. 550

$$-ay(x)^s - bx^{\frac{rs}{r-s}} + y'(x)^r = 0$$

✓ **Mathematica** : cpu = 0.730378 (sec), leaf count = 488

$$\text{Solve}\left[\int_1^{y(x)}\left(\frac{r}{-rx\left(aK[2]^s+bx^{\frac{rs}{r-s}}\right)^{\frac{1}{r}}+sx\left(aK[2]^s+bx^{\frac{rs}{r-s}}\right)^{\frac{1}{r}}+rK[2]}-\int_1^x\left(\frac{asK[2\right.\right.\right.$$
$$\left.rK[1]\left(aK[2]^s+bK[1]\right.\right.$$

✓ **Maple** : cpu = 0.221 (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 = 0.113192 (sec), leaf count = 86

$$\left\{\left\{y(x)\to\frac{-a(a-b)^n\left(\int_1^x(-1)^{1+\frac{1}{n}}f(K[1])dK[1]+c_1\right)^n-bn^n}{-(a-b)^n\left(\int_1^x(-1)^{1+\frac{1}{n}}f(K[1])dK[1]+c_1\right)^n-n^n}\right\}\right\}$$

✓ **Maple** : cpu = 0.309 (sec), leaf count = 55

$$\left\{y(x)=1\left(\left(-\frac{n}{(a-b)\left(\int f(x)\,\mathrm{d}x+\_C1\right)}\right)^n b-a\right)\left(-1+\left(-\frac{n}{(a-b)\left(\int f(x)\,\mathrm{d}x+\_C1\right)}\right)^n\right)^{-1}\right\}$$

2.552 ODE No. 552

$$y'(x)^n - f(x)g(y(x)) = 0$$

✓ **Mathematica** : cpu = 0.0313445 (sec), leaf count = 41

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[\int_1^{\#1} g(K[1])^{-1/n} dK[1]\&\right]\left[\int_1^x f(K[2])^{\frac{1}{n}} dK[2] + c_1\right]\right\}\right\}$$

✓ **Maple** : cpu = 0.059 (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 = 0.255821 (sec), leaf count = 52

$$\text{Solve}\left[\left\{x = \frac{\frac{am\text{K\$536895}^m}{m-1} + \frac{bn\text{K\$536895}^n}{n-1}}{\text{K\$536895}} + c_1, y(x) = a\text{K\$536895}^m + b\text{K\$536895}^n\right\}, \{y(x), \text{K\$536895}\}\right]$$

✓ **Maple** : cpu = 0.042 (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 = 0.096582 (sec), leaf count = 49

$$\text{Solve}\left[\left\{y(x) = \frac{\text{K\$537162}nx^2 - \text{K\$537162}^n x^n}{x}, x = c_1(\text{K\$537162} - \text{K\$537162}n)^{\frac{n}{1-n}}\right\}, \{y(x), \text{K\$537162}\}\right]$$

✓ **Maple** : cpu = 0.309 (sec), leaf count = 32

$$\left\{y(x) = \frac{1}{\_C1}\left(\_C1^2 \sqrt[n]{\frac{x}{\_C1}} n - \left(\_C1^{-1}\right)^{-n}\right)\right\}$$

2.555 ODE No. 555

$$xy'(x)+\sqrt{y'(x)^2+1}-y(x)=0$$

✓ **Mathematica** : cpu = 0.311398 (sec), leaf count = 119

$$\left\{\left\{y(x)\to\frac{-x\sin(2c_1)+ix\cos(2c_1)+2i\sin(c_1)+2\cos(c_1)-ix}{i\sin(2c_1)+\cos(2c_1)+1}\right\},\left\{y(x)\to\frac{i(ix\sin(2c_1)+x\cos(2c_1)-}{i\sin(2c_1)+}\right.\right.$$

✓ **Maple** : cpu = 0.019 (sec), leaf count = 15

$$\left\{y(x)=\sqrt{\_C1^2+1}+x\_C1\right\}$$

2.556 ODE No. 556

$$xy'(x)^2+\sqrt{y'(x)^2+1}+y(x)=0$$

✓ **Mathematica** : cpu = 4.46358 (sec), leaf count = 60

$$\text{Solve}\left[\left\{x=\frac{c_1}{(\text{K\$537938}+1)^2}+\frac{-\sqrt{\text{K\$537938}^2+1}-\sinh^{-1}(\text{K\$537938})}{(\text{K\$537938}+1)^2},y(x)=\text{K\$537938}^2(-x)-\sqrt{\text{K}}\right.\right.$$

✓ **Maple** : cpu = 0.141 (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 = 0.0244663 (sec), leaf count = 39

$$\left\{\left\{y(x)\to-\sqrt{c_1x-x^2}\right\},\left\{y(x)\to\sqrt{c_1x-x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.091 (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 = 0.561397 (sec), leaf count = 327

$$\left\{\text{Solve}\left[\frac{2i\tan^{-1}\left(\frac{y(x)}{x\sqrt{a^2-\frac{y(x)^2}{x^2}-1}}\right)+a\tanh^{-1}\left(\frac{-a^2-\frac{iy(x)}{x}+1}{a\sqrt{a^2-\frac{y(x)^2}{x^2}-1}}\right)-a\tanh^{-1}\left(\frac{-a^2+\frac{iy(x)}{x}+1}{a\sqrt{a^2-\frac{y(x)^2}{x^2}-1}}\right)+a\log\left(\frac{y(x)^2}{x^2}\right.}{2a^2-2}\right.\right.$$

✓ **Maple** : cpu = 0.112 (sec), leaf count = 223

$$\left\{x-\_C1\,\mathrm{e}^{\frac{1}{a}Arcsinh\left(\frac{1}{(a^2-1)x}\left(\sqrt{-a^2x^2+x^2+(y(x))^2}a+y(x)\right)\right)}\frac{1}{\sqrt{\frac{1}{(a^2-1)^2x^2}\left(-a^2x^2+a^2\,(y\,(x))^2+2\,\sqrt{-a^2x^2+x^2+\right.}}}\right.$$

2.559 ODE No. 559

$$-ay(x)y'(x)-ax+y(x)\sqrt{y'(x)^2+1}=0$$

✓ **Mathematica** : cpu = 0.378857 (sec), leaf count = 212

$$\left\{\left\{y(x)\to-\frac{\sqrt{a^6\left(-x^2\right)+3a^4x^2+2a^2xe^{a^2c_1-c_1}-2xe^{a^2c_1-c_1}+e^{2a^2c_1-2c_1}-3a^2x^2+x^2}}{\sqrt{a^6-3a^4+3a^2-1}}\right\},\left\{y(x)\to\frac{\sqrt{a^6}}{}\right.\right.$$

✓ **Maple** : cpu = 0.203 (sec), leaf count = 215

$$\left\{-\mathrm{e}^{\int\frac{1}{\left(a^2-1\right)y(x)}\left(-a^2x-\sqrt{\left(a^2-1\right)(y(x))^2+a^2x^2}\right)}a\left(a\sqrt{\_a^2+1}-\_a\right)\frac{1}{\sqrt{\_a^2+1}}\left(\_a\,a-\sqrt{\_a^2+1}\right)^{-1}\left(\_a^2a-\sqrt{\_a^2+1}\_a+a\right)^{-1}d\_a\,\_C1+\right.$$

2.560 ODE No. 560

$$ay(x)\sqrt{y'(x)^2+1}-x^2-2xy(x)y'(x)+y(x)^2=0$$

✓ **Mathematica** : cpu = 13.9561 (sec), leaf count = 110

$$\left\{\left\{y(x)\to -\frac{\sqrt{a^2c_1{}^2\left(-x^2\right)-4a^2c_1x-4a^2+4x^2}}{\sqrt{a^2c_1{}^2-4}}\right\},\left\{y(x)\to \frac{\sqrt{a^2c_1{}^2\left(-x^2\right)-4a^2c_1x-4a^2+4x^2}}{\sqrt{a^2c_1{}^2-4}}\right\}\right\}$$

✓ **Maple** : cpu = 0.722 (sec), leaf count = 1120

$$\left\{\int_{\_b}^{x}1\left(2\_a^3-2\left(y(x)\right)^2\_a+\sqrt{a^2\left(\_a^4+2\_a^2\left(y\left(x\right)\right)^2-a^2\left(y\left(x\right)\right)^2+\left(y\left(x\right)\right)^4\right)}\right)\left(-2\,a^2\_a\left(y(x)\right)^2+\right.\right.$$

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 = 1.81722 (sec), leaf count = 2138

$$\left\{\text{Solve}\left[\int_1^x\left(\frac{\sqrt{f\left(K[1]^2+y(x)^2\right)^2\left(-f\left(K[1]^2+y(x)^2\right)^2+K[1]^2+y(x)^2\right)}K[1]}{f\left(K[1]^2+y(x)^2\right)^2\left(K[1]^2+y(x)^2\right)}-\frac{\sqrt{f\left(K[1]^2+y(x)^2\right)^2}}{f\left(K[1]^2+y(x)^2\right)^2}\right.\right.\right.$$

✓ **Maple** : cpu = 1.358 (sec), leaf count = 50

$$\left\{y(x)=x\left(\tan\left(RootOf\left(-2\_Z+\int^{\frac{x^2\left(\left(\tan(\_Z)\right)^2+1\right)}{\left(\tan(\_Z)\right)^2}}\frac{f(\_a)}{\_a}\frac{1}{\sqrt{-\left(f\left(\_a\right)\right)^2+\_a}}d\_a+2\_C1\right)\right)\right)^{-1}\right\}$$

2.562 ODE No. 562

$$a\sqrt[3]{y'(x)^3+1}+bxy'(x)-y(x)=0$$

✗ **Mathematica** : cpu = 300.01 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.12 (sec), leaf count = 3306

$$\left\{\left(\left(-\int^{\frac{1}{2\,b^3x^3+2\,a^3}}\left(2\,b^2x^2y(x)\sqrt[3]{-4\,b^6x^6-8\,a^3b^3x^3-4\,b^3x^3(y(x))^3+4\,\sqrt{b^6x^6+2\,a^3b^3x^3+2\,b^3x^3(y(x))^3+a^6-2\,(y(x))^3a^3+(y(x))^6}b^3x^3-4\,a^6\right.\right.\right.\right.$$

2.563 ODE No. 563

$$ay(x)+b+xy'(x)+\log\left(y'(x)\right)=0$$

✓ **Mathematica** : cpu = 0.136293 (sec), leaf count = 59

$$\text{Solve}\left[a\left(\frac{(a+1)\log\left(1-aW\left(xe^{-ay(x)-b}\right)\right)}{a^2}+\frac{W\left(xe^{-ay(x)-b}\right)}{a}\right)+ay(x)=c_1,y(x)\right]$$

✓ **Maple** : cpu = 0.129 (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

$$a(xy'(x)-y(x))+\log\left(y'(x)\right)=0$$

✓ **Mathematica** : cpu = 0.0533459 (sec), leaf count = 28

$$\left\{\left\{y(x)\to-\frac{e^{-c_1}\left(e^{c_1}c_1-ax\right)}{a}\right\}\right\}$$

✓ **Maple** : cpu = 0.018 (sec), leaf count = 32

$$\left\{y(x)=\frac{1}{a}\left(\ln\left(-\frac{1}{ax}\right)-1\right),y(x)=x\_C1+\frac{\ln\left(\_C1\right)}{a}\right\}$$

2.565 ODE No. 565

$$y'(x) + y(x)\log(y'(x)) - xy(x) - y(x)\log(y(x)) = 0$$

✓ **Mathematica** : cpu = 0.0173293 (sec), leaf count = 25

$$\left\{\left\{y(x) \to c_1 e^{\frac{1}{2}W(e^x)^2 + W(e^x)}\right\}\right\}$$

✓ **Maple** : cpu = 0.102 (sec), leaf count = 17

$$\left\{y(x) = \_C1\, e^{\frac{\mathit{lambertW}(e^x)(\mathit{lambertW}(e^x)+2)}{2}}\right\}$$

2.566 ODE No. 566

$$y'(x) + \sin(y'(x)) - x = 0$$

✓ **Mathematica** : cpu = 0.0311171 (sec), leaf count = 31

$$\text{Solve}\left[\left\{x = \text{K\$548413} + \sin(\text{K\$548413}), y(x) = c_1 + \frac{\text{K\$548413}^2}{2} + \text{K\$548413}\sin(\text{K\$548413}) + \cos(\text{K\$54}\right.\right.$$

✓ **Maple** : cpu = 0.023 (sec), leaf count = 16

$$\left\{y(x) = \int \mathit{RootOf}(\sin(\_Z) + \_Z - x)\, dx + \_C1\right\}$$

2.567 ODE No. 567

$$a\cos(y'(x)) + by'(x) + x = 0$$

✓ **Mathematica** : cpu = 0.041835 (sec), leaf count = 42

$$\text{Solve}\left[\left\{y(x) = a\sin(\text{K\$548647}) - a\text{K\$548647}\cos(\text{K\$548647}) - \frac{b\text{K\$548647}^2}{2} + c_1, x = -a\cos(\text{K\$548647}\right.\right.$$

✓ **Maple** : cpu = 0.029 (sec), leaf count = 18

$$\left\{y(x) = \int \mathit{RootOf}(a\cos(\_Z) + b\_Z + x)\, dx + \_C1\right\}$$

2.568 ODE No. 568

$$y'(x)^2\sin\left(y'(x)\right)-y(x)=0$$

✓ **Mathematica** : cpu = 0.0522431 (sec), leaf count = 28

$$\text{Solve}\left[\left\{x=c_1+\text{K\$548887}\sin(\text{K\$548887})-\cos(\text{K\$548887}),y(x)=\text{K\$548887}^2\sin(\text{K\$548887})\right\},\{y(x),\text{K}$$

✓ **Maple** : cpu = 0.046 (sec), leaf count = 32

$$\left\{x-\int^{y(x)}\left(\mathit{RootOf}\left(\sin\left(\_Z\right)\_Z^2-\_a\right)\right)^{-1}d\_a-\_C1=0,y(x)=0\right\}$$

2.569 ODE No. 569

$$\left(y'(x)^2+1\right)\sin^2\left(y(x)-xy'(x)\right)-1=0$$

✓ **Mathematica** : cpu = 0.0927792 (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 = 0.306 (sec), leaf count = 147

$$\left\{y(x)=x\_C1-\arcsin\left(\frac{1}{\sqrt{\_C1^2+1}}\right),y(x)=x\_C1+\arcsin\left(\frac{1}{\sqrt{\_C1^2+1}}\right),y(x)=-x\sqrt{1-x}\sqrt{x}$$

2.570 ODE No. 570

$$\left(y'(x)^2+1\right)\left(ax+\tan^{-1}\left(y'(x)\right)\right)+y'(x)=0$$

✓ **Mathematica** : cpu = 1.42318 (sec), leaf count = 51

$$\text{Solve}\left[\left\{y(x)=\frac{1}{a\left(\text{K\$549361}^2+1\right)}+c_1,x=\frac{\text{K\$549361}^2(-\tan^{-1}(\text{K\$549361}))-\text{K\$549361}-\tan^{-1}(\text{K\$5}}{a\left(\text{K\$549361}^2+1\right)}\right.\right.$$

✓ **Maple** : cpu = 0.04 (sec), leaf count = 30

$$\left\{y(x)=\int\tan\left(\mathit{RootOf}\left(ax(\tan\left(\_Z\right))^2+(\tan\left(\_Z\right))^2\_Z+ax+\tan\left(\_Z\right)+\_Z\right)\right)\,dx+\_C1\right\}$$

2.571 ODE No. 571

$$ax^n f(y'(x)) + xy'(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 0.0874542 (sec), leaf count = 116

$$\text{Solve}\left[\left\{y(x) = af(\text{K\$549626})x^n + \text{K\$549626}x, x = \left(nf(\text{K\$549626})^{\frac{1}{n}-1}\int_1^{\text{K\$549626}} -\frac{f(K[1])^{\frac{n-1}{n}-1}}{an}dK[1]\right.\right.\right.$$

✓ **Maple** : cpu = 0.418 (sec), leaf count = 169

$$\left\{\left[y(\_T) = a\left(\left(\frac{1}{af(\_T)n}\left((1-n)\int (f(\_T))^{-n^{-1}}\,\mathrm{d}\_T + \_C1\,an\right)\right)^{(n-1)^{-1}}(f(\_T))^{\frac{1}{n(n-1)}}\right)^n f(\_T)\right.\right.$$

2.572 ODE No. 572

$$f(y'(x))\,(xy'(x) - y(x))^n + y(x)g(y'(x)) + xh(y'(x)) = 0$$

✗ **Mathematica** : cpu = 0.0385672 (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

$$f(xy'(x)^2) + 2xy'(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 0.0157483 (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 = 0.097 (sec), leaf count = 24

$$\left\{y(x) = \_C1 + 2\,RootOf\left(-f\left(\_Z^2\right) - 2\_Z + \_C1 + \_C2\right)\sqrt{x}\right\}$$

2.574 ODE No. 574

$$f\left(x-\frac{3}{2}y'(x)^2\right)+y'(x)^3-y(x)=0$$

✓ **Mathematica** : cpu = 0.023909 (sec), leaf count = 102

$$\left\{\left\{y(x)\to\frac{1}{9}\left(9f(c_1)+2\sqrt{6}x\sqrt{x-c_1}-2\sqrt{6}c_1\sqrt{x-c_1}\right),y(x)\to\frac{1}{9}\left(9f(c_1)-2\sqrt{6}x\sqrt{x-c_1}+2\sqrt{6}c_1\sqrt{x\right.\right.$$

✓ **Maple** : cpu = 0.096 (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 = 0.0250821 (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

$$\phi\left(f(x,y(x),y'(x)),g(x,y(x),y'(x))\right)=0$$

✗ **Mathematica** : cpu = 0.009432 (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 = 0.242657 (sec), leaf count = 243

$$\text{Solve}\left[\int_1^{y(x)}\left(\frac{1}{-aF\left(\frac{K[2]}{a+x}\right)-xF\left(\frac{K[2]}{a+x}\right)+K[2]}-\int_1^x\left(\frac{F'\left(\frac{K[2]}{a+K[1]}\right)}{(a+K[1])\left(aF\left(\frac{K[2]}{a+K[1]}\right)+K[1]F\left(\frac{K[2]}{a+K[1]}\right)-K\right.}\right.\right.\right.$$

✓ **Maple** : cpu = 0.025 (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 = 0.157726 (sec), leaf count = 100

$$\text{Solve}\left[\int_1^{y(x)}-\frac{F(K[2]-x^2)\int_1^x-\frac{2K[1]F'(K[2]-K[1]^2)}{F(K[2]-K[1]^2)^2}dK[1]+1}{F\left(K[2]-x^2\right)}dK[2]+\int_1^x\left(\frac{2K[1]}{F\left(y(x)-K[1]^2\right)}+1\right)dK[1]\right.$$

✓ **Maple** : cpu = 0.032 (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 = 0.239925 (sec), leaf count = 514

$$\text{Solve}\left[\int_1^{y(x)} -\frac{b\int_1^x \left(\frac{2aK[1]F'\left(\frac{1}{4}aK[1]^2+\frac{1}{2}bK[1]+K[2]\right)}{\left(b+2F\left(\frac{1}{4}aK[1]^2+\frac{1}{2}bK[1]+K[2]\right)\right)^2} + \frac{2F'\left(\frac{1}{4}aK[1]^2+\frac{1}{2}bK[1]+K[2]\right)}{b+2F\left(\frac{1}{4}aK[1]^2+\frac{1}{2}bK[1]+K[2]\right)} - \frac{4F\left(\frac{1}{4}aK[1]^2+\frac{1}{2}bK[1]+K[2]\right)F'\left(\frac{1}{4}aK\right.}{\left(b+2F\left(\frac{1}{4}aK[1]^2+\frac{1}{2}bK[1]+\right.\right.}\right.}{}\right.$$

✓ **Maple** : cpu = 0.035 (sec), leaf count = 35

$$\left\{y(x) = -\frac{ax^2}{4} - \frac{bx}{2} + \mathit{RootOf}\left(-x + 2\int^{\_Z} (2\,F(\_a) + b)^{-1}\,d\_a + \_C1\right)\right\}$$

2.580 ODE No. 580

$$y'(x) = e^{bx}F\left(e^{-bx}y(x)\right)$$

✓ **Mathematica** : cpu = 0.244631 (sec), leaf count = 203

$$\text{Solve}\left[\int_1^{y(x)} \left(\frac{1}{bK[2] - e^{bx}F\left(e^{-bx}K[2]\right)} - \int_1^x \left(\frac{F'\left(e^{-bK[1]}K[2]\right)}{e^{bK[1]}F\left(e^{-bK[1]}K[2]\right) - bK[2]} - \frac{e^{bK[1]}F\left(e^{-bK[1]}K[2]\right)\left(F'\right.}{\left(e^{bK[1]}F\left(e^{-bK[1]}K[\right.\right.}\right.\right.\right.$$

✓ **Maple** : cpu = 0.045 (sec), leaf count = 31

$$\left\{y(x) = \frac{\mathit{RootOf}\left(-x + \int^{\_Z} (F(\_a) - \_a\,b)^{-1}\,d\_a + \_C1\right)}{e^{-bx}}\right\}$$

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 = 0.232309 (sec), leaf count = 144

$$\text{Solve}\left[\int_1^{y(x)} -\frac{F\left(\frac{K[2]x^2+\frac{1}{4}}{x^2}\right)\int_1^x -\frac{F'\left(\frac{K[2]K[1]^2+\frac{1}{4}}{K[1]^2}\right)}{2F\left(\frac{K[2]K[1]^2+\frac{1}{4}}{K[1]^2}\right)^2 K[1]^3}dK[1]+1}{F\left(\frac{K[2]x^2+\frac{1}{4}}{x^2}\right)}dK[2] + \int_1^x \left(\frac{1}{K[1]^2} + \frac{1}{2K[1]^3F\left(\frac{y(x)K[1]^2}{K[1]^2}\right.}\right.\right.$$

✓ **Maple** : cpu = 0.075 (sec), leaf count = 32

$$\left\{y(x) = \frac{4\, RootOf\left(\int^{\_Z}(F(\_a))^{-1}\, d\_ax + x\_C1 + 1\right)x^2 - 1}{4\,x^2}\right\}$$

2.582 ODE No. 582

$$y'(x) = \frac{ax^2F\left(\frac{axy(x)+1}{ax}\right) + 1}{ax^2}$$

✓ **Mathematica** : cpu = 0.247768 (sec), leaf count = 142

$$\text{Solve}\left[\int_1^{y(x)} -\frac{F\left(\frac{axK[2]+1}{ax}\right)\int_1^x \frac{F'\left(\frac{aK[1]K[2]+1}{aK[1]}\right)}{aF\left(\frac{aK[1]K[2]+1}{aK[1]}\right)^2K[1]^2}dK[1]-1}{F\left(\frac{axK[2]+1}{ax}\right)}dK[2] + \int_1^x \left(-1 - \frac{1}{aK[1]^2F\left(\frac{aK[1]y(x)+1}{aK[1]}\right)}\right)\right.$$

✓ **Maple** : cpu = 0.181 (sec), leaf count = 30

$$\left\{y(x) = \frac{RootOf\left(-x + \int^{\_Z}(F(\_a))^{-1}\, d\_a + \_C1\right)xa - 1}{ax}\right\}$$

2.583 ODE No. 583

$$y'(x) = -\frac{1}{2}x\left(ax^2 - 2F\left(\frac{ax^4}{8} + y(x)\right)\right)$$

✓ **Mathematica** : cpu = 0.210888 (sec), leaf count = 126

$$\text{Solve}\left[\int_1^{y(x)} -\frac{F\left(\frac{ax^4}{8}+K[2]\right)\int_1^x \frac{aK[1]^3F'\left(\frac{1}{8}aK[1]^4+K[2]\right)}{2F\left(\frac{1}{8}aK[1]^4+K[2]\right)^2}dK[1]+1}{F\left(\frac{ax^4}{8}+K[2]\right)}dK[2] + \int_1^x \left(K[1] - \frac{aK[1]^3}{2F\left(\frac{1}{8}aK[1]^4 + y(x\right.}\right.\right.$$

✓ **Maple** : cpu = 0.102 (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 = 0.273436 (sec), leaf count = 115

$$\text{Solve}\left[\int_1^{y(x)}\left(\frac{K[2]}{4a^2F\left(K[2]^2-4ax\right)} - \frac{2a\int_1^x \frac{K[2]F'\left(K[2]^2-4aK[1]\right)}{aF\left(K[2]^2-4aK[1]\right)^2}dK[1]-1}{2a}\right)dK[2] + \int_1^x -\frac{1}{2aF\left(y(x)^2 - 4a\right.}\right.$$

✓ **Maple** : cpu = 0.047 (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 = 0.210367 (sec), leaf count = 205

$$\text{Solve}\left[\int_1^{y(x)}\left(\frac{1}{K[2](xF(\log(\log(K[2]))-\log(x))-\log(K[2]))}-\int_1^x\left(\frac{F(\log(\log(K[2]))-\log(K[1]))\left(\right.}{(F(\log(\log(K[2]))-\log(\right.}\right.\right.$$

✓ **Maple** : cpu = 0.344 (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 = 0.56363 (sec), leaf count = 975

$$\text{Solve}\left[\int_1^x\left(-\frac{K[1]\sqrt{K[1]^2+1}F\left(\frac{y(x)}{\sqrt{K[1]^2+1}}\right)^3}{y(x)\left(K[1]^2F\left(\frac{y(x)}{\sqrt{K[1]^2+1}}\right)^2+F\left(\frac{y(x)}{\sqrt{K[1]^2+1}}\right)^2-y(x)^2\right)}-\frac{K[1]F\left(\frac{y(x)}{\sqrt{K[1]^2+1}}\right)^2}{K[1]^2F\left(\frac{y(x)}{\sqrt{K[1]^2+1}}\right)^2+F\left(\frac{y(x)}{\sqrt{K[1]^2}}\right.}\right.\right.$$

✓ **Maple** : cpu = 0.197 (sec), leaf count = 39

$$\left\{y(x) = RootOf\left(-\ln\left(x^2+1\right)+2\int^{\_Z}(F(\_a)-\_a)^{-1}\,d\_a+2\_C1\right)\sqrt{x^2+1}\right\}$$

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 = 0.223263 (sec), leaf count = 123

$$\text{Solve}\left[\int_1^{y(x)} -\frac{F\left(K[2]-\frac{x^3}{6}\right)\int_1^x -\frac{K[1]^2 F'\left(K[2]-\frac{K[1]^3}{6}\right)}{2F\left(K[2]-\frac{K[1]^3}{6}\right)^2}dK[1]+1}{F\left(K[2]-\frac{x^3}{6}\right)}dK[2] + \int_1^x \left(\frac{K[1]^2}{2F\left(y(x)-\frac{K[1]^3}{6}\right)} + \sqrt{K[1\right.\right.$$

✓ **Maple** : cpu = 0.098 (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 = 0.200434 (sec), leaf count = 113

$$\text{Solve}\left[\int_1^{y(x)} \left(-\frac{K[2]}{F(-(x-K[2])(x+K[2]))} - \int_1^x -\frac{2K[1]K[2]F'(-(K[1]-K[2])(K[1]+K[2]))}{F(-(K[1]-K[2])(K[1]+K[2]))^2}dK[1]\right)\right.$$

✓ **Maple** : cpu = 0.089 (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 = 0.228083 (sec), leaf count = 245

$$\text{Solve}\left[\int_1^{y(x)} \left(\frac{1}{\left(-F\left(\frac{1-K[2]\log(x)}{K[2]}\right)-1\right)K[2]^2} - \int_1^x \left(\frac{\left(-\frac{\log(K[1])}{K[2]} - \frac{1-K[2]\log(K[1])}{K[2]^2}\right)F'\left(\frac{1-K[2]\log(K[1])}{K[2]}\right)}{\left(F\left(\frac{1-K[2]\log(K[1])}{K[2]}\right)+1\right)K[1]} - \right.\right.\right.$$

✓ **Maple** : cpu = 0.107 (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 = 0.228438 (sec), leaf count = 94

$$\text{Solve}\left[\int_1^{y(x)} \left(-\frac{K[2]}{F(x^2+K[2]^2)} - \int_1^x \frac{2K[1]K[2]F'(K[1]^2+K[2]^2)}{F(K[1]^2+K[2]^2)^2} dK[1] + 1\right) dK[2] + \int_1^x -\frac{K[1}{F(K[1]^2+\right.$$

✓ **Maple** : cpu = 0.105 (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 = 0.470861 (sec), leaf count = 253

$$\text{Solve}\left[\int_1^{y(x)}\left(-\frac{bK[2]}{b+\sqrt{a}F\left(\frac{bx^2+aK[2]^2}{a}\right)}-\int_1^x\left(\frac{2bK[1]K[2]F'\left(\frac{bK[1]^2+aK[2]^2}{a}\right)}{\sqrt{a}\left(b+\sqrt{a}F\left(\frac{bK[1]^2+aK[2]^2}{a}\right)\right)}-\frac{2bF\left(\frac{bK[1]^2+aK[2]^2}{a}\right)K[1}{\left(b+\sqrt{a}F\left(\frac{bK}{}\right.\right.}\right.\right.\right.$$

✓ **Maple** : cpu = 0.141 (sec), leaf count = 108

$$\left\{y(x)=\frac{1}{a}\sqrt{a\left(-bx^2+RootOf\left(\int^{\_Z}\left(F\left(\_a\right)a+b\sqrt{a}\right)^{-1}d\_aba^{\frac{3}{2}}-bx^2+2\_C1\,a\right)a\right)},y(x)=-\frac{1}{a}\sqrt{\right.$$

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 = 0.517571 (sec), leaf count = 241

$$\text{Solve}\left[\int_1^{y(x)}-\frac{F\left(-\frac{2x^3}{5}-2\sqrt{x}+K[2]\right)\int_1^x\left(-\frac{6F'\left(-\frac{2}{5}K[1]^3-2\sqrt{K[1]}+K[2]\right)K[1]^2}{5F\left(-\frac{2}{5}K[1]^3-2\sqrt{K[1]}+K[2]\right)^2}-\frac{F'\left(-\frac{2}{5}K[1]^3-2\sqrt{K[1]}+K[2]\right)}{F\left(-\frac{2}{5}K[1]^3-2\sqrt{K[1]}+K[2]\right)^2\sqrt{K[1}}\right.}{F\left(-\frac{2x^3}{5}-2\sqrt{x}+K[2]\right)}\right.$$

✓ **Maple** : cpu = 0.138 (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

$$y'(x) = \frac{e^x F\left(y(x)^{3/2} - \frac{3e^x}{2}\right)}{\sqrt{y(x)}}$$

✓ **Mathematica** : cpu = 0.359741 (sec), leaf count = 221

$$\text{Solve}\left[\int_1^{y(x)} \left(\frac{\sqrt{K[2]}}{F\left(K[2]^{3/2} - \frac{3e^x}{2}\right) - 1} - \int_1^x \left(\frac{3e^{K[1]}F\left(K[2]^{3/2} - \frac{3e^{K[1]}}{2}\right)\sqrt{K[2]}F'\left(K[2]^{3/2} - \frac{3e^{K[1]}}{2}\right)}{2\left(F\left(K[2]^{3/2} - \frac{3e^{K[1]}}{2}\right) - 1\right)^2} - \frac{3e\right.\right.\right.$$

✓ **Maple** : cpu = 0.247 (sec), leaf count = 35

$$\left\{\int_{\_b}^{y(x)} 1\sqrt{\_a}\left(F\left(\_a^{\frac{3}{2}} - \frac{3\,\mathrm{e}^x}{2}\right) - 1\right)^{-1} \mathrm{d}\_a - \mathrm{e}^x - \_C1 = 0\right\}$$

2.594 ODE No. 594

$$y'(x) = \frac{xF\left(\frac{y(x)^2 - b}{x^2}\right)}{y(x)}$$

✓ **Mathematica** : cpu = 0.339759 (sec), leaf count = 236

$$\text{Solve}\left[\int_1^{y(x)} \left(-\frac{K[2]}{-F\left(\frac{K[2]^2 - b}{x^2}\right)x^2 + K[2]^2 - b} - \int_1^x \left(\frac{F\left(\frac{K[2]^2 - b}{K[1]^2}\right)K[1]\left(2K[2]F'\left(\frac{K[2]^2 - b}{K[1]^2}\right) - 2K[2]\right)}{\left(F\left(\frac{K[2]^2 - b}{K[1]^2}\right)K[1]^2 - K[2]^2 + b\right)^2} - \right.\right.\right.$$

✓ **Maple** : cpu = 0.099 (sec), leaf count = 67

$$\left\{y(x) = \sqrt{\mathit{RootOf}\left(-2\ln(x) + \int^{\_Z} (F(\_a) - \_a)^{-1} d\_a + 2\_C1\right)x^2 + b}, y(x) = -\sqrt{\mathit{RootOf}\left(-2\,\right.}\right.$$

2.595 ODE No. 595

$$y'(x) = \frac{F\left(\frac{xy(x)^2+1}{x}\right)}{x^2 y(x)}$$

✓ **Mathematica** : cpu = 0.305996 (sec), leaf count = 204

$$\text{Solve}\left[\int_1^{y(x)}\left(\frac{K[2]}{2F\left(\frac{xK[2]^2+1}{x}\right)-1}-\int_1^x\left(\frac{4F\left(\frac{K[1]K[2]^2+1}{K[1]}\right)K[2]F'\left(\frac{K[1]K[2]^2+1}{K[1]}\right)}{\left(2F\left(\frac{K[1]K[2]^2+1}{K[1]}\right)-1\right)^2K[1]^2}-\frac{2K[2]F'\left(\frac{K[1]K[2]^2+}{K[1]}\right.}{\left(2F\left(\frac{K[1]K[2]^2+1}{K[1]}\right)-1\right.}\right.\right.\right.$$

✓ **Maple** : cpu = 0.098 (sec), leaf count = 72

$$\left\{y(x)=\frac{1}{x}\sqrt{x\left(RootOf\left(\int^{\_Z}(-1+2\,F\,(\_a))^{-1}\,d\_ax+x\_C1+1\right)x-1\right)}, y(x)=-\frac{1}{x}\sqrt{x\left(RootOf\right.}\right.$$

2.596 ODE No. 596

$$y'(x) = \frac{F(x^2+y(x)-x)-2x^2+x}{x}$$

✓ **Mathematica** : cpu = 0.249787 (sec), leaf count = 156

$$\text{Solve}\left[\int_1^{y(x)}-\frac{F(x^2-x+K[2])\int_1^x\left(\frac{2K[1]F'(K[1]^2-K[1]+K[2])}{F(K[1]^2-K[1]+K[2])^2}-\frac{F'(K[1]^2-K[1]+K[2])}{F(K[1]^2-K[1]+K[2])^2}\right)dK[1]+1}{F\left(x^2-x+K[2]\right)}dK[2]+\int_1^x\left(\right.\right.$$

✓ **Maple** : cpu = 0.072 (sec), leaf count = 26

$$\left\{y(x)=-x^2+RootOf\left(-\ln\left(x\right)+\int^{\_Z}(F(\_a))^{-1}\,d\_a+\_C1\right)+x\right\}$$

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 = 0.38036 (sec), leaf count = 130

$$\text{Solve}\left[\int_1^{y(x)} \left(-\frac{K[2]}{2aF\left(\frac{xK[2]^2-4a}{x}\right)} - \int_1^x \frac{2K[2]F'\left(\frac{K[1]K[2]^2-4a}{K[1]}\right)}{F\left(\frac{K[1]K[2]^2-4a}{K[1]}\right)^2 K[1]^2} dK[1] + 1\right) dK[2] + \int_1^x -\frac{1}{F\left(\frac{K[1]y(x)^2-4a}{K[1]}\right.}\right.$$

✓ **Maple** : cpu = 0.333 (sec), leaf count = 37

$$\left\{-\frac{y(x)}{2\,a} + \frac{1}{8\,a^2}\int^{(y(x))^2-4\,\frac{a}{x}} (F(\_a))^{-1}\,d\_a - \_C1 = 0\right\}$$

2.598 ODE No. 598

$$y'(x) = \frac{F\left(\frac{y(x)}{x}\right) + y(x)}{x-1}$$

✓ **Mathematica** : cpu = 0.168609 (sec), leaf count = 37

$$\text{Solve}\left[\int_1^{\frac{y(x)}{x}} \frac{1}{F(K[1]) + K[1]} dK[1] = c_1 + \log(1-x) - \log(x), y(x)\right]$$

✓ **Maple** : cpu = 0.016 (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 = 0.154238 (sec), leaf count = 95

$$\text{Solve}\left[\int_1^{y(x)} \left(-\frac{K[2]}{F(x^2 + K[2]^2)} - \int_1^x \frac{2K[1]K[2]F'(K[1]^2 + K[2]^2)}{F(K[1]^2 + K[2]^2)^2} dK[1]\right) dK[2] + \int_1^x \left(1 - \frac{K[1]}{F(K[1]^2 +}\right.\right.$$

✓ **Maple** : cpu = 0.07 (sec), leaf count = 57

$$\left\{y(x) = \sqrt{-x^2 + RootOf\left(-2\,x + \int^{\_Z} (F(\_a))^{-1}\,d\_a + 2\_C1\right)}, y(x) = -\sqrt{-x^2 + RootOf\left(-2\,x +\right.}\right.$$

2.600 ODE No. 600

$$y'(x) = \frac{y(x)^2 F\left(\frac{1-2y(x)\log(x)}{y(x)}\right)}{x}$$

✓ **Mathematica** : cpu = 0.261703 (sec), leaf count = 246

$$\text{Solve}\left[\int_1^{y(x)} \left(-\int_1^x \left(\frac{2\left(-\frac{2\log(K[1])}{K[2]} - \frac{1-2K[2]\log(K[1])}{K[2]^2}\right) F'\left(\frac{1-2K[2]\log(K[1])}{K[2]}\right)}{\left(F\left(\frac{1-2K[2]\log(K[1])}{K[2]}\right) + 2\right) K[1]} - \frac{2F\left(\frac{1-2K[2]\log(K[1])}{K[2]}\right)\left(-\frac{2\log(}{K}\right.}{\left(F\left(\frac{1-2}{}\right.\right.}\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.108 (sec), leaf count = 38

$$\left\{\int_{\_b}^{y(x)} \frac{1}{\_a^2}\left(F\left(\frac{-2\_a\ln(x) + 1}{\_a}\right) + 2\right)^{-1} d\_a - \ln(x) - \_C1 = 0\right\}$$

2.601 ODE No. 601

$$y'(x) = \frac{xF(-(x-y(x))(y(x)+x))}{y(x)}$$

✓ **Mathematica** : cpu = 0.241001 (sec), leaf count = 190

$$\text{Solve}\left[\int_1^{y(x)} \left(\frac{K[2]}{F(-(x-K[2])(x+K[2]))-1} - \int_1^x \left(\frac{2F(-(K[1]-K[2])(K[1]+K[2]))K[1]K[2]F'(-(\right.}{(F(-(K[1]-K[2])(K[1]+K[2}\right.\right.$$

✓ **Maple** : cpu = 0.098 (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 = 0.524275 (sec), leaf count = 167

$$\text{Solve}\left[\int_1^{y(x)} \left(-\int_1^x -\frac{2\left(-\frac{K[1]^2-K[2]}{K[1]^2K[2]^2} - \frac{1}{K[1]^2K[2]}\right)F'\left(\frac{K[1]^2-K[2]}{K[1]^2K[2]}\right)}{F\left(\frac{K[1]^2-K[2]}{K[1]^2K[2]}\right)^2 K[1]^3} dK[1] - \frac{1}{F\left(\frac{x^2-K[2]}{x^2K[2]}\right)K[2]^2}\right) dK[2] + \int_1\right.$$

✓ **Maple** : cpu = 0.099 (sec), leaf count = 33

$$\left\{y(x) = \frac{x^2}{RootOf\left(-\ln(x) - \int^{\_Z} (F(\_a))^{-1} d\_a + \_C1\right)x^2 + 1}\right\}$$

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 = 0.311519 (sec), leaf count = 117

$$\text{Solve}\left[\int_1^{y(x)} -\frac{F(K[2] + \log(2x+1)) \int_1^x -\frac{2F'(K[2]+\log(2K[1]+1))}{F(K[2]+\log(2K[1]+1))^2(2K[1]+1)} dK[1] - 1}{F(K[2] + \log(2x+1))} dK[2] + \int_1^x \left(\frac{\quad}{F(\log(2K[1$$

✓ **Maple** : cpu = 0.108 (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 = 0.388309 (sec), leaf count = 143

$$\text{Solve}\left[\int_1^{y(x)} \left(-\int_1^x \frac{\left(\frac{8K[1]}{K[2]} - \frac{2(4K[1]K[2]^2+1)}{K[2]^3}\right) F'\left(\frac{4K[1]K[2]^2+1}{K[2]^2}\right)}{F\left(\frac{4K[1]K[2]^2+1}{K[2]^2}\right)^2} dK[1] + \frac{1}{K[2]^2} + \frac{1}{2F\left(\frac{4xK[2]^2+1}{K[2]^2}\right)K[2]^3}\right) d$$

✓ **Maple** : cpu = 0.109 (sec), leaf count = 30

$$\left\{-\_C1 - (y(x))^{-1} - \frac{\int^{4x+(y(x))^{-2}} (F(\_a))^{-1} d\_a}{4} = 0\right\}$$

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 = 0.448653 (sec), leaf count = 145

$$\text{Solve}\left[\int_1^{y(x)} \left(-\int_1^x \frac{2\left(-\frac{K[1]}{2K[2]} - \frac{1-\frac{1}{2}K[1]K[2]}{K[2]^2}\right) F'\left(\frac{1-\frac{1}{2}K[1]K[2]}{K[2]}\right)}{F\left(\frac{1-\frac{1}{2}K[1]K[2]}{K[2]}\right)^2} dK[1] - \frac{4}{F\left(\frac{1-\frac{1}{2}xK[2]}{K[2]}\right) K[2]^2}\right) dK[2] + \int_1^x$$

✓ **Maple** : cpu = 0.158 (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 = 0.537564 (sec), leaf count = 361

$$\text{Solve}\left[\int_1^{y(x)} -\frac{F\left(K[2] - \frac{1}{2}e^{-x^2}x^2\right) \int_1^x \left(\frac{e^{-K[1]^2} F'\left(K[2]-\frac{1}{2}e^{-K[1]^2}K[1]^2\right) K[1]^3}{F\left(K[2]-\frac{1}{2}e^{-K[1]^2}K[1]^2\right)^2} - \frac{e^{-K[1]^2}\left(e^{K[1]^2}F\left(K[2]-\frac{1}{2}e^{-K[1]^2}K[1]^2\right) +}{F\left(K[2]-\frac{1}{2}e^{-K[1]}\right.}\right.}{F\left(K[2] - \frac{1}{2}e^{-x^2}x^2\right)}\right.$$

✓ **Maple** : cpu = 0.602 (sec), leaf count = 34

$$\left\{y(x) = \frac{x^2 \mathrm{e}^{-x^2}}{2} + RootOf\left(x^2 - 2\int^{\_Z} (F(\_a))^{-1}\, d\_a + 2\_C1\right)\right\}$$

2.607 ODE No. 607

$$y'(x) = \frac{x^3 F\left(\frac{y(x)}{x^2}\right) + 2y(x)}{x}$$

✓ **Mathematica** : cpu = 0.215566 (sec), leaf count = 121

$$\text{Solve}\left[\int_1^{y(x)} -\frac{F\left(\frac{K[2]}{x^2}\right)\int_1^x \left(\frac{2}{F\left(\frac{K[2]}{K[1]^2}\right)K[1]^3} - \frac{2K[2]F'\left(\frac{K[2]}{K[1]^2}\right)}{F\left(\frac{K[2]}{K[1]^2}\right)^2 K[1]^5}\right)dK[1]x^2 + 1}{x^2 F\left(\frac{K[2]}{x^2}\right)}dK[2] + \int_1^x \left(\frac{2y(x)}{F\left(\frac{y(x)}{K[1]^2}\right)K[1]^3} + \right.\right.$$

✓ **Maple** : cpu = 0.075 (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 = 0.414467 (sec), leaf count = 274

$$\text{Solve}\left[\int_1^{y(x)} \left(-\frac{F\left(\frac{x-K[2]}{\sqrt{K[2]}}\right)}{x\sqrt{K[2]}} - \int_1^x -\frac{-\frac{F\left(\frac{K[1]-K[2]}{\sqrt{K[2]}}\right)}{\sqrt{K[2]}} - 2\left(-\frac{K[1]-K[2]}{2K[2]^{3/2}} - \frac{1}{\sqrt{K[2]}}\right)\sqrt{K[2]}F'\left(\frac{K[1]-K[2]}{\sqrt{K[2]}}\right) - 1}{\left(-2\sqrt{K[2]}F\left(\frac{K[1]-K[2]}{\sqrt{K[2]}}\right) + K[1] - K[2]\right)^2}dK\right.\right.$$

✓ **Maple** : cpu = 0.112 (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 = 0.256558 (sec), leaf count = 117

$$\text{Solve}\left[\int_1^{y(x)} -\frac{x^3 + F(x^3K[2]) \int_1^x \left(\frac{3K[1]^5K[2]F'(K[1]^3K[2])}{F(K[1]^3K[2])^2} - \frac{3K[1]^2}{F(K[1]^3K[2])}\right) dK[1]}{F\left(x^3K[2]\right)} dK[2] + \int_1^x \left(1 - \frac{3K[1]^2y}{F\left(K[1]^3y\right.}\right.\right.$$

✓ **Maple** : cpu = 0.121 (sec), leaf count = 22

$$\left\{y(x) = \frac{RootOf\left(x - \int^{\_Z} (F(\_a))^{-1} \, d\_a + \_C1\right)}{x^3}\right\}$$

2.610 ODE No. 610

$$y'(x) = \frac{x^2F\left(\frac{y(x)}{x}\right) + y(x)}{x}$$

✓ **Mathematica** : cpu = 0.0888794 (sec), leaf count = 25

$$\text{Solve}\left[\int_1^{\frac{y(x)}{x}} \frac{1}{F(K[1])} dK[1] = c_1 + x, y(x)\right]$$

✓ **Maple** : cpu = 0.01 (sec), leaf count = 20

$$\left\{y(x) = RootOf\left(x - \int^{\_Z} (F(\_a))^{-1} \, d\_a + \_C1\right) x\right\}$$

2.611 ODE No. 611

$$y'(x) = \frac{F(x(y(x)+x)) - y(x) - 2x}{x}$$

✓ **Mathematica** : cpu = 0.258779 (sec), leaf count = 191

$$\text{Solve}\left[\int_1^{y(x)} -\frac{x + F(x(x+K[2]))\int_1^x \left(\frac{2F'(K[1](K[1]+K[2]))K[1]^2}{F(K[1](K[1]+K[2]))^2} + \frac{(K[2]-F(K[1](K[1]+K[2])))F'(K[1](K[1]+K[2]))K[1]}{F(K[1](K[1]+K[2]))^2}\right.}{F(x(x+K[2]))}\right.$$

✓ **Maple** : cpu = 0.065 (sec), leaf count = 28

$$\left\{y(x) = \frac{-x^2 + RootOf\left(-x + \int^{\_Z} (F(\_a))^{-1} d\_a + \_C1\right)}{x}\right\}$$

2.612 ODE No. 612

$$y'(x) = \frac{1}{2}e^{\frac{x^2}{4}}\left(2F\left(e^{-\frac{x^2}{4}}y(x)\right) + e^{-\frac{x^2}{4}}xy(x)\right)$$

✓ **Mathematica** : cpu = 0.331484 (sec), leaf count = 199

$$\text{Solve}\left[\int_1^{y(x)} -\frac{e^{-\frac{x^2}{4}}\left(e^{\frac{x^2}{4}}F\left(e^{-\frac{x^2}{4}}K[2]\right)\int_1^x \left(\frac{e^{-\frac{1}{4}K[1]^2}K[1]}{2F\left(e^{-\frac{1}{4}K[1]^2}K[2]\right)} - \frac{e^{-\frac{1}{2}K[1]^2}K[1]K[2]F'\left(e^{-\frac{1}{4}K[1]^2}K[2]\right)}{2F\left(e^{-\frac{1}{4}K[1]^2}K[2]\right)^2}\right)dK[1] + 1\right)}{F\left(e^{-\frac{x^2}{4}}K[2]\right)}\right.$$

✓ **Maple** : cpu = 0.101 (sec), leaf count = 27

$$\left\{y(x) = RootOf\left(-x + \int^{\_Z} (F(\_a))^{-1} d\_a + \_C1\right)\left(\mathrm{e}^{-\frac{x^2}{4}}\right)^{-1}\right\}$$

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 = 0.280517 (sec), leaf count = 226

$$\text{Solve}\left[\int_1^{y(x)} -\frac{xF\left(\frac{K[2]-x\log(x)}{x}\right)\int_1^x \left(-\frac{K[2]F'\left(\frac{K[2]-K[1]\log(K[1])}{K[1]}\right)}{F\left(\frac{K[2]-K[1]\log(K[1])}{K[1]}\right)^2 K[1]^3} - \frac{F'\left(\frac{K[2]-K[1]\log(K[1])}{K[1]}\right)}{F\left(\frac{K[2]-K[1]\log(K[1])}{K[1]}\right)^2 K[1]^2} + \frac{1}{F\left(\frac{K[2]-K[1]\log(K[1]}{K[1]}\right.}\right.}{xF\left(\frac{K[2]-x\log(x)}{x}\right)}\right.$$

✓ **Maple** : cpu = 0.078 (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 = 0.358399 (sec), leaf count = 177

$$\text{Solve}\left[\int_1^{y(x)} \left(\frac{K[2]}{(a-1)(a+1)F\left(-\frac{1}{2}a^2x^2 + \frac{x^2}{2} + \frac{K[2]^2}{2}\right)} - \int_1^x \frac{K[1]K[2]F'\left(-\frac{1}{2}a^2K[1]^2 + \frac{K[1]^2}{2} + \frac{K[2]^2}{2}\right)}{F\left(-\frac{1}{2}a^2K[1]^2 + \frac{K[1]^2}{2} + \frac{K[2]^2}{2}\right)^2} dK\right.\right.$$

✓ **Maple** : cpu = 0.332 (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 = 0.269893 (sec), leaf count = 77

$$\text{Solve}\left[\int_1^{y(x)} \left(-\int_1^x \frac{F'(K[1]K[2])}{F(K[1]K[2])^2} dK[1] - \frac{1}{F(xK[2])K[2]} + 1\right) dK[2] + \int_1^x -\frac{1}{F(K[1]y(x))K[1]} dK[1] =\right.$$

✓ **Maple** : cpu = 0.148 (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

$$y'(x) = \frac{F(x(xy(x) - 1)) - 2x^3 y(x) + x^2}{x^4}$$

✓ **Mathematica** : cpu = 0.457044 (sec), leaf count = 177

$$\text{Solve}\left[\int_1^{y(x)} -\frac{x^2 + F(x(xK[2] - 1)) \int_1^x \left(\frac{2K[2]F'(K[1](K[1]K[2]-1))K[1]^3}{F(K[1](K[1]K[2]-1))^2} - \frac{F'(K[1](K[1]K[2]-1))K[1]^2}{F(K[1](K[1]K[2]-1))^2} - \frac{2K[1]}{F(K[1](K[1]K}\right.}{F(x(xK[2] - 1))}\right.$$

✓ **Maple** : cpu = 0.069 (sec), leaf count = 26

$$\left\{y(x) = \frac{RootOf\left(\int^{-Z} (F(\_a))^{-1} d\_ax + x\_C1 + 1\right) + x}{x^2}\right\}$$

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 = 0.968605 (sec), leaf count = 615

$$\text{Solve}\left[\int_1^{y(x)}\left(\frac{9e^{\frac{3x^2}{2}}-F\left(\frac{e^{\frac{3x^2}{2}}(K[2]+3)}{3K[2]}\right)}{3\left(\left(9e^{\frac{3x^2}{2}}-F\left(\frac{e^{\frac{3x^2}{2}}(K[2]+3)}{3K[2]}\right)\right)K[2]+27e^{\frac{3x^2}{2}}\right)}-\int_1^x\left(-\frac{K[2]\left(\frac{e^{\frac{3K[1]^2}{2}}}{3K[2]}-\frac{e^{\frac{3K[1]^2}{2}}(K[2]+3)}{3K[2]^2}\right)}{-9e^{\frac{3K[1]^2}{2}}K[2]+F\left(\frac{e^{\frac{3K[1]^2}{2}}(K}{3K[2}\right.}\right.\right.\right.$$

✓ **Maple** : cpu = 0.207 (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 = 0.248992 (sec), leaf count = 25

$$\left\{\left\{y(x)\to -W\left(-\frac{e^{c_1e^x-1}}{x}\right)-1\right\}\right\}$$

✓ **Maple** : cpu = 0.32 (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 = 0.650789 (sec), leaf count = 330

$$\text{Solve}\left[\int_1^{y(x)}\left(-\frac{8K[2]^3}{F\left(-\frac{1}{3}K[2]^4 - \frac{K[2]^3}{2} - K[2]^2 - K[2] + x\right)} - \frac{9K[2]^2}{F\left(-\frac{1}{3}K[2]^4 - \frac{K[2]^3}{2} - K[2]^2 - K[2] + x\right)}\right.\right.$$

✓ **Maple** : cpu = 0.323 (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 = 0.759274 (sec), leaf count = 210

$$\text{Solve}\left[\int_1^{y(x)}\left(-\frac{2K[2]}{-x^2 + e^{2F(-(x-K[2])(x+K[2]))} + K[2]^2} - \int_1^x\left(\frac{2K[1]\left(-4\exp(2F(-(K[1]-K[2])(K[1]+\right.}{(K[1]^2 - \exp(2F(-(K[1]\right.\right.\right.$$

✓ **Maple** : cpu = 0.143 (sec), leaf count = 37

$$\left\{y(x) = \mathrm{e}^{RootOf\left(-\_Z + \int\left(\mathrm{e}^{\_Z}\right)^2 - 2\,\mathrm{e}^{\_Z}x\left(\mathrm{e}^{2\,F(\_a)} + \_a\right)^{-1}d\_a + \_C1\right)} - x\right\}$$

2.621 ODE No. 621

$$y'(x) = \frac{1}{y(x) + \sqrt{x}}$$

✓ **Mathematica** : cpu = 0.0561221 (sec), leaf count = 445

$$\left\{\left\{y(x) \to \frac{1}{\text{Root}\left[\#1^6\left(16e^{12c_1} + 16x^3\right) - 24\#1^4x^2 + 8\#1^3x^{3/2} + 9\#1^2x - 6\#1\sqrt{x} + 1\&, 1\right]} - \sqrt{x}\right\}, \left\{y\right.\right.$$

✓ **Maple** : cpu = 0.237 (sec), leaf count = 59

$$\left\{y(x) = 1\left(\sqrt{x}\left(\mathit{RootOf}\left(\_Z^{18}\_C1 - 9\,x\_Z^6 - 6\,\sqrt{x}\_Z^3 - 1\right)\right)^3 + 1\right)\left(\mathit{RootOf}\left(\_Z^{18}\_C1 - 9\,x\_Z^6 - 6\right.\right.\right.$$

2.622 ODE No. 622

$$y'(x) = \frac{1}{y(x) + \sqrt{3x+1} + 2}$$

✓ **Mathematica** : cpu = 0.270061 (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 = 0.181 (sec), leaf count = 77

$$\left\{\ln\left(\left(3\,y(x) + 6\right)\sqrt{3\,x+1} + 3\left(y(x)\right)^2 - 6\,x + 12\,y(x) + 10\right) - 6\,\frac{\sqrt{3\,x+1}}{\sqrt{99\,x+33}}\mathit{Artanh}\left(\frac{3\,\sqrt{3\,x+1} + 6\,y(x)}{\sqrt{99\,x+33}}\right.\right.$$

2.623 ODE No. 623

$$y'(x) = \frac{x^2}{x^{3/2} + y(x)}$$

✓ **Mathematica** : cpu = 0.143007 (sec), leaf count = 77

$$\text{Solve}\left[44c_1 + 6\sqrt{33}\tanh^{-1}\left(\frac{7x^{3/2} + 3y(x)}{\sqrt{33}\left(x^{3/2} + y(x)\right)}\right) = 33\left(\log\left(-\frac{3y(x)}{2x^{3/2}} - \frac{3y(x)^2}{2x^3} + 1\right) + 3\log(x)\right), y(x)\right]$$

✓ **Maple** : cpu = 0.227 (sec), leaf count = 49

$$\left\{\ln\left(3\,x^{3/2}y(x)-2\,x^3+3\,(y(x))^2\right)-\frac{2\sqrt{33}}{11}Artanh\left(\frac{\sqrt{33}}{11}\left(x^{\frac{3}{2}}+2\,y(x)\right)x^{-\frac{3}{2}}\right)-\_C1=0\right\}$$

2.624 ODE No. 624

$$y'(x)=\frac{x^{5/3}}{x^{4/3}+y(x)}$$

✓ **Mathematica** : cpu = 28.9272 (sec), leaf count = 9837

✓ **Maple** : cpu = 1.898 (sec), leaf count = 46

$$\left\{y(x)=\frac{1}{2}\left(RootOf\left(\_Z^{192}+12\,x^{4/3}\_Z^{176}+48\,x^{8/3}\_Z^{160}+64\,x^4\_Z^{144}-\_C1\right)\right)^{16}+\frac{1}{2}x^{\frac{4}{3}}\right\}$$

2.625 ODE No. 625

$$y'(x)=\frac{1}{2}ix^2\left(-2\sqrt{6y(x)-x^3}+i\right)$$

✓ **Mathematica** : cpu = 0.295057 (sec), leaf count = 56

$$\left\{\left\{y(x)\to\frac{1}{6}\left(-W\left(ie^{-6c_1-x^3-1}\right)^2-2W\left(ie^{-6c_1-x^3-1}\right)+x^3-1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.161 (sec), leaf count = 55

$$\left\{\ln\left(-x^3+6\,y(x)+1\right)-2\,i\sqrt{-x^3+6\,y\left(x\right)}+2\,i\arctan\left(\sqrt{-x^3+6\,y\left(x\right)}\right)+2\,x^3-\_C1=0\right\}$$

2.626 ODE No. 626

$$y'(x)=\frac{x}{\sqrt{x^2+1}+y(x)}$$

✓ **Mathematica** : cpu = 0.151535 (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 = 0.264 (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 = 0.811084 (sec), leaf count = 25

$$\left\{\left\{y(x)\to\frac{\tan(c_1+\log(x))}{\log(x)\tan(c_1+\log(x))+1}\right\}\right\}$$

✓ **Maple** : cpu = 0.153 (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 = 0.153931 (sec), leaf count = 38

$$\left\{\left\{y(x)\to \frac{1}{432}\left(-486c_1x^2+729{c_1}^2-216c_1+81x^4-72x^2+16\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.158 (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 = 0.838142 (sec), leaf count = 47

$$\left\{\left\{y(x)\to \frac{1}{\sqrt{2}\left(\sqrt{2}\log(x)-\tan\left(\frac{1}{2}\left(\sqrt{2}c_1+2\sqrt{2}\log(x)\right)\right)\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.152 (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 = 0.370277 (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 = 0.247 (sec), leaf count = 98

$$\left\{ y(x) = \frac{1}{e^{-bx}} \mathit{RootOf}\left(-e^{\mathit{RootOf}\left(\left(\tanh\left(\frac{2\_C1\,b - 2\,bx - \_Z}{2\,b}\sqrt{b^2+4\,b}\right)\right)^2 b + 4\left(\tanh\left(1/2\,\frac{\sqrt{b^2+4\,b}(2\_C1\,b-2\,bx-\_Z)}{b}\right)\right)^2 - 4\,e^{\_Z} - b - 4 \right)} \right.\right.$$

2.631 ODE No. 631

$$y'(x) = \frac{1}{2}x^2\left(2\sqrt{x^3-6y(x)}+1\right)$$

✓ **Mathematica** : cpu = 0.174481 (sec), leaf count = 38

$$\left\{\left\{y(x)\to \frac{1}{96}\left(-192c_1x^3-576c_1^2-48c_1-16x^6+8x^3-1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.174 (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 = 0.145545 (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 = 0.214 (sec), leaf count = 54

$$\left\{x - \frac{\sqrt{5}}{5}\mathit{Artanh}\left(\frac{2\,y(x)\sqrt{5}e^{-x}}{5}+\frac{\sqrt{5}}{5}\right)+\frac{\ln\left((y(x))^2\left(e^{-x}\right)^2+y(x)\,e^{-x}-1\right)}{2} - \_C1 = 0\right\}$$

2.633 ODE No. 633

$$y'(x) = \frac{e^{2x/3}}{e^{-2x/3}y(x)+1}$$

✓ **Mathematica** : cpu = 0.159373 (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 = 0.76 (sec), leaf count = 52

$$\left\{y(x) = 1 RootOf\left(-e^{RootOf\left(343-343\left(\tanh\left(1/6\left(4\_C1-4x-3\_Z\right)\sqrt{7}\right)\right)^2+98e^{-Z}\right)}-3+2\_Z+2\_Z^2\right)\left(e^{-\frac{2x}{3}}\right)^{-1}\right.$$

2.634 ODE No. 634

$$y'(x) = \frac{x^5\sqrt{4x^2y(x)+1}+\frac{1}{2}}{x^3}$$

✓ **Mathematica** : cpu = 0.201415 (sec), leaf count = 33

$$\left\{\left\{y(x)\to\frac{-8c_1x^6+16c_1{}^2x^2+x^{10}-4}{16x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.175 (sec), leaf count = 26

$$\left\{\_C1-\frac{1}{x}\sqrt{4x^2y(x)+1}+\frac{x^4}{2}=0\right\}$$

2.635 ODE No. 635

$$y'(x) = \frac{1}{2}x\left(2\sqrt{x^3-6y(x)}+x\right)$$

✓ **Mathematica** : cpu = 0.171741 (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 = 0.143 (sec), leaf count = 22

$$\left\{\_C1-\frac{3x^2}{2}-\sqrt{x^3-6y(x)}=0\right\}$$

2.636 ODE No. 636

$$y'(x) = y(x)\left(x^2 - \log(y(x))\right)$$

✓ **Mathematica** : cpu = 0.0999756 (sec), leaf count = 24

$$\left\{\left\{y(x)\to e^{-2c_1e^{-x}+x^2-2x+2}\right\}\right\}$$

✓ **Maple** : cpu = 0.138 (sec), leaf count = 19

$$\left\{y(x) = {\rm e}^{\frac{\_C1}{{\rm e}^{x}}+x^2-2\,x+2}\right\}$$

2.637 ODE No. 637

$$y'(x) = \frac{e^{-x^2}x}{e^{x^2}y(x)+1}$$

✓ **Mathematica** : cpu = 11.7394 (sec), leaf count = 59

$$\text{Solve}\left[-\frac{1}{4}\log\left(2e^{2x^2}y(x)^2+2e^{x^2}y(x)+1\right)-\frac{1}{2}\tan^{-1}\left(2e^{x^2}y(x)+1\right)+\frac{x^2}{2}=c_1,y(x)\right]$$

✓ **Maple** : cpu = 0.136 (sec), leaf count = 84

$$\left\{y(x) = -\frac{1}{{\rm e}^{x^2}}\tan\left(RootOf\left(2\,x^2+2\,\ln\left(9/2\,\tan\left(\_Z\right)-9/2\right)-\ln\left(\frac{81\left(\tan\left(\_Z\right)\right)^2}{10}+\frac{81}{10}\right)+6\_C1 -\right.\right.\right.$$

2.638 ODE No. 638

$$y'(x) = y(x)(-(\log(x)-\log(\log(y(x)))))$$

✗ **Mathematica** : cpu = 1.68362 (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 = 0.138 (sec), leaf count = 35

$$\left\{\int_{\_b}^{y(x)}\frac{1}{\_a\left(-\ln\left(\ln\left(\_a\right)\right)x+x\ln\left(x\right)+\ln\left(\_a\right)\right)}{d\_a}+\ln\left(x\right)-\_C1=0\right\}$$

2.639 ODE No. 639

$$y'(x) = y(x)(\log(x) - \log(\log(y(x))))^2$$

✗ **Mathematica** : cpu = 0.274732 (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 = 0.185 (sec), leaf count = 48

$$\left\{\int_{\_b}^{y(x)} \frac{1}{\_a\left(-(\ln(\ln(\_a)))^2 x + 2\ln(\ln(\_a))\ln(x)x - x(\ln(x))^2 + \ln(\_a)\right)}\,d\_a + \ln(x) - \_C1 = 0\right\}$$

2.640 ODE No. 640

$$y'(x) = \frac{y(x)}{\log(\log(y(x))) - \log(x) + 1}$$

✗ **Mathematica** : cpu = 2.37359 (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 = 0.27 (sec), leaf count = 47

$$\left\{\int_{\_b}^{y(x)} \frac{-\ln(\ln(\_a)) + \ln(x) - 1}{(\ln(\_a)\ln(x) - \ln(\_a)\ln(\ln(\_a)) + x - \ln(\_a))\_a}\,d\_a - \_C1 = 0\right\}$$

2.641 ODE No. 641

$$y'(x) = \frac{x^4\sqrt{4x^2y(x)+1} + \frac{1}{2}}{x^3}$$

✓ **Mathematica** : cpu = 0.201112 (sec), leaf count = 35

$$\left\{\left\{y(x) \to \frac{-24c_1x^5 + 36c_1{}^2x^2 + 4x^8 - 9}{36x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.159 (sec), leaf count = 26

$$\left\{\_C1 - \frac{1}{x}\sqrt{4\,x^2y(x) + 1} + \frac{2\,x^3}{3} = 0\right\}$$

2.642 ODE No. 642

$$y'(x) = \frac{\left(4ax - y(x)^2\right)^2}{y(x)}$$

✓ **Mathematica** : cpu = 0.16373 (sec), leaf count = 105

$$\left\{\left\{y(x) \to -\sqrt{4ax - \sqrt{2}\sqrt{a}\tanh\left(\frac{2\sqrt{2}ax - \sqrt{2}c_1}{\sqrt{a}}\right)}\right\}, \left\{y(x) \to \sqrt{4ax - \sqrt{2}\sqrt{a}\tanh\left(\frac{2\sqrt{2}ax - \sqrt{2}c\right.}{\sqrt{a}}\right.}\right.\right.$$

✓ **Maple** : cpu = 0.259 (sec), leaf count = 286

$$\left\{y(x) = \sqrt{4}\sqrt{\left(\_C1\left(ax - \frac{\sqrt{2}}{4}\sqrt{a}\right)e^{2x\left(\sqrt{2}\sqrt{a}-2ax\right)} + e^{-2x\left(\sqrt{2}\sqrt{a}+2ax\right)}\left(ax + \frac{\sqrt{2}}{4}\sqrt{a}\right)\right)\left(\_C1\,e^{2x\left(\sqrt{2}\right.}\right.}\right.$$

2.643 ODE No. 643

$$y'(x) = \frac{1}{3}x\left(3x\sqrt{x^2 + 3y(x)} - 2\right)$$

✓ **Mathematica** : cpu = 0.173581 (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 = 0.143 (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 = 0.347422 (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 = 0.324 (sec), leaf count = 27

$$\left\{\_C1 + \frac{4\,a x^3}{3} - \sqrt{a\,(a x^4 + 8\,y\,(x))} = 0\right\}$$

2.645 ODE No. 645

$$y'(x) = y(x)(x - \log(y(x)))$$

✓ **Mathematica** : cpu = 0.0823529 (sec), leaf count = 20

$$\left\{\left\{y(x) \to e^{-e^{c_1 - x} + x - 1}\right\}\right\}$$

✓ **Maple** : cpu = 0.07 (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 = 0.287999 (sec), leaf count = 35

$$\left\{\left\{y(x) \to \frac{1}{6}\left(18 c_1 \log(x+1) - 9 {c_1}^2 + x^3 - 9\log^2(x+1)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.198 (sec), leaf count = 23

$$\left\{\_C1 - 3\,\ln(1 + x) - \sqrt{x^3 - 6\,y\,(x)} = 0\right\}$$

2.647 ODE No. 647

$$y'(x) = \frac{x(ay(x)^2 + bx^2)^2}{a^{5/2}y(x)}$$

✓ **Mathematica** : cpu = 0.36253 (sec), leaf count = 115

$$\left\{\left\{y(x) \to -\sqrt{\frac{\sqrt{b}\tan\left(\frac{a^{3/2}bx^2+2c_1}{a^{9/4}\sqrt{b}}\right)}{\sqrt[4]{a}} - \frac{bx^2}{a}}\right\}, \left\{y(x) \to \sqrt{\frac{\sqrt{b}\tan\left(\frac{a^{3/2}bx^2+2c_1}{a^{9/4}\sqrt{b}}\right)}{\sqrt[4]{a}} - \frac{bx^2}{a}}\right\}\right\}$$

✓ **Maple** : cpu = 0.207 (sec), leaf count = 460

$$\left\{y(x) = \frac{1}{a}\sqrt{-\left(\_C1\,\mathrm{e}^{\frac{x^2}{2}\left(2\sqrt{-\frac{b}{a^{3/2}}}a^{3/2}+bx^2\right)a^{-\frac{3}{2}}} + \mathrm{e}^{\frac{x^2}{2}\left(-2\sqrt{-\frac{b}{a^{3/2}}}a^{3/2}+bx^2\right)a^{-\frac{3}{2}}}\right) a \left(\left(bx^2 - \sqrt{-ba^{-\frac{3}{2}}}a^{\frac{3}{2}}\right)\mathrm{e}^{\frac{x^2}{2}(}\right.}\right.$$

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 = 0.530367 (sec), leaf count = 128

$$\left\{\left\{y(x) \to \frac{1}{72}\left(-96ac_1x^3 + 144ac_1x^2 - 288ac_1x + 288ac_1\log(x+1) + 144ac_1{}^2 - 432ac_1 + 16ax^6 - 48ax\right.\right.\right.$$

✓ **Maple** : cpu = 0.47 (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 = 0.255398 (sec), leaf count = 37

$$\left\{\left\{y(x) \to \frac{1}{8}\left(-16c_1x^2 + 16{c_1}^2 + 4x^4 - x^2 + 2x - 1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.158 (sec), leaf count = 27

$$\left\{\_C1 + 2\,x^2 + \frac{1}{4} - \sqrt{x^2 - 2\,x + 1 + 8\,y\left(x\right)} = 0\right\}$$

2.650 ODE No. 650

$$y'(x) = x\sqrt{a^2 + 2ax + x^2 + 4y(x)} - \frac{a}{2} - \frac{x}{2}$$

✓ **Mathematica** : cpu = 0.396734 (sec), leaf count = 109

$$\text{Solve}\left[-\frac{1}{2}\sqrt{a^2 + 2ax + x^2 + 4y(x)} - \frac{1}{2}a\log\left(\sqrt{a^2 + 2ax + x^2 + 4y(x)} + a + x\right) + \frac{1}{2}a\tanh^{-1}\left(\frac{}{2\sqrt{a^2 + 2}}\right.\right.$$

✓ **Maple** : cpu = 0.182 (sec), leaf count = 28

$$\left\{\_C1 + x^2 + \frac{1}{2} - \sqrt{x^2 + 2\,ax + a^2 + 4\,y\left(x\right)} = 0\right\}$$

2.651 ODE No. 651

$$y'(x) = \frac{y(x)\left(x^2 + \log(y(x))\right)}{x}$$

✓ **Mathematica** : cpu = 0.0999202 (sec), leaf count = 16

$$\left\{\left\{y(x) \to e^{2c_1x + x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.047 (sec), leaf count = 13

$$\left\{y(x) = \mathrm{e}^{x\_C1}\mathrm{e}^{x^2}\right\}$$

2.652 ODE No. 652

$$y'(x) = \frac{x\sqrt{4ax - y(x)^2} + 2a}{y(x)}$$

✓ **Mathematica** : cpu = 1.24277 (sec), leaf count = 101

$$\left\{\left\{y(x) \to -\frac{\sqrt{4096a^5x - 256a^4x^4 + 32a^2e^{c_1}x^2 - e^{2c_1}}}{32a^2}\right\}, \left\{y(x) \to \frac{\sqrt{4096a^5x - 256a^4x^4 + 32a^2e^{c_1}x^2 - e}}{32a^2}\right.$$

✓ **Maple** : cpu = 0.146 (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 = 0.509653 (sec), leaf count = 94

$$\text{Solve}\left[-\frac{1}{2}\sqrt{x^2 + 4y(x) - 4x} + \log\left(-\sqrt{x^2 + 4y(x) - 4x} - x + 2\right) - \tanh^{-1}\left(\frac{2x - 4}{2\sqrt{x^2 + 4y(x) - 4x}}\right) + \frac{x}{2}\right.$$

✓ **Maple** : cpu = 0.132 (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 = 0.307256 (sec), leaf count = 37

$$\left\{\left\{y(x) \to \frac{1}{12}\left(-18c_1\log(x+1) + 9{c_1}^2 - 4x^2 + 9\log^2(x+1)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.182 (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 = 15.2532 (sec), leaf count = 82

$$\text{Solve}\left[\frac{3}{2}\log(y(x)) + \frac{1}{28}\left(-21\log\left(-3y(x)^2 + 2e^{2x/3}y(x) + 2e^{4x/3}\right) + 6\sqrt{7}\tanh^{-1}\left(\frac{y(x)+2e^{2x/3}}{\sqrt{7}y(x)}\right) + 28x\right.\right.$$

✓ **Maple** : cpu = 0.509 (sec), leaf count = 66

$$\left\{x + \frac{3\sqrt{7}}{14}\mathit{Artanh}\left(\frac{3\,y(x)\,\sqrt{7}}{7}\mathrm{e}^{-\frac{2x}{3}} - \frac{\sqrt{7}}{7}\right) - \frac{3}{4}\ln\left(3\,(y(x))^2\left(\mathrm{e}^{-2/3\,x}\right)^2 - 2\,y(x)\,\mathrm{e}^{-2/3\,x} - 2\right) + \frac{3}{2}\ln\left(y(x)\right.\right.$$

2.656 ODE No. 656

$$y'(x) = \frac{y(x)\left(x^3 + \log(y(x))\right)}{x}$$

✓ **Mathematica** : cpu = 0.0979594 (sec), leaf count = 20

$$\left\{\left\{y(x) \to e^{3c_1x + \frac{x^3}{2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.048 (sec), leaf count = 15

$$\left\{y(x) = \mathrm{e}^{\frac{x^3}{2}}\mathrm{e}^{x\_C1}\right\}$$

2.657 ODE No. 657

$$y'(x) = x^2\sqrt{x^2 + 8y(x) - 2x + 1} - \frac{x}{4} + \frac{1}{4}$$

✓ **Mathematica** : cpu = 0.24826 (sec), leaf count = 37

$$\left\{\left\{y(x) \to \frac{1}{72}\left(-96c_1x^3 + 144{c_1}^2 + 16x^6 - 9x^2 + 18x - 9\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.155 (sec), leaf count = 26

$$\left\{\_C1 + \frac{4\,x^3}{3} - \sqrt{x^2 - 2\,x + 1 + 8\,y\,(x)} = 0\right\}$$

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 = 0.419295 (sec), leaf count = 41

$$\left\{\left\{y(x) \to \frac{1}{8}\left(-32c_1 \log(x+1) + 16{c_1}^2 - x^2 + 2x + 16\log^2(x+1) - 1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.232 (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 = 0.688532 (sec), leaf count = 164

$$\text{Solve}\left[-\frac{\sqrt{a^2x^2 + 2abx + 4ay(x) + b^2 - 4c}}{2a} - \frac{b\log\left(\sqrt{a^2x^2 + 2abx + 4ay(x) + b^2 - 4c} + ax + b\right)}{2a} + \frac{b\tan}{}\right.$$

✓ **Maple** : cpu = 0.168 (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 = 0.430836 (sec), leaf count = 109

$$\text{Solve}\left[-\frac{1}{2}\sqrt{a^2 + 2ax + x^2 + 4y(x)} - \frac{1}{2}a\log\left(\sqrt{a^2 + 2ax + x^2 + 4y(x)} + a + x\right) + \frac{1}{2}a\tanh^{-1}\left(\frac{}{2\sqrt{a^2 + 2}}\right.\right.$$

✓ **Maple** : cpu = 0.169 (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 = 0.684571 (sec), leaf count = 164

$$\text{Solve}\left[-\frac{\sqrt{a^2x^2 + 2abx + 4ay(x) + b^2 - 4c}}{2a} - \frac{b\log\left(\sqrt{a^2x^2 + 2abx + 4ay(x) + b^2 - 4c} + ax + b\right)}{2a} + \frac{b\tan}{}\right.$$

✓ **Maple** : cpu = 0.15 (sec), leaf count = 39

$$\left\{\_C1 + \frac{2\,ax^3}{3} - \sqrt{a^2x^2 + 2\,abx + b^2 + 4\,ay\left(x\right) - 4\,c} = 0\right\}$$

2.662 ODE No. 662

$$y'(x) = x^2\sqrt{x^2 - 4y(x) + 2x + 1} + \frac{x}{2} + \frac{1}{2}$$

✓ **Mathematica** : cpu = 0.266385 (sec), leaf count = 37

$$\left\{\left\{y(x) \to \frac{1}{36}\left(24c_1x^3 - 36{c_1}^2 - 4x^6 + 9x^2 + 18x + 9\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.161 (sec), leaf count = 26

$$\left\{\_C1 - \frac{2\,x^3}{3} - \sqrt{x^2 + 2\,x + 1 - 4\,y\left(x\right)} = 0\right\}$$

2.663 ODE No. 663

$$y'(x) = \frac{x^2\sqrt{4ax - y(x)^2} + 2a}{y(x)}$$

✓ **Mathematica** : cpu = 1.5413 (sec), leaf count = 101

$$\left\{\left\{y(x) \to -\frac{\sqrt{147456a^7x - 4096a^6x^6 + 128a^3e^{c_1}x^3 - e^{2c_1}}}{192a^3}\right\}, \left\{y(x) \to \frac{\sqrt{147456a^7x - 4096a^6x^6 + 128a^3}}{192a^3}\right.$$

✓ **Maple** : cpu = 0.135 (sec), leaf count = 27

$$\left\{-\sqrt{-\left(y\left(x\right)\right)^{2}+4\,ax}-\frac{x^{3}}{3}-\_C1=0\right\}$$

2.664 ODE No. 664

$$y'(x)=x^2\sqrt{x^2+4y(x)-4x}-\frac{x}{2}+1$$

✓ **Mathematica** : cpu = 0.554889 (sec), leaf count = 94

$$\text{Solve}\left[\frac{x^3}{3}-\frac{1}{2}\sqrt{x^2+4y(x)-4x}+\log\left(-\sqrt{x^2+4y(x)-4x}-x+2\right)-\tanh^{-1}\left(\frac{2x-4}{2\sqrt{x^2+4y(x)-4x}}\right)\right.$$

✓ **Maple** : cpu = 0.128 (sec), leaf count = 25

$$\left\{\_C1+\frac{2\,x^{3}}{3}-\sqrt{x^{2}-4\,x+4\,y\left(x\right)}=0\right\}$$

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 = 0.449272 (sec), leaf count = 41

$$\left\{\left\{y(x)\to\frac{1}{8}\left(-32ac_1\log(x+1)+16ac_1{}^2-ax^4+16a\log^2(x+1)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.342 (sec), leaf count = 28

$$\left\{-\frac{1}{4}\sqrt{ax^{4}+8\,y\left(x\right)}\frac{1}{\sqrt{a}}+\ln\left(1+x\right)-\_C1=0\right\}$$

2.666 ODE No. 666

$$y'(x) = y(x)\left(x^3 + x^2 - \log(y(x)) + 1\right)$$

✓ **Mathematica** : cpu = 0.13705 (sec), leaf count = 29

$$\left\{\left\{y(x) \to e^{-c_1 e^{-x} + x^3 - 2x^2 + 4x - 3}\right\}\right\}$$

✓ **Maple** : cpu = 0.129 (sec), leaf count = 24

$$\left\{y(x) = e^{\frac{-C1}{e^x} + x^3 - 2x^2 + 4x - 3}\right\}$$

2.667 ODE No. 667

$$y'(x) = \frac{e^{-2bx} y(x)^3}{e^{-bx} y(x) + 1}$$

✓ **Mathematica** : cpu = 0.926587 (sec), leaf count = 90

$$\text{Solve}\left[\frac{\log(y(x))}{b} + \frac{1}{2}\left(-\frac{\log\left(y(x)^2 - be^{bx}\left(e^{bx} + y(x)\right)\right)}{b} + \frac{2\tanh^{-1}\left(\frac{\sqrt{\frac{b}{b+4}}\left(2e^{bx} + y(x)\right)}{y(x)}\right)}{\sqrt{b}\sqrt{b+4}} + 2x\right) = c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.163 (sec), leaf count = 82

$$\left\{bx - bArtanh\left(\left(-2\,y(x)\,e^{-bx} + b\right)\frac{1}{\sqrt{b^2 + 4\,b}}\right)\frac{1}{\sqrt{b^2 + 4\,b}} + \ln\left(y(x)\,e^{-bx}\right) - \frac{\ln\left(-by(x)\,e^{-bx} + (y(x))^2\,(e\right.}{2}\right.$$

2.668 ODE No. 668

$$y'(x) = \frac{e^{-2x} y(x)^3}{e^{-x} y(x) + 1}$$

✓ **Mathematica** : cpu = 0.595035 (sec), leaf count = 78

$$\text{Solve}\left[\log(y(x)) + y(x)^2\left(\frac{x}{y(x)^2} - \frac{\log\left(-y(x)^2 + e^x y(x) + e^{2x}\right)}{2y(x)^2} + \frac{\tanh^{-1}\left(\frac{y(x) + 2e^x}{\sqrt{5}y(x)}\right)}{\sqrt{5}y(x)^2}\right) = c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.549 (sec), leaf count = 58

$$\left\{y(x) = \mathrm{e}^{RootOf\left(2\sqrt{5}Artanh\left(1/5\,\frac{\left(-2\,\mathrm{e}^{-Z}+\mathrm{e}^{x}\right)\sqrt{5}}{\mathrm{e}^{x}}\right)+5\,\ln\left(-(\mathrm{e}^{x})^2-\mathrm{e}^{-Z+x}+(\mathrm{e}^{-Z})^2\right)+10\_C1-10\_Z-10\,x\right)}\right\}$$

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 = 0.653582 (sec), leaf count = 264

$$\left\{\left\{y(x) \to \frac{\left(3e^{3c_1+x} + 2e^{3c_1} - 2e^{3e^x} + 3e^{x+3e^x}\right)^{2/3}}{\sqrt[3]{8e^{3c_1+3e^x} + 4e^{6c_1} + 4e^{6e^x}}}\right\}, \left\{y(x) \to -\frac{\sqrt[3]{-1}\left(3e^{3c_1+x} + 2e^{3c_1} - 2e^{3e^x} + 3e^{x+3e^x}\right)}{\sqrt[3]{8e^{3c_1+3e^x} + 4e^{6c_1} + 4e^{6e^x}}}\right.$$

✓ **Maple** : cpu = 0.142 (sec), leaf count = 72

$$\left\{\_C1 + 1\mathrm{e}^{-\frac{3\,\mathrm{e}^{x}}{2}-\frac{9\,\mathrm{e}^{2\,x}}{8}}\left(2\left(y(x)\right)^{3/2}\mathrm{e}^{x} - 2\,\mathrm{e}^{x} - 3\,\mathrm{e}^{2\,x}\right)\left(\mathrm{e}^{\frac{3\,\mathrm{e}^{x}}{2}-\frac{9\,\mathrm{e}^{2\,x}}{8}}\right)^{-1}\left(2\left(y(x)\right)^{3/2}\mathrm{e}^{x} + 2\,\mathrm{e}^{x} - 3\,\mathrm{e}^{2\,x}\right)^{-1} = 0\right\}$$

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 = 0.494221 (sec), leaf count = 62

$$\left\{\left\{y(x) \to \exp\left(\frac{1}{4}\left(-4\log(a) - W\left(ie^{-4c_1-x^2-1}\right)^2 - 2W\left(ie^{-4c_1-x^2-1}\right) + x^2 - 1\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.25 (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

$$y'(x) = \frac{(xy(x)^2+1)^2}{x^4y(x)}$$

✓ **Mathematica** : cpu = 0.329054 (sec), leaf count = 192

$$\left\{\left\{y(x)\to -\frac{\sqrt{\sqrt{2}e^{\frac{2\sqrt{2}(c_1x+1)}{x}} - \frac{2e^{\frac{2\sqrt{2}(c_1x+1)}{x}}}{x} - \frac{2}{x} - \sqrt{2}}}{\sqrt{2e^{\frac{2\sqrt{2}(c_1x+1)}{x}}+2}}\right\}, \left\{y(x)\to \frac{\sqrt{\sqrt{2}e^{\frac{2\sqrt{2}(c_1x+1)}{x}} - \frac{2e^{\frac{2\sqrt{2}(c_1x+1)}{x}}}{x} - \frac{2}{x} - \sqrt{}}}{\sqrt{2e^{\frac{2\sqrt{2}(c_1x+1)}{x}}+2}}\right.$$

✓ **Maple** : cpu = 0.148 (sec), leaf count = 237

$$\left\{y(x) = -\frac{\sqrt{2}}{2\,x}\sqrt{-\left(\_C1\,\mathrm{e}^{\frac{-1-\sqrt{2}x}{x^2}} + \mathrm{e}^{\frac{-1+\sqrt{2}x}{x^2}}\right)x\left(\_C1\,\left(\sqrt{2}x+2\right)\mathrm{e}^{\frac{-1-\sqrt{2}x}{x^2}} + \left(2-\sqrt{2}x\right)\mathrm{e}^{\frac{-1+\sqrt{2}x}{x^2}}\right)\left(\_C1\,\mathrm{e}\right.}\right.$$

2.672 ODE No. 672

$$y'(x) = \frac{x^2\left(\sqrt{4y(x)^3-9x^4}+3x\right)}{y(x)^2}$$

✓ **Mathematica** : cpu = 2.29389 (sec), leaf count = 4512

$$\text{Solve}\left[\int_1^x\left(-\frac{24\sqrt{4y(x)^3-9K[1]^4}y(x)^9}{(9K[1]^4-4y(x)^3)\,(4y(x)^9-729)} + \frac{16K[1]^2\sqrt{4y(x)^3-9K[1]^4}y(x)^9}{(4K[1]^6+9K[1]^4+16K[1]^3-4y(x)^3+16)\,(4y(x)^9-\right.\right.$$

✓ **Maple** : cpu = 0.149 (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 = 0.309837 (sec), leaf count = 23

$$\left\{\left\{y(x) \to \tan^{-1}\left(\frac{3c_1 + 2x^3}{6x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.314 (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 = 0.607849 (sec), leaf count = 91

$$\text{Solve}\left[-\frac{1}{2}\sqrt{x^2 + 4y(x) - 4x} + \log\left(-\sqrt{x^2 + 4y(x) - 4x} - x + 2\right) - \tanh^{-1}\left(\frac{2x-4}{2\sqrt{x^2 + 4y(x) - 4x}}\right) - \frac{1}{2}\right.$$

✓ **Maple** : cpu = 0.217 (sec), leaf count = 27

$$\left\{\_C1 + 2\ln(1+x) - 1 - \sqrt{x^2 - 4\,x + 4\,y(x)} = 0\right\}$$

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 = 0.327613 (sec), leaf count = 48

$$\left\{\left\{y(x) \to \sqrt{a}x\tanh\left(\frac{1}{6}\sqrt{a}(6c_1 + 2x^3 + 3x^2 + 6e^x x - 6e^x)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.044 (sec), leaf count = 37

$$\left\{y(x) = \tanh\left(\frac{(6\,x-6)\,e^x + 2\,x^3 + 3\,x^2 + 6\_C1}{6}\sqrt{a}\right)x\sqrt{a}\right\}$$

2.676 ODE No. 676

$$y'(x) = \frac{x^6\sqrt{4x^2y(x)+1} + \frac{x}{2} + \frac{1}{2}}{x^3(x+1)}$$

✓ **Mathematica** : cpu = 0.435673 (sec), leaf count = 144

$$\left\{\left\{y(x) \to \frac{-72c_1x^6 + 96c_1x^5 - 144c_1x^4 + 288c_1x^3 + 144c_1{}^2x^2 - 288c_1x^2\log(x+1) + 9x^{10} - 24x^9 + 52x\right.\right.$$

✓ **Maple** : cpu = 0.305 (sec), leaf count = 43

$$\left\{\_C1 + 2\ln(1+x) - \frac{1}{x}\sqrt{4x^2y(x)+1} - 2x + x^2 - \frac{2x^3}{3} + \frac{x^4}{2} = 0\right\}$$

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 = 0.175903 (sec), leaf count = 80

$$\left\{\left\{y(x) \to \sqrt{a}x\tanh\left(\frac{1}{12}(12\sqrt{a}c_1 + 4\sqrt{a}x^3 + 3\sqrt{a}x^2 + 6\sqrt{a}x^2\log(x+1) + 6\sqrt{a}x - 6\sqrt{a}\log(x+1))\right)\right\}$$

✓ **Maple** : cpu = 0.04 (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 = 0.325121 (sec), leaf count = 101

$$\left\{\left\{y(x) \to \frac{1}{24}(24c_1x^3 - 36c_1x^2 + 72c_1x - 72c_1\log(x+1) - 36c_1{}^2 - 4x^6 + 12x^5 - 33x^4 + 40x^3 + 24x^3\log\right.\right.$$

✓ **Maple** : cpu = 0.236 (sec), leaf count = 37

$$\left\{\_C1 - x^3 + \frac{3\,x^2}{2} - 3\,x + 3\,\ln\left(1+x\right) - \frac{1}{2} - \sqrt{x^3 - 6\,y\left(x\right)} = 0\right\}$$

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 = 0.148911 (sec), leaf count = 59

$$\left\{\left\{y(x) \to \frac{x\tan\left(\frac{1}{12}\left(12\sqrt{7}c_1 + 4\sqrt{7}x^3 + 3\sqrt{7}x^2 + 6\sqrt{7}x^2\log(x)\right)\right)}{\sqrt{7}}\right\}\right\}$$

✓ **Maple** : cpu = 0.036 (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 = 0.736331 (sec), leaf count = 89

$$\text{Solve}\left[\frac{1}{2}\left(\sqrt{x^2 - 4y(x) + 2x + 1} + \log\left(\sqrt{x^2 - 4y(x) + 2x + 1} + x + 1\right) - \tanh^{-1}\left(\frac{2x+2}{2\sqrt{x^2 - 4y(x) + 2x}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.23 (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 = 0.203968 (sec), leaf count = 84

$$\left\{\left\{y(x) \to \frac{\sqrt{b}x\tan\left(\frac{1}{12}\left(12\sqrt{a}\sqrt{b}c_1 + 4\sqrt{a}\sqrt{b}x^3 + 9\sqrt{a}\sqrt{b}x^2 - 6\sqrt{a}\sqrt{b}x^2\log(x)\right)\right)}{\sqrt{a}}\right\}\right\}$$

✓ **Maple** : cpu = 0.049 (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 = 0.24987 (sec), leaf count = 39

$$\text{Solve}\left[\frac{y(x)^2e^{-4ay(x)}}{8a} - \frac{e^{-4ay(x)}}{2x} = c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.303 (sec), leaf count = 28

$$\left\{\_C1 + \frac{-x\left(y(x)\right)^2 + 4\,a}{\mathrm{e}^{4\,ay(x)}x} = 0\right\}$$

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 = 1.10817 (sec), leaf count = 84

$$\left\{\left\{y(x) \to \frac{e^{\frac{2x^3}{9}+\frac{x}{3}}}{c_1e^{\frac{x^2}{6}}x\sqrt[3]{x+1}(x(x+1))^{\frac{x^3}{3}} + e^{\frac{x^2}{6}+\frac{1}{18}(4x^2-3x+6)x}x}\right\}\right\}$$

✓ **Maple** : cpu = 0.082 (sec), leaf count = 152

$$\left\{y(x)=\frac{1}{x}(x(1+x))^{-\frac{x^3}{3}}\mathrm{e}^{\frac{2x^3}{9}}\mathrm{e}^{-\frac{x^2}{6}}\mathrm{e}^{\frac{x}{3}}\left((1+x)^{-\frac{x^3}{3}}x^{-\frac{x^3}{3}}\mathrm{e}^{\frac{x}{6}\left(ix^2\pi\,(csgn(ix(1+x)))^3-i(csgn(ix)+csgn(i+ix))x^2\pi\,(csgn(ix(1+\right.}\right.\right.$$

2.684 ODE No. 684

$$y'(x)=\frac{x^2\sqrt{x^2+y(x)^2}+y(x)}{x}$$

✓ **Mathematica** : cpu = 0.107754 (sec), leaf count = 20

$$\left\{\left\{y(x)\to x\sinh\left(\frac{1}{2}\left(2c_1+x^2\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 2.668 (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 = 0.148037 (sec), leaf count = 87

$$\left\{\left\{y(x)\to\frac{x\tan\left(\frac{1}{2}\left(2\sqrt{7}c_1-\sqrt{7}x^2+\sqrt{7}x^2\log(x-1)+\sqrt{7}x^2\log(x+1)-\sqrt{7}\log(1-x)-\sqrt{7}\log(x+\right.\right.}{\sqrt{7}}\right.\right.$$

✓ **Maple** : cpu = 0.058 (sec), leaf count = 48

$$\left\{y(x)=\frac{x\sqrt{7}}{7}\tan\left(\frac{\left(x^2\ln\left((1+x)(x-1)\right)-x^2-\ln\left((1+x)(x-1)\right)+2\_C1+1\right)\sqrt{7}}{2}\right)\right\}$$

2.686 ODE No. 686

$$y'(x) = \frac{e^{2x^2} x y(x)^3}{e^{x^2} y(x) + 1}$$

✓ **Mathematica** : cpu = 11.7191 (sec), leaf count = 68

$$\text{Solve}\left[\log(y(x)) - 2y(x)^2\left(\frac{\log\left(e^{2x^2}y(x)^2 + 2e^{x^2}y(x) + 2\right)}{4y(x)^2} - \frac{\tan^{-1}\left(e^{x^2}y(x) + 1\right)}{2y(x)^2}\right) = c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.098 (sec), leaf count = 85

$$\left\{y(x) = \frac{1}{e^{x^2}}\left(1 - \tan\left(RootOf\left(-2\,x^2 - \ln\left(\frac{81\,(\tan(\_Z))^2}{10} + \frac{81}{10}\right) + 2\,\ln(9/2\,\tan(\_Z) - 9/2) + 6\_\right.\right.\right.\right.$$

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 = 0.155263 (sec), leaf count = 130

$$\left\{\left\{y(x) \to \frac{-x^2(x+1)^{x^2}e^{2c_1+2x} + x(x+1)^{x^2}e^{2c_1+2x} - x^2(x-1)^{x^2} - x(x-1)^{x^2}}{-(x+1)^{x^2}e^{2c_1+2x} + x(x+1)^{x^2}e^{2c_1+2x} - x(x-1)^{x^2} - (x-1)^{x^2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.082 (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 = 0.350856 (sec), leaf count = 82

$$\left\{\left\{y(x)\to x\tan\left(\frac{1}{2}\left(2c_1 - 8e\text{Ei}\left(\frac{2}{x-1}\right) + e^{\frac{x}{x-1}+\frac{1}{x-1}}x^2 + 2e^{\frac{x}{x-1}+\frac{1}{x-1}}x - 3e^{\frac{x}{x-1}+\frac{1}{x-1}}\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.068 (sec), leaf count = 42

$$\left\{y(x) = \tan\left(\frac{x^2+2x-3}{2}e^{\frac{1+x}{x-1}} + 4\,e Ei(1, -2(x-1)^{-1}) + \_C1\right)x\right\}$$

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 = 0.31832 (sec), leaf count = 60

$$\left\{\left\{y(x)\to -\frac{x\left(e^{2c_1+2e^2\text{Ei}(x-1)+2e^{x+1}}-1\right)}{e^{2c_1+2e^2\text{Ei}(x-1)+2e^{x+1}}+1}\right\}\right\}$$

✓ **Maple** : cpu = 0.034 (sec), leaf count = 25

$$\{y(x) = -\tanh\left(e^{1+x} - e^2 Ei(1, 1-x) + \_C1\right)x\}$$

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 = 0.51182 (sec), leaf count = 105

$$\left\{\left\{y(x)\to \frac{1}{72}(-96c_1x^3 + 144c_1x^2 - 288c_1x + 288c_1\log(x+1) + 144c_1{}^2 + 16x^6 - 48x^5 + 132x^4 - 144x^3\right.\right.$$

✓ **Maple** : cpu = 0.263 (sec), leaf count = 40

$$\left\{\_C1 + \frac{4x^3}{3} - 2x^2 + 4x - 4\ln(1+x) - \sqrt{x^2-2x+1+8y(x)} = 0\right\}$$

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 = 0.297619 (sec), leaf count = 21

$$\left\{\left\{y(x) \to \tan^{-1}\left(\frac{2c_1 + x^4}{4x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.474 (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 = 0.103883 (sec), leaf count = 20

$$\left\{\left\{y(x) \to x\sinh\left(\frac{1}{3}(3c_1 + x^3)\right)\right\}\right\}$$

✓ **Maple** : cpu = 2.174 (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 = 0.291336 (sec), leaf count = 146

$$\text{Solve}\left[-\frac{1}{3}(9b+29)^{2/3}\text{RootSum}\left[\#1^3(9b+29)^{2/3} - 9\#1b - 3\#1 + (9b+29)^{2/3}\&, \frac{\log\left(\frac{3e^{-2bx}y(x)+e^{-bx}}{\sqrt[3]{(9b+29)e^{-3bx}}} - \right.}{\#1^2\left(-(9b+29)^{2/3}\right) + }\right.\right.$$

✓ **Maple** : cpu = 0.074 (sec), leaf count = 40

$$\left\{y(x) = \frac{1}{e^{-bx}}RootOf\left(-x - \int^{\_Z} -\left(\_a^3 + \_a^2 - \_a\,b + 1\right)^{-1}d\_a + \_C1\right)\right\}$$

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 = 0.404363 (sec), leaf count = 66

$$\left\{\left\{y(x)\to \frac{-8c_1x^3+4c_1{}^2x^2+8c_1x^2\log(x+1)+4x^4-8x^3\log(x+1)+4x^2\log^2(x+1)-1}{4x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.24 (sec), leaf count = 30

$$\left\{-2\ln(1+x)-\frac{1}{x}\sqrt{4\,x^2y\left(x\right)+1}+2\,x+\_C1=0\right\}$$

2.695 ODE No. 695

$$y'(x) = \frac{x^4+x^3+x^2y(x)^2+xy(x)^2+y(x)\log(x-1)}{x\log(x-1)}$$

✓ **Mathematica** : cpu = 0.206066 (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 = 0.034 (sec), leaf count = 39

$$\{y(x)=\tan\left(-Ei(1,-3\,\ln(x-1))-3\,Ei(1,-2\,\ln(x-1))-2\,Ei(1,-\ln(x-1))+\_C1\right)x\}$$

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 = 0.681949 (sec), leaf count = 51

$$\left\{\left\{y(x)\to \frac{x\tan\left(\sqrt{7}\int_1^x\frac{e^{K[1]+1}K[1]}{\log(K[1]-1)}dK[1]+\sqrt{7}c_1\right)}{\sqrt{7}}\right\}\right\}$$

✓ **Maple** : cpu = 0.044 (sec), leaf count = 32

$$\left\{y(x)=\frac{x\sqrt{7}}{7}\tan\left(\left(\mathrm{e}\int\frac{x\mathrm{e}^x}{\ln(x-1)}\,\mathrm{d}x+\_C1\right)\sqrt{7}\right)\right\}$$

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 = 0.254794 (sec), leaf count = 114

$$\text{Solve}\left[-\frac{35}{3}\text{RootSum}\left[-35\#1^3 + 9\sqrt[3]{35}\#1 - 35\&, \frac{\log\left(\frac{3e^{-4x/3}y(x)+e^{-2x/3}}{\sqrt[3]{35}\sqrt[3]{e^{-2x}}} - \#1\right)}{3\sqrt[3]{35} - 35\#1^2}\&\right] = c_1 + \frac{1}{9}35^{2/3}e^{4x/3}\left(e^{-\right.$$

✓ **Maple** : cpu = 0.076 (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 = 0.254395 (sec), leaf count = 108

$$\text{Solve}\left[-\frac{19}{3}\text{RootSum}\left[-19\#1^3 + 6\sqrt[3]{38}\#1 - 19\&, \frac{\log\left(\frac{3e^{-2x}y(x)+e^{-x}}{\sqrt[3]{38}\sqrt[3]{e^{-3x}}} - \#1\right)}{2\sqrt[3]{38} - 19\#1^2}\&\right] = c_1 + \frac{1}{9}38^{2/3}e^{2x}\left(e^{-3x}\right)^{2/\right.$$

✓ **Maple** : cpu = 0.062 (sec), leaf count = 34

$$\left\{y(x) = \frac{\mathit{RootOf}\left(-x + \int^{\_Z}\left(\_a^3 + \_a^2 - \_a + 1\right)^{-1}d\_a + \_C1\right)}{\mathrm{e}^{-x}}\right\}$$

2.699 ODE No. 699

$$y'(x) = \frac{x\left(3x^2\sqrt{x^2+3y(x)} - 2x - 2\right)}{3(x+1)}$$

✓ **Mathematica** : cpu = 0.328138 (sec), leaf count = 101

$$\left\{\left\{y(x) \to \frac{1}{48}\left(-24c_1x^3 + 36c_1x^2 - 72c_1x + 72c_1\log(x+1) + 36c_1{}^2 + 4x^6 - 12x^5 + 33x^4 - 36x^3 - 24x^3\right.\right.\right.$$

✓ **Maple** : cpu = 0.235 (sec), leaf count = 36

$$\left\{\_C1+\frac{x^{3}}{2}-\frac{3\,x^{2}}{4}-\frac{3\,\ln\left(1+x\right)}{2}+\frac{3\,x}{2}-\sqrt{x^{2}+3\,y\left(x\right)}=0\right\}$$

2.700 ODE No. 700

$$y'(x)=\frac{1}{xy(x)\left(xy(x)^2+x+1\right)}$$

✓ **Mathematica** : cpu = 0.15071 (sec), leaf count = 76

$$\left\{\left\{y(x)\to-\frac{\sqrt{2xW\left(c_1e^{\frac{1}{2x}-\frac{1}{2}}\right)+x-1}}{\sqrt{x}}\right\},\left\{y(x)\to\frac{\sqrt{2xW\left(c_1e^{\frac{1}{2x}-\frac{1}{2}}\right)+x-1}}{\sqrt{x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.09 (sec), leaf count = 62

$$\left\{y(x)=\frac{1}{x}\sqrt{x\left(2\,\mathit{lambertW}\left(1/2\_C1\,\mathrm{e}^{-1/2\,\frac{x-1}{x}}\right)x+x-1\right)},y(x)=-\frac{1}{x}\sqrt{x\left(2\,\mathit{lambertW}\left(1/2\_C1\,\mathrm{e}^{-1/\right.\right.}}$$

2.701 ODE No. 701

$$y'(x)=\frac{x^4+x^4\log(x)-2x^2y(x)-2x^2y(x)\log(x)+y(x)^2+y(x)^2\log(x)+2e^xx-2x-\log(x)-1}{e^x-1}$$

✓ **Mathematica** : cpu = 1.78463 (sec), leaf count = 88

$$\left\{\left\{y(x)\to\frac{\exp\left(\int_1^x\frac{2(\log(K[5])+1)}{-1+e^{K[5]}}dK[5]\right)}{c_1-\int_1^x\frac{\exp\left(\int_1^{K[6]}\frac{2(\log(K[5])+1)}{-1+e^{K[5]}}dK[5]\right)(\log(K[6])+1)}{-1+e^{K[6]}}dK[6]}+x^2+1\right\}\right\}$$

✓ **Maple** : cpu = 4.746 (sec), leaf count = 71

$$\left\{y(x)=1\left(-x^{2}\left(\mathrm{e}^{\int\frac{\ln(x)+1}{\mathrm{e}^{x}-1}\,\mathrm{d}x}\right)^{2}+\_C1\,x^{2}+\left(\mathrm{e}^{\int\frac{\ln(x)+1}{\mathrm{e}^{x}-1}\,\mathrm{d}x}\right)^{2}+\_C1\right)\left(-\left(\mathrm{e}^{\int\frac{\ln(x)+1}{\mathrm{e}^{x}-1}\,\mathrm{d}x}\right)^{2}+\_C1\right)^{-1}\right\}$$

2.702 ODE No. 702

$$y'(x) = \frac{-x^3 + x^3(-\log(x)) - xy(x)^2 + xy(x) - e^x y(x) - xy(x)^2 \log(x)}{x\,(x - e^x)}$$

✓ **Mathematica** : cpu = 2.54025 (sec), leaf count = 37

$$\left\{\left\{y(x) \to x \tan\left(\int_1^x \frac{K[1](\log(K[1]) + 1)}{e^{K[1]} - K[1]} dK[1] + c_1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.057 (sec), leaf count = 35

$$\left\{y(x) = \tan\left(\int \frac{x \ln(x)}{e^x - x}\,dx + \int \frac{x}{e^x - x}\,dx + \_C1\right) x\right\}$$

2.703 ODE No. 703

$$y'(x) = \frac{y(x)\,(x^3 y(x) + x^2 y(x) \log(x) - x^2 - x - x\log(x) + 1)}{(x - 1)x}$$

✓ **Mathematica** : cpu = 0.43904 (sec), leaf count = 101

$$\left\{\left\{y(x) \to -\frac{e^{-\mathrm{Li}_2(x) - x}(1 - x)^{-\log(x)}}{(x - 1)x\left(c_1 - \int_1^x \frac{\exp(-K[1] - \log(1 - K[1])(\log(K[1]) + 1) - \mathrm{Li}_2(K[1]))(K[1]^3 + \log(K[1])K[1]^2)}{(K[1] - 1)K[1]^2} dK[1]\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.178 (sec), leaf count = 44

$$\left\{y(x) = \frac{e^{dilog(x)}}{x e^x (x - 1)}\left(\int -\frac{e^{dilog(x)}(x + \ln(x))}{e^x (x - 1)^2}\,dx + \_C1\right)^{-1}\right\}$$

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 = 9.77776 (sec), leaf count = 66

$$\left\{\left\{y(x) \to \frac{\sqrt{b}x \tan\left(\sqrt{a}\sqrt{b}\int_1^x \frac{2K[1]^3}{K[1]\log(K[1]) - 1} dK[1] + \sqrt{a}\sqrt{b}c_1\right)}{\sqrt{a}}\right\}\right\}$$

✓ **Maple** : cpu = 0.043 (sec), leaf count = 38

$$\left\{y(x)=\frac{x}{a}\tan\left(2\sqrt{ab}\left(\_C1+\int\frac{x^3}{x\ln(x)-1}\,\mathrm{d}x\right)\right)\sqrt{ab}\right\}$$

2.705 ODE No. 705

$$y'(x)=\frac{y(x)\left(x^4+x^3+\log(y(x))+x\right)}{x}$$

✓ **Mathematica** : cpu = 0.14364 (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 = 0.137 (sec), leaf count = 24

$$\left\{y(x)=\mathrm{e}^{\frac{x^4}{3}}\mathrm{e}^{\frac{x^3}{2}}\mathrm{e}^{x\_C1}x^x\right\}$$

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 = 40.2192 (sec), leaf count = 610

$$\text{Solve}\left[\int_1^{y(x)}\left(\frac{-2\log(x)x^2+\log(K[2]-1)x^2-\log(K[2]+1)x^2-8}{2\left(2\log(x)x^2-\log(K[2]-1)x^2+\log(K[2]+1)x^2+K[2]\left(2\log(x)x^2-\log(K[2]-1)x^2+\right.\right.}\right.\right.$$

✓ **Maple** : cpu = 0.464 (sec), leaf count = 65

$$\left\{\int_{\_b}^{y(x)}-\frac{1}{2\_a+2}\left(-\frac{x^2(\_a+1)\ln(\_a-1)}{2}+\frac{x^2(\_a+1)\ln(\_a+1)}{2}+x^2(\_a+1)\ln(x)+4\_a-4\right)\right.$$

2.707 ODE No. 707

$$y'(x)=\frac{1}{16}x(y(x)+1)^2(-\log(y(x)-1)+\log(y(x)+1)+2\log(x))^2$$

✓ **Mathematica** : cpu = 4.95341 (sec), leaf count = 1391

$$\text{Solve}\left[\int_1^x -\frac{}{4\log^2(K[1])K[1]^2+\log^2(y(x)-1)K[1]^2+\log^2(y(x)+1)K[1]^2-4\log(K[1])\log(y(x)-1)K}\right.$$

✓ **Maple** : cpu = 0.368 (sec), leaf count = 105

$$\left\{\int_{\_b}^{y(x)}\frac{1}{4\_a+4}\left(\frac{x^2(\_a+1)(\ln(\_a+1))^2}{4}+\left(-\frac{\ln(\_a-1)}{2}+\ln(x)\right)x^2(\_a+1)\ln(\_a+1)+\frac{x^2(\_}{}\right.\right.$$

2.708 ODE No. 708

$$y'(x)=\frac{(4ax-y(x)^2)^3}{y(x)(4ax-y(x)^2-1)}$$

✓ **Mathematica** : cpu = 0.349485 (sec), leaf count = 89

$$\text{Solve}\left[2a\left(x-\frac{\text{RootSum}\left[-\#1^3+2\#1a-2a\&,\frac{\#1a\log(-\#1+4ax-y(x)^2)-a\log(-\#1+4ax-y(x)^2)}{2a-3\#1^2}\&\right]}{2a}\right)=c_1,y(x)\right.$$

✓ **Maple** : cpu = 13.651 (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 = 2.77764 (sec), leaf count = 217

$$\left\{\left\{y(x) \to -\frac{1}{6}\sqrt{144ax - 24c_1x^3 + 36c_1x^2 - 72c_1x + 72c_1\log(x+1) - 36c_1{}^2 - 4x^6 + 12x^5 - 33x^4 + 36x\right.\right.$$

✓ **Maple** : cpu = 0.227 (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 = 1.18221 (sec), leaf count = 38

$$\left\{\left\{y(x) \to \tan\left(\int_1^x -\frac{2K[5]}{e^{\frac{1}{K[5]}} - \log(K[5])}dK[5] + c_1\right) - x\right\}\right\}$$

✓ **Maple** : cpu = 1.887 (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 = 0.202847 (sec), leaf count = 28

$$\left\{\left\{y(x) \to e^{c_1e^{-x} + e^{-x-1}\text{Ei}(x+1)}\right\}\right\}$$

✓ **Maple** : cpu = 0.105 (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 = 0.481971 (sec), leaf count = 105

$$\left\{\left\{y(x) \to \frac{1}{36}\left(24c_1x^3 - 36c_1x^2 + 72c_1x - 72c_1\log(x+1) - 36c_1{}^2 - 4x^6 + 12x^5 - 33x^4 + 36x^3 + 24x^3\log\right.\right.\right.$$

✓ **Maple** : cpu = 0.274 (sec), leaf count = 38

$$\left\{\_C1 - \frac{2\,x^3}{3} + x^2 - 2\,x + 2\,\ln\left(1+x\right) - \sqrt{x^2 + 2\,x + 1 - 4\,y\left(x\right)} = 0\right\}$$

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 = 0.0862676 (sec), leaf count = 649

$$\left\{\left\{y(x) \to \frac{1}{a^2\text{Root}\left[\#1^6\left(16e^{12c_1} + 16x^3\right) - \frac{24\#1^4x^2}{a^4} + \frac{8\#1^3x^{3/2}}{a^6} + \frac{9\#1^2x}{a^8} - \frac{6\#1\sqrt{x}}{a^{10}} + \frac{1}{a^{12}}\&, 1\right]} - \frac{a\sqrt{x} - a -}{a}\right.\right.$$

✓ **Maple** : cpu = 0.292 (sec), leaf count = 86

$$\left\{y(x) = \frac{1}{2\,a}\left(3\,\tanh\left(\mathit{RootOf}\left(729\,x^3(\tanh\left(\_Z\right))^6\,a^6 - 2187\,x^3(\tanh\left(\_Z\right))^4\,a^6 + 2187\,x^3(\tanh\left(\_Z\right))^2\,a^6\right.\right.\right.\right.$$

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 = 1.43792 (sec), leaf count = 162

$$\left\{\left\{y(x)\to\frac{\exp\left(\int_1^x-\frac{-K[1]^2-\log(K[1])K[1]+e^{K[1]}-\log\left(\frac{1}{K[1]}\right)}{K[1]\left(e^{K[1]}-\log\left(\frac{1}{K[1]}\right)\right)}dK[1]\right)}{c_1-\int_1^x-\frac{\exp\left(\int_1^{K[2]}-\frac{-K[1]^2-\log(K[1])K[1]+e^{K[1]}-\log\left(\frac{1}{K[1]}\right)}{K[1]\left(e^{K[1]}-\log\left(\frac{1}{K[1]}\right)\right)}dK[1]\right)(K[2]^3+\log(K[2])K[2]^2)}{K[2]\left(e^{K[2]}-\log\left(\frac{1}{K[2]}\right)\right)}dK[2]}\right\}\right\}$$

✓ **Maple** : cpu = 0.139 (sec), leaf count = 96

$$\left\{y(x)=1\mathrm{e}^{\int\frac{x\ln(x)+x^2-\mathrm{e}^x+\ln\left(x^{-1}\right)}{\left(-\ln\left(x^{-1}\right)+\mathrm{e}^x\right)x}\,\mathrm{d}x}\left(\int\frac{x(x+\ln(x))}{-\ln\left(x^{-1}\right)+\mathrm{e}^x}\mathrm{e}^{\int\frac{x\ln(x)+x^2-\mathrm{e}^x+\ln\left(x^{-1}\right)}{\left(-\ln\left(x^{-1}\right)+\mathrm{e}^x\right)x}\,\mathrm{d}x}\,\mathrm{d}x+\_C1\right)^{-1}\right\}$$

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 = 0.482392 (sec), leaf count = 104

$$\left\{\left\{y(x)\to\frac{1}{36}\left(-24c_1x^3+36c_1x^2-72c_1x+72c_1\log(x+1)+36c_1{}^2+4x^6-12x^5+33x^4-36x^3-24x^3\right.\right.\right.$$

✓ **Maple** : cpu = 0.227 (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 = 2.72477 (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 = 0.25 (sec), leaf count = 37

$$\left\{\int^{y(x)}_{\_b} \_a^2 \frac{1}{\sqrt{9\,x^4-4\_a^3}}\,d\_a - \ln(1+x) - \_C1 = 0\right\}$$

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 = 0.592844 (sec), leaf count = 106

$$\text{Solve}\left[-\frac{1}{2}\sqrt{a^2+2ax+x^2+4y(x)} - \frac{1}{2}a\log\left(\sqrt{a^2+2ax+x^2+4y(x)}+a+x\right) + \frac{1}{2}a\tanh^{-1}\left(\frac{}{2\sqrt{a^2+2}}\right.\right.$$

✓ **Maple** : cpu = 0.281 (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 = 0.295692 (sec), leaf count = 127

$$\text{Solve}\left[\frac{11}{3}\text{RootSum}\left[11\#1^3+15\sqrt[3]{11}\#1+11\&, \frac{\log\left(\frac{3e^{2x^2}xy(x)+e^{x^2}x}{\sqrt[3]{11}\sqrt[3]{e^{3x^2}x^3}} - \#1\right)}{11\#1^2+5\sqrt[3]{11}}\&\right] = c_1 + \frac{11^{2/3}e^{x^2}x^3}{18\sqrt[3]{e^{3x^2}x^3}}, y(x)\right]$$

✓ **Maple** : cpu = 0.045 (sec), leaf count = 44

$$\left\{y(x) = \frac{-11\,RootOf\left(-5\,x^2+20250\int^{\_Z}(121\_a^3+3375\_a-3375)^{-1}d\_a+6\_C1\right)-15}{45\,e^{x^2}}\right\}$$

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 = 0.37027 (sec), leaf count = 49

$$\left\{\left\{y(x) \to \frac{2^{e^{-x}}x^{e^{-x}-1}}{c_1e^{\text{Ei}(-x)} + 2^{e^{-x}}x^{e^{-x}}}\right\}\right\}$$

✓ **Maple** : cpu = 0.094 (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 = 2.92933 (sec), leaf count = 314

$$\left\{\left\{y(x) \to \sqrt[3]{6c_1x^3 - 9c_1x^2 + 18c_1x - 18c_1\log(x+1) - 9c_1{}^2 - x^6 + 3x^5 - 6x^4 + 9x^3 + 6x^3\log(x+1) -}\right.\right.$$

✓ **Maple** : cpu = 0.166 (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 = 0.104903 (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 = 0.066 (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 = 41.867 (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 = 0.246 (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 = 0.215288 (sec), leaf count = 663

$$\left\{ \left\{ y(x) \to -\frac{\sqrt[3]{-1024a^6{c_1}^3 + 9216a^5c_1x - 432a^2 + \sqrt{4\left(-64a^4{c_1}^2 - 192a^3x\right)^3 + \left(-1024a^6{c_1}^3 + 9216a^5c\right.}}}{12\sqrt[3]{2}a}\right.\right.$$

✓ **Maple** : cpu = 0.056 (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 = 43.1731 (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 = 0.035 (sec), leaf count = 18

$$\left\{y(x) = \left(-lambertW\left(\_C1\, e^{-2}x\right)+\ln(x)-2\right)^{-1}\right\}$$

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 = 0.313836 (sec), leaf count = 19

$$\{\{y(x)\to \tan(c_1+\log(2)\text{li}(x)+x)-x\}\}$$

✓ **Maple** : cpu = 0.707 (sec), leaf count = 25

$$\{y(x) = -x-\tan(\ln(2)\,Ei(1,-\ln(x))+\_C1-x)\}$$

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 = 0.0572307 (sec), leaf count = 625

$$\left\{\left\{y(x)\to \frac{1}{a^2\text{Root}\left[\#1^6\left(16e^{12c_1}+16x^3\right)-\frac{24\#1^4x^2}{a^4}+\frac{8\#1^3x^{3/2}}{a^6}+\frac{9\#1^2x}{a^8}-\frac{6\#1\sqrt{x}}{a^{10}}+\frac{1}{a^{12}}\&,1\right]}-\frac{a\sqrt{x}+bx-}{a}\right.\right.$$

✓ **Maple** : cpu = 0.213 (sec), leaf count = 83

$$\left\{y(x) = \frac{1}{2a}\left(3\tanh\left(RootOf\left(-729x^3(\tanh(\_Z))^6a^6 + 2187x^3(\tanh(\_Z))^4a^6 - 2187x^3(\tanh(\_Z))^2\right.\right.\right.\right.$$

2.727 ODE No. 727

$$y'(x) = \frac{y(x)(y(x) + 2x + 2)}{(x+1)(\log(y(x)) + 2x - 1)}$$

✓ **Mathematica** : cpu = 0.415327 (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 = 0.193 (sec), leaf count = 25

$$\left\{y(x) = e^{-lambertW((\ln(1+x) - \_C1)e^{-2x}) - 2x}\right\}$$

2.728 ODE No. 728

$$y'(x) = \frac{y(x)\left(x^3 + 3y(x)^2\right)}{x\left(6y(x)^2 + x\right)}$$

✓ **Mathematica** : cpu = 0.350217 (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 = 0.25 (sec), leaf count = 50

$$\left\{\left((y(x))^{-2} + 6x^{-1}\right)^{-1} = \frac{x}{54}\left(e^{RootOf\left(x^2 e^{-\_Z} - e^{-\_Z}\ln\left(\frac{(e^{-\_Z}+9)x}{2}\right) + 3\_C1\, e^{-\_Z} + \_Z\, e^{-\_Z} + 9\right)} + 9\right)\right\}$$

2.729 ODE No. 729

$$y'(x) = \frac{(x - y(x))y(x)}{x\,(x - y(x)^3)}$$

✓ **Mathematica** : cpu = 0.28227 (sec), leaf count = 327

$$\left\{\left\{y(x) \to \frac{\sqrt[3]{2}(6c_1 - 6\log(x))}{3\sqrt[3]{\sqrt{4(6c_1 - 6\log(x))^3 + 2916x^2} + 54x}} - \frac{\sqrt[3]{\sqrt{4(6c_1 - 6\log(x))^3 + 2916x^2} + 54x}}{3\sqrt[3]{2}}\right\}, \left\{y(x)\right.\right.$$

✓ **Maple** : cpu = 0.086 (sec), leaf count = 404

$$\left\{y(x) = \frac{1}{6}\left(\left(i\left(-27\,x + 3\sqrt{24\_C1^3 - 72\_C1^2 \ln(x) + 72\_C1\,(\ln(x))^2 - 24\,(\ln(x))^3 + 81\,x^2}\right)^{\frac{2}{3}} + 6\right.\right.\right.$$

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 = 47.2981 (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 = 1.31 (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 = 0.339934 (sec), leaf count = 47

$$\text{Solve}\left[\frac{1}{64}\left(-4y(x)^2 + 4y(x) - 2\log(8y(x)+4) + 3\right) - \frac{1}{4x(2y(x)+1)} = c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.148 (sec), leaf count = 42

$$\left\{y(x) = \frac{\mathrm{e}^{\mathit{RootOf}\left(x\left(\mathrm{e}^{\_Z}\right)^3 - 4x\left(\mathrm{e}^{\_Z}\right)^2 + 8x\_C1\,\mathrm{e}^{\_Z} + 2\_Z\,\mathrm{e}^{\_Z}x + 3\,\mathrm{e}^{\_Z}x + 16\right)}}{2} - \frac{1}{2}\right\}$$

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 = 0.712008 (sec), leaf count = 116

$$\text{Solve}\left[-\frac{1}{2}\sqrt{a^2 + 2ax + x^2 + 4y(x)} - \frac{1}{2}a\log\left(\sqrt{a^2 + 2ax + x^2 + 4y(x)} + a + x\right) + \frac{1}{2}a\tanh^{-1}\left(\frac{}{\sqrt{a^2 + 2a}}\right.\right.$$

✓ **Maple** : cpu = 0.285 (sec), leaf count = 43

$$\left\{\_C1 + \frac{2x^3}{3} - x^2 + 2x - 2\ln(1+x) - \sqrt{x^2 + 2ax + a^2 + 4y(x)} = 0\right\}$$

2.733 ODE No. 733

$$y'(x) = \csc(x)\left(x^4\log(2x) - 2x^2y(x)\log(2x) + y(x)^2\log(2x) - \log(2x) + 2x\sin(x)\right)$$

✓ **Mathematica** : cpu = 12.5361 (sec), leaf count = 73

$$\left\{\left\{y(x) \to \frac{\exp\left(\int_1^x 2\csc(K[5])\log(2K[5])dK[5]\right)}{c_1 - \int_1^x \exp\left(\int_1^{K[6]} 2\csc(K[5])\log(2K[5])dK[5]\right)\csc(K[6])\log(2K[6])dK[6]} + x^2 + 1\right\}\right\}$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(y(x),x) = (2*x*sin(x)-ln(2*x)+ln(2*x)*x^4-2*ln(2*x)*x^2*y(x)+ln(2*x)*y(x)
```

2.734 ODE No. 734

$$y'(x) = \frac{y(x)\left(x^3 - x\log(y(x)) - \log(y(x))\right)}{x+1}$$

✓ **Mathematica** : cpu = 0.232825 (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 = 0.228 (sec), leaf count = 39

$$\left\{ y(x) = \frac{e^{x^2} e^4}{(e^x)^3} e^{\frac{-C1}{e^x}} e^{\frac{Ei(1,-1-x)}{ee^x}} \right\}$$

2.735 ODE No. 735

$$y'(x) = \frac{(2y(x)\log(x) - 1)^3}{x(-y(x) + 2y(x)\log(x) - 1)}$$

✓ **Mathematica** : cpu = 11.5491 (sec), leaf count = 573

$$\text{Solve}\left[\int_1^{y(x)} \left(\frac{2(2\log(x)K[1] - K[1] - 1)}{8\log^3(x)K[1]^3 + 4\log(x)K[1]^3 - 2K[1]^3 - 12\log^2(x)K[1]^2 - 2K[1]^2 + 6\log(x)K[1] - 1} + \right.\right.$$

✓ **Maple** : cpu = 0.066 (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

$$y'(x) = \frac{x^4 - 2x^2 y(x) + 2x^2 + y(x)^2 + 2x - 1}{x+1}$$

✓ **Mathematica** : cpu = 0.209685 (sec), leaf count = 31

$$\left\{\left\{y(x) \to \frac{(x+1)^2}{c_1 - \frac{x^2}{2} - x} + x^2 + 1\right\}\right\}$$

✓ **Maple** : cpu = 0.165 (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 = 0.024763 (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 = 0.089 (sec), leaf count = 29

$$\left\{y(x) = x^2+\frac{1}{2}\mathit{lambertW}\left(-2\,\frac{\mathrm{e}^{4/3\,x^3}\_C1\,\mathrm{e}^{-1}}{\left(\mathrm{e}^{x^2}\right)^2}\right)+\frac{1}{2}\right\}$$

2.738 ODE No. 738

$$y'(x) = \frac{2a}{32a^3-16a^2xy(x)^2+2ax^2y(x)^4-x^2y(x)}$$

✓ **Mathematica** : cpu = 0.484158 (sec), leaf count = 1347

$$\left\{\left\{y(x)\to -\frac{4a+e^{c_1}}{12a}+\frac{\sqrt[3]{4608x^2a^4-128x^3a^3+1152e^{c_1}x^2a^3-96e^{c_1}x^3a^2-432x^3a^2-24e^{2c_1}x^3a-2e^{3c}}}{}\right.\right.$$

✓ **Maple** : cpu = 0.861 (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

$$y'(x)=\frac{2y(x)+1}{x\left(2xy(x)^2+xy(x)-2\right)}$$

✓ **Mathematica** : cpu = 0.287598 (sec), leaf count = 39

$$\text{Solve}\left[\frac{1}{8}(-2y(x)+\log(4y(x)+2)-1)-\frac{1}{2x(2y(x)+1)}=c_1,y(x)\right]$$

✓ **Maple** : cpu = 0.152 (sec), leaf count = 35

$$\left\{y(x)=\frac{e^{\mathit{RootOf}\left(x\left(e^{\_Z}\right)^2+2\_\mathit{C1}\,xe^{\_Z}-\_Z\,xe^{\_Z}-xe^{\_Z}+4\right)}}{2}-\frac{1}{2}\right\}$$

2.740 ODE No. 740

$$y'(x)=\frac{x^4-2x^2y(x)^2+y(x)^4+x}{y(x)}$$

✓ **Mathematica** : cpu = 0.114547 (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 = 0.075 (sec), leaf count = 72

$$\left\{y(x)=\frac{\sqrt{2}}{2\_\mathit{C1}+2\,x}\sqrt{(\_\mathit{C1}+x)\left(2\_\mathit{C1}\,x^2+2\,x^3-1\right)},y(x)=-\frac{\sqrt{2}}{2\_\mathit{C1}+2\,x}\sqrt{(\_\mathit{C1}+x)\left(2\_\mathit{C1}\,x^2\right.}\right.$$

2.741 ODE No. 741

$$y'(x)=\frac{x\left(ay(x)^2+bx^2\right)^3}{a^{5/2}y(x)\left(ay(x)^2+a+bx^2\right)}$$

✓ **Mathematica** : cpu = 2.17816 (sec), leaf count = 175

$$\text{Solve}\left[\frac{1}{2}\left(x^2-a^{3/2}\text{RootSum}\left[\#1^3b^3+3\#1^2ab^2y(x)^2+\#1a^{3/2}b^2+3\#1a^2by(x)^4+a^{5/2}by(x)^2+a^{5/2}b+a\right.\right.\right.$$

✓ **Maple** : cpu = 0.9 (sec), leaf count = 246

$$\left\{\int_{\_b}^{x}\frac{\left(\_a^2b+a(y(x))^2\right)^3\_a}{a^3}\left(b\left((y(x))^2+1\right)a^{\frac{5}{2}}+a^{\frac{3}{2}}b^2\_a^2+\left(\_a^2b+a(y(x))^2\right)^3\right)^{-1}\mathrm{d}\_a+\int^{y(x)}1\Bigg(\Big((-\right.$$

2.742 ODE No. 742

$$y'(x)=-\frac{(-\cos(y(x))+x+1)\cos(y(x))}{(x+1)(x\sin(y(x))-1)}$$

✓ **Mathematica** : cpu = 3.05891 (sec), leaf count = 3913

$$\left\{\left\{y(x)\to-\sec^{-1}\left(\frac{c_1x^3}{x^2-1}+\frac{\log(x+1)x^3}{x^2-1}-\frac{{c_1}^3x^3}{(x^2-1)\left({c_1}^2+2\log(x+1)c_1+\log^2(x+1)+1\right)}-\frac{}{(x^2-\right.\right.\right.$$

✓ **Maple** : cpu = 1.325 (sec), leaf count = 239

$$\left\{y(x)=\arctan\left(\frac{1}{\_C1^2-2\_C1\,\ln(1+x)+(\ln(1+x))^2+1}\left((-\_C1+\ln(1+x))\sqrt{(\ln(1+x))^2-2}\right.\right.\right.$$

2.743 ODE No. 743

$$y'(x)=-\frac{i(x^4+8x^2y(x)^2+16y(x)^4+8ix)}{32y(x)}$$

✗ **Mathematica** : cpu = 45.9889 (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 = 0.322 (sec), leaf count = 296

$$\left\{y(x)=\sqrt{2}\sqrt{\left(\mathrm{Ai}\left(\frac{\left(-\sqrt{3}+i\right)x}{2}\right)\_C1+\mathrm{Bi}\left(\frac{\left(-\sqrt{3}+i\right)x}{2}\right)\right)\left(\left(i\sqrt{3}+1\right)\_C1\,\mathrm{Ai}^{(1)}\left(\frac{\left(-\sqrt{3}+i\right)x}{2}\right.\right.}\right.$$

2.744 ODE No. 744

$$y'(x) = \frac{x}{x^4 + 2x^2 y(x)^2 + y(x)^4 - y(x)}$$

✓ **Mathematica** : cpu = 0.162603 (sec), leaf count = 510

$$\left\{\left\{y(x) \to \frac{\sqrt[3]{144c_1x^2 + \sqrt{4\left(12x^2 - 4c_1{}^2\right)^3 + \left(144c_1x^2 + 16c_1{}^3 - 108\right)^2} + 16c_1{}^3 - 108}}{6\sqrt[3]{2}} - \frac{}{3\ 2^{2/3}\sqrt[3]{144c_1x}}\right.\right.$$

✓ **Maple** : cpu = 0.144 (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 = 11.4691 (sec), leaf count = 546

$$\text{Solve}\left[\int_1^{y(x)}\left(\frac{\log(x)K[1] - K[1] - 1}{\log^3(x)K[1]^3 + \log(x)K[1]^3 - K[1]^3 - 3\log^2(x)K[1]^2 - K[1]^2 + 3\log(x)K[1] - 1} + \text{RootS}\right.\right.$$

✓ **Maple** : cpu = 0.047 (sec), leaf count = 78

$$\left\{y(x) = \frac{47\,RootOf\left(-27783\int^{\_Z}\left(2209\_a^3 - 9261\_a + 9261\right)^{-1}d\_a - 7\ln(x) + 3\_C1\right)}{(47\ln(x) - 47)\,RootOf\left(-27783\int^{\_Z}\left(2209\_a^3 - 9261\_a + 9261\right)^{-1}d\_a - 7\ln(x) + 3\_C1\right)}\right.$$

2.746 ODE No. 746

$$y'(x) = -\frac{i(x^4 + 2x^2y(x)^2 + y(x)^4 + ix)}{y(x)}$$

✗ **Mathematica** : cpu = 44.9473 (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 = 0.267 (sec), leaf count = 232

$$\left\{ y(x) = \frac{\sqrt{2}}{2\,\mathrm{Ai}\left(-\sqrt[3]{-8}\,ix\right)\_C1 + 2\,\mathrm{Bi}\left(-\sqrt[3]{-8}\,ix\right)} \sqrt{\left(\mathrm{Ai}\left(-\sqrt[3]{-8}\,ix\right)\_C1 + \mathrm{Bi}\left(-\sqrt[3]{-8}\,ix\right)\right)\left(\left(i\sqrt{3}+1\right)\right.}\right.$$

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 = 2.91138 (sec), leaf count = 88

$$\left\{\left\{y(x) \to \frac{\exp\left(\int_1^x \frac{-\cot(K[1])K[1]\log(2K[1])-1}{K[1]}dK[1]\right)}{c_1 - \int_1^x \exp\left(\int_1^{K[2]} \frac{-\cot(K[1])K[1]\log(2K[1])-1}{K[1]}dK[1]\right)\cot(K[2])K[2]\log(2K[2])dK[2]}\right\}\right\}$$

✓ **Maple** : cpu = 0.283 (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 = 0.292097 (sec), leaf count = 285

$$\left\{\left\{y(x) \to \frac{2\sqrt[3]{2}(c_1+\log(x))}{\sqrt[3]{\sqrt{2916x^2 - 864(c_1+\log(x))^3} + 54x}} + \frac{\sqrt[3]{\sqrt{2916x^2 - 864(c_1+\log(x))^3} + 54x}}{3\sqrt[3]{2}}\right\}, \left\{y(x) \right.\right.$$

✓ **Maple** : cpu = 0.082 (sec), leaf count = 404

$$\left\{y(x) = \frac{1}{6}\left(\left(i\left(27\,x + 3\sqrt{-24\_C1^3 - 72\_C1^2\ln(x) - 72\_C1\,(\ln(x))^2 - 24\,(\ln(x))^3 + 81\,x^2}\right)^{\frac{2}{3}} - 6\right.\right.\right.$$

2.749 ODE No. 749

$$y'(x) = \frac{x(x-y(x))^2(y(x)+x)^2}{y(x)}$$

✓ **Mathematica** : cpu = 0.153221 (sec), leaf count = 126

$$\left\{\left\{y(x)\to -\frac{\sqrt{x^2e^{4c_1+2x^2}-e^{4c_1+2x^2}+x^2+1}}{\sqrt{e^{4c_1+2x^2}+1}}\right\},\left\{y(x)\to \frac{\sqrt{x^2e^{4c_1+2x^2}-e^{4c_1+2x^2}+x^2+1}}{\sqrt{e^{4c_1+2x^2}+1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.095 (sec), leaf count = 192

$$\left\{y(x) = 1\sqrt{\left(\left(x^2+1\right)\mathrm{e}^{-\frac{x^2\left(x^2+2\right)}{2}} + \_C1\,\left(x^2-1\right)\mathrm{e}^{-\frac{x^2\left(x^2-2\right)}{2}}\right)\left(\_C1\,\mathrm{e}^{-\frac{x^2\left(x^2-2\right)}{2}} + \mathrm{e}^{-\frac{x^2\left(x^2+2\right)}{2}}\right)\left(\_C1\,\mathrm{e}^{-\frac{x^2}{}}\right.}\right.$$

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 = 0.32049 (sec), leaf count = 72

$$\left\{\left\{y(x)\to -\frac{\sqrt{x}\sqrt{W\left(\frac{6e^{2c_1+2x}}{x}\right)}}{\sqrt{6}}\right\},\left\{y(x)\to \frac{\sqrt{x}\sqrt{W\left(\frac{6e^{2c_1+2x}}{x}\right)}}{\sqrt{6}}\right\}\right\}$$

✓ **Maple** : cpu = 0.198 (sec), leaf count = 49

$$\left\{\left((y(x))^{-2} + 6\,x^{-1}\right)^{-1} = \frac{x}{54}\left(\mathrm{e}^{RootOf\left(-\mathrm{e}^{\_Z}\ln\left(\frac{\left(\mathrm{e}^{\_Z}+9\right)x}{2}\right)+3\_C1\,\mathrm{e}^{\_Z}+\_Z\,\mathrm{e}^{\_Z}+2\,x\mathrm{e}^{\_Z}+9\right)} + 9\right)\right\}$$

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 = 0.167444 (sec), leaf count = 30

$$\left\{\left\{y(x) \to (x+1)^x e^{c_1 x + \frac{x^3}{2} - x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.069 (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 = 28.6556 (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 = 1.096 (sec), leaf count = 723

$$\left\{y(x) = \arctan\left(\frac{1}{36\,(\ln(1+x))^2 + (-24\,x^3 + 36\,x^2 - 72\,\_C1 - 72\,x)\ln(1+x) + 4\,x^6 - 12\,x^5 + 33\,x^4 +\right.\right.$$

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 = 0.167611 (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 = 0.102 (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 = 0.109114 (sec), leaf count = 47

$$\text{Solve}\left[\text{RootSum}\left[\#1^3 + \#1^2 + 1\&, \frac{\log\left(\frac{y(x)}{x} - \#1\right)}{3\#1^2 + 2\#1}\&\right] = c_1 + x, y(x)\right]$$

✓ **Maple** : cpu = 0.011 (sec), leaf count = 26

$$\left\{y(x) = \mathit{RootOf}\left(-\int^{\_Z}\left(\_a^3 + \_a^2 + 1\right)^{-1} d\_a + x + \_C1\right)x\right\}$$

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 = 0.277235 (sec), leaf count = 2633

$$\left\{\left\{y(x) \to \frac{2}{3}\left(x + e^{c_1} + 2e^{2c_1}\right) - \frac{1}{3}\sqrt[3]{x^3 + 3e^{c_1}x^2 - 12e^{2c_1}x^2 + 3e^{2c_1}x + 12e^{3c_1}x + 48e^{4c_1}x + e^{3c_1} - 30e^{4c_1}}\right.\right.$$

✓ **Maple** : cpu = 0.093 (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

$$y'(x) = \frac{x^6 + 2x^3y(x) + x^2y(x)^2 + y(x)^3}{x^4}$$

✓ **Mathematica** : cpu = 0.154634 (sec), leaf count = 95

$$\text{Solve}\left[-\frac{29}{3}\text{RootSum}\left[-29\#1^3 + 3\sqrt[3]{29}\#1 - 29\&, \frac{\log\left(\frac{\frac{3y(x)}{x^4} + \frac{1}{x^2}}{\sqrt[3]{29}\sqrt[3]{\frac{1}{x^6}}} - \#1\right)}{\sqrt[3]{29} - 29\#1^2}\&\right] = c_1 + \frac{1}{9}29^{2/3}\left(\frac{1}{x^6}\right)^{2/3}x^5, y(\right.$$

✓ **Maple** : cpu = 0.022 (sec), leaf count = 37

$$\left\{y(x)=\frac{\left(-3+29\,RootOf\left(-81\int^{\_Z}\left(841\_a^3-27\_a+27\right)^{-1}d\_a+x+3\_C1\right)\right)x^2}{9}\right\}$$

2.757 ODE No. 757

$$y'(x)=\frac{x^3+2x^2-4xy(x)-4x-8}{2x^2-8y(x)+4x-8}$$

✓ **Mathematica** : cpu = 0.022504 (sec), leaf count = 36

$$\left\{\left\{y(x)\to 2\left(W\left(-e^{c_1-\frac{x}{4}-1}\right)+1\right)+\frac{1}{4}\left(x^2+2x-4\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.044 (sec), leaf count = 26

$$\left\{y(x)=\frac{x^2}{4}+2\,lambertW\left(1/2\_C1\,\mathrm{e}^{-x/4}\mathrm{e}^{-1/2}\right)+\frac{x}{2}+1\right\}$$

2.758 ODE No. 758

$$y'(x)=\frac{y(x)\left(x^3y(x)+2x+2\right)}{(x+1)(\log(y(x))+2x-1)}$$

✓ **Mathematica** : cpu = 0.768166 (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 = 0.165 (sec), leaf count = 41

$$\left\{y(x)=\mathrm{e}^{-lambertW\left(-\frac{\left(-2x^3+3x^2+6\ln(1+x)+6\_C1-6x\right)\mathrm{e}^{-2x}}{6}\right)-2x}\right\}$$

2.759 ODE No. 759

$$y'(x) = -\frac{ix(x^8 + 18x^4y(x)^2 + 54ix^2 + 81y(x)^4)}{243y(x)}$$

✗ **Mathematica** : cpu = 40.6015 (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 = 0.384 (sec), leaf count = 305

$$\left\{ y(x) = -\frac{\sqrt{3}}{3\,x}\sqrt{\left(J_{\frac{1}{3}}\left(\left(\frac{2}{27}-\frac{2\,i}{27}\right)\sqrt{6}x^3\right)\_C1 + Y_{\frac{1}{3}}\left(\left(\frac{2}{27}-\frac{2\,i}{27}\right)\sqrt{6}x^3\right)\right)\left(-9\,\left(1/27\,x^6+i\right)\_C1\,J_{1/}\right.}\right.$$

2.760 ODE No. 760

$$y'(x) = \frac{(xy(x)^2+1)^3}{x^4y(x)\,(xy(x)^2+x+1)}$$

✓ **Mathematica** : cpu = 0.992347 (sec), leaf count = 112

$$\text{Solve}\left[2\left(\frac{1}{10}\log\left(2x^2y(x)^4+2x^2y(x)^2+x^2+4xy(x)^2+2x+2\right)-\frac{1}{5}\log\left(xy(x)^2-x+1\right)-\frac{1}{10}\tan^{-1}\left(2x\right.\right.\right.$$

✓ **Maple** : cpu = 0.785 (sec), leaf count = 136

$$\left\{ -\frac{(1+y(x))\left(2\,(y(x))^4+2\,(y(x))^2+1\right)(-1+y(x))\left(\ln\left(2\,x^2(y(x))^4+\left(2\,x^2+4\,x\right)(y(x))^2+x^2+2\,x+\right.\right.}{5\,x}\right.$$

2.761 ODE No. 761

$$y'(x) = \frac{-x^3+4x^2-4xy(x)-4x+8}{2x^2+8y(x)-8x+8}$$

✓ **Mathematica** : cpu = 0.0222225 (sec), leaf count = 33

$$\left\{\left\{y(x)\to W\left(-e^{c_1-x-1}\right)+\frac{1}{4}\left(-x^2+4x-4\right)+1\right\}\right\}$$

✓ **Maple** : cpu = 0.04 (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 = 0.170417 (sec), leaf count = 26

$$\left\{\left\{y(x) \to (x+1)^{-1/x} e^{1-\frac{c_1}{x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.086 (sec), leaf count = 22

$$\left\{y(x) = \frac{\mathrm{e}}{\sqrt[x]{1+x}} \mathrm{e}^{-\frac{\_C1}{x}}\right\}$$

2.763 ODE No. 763

$$y'(x) = \frac{y(x)(x\log(y(x)) + \log(y(x)) + x)}{x(x+1)}$$

✓ **Mathematica** : cpu = 0.151148 (sec), leaf count = 22

$$\{\{y(x) \to x^x (x+1)^{-x} e^{c_1 x}\}\}$$

✓ **Maple** : cpu = 0.078 (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 = 0.192848 (sec), leaf count = 50

$$\left\{\left\{y(x) \to (x+1)^{\frac{1}{x}} e^{-\frac{c_1}{x} + \frac{x^3}{4} - \frac{x^2}{3} + \frac{x}{2} - \frac{25}{12x} - 1}\right\}\right\}$$

✓ **Maple** : cpu = 0.08 (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 = 0.342323 (sec), leaf count = 138

$$\left\{\left\{y(x) \to \frac{\exp\left(-\text{Li}_2(1-x) + \text{Li}_2(-x) - \frac{1}{2}\log^2(x) + \log(x+1)\log(x) - \log\left(x - \frac{1}{x}\right)\log(\right.}{x\left(c_1 - \int_1^x \frac{\exp\left(-\frac{1}{2}\log^2(K[1]) + \log(K[1]+1)\log(K[1]) - \log\left(K[1] - \frac{1}{K[1]}\right)\log(K[1]) - \text{Li}_2(1-K[1]) + \text{Li}_2(-K[1])\right)\log\left(\frac{(K[1]-}{}\right.}{K[1]}\right.}\right.\right.$$

✓ **Maple** : cpu = 0.139 (sec), leaf count = 106

$$\left\{y(x) = \frac{e^{dilog(1+x)}x^{\ln(1+x)}}{xe^{dilog(x)}}e^{-\frac{(\ln(x))^2}{2}}\left(\int -\frac{e^{dilog(1+x)}x^{\ln(1+x)}}{xe^{dilog(x)}}e^{-\frac{(\ln(x))^2}{2}}\ln\left(\frac{(1+x)(x-1)}{x}\right)\left(x^{\ln\left(\frac{(1+x)(x-1)}{x}\right)}\right)^{-}\right.\right.$$

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 = 0.306374 (sec), leaf count = 129

$$\left\{\left\{y(x) \to \frac{\exp\left(\int_1^x \frac{-\log(K[1]) - K[1]\log\left(\frac{(K[1]-1)(K[1]+1)}{K[1]}\right)}{K[1]\log(K[1])}dK[1]\right)}{c_1 - \int_1^x \frac{\exp\left(\int_1^{K[2]} \frac{-\log(K[1]) - K[1]\log\left(\frac{(K[1]-1)(K[1]+1)}{K[1]}\right)}{K[1]\log(K[1])}dK[1]\right)K[2]\log\left(\frac{(K[2]-1)(K[2]+1)}{K[2]}\right)}{\log(K[2])}dK[2]}\right\}\right\}$$

✓ **Maple** : cpu = 0.109 (sec), leaf count = 89

$$\left\{y(x) = 1e^{\int \frac{1}{x\ln(x)}\left(-x\ln\left(\frac{(1+x)(x-1)}{x}\right) - \ln(x)\right)dx}\left(\int -\frac{x}{\ln(x)}e^{\int \frac{1}{x\ln(x)}\left(-x\ln\left(\frac{(1+x)(x-1)}{x}\right) - \ln(x)\right)dx}\ln\left(\frac{(1+x)(x-1)}{x}\right)\right.\right.$$

2.767 ODE No. 767

$$y'(x) = \frac{-x^3 + 2x^2 - 8xy(x) - 8x + 32}{4x^2 + 32y(x) - 8x + 32}$$

✓ **Mathematica** : cpu = 0.0238803 (sec), leaf count = 38

$$\left\{\left\{y(x) \to 4\left(W\left(-e^{c_1 - \frac{x}{16} - 1}\right) + 1\right) + \frac{1}{8}\left(-x^2 + 2x - 8\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.044 (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 = 1.05264 (sec), leaf count = 66

$$\text{Solve}\left[\frac{2^{2/3}\left(xy(x)\left(-\log\left(\frac{xy(x)}{(x-1)y(x)-1}\right) + \log\left(\frac{y(x)+1}{-xy(x)+y(x)+1}\right) + \log(x) + 1\right) - 1\right)}{9xy(x)} = c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.059 (sec), leaf count = 26

$$\left\{y(x) = -\left(x\,\mathit{lambertW}\left(\frac{1}{x\mathrm{e}^{x^{-1}}\_C1}\right) + 1\right)^{-1}\right\}$$

2.769 ODE No. 769

$$y'(x) = -\frac{ix(x^8 + 8x^4y(x)^2 + 16ix^2 + 16y(x)^4)}{32y(x)}$$

✗ **Mathematica** : cpu = 42.1802 (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 = 0.296 (sec), leaf count = 251

$$\left\{y(x) = -\frac{\sqrt{4}}{2\,x}\sqrt{\left(J_{\frac{1}{3}}\left(\left(\frac{1}{3} - \frac{i}{3}\right)x^3\right)\_C1 + Y_{\frac{1}{3}}\left(\left(\frac{1}{3} - \frac{i}{3}\right)x^3\right)\right)\left(-2\,\left(1/8\,x^6 + i\right)\_C1\,J_{1/3}\left((1/3 - i/3\right.\right.}\right.$$

2.770 ODE No. 770

$$y'(x) = \frac{2y(x)^6}{32x^2y(x)^4 + y(x)^3 + 16xy(x)^2 + 2}$$

✓ **Mathematica** : cpu = 0.21323 (sec), leaf count = 705

$$\left\{\left\{y(x) \to \frac{\sqrt[3]{18432c_1{}^2x^2 + \sqrt{4\left(192c_1{}^2x - 12c_1 - 256x^2\right)^3 + \left(18432c_1{}^2x^2 - 2880c_1x + 8192x^3 + 108\right)^2} \cdots}}{3\sqrt[3]{2}(1 - 16c_1x)} \cdots\right.\right.$$

✓ **Maple** : cpu = 0.105 (sec), leaf count = 1105

$$\left\{y(x) = \frac{1}{96\,x + 6\_C1}\left(32\_C1\,x\sqrt[3]{96\,\left(\_C1/16 + x\right)\sqrt{3}\sqrt{\left(4096\,x^3 + 27\right)\_C1^4 + 576\,x\_C1^3 + 2048\,\_\cdots}}\right.\right.$$

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 = 0.0302527 (sec), leaf count = 46

$$\left\{\left\{y(x) \to \frac{1}{4}\left(-ax^2 - 2bx - 4\right) - \frac{2\left(W\left(-e^{-\frac{b^2x}{4}+c_1-1}\right) + 1\right)}{b}\right\}\right\}$$

✓ **Maple** : cpu = 0.076 (sec), leaf count = 84

$$\left\{y(x) = \frac{1}{4\,b}\left(-ax^2b - 2\,b^2x - 4\,b + 4\,\mathrm{e}^{1/4\,\frac{1}{a}\left(-4\,lambertW\left(-1/2\,\mathrm{e}^{-1/4\,b^2x}\mathrm{e}^{-1/2\,\frac{\_C1\,b^2}{a}}\mathrm{e}^{-b/2}\mathrm{e}^{-1}\right)a + \left(-b^2x - 2\,b - 4\right)a - 2\_C1\,\cdots}\right.\right.$$

2.772 ODE No. 772

$$y'(x) = \frac{y(x)\log(y(x))(x\log(y(x)) + x + 1)}{x(x+1)}$$

✓ **Mathematica** : cpu = 0.155289 (sec), leaf count = 21

$$\left\{\left\{y(x) \to e^{\frac{x}{c_1 - x + \log(x+1)}}\right\}\right\}$$

✓ **Maple** : cpu = 0.073 (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 = 0.162875 (sec), leaf count = 61

$$\text{Solve}\left[\frac{1}{2}\log\left(\frac{y(x)^2}{x^2} + \frac{y(x)}{x} + 1\right) + \frac{\tan^{-1}\left(\frac{\frac{2y(x)}{x}+1}{\sqrt{3}}\right)}{\sqrt{3}} = c_1 + \log(1-x) - \log(x), y(x)\right]$$

✓ **Maple** : cpu = 0.159 (sec), leaf count = 48

$$\left\{y(x) = -\frac{x}{2} + \frac{\sqrt{3}x}{2}\tan\left(\mathit{RootOf}\left(-\sqrt{3}\ln\left(\frac{3\,x^2\left((\tan(\_Z))^2 + 1\right)}{4\,(x-1)^2}\right) + 2\sqrt{3}\_C1 - 2\_Z\right)\right)\right\}$$

2.774 ODE No. 774

$$y'(x) = \frac{-2ax^2 - x^3 - 4xy(x) - 4x + 8}{4ax + 2x^2 + 8y(x) + 8}$$

✓ **Mathematica** : cpu = 0.0262517 (sec), leaf count = 45

$$\left\{\left\{y(x) \to \frac{1}{4}(-2ax - x^2 - 4) - \frac{2\left(W\left(-e^{-\frac{a^2x}{4}+c_1-1}\right)+1\right)}{a}\right\}\right\}$$

✓ **Maple** : cpu = 0.064 (sec), leaf count = 51

$$\left\{y(x)=\frac{1}{4\,a}\left(-2\,a^2x-ax^2-8\,lambertW\left(-1/2\,\mathrm{e}^{-1/4\,a^2x}\mathrm{e}^{-a/2}\mathrm{e}^{-1}\mathrm{e}^{1/4\_C1\,a^2}\right)-4\,a-8\right)\right\}$$

2.775 ODE No. 775

$$y'(x)=\frac{-y(x)+\sqrt{y(x)}+x}{-y(x)+\sqrt{y(x)}+x+1}$$

✓ **Mathematica** : cpu = 0.157292 (sec), leaf count = 943

$$\{\{y(x)\to \mathrm{Root}\left[x^6-2e^{3c_1}x^3+e^{6c_1}+\#1^6+(-6x-6)\#1^5+\left(15x^2+24x+9\right)\#1^4+\left(-20x^3-36x^2-\right.\right.$$

✓ **Maple** : cpu = 0.059 (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 = 0.376417 (sec), leaf count = 133

$$\left\{\left\{y(x)\to\frac{\exp\left(\int_1^x\frac{-\log\left(\frac{1}{K[1]}\right)-K[1]\log\left(\frac{K[1]^2+1}{K[1]}\right)}{K[1]\log\left(\frac{1}{K[1]}\right)}dK[1]\right)}{c_1-\int_1^x\frac{\exp\left(\int_1^{K[2]}\frac{-\log\left(\frac{1}{K[1]}\right)-K[1]\log\left(\frac{K[1]^2+1}{K[1]}\right)}{K[1]\log\left(\frac{1}{K[1]}\right)}dK[1]\right)K[2]\log\left(\frac{K[2]^2+1}{K[2]}\right)}{\log\left(\frac{1}{K[2]}\right)}dK[2]}\right\}\right\}$$

✓ **Maple** : cpu = 0.132 (sec), leaf count = 96

$$\left\{y(x)=1\mathrm{e}^{\int\frac{1}{x\ln\left(x^{-1}\right)}\left(-\ln\left(\frac{x^2+1}{x}\right)x-\ln\left(x^{-1}\right)\right)\mathrm{d}x}\left(\int-\frac{x}{\ln\left(x^{-1}\right)}\mathrm{e}^{\int\frac{1}{x\ln\left(x^{-1}\right)}\left(-\ln\left(\frac{x^2+1}{x}\right)x-\ln\left(x^{-1}\right)\right)\mathrm{d}x}\ln\left(\frac{x^2+1}{x}\right)\mathrm{d}x+\right.\right.$$

2.777 ODE No. 777

$$y'(x) = \frac{y(x)(y(x)+1)}{x\left(xy(x)^4 - y(x) - 1\right)}$$

✓ **Mathematica** : cpu = 0.219397 (sec), leaf count = 39

$$\text{Solve}\left[-\frac{1}{2}(y(x)+1)^2 + 2(y(x)+1) - \frac{1}{xy(x)} - \log(y(x)+1) = c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.142 (sec), leaf count = 51

$$\left\{y(x) = e^{RootOf\left(\left(e^{\_Z}\right)^3 x - 5\,x\left(e^{\_Z}\right)^2 + 2\_C1\,x e^{\_Z} + 2\_Z\,x e^{\_Z} + 7\,x e^{\_Z} - 2\_C1\,x - 2\_Z\,x - 3\,x + 2\right)} - 1\right\}$$

2.778 ODE No. 778

$$y'(x) = \frac{x^9 y(x)^3 + x^6 y(x)^2 - 3x^2 y(x) + 1}{x^3}$$

✓ **Mathematica** : cpu = 0.148108 (sec), leaf count = 95

$$\text{Solve}\left[-\frac{29}{3}\text{RootSum}\left[-29\#1^3 + 3\sqrt[3]{29}\#1 - 29\&, \frac{\log\left(\frac{3x^6 y(x)+x^3}{\sqrt[3]{29}\sqrt[3]{x^9}} - \#1\right)}{\sqrt[3]{29} - 29\#1^2}\&\right] = c_1 + \frac{29^{2/3}\left(x^9\right)^{2/3}}{9x^5}, y(x)\right]$$

✓ **Maple** : cpu = 0.019 (sec), leaf count = 37

$$\left\{y(x) = \frac{-3 + 29\,RootOf\left(-81\int^{\_Z}\left(841\_a^3 - 27\_a + 27\right)^{-1} d\_a + x + 3\_C1\right)}{9\,x^3}\right\}$$

2.779 ODE No. 779

$$y'(x) = \frac{x^3 y(x) + x^3 + xy(x)^2 + y(x)^3}{(x-1)x^3}$$

✓ **Mathematica** : cpu = 0.15583 (sec), leaf count = 57

$$\text{Solve}\left[-\frac{1}{4}\log\left(\frac{y(x)^2}{x^2} + 1\right) + \frac{1}{2}\log\left(\frac{y(x)}{x} + 1\right) + \frac{1}{2}\tan^{-1}\left(\frac{y(x)}{x}\right) = c_1 + \log(1-x) - \log(x), y(x)\right]$$

✓ **Maple** : cpu = 0.079 (sec), leaf count = 50

$$\left\{-\frac{1}{4}\ln\left(\frac{(y(x))^2+x^2}{x^2}\right)+\frac{1}{2}\arctan\left(\frac{y(x)}{x}\right)+\frac{1}{2}\ln\left(\frac{y(x)+x}{x}\right)-\ln(x-1)+\ln(x)-\_C1=0\right\}$$

2.780 ODE No. 780

$$y'(x)=\frac{x\sqrt{x^2+y(x)^2}+xy(x)+y(x)}{x(x+1)}$$

✓ **Mathematica** : cpu = 0.154961 (sec), leaf count = 15

$$\{\{y(x)\to x\sinh(c_1+\log(x+1))\}\}$$

✓ **Maple** : cpu = 0.325 (sec), leaf count = 27

$$\left\{\_C1+\frac{1}{x(1+x)}\left(y(x)+\sqrt{(y(x))^2+x^2}\right)=0\right\}$$

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 = 0.487278 (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 = 0.234 (sec), leaf count = 61

$$\left\{\left((y(x))^{-2}+6\,x^{-1}\right)^{-1}=\frac{x}{54}\left(e^{RootOf\left(2\,x^3e^{\_Z}+3\,x^2e^{\_Z}-3\,e^{\_Z}\ln\left(1/2\,\frac{e^{\_Z}+9}{x}\right)+9\,\_C1\,e^{\_Z}+3\,\_Z\,e^{\_Z}+27\right)}+9\right)\right\}$$

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 = 4.14199 (sec), leaf count = 115

$$\left\{\left\{y(x)\to\frac{\exp\left(\int_1^x \frac{-\coth\left(\frac{1}{K[1]}\right)K[1]\log\left(\frac{K[1]^2+1}{K[1]}\right)-1}{K[1]}dK[1]\right)}{c_1-\int_1^x \exp\left(\int_1^{K[2]} \frac{-\coth\left(\frac{1}{K[1]}\right)K[1]\log\left(\frac{K[1]^2+1}{K[1]}\right)-1}{K[1]}dK[1]\right)\coth\left(\frac{1}{K[2]}\right)K[2]\log\left(\frac{K[2]^2+1}{K[2]}\right)dK[2]}\right\}\right\}$$

✓ **Maple** : cpu = 0.961 (sec), leaf count = 96

$$\left\{y(x) = 1e^{\int \frac{1}{x\tanh(x^{-1})}\left(-\ln\left(\frac{x^2+1}{x}\right)x-\tanh(x^{-1})\right)\mathrm{d}x}\left(\int -\frac{x}{\tanh(x^{-1})}e^{\int \frac{1}{x\tanh(x^{-1})}\left(-\ln\left(\frac{x^2+1}{x}\right)x-\tanh(x^{-1})\right)\mathrm{d}x}\ln\left(\frac{x^2}{x}\right.\right.\right.$$

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 = 4.16498 (sec), leaf count = 88

$$\left\{\left\{y(x)\to\frac{\exp\left(\int_1^x \frac{-\coth(K[1])K[1]\log(2K[1])-1}{K[1]}dK[1]\right)}{c_1-\int_1^x \exp\left(\int_1^{K[2]} \frac{-\coth(K[1])K[1]\log(2K[1])-1}{K[1]}dK[1]\right)\coth(K[2])K[2]\log(2K[2])dK[2]}\right\}\right\}$$

✓ **Maple** : cpu = 0.122 (sec), leaf count = 75

$$\left\{y(x) = 1e^{\int \frac{-x\ln(x)-x\ln(2)-\tanh(x)}{x\tanh(x)}\mathrm{d}x}\left(\int -\frac{x(\ln(2)+\ln(x))}{\tanh(x)}e^{\int \frac{-x\ln(x)-x\ln(2)-\tanh(x)}{x\tanh(x)}\mathrm{d}x}\mathrm{d}x + \_C1\right)^{-1}\right\}$$

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 = 19.9038 (sec), leaf count = 27

$$\left\{\left\{y(x) \to \tan\left(\int_1^x \operatorname{csch}(K[5])\log(K[5])dK[5] + c_1\right) - x\right\}\right\}$$

✓ **Maple** : cpu = 20.355 (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 = 7.31226 (sec), leaf count = 29

$$\left\{\left\{y(x) \to \tan\left(\int_1^x \frac{\sinh(K[5])}{\log(K[5])}dK[5] + c_1\right) - x\right\}\right\}$$

✓ **Maple** : cpu = 66.315 (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 = 3.62055 (sec), leaf count = 61

$$\left\{\left\{y(x) \to \frac{\sqrt{b}x\tan\left(\sqrt{a}\sqrt{b}\int_1^x \frac{\cosh(K[1])K[1]}{\log(K[1])}dK[1] + \sqrt{a}\sqrt{b}c_1\right)}{\sqrt{a}}\right\}\right\}$$

✓ **Maple** : cpu = 0.05 (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 = 25.9792 (sec), leaf count = 488

$$\text{Solve}\left[\frac{\left(2 - \frac{x(x^2-x-1)(2x^2-2y(x)+3)}{\sqrt[3]{x^3(x^2-x-1)^3}(x^2-y(x))}\right)\left(\frac{x(x^2-x-1)(2x^2-2y(x)+3)}{\sqrt[3]{x^3(x^2-x-1)^3}(x^2-y(x))} + 4\right)\left(\left(1 - \frac{x(x^2-x-1)(2x^2-2y(x)+3)}{2\sqrt[3]{x^3(x^2-x-1)^3}(x^2-y(x))}\right)\log\left(2 - \cdots\right.\right.}{18\sqrt[3]{2}\left(-\frac{(2x^2-2y(x)+3)^3}{8(x^2-y(x))^3} + \frac{3x(x^2-\cdots}{2\sqrt[3]{x^3(\cdots}}\right.}\right.$$

✓ **Maple** : cpu = 0.267 (sec), leaf count = 191

$$\left\{y(x) = 1\left(4\,x^2 e^{RootOf\left(8\,x^3 e^{\_Z} - 24\,x^2 e^{\_Z} - 36\,x^3 + 6\,\ln\left(\frac{2\,e^{\_Z}-9}{(1+x)^4}\right)e^{\_Z} + 18\,\_C1\,e^{\_Z} - 6\,\_Z\,e^{\_Z} + 24\,x e^{\_Z} + 108\,x^2 - 27\,\ln\left(\frac{2\,e^{\_Z}-9}{(1+x)^4}\right) - \cdots\right.}\right.\right.$$

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 = 28.5492 (sec), leaf count = 348

$$\left\{\left\{y(x) \to \frac{\exp\left(\int_1^x \frac{-e^2\cosh(K[1])K[1] - \cosh(K[1])K[1] - e^2\sinh(K[1])K[1] + \sinh(K[1])K[1] - e^2\cos\cdots}{K[1]\log(K[1]-1)(e^2\cosh(\cdots}\right.}{c_1 - \int_1^x \frac{\exp\left(\int_1^{K[2]} \frac{-e^2\cosh(K[1])K[1] - \cosh(K[1])K[1] - e^2\sinh(K[1])K[1] + \sinh(K[1])K[1] - e^2\cosh(K[1])\log(K[1]-1) + \cosh(K[1])\log(K\cdots}{K[1]\log(K[1]-1)\left(e^2\cosh(K[1]) - \cosh(K[1]) + e^2\sinh(K[1]) + \sinh(\cdots\right.}\right.}{K[2]\log(K[2]-1)(e^2\cosh\cdots}}\right.\right.$$

✓ **Maple** : cpu = 0.166 (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 = 71.3468 (sec), leaf count = 120

$$\left\{\left\{y(x) \to \tan\left(\int_1^x \frac{e^2\cosh(K[5]) + \cosh(K[5]) + e^2\sinh(K[5]) - \sinh(K[5])}{\log(K[5]-1)\left(e^2\cosh(K[5]) - \cosh(K[5]) + e^2\sinh(K[5]) + \sinh(K[5])\right)} dK[5] + c_1\right.\right.$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(y(x),x) = -(ln(x-1)-coth(1+x)*x^2-2*coth(1+x)*x*y(x)-coth(1+x)-
coth(1+x)*y(x)^2)/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 = 86.1163 (sec), leaf count = 127

$$\left\{\left\{y(x) \to \frac{\exp\left(\int_1^x \frac{2\coth\left(\frac{K[5]}{K[5]-1} + \frac{1}{K[5]-1}\right)}{\log\left(\frac{1}{K[5]-1}\right)} dK[5]\right)}{c_1 - \int_1^x \frac{\exp\left(\int_1^{K[6]} \frac{2\coth\left(\frac{K[5]}{K[5]-1} + \frac{1}{K[5]-1}\right)}{\log\left(\frac{1}{K[5]-1}\right)} dK[5]\right)\coth\left(\frac{K[6]}{K[6]-1} + \frac{1}{K[6]-1}\right)}{\log\left(\frac{1}{K[6]-1}\right)} dK[6]} + x^2 + 1\right\}\right\}$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(y(x),x) = (2*x*ln(1/(x-1))-coth((1+x)/(x-1))+coth((1+x)/(x-1))*y(x)^2-
2*coth((1+x)/(x-1))*x^2*y(x)+coth((1+x)/(x-1))*x^4)/ln(1/(x-1)),y(x))
```

2.791 ODE No. 791

$$y'(x) = \frac{\operatorname{sech}\left(\frac{1}{x-1}\right)\left(x^5 + x^4 - 2x^3y(x) - 2x^2y(x) + 2x^2\cosh\left(\frac{1}{x-1}\right) + xy(x)^2 + y(x)^2 - x - 2x\cosh\left(\frac{1}{x-1}\right)\right.}{x-1}$$

✓ **Mathematica** : cpu = 7.89596 (sec), leaf count = 110

$$\left\{\left\{y(x) \to \frac{\exp\left(\int_1^x \frac{2(K[5]+1)\operatorname{sech}\left(\frac{1}{K[5]-1}\right)}{K[5]-1}dK[5]\right)}{c_1 - \int_1^x \frac{\exp\left(\int_1^{K[6]} \frac{2(K[5]+1)\operatorname{sech}\left(\frac{1}{K[5]-1}\right)}{K[5]-1}dK[5]\right)(K[6]+1)\operatorname{sech}\left(\frac{1}{K[6]-1}\right)}{K[6]-1}dK[6]} + \frac{x^3+x^2}{x+1} + 1\right\}\right\}$$

✓ **Maple** : cpu = 13.26 (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

$$y'(x) = \frac{y(x)\operatorname{sech}\left(\frac{1}{x+1}\right)\left(x^3y(x) + x^2y(x) - x^2 - x - x\cosh\left(\frac{1}{x+1}\right) + \cosh\left(\frac{1}{x+1}\right)\right)}{(x-1)x}$$

✓ **Mathematica** : cpu = 3.03214 (sec), leaf count = 157

$$\left\{\left\{y(x) \to \frac{\exp\left(\int_1^x \frac{-\operatorname{sech}\left(\frac{1}{K[1]+1}\right)K[1]^2 - \operatorname{sech}\left(\frac{1}{K[1]+1}\right)K[1] - K[1]+1}{(K[1]-1)K[1]}dK[1]\right)}{c_1 - \int_1^x \frac{\exp\left(\int_1^{K[2]} \frac{-\operatorname{sech}\left(\frac{1}{K[1]+1}\right)K[1]^2 - \operatorname{sech}\left(\frac{1}{K[1]+1}\right)K[1] - K[1]+1}{(K[1]-1)K[1]}dK[1]\right)\left(\operatorname{sech}\left(\frac{1}{K[2]+1}\right)K[2]^3 + \operatorname{sech}\left(\frac{1}{K[2]+1}\right)K[2]^2\right)}{(K[2]-1)K[2]}dK}\right.\right.$$

✓ **Maple** : cpu = 0.271 (sec), leaf count = 112

$$\left\{y(x) = 1e^{\int \frac{(1-x)\cosh\left((1+x)^{-1}\right)-x^2-x}{x(x-1)\cosh\left((1+x)^{-1}\right)}dx}\left(\int -\frac{x(1+x)}{(x-1)\cosh\left((1+x)^{-1}\right)}e^{\int \frac{(1-x)\cosh\left((1+x)^{-1}\right)-x^2-x}{x(x-1)\cosh\left((1+x)^{-1}\right)}dx}dx + \_C1\right)^{-1}\right.$$

2.793 ODE No. 793

$$y'(x) = -\frac{y(x)(xy(x)+1)}{x(xy(x)-y(x)+1)}$$

✓ **Mathematica** : cpu = 13.0469 (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 = 0.115 (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

$$y'(x) = \frac{y(x)}{x\,(x^3y(x)^4+x^2y(x)^3+y(x)-1)}$$

✓ **Mathematica** : cpu = 0.191681 (sec), leaf count = 67

$$\text{Solve}\left[\text{RootSum}\left[\#1^3y(x)^3+\#1^2y(x)^2+1\&,\frac{\#1y(x)\log(x-\#1)+\log(x-\#1)}{3\#1y(x)+2}\&\right]+y(x)-\log(x)=c\right.$$

✓ **Maple** : cpu = 0.41 (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 = 0.376293 (sec), leaf count = 111

$$\text{Solve}\left[-\frac{19}{3}\text{RootSum}\left[-19\#1^3 + 6\sqrt[3]{38}\#1 - 19\&, \frac{\log\left(\frac{\frac{3y(x)}{(a+x)^3}+\frac{1}{(a+x)^2}}{\sqrt[3]{38}\sqrt[3]{\frac{1}{(a+x)^6}}} - \#1\right)}{2\sqrt[3]{38} - 19\#1^2}\&\right] = \frac{1}{9}38^{2/3}\left(\frac{1}{(a+x)^6}\right)^{2/3}$$

✓ **Maple** : cpu = 0.019 (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

$$y'(x) = \frac{e^{-\frac{3x^2}{2}} xy(x)^3}{3\left(e^{\frac{3x^2}{2}} y(x) + 3e^{\frac{3x^2}{2}} + 3y(x)\right)}$$

✓ **Mathematica** : cpu = 12.2831 (sec), leaf count = 102

$$\text{Solve}\left[\frac{1}{62}\left(-31\log\left(9e^{\frac{3x^2}{2}}(y(x)+3)y(x) + 3e^{3x^2}(y(x)+3)^2 - y(x)^2\right) + 6\sqrt{93}\tanh^{-1}\left(\frac{\sqrt{\frac{3}{31}}\left(2e^{\frac{3x^2}{2}}(y(x)\right.}{y(x}\right.\right.\right.$$

✓ **Maple** : cpu = 0.88 (sec), leaf count = 143

$$\left\{y(x) = RootOf\left(\left(\left(7\,\mathrm{e}^{3\,x^2 + RootOf\left(\left(\mathrm{e}^{3/2\,x^2}\right)^2\left(217\left(\tanh\left(\frac{(\_C1-5\_Z)\sqrt{93}}{90}\right)\right)^2\mathrm{e}^{3\,x^2+\_Z} + 42\tanh\left(\frac{(\_C1-5\_Z)\sqrt{93}}{90}\right)\sqrt{93}\mathrm{e}^{3\,x^2+\_Z}+1\right.\right.}\right.\right.\right.\right.$$

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 = 1.90146 (sec), leaf count = 349

$$\left\{\left\{y(x) \to \frac{\exp\left(\frac{(3e^2-1)\mathrm{Chi}\left(\frac{2}{x-1}\right)}{e} + \frac{(1+3e^2)\mathrm{Shi}\left(\frac{2}{x-1}\right)}{e} - \frac{1}{4}ex^2\sinh\left(\frac{2}{x-1}\right) + \frac{x^2\sinh\left(\frac{2}{x-1}\right)}{4e} - \frac{1}{4}ex^2\cosh\left(\frac{2}{x-1}\right) - \frac{x^2}{}\right.}{x\left(\exp\left(\frac{(3e^2-1)\mathrm{Chi}\left(\frac{2}{x-1}\right)}{e}\right.\right.}\right.\right.$$

✓ **Maple** : cpu = 0.258 (sec), leaf count = 168

$$\left\{y(x) = \frac{1}{x}\left(\mathrm{e}^{\frac{x^2-1}{4}\mathrm{e}^{\frac{-1-x}{x-1}} + \frac{x^2+4x-5}{4}\mathrm{e}^{\frac{1+x}{x-1}} - Ei\left(1,2(x-1)^{-1}\right)\mathrm{e}^{-1} + 3\,Ei\left(1,-2(x-1)^{-1}\right)\mathrm{e}}\right)^{-1}\left(\_C1 + \int -\cosh\left(\frac{1+x}{x-1}\right)\mathrm{e}^{-}\right.\right.$$

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 = 0.583794 (sec), leaf count = 27

$$\mathrm{Solve}\left[y(x)^2 - \frac{x}{y(x)} + \log(y(x)) - \log(x+1) = c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.125 (sec), leaf count = 30

$$\left\{y(x) = \mathrm{e}^{RootOf\left(-\left(\mathrm{e}^{\_Z}\right)^3 + \ln(1+x)\mathrm{e}^{\_Z} + \mathrm{e}^{\_Z}\_C1 - \_Z\,\mathrm{e}^{\_Z} + x\right)}\right\}$$

2.799 ODE No. 799

$$y'(x)=\frac{y(x)\left(e^{\frac{x+1}{x-1}}x^3y(x)+e^{\frac{x+1}{x-1}}x^2y(x)-e^{\frac{x+1}{x-1}}x^2-e^{\frac{x+1}{x-1}}x-1\right)}{x}$$

✓ **Mathematica** : cpu = 1.06124 (sec), leaf count = 126

$$\left\{\left\{y(x)\to\frac{\exp\left(6e\mathrm{Ei}\left(\frac{2}{x-1}\right)+\frac{1}{2}e^{\frac{x}{x-1}+\frac{1}{x-1}}(x^2+4x-5)-e^{\frac{2}{x-1}}\left(\frac{1}{2}e(x-1)^2+3e(x-1)\right)\right)}{x\left(c_1e^{\frac{1}{2}e^{\frac{x}{x-1}+\frac{1}{x-1}}(x^2+4x-5)}+e^{6e\mathrm{Ei}\left(\frac{2}{x-1}\right)}\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.236 (sec), leaf count = 147

$$\left\{y(x)=\frac{1}{x}\mathrm{e}^{\frac{5}{2}\mathrm{e}^{\frac{1+x}{x-1}}}\mathrm{e}^{-\frac{x^2}{2}\mathrm{e}^{\frac{1+x}{x-1}}}\left(\mathrm{e}^{Ei\left(1,-2\,(x-1)^{-1}\right)\mathrm{e}}\right)^{-6}\left(\mathrm{e}^{x\mathrm{e}^{\frac{1+x}{x-1}}}\right)^{-2}\left(\int-(1+x)\mathrm{e}^{\frac{1+x}{x-1}}\mathrm{e}^{\frac{5}{2}\mathrm{e}^{\frac{1+x}{x-1}}}\mathrm{e}^{-\frac{x^2}{2}\mathrm{e}^{\frac{1+x}{x-1}}}\left(\mathrm{e}^{Ei\left(1,-2\,(x-\right.}\right.\right.\right.$$

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 = 0.409432 (sec), leaf count = 128

$$\mathrm{Solve}\left[-\frac{19}{3}\mathrm{RootSum}\left[-19\#1^3+6\sqrt[3]{38}\#1-19\&,\frac{\log\left(\frac{\frac{4}{(b-2x)^2}-\frac{24y(x)}{(b-2x)^3}}{4\sqrt[3]{38}\sqrt[3]{\frac{1}{(b-2x)^6}}}-\#1\right)}{2\sqrt[3]{38}-19\#1^2}\&\right]=\frac{1}{9}38^{2/3}\left(\frac{1}{(b-2x)^6}\right)^{2/}\right.$$

✓ **Maple** : cpu = 0.017 (sec), leaf count = 41

$$\left\{y(x)=\frac{RootOf\left(-\int^{\_Z}(\_a^3-\_a^2-\_a-1)^{-1}d\_a+\ln(-2\,x+b)+\_C1\right)(-2\,x+b)}{2}\right\}$$

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 = 0.361924 (sec), leaf count = 126

$$\text{Solve}\left[-\frac{29}{3}\text{RootSum}\left[-29\#1^3+3\sqrt[3]{29}\#1-29\&,\frac{\log\left(\frac{3e^{-\frac{x^2}{2}}y(x)+e^{-\frac{x^2}{4}}}{\sqrt[3]{29}\sqrt[3]{e^{-\frac{3x^2}{4}}}}-\#1\right)}{\sqrt[3]{29}-29\#1^2}\&\right]=c_1+\frac{1}{9}29^{2/3}e^{\frac{x^2}{2}}\left(e^{-\frac{3x}{4}}\right.\right.$$

✓ **Maple** : cpu = 0.043 (sec), leaf count = 63

$$\left\{y(x)=\frac{1}{9}\left(-3\,\mathrm{e}^{-1/4\,x^2}\mathrm{e}^{1/4\,x^2}+29\,\mathit{RootOf}\left(-81\int^{\_Z}\left(841\,\_a^3-27\,\_a+27\right)^{-1}d\_a+x+3\,\_C1\right)\right)\left(\mathrm{e}\right.\right.$$

2.802 ODE No. 802

$$y'(x)=\frac{\_F1\left(y(x)+\frac{1}{x}\right)+\frac{1}{x}}{x}$$

✓ **Mathematica** : cpu = 0.121728 (sec), leaf count = 101

$$\text{Solve}\left[\int_1^{y(x)}-\frac{\_F1\left(K[2]+\frac{1}{x}\right)\int_1^x-\frac{\_F1'\left(K[2]+\frac{1}{K[1]}\right)}{K[1]^2\left(\_F1\left(K[2]+\frac{1}{K[1]}\right)\right)^2}dK[1]+1}{\_F1\left(K[2]+\frac{1}{x}\right)}dK[2]+\int_1^x\left(\frac{1}{K[1]}+\frac{1}{\_F1\left(y(x)+\frac{1}{K}\right.}\right.\right.$$

✓ **Maple** : cpu = 0.087 (sec), leaf count = 27

$$\left\{y(x)=\frac{\mathit{RootOf}\left(-\ln(x)+\int^{\_Z}(\_F1(\_a))^{-1}d\_a+\_C1\right)x-1}{x}\right\}$$

2.803 ODE No. 803

$$y'(x) = \frac{\_F1(y(x)^2 - 2\log(x))}{x\sqrt{y(x)^2}}$$

✓ **Mathematica** : cpu = 0.291198 (sec), leaf count = 637

$$\text{Solve}\left[\int_1^{y(x)}\left(\frac{K[2]}{(\_F1(K[2]^2 - 2\log(x)) - 1)(\_F1(K[2]^2 - 2\log(x)) + 1)} - \int_1^x\left(\frac{2K[2]\_F1'(K[2]^2 -}{K[1](\_F1(K[2]^2 - 2\text{lo}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.299 (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 = 0.608996 (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 = 0.796 (sec), leaf count = 38

$$\left\{y(x) = \arctan\left(\frac{3x^4 - 4x^3 + 6x^2 + 12\ln(1+x) - 12\_C1 - 12x}{12x}\right)\right\}$$

2.805 ODE No. 805

$$y'(x) = \frac{x^4\sqrt{x^2 + y(x)^2} + xy(x) + y(x)}{x(x+1)}$$

✓ **Mathematica** : cpu = 0.163177 (sec), leaf count = 37

$$\left\{\left\{y(x) \to x\sinh\left(\frac{1}{6}(6c_1 + 2x^3 - 3x^2 + 6x - 6\log(x+1) + 11)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.539 (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 = 0.431649 (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 = 0.44 (sec), leaf count = 22

$$\left\{y(x)=-\arctan\left(\frac{\ln(1+x)-x-\_C1}{x}\right)\right\}$$

2.807 ODE No. 807

$$y'(x)=-\frac{1}{-e^{y(x)}y(x)\_\mathrm{F1}(y(x)-\log(x))-x}$$

✗ **Mathematica** : cpu = 1.34888 (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 = 0.45 (sec), leaf count = 43

$$\left\{\frac{(\ln(x))^2}{2}-y(x)\ln(x)-\int^{y(x)-\ln(x)}\frac{\_F1(\_a)\_a+\mathrm{e}^{-\_a}}{\_F1(\_a)}d\_a+\_C1=0\right\}$$

2.808 ODE No. 808

$$y'(x) = \frac{(y(x)+1)(2y(x)+1)}{x(2xy(x)-2y(x)+x-2)}$$

✓ **Mathematica** : cpu = 1.46902 (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 = 0.07 (sec), leaf count = 45

$$\left\{y(x) = 1\left(-x\mathit{lambertW}\left(\frac{1}{x\mathrm{e}^{x^{-1}}\_C1}\right)-2\right)\left(2\,x\mathit{lambertW}\left(\frac{1}{x\mathrm{e}^{x^{-1}}\_C1}\right)+2\right)^{-1}\right\}$$

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 = 0.294911 (sec), leaf count = 128

$$\text{Solve}\left[-\frac{19}{3}\text{RootSum}\left[-19\#1^3+6\sqrt[3]{38}\#1-19\&,\frac{\log\left(\frac{\frac{192y(x)}{(4x-5)^3}+\frac{16}{(4x-5)^2}}{16\sqrt[3]{38}\sqrt[3]{\frac{1}{(4x-5)^6}}}-\#1\right)}{2\sqrt[3]{38}-19\#1^2}\&\right]=c_1+\frac{1}{9}38^{2/3}\left(\frac{1}{(5-4x}\right.\right.$$

✓ **Maple** : cpu = 0.014 (sec), leaf count = 41

$$\left\{y(x) = -\frac{\mathit{RootOf}\left(-\int^{-Z}(\_a^3-\_a^2-\_a-1)^{-1}\,d\_a+\ln(4\,x-5)+\_C1\right)(4\,x-5)}{4}\right\}$$

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 = 0.10567 (sec), leaf count = 40

$$\left\{\left\{y(x) \to \frac{1}{\frac{c_1}{x} - 1} - \frac{1}{2}x^2\left(\frac{1 - 2x\log(x)}{x^2} - \frac{1}{x^2}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.039 (sec), leaf count = 16

$$\left\{y(x) = \left(\ln(x) + (\_C1 - x)^{-1}\right)x\right\}$$

2.811 ODE No. 811

$$y'(x) = \frac{x^4 + x^3 e^{y(x)} + xy(x) + e^{y(x)}y(x) - x\log\left(e^{y(x)} + x\right) - e^{y(x)}\log\left(e^{y(x)} + x\right) + x}{x^2}$$

✓ **Mathematica** : cpu = 1.75427 (sec), leaf count = 33

$$\left\{\left\{y(x) \to -\log\left(\frac{e^{-c_1 x - \frac{x^3}{2}}}{x} - \frac{1}{x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 1.545 (sec), leaf count = 32

$$\left\{y(x) = \frac{x^3}{2} + x\_C1 + \ln\left(-x\left(-1 + \mathrm{e}^{\frac{x^3}{2}}\mathrm{e}^{x\_C1}\right)^{-1}\right)\right\}$$

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 = 0.392131 (sec), leaf count = 78

$$\left\{\left\{y(x) \to \frac{1}{96}\left(72c_1x^4 + 96c_1x^3 + 288c_1x - 144c_1{}^2 + 24c_1 - 9x^8 - 24x^7 - 16x^6 - 72x^5 - 102x^4 + 8x^3 - \right.\right.\right.$$

✓ **Maple** : cpu = 0.197 (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 = 0.547703 (sec), leaf count = 93

$$\left\{\left\{y(x) \to \frac{-1152ac_1x^4 - 1536ac_1x^3 - 4608ac_1x + 2304ac_1{}^2 - 288ac_1 + 144ax^8 + 384ax^7 + 256ax^6 + 11}{1152}\right.\right.$$

✓ **Maple** : cpu = 0.372 (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 = 0.128825 (sec), leaf count = 72

$$\left\{\left\{y(x) \to \frac{x}{\frac{\sqrt{x(c_1-2x)+x}}{\sqrt{\frac{1}{x^7}}} - x^4}\right\}, \left\{y(x) \to -\frac{x}{\frac{\sqrt{x(c_1-2x)+x}}{\sqrt{\frac{1}{x^7}}} + x^4}\right\}\right\}$$

✓ **Maple** : cpu = 0.028 (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 = 12.9188 (sec), leaf count = 99

$$\text{Solve}\left[\frac{1}{186}\left(\left(31+3\sqrt{93}\right)\log\left(9\left(9+\sqrt{93}\right)y(x) - 2e^{\frac{3x^2}{2}}(y(x)+3)\right) + \left(31-3\sqrt{93}\right)\log\left(2e^{\frac{3x^2}{2}}(y(x)+3)\right.\right.\right.$$

✓ **Maple** : cpu = 0.604 (sec), leaf count = 168

$$\left\{-10\ln\left(\frac{10\,e^{3/2\,x^2}(3+y(x))}{27\,e^{3/2\,x^2}+9\,e^{3/2\,x^2}y\left(x\right)+27\,y\left(x\right)}\right)+5\ln\left(\frac{100\left(3+y(x)\right)^2\left(e^{3/2\,x^2}\right)^2+\left(-8100\left(y(x)\right)^2-24\right.}{189\left(e^{3/2\,x^2}\left(3+y\left(x\right)\right)+\right.}\right.\right.$$

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 = 0.239307 (sec), leaf count = 74

$$\mathrm{Solve}\left[\frac{1}{2}\left(\mathrm{RootSum}\left[\#1^3-\#1+1\&,\frac{\#1\log\left(-\#1+x^2-y(x)^2\right)-\log\left(-\#1+x^2-y(x)^2\right)}{3\#1^2-1}\&\right]+x^2\right)=$$

✓ **Maple** : cpu = 0.444 (sec), leaf count = 190

$$\left\{\int_{\_b}^{x}\frac{\left(\_a-y(x)\right)^3\left(y(x)+\_a\right)^3\_a}{\_a^6-3\,\_a^4\left(y\left(x\right)\right)^2+3\,\_a^2\left(y\left(x\right)\right)^4-\left(y\left(x\right)\right)^6-\_a^2+\left(y\left(x\right)\right)^2+1}\,d\_a+\int^{y(x)}-\frac{(}{-\_f^6+3\,\_f^4x}\right.$$

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 = 0.55245 (sec), leaf count = 63

$$\left\{\left\{y(x)\to-\sec^{-1}\left(\frac{-9c_1-x^3+3x^3\log(x)}{9\log(x)}\right)\right\},\left\{y(x)\to\sec^{-1}\left(\frac{-9c_1-x^3+3x^3\log(x)}{9\log(x)}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.518 (sec), leaf count = 27

$$\left\{y(x)=\arccos\left(9\,\frac{\ln\left(x\right)}{3\,x^3\ln\left(x\right)-x^3+9\,\_C1}\right)\right\}$$

2.818 ODE No. 818

$$y'(x) = \frac{y(x)}{x\left(xy(x)^4 + xy(x)^3 + xy(x) - 1\right)}$$

✓ **Mathematica** : cpu = 0.18595 (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 = 0.149 (sec), leaf count = 34

$$\left\{y(x) = \mathrm{e}^{\mathit{RootOf}\left(-2\,x\left(\mathrm{e}^{\_Z}\right)^4 - 3\,x\left(\mathrm{e}^{\_Z}\right)^3 + 6\,\_C1\,x\mathrm{e}^{\_Z} - 6\,\_Z\,x\mathrm{e}^{\_Z} - 6\right)}\right\}$$

2.819 ODE No. 819

$$y'(x) = x^2\sqrt{x^2 + 3y(x)} + \sqrt{x^2 + 3y(x)} + x^3\sqrt{x^2 + 3y(x)} - \frac{2x}{3}$$

✓ **Mathematica** : cpu = 0.285183 (sec), leaf count = 65

$$\left\{\left\{y(x) \to \frac{1}{192}\left(-72c_1x^4 - 96c_1x^3 - 288c_1x + 144c_1{}^2 + 9x^8 + 24x^7 + 16x^6 + 72x^5 + 96x^4 + 80x^2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.183 (sec), leaf count = 30

$$\left\{\_C1 + \frac{3\,x^4}{8} + \frac{x^3}{2} + \frac{3\,x}{2} - \sqrt{x^2 + 3\,y\left(x\right)} = 0\right\}$$

2.820 ODE No. 820

$$y'(x) = \frac{\csc(y(x))\left(\frac{1}{2}x^2\log(x)\cos(2y(x)) + \frac{1}{2}x^2\log(x) - \cos(y(x))\right)}{x\log(x)}$$

✓ **Mathematica** : cpu = 0.529854 (sec), leaf count = 63

$$\left\{\left\{y(x) \to -\sec^{-1}\left(\frac{-4c_1 - x^2 + 2x^2\log(x)}{4\log(x)}\right)\right\}, \left\{y(x) \to \sec^{-1}\left(\frac{-4c_1 - x^2 + 2x^2\log(x)}{4\log(x)}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.482 (sec), leaf count = 27

$$\left\{y(x) = \arccos\left(4\,\frac{\ln\left(x\right)}{2\,x^2\ln\left(x\right) - x^2 + 4\,\_C1}\right)\right\}$$

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 = 0.234498 (sec), leaf count = 2093

$$\left\{\left\{y(x) \to \frac{c_1}{4} - \frac{1}{2}\sqrt{\frac{c_1{}^2}{4} + \frac{\sqrt[3]{1944c_1{}^2x^6 + 1458x^5 + \sqrt{\left(1944c_1{}^2x^6 + 1458x^5\right)^2 - 4\left(54c_1x^4 + 144x^3\right)^3}}}{18\sqrt[3]{2}x^3} + \cdots}\right.\right.$$

✓ **Maple** : cpu = 0.122 (sec), leaf count = 27

$$\left\{-\frac{1}{2\,x^2\,(y\,(x))^2} - \frac{1}{3\,x^3\,(y\,(x))^3} - y(x) + \_C1 = 0\right\}$$

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 = 0.301187 (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 = 0.092 (sec), leaf count = 25

$$\left\{y(x) = \frac{x^2\mathrm{e}^{-x^2}}{2} + \left(\_C1 - \frac{x^2}{2}\right)^{-1}\right\}$$

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 = 0.418963 (sec), leaf count = 39

$$\text{Solve}\left[\frac{y(x)^3}{3}+\frac{y(x)^2}{2}+\log(y(x))-\frac{y(x)\log(x)+x}{y(x)}=c_1,y(x)\right]$$

✓ **Maple** : cpu = 0.137 (sec), leaf count = 38

$$\left\{y(x)=\mathrm{e}^{RootOf\left(-2\left(\mathrm{e}^{\_Z}\right)^4-3\left(\mathrm{e}^{\_Z}\right)^3+6\,\mathrm{e}^{\_Z}\ln(x)+6\,\mathrm{e}^{\_Z}\_C1-6\_Z\,\mathrm{e}^{\_Z}+6\,x\right)}\right\}$$

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 = 0.201346 (sec), leaf count = 68

$$\text{Solve}\left[-\frac{1}{2}\log\left(\frac{y(x)^2}{x^2}+\frac{y(x)}{x}+1\right)+\log\left(\frac{y(x)}{x}\right)+\frac{\tan^{-1}\left(\frac{\frac{2y(x)}{x}+1}{\sqrt{3}}\right)}{\sqrt{3}}=c_1+\log(1-x)-\log(x),y(x)\right]$$

✓ **Maple** : cpu = 0.341 (sec), leaf count = 61

$$\left\{\ln\left(\frac{y(x)}{x}\right)-\frac{1}{2}\ln\left(\frac{(y(x))^2+xy(x)+x^2}{x^2}\right)+\frac{\sqrt{3}}{3}\arctan\left(\frac{\sqrt{3}(x+2\,y(x))}{3\,x}\right)-\ln(x-1)+\ln(x)-\_C$$

2.825 ODE No. 825

$$y'(x)=\frac{x\left(x^2y(x)^3+\left(x^2+1\right)^{3/2}y(x)^2+x^2\left(x^2+1\right)^{3/2}+\left(x^2+1\right)^{3/2}+y(x)^3\right)}{\left(x^2+1\right)^3}$$

✓ **Mathematica** : cpu = 0.412246 (sec), leaf count = 148

$$\text{Solve}\left[-\frac{19}{3}\text{RootSum}\left[-19\#1^3+6\sqrt[3]{38}\#1-19\&,\frac{\log\left(\frac{\frac{3xy(x)}{\left(x^2+1\right)^2}+\frac{x}{\left(x^2+1\right)^{3/2}}}{\sqrt[3]{38}\sqrt[3]{\frac{x^3}{\left(x^2+1\right)^{9/2}}}}-\#1\right)}{2\sqrt[3]{38}-19\#1^2}\&\right]=c_1+\frac{19^{2/3}\left(\frac{x^3}{\left(x^2+1\right)^{9}}\right.}{}\right.$$

✓ **Maple** : cpu = 0.075 (sec), leaf count = 48

$$\left\{y(x)=\frac{19\,RootOf\left(-1296\int^{-Z}\left(361\_a^3-432\_a+432\right)^{-1}d\_a+2\,\ln\left(x^2+1\right)+3\_C1\right)-6}{18}\sqrt{x^2+1}\right.$$

2.826 ODE No. 826

$$y'(x)=\frac{y(x)\left(3xy(x)^2+3y(x)^2+x\right)}{x(x+1)\left(6y(x)^2+x\right)}$$

✓ **Mathematica** : cpu = 0.557672 (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 = 0.255 (sec), leaf count = 51

$$\left\{\left((y(x))^{-2}+6\,x^{-1}\right)^{-1}=\frac{x}{54}\left(e^{RootOf\left(-e^{-Z}\ln\left(\frac{(1+x)^2\left(e^{-Z}+9\right)}{2\,x}\right)+3\,e^{-Z}\_C1+\_Z\,e^{-Z}+9\right)}+9\right)\right\}$$

2.827 ODE No. 827

$$y'(x) = \frac{x^2y(x)\sqrt{x^2+y(x)^2}+x^3\left(-\sqrt{x^2+y(x)^2}\right)+y(x)}{x}$$

✓ **Mathematica** : cpu = 0.189673 (sec), leaf count = 221

$$\left\{\left\{y(x)\to \frac{x-2\sqrt{x^2\tanh^2\left(\frac{1}{3}\left(-3\sqrt{2}c_1-\sqrt{2}x^3\right)\right)-x^2\tanh^4\left(\frac{1}{3}\left(-3\sqrt{2}c_1-\sqrt{2}x^3\right)\right)}}{2\tanh^2\left(\frac{1}{3}\left(-3\sqrt{2}c_1-\sqrt{2}x^3\right)\right)-1}\right\},\left\{y(x)\to \frac{2\sqrt{x}\right.\right.$$

✓ **Maple** : cpu = 0.169 (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

$$y'(x) = \frac{(y(x)+1)(2y(x)+1)}{x\left(2xy(x)^4+xy(x)^3-2y(x)-2\right)}$$

✓ **Mathematica** : cpu = 0.407943 (sec), leaf count = 56

$$\text{Solve}\left[-\frac{1}{8}y(x)^2+\frac{3y(x)}{8}-\frac{1}{2x(2y(x)+1)}-\frac{1}{2}\log(y(x)+1)+\frac{1}{16}\log(2y(x)+1)=c_1,y(x)\right]$$

✓ **Maple** : cpu = 0.217 (sec), leaf count = 54

$$\left\{y(x)=\frac{1}{2}e^{RootOf\left(x\left(e^{\_Z}\right)^3-8\,x\left(e^{\_Z}\right)^2+16\,\ln(1/2\,e^{\_Z}+1/2)xe^{\_Z}+8\,\_C1\,xe^{\_Z}-2\,\_Z\,xe^{\_Z}+7\,e^{\_Z}x+16\right)}-\frac{1}{2}\right\}$$

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 = 0.422835 (sec), leaf count = 74

$$\left\{\left\{y(x) \to \frac{-160c_1x^7 - 200c_1x^6 - 400c_1x^4 + 400c_1{}^2x^2 + 16x^{12} + 40x^{11} + 25x^{10} + 80x^9 + 100x^8 + 100x^6}{400x^2}\right.\right.$$

✓ **Maple** : cpu = 0.231 (sec), leaf count = 34

$$\left\{\_C1 - \frac{1}{x}\sqrt{4\,x^2y\left(x\right)+1} + x^2 + \frac{x^4}{2} + \frac{2\,x^5}{5} = 0\right\}$$

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 = 0.446631 (sec), leaf count = 37

$$\text{Solve}\left[-\frac{1}{3}y(x)^3 - \frac{y(x)^2}{2} - \frac{x}{y(x)} - \log(y(x)) + \log(x) = c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.122 (sec), leaf count = 38

$$\left\{y(x) = \mathrm{e}^{RootOf\left(2\,\left(\mathrm{e}^{\_Z}\right)^4+3\,\left(\mathrm{e}^{\_Z}\right)^3-6\,\mathrm{e}^{\_Z}\ln(x)+6\,\mathrm{e}^{\_Z}\_C1+6\,\_Z\,\mathrm{e}^{\_Z}+6\,x\right)}\right\}$$

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 = 2.9878 (sec), leaf count = 145

$$\left\{\left\{y(x) \to -\frac{1}{12}\sqrt{576ax - 72c_1x^4 - 96c_1x^3 - 288c_1x - 144c_1{}^2 - 9x^8 - 24x^7 - 16x^6 - 72x^5 - 96x^4 - 14}\right.\right.$$

✓ **Maple** : cpu = 0.286 (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 = 2.1788 (sec), leaf count = 2497

$$\left\{\left\{y(x) \to -\frac{1}{2}\sqrt{\frac{3\sqrt[3]{2}(-8x+3c_1+}{\sqrt[3]{1944(c_1+\log(x+1))^2+972(c_1+\log(x+1))+3726x+\sqrt{(1944(c_1+\log(x+1))^2}}}}\right.\right.$$

✓ **Maple** : cpu = 0.143 (sec), leaf count = 31

$$\left\{\ln(1+x)+\frac{x}{y(x)}-\frac{(y(x))^3}{3}-\frac{(y(x))^2}{2}-y(x)+\_C1=0\right\}$$

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 = 0.19301 (sec), leaf count = 221

$$\left\{\left\{y(x) \to \frac{x-2\sqrt{x^2\tanh^2\left(\frac{1}{4}\left(-4\sqrt{2}c_1-\sqrt{2}x^4\right)\right)-x^2\tanh^4\left(\frac{1}{4}\left(-4\sqrt{2}c_1-\sqrt{2}x^4\right)\right)}}{2\tanh^2\left(\frac{1}{4}\left(-4\sqrt{2}c_1-\sqrt{2}x^4\right)\right)-1}\right\},\left\{y(x) \to \frac{2\sqrt{x}}{}\right.\right.$$

✓ **Maple** : cpu = 0.124 (sec), leaf count = 49

$$\left\{\ln\left(2\,\frac{x\left(\sqrt{2\,(y(x))^2+2\,x^2}+y(x)+x\right)}{y(x)-x}\right)+\frac{\sqrt{2}x^4}{4}-\ln(x)-\_C1=0\right\}$$

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 = 0.650709 (sec), leaf count = 90

$$\left\{\left\{y(x) \to -\frac{\sqrt{x}\sqrt{W\left(\frac{6(x+1)^2 e^{2c_1 + x^2 - 2x - 3}}{x}\right)}}{\sqrt{6}}\right\}, \left\{y(x) \to \frac{\sqrt{x}\sqrt{W\left(\frac{6(x+1)^2 e^{2c_1 + x^2 - 2x - 3}}{x}\right)}}{\sqrt{6}}\right\}\right\}$$

✓ **Maple** : cpu = 0.333 (sec), leaf count = 60

$$\left\{\left((y(x))^{-2} + 6\,x^{-1}\right)^{-1} = \frac{x}{54}\left(e^{RootOf\left(x^2 e^{\_Z} - e^{\_Z}\ln\left(\frac{x\left(e^{\_Z}+9\right)}{2\,(1+x)^2}\right) + 3\,e^{\_Z}\_C1 + \_Z\,e^{\_Z} - 2\,e^{\_Z}x + 9\right)} + 9\right)\right\}$$

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 = 1.6724 (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 = 10.8515 (sec), leaf count = 379

$$\text{Solve}\left[\frac{1}{9}2^{2/3}\left(\frac{\left(1 - \frac{(x-1)^2\left(\frac{x^6}{(x-1)^3}\right)^{2/3}((x+2)y(x)+x)}{x^4((x-1)y(x)+x)}\right)\left(\frac{\left(\frac{x^6}{(x-1)^3}\right)^{2/3}(x-1)^2((x+2)y(x)+x)}{x^4((x-1)y(x)+x)} + 2\right)\left(\left(1 - \frac{(x-1)^2\left(\frac{x^6}{(x-1)^3}\right)^{2/3}}{x^4((x-1)}\right.\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.161 (sec), leaf count = 73

$$\left\{y(x) = -x\mathrm{e}^{RootOf\left(-\ln\left(\frac{\mathrm{e}^{\_Z}}{2}+\frac{9}{2}\right)\mathrm{e}^{\_Z}+3\,\mathrm{e}^{\_Z}\_C1+\_Z\,\mathrm{e}^{\_Z}-\mathrm{e}^{\_Z}x+9\right)}\left(-9+(x-1)\,\mathrm{e}^{RootOf\left(-\ln\left(\frac{\mathrm{e}^{\_Z}}{2}+\frac{9}{2}\right)\mathrm{e}^{\_Z}+3\,\mathrm{e}^{\_Z}\_C1+\right.}\right.\right.$$

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 = 2.0365 (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 = 0.15508 (sec), leaf count = 31

$$\left\{\left\{y(x)\to\frac{1}{c_1-\log(x)}+\frac{2}{5}\sqrt{x}\left(x^{5/2}+5\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.088 (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 = 0.266065 (sec), leaf count = 28

$$\left\{\left\{y(x) \to -x\log\left(\frac{e^{2c_1}}{2x} - \frac{x}{2}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.052 (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 = 0.286069 (sec), leaf count = 30

$$\left\{\left\{y(x) \to -x\log\left(\frac{e^{3c_1}}{3x} - \frac{x^2}{3}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.046 (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 = 1.08269 (sec), leaf count = 236

$$\left\{\left\{y(x) \to -\frac{\sqrt{2a^{5/2}bx^2 - 2a^{5/2}c + 4a^3b^2x^3 - 4a^3bcx + a^2x + 4\sqrt{a}b^2c_1x^2 - 4\sqrt{a}bcc_1 + 2bc_1x}}{\sqrt{2}\sqrt{2a^{3/2}bc_1 + a^{7/2} + 2a^4bx}}\right\}, \left\{y(x) -\right.\right.$$

✓ **Maple** : cpu = 0.217 (sec), leaf count = 97

$$\left\{y(x)=\frac{1}{x\_C1+1}\sqrt{\left(\left(x\_C1+1\right)\left(bx^2-c\right)\sqrt{a}+\frac{x}{2}\right)\left(x\_C1+1\right)a^{\frac{3}{2}}}a^{-\frac{3}{2}},y(x)=-2\,\frac{\sqrt{\left(\left(x\_C1+1\right)\left(b\right.\right.}}{}\right.$$

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 = 0.209774 (sec), leaf count = 186

$$\left\{\left\{y(x)\to-\frac{c_1e^{\frac{1}{4}x^2(2\log(x)-1)}\left(\frac{x}{2}+\frac{1}{2}x(2\log(x)-1)\right)+\frac{1}{4}x^2e^{\frac{1}{4}x^2(2\log(x)-1)}(2\log(x)-1)\left(\frac{x}{2}+\frac{1}{2}x(2\log(x)-\right.\right.}{x\left(c_1e^{\frac{1}{4}x^2(2\log(x)-1)}+\frac{1}{4}x^2e^{\frac{1}{4}x^2(2\log(x)-1)}(2\log(\right.}\right.\right.$$

✓ **Maple** : cpu = 0.017 (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 = 0.211597 (sec), leaf count = 198

$$\left\{\left\{y(x)\to-\frac{c_1e^{\frac{1}{9}x^3(3\log(x)-1)}\left(\frac{x^2}{3}+\frac{1}{3}x^2(3\log(x)-1)\right)+\frac{1}{9}x^3e^{\frac{1}{9}x^3(3\log(x)-1)}(3\log(x)-1)\left(\frac{x^2}{3}+\frac{1}{3}x^2(3\log(\right.\right.}{x^2\left(c_1e^{\frac{1}{9}x^3(3\log(x)-1)}+\frac{1}{9}x^3e^{\frac{1}{9}x^3(3\log(x)-1)}(3\right.}\right.\right.$$

✓ **Maple** : cpu = 0.02 (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 = 13.0211 (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 = 0.148 (sec), leaf count = 97

$$\left\{y(x) = -xe^{RootOf\left(-\ln\left(\frac{e^{-Z}}{2}+\frac{9}{2}\right)e^{-Z}+3\,e^{-Z}\_C1+\_Z\,e^{-Z}+e^{-Z}x+9\right)}\left(e^{RootOf\left(-\ln\left(\frac{e^{-Z}}{2}+\frac{9}{2}\right)e^{-Z}+3\,e^{-Z}\_C1+\_Z\,e^{-Z}+e^{-Z}x+9\right)}\right.\right.$$

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 = 3.22622 (sec), leaf count = 266

$$\left\{\left\{y(x)\to -\frac{1}{2}\sqrt[3]{-\frac{1}{2}}\sqrt[3]{72c_1x^4+96c_1x^3+288c_1x+144c_1{}^2-72c_1+9x^8+24x^7+16x^6+72x^5+114x^4-\right.\right.$$

✓ **Maple** : cpu = 0.184 (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

$$y'(x) = \frac{1}{x^2\left(-\left(\frac{1}{y(x)}+1\right)\right)\_F1\left(x\left(\frac{1}{y(x)}+1\right)\right)+x^2\_F1\left(x\left(\frac{1}{y(x)}+1\right)\right)+x\left(\frac{1}{y(x)}+1\right)-x}$$

✓ **Mathematica** : cpu = 0.892233 (sec), leaf count = 365

$$\text{Solve}\left[\int_1^{y(x)}\left(\frac{x\_F1\left(x\left(1+\frac{1}{K[2]}\right)\right)-1}{x\_F1\left(x\left(1+\frac{1}{K[2]}\right)\right)K[2]-K[2]+x\_F1\left(x\left(1+\frac{1}{K[2]}\right)\right)}-\int_1^x\left(\frac{\_F1\left(K[1]\left(1+\frac{1}{K[2]}\right)\right.}{K[1]\left(K[2]\_F1\left(K[1]\right.\right.}\right.\right.\right.$$

✓ **Maple** : cpu = 0.144 (sec), leaf count = 40

$$\left\{y(x) = e^{RootOf\left(-\_Z-\int^{\frac{e^{\_Z}x}{e^{\_Z}-1}}\frac{1}{(\_F1(\_a)\_a-1)\_a}d\_a+\_C1\right)}-1\right\}$$

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 = 0.823634 (sec), leaf count = 103

$$\text{Solve}\left[\frac{x^4}{4}+\frac{x^3}{3}+\frac{1}{2}\sqrt{x^2-4y(x)+2x+1}+\frac{1}{2}\log\left(\sqrt{x^2-4y(x)+2x+1}+x+1\right)-\frac{1}{2}\tanh^{-1}\left(\frac{}{2\sqrt{x^2}}\right.\right.$$

✓ **Maple** : cpu = 0.215 (sec), leaf count = 34

$$\left\{\_C1-\frac{x^4}{2}-\frac{2\,x^3}{3}-2\,x-\sqrt{x^2+2\,x+1-4\,y\left(x\right)}=0\right\}$$

2.848 ODE No. 848

$$y'(x) = \_F1(y(x) - \log(\sinh(x))) + \coth(x)$$

✓ **Mathematica** : cpu = 0.205334 (sec), leaf count = 157

$$\text{Solve}\left[\int_1^{y(x)} -\frac{\_F1(K[2]-\log(\sinh(x)))\int_1^x\left(\frac{(\coth(K[1])+\_F1(K[2]-\log(\sinh(K[1]))))\_F1'(K[2]-\log(\sinh(K[1])))}{(\_F1(K[2]-\log(\sinh(K[1]))))^2} - \frac{\_F1'}{\_F1(}\right.}{\_F1(K[2]-\log(\sinh(x)))}\right.$$

✓ **Maple** : cpu = 0.404 (sec), leaf count = 27

$$\left\{\int^{y(x)}_{\_b}(\_F1(\_a - \ln(\sinh(x))))^{-1}\, d\_a - x - \_C1 = 0\right\}$$

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 = 0.746434 (sec), leaf count = 102

$$\text{Solve}\left[\frac{x^4}{4} + \frac{x^3}{3} - \frac{1}{2}\sqrt{x^2+4y(x)-4x} + \log\left(-\sqrt{x^2+4y(x)-4x} - x + 2\right) - \tanh^{-1}\left(\frac{2x-4}{2\sqrt{x^2+4y(x)-}}\right.\right.$$

✓ **Maple** : cpu = 0.211 (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

$$y'(x) = \_F1(y(x) - \log(\sin(x)) + \log(\cos(x)+1)) + \csc(x)$$

✓ **Mathematica** : cpu = 0.227882 (sec), leaf count = 1485

$$\text{Solve}\left[\int_1^x -\frac{(\cot^2(K[1]) + \csc(K[1])\cot(K[1]) + 1)\sin(K[1])(\csc(K[1]) + \_F1(\log(}{-\cot^2(K[1]) + \_F1(\log(\cos(K[1])+1) - \log(\sin(K[1])) + y(x))\cot(K[1]) + \csc^2(K[1]) + c}\right.$$

✓ **Maple** : cpu = 0.783 (sec), leaf count = 32

$$\left\{\int^{y(x)}_{\_b} (\_F1(\_a - \ln(\sin(x)) + \ln(\cos(x)+1)))^{-1} \, d\_a - x - \_C1 = 0\right\}$$

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 = 0.343324 (sec), leaf count = 145

$$\text{Solve}\left[-\frac{1}{3}(27a+29b)^{2/3}\text{RootSum}\left[\#1^3(27a+29b)^{2/3} - 3\#1b^{2/3} + (27a+29b)^{2/3}\&, \frac{\log\left(\frac{\frac{3ax+b}{b}+3y(x)}{\sqrt[3]{\frac{27a+29b}{b}}} - \right.}{b^{2/3} - \#1^2(27a+29}\right.\right.$$

✓ **Maple** : cpu = 0.046 (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 = 0.32207 (sec), leaf count = 145

$$\text{Solve}\left[-\frac{1}{3}(29\alpha+27\beta)^{2/3}\text{RootSum}\left[\#1^3(29\alpha+27\beta)^{2/3} - 3\#1\alpha^{2/3} + (29\alpha+27\beta)^{2/3}\&, \frac{\log\left(\frac{\frac{\alpha+3\beta x}{\alpha}+3y(x)}{\sqrt[3]{\frac{29\alpha+27\beta}{\alpha}}}\right.}{\alpha^{2/3} - \#1^2(29\alpha -}\right.\right.$$

✓ **Maple** : cpu = 0.047 (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 = 0.155731 (sec), leaf count = 76

$$\left\{\left\{y(x) \to \frac{1}{x^3\left(\frac{1}{x^3} - \frac{1}{x^3\sqrt{c_1-2x}}\right)} - \frac{x+2}{x}\right\}, \left\{y(x) \to \frac{1}{x^3\left(\frac{1}{x^3\sqrt{c_1-2x}} + \frac{1}{x^3}\right)} - \frac{x+2}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.026 (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 = 0.556538 (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 = 0.158 (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 = 0.613281 (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 = 0.148 (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

$$y'(x) = -\frac{x\left(-\_F1(y(x)^2 - 2x) - \frac{1}{x}\right)}{\sqrt{y(x)^2}}$$

✓ **Mathematica** : cpu = 0.555036 (sec), leaf count = 103

$$\text{Solve}\left[\int_1^{y(x)} \left(\frac{\sqrt{K[2]^2}}{\_F1\left(K[2]^2 - 2x\right)} - \int_1^x \frac{2K[2]\_F1'(K[2]^2 - 2K[1])}{\left(\_F1\left(K[2]^2 - 2K[1]\right)\right)^2} dK[1]\right) dK[2] + \int_1^x \left(-K[1] - \frac{}{\_F1(}\right.\right.$$

✓ **Maple** : cpu = 0.207 (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 = 0.606804 (sec), leaf count = 107

$$\text{Solve}\left[\frac{x^4}{4} + \frac{x^3}{3} - \frac{1}{4}\sqrt{x^2 + 8y(x) - 2x + 1} + \frac{1}{4}\log\left(-\sqrt{x^2 + 8y(x) - 2x + 1} - x + 1\right) - \frac{1}{4}\tanh^{-1}\left(\frac{}{2\sqrt{x}}\right.\right.$$

✓ **Maple** : cpu = 0.213 (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 = 0.34358 (sec), leaf count = 145

$$\text{Solve}\left[-\frac{1}{3}(29a+27b)^{2/3}\text{RootSum}\left[\#1^3(29a+27b)^{2/3}-3\#1a^{2/3}+(29a+27b)^{2/3}\&,\frac{\log\left(\frac{\frac{a+3bx}{a}+3y(x)}{\sqrt[3]{\frac{29a+27b}{a}}}-\right.}{a^{2/3}-\#1^2(29a+2}\right.\right.$$

✓ **Maple** : cpu = 0.046 (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

$$y'(x)=\frac{\_F1(y(x)^2-2x)+x}{x\sqrt{y(x)^2}}$$

✓ **Mathematica** : cpu = 0.813357 (sec), leaf count = 105

$$\text{Solve}\left[\int_1^{y(x)}\left(\frac{\sqrt{K[2]^2}}{\_F1\left(K[2]^2-2x\right)}-\int_1^x\frac{2K[2]\_F1'(K[2]^2-2K[1])}{\left(\_F1\left(K[2]^2-2K[1]\right)\right)^2}dK[1]\right)dK[2]+\int_1^x\left(-\frac{1}{\_F1\left(y(x)^2-\right.}\right.\right.$$

✓ **Maple** : cpu = 0.198 (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 = 0.364498 (sec), leaf count = 33

$$\left\{\left\{y(x)\to\tan^{-1}\left(\frac{10c_1+4x^5+5x^4+10x^2}{20x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 1.57 (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 = 1.36388 (sec), leaf count = 158

$$\mathrm{Solve}\left[\int_1^{y(x)} -\frac{\_\mathrm{F1}\left(e^{\frac{1}{x}}K[2]\right)\int_1^x \left(\frac{e^{\frac{1}{K[1]}}}{K[1]^2\_\mathrm{F1}\left(e^{\frac{1}{K[1]}}K[2]\right)} - \frac{e^{\frac{2}{K[1]}}K[2]\_\mathrm{F1}'\left(e^{\frac{1}{K[1]}}K[2]\right)}{K[1]^2\left(\_\mathrm{F1}\left(e^{\frac{1}{K[1]}}K[2]\right)\right)^2}\right)dK[1] + e^{\frac{1}{x}}}{\_\mathrm{F1}\left(e^{\frac{1}{x}}K[2]\right)}dK[2] + \int_1^x \left(\right.\right.$$

✓ **Maple** : cpu = 0.119 (sec), leaf count = 26

$$\left\{y(x) = \frac{\mathit{RootOf}\left(-\ln(x) + \int^{\_Z}(\_F1(\_a))^{-1}d\_a + \_C1\right)}{e^{x^{-1}}}\right\}$$

2.862 ODE No. 862

$$y'(x) = -\log(y(x)-1)\left(\frac{\mathrm{Ei}(-\log(y(x)-1))}{x} - \_\mathrm{F1}(x)\right)$$

✗ **Mathematica** : cpu = 0.752759 (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 = 0.159 (sec), leaf count = 27

$$\left\{y(x) = e^{\mathit{RootOf}\left(\int -\frac{\_F1(x)}{x}dxx + x\_C1 + Ei(1, -\_Z)\right)} + 1\right\}$$

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 = 0.176132 (sec), leaf count = 30

$$\left\{\left\{y(x) \to x\sinh\left(\frac{1}{12}\left(12c_1 + 3x^4 + 4x^3 + 12x\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 6.227 (sec), leaf count = 38

$$\left\{\ln\left(y(x) + \sqrt{(y(x))^2 + x^2}\right) - \frac{x^4}{4} - \frac{x^3}{3} - x - \ln(x) - \_C1 = 0\right\}$$

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 = 0.280505 (sec), leaf count = 137

$$\left\{\left\{y(x) \to \frac{2e^{\frac{x^2}{2}}}{\sqrt{2}\sqrt{2e^{\frac{x^2}{2}}(c_1 - 2x) + 2e^{\frac{x^2}{2}}} - 2e^{\frac{x^2}{4}}}\right\}, \left\{y(x) \to -\frac{2e^{\frac{x^2}{2}}}{\sqrt{2}\sqrt{2e^{\frac{x^2}{2}}(c_1 - 2x) + 2e^{\frac{x^2}{2}}} + 2e^{\frac{x^2}{4}}}\right\}\right\}$$

✓ **Maple** : cpu = 0.06 (sec), leaf count = 162

$$\left\{y(x) = 1\left(e^{\frac{x^2}{2}}\left(\sqrt{\_C1 - 2x} - 1\right)e^{-\frac{x^2}{4}} - e^{\frac{x^2}{4}}\sqrt{\_C1 - 2x}\right)\left(e^{-\frac{x^2}{4}}\right)^{-1}\left(e^{\frac{x^2}{4}}\sqrt{\_C1 - 2x} + e^{-\frac{x^2}{4}}e^{\frac{x^2}{2}}\right)^{-1},$$

2.865 ODE No. 865

$$y'(x) = (1 - y(x))\left(-f(x) + \frac{y(x)\log(y(x) - 1)}{x(1 - y(x))\log(x)} - \frac{\log(y(x) - 1)}{x(1 - y(x))\log(x)}\right)$$

✓ **Mathematica** : cpu = 0.311079 (sec), leaf count = 87

$$\text{Solve}\left[\int_1^x \left(-\frac{f(K[1])}{\log(K[1])} - \frac{\log(y(x) - 1)}{K[1]\log^2(K[1])}\right) dK[1] + \int_1^{y(x)} \left(\frac{1}{(K[2] - 1)\log(x)} - \int_1^x -\frac{1}{K[1](K[2] - 1)\log}\right.\right.$$

✓ **Maple** : cpu = 0.144 (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 = 0.683723 (sec), leaf count = 117

$$\text{Solve}\left[-\frac{1}{2}\sqrt{a^2 + 2ax + x^2 + 4y(x)} - \frac{1}{2}a\log\left(\sqrt{a^2 + 2ax + x^2 + 4y(x)} + a + x\right) + \frac{1}{2}a\tanh^{-1}\left(\frac{}{2\sqrt{a^2 + 2}}\right.\right.$$

✓ **Maple** : cpu = 0.236 (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 = 0.201235 (sec), leaf count = 77

$$\text{Solve}\left[-\frac{29}{3}\text{RootSum}\left[-29\#1^3 + 3\sqrt[3]{29}\#1 - 29\&, \frac{\log\left(\frac{x^2+3y(x)+1}{\sqrt[3]{29}} - \#1\right)}{\sqrt[3]{29} - 29\#1^2}\&\right] = c_1 + \frac{1}{9}29^{2/3}x, y(x)\right]$$

✓ **Maple** : cpu = 0.048 (sec), leaf count = 30

$$\left\{y(x) = -\frac{x^2}{3} + RootOf\left(-x + \int^{\_Z} \left(\_a^3 + \_a^2 + 1\right)^{-1} d\_a + \_C1\right)\right\}$$

2.868 ODE No. 868

$$y'(x) = -x^6 + 3x^4y(x) + x^4 - 3x^2y(x)^2 - 2x^2y(x) + y(x)^3 + y(x)^2 + 2x + 1$$

✓ **Mathematica** : cpu = 0.16876 (sec), leaf count = 79

$$\text{Solve}\left[-\frac{29}{3}\text{RootSum}\left[-29\#1^3 + 3\sqrt[3]{29}\#1 - 29\&, \frac{\log\left(\frac{-3x^2+3y(x)+1}{\sqrt[3]{29}} - \#1\right)}{\sqrt[3]{29} - 29\#1^2}\&\right] = c_1 + \frac{1}{9}29^{2/3}x, y(x)\right]$$

✓ **Maple** : cpu = 0.044 (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

$$y'(x) = \frac{2x^5 + 2x^4 - 2x^3y(x) + x^3 - 2x^2y(x) + 3x^2 - 2y(x) - x + 1}{x^2 - y(x)}$$

✓ **Mathematica** : cpu = 0.0318906 (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 = 0.063 (sec), leaf count = 37

$$\left\{y(x) = x^2 + \frac{1}{2}\mathit{lambertW}\left(-2\frac{e^{x^4}e^{4/3\,x^3}\_C1\,(e^x)^4\,e^{-1}}{(e^{x^2})^2}\right) + \frac{1}{2}\right\}$$

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 = 1.51374 (sec), leaf count = 35

$$\left\{\left\{y(x) \to -x\log\left(\frac{-c_1 - \frac{x^4}{4} - \frac{x^3}{3} - x}{x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.682 (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 = 0.229556 (sec), leaf count = 22

$$\left\{\left\{y(x) \to \frac{1}{c_1 - x} - \log(2x+1)\right\}\right\}$$

✓ **Maple** : cpu = 0.069 (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 = 0.0413268 (sec), leaf count = 215

$$\left\{\left\{y(x) \to \frac{1}{5}\left(2x^3 + 10\sqrt{x} - 5\right) - \frac{\sqrt{-25c_1x - x\left(2x^3 + 10\sqrt{x} - 5\right)^2 - 50x\left(-\frac{4x^{7/2}}{5} - \frac{2x^6}{25} + \frac{2x^3}{5} - 2x + 2}}{5\sqrt{-\frac{1}{x}}x}$$

✓ **Maple** : cpu = 0.046 (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 = 0.511711 (sec), leaf count = 53

$$\text{Solve}\left[\frac{1}{192}\left(-16y(x)^3 - 12y(x)^2 + 12y(x) - 54\log(4y(x)+2) + 7\right) - \frac{1}{2x(2y(x)+1)} = c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.216 (sec), leaf count = 50

$$\left\{y(x) = \frac{\mathrm{e}^{RootOf\left(2\,x\left(\mathrm{e}^{\_Z}\right)^4 - 3\,x\left(\mathrm{e}^{\_Z}\right)^3 - 6\,x\left(\mathrm{e}^{\_Z}\right)^2 + 48\_C1\,x\mathrm{e}^{\_Z} + 54\_Z\,x\mathrm{e}^{\_Z} + 7\,\mathrm{e}^{\_Z}x + 96\right)}}{2} - \frac{1}{2}\right\}$$

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 = 0.229077 (sec), leaf count = 101

$$\text{Solve}\left[-\frac{29}{3}\text{RootSum}\left[-29\#1^3 + 3\sqrt[3]{29}\#1 - 29\&, \frac{\log\left(\frac{\frac{1}{8}\left(3ax^5+8x\right)+3xy(x)}{\sqrt[3]{29}\sqrt[3]{x^3}} - \#1\right)}{\sqrt[3]{29} - 29\#1^2}\&\right] = c_1 + \frac{1}{18}29^{2/3}\left(x^3\right)^{2/}\right.$$

✓ **Maple** : cpu = 0.037 (sec), leaf count = 40

$$\left\{y(x) = -\frac{ax^4}{8} - \frac{1}{3} + \frac{29\,RootOf\left(x^2 - 162\int^{\_Z}\left(841\_a^3 - 27\_a + 27\right)^{-1}d\_a + 6\_C1\right)}{9}\right\}$$

2.875 ODE No. 875

$$y'(x) = \frac{x^5\left(-\sqrt{x^2+y(x)^2}\right)+x^4y(x)\sqrt{x^2+y(x)^2}+xy(x)+y(x)}{x(x+1)}$$

✓ **Mathematica** : cpu = 0.239628 (sec), leaf count = 497

$$\left\{\left\{y(x)\to \frac{x-2\sqrt{x^2\tanh^2\left(\frac{1}{12}\left(-12\sqrt{2}c_1-3\sqrt{2}x^4+4\sqrt{2}x^3-6\sqrt{2}x^2+12\sqrt{2}x-12\sqrt{2}\log(x+1)+25\right.\right.}}{2\tanh^2\left(\frac{1}{12}\left(-12\sqrt{2}c_1-3\sqrt{2}x^4+4\sqrt{2}x^3-\right.\right.}\right.\right.$$

✓ **Maple** : cpu = 0.174 (sec), leaf count = 73

$$\left\{\ln\left(2\,\frac{x\left(\sqrt{2\,\left(y\left(x\right)\right)^2+2\,x^2}+y(x)+x\right)}{y\left(x\right)-x}\right)+\sqrt{2}\ln\left(1+x\right)+\frac{\left(3\,x^4-4\,x^3+6\,x^2-12\,x\right)\sqrt{2}}{12}-\_C1-\right.$$

2.876 ODE No. 876

$$y'(x) = -\frac{y(x)^2\left(x^2y(x)-2xy(x)+y(x)-2x\right)}{2x(xy(x)-2y(x)-2)}$$

✓ **Mathematica** : cpu = 0.165911 (sec), leaf count = 135

$$\left\{\left\{y(x)\to -\frac{4x}{\frac{2\sqrt{-4x\left(c_1-2\left(\frac{x^2}{8}-\frac{x}{2}+\frac{\log(x)}{4}\right)\right)-x(x-2)^2}}{\sqrt{-\frac{1}{x}}}-2(x-2)x}\right\},\left\{y(x)\to \frac{4x}{\frac{2\sqrt{-4x\left(c_1-2\left(\frac{x^2}{8}-\frac{x}{2}+\frac{\log(x)}{4}\right)\right)-x(x-2)^2}}{\sqrt{-\frac{1}{x}}}}\right.\right.$$

✓ **Maple** : cpu = 0.036 (sec), leaf count = 41

$$\left\{y(x)=-4\left(\sqrt{\_C1-8\,\ln\left(x\right)}-2\,x+4\right)^{-1},y(x)=4\left(\sqrt{\_C1-8\,\ln\left(x\right)}+2\,x-4\right)^{-1}\right\}$$

2.877 ODE No. 877

$$y'(x) = \frac{x^6 - 3x^4 y(x) + 2x^3 + 3x^2 y(x)^2 - 2xy(x) - y(x)^3 - 2x}{x^2 - y(x) - 1}$$

✓ **Mathematica** : cpu = 0.186079 (sec), leaf count = 49

$$\left\{\left\{y(x) \to \frac{1}{1 - \frac{1}{\sqrt{c_1 - 2x}}} + x^2 - 1\right\}, \left\{y(x) \to \frac{1}{\frac{1}{\sqrt{c_1 - 2x}} + 1} + x^2 - 1\right\}\right\}$$

✓ **Maple** : cpu = 0.032 (sec), leaf count = 73

$$\left\{y(x) = \frac{1}{-2\_C1 + 2x}\left(-2\_C1\, x^2 + 2x^3 + \sqrt{2\_C1 - 2x + 1} - 1\right), y(x) = \frac{1}{-2x + 2\_C1}\left(2\_C1\, x^2 \cdot\right.$$

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 = 0.345161 (sec), leaf count = 130

$$\text{Solve}\left[2a\left(x - \frac{1}{2}\text{RootSum}\left[64\#1^3a^3 - 48\#1^2a^2y(x)^2 - 16\#1^2a^2 + 12\#1ay(x)^4 + 8\#1ay(x)^2 + 2a - y(x\right.\right.\right.$$

✓ **Maple** : cpu = 10.437 (sec), leaf count = 75

$$\left\{\int_{\_b}^{y(x)} \frac{\_a}{-\_a^6 + 12\_a^4ax - 48\_a^2a^2x^2 + 64a^3x^3 - \_a^4 + 8\_a^2ax - 16a^2x^2 + 2a - 1} d\_a + x - \_C1\right.$$

2.879 ODE No. 879

$$y'(x) = \frac{x^2\left(-\sqrt{x^2 + y(x)^2}\right) + xy(x)\sqrt{x^2 + y(x)^2} + xy(x) + y(x)}{x(x+1)}$$

✓ **Mathematica** : cpu = 0.242861 (sec), leaf count = 239

$$\left\{\left\{y(x) \to \frac{x - 2\sqrt{x^2 \tanh^2\left(\sqrt{2}c_1 + \sqrt{2}x - \sqrt{2}\log(x+1)\right) - x^2 \tanh^4\left(\sqrt{2}c_1 + \sqrt{2}x - \sqrt{2}\log(x+1)\right)}}{2\tanh^2\left(\sqrt{2}c_1 + \sqrt{2}x - \sqrt{2}\log(x+1)\right) - 1}\right\}\right.$$

✓ **Maple** : cpu = 0.16 (sec), leaf count = 55

$$\left\{\ln\left(2\frac{x\left(\sqrt{2\left(y\left(x\right)\right)^{2}+2x^{2}}+y(x)+x\right)}{y\left(x\right)-x}\right)+\sqrt{2}x-\sqrt{2}\ln\left(1+x\right)-\ln\left(x\right)-\_C1=0\right\}$$

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 = 0.422608 (sec), leaf count = 131

$$\text{Solve}\left[\frac{\text{RootSum}\left[-64\#1^3a^3+48\#1^2a^2y(x)^2+16\#1^2a^2-12\#1ay(x)^4-8\#1ay(x)^2+y(x)^6+y(x)^4+1\right.}{8a^2}\right.$$

✓ **Maple** : cpu = 0.049 (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 = 0.169906 (sec), leaf count = 75

$$\left\{\left\{y(x)\to\frac{1}{27\left(\frac{1}{27}-\frac{1}{\sqrt{c_1-1458x}}\right)}+\frac{1}{3}(-x^2-3)\right\},\left\{y(x)\to\frac{1}{27\left(\frac{1}{\sqrt{c_1-1458x}}+\frac{1}{27}\right)}+\frac{1}{3}(-x^2-3)\right\}\right\}$$

✓ **Maple** : cpu = 0.033 (sec), leaf count = 77

$$\left\{y(x)=\frac{1}{-6\,x+6\_C1}\left(-2\_C1\,x^2+2\,x^3-3\,\sqrt{2\_C1-2\,x+1}+3\right),y(x)=\frac{1}{-6\,x+6\_C1}\left(-2\_C1\right.\right.$$

2.882 ODE No. 882

$$y'(x) = -\frac{1}{216}\sqrt{x}(-108x^{3/2} + x^9 - 18x^6y(x) - 6x^6 + 108x^3y(x)^2 + 72x^3y(x) - 216y(x)^3 - 216y(x)^2 - 2$$

✓ **Mathematica** : cpu = 0.239443 (sec), leaf count = 119

$$\text{Solve}\left[-\frac{29}{3}\text{RootSum}\left[-29\#1^3 + 3\sqrt[3]{29}\#1 - 29\&, \frac{\log\left(\frac{\frac{1}{2}(2\sqrt{x}-x^{7/2})+3\sqrt{x}y(x)}{\sqrt[3]{29}\sqrt[3]{x^{3/2}}} - \#1\right)}{\sqrt[3]{29} - 29\#1^2}\&\right] = c_1 + \frac{2}{27}29^{2/3}\sqrt{x}$$

✓ **Maple** : cpu = 0.047 (sec), leaf count = 41

$$\left\{y(x) = \frac{x^3}{6} - \frac{1}{3} + \frac{29}{9}\mathit{RootOf}\left(2\,x^{3/2} - 243\int^{\_Z}\left(841\,\_a^3 - 27\,\_a + 27\right)^{-1}d\_a + 9\,\_C1\right)\right\}$$

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 = 1.13492 (sec), leaf count = 164

$$\text{Solve}\left[\frac{x^2}{2} - \frac{1}{2}a^{5/2}\text{RootSum}\left[\#1^3b^3 + 3\#1^2ab^2y(x)^2 + \#1^2ab^2 + 3\#1a^2by(x)^4 + 2\#1a^2by(x)^2 + a^{5/2}b + a^3\right.\right.$$

✓ **Maple** : cpu = 0.511 (sec), leaf count = 352

$$\left\{\int_{\_b}^{x}(b^3\_a^6 + 3\,(y(x))^2\,ab^2\_a^4 + 3\,(y(x))^4\,a^2b\_a^2 + (y(x))^6\,a^3 + a\_a^4b^2 + 2\,a^2(y(x))^2\,b\_a^2 + (y(x))^4\,a^3$$

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 = 0.564047 (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 = 0.296 (sec), leaf count = 107

$$\left\{y(x) = \mathrm{e}^{RootOf\left(-3x^2(\mathrm{e}^{\_Z})^2+6x^3\mathrm{e}^{\_Z}+3(\mathrm{e}^{\_Z})^2\ln\left(\frac{(\mathrm{e}^{\_Z})^2-2\mathrm{e}^{\_Z}x+1}{\mathrm{e}^{\_Z}-2x}\right)-2\_C1(\mathrm{e}^{\_Z})^2-3\_Z(\mathrm{e}^{\_Z})^2-6\mathrm{e}^{\_Z}\ln\left(\frac{(\mathrm{e}^{\_Z})^2-2\mathrm{e}^{\_Z}x+1}{\mathrm{e}^{\_Z}-2x}\right)\right.}\right.$$

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 = 40.6342 (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 = 0.171533 (sec), leaf count = 82

$$\text{Solve}\left[-\frac{29}{3}\text{RootSum}\left[-29\#1^3 + 3\sqrt[3]{29}\#1 - 29\&, \frac{\log\left(\frac{3x^2y(x)-3x+1}{\sqrt[3]{29}} - \#1\right)}{\sqrt[3]{29} - 29\#1^2}\&\right] = c_1 - \frac{29^{2/3}}{9x}, y(x)\right]$$

✓ **Maple** : cpu = 0.023 (sec), leaf count = 42

$$\left\{y(x) = \frac{9x - 3 + 29\,RootOf\left(-81\int^{\_Z}(841\_a^3 - 27\_a + 27)^{-1}d\_a x + 3x\_C1 - 1\right)}{9x^2}\right\}$$

2.887 ODE No. 887

$$y'(x) = \frac{a^3x^3y(x)^3 + 3a^2x^2y(x)^2 + a^2xy(x) + a^2x + 3axy(x) + a + 1}{a^2x^2(axy(x) + ax + 1)}$$

✓ **Mathematica** : cpu = 0.224655 (sec), leaf count = 106

$$\left\{\left\{y(x) \to \frac{1}{a^3x^3\left(\frac{1}{a^3x^3} - \frac{1}{x^3\sqrt{c_1 - 2a^6x}}\right)} - \frac{ax+1}{ax}\right\}, \left\{y(x) \to \frac{1}{a^3x^3\left(\frac{1}{x^3\sqrt{c_1 - 2a^6x}} + \frac{1}{a^3x^3}\right)} - \frac{ax+1}{ax}\right\}\right\}$$

✓ **Maple** : cpu = 0.034 (sec), leaf count = 72

$$\left\{y(x) = \frac{1}{ax}\left(-ax - \sqrt{\_C1 - 2\,x} - 1\right)\left(\sqrt{\_C1 - 2\,x} + 1\right)^{-1}, y(x) = \frac{1}{ax}\left(ax - \sqrt{\_C1 - 2\,x} + 1\right)\left(\sqrt{\_\right.$$

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 = 0.170295 (sec), leaf count = 78

$$\left\{\left\{y(x) \to \frac{1}{x^4\left(\frac{1}{x^2} - \frac{1}{x^2\sqrt{c_1 + \frac{2}{x}}}\right)} + \frac{x-1}{x^2}\right\}, \left\{y(x) \to \frac{1}{x^4\left(\frac{1}{x^2\sqrt{c_1 + \frac{2}{x}}} + \frac{1}{x^2}\right)} + \frac{x-1}{x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.043 (sec), leaf count = 79

$$\left\{y(x) = \frac{1}{x^2}\left(\sqrt{\frac{x\_C1 + 2}{x}}x - x + 1\right)\left(\sqrt{\frac{x\_C1 + 2}{x}} - 1\right)^{-1}, y(x) = \frac{1}{x^2}\left(\sqrt{\frac{x\_C1 + 2}{x}}x + x - 1\right)\left(\sqrt{\right.\right.$$

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 = 300.373 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.825 (sec), leaf count = 49

$$\left\{ \mathrm{e}^{x} - \frac{2}{3}\ln\left((y(x))^{\frac{3}{2}} - \frac{3\,\mathrm{e}^{x}}{2} + 1 \right) - 4\left(-6\,(y(x))^{3/2} + 9\,\mathrm{e}^{x} \right)^{-1} + \frac{2}{3}\ln\left((y(x))^{\frac{3}{2}} - \frac{3\,\mathrm{e}^{x}}{2} \right) - \_C1 = 0 \right\}$$

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 = 0.180655 (sec), leaf count = 103

$$\text{Solve}\left[y(x) - \frac{1}{2}\text{RootSum}\left[\#1^3 + 3\#1^2 y(x)^2 + \#1^2 + 3\#1 y(x)^4 + 2\#1 y(x)^2 + y(x)^6 + y(x)^4 + 1\&, \frac{}{3\#1^2} \right.\right.$$

✓ **Maple** : cpu = 0.519 (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 = 0.175207 (sec), leaf count = 135

$$\left\{ \left\{ y(x) \to \frac{x^5}{\frac{\sqrt{x^5 \left(c_1 - 2\left(\frac{1}{2x^4} - \frac{1}{x^2} + \log(x)\right)\right) + (x^2-1)^2 x}}{\sqrt{\frac{1}{x^5}}} - x^3 \left(x^2 - 1\right)} \right\}, \left\{ y(x) \to -\frac{x^5}{\frac{\sqrt{x^5 \left(c_1 - 2\left(\frac{1}{2x^4} - \frac{1}{x^2} + \log(x)\right)\right) + (x^2-1)^{2}}}{\sqrt{\frac{1}{x^5}}}} \right.\right.$$

✓ **Maple** : cpu = 0.043 (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 = 2.24762 (sec), leaf count = 1283

$$\text{Solve}\left[\int_1^x\left(-e^{\int_1^{(K[2]-y(x))(K[2]+y(x))}\frac{2((K[1]-3)K[1]+1)}{\left(e^{-\frac{2}{K[1]-1}}-K[1]\right)(K[1]-1)^2}dK[1]+\frac{2}{K[2]^2-y(x)^2-1}}K[2]^2-2e^{\int_1^{(K[2]-y(x))(K[2]+y(x))}\frac{2((}{\left(e^{-\frac{2}{K[1]}}\right.}}\right.\right.$$

✓ **Maple** : cpu = 0.376 (sec), leaf count = 40

$$\left\{y(x)=\mathrm{e}^{RootOf\left(-\_Z+\int^{\left(\mathrm{e}^{\_Z}\right)^2-2\,\mathrm{e}^{\_Z}x}\left(\mathrm{e}^{2\,(1+\_a)^{-1}}+\_a\right)^{-1}d\_a+\_C1\right)}-x\right\}$$

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 = 0.168645 (sec), leaf count = 80

$$\text{Solve}\left[-\frac{29}{3}\text{RootSum}\left[-29\#1^3+3\sqrt[3]{29}\#1-29\&,\frac{\log\left(\frac{3y(x)+\frac{x+6}{x}}{\sqrt[3]{29}}-\#1\right)}{\sqrt[3]{29}-29\#1^2}\&\right]=c_1+\frac{1}{9}29^{2/3}x,y(x)\right]$$

✓ **Maple** : cpu = 0.019 (sec), leaf count = 41

$$\left\{y(x)=\frac{29\,RootOf\left(-81\int^{\_Z}(841\_a^3-27\_a+27)^{-1}d\_a+x+3\_C1\right)x-3x-18}{9x}\right\}$$

2.894 ODE No. 894

$$y'(x) = -\frac{i(x^6+3x^4y(x)^2+x^4+3x^2y(x)^4+2x^2y(x)^2+y(x)^6+y(x)^4+ix+1)}{y(x)}$$

✗ **Mathematica** : cpu = 40.5839 (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 = 0.222041 (sec), leaf count = 81

$$\left\{\left\{y(x)\to\frac{1}{8}\left(-ax^4-8\right)+\frac{1}{512\left(\frac{1}{512}-\frac{1}{\sqrt{c_1-262144x^2}}\right)}\right\},\left\{y(x)\to\frac{1}{8}\left(-ax^4-8\right)+\frac{1}{512\left(\frac{1}{\sqrt{c_1-262144x^2}}+\frac{}{5}\right.}\right.$$

✓ **Maple** : cpu = 0.044 (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 = 0.294567 (sec), leaf count = 106

$$\text{Solve}\left[\frac{1}{2}\text{RootSum}\left[-\#1^3+3\#1^2y(x)^2+\#1^2-3\#1y(x)^4-2\#1y(x)^2+y(x)^6+y(x)^4+1\&,\frac{}{3\#1^2-6\#}\right.\right.$$

✓ **Maple** : cpu = 0.39 (sec), leaf count = 63

$$\left\{\int_{\_b}^{y(x)}\frac{\_a}{-\_a^6+3\_a^4x^2-3\_a^2x^4+x^6-\_a^4+2\_a^2x^2-x^4-1}\,\mathrm{d}\_a+x-\_C1=0\right\}$$

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 = 0.211747 (sec), leaf count = 79

$$\left\{\left\{y(x) \to \frac{1}{6}\left(x^3-6\right) - \frac{1}{216\left(-\frac{1}{\sqrt{c_1-62208x^{3/2}}} - \frac{1}{216}\right)}\right\}, \left\{y(x) \to \frac{1}{6}\left(x^3-6\right) - \frac{1}{216\left(\frac{1}{\sqrt{c_1-62208x^{3/2}}} - \frac{1}{216}\right)}\right.$$

✓ **Maple** : cpu = 0.056 (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 = 0.176434 (sec), leaf count = 106

$$\left\{\left\{y(x) \to \frac{1}{64x^8\left(\frac{1}{64x^8} - \frac{1}{x^8\sqrt{c_1+\frac{8192}{x}}}\right)} - \frac{4x^2+1}{4x^2}\right\}, \left\{y(x) \to \frac{1}{64x^8\left(\frac{1}{x^8\sqrt{c_1+\frac{8192}{x}}} + \frac{1}{64x^8}\right)} - \frac{4x^2+1}{4x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.033 (sec), leaf count = 87

$$\left\{y(x) = \frac{1}{4\,x^2}\left(-4\,x^2 - \sqrt{\frac{x\_C1+2}{x}} - 1\right)\left(\sqrt{\frac{x\_C1+2}{x}} + 1\right)^{-1}, y(x) = \frac{1}{4\,x^2}\left(4\,x^2 - \sqrt{\frac{x\_C1+2}{x}} + \right.\right.$$

2.899 ODE No. 899

$$y'(x) = \frac{x^6y(x)^3 + x^6y(x)^2 + x^6 + \frac{x^5}{2} + \frac{3}{4}x^4y(x)^2 + \frac{1}{2}x^4y(x) + \frac{3}{16}x^2y(x) + \frac{x^2}{16} + \frac{1}{64}}{x^8}$$

✓ **Mathematica** : cpu = 0.203255 (sec), leaf count = 106

$$\text{Solve}\left[-\frac{29}{3}\text{RootSum}\left[-29\#1^3 + 3\sqrt[3]{29}\#1 - 29\&, \frac{\log\left(\frac{\frac{3y(x)}{x^2}+\frac{4x^2+3}{4x^4}}{\sqrt[3]{29}\sqrt[3]{\frac{1}{x^6}}} - \#1\right)}{\sqrt[3]{29} - 29\#1^2}\&\right] = c_1 - \frac{1}{9}29^{2/3}\left(\frac{1}{x^6}\right)^{2/3}x^3,$$

✓ **Maple** : cpu = 0.023 (sec), leaf count = 47

$$\left\{y(x) = \frac{116\, RootOf\left(-81\int^{\_Z}(841\_a^3 - 27\_a + 27)^{-1}d\_a x + 3\,x\_C1 - 1\right)x^2 - 12\,x^2 - 9}{36\,x^2}\right\}$$

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 = 0.168641 (sec), leaf count = 381

$$\{\{y(x) \to \text{Root}[8\#1^5a - 16\#1^4a^2c_1 - 64\#1^3a^2x + \#1^2(128a^3c_1x - 2) + 128\#1a^3x^2 - 256a^4c_1x^2 + 8ax$$

✓ **Maple** : cpu = 0.049 (sec), leaf count = 48

$$\left\{\frac{y(x)}{2\,a} - \frac{1}{16\,a^2\left((y(x))^2 - 4\,ax\right)^2} + \left(32\,a^3x - 8\,a^2(y(x))^2\right)^{-1} - \_C1 = 0\right\}$$

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 = 0.514009 (sec), leaf count = 33

$$\text{Solve}\left[ax\log(y(x)) - \frac{x^2}{2} - y(x)\log(x) - y(x)\log(y(x)) = c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.414 (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 = 0.223868 (sec), leaf count = 295

$$\left\{\left\{y(x) \to -\frac{1}{2}\sqrt{\frac{4x^3}{x-c_1} - \frac{4c_1x^2}{x-c_1} - \frac{\sqrt{4c_1-4x+1}}{x-c_1} - \frac{1}{x-c_1}}\right\}, \left\{y(x) \to \frac{1}{2}\sqrt{\frac{4x^3}{x-c_1} - \frac{4c_1x^2}{x-c_1} - \frac{\sqrt{4c_1}}{x}\right.\right.$$

✓ **Maple** : cpu = 0.18 (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 = 0.117046 (sec), leaf count = 19

$$\left\{\left\{y(x) \to 2x\cot^{-1}\left(e^{-c_1-x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.053 (sec), leaf count = 48

$$\left\{y(x) = \arctan\left(2\,\frac{\_C1\,\mathrm{e}^{x}}{\_C1^{2}\left(\mathrm{e}^{x}\right)^{2}+1}, \frac{-\_C1^{2}(\mathrm{e}^{x})^{2}+1}{\_C1^{2}\left(\mathrm{e}^{x}\right)^{2}+1}\right)x\right\}$$

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 = 0.103184 (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 = 0.035 (sec), leaf count = 64

$$\left\{y(x) = \arctan\left(2\,\frac{\mathrm{e}^{1/2\,x^{2}}\_C1}{\left(\mathrm{e}^{1/2\,x^{2}}\right)^{2}\_C1^{2}+1}, 1\left(-\left(\mathrm{e}^{\frac{x^2}{2}}\right)^{2}\_C1^{2}+1\right)\left(\left(\mathrm{e}^{\frac{x^2}{2}}\right)^{2}\_C1^{2}+1\right)^{-1}\right)x\right\}$$

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 = 0.239061 (sec), leaf count = 85

$$\mathrm{Solve}\left[-\frac{29}{3}\mathrm{RootSum}\left[-29\#1^3+3\sqrt[3]{29}\#1-29\&, \frac{\log\left(\frac{\frac{ax+3}{ax}+3y(x)}{\sqrt[3]{29}}-\#1\right)}{\sqrt[3]{29}-29\#1^2}\&\right] = c_1+\frac{1}{9}29^{2/3}x, y(x)\right]$$

✓ **Maple** : cpu = 0.03 (sec), leaf count = 46

$$\left\{y(x) = \frac{29\,\mathit{RootOf}\left(-81\int^{\_Z}\left(841\_a^{3}-27\_a+27\right)^{-1}d\_a+x+3\_C1\right)ax-3\,ax-9}{9\,ax}\right\}$$

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 = 0.12338 (sec), leaf count = 326

$$\{\{y(x) \to \text{Root}\left[4\#1^5 - 4\#1^4c_1 + 8\#1^3x^2 + \#1^2\left(2 - 8c_1x^2\right) + 4\#1x^4 - 4c_1x^4 + 2x^2 + 1\&, 1\right]\}, \{y(x) -$$

✓ **Maple** : cpu = 0.244 (sec), leaf count = 37

$$\left\{-\frac{1}{4\left((y(x))^2 + x^2\right)^2} - \left(2(y(x))^2 + 2x^2\right)^{-1} - y(x) + \_C1 = 0\right\}$$

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 = 0.272028 (sec), leaf count = 22

$$\left\{\left\{y(x) \to \frac{1}{c_1 - \log(x)} - x(\cos(x) - 1)\right\}\right\}$$

✓ **Maple** : cpu = 0.112 (sec), leaf count = 20

$$\left\{y(x) = -(-1 + \cos(x))\,x + (\_C1 - \ln(x))^{-1}\right\}$$

2.908 ODE No. 908

$$y'(x) = \frac{4(a-1)(a+1)x}{a^6x^4 - 3a^4x^4 - 2a^4x^2y(x)^2 + 3a^2x^4 + 4a^2x^2y(x)^2 + a^2y(x)^4 - x^4 - 2x^2y(x)^2 - y(x)^4 + 4y(x)}$$

✓ **Mathematica** : cpu = 1.09792 (sec), leaf count = 1269

$$\left\{\left\{y(x) \to \frac{c_1}{3(a^2-1)} + \frac{\sqrt[3]{-18x^2c_1a^6 + 54x^2c_1a^4 + 54a^4 - 54x^2c_1a^2 - 108a^2 + 2c_1{}^3 + 18x^2c_1 + \sqrt{4(-3}}}{}\right.\right.$$

✓ **Maple** : cpu = 0.282 (sec), leaf count = 1742

$$\left\{ y(x) = \frac{9^{\frac{2}{3}}}{27\,a^2 - 27}\left(\left(-\_C1\;a^2 + \_C1\right)\sqrt[3]{9}\sqrt[3]{(a+1)^2\,(a-1)^2\left(\frac{1}{3}\sqrt{-3\,(a-1)^5\,(a+1)^5\,x^6 + 6\_C1^2\,(\right.}}\right.\right.$$

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 = 40.6199 (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 = 0.407 (sec), leaf count = 84

$$\left\{ y(x) = \frac{1}{x}\sqrt{x\left(RootOf\left(\int^{\_Z}\left(2\_a^3 + 2\_a^2 + 1\right)^{-1}d\_a x + x\_C1 + 1\right)x - 1\right)}, y(x) = -\frac{1}{x}\sqrt{x\left(Roo\right.}\right.$$

2.910 ODE No. 910

$$y'(x) = \frac{x^6 + 3x^5y(x) + 3x^4y(x)^2 + x^4 + x^3y(x)^3 + 2x^3y(x) + x^2y(x)^2 - y(x) - 2x + 1}{x}$$

✓ **Mathematica** : cpu = 0.226512 (sec), leaf count = 98

$$\text{Solve}\left[-\frac{29}{3}\text{RootSum}\left[-29\#1^3 + 3\sqrt[3]{29}\#1 - 29\&, \frac{\log\left(\frac{3x^3+3x^2y(x)+x}{\sqrt[3]{29}\sqrt[3]{x^3}} - \#1\right)}{\sqrt[3]{29} - 29\#1^2}\&\right] = c_1 + \frac{29^{2/3}\left(x^3\right)^{2/3}}{9x}, y(x)\right.$$

✓ **Maple** : cpu = 0.022 (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

$$y'(x) = -y(x)\left(-\_F1(x) - \frac{\log(y(x))}{x} + \cot(x)\log(y(x))\right)$$

✓ **Mathematica** : cpu = 0.731553 (sec), leaf count = 106

$$\text{Solve}\left[\int_1^x \left(\frac{2\log(y(x))\sin(K[1])}{K[1]^2} - \frac{2(\cos(K[1])\log(y(x)) - \sin(K[1])\_F1(K[1]))}{K[1]}\right) dK[1] + \int_1^{y(x)} \left(-\frac{2\,\mathrm{s}}{x}\right.\right.$$

✓ **Maple** : cpu = 0.361 (sec), leaf count = 30

$$\left\{y(x) = e^{\frac{x\_C1}{\sin(x)}} e^{\frac{x}{\sin(x)}\int \frac{\_F1(x)\sin(x)}{x}\,dx}\right\}$$

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 = 1.24094 (sec), leaf count = 201

$$\text{Solve}\left[-\text{RootSum}\left[-\#1^3y(x)^6 - \#1^3y(x)^4 - \#1^3 + 12\#1^2ay(x)^4 + 8\#1^2ay(x)^2 - 48\#1a^2y(x)^2 - 16\#1\right.\right.$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(y(x),x) = 2*a*x/(-x^3*y(x)+2*a*x^3+2*a*y(x)^4*x^3-16*y(x)^2*a^2*x^2+32*a^3
24*y(x)^4*a^2*x^2+96*y(x)^2*x*a^3-128*a^4),y(x))
```

2.913 ODE No. 913

$$y'(x) = \frac{y(x)^3 + y(x) + y(x)^3\left(-\log^3(x)\right) + y(x)^3\log^2(x) + 3y(x)^2\log^2(x) - 2y(x)^2\log(x) - 3y(x)\log(x)}{xy(x)}$$

✓ **Mathematica** : cpu = 0.779856 (sec), leaf count = 716

$$\text{Solve}\left[\int_1^{y(x)} \left(2\text{RootSum}\left[\#1^3K[1]^3 - \#1^2K[1]^3 - 2K[1]^3 - 3\#1^2K[1]^2 + 2\#1K[1]^2 + 3\#1K[1] - K[1]\right.\right.\right.$$

✓ **Maple** : cpu = 0.118 (sec), leaf count = 43

$$\left\{y(x) = 9\left(9\ln(x) + 56\,RootOf\left(-81\int^{\_Z}(3136\_a^3 - 27\_a + 27)^{-1}d\_a - \ln(x) + 3\_C1\right) - 3\right)^{-1}$$

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 = 1.1785 (sec), leaf count = 401

$$\{\{y(x) \to \text{Root}\left[8\#1^5ax^2 - 8\#1^4ac_1x^2 - 64\#1^3a^2x + \#1^2\left(64a^2c_1x + 2x^2\right) + 128\#1a^3 - 128a^3c_1 - 8ax\right.$$

✓ **Maple** : cpu = 3.299 (sec), leaf count = 71

$$\left\{\frac{x(y(x))^4 + (-4a + x)(y(x))^2 - 2a}{2a(y(x))^4\left(-x(y(x))^2 + 4a\right)^2} + \frac{8a(y(x))^5 + 2(y(x))^2 + 1}{16a^2(y(x))^4} + \_C1 = 0\right\}$$

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 = 0.865219 (sec), leaf count = 724

$$\text{Solve}\left[\int_1^{y(x)}\left(4\text{RootSum}\left[8\#1^3K[1]^3 - 4\#1^2K[1]^3 - 3K[1]^3 - 12\#1^2K[1]^2 + 4\#1K[1]^2 + 6\#1K[1] - K\right.\right.\right.$$

✓ **Maple** : cpu = 0.044 (sec), leaf count = 43

$$\left\{y(x) = 9\left(18\ln(x) + 83\,RootOf\left(-81\int^{\_Z}(6889\_a^3 - 27\_a + 27)^{-1}d\_a - \ln(x) + 3\_C1\right) - 3\right)^{-}$$

2.916 ODE No. 916

$$y'(x) = \frac{y(x) \left(x^4 \log^2(y(x)) + 2x^4 \log(x) \log(y(x)) + x^4 \log^2(x) + x \log(y(x)) + \log(y(x)) - x + x \log(x) +\right.}{x(x+1)}$$

✗ **Mathematica** : cpu = 1.60191 (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 = 0.293 (sec), leaf count = 73

$$\left\{ y(x) = e^{\frac{-12\ \ln(1+x)\ln(x) + \left(-3\,x^4+4\,x^3-6\,x^2+12\_C1+12\,x\right)\ln(x) - 12\,x}{3\,x^4-4\,x^3+6\,x^2+12\ \ln(1+x)-12\_C1-12\,x}} \right\}$$

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 = 1.02715 (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 = 0.155 (sec), leaf count = 38

$$\left\{ y(x) = e^{\frac{\ln(1+x)\ln(x) + (-x+\_C1)\ln(x) - x}{-\ln(1+x) - \_C1 + x}} \right\}$$

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 = 0.45165 (sec), leaf count = 720

$$\text{Solve}\left[\int_1^{y(x)} \left(\text{RootSum}\left[64\#1^3K[1]^6 + 16\#1^2K[1]^6 + K[1]^6 + 48\#1^2K[1]^4 + 8\#1K[1]^4 + 12\#1K[1]^2 +\right.\right.\right.$$

✓ **Maple** : cpu = 0.961 (sec), leaf count = 41

$$\left\{ x - \mathit{RootOf}\left(\int^{\_Z} \left(64\_a^3 + 16\_a^2 + 1\right)^{-1} d\_a y(x) + \_C1\, y(x) + 1\right) + \frac{1}{4\,(y(x))^2} = 0 \right\}$$

2.919 ODE No. 919

$$y'(x) = \frac{\left(-y(x) + \sqrt{y(x)} + x\right) y(x)^{3/2}}{x^3 - 3x^2 y(x) + 3xy(x)^2 + xy(x)^{3/2} - y(x)^3 - y(x)^{5/2} + y(x)^2}$$

✗ **Mathematica** : cpu = 300.415 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.164 (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

$$y'(x) = \frac{2y(x)^6 \left(4xy(x)^2 + y(x)^2 + 1\right)}{128x^3 y(x)^6 + 96x^2 y(x)^4 + 4xy(x)^5 + y(x)^5 + y(x)^3 + 24xy(x)^2 + 2}$$

✓ **Mathematica** : cpu = 0.453647 (sec), leaf count = 301

$$\{\{y(x) \to \text{Root}\left[\#1^5 \left(128c_1x^2 - 8x - 1\right) + 128\#1^4x^2 + \#1^3(64c_1x - 2) + 64\#1^2x + 8\#1c_1 + 8\&, 1\right]\}, \{$$

✗ **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 = 0.231542 (sec), leaf count = 92

$$\text{Solve}\left[\int_1^x \left(\frac{\log(y(x)) - \log(K[1])\log(y(x))}{K[1]^2} - \frac{\log(K[1])\_\text{F1}(K[1])}{K[1]}\right) dK[1] + \int_1^{y(x)} \left(\frac{\log(x)}{xK[2]} - \int_1^x \frac{\frac{1}{K[2]}}{}\right.\right.$$

✓ **Maple** : cpu = 0.1 (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 = 1.24035 (sec), leaf count = 882

$$\text{Solve}\left[\int_1^{y(x)} \left(\frac{-x - K[1]}{2\left(-2x^3 + 6K[1]x^2 - 2\sqrt{K[1]}x^2 - 6K[1]^2x + 4K[1]^{3/2}x + K[1]x + 2K[1]^3 - 2K[1]^{5/2} - \right.}\right.\right.$$

✓ **Maple** : cpu = 0.102 (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 = 1.39399 (sec), leaf count = 432

$$\text{Solve}\left[\int_1^{y(x)} \left(-\frac{2e^{2(x-K[2])(x+K[2])}K[2]}{-e^{2(x-K[2])(x+K[2])}x^2 + e^{2(x-K[2])(x+K[2])}K[2]^2 + 1} - \int_1^x \left(-\frac{2e^{2(K[1]-K[2])(K[1]+K[2])}K[1](2}{e^{2(K[1]-K[2])(K[1]+K[2])}K[1]^2 -}\right.\right.\right.$$

✓ **Maple** : cpu = 0.242 (sec), leaf count = 36

$$\left\{y(x) = e^{RootOf\left(-\_Z + \int^{\left(e^{\_Z}\right)^2 - 2e^{\_Z}x} \left(e^{2\_a} + \_a\right)^{-1} d\_a + \_C1\right)} - x\right\}$$

2.924 ODE No. 924

$$y'(x) = -\frac{y(x)\left(-\_F1(x) - \frac{\log^2(y(x))}{2x}\right)}{\log(y(x))}$$

✓ **Mathematica** : cpu = 0.235722 (sec), leaf count = 80

$$\text{Solve}\left[\int_1^x \left(-\frac{\log^2(y(x))}{2K[1]^2} - \frac{\_F1(K[1])}{K[1]}\right) dK[1] + \int_1^{y(x)} \left(\frac{\log(K[2])}{xK[2]} - \int_1^x -\frac{\log(K[2])}{K[1]^2K[2]}dK[1]\right) dK[2] = c$$

✓ **Maple** : cpu = 0.107 (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 = 2.0394 (sec), leaf count = 228

$$\text{Solve}\left[\int_1^{y(x)} \left(-\frac{2K[2]}{-x^2 + e^{2(x-K[2])^2(x+K[2])^2} + K[2]^2} - \int_1^x \left(\frac{2K[1]\left(-2K[2] - e^{2(K[1]-K[2])^2(K[1]+K[2])^2}(4(K\right.}{(K[1]^2 - e^{2(K}}\right.\right.$$

✓ **Maple** : cpu = 0.18 (sec), leaf count = 38

$$\left\{y(x) = \mathrm{e}^{RootOf\left(-\_Z + \int \left(\mathrm{e}^{\_Z}\right)^2 - 2\,\mathrm{e}^{\_Z}x\left(\mathrm{e}^{2\_a^2} + \_a\right)^{-1} d\_a + \_C1\right)} - x\right\}$$

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 = 0.184798 (sec), leaf count = 128

$$\left\{\left\{y(x) \to \frac{1}{16x(x-2)\left(-\frac{e^{2\left(\frac{1}{2}\log(2-x)-\frac{\log(x)}{2}\right)}}{\sqrt{c_1+2048\log(x)}} - \frac{1}{64}\right)} + \frac{2}{x-2}\right\}, \left\{y(x) \to \frac{1}{16x(x-2)\left(\frac{e^{2\left(\frac{1}{2}\log(2-x)-\frac{\log(x)}{2}\right)}}{\sqrt{c_1+2048\log(x)}}\right.}\right.$$

✓ **Maple** : cpu = 0.044 (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 = 0.565879 (sec), leaf count = 112

$$\text{Solve}\left[-\frac{29}{3}\text{RootSum}\left[-29\#1^3 + 3\sqrt[3]{29}\#1 - 29\&, \frac{\log\left(\frac{\frac{1}{2}e^{-x^2}x\left(2e^{x^2}-3x^2\right)+3xy(x)}{\sqrt[3]{29}\sqrt[3]{x^3}} - \#1\right)}{\sqrt[3]{29} - 29\#1^2}\&\right] = c_1 + \frac{1}{18}29^{2/3}\right.$$

✓ **Maple** : cpu = 0.083 (sec), leaf count = 68

$$\left\{y(x) = \frac{58\, RootOf\left(x^2 - 162\int^{\_Z}(841\_a^3 - 27\_a + 27)^{-1}d\_a + 6\_C1\right) + \left(9x^2 - 6e^{x^2}\right)e^{-x^2}}{18\,e^{-x^2}e^{x^2}}\right\}$$

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 = 1.22982 (sec), leaf count = 23

$$\left\{\left\{y(x) \to -x\log\left(-\frac{\log(x+1) - c_1}{x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.273 (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 = 0.806826 (sec), leaf count = 683

$$\text{Solve}\left[\int_1^{y(x)}\left(-32\text{RootSum}\left[\#1^3K[1]^3 - 2\#1^2K[1]^3 - 8K[1]^3 - 6\#1^2K[1]^2 + 8\#1K[1]^2 + 12\#1K[1] - \right.\right.\right.$$

✓ **Maple** : cpu = 0.03 (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 = 1.41358 (sec), leaf count = 39

$$\left\{\left\{y(x) \to -x\log\left(\frac{-c_1 - \frac{x^3}{3} + \frac{x^2}{2} - x + \log(x+1)}{x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.419 (sec), leaf count = 36

$$\left\{y(x)=-\ln\left(\frac{-2\,x^3+3\,x^2+6\,\ln(1+x)-6\_C1-6\,x}{6\,x}\right)x\right\}$$

2.931 ODE No. 931

$$y'(x)=\frac{x^6+3x^5y(x)+3x^4y(x)^2+x^3y(x)^3-2x^3-3x^2y(x)-xy(x)^2-y(x)-2x}{x\left(x^2+xy(x)+1\right)}$$

✓ **Mathematica** : cpu = 0.169507 (sec), leaf count = 80

$$\left\{\left\{y(x)\to\frac{1}{x^2\left(\frac{1}{x}-\frac{1}{x\sqrt{c_1-2x}}\right)}-\frac{x^2+1}{x}\right\},\left\{y(x)\to\frac{1}{x^2\left(\frac{1}{x\sqrt{c_1-2x}}+\frac{1}{x}\right)}-\frac{x^2+1}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.032 (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 = 4.53863 (sec), leaf count = 4323

$$\text{Solve}\left[\frac{x^2}{2}+\frac{27}{2}\text{RootSum}\left[y(x)^3\#1^3+9y(x)^2\#1^3+27y(x)\#1^3+27\#1^3+3y(x)^3\#1^2+18y(x)^2\#1^2+27\right.\right.$$

✓ **Maple** : cpu = 0.101 (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

$$y'(x) = \frac{x^3 + x^3(-\log^3(x)) + x^3\log^2(x) + 3x^2y(x)\log^2(x) - 2x^2y(x)\log(x) + x^2 + xy(x)^2 + xy(x) + y(x}{x^2}$$

✓ **Mathematica** : cpu = 0.235948 (sec), leaf count = 99

$$\text{Solve}\left[-\frac{29}{3}\text{RootSum}\left[-29\#1^3 + 3\sqrt[3]{29}\#1 - 29\&, \frac{\log\left(\frac{\frac{3y(x)}{x^2}+\frac{1-3\log(x)}{x}}{\sqrt[3]{29}\sqrt[3]{\frac{1}{x^3}}} - \#1\right)}{\sqrt[3]{29} - 29\#1^2}\&\right] = c_1 + \frac{29^{2/3}}{9\sqrt[3]{\frac{1}{x^3}}}, y(x)\right]$$

✓ **Maple** : cpu = 0.026 (sec), leaf count = 39

$$\left\{y(x) = \frac{x\left(9\ln(x) - 3 + 29\,RootOf\left(-81\int^{\_Z}(841\_a^3 - 27\_a + 27)^{-1}d\_a + x + 3\_C1\right)\right)}{9}\right\}$$

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 = 0.268849 (sec), leaf count = 102

$$\text{Solve}\left[-\frac{31}{3}\text{RootSum}\left[-31\#1^3 + 3\ 2^{2/3}\sqrt[3]{31}\#1 - 31\&, \frac{\log\left(\sqrt[3]{\frac{2}{31}}\left(\frac{1}{4}(-3x^2 - 6x + 4) + 3y(x)\right) - \#1\right)}{2^{2/3}\sqrt[3]{31} - 31\#1^2}\&\right]\right.$$

✓ **Maple** : cpu = 0.051 (sec), leaf count = 39

$$\left\{y(x) = \frac{x^2}{4} + \frac{x}{2} + RootOf\left(-x + 2\int^{\_Z}(2\_a^3 + 2\_a^2 + 1)^{-1}d\_a + \_C1\right)\right\}$$

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 = 27.5437 (sec), leaf count = 248

$$\text{Solve}\left[\frac{\sqrt[3]{2}\left(\frac{\frac{1}{4}(3x^2-12x+4)+3y(x)}{\sqrt[3]{2}} + 2^{2/3}\right)\left(2^{2/3} - 2^{2/3}\left(\frac{1}{4}(3x^2-12x+4)+3y(x)\right)\right)\left(\left(\frac{1}{4}(-3x^2+12x-4) - 3y\right.\right.}{9\left(-\left(\frac{1}{4}(3x^2-12x+\right.\right.}\right.$$

✓ **Maple** : cpu = 0.153 (sec), leaf count = 55

$$\left\{y(x) = \frac{e^{RootOf(\ln(e^{\_Z}-4)e^{\_Z} + \_C1\,e^{\_Z} - \_Z\,e^{\_Z} + e^{\_Z}x - 4\ln(e^{\_Z}-4) - 4\_C1 + 4\_Z - 4x + 4)}}{4} - 1 - \frac{x^2}{4} + x\right\}$$

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 = 0.247281 (sec), leaf count = 99

$$\text{Solve}\left[-\frac{89}{3}\text{RootSum}\left[-89\#1^3 + 6\sqrt[3]{178}\#1 - 89\&, \frac{\log\left(\frac{2^{2/3}\left(\frac{1}{8}(3x^2-6x+8)+3y(x)\right)}{\sqrt[3]{89}} - \#1\right)}{2\sqrt[3]{178} - 89\#1^2}\&\right] = c_1 + \frac{89^{2/3}x}{18\sqrt[3]{2}},\right.$$

✓ **Maple** : cpu = 0.053 (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 = 0.270636 (sec), leaf count = 124

$$\left\{\left\{y(x) \to \frac{1}{(2x+1)\left(\frac{2x+1}{4x^2+4x+1} - \frac{1}{(2x+1)\sqrt{c_1-2x}}\right)} - \log(2x+1) - 1\right\}, \left\{y(x) \to \frac{1}{(2x+1)\left(\frac{1}{(2x+1)\sqrt{c_1-2x}} +\right.}\right.$$

✓ **Maple** : cpu = 0.043 (sec), leaf count = 79

$$\left\{y(x) = 1\left(-\sqrt{\_C1 - 2\,x}\ln(2\,x+1) - \ln(2\,x+1) - 1\right)\left(\sqrt{\_C1 - 2\,x} + 1\right)^{-1}, y(x) = 1\left(-\sqrt{\_C1 - 2\right.\right.$$

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 = 0.239283 (sec), leaf count = 108

$$\text{Solve}\left[-\frac{29}{3}\text{RootSum}\left[-29\#1^3 + 3\sqrt[3]{29}\#1 - 29\&, \frac{\log\left(\frac{\frac{3x^2-3x+1}{x} + \frac{3y(x)}{x}}{\sqrt[3]{29}\sqrt[3]{\frac{1}{x^3}}} - \#1\right)}{\sqrt[3]{29} - 29\#1^2}\&\right] = c_1 + \frac{1}{9}29^{2/3}\left(\frac{1}{x^3}\right)^{2/3}\right.$$

✓ **Maple** : cpu = 0.026 (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 = 0.528905 (sec), leaf count = 136

$$\text{Solve}\left[\frac{2}{5}\text{RootSum}\left[\#1^4 + 4\#1^3 - 8\#1^2y(x) - 16\#1y(x) - 8\#1 + 16y(x)^2 + 16y(x) + 8\&, \frac{\#1^2(-\log(x -}{}\right.\right.$$

✓ **Maple** : cpu = 0.105 (sec), leaf count = 70

$$\left\{x + \frac{2}{5}\ln\left(2\left(y(x) - 1/4\,x^2 - x/2\right)^2 + 2\,y(x) - \frac{x^2}{2} - x + 1\right) - \frac{2}{5}\arctan\left(-2\,y(x) + \frac{x^2}{2} + x - 1\right) - \frac{4}{5}\ln\right.$$

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 = 0.205835 (sec), leaf count = 80

$$\left\{\left\{y(x) \to -\frac{1}{x\left(-\frac{1}{x^2\sqrt{c_1 - 2x}} - \frac{1}{x^2}\right)} - x + x\log(x)\right\}, \left\{y(x) \to -\frac{1}{x\left(\frac{1}{x^2\sqrt{c_1 - 2x}} - \frac{1}{x^2}\right)} - x + x\log(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.035 (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 = 0.45322 (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 = 0.04 (sec), leaf count = 35

$$\left\{y(x)=-\frac{x^2}{4}+x+RootOf\left(-x+\int^{\_Z}\frac{\_a+1}{\_a^3-\_a-1}d\_a+\_C1\right)\right\}$$

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 = 4.3152 (sec), leaf count = 349

$$\text{Solve}\left[\int_1^{y(x)}\left(-\frac{2K[2]}{-x^2+\exp\left(\frac{2(x-K[2])^3(x+K[2])^3}{x^2-K[2]^2-1}\right)+K[2]^2}-\int_1^x\left(\frac{2K[1]\left(-2K[2]-\exp\left(\frac{2(K[1]-K[2])^3(K[1]-}{K[1]^2-K[2]^2-}\right.\right.}{\left(\right.}\right.\right.\right.$$

✓ **Maple** : cpu = 0.427 (sec), leaf count = 43

$$\left\{y(x)=e^{RootOf\left(-\_Z+\int\left(e^{\_Z}\right)^2-2e^{\_Z}x\left(e^{2\frac{\_a^3}{\_a+1}}+\_a\right)^{-1}d\_a+\_C1\right)}-x\right\}$$

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 = 0.50473 (sec), leaf count = 53

$$\text{Solve}\left[x-16\text{RootSum}\left[6656\#1^3-23\#1-1\&,\#1\log\left(79872\#1^2-18304\#1+181x^2+1448y(x)-362x\right.\right.\right.$$

✓ **Maple** : cpu = 0.039 (sec), leaf count = 40

$$\left\{y(x)=-\frac{x^2}{8}+\frac{x}{4}+RootOf\left(-x+\int^{\_Z}4\frac{\_a+1}{4\_a^3-\_a-1}d\_a+\_C1\right)\right\}$$

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 = 1.64987 (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 = 0.058 (sec), leaf count = 47

$$\left\{y(x) = -\frac{ax^2}{4} - \frac{bx}{2} + \mathit{RootOf}\left(bx + 2\int^{\_Z} -\frac{b(\_a+1)}{2\_a^3 + \_a\,b + b}d\_a + 2\_C1\right)\right\}$$

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 = 1.28946 (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 = 0.046 (sec), leaf count = 41

$$\left\{y(x) = -\frac{x^2}{4} - \frac{ax}{2} + \mathit{RootOf}\left(-x + \int^{\_Z} 2\,\frac{\_a+1}{2\_a^3 + \_a\,a + a}d\_a + \_C1\right)\right\}$$

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 = 0.605836 (sec), leaf count = 150

$$\left\{\left\{y(x) \to \frac{e^{-3x^2}}{8\left(\frac{1}{8}e^{-3x^2} - \frac{e^{-3x^2}}{\sqrt{c_1 - 64x^2}}\right)} - \frac{1}{2}e^{-x^2}\left(2e^{x^2} - x^2\right)\right\}, \left\{y(x) \to \frac{e^{-3x^2}}{8\left(\frac{e^{-3x^2}}{\sqrt{c_1 - 64x^2}} + \frac{1}{8}e^{-3x^2}\right)} - \frac{1}{2}e^{-x^2}\left(2e\right.\right.\right.$$

✓ **Maple** : cpu = 0.109 (sec), leaf count = 85

$$\left\{y(x) = 1\left(-2+x^2\left(\sqrt{-x^2+\_C1}+1\right)e^{-x^2}\right)\left(2\sqrt{-x^2+\_C1}+2\right)^{-1}, y(x) = 1\left(2+x^2\left(\sqrt{-x^2+\_C\right.\right.\right.$$

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 = 0.412224 (sec), leaf count = 30

$$\left\{\left\{y(x)\to\frac{1}{c_1-\log(x)}-\frac{-\sin(x)+x\cos(x)+1}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.193 (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 = 0.602711 (sec), leaf count = 39

$$\text{Solve}\left[\frac{36}{y(x)\,(2y(x)^3+3y(x)^2+6y(x)+6)-6x}+\log(y(x))=c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.185 (sec), leaf count = 68

$$\left\{y(x) = e^{RootOf\left(-12\_C1\,(e^{\_Z})^4-2\,(e^{\_Z})^4\_Z-18\_C1\,(e^{\_Z})^3-3\,(e^{\_Z})^3\_Z-36\_C1\,(e^{\_Z})^2-6\,(e^{\_Z})^2\_Z-36\_C1\,e^{\_Z}-6\_Z\,e^{\_Z}+3\right.}\right.$$

2.949 ODE No. 949

$$y'(x) = \frac{x^6 - 3x^5 + 3x^4 y(x) + x^4 - 6x^3 y(x) + 2x^3 + 3x^2 y(x)^2 + x^2 y(x) - 3x^2 - 3xy(x)^2 + xy(x) + y(x)^3}{x\left(x^2 + y(x) - x + 1\right)}$$

✓ **Mathematica** : cpu = 0.203243 (sec), leaf count = 76

$$\left\{\left\{y(x) \to \frac{1}{x\left(\frac{1}{x} - \frac{1}{x\sqrt{c_1 - 2\log(x)}}\right)} - x^2 + x - 1\right\}, \left\{y(x) \to \frac{1}{x\left(\frac{1}{x\sqrt{c_1 - 2\log(x)}} + \frac{1}{x}\right)} - x^2 + x - 1\right\}\right\}$$

✓ **Maple** : cpu = 0.037 (sec), leaf count = 81

$$\left\{y(x) = 1\left(\left(-x^2 + x\right)\sqrt{\_C1 - 2\,\ln(x)} - x^2 + x - 1\right)\left(1 + \sqrt{\_C1 - 2\,\ln(x)}\right)^{-1}, y(x) = 1\left(\left(-x^2 + x\right)\right.\right.$$

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 = 0.496273 (sec), leaf count = 141

$$\text{Solve}\left[-\frac{1}{3}(27b+58)^{2/3}\text{RootSum}\left[\#1^3(27b+58)^{2/3} - 3\ 2^{2/3}\#1 + (27b+58)^{2/3}\&, \frac{\log\left(\frac{\sqrt[3]{2}\left(\frac{1}{4}\left(3ax^2+6bx+4\right)+3\right.}{\sqrt[3]{27b+58}}\right.}{2^{2/3} - \#1^2(27b+}\right.\right.$$

✓ **Maple** : cpu = 0.066 (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 = 0.405526 (sec), leaf count = 140

$$\text{Solve}\left[-\frac{1}{3}(27a+58)^{2/3}\text{RootSum}\left[\#1^3(27a+58)^{2/3}-3\ 2^{2/3}\#1+(27a+58)^{2/3}\&,\frac{\log\left(\frac{\sqrt[3]{2}\left(\frac{1}{4}(6ax+3x^2+4)+3\right.}{\sqrt[3]{27a+58}}\right.}{2^{2/3}-\#1^2(27a+}\right.\right.$$

✓ **Maple** : cpu = 0.054 (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 = 0.335186 (sec), leaf count = 341

$$\left\{\left\{y(x)\to\frac{x-2\sqrt{x^2\tanh^2\left(\frac{1}{20}\left(-20\sqrt{2}c_1-4\sqrt{2}x^5-5\sqrt{2}x^4-10\sqrt{2}x^2\right)\right)-x^2\tanh^4\left(\frac{1}{20}\left(-20\sqrt{2}c_1-4\right.\right.}}{2\tanh^2\left(\frac{1}{20}\left(-20\sqrt{2}c_1-4\sqrt{2}x^5-5\sqrt{2}x^4-10\sqrt{2}x^2\right)\right)-1}\right.\right.$$

✓ **Maple** : cpu = 0.266 (sec), leaf count = 62

$$\left\{\ln\left(2\frac{x\left(\sqrt{2\left(y(x)\right)^2+2x^2}+y(x)+x\right)}{y(x)-x}\right)+\frac{\left(4x^5+5x^4+10x^2\right)\sqrt{2}}{20}-\_C1-\ln(x)=0\right\}$$

2.953 ODE No. 953

$$y'(x) = \frac{y(x)\left(x^4\log^2(y(x)) + 2x^4\log(x)\log(y(x)) + x^4\log^2(x) + x^3\log^2(y(x)) + 2x^3\log(x)\log(y(x)) + x^3}{x}$$

✗ **Mathematica** : cpu = 1.24781 (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 = 0.273 (sec), leaf count = 145

$$\left\{y(x) = 1\left(x^{\frac{x^5}{4\,x^5+5\,x^4+10\,x^2+20\,\_C1}}\right)^{-4}\left(x^{\frac{x^4}{4\,x^5+5\,x^4+10\,x^2+20\,\_C1}}\right)^{-5}\left(x^{\frac{x^2}{4\,x^5+5\,x^4+10\,x^2+20\,\_C1}}\right)^{-10}\left(x^{\frac{\_C1}{4\,x^5+5\,x^4+10\,x^2+20\,\_C1}}\right.\right.$$

2.954 ODE No. 954

$$y'(x) = \frac{\frac{24}{5}x^{7/2}y(x) - \frac{24x^{13/2}}{25} + \frac{8x^{7/2}}{5} - 8x^{3/2} - \frac{8x^9}{125} + \frac{12}{25}x^6y(x) + \frac{4x^6}{25} - \frac{24x^4}{5} - \frac{6}{5}x^3y(x)^2 - \frac{4}{5}x^3y(x) + \frac{6x^3}{5} +}{x}$$

✓ **Mathematica** : cpu = 0.334305 (sec), leaf count = 115

$$\text{Solve}\left[-\frac{29}{3}\text{RootSum}\left[-29\#1^3 + 3\sqrt[3]{29}\#1 - 29\&, \frac{\log\left(\frac{\frac{-6x^3-30\sqrt{x}+5}{5x}+\frac{3y(x)}{x}}{\sqrt[3]{29}\sqrt[3]{\frac{1}{x^3}}} - \#1\right)}{\sqrt[3]{29} - 29\#1^2}\&\right] = c_1 + \frac{1}{9}29^{2/3}\left(\frac{1}{x^3}\right)\right.$$

✓ **Maple** : cpu = 0.062 (sec), leaf count = 53

$$\left\{y(x) = \frac{1}{45}\left(18\,x^{7/2} + 145\,RootOf\left(-81\int^{\_Z}\left(841\,\_a^3 - 27\,\_a + 27\right)^{-1}d\_a + \ln(x) + 3\,\_C1\right)\sqrt{x} - 1\right.\right.$$

2.955 ODE No. 955

$$y'(x) = \frac{-24x^{7/2}y(x) + \frac{24x^{13/2}}{5} + 14x^{7/2} + 40x^{3/2} + \frac{8x^9}{25} - \frac{12}{5}x^6y(x) + \frac{12x^6}{5} + 24x^4 + 6x^3y(x)^2 - 6x^3y(x) -}{x\left(2x^3 - 5y(x) + 10\sqrt{x} - 5\right)}$$

✓ **Mathematica** : cpu = 0.316397 (sec), leaf count = 112

$$\left\{\left\{y(x) \to \frac{1}{5}\left(2x^3 + 10\sqrt{x} - 5\right) - \frac{1}{125x\left(-\frac{1}{x\sqrt{c_1-31250\log(x)}} - \frac{1}{125x}\right)}\right\}, \left\{y(x) \to \frac{1}{5}\left(2x^3 + 10\sqrt{x} - 5\right) - \right.\right.$$

✓ **Maple** : cpu = 0.075 (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

$$y'(x) = \frac{y(x)\left(y(x)e^{\frac{2\log^2(x)}{\log(x)+1}}x^{\frac{2}{\log(x)+1}+2} + y(x)e^{\frac{2\log^2(x)}{\log(x)+1}}\log^2(x)x^{\frac{2}{\log(x)+1}+2} + 2y(x)e^{\frac{2\log^2(x)}{\log(x)+1}}\log(x)x^{\frac{2}{\log(x)+1}+2} - e\right.}{x(\log(x)+1)}$$

✓ **Mathematica** : cpu = 1.14726 (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 = 0.092 (sec), leaf count = 79

$$\left\{y(x) = \frac{1}{\ln\left(x\right)+1}{\rm e}^{-\frac{x^4}{4}}\left(x^{-2\,\frac{\ln(x)}{\ln(x)+1}}\left(\ln\left(x\right)+1\right){\rm e}^{\frac{(-4\,\ln(x)-4)\ln(\ln(x)+1)-x^4\ln(x)-x^4+8\,(\ln(x))^2}{4\,\ln(x)+4}}+\_C1\right)^{-1}\right\}$$

2.957 ODE No. 957

$$y'(x) = \frac{y(x)\left(y(x)e^{\frac{2\log^2(x)}{\log(x)+1}}x^{\frac{2}{\log(x)+1}+3} + y(x)e^{\frac{2\log^2(x)}{\log(x)+1}}\log^2(x)x^{\frac{2}{\log(x)+1}+3} + 2y(x)e^{\frac{2\log^2(x)}{\log(x)+1}}\log(x)x^{\frac{2}{\log(x)+1}+3} - e\right.}{x(\log(x)+1)}$$

✓ **Mathematica** : cpu = 1.12027 (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 = 0.049 (sec), leaf count = 79

$$\left\{y(x) = \frac{1}{\ln\left(x\right)+1}{\rm e}^{-\frac{x^5}{5}}\left(x^{-2\,\frac{\ln(x)}{\ln(x)+1}}\left(\ln\left(x\right)+1\right){\rm e}^{\frac{(-5\,\ln(x)-5)\ln(\ln(x)+1)-x^5\ln(x)-x^5+10\,(\ln(x))^2}{5\,\ln(x)+5}}+\_C1\right)^{-1}\right\}$$

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 = 0.432636 (sec), leaf count = 82

$$\text{Solve}\left[-\frac{29}{3}\text{RootSum}\left[-29\#1^3 + 3\sqrt[3]{29}\#1 - 29\&, \frac{\log\left(\frac{3y(x)+3\log(2x+1)+1}{\sqrt[3]{29}} - \#1\right)}{\sqrt[3]{29} - 29\#1^2}\&\right] = c_1 + \frac{1}{9}29^{2/3}x, y(x)$$

✓ **Maple** : cpu = 0.033 (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 = 0.255663 (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 = 0.059 (sec), leaf count = 15

$$\left\{y(x) = \arcsin\left(\mathrm{e}^{\frac{x^2}{2}}\_C1\right)x\right\}$$

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 = 0.160266 (sec), leaf count = 14

$$\left\{\left\{y(x) \to x\sin^{-1}\left(e^{c_1+x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.04 (sec), leaf count = 11

$$\left\{y(x) = \arcsin\left(\mathrm{e}^{x}\_C1\right)x\right\}$$

2.961 ODE No. 961

$$y'(x) = \frac{\exp\left(-2x^6 + 6x^4y(x)^2 + 2x^4 - 6x^2y(x)^4 - 4x^2y(x)^2 + 2y(x)^6 + 2y(x)^4 + 2\right) + x^2 + 2xy(x) + y(x}{-\exp\left(-2x^6 + 6x^4y(x)^2 + 2x^4 - 6x^2y(x)^4 - 4x^2y(x)^2 + 2y(x)^6 + 2y(x)^4 + 2\right) + x^2 + 2xy(x) + y}$$

✓ **Mathematica** : cpu = 5.11883 (sec), leaf count = 813

$$\text{Solve}\left[\int_1^x \left(\frac{1}{K[1] + y(x)} - \frac{2e^{2K[1]^6+6y(x)^4K[1]^2+4y(x)^2K[1]^2}K[1]}{e^{2K[1]^6+6y(x)^4K[1]^2+4y(x)^2K[1]^2}K[1]^2 - e^{2y(x)^6+2y(x)^4+6K[1]^4y(x)^2+2K[1]^4+2} - e^{2K[1]^6+}\right.\right.$$

✓ **Maple** : cpu = 0.264 (sec), leaf count = 45

$$\left\{y(x) = e^{RootOf\left(-\_Z+\int^{\left(e^{\_Z}\right)^2-2e^{\_Z}x}\left(e^{2\_a^3+2\_a^2+2}+\_a\right)^{-1}d\_a+\_C1\right)} - x\right\}$$

2.962 ODE No. 962

$$y'(x) = \frac{4(a-1)(a+1)x(a^2x^2}{a^8x^6 - 4a^6x^6 - 3a^6x^4y(x)^2 + 6a^4x^6 + 9a^4x^4y(x)^2 + 3a^4x^2y(x)^4 - 4a^2x^6 - 9a^2x^4y(x)^2 - 6a^2x^2y(}$$

✓ **Mathematica** : cpu = 4.46379 (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 = 1.214 (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 = 0.523134 (sec), leaf count = 108

$$\text{Solve}\left[-\frac{29}{3}\text{RootSum}\left[-29\#1^3+3\sqrt[3]{29}\#1-29\&,\frac{\log\left(\frac{\frac{3y(x)}{x}+\frac{-3x+3x\cos(x)+1}{x}}{\sqrt[3]{29}\sqrt[3]{\frac{1}{x^3}}}-\#1\right)}{\sqrt[3]{29}-29\#1^2}\&\right]=c_1+\frac{1}{9}29^{2/3}\left(\frac{1}{x^3}\right.$$

✓ **Maple** : cpu = 0.15 (sec), leaf count = 39

$$\left\{y(x)=-\cos(x)\,x+x-\frac{1}{3}+\frac{29\,RootOf\left(-81\int^{-Z}\left(841\_a^3-27\_a+27\right)^{-1}d\_a+\ln(x)+3\_C1\right)}{9}\right\}$$

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 = 4.06037 (sec), leaf count = 264

$$\text{Solve}\left[\frac{y(x)}{(a-1)(a+1)}-\frac{8\text{RootSum}\left[-\#1^3a^6+3\#1^3a^4-3\#1^3a^2+\#1^3+3\#1^2a^4y(x)^2+2\#1^2a^4-6\#1\right.}{}\right.$$

✓ **Maple** : cpu = 2.166 (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 = 0.287332 (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 = 0.047 (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 = 0.738537 (sec), leaf count = 292

$$\text{Solve}\left[72\text{RootSum}\left[-216\#1^3 + 216\#1^2y(x)^4 + 324\#1^2y(x)^3 + 648\#1^2y(x)^2 + 648\#1^2y(x) - 216\#1^2 -\right.\right.$$

✓ **Maple** : cpu = 0.523 (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 = 0.509784 (sec), leaf count = 151

$$\text{Solve}\left[-\frac{29}{3}\text{RootSum}\left[-29\#1^3 + 3\sqrt[3]{29}\#1 - 29\&, \frac{\log\left(\frac{\frac{3xy(x)}{x^2+1} + \frac{-4x^4+2x^3+5x}{2\left(x^2+1\right)^2}}{\sqrt[3]{29}\sqrt[3]{\frac{x^3}{\left(x^2+1\right)^3}}} - \#1\right)}{\sqrt[3]{29} - 29\#1^2}\&\right] = c_1 + \frac{29^{2/3}\left(\frac{x^3}{(x^2+1)}\right.}{}\right.$$

✓ **Maple** : cpu = 0.054 (sec), leaf count = 91

$$\left\{y(x) = \frac{58\, RootOf\left(-162\int^{\_Z}\left(841\,\_a^3 - 27\,\_a + 27\right)^{-1} d\_a + \ln\left(x^2+1\right) + 6\,\_C1\right) x^2 + 12\,x^3 - 6\,x^2 -}{18\,x^2 + 18}\right.$$

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 = 0.354667 (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 = 0.062 (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

$$y'(x) = \frac{\csc\left(\frac{y(x)}{2x}\right)\sec\left(\frac{y(x)}{2x}\right)\sec\left(\frac{y(x)}{x}\right)\left(-\frac{1}{2}xy(x)\sin\left(\frac{y(x)}{x}\right) - \frac{1}{2}y(x)\sin\left(\frac{y(x)}{x}\right) + x\sin\left(\frac{y(x)}{2x}\right)\sin\left(\frac{y(x)}{x}\right)\mathrm{co}\right.}{}$$

✓ **Mathematica** : cpu = 0.28074 (sec), leaf count = 19

$$\left\{\left\{y(x)\to x\sin^{-1}\left(\frac{e^{c_1}x}{x+1}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.065 (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 = 0.587665 (sec), leaf count = 66

$$\mathrm{Solve}\left[\frac{36(2y(x)^4+3y(x)^3+6y(x)^2+6y(x)-6x-3)}{(y(x)\,(2y(x)^3+3y(x)^2+6y(x)+6)-6x)^2}+\log(y(x))=c_1,y(x)\right]$$

✓ **Maple** : cpu = 0.605 (sec), leaf count = 181

$$\left\{\frac{1}{6\_C1 - 6\,\ln(y(x))}\left(-6\sqrt{3\,\ln(y(x)) - 3\_C1 + 9} + \left(2\,(y(x))^4 + 3\,(y(x))^3 + 6\,(y(x))^2 - 6\,x + 6\,y(x)\right.\right.\right.$$

2.971 ODE No. 971

$$y'(x) = \frac{(xy(x)+1)^3}{x^5}$$

✓ **Mathematica** : cpu = 0.199348 (sec), leaf count = 157

$$\text{Solve}\left[\frac{1}{3}\log\left(\frac{\frac{3}{x^3}+\frac{3y(x)}{x^2}}{3\sqrt[3]{-\frac{1}{x^6}}}+1\right)-\frac{1}{6}\log\left(\frac{\left(\frac{3}{x^3}+\frac{3y(x)}{x^2}\right)^2}{9\left(-\frac{1}{x^6}\right)^{2/3}}-\frac{\frac{3}{x^3}+\frac{3y(x)}{x^2}}{3\sqrt[3]{-\frac{1}{x^6}}}+1\right)+\frac{\tan^{-1}\left(\frac{\frac{2\left(\frac{3}{x^3}+\frac{3y(x)}{x^2}\right)}{3\sqrt[3]{-\frac{1}{x^6}}}-1}{\sqrt{3}}\right)}{\sqrt{3}}=c\right.$$

✓ **Maple** : cpu = 0.221 (sec), leaf count = 86

$$\left\{y(x)=\frac{\sqrt{3}}{6\,x}\left(3\,\tan\left(\mathit{RootOf}\left(-18\,x^3\left(-x^{-6}\right)^{2/3}-6\_Z\sqrt{3}-\ln\left(\frac{\left(\sqrt{3}+\tan\left(\_Z\right)\right)^6}{\left(\left(\tan\left(\_Z\right)\right)^2+1\right)^3}\right)+18\_C1\right)\right)\right)x\right.$$

2.972 ODE No. 972

$$y'(x) = \frac{x(-2x^4+2x^2y(x)-x^2+1)}{y(x)-x^2}$$

✓ **Mathematica** : cpu = 0.0233276 (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 = 0.069 (sec), leaf count = 27

$$\left\{y(x)=x^2+\frac{1}{2}\mathit{lambertW}\left(-2\,\frac{e^{x^4}\_C1\,e^{-1}}{\left(e^{x^2}\right)^2}\right)+\frac{1}{2}\right\}$$

2.973 ODE No. 973

$$y'(x) = e^{-2bx}y(x)\left(e^{bx}y(x) + e^{2bx} + y(x)^2\right)$$

✓ **Mathematica** : cpu = 0.338295 (sec), leaf count = 146

$$\text{Solve}\left[-\frac{1}{3}(9b-7)^{2/3}\text{RootSum}\left[\#1^3(9b-7)^{2/3} - 9\#1b + 6\#1 + (9b-7)^{2/3}\&, \frac{\log\left(\frac{3e^{-2bx}y(x)+e^{-bx}}{\sqrt[3]{(9b-7)e^{-3bx}}} - \#1\right.}{\#1^2\left(-(9b-7)^{2/3}\right) + 3b -}\right.\right.$$

✓ **Maple** : cpu = 0.297 (sec), leaf count = 136

$$\left\{y(x) = -\frac{e^{bx}}{2} + \frac{1}{2}\tan\left(RootOf\left(-2\_Z\,e^{bx} - \sqrt{-\left(e^{bx}\right)^2(4\,b-3)}\ln\left(-(4\left(\tan\left(\_Z\right)\right)^2 b - 3\left(\tan\left(\_Z\right)\right)^2\right.\right.\right.\right.$$

2.974 ODE No. 974

$$y'(x) = -x^6 + 3x^4y(x) - 3x^2y(x)^2 + y(x)^3 + 2x$$

✓ **Mathematica** : cpu = 0.0828564 (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 = 0.029 (sec), leaf count = 57

$$\left\{y(x) = 1\left(x^2\sqrt{2\_C1 - 2\,x} - 1\right)\frac{1}{\sqrt{2\_C1 - 2\,x}}, y(x) = 1\left(x^2\sqrt{2\_C1 - 2\,x} + 1\right)\frac{1}{\sqrt{2\_C1 - 2\,x}}\right\}$$

2.975 ODE No. 975

$$y'(x) = \frac{x^6}{27} + \frac{1}{3}x^4y(x) + x^2y(x)^2 + y(x)^3 - \frac{2x}{3}$$

✓ **Mathematica** : cpu = 0.0811559 (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 = 0.028 (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 = 0.162698 (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 = 0.177 (sec), leaf count = 57

$$\left\{y(x) = \frac{1}{2\,x^3}\left(\sqrt{3}\tan\left(RootOf\left(-\sqrt{3}\ln\left(\frac{9\left(\tan\left(\_Z\right)\right)^2 + 9}{7\left(-3\tan\left(\_Z\right) + \sqrt{3}\right)^2}\right) + 3\sqrt{3}\_C1 - 2\sqrt{3}x - 2\_Z\right)\right) -\right.\right.$$

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 = 0.373049 (sec), leaf count = 139

$$\text{Solve}\left[-\frac{25}{3}\text{RootSum}\left[-25\#1^3 + 24\sqrt[3]{-15}^{2/3}\#1 - 25\&, \frac{\log\left(\frac{3e^{2x^2} x y(x) + e^{x^2} x}{5^{2/3}\sqrt[3]{-e^{3x^2} x^3}} - \#1\right)}{8\sqrt[3]{-15}^{2/3} - 25\#1^2}\&\right] = c_1 - \frac{5\sqrt[3]{5}e^{x^2} x^3}{18\sqrt[3]{-e^{3x^2}x}}\right.$$

✓ **Maple** : cpu = 0.155 (sec), leaf count = 122

$$\left\{y(x) = \frac{1}{2\,e^{x^2}}\left(\sqrt{11}\tan\left(RootOf\left(-4\sqrt{11}x^2 + 4\sqrt{11}\ln\left(11\right) - 4\sqrt{11}\ln\left(\frac{2592\sqrt{11}\left(e^{x^2}\right)^2\tan\left(\_Z\right)}{25} -\right.\right.\right.\right.\right.\right.$$

2.978 ODE No. 978

$$y'(x) = \frac{y(x)\left(x^2 + xy(x) + y(x)^2 + x\right)}{x^2}$$

✓ **Mathematica** : cpu = 0.138787 (sec), leaf count = 60

$$\text{Solve}\left[-\frac{1}{2}\log\left(\frac{y(x)^2}{x^2} + \frac{y(x)}{x} + 1\right) + \log\left(\frac{y(x)}{x}\right) - \frac{\tan^{-1}\left(\frac{\frac{2y(x)}{x}+1}{\sqrt{3}}\right)}{\sqrt{3}} = c_1 + x, y(x)\right]$$

✓ **Maple** : cpu = 0.138 (sec), leaf count = 71

$$\left\{y(x) = \frac{\sqrt{3}x}{2}\tan\left(\mathit{RootOf}\left(-\sqrt{3}\ln\left(\frac{4}{3+3\left(\tan\left(\_Z\right)\right)^2}\right) - 2\sqrt{3}\ln\left(-1/6\sqrt{3} + 1/2\tan\left(\_Z\right)\right) - \sqrt{3}\mathrm{l}\right.\right.\right.$$

2.979 ODE No. 979

$$y'(x) = \frac{-x^3 + 3x^2y(x) - 3xy(x)^2 + y(x)^3 + x}{x}$$

✓ **Mathematica** : cpu = 0.0990425 (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 = 0.033 (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

$$y'(x) = \frac{x^3y(x)^3 + 6x^2y(x)^2 + 12xy(x) + 2x + 8}{x^3}$$

✓ **Mathematica** : cpu = 0.113835 (sec), leaf count = 43

$$\left\{\left\{y(x) \to -\frac{1}{\sqrt{c_1 - 2x}} - \frac{2}{x}\right\}, \left\{y(x) \to \frac{1}{\sqrt{c_1 - 2x}} - \frac{2}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.013 (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 = 0.148372 (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 = 0.017 (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 = 0.347731 (sec), leaf count = 132

$$\text{Solve}\left[-\frac{7}{3}\text{RootSum}\left[-7\#1^3 + 6\sqrt[3]{-7}\#1 - 7\&, \frac{\log\left(\frac{3e^{-\frac{x^2}{2}}y(x)+e^{-\frac{x^2}{4}}}{\sqrt[3]{7}\sqrt[3]{-e^{-\frac{3x^2}{4}}}} - \#1\right)}{2\sqrt[3]{-7} - 7\#1^2}\&\right] = c_1 + \frac{1}{9}7^{2/3}e^{\frac{x^2}{2}}\left(-e^{-\frac{3x^2}{4}}\right.$$

✓ **Maple** : cpu = 0.327 (sec), leaf count = 145

$$\left\{-\frac{2}{3}\ln\left(-6+\left(18\,y(x)\,\mathrm{e}^{-1/2\,x^2}+6\,\mathrm{e}^{-1/4\,x^2}\right)\mathrm{e}^{\frac{x^2}{4}}\right)+\frac{1}{3}\ln\left(36+\frac{324}{7}\left(y(x)\,\mathrm{e}^{-\frac{x^2}{2}}+\frac{1}{3}\mathrm{e}^{-\frac{x^2}{4}}\right)^2\left(\mathrm{e}^{\frac{x^2}{4}}\right)^2+\frac{1}{7}\Big(1\right.$$

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 = 0.4862 (sec), leaf count = 238

$$\text{Solve}\left[\frac{1}{3}\log\left(\frac{\frac{3y(x)}{x^2-1}-\frac{3x}{x^2-1}}{3\sqrt[3]{\frac{1}{(x-1)^3(x+1)^3}}}+1\right)-\frac{1}{6}\log\left(\frac{\left(\frac{3y(x)}{x^2-1}-\frac{3x}{x^2-1}\right)^2}{9\left(\frac{1}{(x-1)^3(x+1)^3}\right)^{2/3}}-\frac{\frac{3y(x)}{x^2-1}-\frac{3x}{x^2-1}}{3\sqrt[3]{\frac{1}{(x-1)^3(x+1)^3}}}+1\right)+\frac{\tan^{-1}\left(\frac{2\left(\frac{3y(x)}{x^2-\dots}\right.}{3\sqrt[3]{(x-\dots}}\right.}{\sqrt{\dots}}\right.$$

✓ **Maple** : cpu = 0.34 (sec), leaf count = 188

$$\left\{y(x)=\frac{\sqrt{3}}{2}\left(\frac{x^2-1}{3}\left(3\tan\left(RootOf\left(9\left(\frac{1}{(1+x)^3(x-1)^3}\right)^{2/3}\ln\left(\frac{x-1}{1+x}\right)x^4-18\left(\frac{1}{(1+x)^3(x-1)^3}\right.\right.\right.\right.\right.\right.$$

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 = 5.84137 (sec), leaf count = 428

$$\text{Solve}\left[\frac{\sqrt[3]{2}\left(\frac{3e^{-2x}x(x-1)y(x)+e^{-x}(x-1)}{\sqrt[3]{2}\sqrt[3]{e^{-3x}(x-1)^3}}+2^{2/3}\right)\left(2^{2/3}-\frac{2^{2/3}\left(3e^{-2x}x(x-1)y(x)+e^{-x}(x-1)\right)}{\sqrt[3]{e^{-3x}(x-1)^3}}\right)\left(\left(1-\frac{3e^{-2x}x(x-1)y(x)+e^{-x}(x\dots}{\sqrt[3]{e^{-3x}(x-1)^3}}\right.\right.}{9\left(-\frac{e^{3x}(3e^{-2x}x(x-1)y(x\dots}{(x-1)^{\dots}}\right.}\right.$$

✓ **Maple** : cpu = 0.22 (sec), leaf count = 40

$$\left\{y(x)=\frac{1}{9\,x}\mathrm{e}^{RootOf\left(-\mathrm{e}^{\_Z}\ln\left(\frac{x\left(\mathrm{e}^{\_Z}+9\right)}{2}\right)+3\_C1\,\mathrm{e}^{\_Z}+\_Z\,\mathrm{e}^{\_Z}+\mathrm{e}^{\_Z}x+9\right)+x}\right\}$$

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 = 0.32877 (sec), leaf count = 103

$$\text{Solve}\left[-\frac{17}{3}\text{RootSum}\left[-17\#1^3 + 3\sqrt[3]{-34}\#1 - 17\&, \frac{\log\left(\frac{\frac{x+3}{x^3}+\frac{3y(x)}{x^2}}{\sqrt[3]{34}\sqrt[3]{-\frac{1}{x^6}}} - \#1\right)}{\sqrt[3]{-34} - 17\#1^2}\&\right] = c_1 - \frac{1}{9}34^{2/3}\left(-\frac{1}{x^6}\right)^{2/3} x$$

✓ **Maple** : cpu = 0.027 (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 = 0.12713 (sec), leaf count = 44

$$\left\{\left\{y(x) \to x\log(x) - \frac{x}{\sqrt{c_1 - 2x}}\right\}, \left\{y(x) \to \frac{x}{\sqrt{c_1 - 2x}} + x\log(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.017 (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 = 0.15248 (sec), leaf count = 41

$$\left\{\left\{y(x) \to \sqrt{a}x\tanh\left(\sqrt{a}\int_1^x F(K[1])K[1]dK[1] + \sqrt{a}c_1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.039 (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 = 0.204122 (sec), leaf count = 107

$$\left\{\left\{y(x) \to -\frac{x\left(-\exp\left(2\sqrt{2}\left(\int_1^x -F(K[1])K[1]dK[1] + c_1\right)\right) + \sqrt{2}\exp\left(2\sqrt{2}\left(\int_1^x -F(K[1])K[1]dK[1] + c_1\right.\right.\right.}{\exp\left(2\sqrt{2}\left(\int_1^x -F(K[1])K[1]dK[1] + c_1\right)\right) + 1}\right.\right.$$

✓ **Maple** : cpu = 0.031 (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 = 0.16291 (sec), leaf count = 56

$$\left\{\left\{y(x) \to \frac{\sqrt{b}x\tan\left(\sqrt{a}\sqrt{b}\int_1^x F(K[1])K[1]dK[1] + \sqrt{a}\sqrt{b}c_1\right)}{\sqrt{a}}\right\}\right\}$$

✓ **Maple** : cpu = 0.033 (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

$$y'(x)=2x-F(x)\left(-x^4+2x^2y(x)-y(x)^2+1\right)$$

✓ **Mathematica** : cpu = 0.202833 (sec), leaf count = 58

$$\left\{\left\{y(x)\to\frac{\exp\left(\int_1^x 2F(K[5])dK[5]\right)}{c_1-\int_1^x\exp\left(\int_1^{K[6]}2F(K[5])dK[5]\right)F(K[6])dK[6]}+x^2+1\right\}\right\}$$

✓ **Maple** : cpu = 0.387 (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 = 0.192807 (sec), leaf count = 104

$$\left\{\left\{y(x)\to-\frac{x\left(-\exp\left(2\sqrt{2}\left(\int_1^x F(K[1])K[1]dK[1]+c_1\right)\right)+\sqrt{2}\exp\left(2\sqrt{2}\left(\int_1^x F(K[1])K[1]dK[1]+c_1\right)\right)\right.}{\exp\left(2\sqrt{2}\left(\int_1^x F(K[1])K[1]dK[1]+c_1\right)\right)+1}\right.\right.$$

✓ **Maple** : cpu = 0.027 (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 = 0.11647 (sec), leaf count = 43

$$\left\{\left\{y(x) \to \frac{x\tan\left(\sqrt{7}\int_1^x F(K[1])K[1]^2 dK[1] + \sqrt{7}c_1\right)}{\sqrt{7}}\right\}\right\}$$

✓ **Maple** : cpu = 0.03 (sec), leaf count = 25

$$\left\{y(x) = \frac{\tan\left(\left(\int x^2 F(x)\, dx + \_C1\right)\sqrt{7}\right)x\sqrt{7}}{7}\right\}$$

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 = 1.40307 (sec), leaf count = 73

$$\left\{\left\{y(x) \to \frac{\int_1^x \frac{F(K[5])}{\sqrt{\frac{1}{\log^2(K[5])}}} dK[5] + c_1 - 1}{\sqrt{\frac{1}{\log^2(x)}}\int_1^x \frac{F(K[5])}{\sqrt{\frac{1}{\log^2(K[5])}}} dK[5] + c_1\sqrt{\frac{1}{\log^2(x)}}}\right\}\right\}$$

✓ **Maple** : cpu = 0.02 (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 = 0.205535 (sec), leaf count = 198

$$\left\{\left\{y(x) \to -\frac{c_1 e^{\frac{1}{16}x^4(4\log(x)-1)}\left(\frac{x^3}{4}+\frac{1}{4}x^3(4\log(x)-1)\right)+\frac{1}{16}x^4 e^{\frac{1}{16}x^4(4\log(x)-1)}(4\log(x)-1)\left(\frac{x^3}{4}+\frac{1}{4}x^3(4\mathrm{lo}\right.}{x^3\left(c_1 e^{\frac{1}{16}x^4(4\log(x)-1)}+\frac{1}{16}x^4 e^{\frac{1}{16}x^4(4\log(x)-1}\right.}\right.\right.$$

✓ **Maple** : cpu = 0.017 (sec), leaf count = 43

$$\left\{y(x) = -\frac{\ln(x)\left(4x^4\ln(x) - x^4 + 8\_C1 + 16\right)}{4x^4\ln(x) - x^4 + 8\_C1}\right\}$$

2.995 ODE No. 995

$$y'(x) = (y(x) - e^x)^2 + e^x$$

✓ **Mathematica** : cpu = 0.164414 (sec), leaf count = 17

$$\left\{\left\{y(x) \to \frac{1}{c_1 - x} + e^x\right\}\right\}$$

✓ **Maple** : cpu = 0.114 (sec), leaf count = 14

$$\left\{y(x) = \mathrm{e}^x + (\_C1 - x)^{-1}\right\}$$

2.996 ODE No. 996

$$y'(x) = \frac{(y(x) - \mathrm{Si}(x))^2 + \sin(x)}{x}$$

✗ **Mathematica** : cpu = 26.1229 (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 = 0.047 (sec), leaf count = 15

$$\left\{y(x) = Si(x) + (\_C1 - \ln(x))^{-1}\right\}$$

2.997 ODE No. 997

$$y'(x) = (y(x) + \cos(x))^2 + \sin(x)$$

✓ **Mathematica** : cpu = 0.0987217 (sec), leaf count = 18

$$\left\{\left\{y(x) \to \frac{1}{c_1 - x} - \cos(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.043 (sec), leaf count = 16

$$\left\{y(x) = -\cos(x) + (\_C1 - x)^{-1}\right\}$$

2.998 ODE No. 998

$$y'(x) = \frac{(-\mathrm{Ci}(x) + y(x) - \log(x))^2 + \cos(x)}{x}$$

✓ **Mathematica** : cpu = 0.462001 (sec), leaf count = 27

$$\left\{\left\{y(x) \to \mathrm{Ci}(x) + \frac{x^2}{c_1 - \frac{x^2}{2}} + \log(x) + 1\right\}\right\}$$

✓ **Maple** : cpu = 0.273 (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 = 0.182749 (sec), leaf count = 24

$$\left\{\left\{y(x) \to \frac{1}{c_1 - \log(x + 1)} + x - \log(x + 1)\right\}\right\}$$

✓ **Maple** : cpu = 0.039 (sec), leaf count = 36

$$\left\{y(x) = \frac{-(\ln(1 + x))^2 + (x - \_C1)\ln(1 + x) + \_C1\, x - 1}{\ln(1 + x) + \_C1}\right\}$$

2.1000 ODE No. 1000

$$y'(x) = \frac{x^3 + 2x^2y(x) - xy(x) - y(x)^2 + xy(x)\log(x)}{x^2(x + \log(x))}$$

✓ **Mathematica** : cpu = 0.95808 (sec), leaf count = 351

$$\left\{\left\{y(x) \to \frac{x^2(x+\log(x))\left(c_1\left(\frac{\exp\left(-\frac{1}{2}\int_1^x \frac{K[5]+\log(K[5])+2}{K[5]^2+\log(K[5])K[5]}dK[5]\right)}{2\sqrt{x}} - \frac{\sqrt{x}(x+\log(x)+2)\exp\left(-\frac{1}{2}\int_1^x \frac{K[5]+\log(K[5])+2}{K[5]^2+\log(K[5])K[5]}dK[5]\right)}{2(x^2+x\log(x))}\right.\right.}{c_1\sqrt{x}\exp\left(-\frac{1}{2}\int_1^x \frac{K[5]+\log(K[5])}{K[5]^2+\log(K[5])}\right.}\right.\right.$$

✓ **Maple** : cpu = 0.107 (sec), leaf count = 19

$$\left\{y(x) = \frac{x(\_C1\, x - 1)}{\_C1\, \ln(x) + 1}\right\}$$

2.1001 ODE No. 1001

$$y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0027672 (sec), leaf count = 12

$$\{\{y(x) \to c_2x + c_1\}\}$$

✓ **Maple** : cpu = 0.003 (sec), leaf count = 9

$$\{y(x) = \_C1\, x + \_C2\}$$

Hand solution

$$y'' = 0$$

Integration twice gives

$$y(x) = c_1x + c_2$$

2.1002 ODE No. 1002

$$y''(x) + y(x) = 0$$

✓ **Mathematica** : cpu = 0.0034822 (sec), leaf count = 16

$$\{\{y(x) \to c_2 \sin(x) + c_1 \cos(x)\}\}$$

✓ **Maple** : cpu = 0.005 (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 = 0.0979911 (sec), leaf count = 45

$$\left\{\left\{y(x) \to c_2 \sin(x) + c_1 \cos(x) + \frac{\cos^2(x)(-\sin(nx)) - \sin^2(x)\sin(nx)}{n^2-1}\right\}\right\}$$

✓ **Maple** : cpu = 0.039 (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.

```
restart;
ode:=diff(diff(y(x),x),x)+y(x)-sin(n*x)=0;
y0:=_C1*cos(x)+_C2*sin(x)+sin(n*x)/(1-n^2);
odetest(y(x)=y0,ode);
0
```

2.1004 ODE No. 1004

$$-a\cos(bx)+y''(x)+y(x)=0$$

✓ **Mathematica** : cpu = 0.0888685 (sec), leaf count = 47

$$\left\{\left\{y(x)\to \frac{-a\cos^2(x)\cos(bx)-a\sin^2(x)\cos(bx)}{b^2-1}+c_2\sin(x)+c_1\cos(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.033 (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

$$\begin{aligned}\lambda^2e^{\lambda x}+e^{\lambda x}&=0\\ \lambda^2+1&=0\end{aligned}$$

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 = 0.413988 (sec), leaf count = 1163

$$\left\{\left\{y(x) \to c_1\cos(x) + c_2\sin(x) + \frac{-\cos(x)\cos((a-b-1)x)a^3 + \cos(x)\cos((a-b+1)x)a^3 + \cos(x)\cos}{}\right.\right.$$

✓ **Maple** : cpu = 0.069 (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

$$\begin{aligned}y_h &= c_1\cos x + c_2\sin x\\ &= y_h = c_1y_1 + c_2y_2\end{aligned}$$

Now we solve for the particular solution using variation of parameters.

$$
y_p = u_1 y_1 + u_2 y_2
$$

Wonskian is

$$
W = \begin{vmatrix} y_1 & y_2 \\ y_1' & y_2' \end{vmatrix} = \begin{vmatrix} \cos x & \sin x \\ -\sin x & \cos x \end{vmatrix} = \cos^2 x + \sin^2 x = 1
$$

Hence, using $f = \sin ax \sin bx$, which is the RHS of the ODE, and noting that a_0 is the coefficient of y'' which is one here, then

$$
\begin{aligned}
u_1 &= \int \frac{-y_2}{W} \frac{f}{a_0} dx = -\int \sin x \sin(ax) \sin(bx)\, dx \\
&= -\frac{1}{4}\left(\frac{\cos((a-b-1)x)}{a-b-1} - \frac{\cos((a-b+1)x)}{a-b+1} - \frac{\cos((a+b-1)x)}{a+b-1} + \frac{\cos((a+b+1)x)}{a+b+1}\right)
\end{aligned}
$$

And

$$
\begin{aligned}
u_2 &= \int \frac{y_1}{W} \frac{f}{a_0} dx = -\int \cos x \sin(ax) \sin(bx)\, dx \\
&= \frac{1}{4}\left(\frac{\sin((a-b-1)x)}{a-b-1} + \frac{\sin((a-b+1)x)}{a-b+1} - \frac{\sin((a+b-1)x)}{a+b-1} - \frac{\sin((a+b+1)x)}{a+b+1}\right)
\end{aligned}
$$

Since $y_p = u_1(x)\cos x + u_2(x)\sin x$ then

$$
\begin{aligned}
y_p &= -\frac{1}{4}\left(\frac{\cos((a-b-1)x)}{a-b-1} - \frac{\cos((a-b+1)x)}{a-b+1} - \frac{\cos((a+b-1)x)}{a+b-1} + \frac{\cos((a+b+1)x)}{a+b+1}\right)\cos x \\
&\quad + \frac{1}{4}\left(\frac{\sin((a-b-1)x)}{a-b-1} + \frac{\sin((a-b+1)x)}{a-b+1} - \frac{\sin((a+b-1)x)}{a+b-1} - \frac{\sin((a+b+1)x)}{a+b+1}\right)\sin x
\end{aligned}
$$

$$
\begin{aligned}
&= \frac{1}{4}\left(-\frac{\cos^2((a-b-1)x)}{a-b-1} + \frac{\sin^2((a-b-1)x)}{a-b-1}\right) + \frac{1}{4}\left(\frac{\cos^2((a-b+1)x)}{a-b+1} + \frac{\sin^2((a-b+1)x)}{a-b+1}\right) \\
&\quad + \frac{1}{4}\left(\frac{\cos^2((a+b-1)x)}{a+b-1} - \frac{\sin^2((a+b-1)x)}{a+b-1}\right) + \frac{1}{4}\left(-\frac{\cos^2((a+b+1)x)}{a+b+1} - \frac{\sin^2((a+b+1)x)}{a+b+1}\right)
\end{aligned}
$$

$$
\begin{aligned}
&= \frac{1}{4}\left(-\frac{\cos^2((a-b-1)x)}{a-b-1} + \frac{\sin^2((a-b-1)x)}{a-b-1}\right) + \frac{1}{4}\left(\frac{1}{a-b+1}\right) \\
&\quad + \frac{1}{4}\left(\frac{\cos^2((a+b-1)x)}{a+b-1} - \frac{\sin^2((a+b-1)x)}{a+b-1}\right) - \frac{1}{4}\left(\frac{1}{a+b+1}\right)
\end{aligned}
$$

Let $a-b-1=\alpha, a+b-1=\beta$ then

$$
\begin{aligned}
y_p &= \frac{1}{4}\left(\frac{\sin^2(\alpha x)-\cos^2(\alpha x)}{\alpha}\right)+\frac{1}{4}\left(\frac{\cos^2(\beta x)-\sin^2(\beta x)}{\beta}\right)+\frac{1}{4}\left(\frac{1}{\alpha+2}\right)-\frac{1}{4}\left(\frac{1}{\beta+2}\right)\\
&= \frac{1}{4}\left(\frac{\sin^2(\alpha x)-\cos^2(\alpha x)}{\alpha}+\frac{\cos^2(\beta x)-\sin^2(\beta x)}{\beta}+\frac{1}{\alpha+2}-\frac{1}{\beta+2}\right)
\end{aligned}
$$

Therefore, the full solution is

$$
\begin{aligned}
y &= y_h + y_p\\
&= c_1\cos x + c_2\sin x + \frac{1}{4}\left(\frac{\sin^2(\alpha x)-\cos^2(\alpha x)}{\alpha}+\frac{\cos^2(\beta x)-\sin^2(\beta x)}{\beta}+\frac{1}{\alpha+2}-\frac{1}{\beta+2}\right)
\end{aligned}
$$

I made mistake. Need to go over it again. I do not see it now. Maple does not verify.

```
restart;
ode:=diff(diff(y(x),x),x)+y(x)-sin(a*x)*sin(b*x)=0;
alpha:=a-b-1;
beta:=a+b-1;
yp:=1/4*(1/alpha* (sin(alpha*x)^2-cos(alpha*x)^2)+1/beta* (cos(beta*x)^2-sin(beta*x)^2))+(1/
y0:=yp+_C1*sin(x)+_C2*cos(x);
not zero
```

2.1006 ODE No. 1006

$$y''(x)-y(x)=0$$

✓ **Mathematica** : cpu = 0.0032838 (sec), leaf count = 20

$$\left\{\left\{y(x)\to c_1e^x+c_2e^{-x}\right\}\right\}$$

✓ **Maple** : cpu = 0.004 (sec), leaf count = 15

$$\left\{y(x)=\_C1\,e^{-x}+\_C2\,e^{x}\right\}$$

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 = 0.0856191 (sec), leaf count = 135

$$\left\{\left\{y(x) \to c_1 e^{\sqrt{2}x} + c_2 e^{-\sqrt{2}x} + \frac{e^{-\sqrt{2}x}\left(-2e^{x\left(x+\sqrt{2}\right)}x + 2e^{\left(x-\sqrt{2}\right)x+2\sqrt{2}x}x + \sqrt{2}e^{x\left(x+\sqrt{2}\right)} + \sqrt{2}e^{\left(x-\sqrt{2}\right)x+2\sqrt{}}\right.}{2\sqrt{2}}\right.\right.$$

✓ **Maple** : cpu = 0.014 (sec), leaf count = 26

$$\left\{y(x) = \mathrm{e}^{\sqrt{2}x}\_C2 + \mathrm{e}^{-\sqrt{2}x}\_C1 + \mathrm{e}^{x^2}\right\}$$

Hand solution

$$y'' - 2y = 4x^2 e^{x^2} \tag{1}$$

We start by solving the homogeneous equation

$$y'' - 2y = 0$$

Let $y = e^{\lambda x}$, substitution in above gives

$$
\begin{aligned}
\lambda^2 e^{\lambda x} - 2e^{\lambda x} &= 0 \\
\lambda^2 - 2 &= 0
\end{aligned}
$$

Hence $\lambda = \pm\sqrt{2}$, therefore the solution is

$$
\begin{aligned}
y_h &= Ae^{\sqrt{2}x} + Be^{-\sqrt{2}x} \\
&= Ay_1 + By_2
\end{aligned}
$$

Now we solve for the particular solution using variation of parameters.

$$
y_p = u_1 y_1 + u_2 y_2
$$

wronskian is

$$
W = \begin{vmatrix} y_1 & y_2 \\ y_1' & y_2' \end{vmatrix} = \begin{vmatrix} e^{\sqrt{2}x} & e^{-\sqrt{2}x} \\ \sqrt{2}e^{\sqrt{2}x} & -\sqrt{2}e^{-\sqrt{2}x} \end{vmatrix} = -\sqrt{2} - \sqrt{2} = -2\sqrt{2}
$$

Hence, using $f = 4x^2 e^{x^2}$, which is the RHS of the ODE, and noting that a_0 is the coefficient of y'' which is one here, then

$$
\begin{aligned}
u_1 &= \int \frac{-y_2}{W}\frac{f}{a_0} dx = -\int \frac{e^{-\sqrt{2}x}}{-2\sqrt{2}} 4x^2 e^{x^2} dx \\
&= \frac{2}{\sqrt{2}} \int x^2 e^{x^2 - \sqrt{2}x} dx \\
&= \frac{2}{\sqrt{2}} \left(\frac{1}{4} e^{x\left(x - \sqrt{2}\right)} \left(\sqrt{2} + 2x\right) \right)
\end{aligned}
$$

And

$$
\begin{aligned}
u_2 &= \int \frac{y_1}{W}\frac{f}{a_0} dx = \int \frac{e^{\sqrt{2}x}}{-2\sqrt{2}} 4x^2 e^{x^2} dx \\
&= \frac{-2}{\sqrt{2}} \int x^2 e^{x^2 + \sqrt{2}x} dx \\
&= \frac{-2}{\sqrt{2}} \left(-\frac{1}{4} e^{x\left(x + \sqrt{2}\right)} \left(\sqrt{2} - 2x\right) \right)
\end{aligned}
$$

Since $y_p = u_1 e^{\sqrt{2}x} + u_2 e^{-\sqrt{2}x}$ 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 = 0.0354348 (sec), leaf count = 48

$$\left\{\left\{y(x)\to -\frac{\sin(ax)\left(\log\left(\cos\left(\frac{ax}{2}\right)\right)-\log\left(\sin\left(\frac{ax}{2}\right)\right)\right)}{a^2}+c_2\sin(ax)+c_1\cos(ax)\right\}\right\}$$

✓ **Maple** : cpu = 0.058 (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 = 0.0036165 (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 = 0.012 (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 = 0.0048403 (sec), leaf count = 46

$$\left\{\left\{y(x)\to c_1\text{Ai}\left(\frac{-b-ax}{(-a)^{2/3}}\right)+c_2\text{Bi}\left(\frac{-b-ax}{(-a)^{2/3}}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.03 (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

$$\begin{aligned}a^2\frac{d^2\eta}{d\xi^2}+\xi\eta(\xi)&=0\\a^2\eta''+\xi\eta&=0\end{aligned} \tag{2}$$

This is Airy ODE but with plus sign instead of the normal Airy $\eta'' - \xi\eta = 0$. Let

$$
\begin{aligned}
\eta &= \sum_{n=0}^{\infty} c_n \xi^n \\
\eta' &= \sum_{n=0}^{\infty} n c_n \xi^{n-1} = \sum_{n=1}^{\infty} n c_n \xi^{n-1} = \sum_{n=0}^{\infty} (n+1)\, c_{n+1} \xi^n \\
\eta'' &= \sum_{n=0}^{\infty} n(n+1)\, c_{n+1} \xi^{n-1} = \sum_{n=1}^{\infty} n(n+1)\, c_{n+1} \xi^{n-1} = \sum_{n=0}^{\infty} (n+1)\,(n+2)\, c_{n+2} \xi^n
\end{aligned}
$$

Hence (2) becomes

$$
\begin{aligned}
a^2 \sum_{n=0}^{\infty} (n+1)\,(n+2)\, c_{n+2} \xi^n + \xi \sum_{n=0}^{\infty} c_n \xi^n &= 0 \\
\sum_{n=0}^{\infty} a^2 (n+1)\,(n+2)\, c_{n+2} \xi^n + \sum_{n=0}^{\infty} c_n \xi^{n+1} &= 0 \\
\sum_{n=0}^{\infty} a^2 (n+1)\,(n+2)\, c_{n+2} \xi^n + \sum_{n=1}^{\infty} c_{n-1} \xi^n &= 0 \\
2a^2 c_2 + \sum_{n=1}^{\infty} \left(a^2 (n+1)\,(n+2)\, c_{n+2} + c_{n-1} \right) \xi^n &= 0
\end{aligned}
$$

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

$$f(\xi) = \sum_{n=0}^{\infty} 3^n \left(\frac{1}{3}\right)_n \frac{\xi^{3n}}{(3n)!}$$
$$g(\xi) = \sum_{n=0}^{\infty} 3^n \left(\frac{2}{3}\right)_n \frac{\xi^{3n+1}}{(3n+1)!}$$

Now looking at definition of AiryAI (z) we see

$$\text{AiryAI}\,(z) = r_1 f(z) - r_2 g(z)$$
$$\text{AiryBI}\,(z) = \sqrt{3}(r_1 f(z) + r_2 g(z))$$

These are Airy functions AiryAI and AiryBI with appropriate choice of c_0, c_1. See definition of these special functions. Converting back to x using $\xi = ax + b$ should result in solution given by CAS. Need to write these final details to make sure. Will finish later.

2.1011 ODE No. 1011

$$y''(x) - (x^2+1)\, y(x) = 0$$

✓ **Mathematica** : cpu = 0.0049012 (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 = 0.02 (sec), leaf count = 17

$$\left\{y(x) = \mathrm{e}^{\frac{x^2}{2}}\left(\mathit{Erf}(x)\_C2 + \_C1\right)\right\}$$

Hand solution

$$y'' - \left(x^2+1\right) y = 0 \tag{1}$$

Second order with varying coefficient. Using power series, let $y = \sum_{n=0}^{\infty} c_n x^n$, hence

$$\begin{aligned}
y' &= \sum_{n=0}^{\infty} n c_n x^{n-1} = \sum_{n=1}^{\infty} n c_n x^{n-1} = \sum_{n=0}^{\infty} (n+1)\, c_{n+1} x^n \\
y'' &= \sum_{n=0}^{\infty} n(n+1)\, c_{n+1} x^{n-1} = \sum_{n=1}^{\infty} n(n+1)\, c_{n+1} x^{n-1} = \sum_{n=0}^{\infty} (n+1)\,(n+2)\, c_{n+2} x^n
\end{aligned}$$

Substituting back in the original ODE gives

$$\begin{aligned}
\sum_{n=0}^{\infty} (n+1)\,(n+2)\, c_{n+2} x^n - \left(x^2+1\right) \sum_{n=0}^{\infty} c_n x^n &= 0 \\
\sum_{n=0}^{\infty} (n+1)\,(n+2)\, c_{n+2} x^n - x^2 \sum_{n=0}^{\infty} c_n x^n - \sum_{n=0}^{\infty} c_n x^n &= 0 \\
\sum_{n=0}^{\infty} (n+1)\,(n+2)\, c_{n+2} x^n - \sum_{n=0}^{\infty} c_n x^{n+2} - \sum_{n=0}^{\infty} c_n x^n &= 0 \\
\sum_{n=0}^{\infty} (n+1)\,(n+2)\, c_{n+2} x^n - \sum_{n=2}^{\infty} c_{n-2} x^n - \sum_{n=0}^{\infty} c_n x^n &= 0
\end{aligned}$$

For $n = 0$

$$\begin{aligned}
(n+1)\,(n+2)\, c_{n+2} - c_n &= 0 \\
2c_2 - c_0 &= 0 \\
c_2 &= \frac{c_0}{2}
\end{aligned}$$

For $n = 1$

$$\begin{aligned}
(n+1)\,(n+2)\, c_{n+2} - c_n &= 0 \\
(2)\,(3)\, c_3 - c_1 &= 0 \\
c_3 &= \frac{c_1}{6}
\end{aligned}$$

For $n \geq 2$

$$\begin{aligned}
(n+1)\,(n+2)\, c_{n+2} - c_{n-2} - c_n = 0 & \\
c_{n+2} &= \frac{c_{n-2} + c_n}{(n+1)\,(n+2)}
\end{aligned}$$

Hence for $n=2$

$$c_4 = \frac{c_0 + c_2}{(3)(4)} = \frac{c_0 + \frac{c_0}{2}}{(3)(4)} = \frac{2c_0 + c_0}{(2)(3)(4)} = c_0 \frac{3}{(2)(3)(4)}$$

For $n=3$

$$c_5 = \frac{c_1 + c_3}{(4)(5)} = \frac{c_1 + \frac{c_1}{6}}{(4)(5)} = \frac{6c_1 + c_1}{(4)(5)(6)} = c_1 \frac{7}{(4)(5)(6)}$$

For $n=4$

$$c_6 = \frac{c_2 + c_4}{(5)(6)} = \frac{\frac{c_0}{2} + c_0 \frac{3}{(2)(3)(4)}}{(5)(6)} = \frac{c_0 (3)(4) + 3c_0}{(2)(3)(4)(5)(6)} = c_0 \frac{15}{(2)(3)(4)(5)(6)}$$

For $n=5$

$$\begin{aligned} c_7 &= \frac{c_3 + c_5}{(6)(7)} \\ &= \frac{\frac{c_1}{6} + c_1 \frac{7}{(4)(5)(6)}}{(6)(7)} = \frac{3}{560} c_1 \end{aligned}$$

And so on. Hence the series is

$$\begin{aligned} y &= \sum_{n=0}^{\infty} c_n x^n \\ &= c_0 + c_1 x + c_2 x^2 + c_3 x^3 + \cdots \\ &= c_0 + c_1 x + \frac{c_0}{2} x^2 + \frac{c_1}{6} x^3 + c_0 \frac{3}{(2)(3)(4)} x^4 + c_1 \frac{7}{(4)(5)(6)} x^5 + c_0 \frac{15}{(2)(3)(4)(5)(6)} x^6 + c_1 \frac{3}{560} x^7 + \cdots \\ &= c_0 + c_1 x + \frac{c_0}{2} x^2 + \frac{c_1}{6} x^3 + c_0 \frac{1}{8} x^4 + c_1 \frac{7}{120} x^5 + c_0 \frac{1}{48} x^6 + c_1 \frac{3}{560} x^7 + \cdots \\ &= c_0 \left(1 + \frac{x^2}{2} + \frac{1}{8} x^4 + \frac{1}{48} x^6 + \cdots\right) + c_1 \left(x + \frac{1}{6} x^3 + \frac{7}{120} x^5 + \frac{3}{560} x^7 + \cdots\right) \end{aligned}$$

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

$$y''(x) - \left(a + x^2\right) y(x) = 0$$

✓ **Mathematica** : cpu = 0.0058376 (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 = 0.072 (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

$$y''(x) - (a^2x^2 + a)\, y(x) = 0$$

✓ **Mathematica** : cpu = 0.0131644 (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 = 0.027 (sec), leaf count = 22

$$\left\{y(x) = e^{\frac{ax^2}{2}}\left(\mathit{Erf}\left(\sqrt{a}x\right)\_C2 + \_C1\right)\right\}$$

2.1014 ODE No. 1014

$$y''(x) - cx^a y(x) = 0$$

✓ **Mathematica** : cpu = 0.0189907 (sec), leaf count = 170

$$\left\{\left\{y(x) \to (a+2)^{-\frac{1}{a+2}} c_1 c^{\frac{1}{2(a+2)}} x^{\frac{\frac{a}{2}+1}{a+2}} \Gamma\left(1 - \frac{1}{a+2}\right) I_{-\frac{1}{a+2}}\left(\frac{2\sqrt{c}x^{\frac{a+2}{2}}}{a+2}\right) + (-1)^{\frac{1}{a+2}} (a+2)^{-\frac{1}{a+2}} c_2 c^{\frac{1}{2(a+2)}} x^{1-}\right.\right.$$

✓ **Maple** : cpu = 0.078 (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 = 0.272784 (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

$$\left\{y(x) = \mathit{DESol}\left(\left\{\frac{d^2}{dx^2}\_Y(x) + \left(-a^2x^{2n} + 1\right)\_Y(x)\right\}, \{\_Y(x)\}\right)\right\}$$

2.1016 ODE No. 1016

$$y(x)\left(ax^{2c}+bx^{c-1}\right)+y''(x)=0$$

✓ **Mathematica** : cpu = 0.083916 (sec), leaf count = 312

$$\left\{\left\{y(x)\to 2^{\frac{c}{2(c+1)}}c_1\left(x^{c+1}\right)^{\frac{c}{2(c+1)}}x^{-c/2}e^{-\frac{\sqrt{a}x^{c+1}}{\sqrt{-c^2-2c-1}}}U\left(\frac{\frac{\sqrt{a}cb}{\sqrt{-(c+1)^2}}+\frac{\sqrt{a}b}{\sqrt{-(c+1)^2}}+ac}{2(ca+a)},\frac{c}{c+1},\frac{2\sqrt{a}x^{c+1}}{\sqrt{-c^2-2c-1}}\right)+\right.\right.$$

✓ **Maple** : cpu = 0.15 (sec), leaf count = 91

$$\left\{y(x)=x^{-\frac{c}{2}}\left(M_{\frac{-ib}{2c+2}\frac{1}{\sqrt{a}},(2c+2)^{-1}}\left(\frac{2\,ix^{c+1}}{c+1}\sqrt{a}\right)\_C1+W_{\frac{-ib}{2c+2}\frac{1}{\sqrt{a}},(2c+2)^{-1}}\left(\frac{2\,ix^{c+1}}{c+1}\sqrt{a}\right)\_C2\right)\right\}$$

2.1017 ODE No. 1017

$$\left(e^{2x}-v^2\right)y(x)+y''(x)=0$$

✓ **Mathematica** : cpu = 0.018978 (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 = 0.03 (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 = 0.015129 (sec), leaf count = 55

$$\left\{\left\{y(x)\to c_1J_0\left(\frac{2\sqrt{a}\sqrt{e^{bx}}}{b}\right)+2c_2Y_0\left(\frac{2\sqrt{a}\sqrt{e^{bx}}}{b}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.039 (sec), leaf count = 39

$$\left\{y(x)=\_C1\,J_0\left(2\,\frac{\sqrt{a}e^{1/2\,bx}}{b}\right)+\_C2\,Y_0\left(2\,\frac{\sqrt{a}e^{1/2\,bx}}{b}\right)\right\}$$

2.1019 ODE No. 1019

$$y''(x) - y(x)\left(4a^2b^2x^2e^{2bx^2} - 1\right) = 0$$

✗ **Mathematica** : cpu = 0.57384 (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

$$\left\{y(x) = DESol\left(\left\{\frac{d^2}{dx^2}\_Y(x) + \left(-4\,a^2b^2x^2e^{2\,bx^2} + 1\right)\_Y(x)\right\}, \{\_Y(x)\}\right)\right\}$$

2.1020 ODE No. 1020

$$y(x)\left(ae^{2x} + be^x + c\right) + y''(x) = 0$$

✓ **Mathematica** : cpu = 0.497464 (sec), leaf count = 180

$$\left\{\left\{y(x) \to c_1 e^{i\left(\sqrt{c}\log(e^x) - \sqrt{a}e^x\right)} U\left(\frac{i\left(b - i\sqrt{a} + 2\sqrt{a}\sqrt{c}\right)}{2\sqrt{a}}, 2i\sqrt{c} + 1, 2i\sqrt{a}e^x\right) + c_2 e^{i\left(\sqrt{c}\log(e^x) - \sqrt{a}e^x\right)} L^{2i\sqrt{c}}_{-\frac{i(b-i\sqrt{}}{2}}\right.\right.$$

✓ **Maple** : cpu = 0.141 (sec), leaf count = 58

$$\left\{y(x) = e^{-\frac{x}{2}}\left(M_{-\frac{i}{2}b\frac{1}{\sqrt{a}}, i\sqrt{c}}(2\,i\sqrt{a}e^x)\_C1 + W_{-\frac{i}{2}b\frac{1}{\sqrt{a}}, i\sqrt{c}}(2\,i\sqrt{a}e^x)\_C2\right)\right\}$$

2.1021 ODE No. 1021

$$y(x)\left(a\cos^2(x) + b\right) + y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0238298 (sec), leaf count = 44

$$\left\{\left\{y(x) \to c_1\text{MathieuC}\left[\frac{1}{2}(a + 2b), -\frac{a}{4}, x\right] + c_2\text{MathieuS}\left[\frac{1}{2}(a + 2b), -\frac{a}{4}, x\right]\right\}\right\}$$

✓ **Maple** : cpu = 0.165 (sec), leaf count = 39

$$\left\{y(x) = \_C1\ MathieuC\left(-\frac{a}{2} - b, \frac{a}{4}, ix\right) + \_C2\ MathieuS\left(-\frac{a}{2} - b, \frac{a}{4}, ix\right)\right\}$$

2.1022 ODE No. 1022

$$y(x)(a\cos(2x)+b)+y''(x)=0$$

✓ **Mathematica** : cpu = 0.0192206 (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 = 0.158 (sec), leaf count = 21

$$\left\{y(x)=\_C1\ MathieuC\left(b,-\frac{a}{2},x\right)+\_C2\ MathieuS\left(b,-\frac{a}{2},x\right)\right\}$$

2.1023 ODE No. 1023

$$y(x)\left(a\cos^2(x)+b\right)+y''(x)=0$$

✓ **Mathematica** : cpu = 0.0099684 (sec), leaf count = 44

$$\left\{\left\{y(x)\to c_1\text{MathieuC}\left[\frac{1}{2}(a+2b),-\frac{a}{4},x\right]+c_2\text{MathieuS}\left[\frac{1}{2}(a+2b),-\frac{a}{4},x\right]\right\}\right\}$$

✓ **Maple** : cpu = 0.16 (sec), leaf count = 29

$$\left\{y(x)=\_C1\ MathieuC\left(\frac{a}{2}+b,-\frac{a}{4},x\right)+\_C2\ MathieuS\left(\frac{a}{2}+b,-\frac{a}{4},x\right)\right\}$$

2.1024 ODE No. 1024

$$y''(x)-y(x)\left(2\tan^2(x)+1\right)=0$$

✓ **Mathematica** : cpu = 0.109967 (sec), leaf count = 84

$$\left\{\left\{y(x)\to\frac{c_1\sqrt[4]{1-\cos^2(x)}\sec(x)}{\sqrt[4]{\cos^2(x)-1}}-\frac{c_2\sqrt[4]{1-\cos^2(x)}\sec(x)\left(\cos(x)\sqrt{1-\cos^2(x)}-\sin^{-1}(\cos(x))\right)}{2\sqrt[4]{\cos^2(x)-1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.095 (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 = 0.656162 (sec), leaf count = 615

$$\left\{\left\{y(x) \to \frac{c_2(-1)^{\frac{1}{2}(-2m-1)+1}\cos^2(x)^{\frac{1}{4}(-2m-1)+1}\left(\cos^2(x)-1\right)^{\frac{1}{2}\left(\frac{4am+4\sqrt{-a}n^2+4an-4\sqrt{-a}n+4(-a)^{3/2}+8\sqrt{-a}a+\sqrt{-a}+4mn}{8a+8n^2-8n+2}\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.135 (sec), leaf count = 102

$$\left\{y(x) = (\sin(x))^n\left((\cos(x))^{-m+1}{}_2\mathrm{F}_1(\frac{n}{2}-\frac{m}{2}+\frac{i}{2}\sqrt{a}+\frac{1}{2},\frac{n}{2}-\frac{m}{2}-\frac{i}{2}\sqrt{a}+\frac{1}{2};\frac{3}{2}-m;(\cos(x))^2)\_C2\right.\right.$$

2.1026 ODE No. 1026

$$y''(x) - y(x)(B + n(n+1)\wp(x;\mathrm{g2},\mathrm{g3})) = 0$$

✗ **Mathematica** : cpu = 0.161726 (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 = 1.03479 (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 = 0.263 (sec), leaf count = 69

$$\left\{y(x) = \_C1\ \mathit{HeunG}\left(k^{-2},\frac{b}{4k^2},-\frac{n}{2},\frac{n}{2}+\frac{1}{2},\frac{1}{2},\frac{1}{2},(\mathit{JacobiSN}(x,k))^2\right) + \_C2\ \mathit{HeunG}\left(k^{-2},\frac{k^2+b+1}{4k^2},\right.\right.$$

2.1028 ODE No. 1028

$$y''(x) - y(x)\left(ap(x) + b + \frac{p^4(x)}{30} + \frac{7p''(x)}{3}\right) = 0$$

✗ **Mathematica** : cpu = 0.228032 (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 = 0.114724 (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 = 0.092 (sec), leaf count = 22

$$\left\{y(x) = \left(\int e^{\int -2f(x)\,dx}\,dx + \_C1\right)e^{\int f(x)\,dx}\_C2\right\}$$

2.1030 ODE No. 1030

$$y(x)(l + P(x)) + y''(x) = 0$$

✗ **Mathematica** : cpu = 0.123922 (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

$$\left\{y(x) = DESol\left(\left\{(P(x) + l)\_Y(x) + \frac{d^2}{dx^2}\_Y(x)\right\}, \{\_Y(x)\}\right)\right\}$$

2.1031 ODE No. 1031

$$y''(x) - f(x)y(x) = 0$$

✗ **Mathematica** : cpu = 0.0996267 (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

$$\left\{y(x) = DESol\left(\left\{-f(x)\_Y(x) + \frac{d^2}{dx^2}\_Y(x)\right\}, \{\_Y(x)\}\right)\right\}$$

2.1032 ODE No. 1032

$$y(x)\left(\frac{\left(\frac{1}{4} - v^2\right)g'(x)^2}{g(x)} + g'(x)^2 + \frac{g^3(x)}{2g'(x)} - \frac{3g''(x)^2}{4g'(x)^2}\right) + y''(x) = 0$$

✗ **Mathematica** : cpu = 0.386794 (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 = 0.082 (sec), leaf count = 48

$$\left\{y(x) = 1\left(\_C2\, W_{\frac{i}{2}v^2 - \frac{i}{8}, \frac{1}{2}}(2\,ig(x)) + \_C1\, M_{\frac{i}{2}v^2 - \frac{i}{8}, \frac{1}{2}}(2\,ig(x))\right)\frac{1}{\sqrt{\frac{d}{dx}g(x)}}\right\}$$

2.1033 ODE No. 1033

$$ae^{-2x}y(x) + y''(x) + y'(x) = 0$$

✓ **Mathematica** : cpu = 0.0121353 (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 = 0.01 (sec), leaf count = 27

$$\left\{y(x) = \_C1\, \sin\left(e^{-x}\sqrt{a}\right) + \_C2\, \cos\left(e^{-x}\sqrt{a}\right)\right\}$$

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 = 0.0084406 (sec), leaf count = 20

$$\{\{y(x) \to c_2 \sin(e^x) + c_1 \cos(e^x)\}\}$$

✓ **Maple** : cpu = 0.009 (sec), leaf count = 15

$$\{y(x) = \_C1 \sin(e^x) + \_C2 \cos(e^x)\}$$

Hand solution

$$y'' - y' + e^{2x}y = 0$$

Let $y(x) = \eta(\xi)$ where $\xi = e^x$, hence

$$\begin{aligned}\frac{dy}{dx} &= \frac{d\eta}{d\xi}\frac{d\xi}{dx}\\ &= \frac{d\eta}{d\xi}e^x\end{aligned}$$

And

$$\begin{aligned}\frac{d^2y}{dx^2} &= \frac{d}{dx}\left(\frac{d\eta}{d\xi}e^x\right)\\ &= \frac{d^2\eta}{d\xi^2}\frac{d\xi}{dx}(e^x) + \frac{d\eta}{d\xi}(e^x)\\ &= \frac{d^2\eta}{d\xi^2}(e^x)(e^x) + \frac{d\eta}{d\xi}(e^x)\\ &= \frac{d^2\eta}{d\xi^2}(e^{2x}) + \frac{d\eta}{d\xi}(e^x)\end{aligned}$$

Hence the original ODE becomes

$$
\begin{aligned}
\frac{d^2\eta}{d\xi^2}\left(e^{2x}\right)+\frac{d\eta}{d\xi}\left(e^{x}\right)-\frac{d\eta}{d\xi}\left(e^{x}\right)+e^{2x}\eta=0\\
\eta''+\eta=0
\end{aligned}
$$

This is standard second order with constant coefficients. The solution is

$$
\eta=c_1\cos\left(\xi\right)+c_2\sin\left(\xi\right)
$$

Substituting back

$$
y(x)=c_1\cos\left(e^{x}\right)+c_2\sin\left(e^{x}\right)
$$

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 = 0.0041726 (sec), leaf count = 58

$$
\left\{\left\{y(x)\to c_1e^{\frac{1}{2}x\left(-\sqrt{a^2-4b}-a\right)}+c_2e^{\frac{1}{2}x\left(\sqrt{a^2-4b}-a\right)}\right\}\right\}
$$

✓ **Maple** : cpu = 0.01 (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 = 0.126227 (sec), leaf count = 209

$$\left\{\left\{y(x) \to e^{\frac{1}{2}x\left(-\sqrt{a^2-4b}-a\right)} \int_1^x -\frac{e^{aK[1]+\frac{1}{2}\left(\sqrt{a^2-4b}-a\right)K[1]} f(K[1])}{\sqrt{a^2-4b}} dK[1] + e^{\frac{1}{2}x\left(\sqrt{a^2-4b}-a\right)} \int_1^x \frac{e^{aK[2]+\frac{1}{2}\left(-a-\sqrt{a^2\right.}}}{\sqrt{a^2}}\right.\right.$$

✓ **Maple** : cpu = 0.071 (sec), leaf count = 124

$$\left\{y(x) = \mathrm{e}^{-\frac{x}{2}\left(a-\sqrt{a^2-4\,b}\right)}\_C2 + \mathrm{e}^{-\frac{x}{2}\left(a+\sqrt{a^2-4\,b}\right)}\_C1 + 1\left(\left(\int f(x)\,\mathrm{e}^{-\frac{x}{2}\left(-a+\sqrt{a^2-4\,b}\right)}\,\mathrm{d}x\mathrm{e}^{x\sqrt{a^2-4\,b}} - \int f(x)\,\mathrm{e}^{\frac{x}{2}\left(\right.}\right.\right.\right.$$

2.1037 ODE No. 1037

$$ay'(x) + y(x)\left(-\left(b^2x^2 + c\right)\right) + y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0198268 (sec), leaf count = 101

$$\left\{\left\{y(x) \to c_1 e^{-\frac{ax}{2}-\frac{bx^2}{2}} H_{\frac{-a^2-4b-4c}{8b}}\left(\sqrt{b}x\right) + c_2 e^{-\frac{ax}{2}-\frac{bx^2}{2}}\,{}_1F_1\left(-\frac{-a^2-4b-4c}{16b}; \frac{1}{2}; bx^2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.069 (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 = 0.293256 (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

$$\left\{y(x) = \mathit{DESol}\left(\left\{f(x)\_Y(x) + 2\,a\frac{\mathrm{d}}{\mathrm{d}x}\_Y(x) + \frac{\mathrm{d}^2}{\mathrm{d}x^2}\_Y(x)\right\}, \{\_Y(x)\}\right)\right\}$$

2.1039 ODE No. 1039

$$y''(x) + xy'(x) + y(x) = 0$$

✓ **Mathematica** : cpu = 0.0086234 (sec), leaf count = 47

$$\left\{\left\{y(x) \to \sqrt{\frac{\pi}{2}} c_1 e^{-\frac{x^2}{2}} \operatorname{erfi}\left(\frac{x}{\sqrt{2}}\right) + c_2 e^{-\frac{x^2}{2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.007 (sec), leaf count = 25

$$\left\{y(x) = \left(\mathit{Erf}\left(\frac{i}{2}\sqrt{2}x\right)\_C1 + \_C2\right)\left(\mathrm{e}^{\frac{x^2}{2}}\right)^{-1}\right\}$$

2.1040 ODE No. 1040

$$y''(x) + xy'(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 0.0300953 (sec), leaf count = 53

$$\left\{\left\{y(x) \to c_1 x - \frac{1}{2} c_2 e^{-\frac{x^2}{2}}\left(\sqrt{2\pi} e^{\frac{x^2}{2}} x \operatorname{erf}\left(\frac{x}{\sqrt{2}}\right) + 2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.029 (sec), leaf count = 33

$$\left\{y(x) = \sqrt{\pi}\sqrt{2}\mathrm{e}^{-\frac{x^2}{2}}\_C2 + x\left(\pi\_C2\ \mathit{Erf}\left(\frac{\sqrt{2}x}{2}\right) + \_C1\right)\right\}$$

2.1041 ODE No. 1041

$$(n+1)y(x) + y''(x) + xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.0071444 (sec), leaf count = 55

$$\left\{\left\{y(x) \to c_1 e^{-\frac{x^2}{2}} H_n\left(\frac{x}{\sqrt{2}}\right) + c_2 e^{-\frac{x^2}{2}} {}_1F_1\left(-\frac{n}{2}; \frac{1}{2}; \frac{x^2}{2}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.055 (sec), leaf count = 41

$$\left\{y(x) = \mathrm{e}^{-\frac{x^2}{2}} x\left(M\left(-\frac{n}{2} + \frac{1}{2}, \frac{3}{2}, \frac{x^2}{2}\right)\_C1 + U\left(-\frac{n}{2} + \frac{1}{2}, \frac{3}{2}, \frac{x^2}{2}\right)\_C2\right)\right\}$$

2.1042 ODE No. 1042

$$-ny(x) + y''(x) + xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.0059692 (sec), leaf count = 61

$$\left\{\left\{y(x) \to c_1 e^{-\frac{x^2}{2}} H_{-n-1}\left(\frac{x}{\sqrt{2}}\right) + c_2 e^{-\frac{x^2}{2}} {}_1F_1\left(\frac{n+1}{2}; \frac{1}{2}; \frac{x^2}{2}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.052 (sec), leaf count = 41

$$\left\{y(x) = \mathrm{e}^{-\frac{x^2}{2}} x \left(U\left(\frac{n}{2}+1, \frac{3}{2}, \frac{x^2}{2}\right)\_C2 + M\left(\frac{n}{2}+1, \frac{3}{2}, \frac{x^2}{2}\right)\_C1\right)\right\}$$

2.1043 ODE No. 1043

$$y''(x) - xy'(x) + 2y(x) = 0$$

✓ **Mathematica** : cpu = 0.0991634 (sec), leaf count = 69

$$\left\{\left\{y(x) \to \frac{1}{4} c_2 \left(\sqrt{2\pi} x^2 \operatorname{erfi}\left(\frac{x}{\sqrt{2}}\right) - \sqrt{2\pi} \operatorname{erfi}\left(\frac{x}{\sqrt{2}}\right) - 2e^{\frac{x^2}{2}} x\right) + c_1 (x^2 - 1)\right\}\right\}$$

✓ **Maple** : cpu = 0.164 (sec), leaf count = 39

$$\left\{y(x) = -2\,\mathrm{e}^{1/2\,x^2}\_C1\,x + (x-1)(1+x)\left(\sqrt{2}\sqrt{\pi}\mathit{erfi}\left(\frac{\sqrt{2}x}{2}\right)\_C1 + \_C2\right)\right\}$$

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

$$y' = \sum_{n=0}^{\infty} n c_n x^{n-1} = \sum_{n=1}^{\infty} n c_n x^{n-1} = \sum_{n=0}^{\infty} (n+1)\, c_{n+1} x^n$$
$$y'' = \sum_{n=0}^{\infty} n(n+1)\, c_{n+1} x^{n-1} = \sum_{n=1}^{\infty} n(n+1)\, c_{n+1} x^{n-1} = \sum_{n=0}^{\infty} (n+1)(n+2)\, c_{n+2} x^n$$

Substituting back in the original ODE gives

$$
\begin{aligned}
\sum_{n=0}^{\infty}(n+1)(n+2)c_{n+2}x^n - x\sum_{n=0}^{\infty}(n+1)c_{n+1}x^n + 2\sum_{n=0}^{\infty}c_nx^n &= 0 \\
\sum_{n=0}^{\infty}(n+1)(n+2)c_{n+2}x^n - \sum_{n=0}^{\infty}(n+1)c_{n+1}x^{n+1} + \sum_{n=0}^{\infty}2c_nx^n &= 0 \\
\sum_{n=0}^{\infty}(n+1)(n+2)c_{n+2}x^n - \sum_{n=1}^{\infty}nc_nx^n + \sum_{n=0}^{\infty}2c_nx^n &= 0
\end{aligned}
$$

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 $n \geq 1$

$$
\begin{aligned}
(n+1)(n+2)c_{n+2} - nc_n + 2c_n &= 0 \\
c_{n+2} &= \frac{c_n(n-2)}{(n+1)(n+2)}
\end{aligned}
$$

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

$$\begin{aligned}
y &= \sum_{n=0}^{\infty} c_n x^n \\
&= c_0 + c_1 x + c_2 x^2 + c_3 x^3 + \cdots \\
&= c_0 + c_1 x - c_0 x^2 - \frac{c_1}{(2)(3)} x^3 - \frac{c_1}{(2)(3)(4)(5)} x^5 - \frac{3c_1}{(2)(3)(4)(5)(6)(7)} x^7 - \frac{(3)(5)\,c_1}{(2)(3)(4)(5)(6)(7)(8)(9)} \\
&= c_0(1 - x^2) + c_1 \left(x - \frac{1}{(2)(3)} x^3 - \frac{1}{(2)(3)(4)(5)} x^5 - \frac{3}{(2)(3)(4)(5)(6)(7)} x^7 - \frac{(3)(5)}{(2)(3)(4)(5)(6)(7)(8)} \right. \\
&= c_0(1 - x^2) + c_1 \left(x - \frac{1}{3!} x^3 - \frac{1}{5!} x^5 - \frac{3}{7!} x^7 - \frac{15}{9!} x^9 - \cdots \right)
\end{aligned}$$

Hence

$$y(x) = c_0(1 - x^2) + c_1 \left(x - \frac{1}{6} x^3 - \frac{1}{120} x^5 - \frac{1}{1680} x^7 - \frac{1}{24\,192} x^9 - \cdots \right)$$

Verification

```
restart;
Order:=10:
sol:=dsolve(ode,y(x),series):
subs({y(0)=c0,D(y)(0)=c1},rhs(sol)):
sol:=convert(%,polynom):

sol:=collect(sol,{c0,c1});
sol := (-x^2+1)*c0+(x-(1/6)*x^3-(1/120)*x^5-(1/1680)*x^7-(1/24192)*x^9)*c1
```

2.1044 ODE No. 1044

$$-ay(x) + y''(x) - xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.0064759 (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 = 0.055 (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 = 0.0280429 (sec), leaf count = 39

$$\left\{\left\{y(x) \to \sqrt{\frac{\pi}{2}} c_2 e^{x-2} \text{erfi}\left(\frac{x-2}{\sqrt{2}}\right) + c_1 e^x\right\}\right\}$$

✓ **Maple** : cpu = 0.005 (sec), leaf count = 21

$$\left\{y(x) = e^x\left(\mathit{Erf}\left(\frac{i}{2}\sqrt{2}(x-2)\right)\_C1 + \_C2\right)\right\}$$

2.1046 ODE No. 1046

$$ay(x) + y''(x) - 2xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.0055442 (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 = 0.054 (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

$$(4x^2 + 2)\, y(x) + y''(x) + 4xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.0095861 (sec), leaf count = 27

$$\left\{\left\{y(x) \to c_1 e^{-x^2} + c_2 e^{-x^2} x\right\}\right\}$$

✓ **Maple** : cpu = 0.02 (sec), leaf count = 16

$$\left\{y(x) = e^{-x^2}(\_C2\, x + \_C1)\right\}$$

Hand solution

$$y'' + 4xy' + \left(4x^2 + 2\right) y = 0 \tag{1}$$

Second order with varying coefficient. Using power series, let $y = \sum_{n=0}^{\infty} c_n x^n$, 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

$$\begin{aligned}
\sum_{n=0}^{\infty} (n+1)\,(n+2)\, c_{n+2} x^n + 4x \sum_{n=0}^{\infty} (n+1)\, c_{n+1} x^n + \left(4x^2 + 2\right) \sum_{n=0}^{\infty} c_n x^n &= 0 \\
\sum_{n=0}^{\infty} (n+1)\,(n+2)\, c_{n+2} x^n + \sum_{n=0}^{\infty} 4(n+1)\, c_{n+1} x^{n+1} + \sum_{n=0}^{\infty} 4 c_n x^{n+2} + \sum_{n=0}^{\infty} 2 c_n x^n &= 0 \\
\sum_{n=0}^{\infty} (n+1)\,(n+2)\, c_{n+2} x^n + \sum_{n=1}^{\infty} 4 n c_n x^n + \sum_{n=2}^{\infty} 4 c_{n-2} x^n + \sum_{n=0}^{\infty} 2 c_n x^n &= 0
\end{aligned}$$

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 $n = 1$

$$\begin{aligned}
(n+1)\,(n+2)\, c_{n+2} + 4n c_n + 2c_n &= 0 \\
(2)\,(3)\, c_3 + 4c_1 + 2c_1 &= 0 \\
c_3 &= -c_1
\end{aligned}$$

For $n \geq 2$

$$\begin{aligned}
(n+1)\,(n+2)\, c_{n+2} + 4n c_n + 4c_{n-2} + 2c_n &= 0 \\
c_{n+2} &= \frac{(-4n-2)\, c_n - 4c_{n-2}}{(n+1)\,(n+2)}
\end{aligned}$$

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

$$\begin{aligned}
y &= \sum_{n=0}^{\infty} c_n x^n \\
&= c_0 + c_1 x + c_2 x^2 + \cdots \\
&= c_0 + c_1 x - c_0 x^2 - c_1 x^3 + c_0 \frac{6}{(3)\,(4)} x^4 + c_1 \frac{10}{(4)\,(5)} x^5 - c_0 \frac{5}{(5)\,(7)} x^6 - c_1 \frac{7}{(6)\,(7)} x^7 + c_0 \frac{12}{7} \frac{1}{(7)\,(8)} x^8 + \cdots \\
&= c_0 \left(1 - x^2 + \frac{6}{(3)\,(4)} x^4 - \frac{5}{(5)\,(6)} x^6 + \frac{7}{3} \frac{1}{(7)\,(8)} x^8 + \cdots \right) + c_1 \left(x - x^3 + \frac{10}{(4)\,(5)} x^5 - \frac{7}{(6)\,(7)} x^7 + \cdots \right) \\
&= c_0 \left(1 - x^2 + \frac{1}{2} x^4 - \frac{1}{6} x^6 + \frac{1}{24} x^8 + \cdots \right) + c_1 \left(x - x^3 + \frac{1}{2} x^5 - \frac{1}{6} x^7 + \cdots \right)
\end{aligned}$$

But Taylor series for $e^{-x^2} = 1 - x^2 + \frac{1}{2} x^4 - \frac{x^6}{4} + \cdots$, therefore the above becomes

$$y = c_0 e^{-x^2} + c_1 x e^{-x^2}$$

Verification

```
restart;
restart;
ode:=diff(diff(y(x),x),x)+4*x*diff(y(x),x)+(4*x^2+2)*y(x)=0;
y0:=_C0*exp(-x^2)+_C1*x*exp(-x^2);
odetest(y(x)=y0,ode);
0
```

2.1048 ODE No. 1048

$$(2n + 3x^2 - 1)\, y(x) + y''(x) - 4xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.0077407 (sec), leaf count = 45

$$\left\{\left\{y(x) \to c_1 e^{\frac{x^2}{2}} H_n(x) + c_2 e^{\frac{x^2}{2}}\, {}_1F_1\left(-\frac{n}{2}; \frac{1}{2}; x^2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.052 (sec), leaf count = 37

$$\left\{y(x) = x e^{\frac{x^2}{2}} \left(U\left(-\frac{n}{2} + \frac{1}{2}, \frac{3}{2}, x^2\right) \_C2 + M\left(-\frac{n}{2} + \frac{1}{2}, \frac{3}{2}, x^2\right) \_C1\right)\right\}$$

2.1049 ODE No. 1049

$$(4x^2 - 1)\, y(x) + y''(x) - 4xy'(x) - e^x = 0$$

✓ **Mathematica** : cpu = 0.04868 (sec), leaf count = 109

$$\left\{\left\{y(x) \to c_1 e^{x(x-i)} - \frac{1}{2} i c_2 e^{(x-i)x + 2ix} + \frac{1}{4}\sqrt{\pi} e^{x(x-i) - \frac{i}{2}} \left(e^{2ix} \operatorname{erfi}\left(\left(\frac{1}{2} + \frac{i}{2}\right) - ix\right) - i e^{i} \operatorname{erf}\left(-x + \left(\frac{1}{2} + \frac{i}{2}\right.\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.128 (sec), leaf count = 66

$$\left\{y(x) = \frac{\left((i\cos(x) + \sin(x))\sqrt{\pi} e^{\frac{i}{2}} Erf\left(x - \frac{1}{2} - \frac{i}{2}\right) - (i\cos(x) - \sin(x)) e^{-\frac{i}{2}} \sqrt{\pi} Erf\left(x - \frac{1}{2} + \frac{i}{2}\right) + 4 \sin\right.}{4}\right.$$

2.1050 ODE No. 1050

$$(4x^2 - 2)\, y(x) + y''(x) - 4xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.0086054 (sec), leaf count = 23

$$\left\{\left\{y(x) \to c_1 e^{x^2} + c_2 e^{x^2} x\right\}\right\}$$

✓ **Maple** : cpu = 0.017 (sec), leaf count = 14

$$\left\{y(x) = e^{x^2} (\_C2\, x + \_C1)\right\}$$

2.1051 ODE No. 1051

$$(4x^2-3)\,y(x)-e^{x^2}+y''(x)-4xy'(x)=0$$

✓ **Mathematica** : cpu = 0.0174905 (sec), leaf count = 44

$$\left\{\left\{y(x)\to c_1e^{(x-1)x}+\frac{1}{2}c_2e^{(x-1)x+2x}-e^{(x-1)x+x}\right\}\right\}$$

✓ **Maple** : cpu = 0.023 (sec), leaf count = 27

$$\left\{y(x)=\mathrm{e}^{x(1+x)}\_C2+\mathrm{e}^{x(x-1)}\_C1-\mathrm{e}^{x^2}\right\}$$

2.1052 ODE No. 1052

$$axy'(x)+by(x)+y''(x)=0$$

✓ **Mathematica** : cpu = 0.0145954 (sec), leaf count = 78

$$\left\{\left\{y(x)\to c_1e^{-\frac{ax^2}{2}}H_{\frac{b-a}{a}}\left(\frac{\sqrt{a}x}{\sqrt{2}}\right)+c_2e^{-\frac{ax^2}{2}}\,{}_1F_1\left(-\frac{b-a}{2a};\frac{1}{2};\frac{ax^2}{2}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.058 (sec), leaf count = 58

$$\left\{y(x)=\mathrm{e}^{-\frac{ax^2}{2}}x\left(M\left(\frac{2\,a-b}{2\,a},\frac{3}{2},\frac{ax^2}{2}\right)\_C1+U\left(\frac{2\,a-b}{2\,a},\frac{3}{2},\frac{ax^2}{2}\right)\_C2\right)\right\}$$

2.1053 ODE No. 1053

$$a^2x^2y(x)+2axy'(x)+y''(x)=0$$

✓ **Mathematica** : cpu = 0.0227701 (sec), leaf count = 57

$$\left\{\left\{y(x)\to c_1e^{-\frac{ax^2}{2}-\sqrt{a}x}+\frac{c_2e^{\sqrt{a}x-\frac{ax^2}{2}}}{2\sqrt{a}}\right\}\right\}$$

✓ **Maple** : cpu = 0.032 (sec), leaf count = 35

$$\left\{y(x)=\_C1\,\mathrm{e}^{-\frac{x}{2}(ax-2\sqrt{a})}+\_C2\,\mathrm{e}^{-\frac{x}{2}(ax+2\sqrt{a})}\right\}$$

2.1054 ODE No. 1054

$$(ax+b)y'(x)+y(x)(cx+d)+y''(x)=0$$

✓ **Mathematica** : cpu = 0.0332217 (sec), leaf count = 172

$$\left\{\left\{y(x)\to c_1e^{\frac{cx}{a}-\frac{ax^2}{2}-bx}H_{\frac{-a^3+da^2-bca+c^2}{a^3}}\left(\frac{ab-2c}{\sqrt{2}a^{3/2}}+\frac{\sqrt{a}x}{\sqrt{2}}\right)+c_2e^{\frac{cx}{a}-\frac{ax^2}{2}-bx}\,{}_1F_1\left(-\frac{-a^3+da^2-bca+c^2}{2a^3};\frac{1}{2}\right.\right.\right.$$

✓ **Maple** : cpu = 0.034 (sec), leaf count = 98

$$\left\{y(x)=\mathrm{e}^{-\frac{cx}{a}}\left(U\left(\frac{da^2-abc+c^2}{2\,a^3},\frac{1}{2},-\frac{\left(a^2x+ab-2\,c\right)^2}{2\,a^3}\right)\_C2+M\left(\frac{da^2-abc+c^2}{2\,a^3},\frac{1}{2},-\frac{\left(a^2x+ab-\right.}{2\,a^3}\right.\right.\right.$$

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 = 0.138688 (sec), leaf count = 421

$$\left\{\left\{y(x)\to c_1\exp\left(\frac{-bx\sqrt{a^2-4\mathrm{a1}}-\frac{1}{2}ax^2\sqrt{a^2-4\mathrm{a1}}-\frac{1}{2}a^2x^2-abx+2\mathrm{a1}x^2+2\mathrm{b1}x}{2\sqrt{a^2-4\mathrm{a1}}}\right)H_{\frac{-a^3+2\mathrm{c1}a^2-\sqrt{a^2-4\mathrm{a1}}}{}}\right.\right.$$

✓ **Maple** : cpu = 0.136 (sec), leaf count = 262

$$\left\{y(x)=\mathrm{e}^{-\frac{x}{4}\left(\left(ax+2\,b\right)\left(a^2-4\,a1\right)^{\frac{3}{2}}+\left(a^2-4\,a1\right)\left(a^2x+2\,ab-4\,a1\,x-4\,b1\right)\right)\left(a^2-4\,a1\right)^{-\frac{3}{2}}}\left(\_C2\left(a^2x+ab-4\,a1\,x-2\,b1\right){}_1\mathrm{F}\right.\right.$$

2.1056 ODE No. 1056

$$x^2(-y'(x))+y''(x)+xy(x)=0$$

✓ **Mathematica** : cpu = 0.0247726 (sec), leaf count = 41

$$\left\{\left\{y(x)\to c_1x-\frac{c_2\sqrt[3]{-x^3}\Gamma\left(-\frac{1}{3},-\frac{x^3}{3}\right)}{3\sqrt[3]{3}}\right\}\right\}$$

✓ **Maple** : cpu = 0.069 (sec), leaf count = 47

$$\left\{y(x)=\frac{1}{x^2}\left(\mathrm{e}^{\frac{x^3}{3}}\left(-x^3\right)^{\frac{2}{3}}\sqrt[3]{3}\_C2+x^3\left(-\_C2\,\Gamma\left(\frac{2}{3}\right)+\_C2\,\Gamma\left(\frac{2}{3},-\frac{x^3}{3}\right)+\_C1\right)\right)\right\}$$

2.1057 ODE No. 1057

$$x^2(-y'(x)) + y''(x) - (x+1)^2 y(x) = 0$$

✓ **Mathematica** : cpu = 0.0342996 (sec), leaf count = 56

$$\left\{\left\{y(x) \to c_2 e^{\frac{x^3}{3}+x} \int_1^x e^{-\frac{1}{3}K[1]^3 - 2K[1]} dK[1] + c_1 e^{\frac{x^3}{3}+x}\right\}\right\}$$

✓ **Maple** : cpu = 0.118 (sec), leaf count = 50

$$\left\{y(x) = \_C1\ HeunT\left(0, -3, 2\sqrt[3]{3}, \frac{3^{\frac{2}{3}}x}{3}\right) e^{-x} + \_C2\ HeunT\left(0, 3, 2\sqrt[3]{3}, -\frac{3^{\frac{2}{3}}x}{3}\right) e^{\frac{x(x^2+3)}{3}}\right\}$$

2.1058 ODE No. 1058

$$\left(x^4 - 2\right) x y(x) - (x+1)x^2 y'(x) + y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0334336 (sec), leaf count = 56

$$\left\{\left\{y(x) \to c_2 e^{\frac{x^3}{3}} \int_1^x e^{\frac{K[1]^4}{4} - \frac{K[1]^3}{3}} dK[1] + c_1 e^{\frac{x^3}{3}}\right\}\right\}$$

✓ **Maple** : cpu = 0.088 (sec), leaf count = 29

$$\left\{y(x) = e^{\frac{x^3}{3}}\left(\int e^{\frac{x^4}{4} - \frac{x^3}{3}}\, dx\_C2 + \_C1\right)\right\}$$

2.1059 ODE No. 1059

$$x^4 y'(x) - x^3 y(x) + y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0272441 (sec), leaf count = 39

$$\left\{\left\{y(x) \to c_1 x - \frac{c_2 \sqrt[5]{x^5}\,\Gamma\left(-\frac{1}{5}, \frac{x^5}{5}\right)}{5\sqrt[5]{5}}\right\}\right\}$$

✓ **Maple** : cpu = 0.052 (sec), leaf count = 56

$$\left\{y(x) = \frac{1}{x^7}\left(9\_C2\, e^{-1/10\, x^5}\left(x^5 + 4\right) M_{7/5,\, \frac{9}{10}}\left(1/5\, x^5\right) + x^8\left(x^2\_C2\, e^{-\frac{x^5}{10}} M_{\frac{2}{5},\, \frac{9}{10}}\left(\frac{x^5}{5}\right) + \_C1\right)\right)\right\}$$

2.1060 ODE No. 1060

$$ax^{q-1}y'(x) + bx^{q-2}y(x) + y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0257178 (sec), leaf count = 83

$$\left\{\left\{y(x) \to c_2 q^{-1/q} a^{\frac{1}{q}} (x^q)^{\frac{1}{q}} \, {}_1F_1\left(\frac{b}{aq} + \frac{1}{q}; 1 + \frac{1}{q}; -\frac{ax^q}{q}\right) + c_1 \, {}_1F_1\left(\frac{b}{aq}; 1 - \frac{1}{q}; -\frac{ax^q}{q}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.122 (sec), leaf count = 81

$$\left\{y(x) = \mathrm{e}^{-\frac{ax^q}{q}} x \left(M\left(\frac{aq-b}{aq}, \frac{q+1}{q}, \frac{ax^q}{q}\right)\_C1 + U\left(\frac{aq-b}{aq}, \frac{q+1}{q}, \frac{ax^q}{q}\right)\_C2\right)\right\}$$

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 = 0.057806 (sec), leaf count = 70

$$\left\{\left\{y(x) \to c_1 e^{-\frac{1}{3}(\sqrt{x}+9)x} + \frac{1}{6} c_2 e^{6x - \frac{1}{3}(\sqrt{x}+9)x} - \frac{1}{9} e^{3x - \frac{1}{3}(\sqrt{x}+9)x} x\right\}\right\}$$

✓ **Maple** : cpu = 0.066 (sec), leaf count = 28

$$\left\{y(x) = -\frac{-9 \cosh(3x)\_C1 - 9 \sinh(3x)\_C2 + x}{9} \mathrm{e}^{-\frac{1}{3} x^{\frac{3}{2}}}\right\}$$

2.1062 ODE No. 1062

$$\frac{(x + \sqrt{x} - 8) y(x)}{4x^2} + y''(x) - \frac{y'(x)}{\sqrt{x}} = 0$$

✓ **Mathematica** : cpu = 0.0190285 (sec), leaf count = 35

$$\left\{\left\{y(x) \to \frac{1}{3} c_2 e^{\sqrt{x}} x^2 + \frac{c_1 e^{\sqrt{x}}}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.02 (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 = 0.0404552 (sec), leaf count = 28

$$\left\{\left\{y(x) \to c_1 e^{e^x} + c_2 e^{x+e^x} + e^x + 2\right\}\right\}$$

✓ **Maple** : cpu = 0.224 (sec), leaf count = 34

$$\left\{y(x) = \mathrm{e}^{\frac{x}{2}+\mathrm{e}^x} \sinh\left(\frac{x}{2}\right)\_C2 + \mathrm{e}^{\frac{x}{2}+\mathrm{e}^x} \cosh\left(\frac{x}{2}\right)\_C1 + \mathrm{e}^x + 2\right\}$$

2.1064 ODE No. 1064

$$ay'(x) + by(x) + y''(x) + \tan(x) = 0$$

✓ **Mathematica** : cpu = 0.476844 (sec), leaf count = 1400

$$\left\{\left\{y(x) \to e^{\frac{1}{2}\left(-a-\sqrt{a^2-4b}\right)x} c_1 + e^{\frac{1}{2}\left(\sqrt{a^2-4b}-a\right)x} c_2 + \frac{8\left(2\,{}_2F_1\left(1, \frac{1}{4}i\left(\sqrt{a^2-4b}-a\right); \frac{1}{4}i\left(\sqrt{a^2-4b}-a\right)+1; -\right.\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.22 (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

$$\left(n^2 - a^2\right) y(x) + 2n\cot(x)y'(x) + y''(x) = 0$$

✓ **Mathematica** : cpu = 0.122119 (sec), leaf count = 114

$$\left\{\left\{y(x) \to c_1\left(\cos^2(x) - 1\right)^{\frac{1}{4}(1-2n)} P^{\frac{1}{2}(2n-1)}_{\frac{1}{2}\left(2\sqrt{2n^2-a^2}-1\right)}(\cos(x)) + c_2\left(\cos^2(x) - 1\right)^{\frac{1}{4}(1-2n)} Q^{\frac{1}{2}(2n-1)}_{\frac{1}{2}\left(2\sqrt{2n^2-a^2}-1\right)}(\cos(x)\right.\right.$$

✓ **Maple** : cpu = 0.158 (sec), leaf count = 60

$$\left\{y(x) = (\sin(x))^{-n+\frac{1}{2}}\left(LegendreP\left(-\frac{1}{2} + \sqrt{-a^2 + 2\,n^2}, n - \frac{1}{2}, \cos(x)\right)\_C1 + LegendreQ\left(-\frac{1}{2} + \sqrt{-a\right.\right.\right.$$

2.1066 ODE No. 1066

$$y''(x) + \tan(x)y'(x) + y(x)\cos^2(x) = 0$$

✓ **Mathematica** : cpu = 0.0230192 (sec), leaf count = 18

$$\{\{y(x) \to c_2 \sin(\sin(x)) + c_1 \cos(\sin(x))\}\}$$

✓ **Maple** : cpu = 0.049 (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 = 0.0230378 (sec), leaf count = 21

$$\{\{y(x) \to c_1 \cosh(\sin(x)) + ic_2 \sinh(\sin(x))\}\}$$

✓ **Maple** : cpu = 0.033 (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 = 0.104674 (sec), leaf count = 20

$$\{\{y(x) \to c_1 P_v(\cos(x)) + c_2 Q_v(\cos(x))\}\}$$

✓ **Maple** : cpu = 0.153 (sec), leaf count = 45

$$\left\{y(x) = \_C1 \, {}_2F_1(-\frac{v}{2}, \frac{1}{2} + \frac{v}{2}; \frac{1}{2}; (\cos(x))^2) + \_C2 \, \cos(x) \, {}_2F_1(1 + \frac{v}{2}, \frac{1}{2} - \frac{v}{2}; \frac{3}{2}; (\cos(x))^2)\right\}$$

2.1069 ODE No. 1069

$$y''(x) - \cot(x)y'(x) + y(x)\sin^2(x) = 0$$

✓ **Mathematica** : cpu = 0.0252014 (sec), leaf count = 19

$$\{\{y(x) \to c_1 \cos(\cos(x)) - c_2 \sin(\cos(x))\}\}$$

✓ **Maple** : cpu = 0.064 (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 = 0.234951 (sec), leaf count = 143

$$\left\{\left\{y(x) \to c_1\, {}_2F_1\left(-\frac{a}{4} - \frac{1}{4}\sqrt{a^2+4b}, \frac{1}{4}\sqrt{a^2+4b} - \frac{a}{4}; \frac{1}{2} - \frac{a}{2}; \cos^2(x)\right) + i^{a+1}c_2\cos^{a+1}(x)\, {}_2F_1\left(\frac{a}{4} - \frac{1}{4}\sqrt{a^2\right.\right.\right.$$

✓ **Maple** : cpu = 0.118 (sec), leaf count = 60

$$\left\{y(x) = (\cos(x))^{\frac{1}{2}+\frac{a}{2}}\left(\mathit{LegendreQ}\left(\frac{1}{2}\sqrt{a^2+4\,b} - \frac{1}{2}, \frac{1}{2} + \frac{a}{2}, \sin(x)\right)\_C2 + \mathit{LegendreP}\left(\frac{1}{2}\sqrt{a^2+4\,b} - \frac{1}{2}\right.\right.\right.$$

2.1071 ODE No. 1071

$$\left(b^2 - a^2\right)y(x) + 2a\cot(ax)y'(x) + y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0597223 (sec), leaf count = 44

$$\left\{\left\{y(x) \to c_1 e^{-ibx}\csc(ax) - \frac{ic_2 e^{ibx}\csc(ax)}{2b}\right\}\right\}$$

✓ **Maple** : cpu = 0.046 (sec), leaf count = 24

$$\left\{y(x) = \frac{\_C2 \cos(bx) + \_C1 \sin(bx)}{\sin(ax)}\right\}$$

2.1072 ODE No. 1072

$$y(x)\left(-4anp(x)^2+a+bp(x)\right)+ap''(x)y'(x)+y''(x)=0$$

✗ **Mathematica** : cpu = 0.27131 (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

$$\frac{y'(x)\left(-\wp(x;a,b)\wp'(x;a,b)+\wp(x;a,b)^3-6\wp(x;a,b)^2+\frac{a}{2}\right)}{\wp'(x;a,b)-\wp(x;a,b)^2}+\frac{y(x)\left(\wp(x;a,b)^2(-\wp'(x;a,b))-(6\wp(x;a,b)^2}{\wp(x;a,b)^2+\wp'(x;}$$

✗ **Mathematica** : cpu = 1.1033 (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

$$\frac{k^2\mathrm{cn}(x|k)\mathrm{sn}(x|k)y'(x)}{\mathrm{dn}(x|k)}+n^2y(x)\mathrm{dn}(x|k)^2+y''(x)=0$$

✗ **Mathematica** : cpu = 4.1035 (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 = 0.017 (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 = 0.200222 (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

$$y(x)\left(a + f'(x)\right) + f(x)y'(x) - g(x) + y''(x) = 0$$

✗ **Mathematica** : cpu = 0.194879 (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 = 0.324164 (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

$$\left\{y(x) = DESol\left(\left\{\frac{\mathrm{d}^2}{\mathrm{d}x^2}\_Y(x) + (af(x) + b)\frac{\mathrm{d}}{\mathrm{d}x}\_Y(x) + (cf(x) + d)\_Y(x)\right\}, \{\_Y(x)\}\right)\right\}$$

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 = 0.0305373 (sec), leaf count = 76

$$\left\{\left\{y(x)\to c_1\exp\left(-\frac{1}{2}\int_1^x f(K[1])dK[1]-i\sqrt{a}x\right)-\frac{ic_2\exp\left(-\frac{1}{2}\int_1^x f(K[1])dK[1]+i\sqrt{a}x\right)}{2\sqrt{a}}\right\}\right\}$$

✓ **Maple** : cpu = 0.023 (sec), leaf count = 33

$$\left\{y(x)=\mathrm{e}^{-\frac{\int f(x)\,\mathrm{d}x}{2}}\left(\sinh\left(\sqrt{-a}x\right)\_C1+\cosh\left(\sqrt{-a}x\right)\_C2\right)\right\}$$

2.1079 ODE No. 1079

$$by(x)f(x)^{2a}-\frac{af'(x)y'(x)}{f(x)}+y''(x)=0$$

✓ **Mathematica** : cpu = 0.192337 (sec), leaf count = 315

$$\left\{\left\{y(x)\to-\frac{\sqrt{c_1}\exp\left(-c_2-\int_1^x -i\sqrt{b}f(K[1])^a dK[1]\right)\left(-1+\exp\left(2c_2+2\int_1^x -i\sqrt{b}f(K[1])^a dK[1]\right)\right)}{\sqrt{2}}\right.\right.$$

✓ **Maple** : cpu = 0.015 (sec), leaf count = 37

$$\left\{y(x)=\_C1\,\mathrm{e}^{\int i(f(x))^a\sqrt{b}\,\mathrm{d}x}+\_C2\,\mathrm{e}^{-\int i(f(x))^a\sqrt{b}\,\mathrm{d}x}\right\}$$

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 = 0.334611 (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 = 0.24 (sec), leaf count = 74

$$\left\{y(x)=\mathrm{e}^{\int-1\left(\frac{f(x)\left(\mathrm{e}^{\_C1\,b}\right)^2b}{\left(\mathrm{e}^{\int f(x)\,\mathrm{d}xb}\right)^2}+bf(x)-\frac{\left(\mathrm{e}^{\_C1\,b}\right)^2a}{\left(\mathrm{e}^{\int f(x)\,\mathrm{d}xb}\right)^2}+a\right)\left(\frac{\left(\mathrm{e}^{\_C1\,b}\right)^2}{\left(\mathrm{e}^{\int f(x)\,\mathrm{d}xb}\right)^2}-1\right)^{-1}\mathrm{d}x}\_C2\right\}$$

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 = 0.676623 (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

$$\left\{y(x)=DESol\left(\left\{\frac{d^2}{dx^2}\_Y(x)+\frac{f(x)\left(\frac{d^3}{dx^3}f(x)\right)\frac{d}{dx}\_Y(x)}{(f(x))^2+b^2}-\frac{\left(\frac{d}{dx}f(x)\right)^2a^2\_Y(x)}{(f(x))^2+b^2}\right\},\{\_Y(x)\}\right)\right\}$$

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 = 0.530661 (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]) - Deriv
1 + 2*m)*Derivative[1][g][x])/g[x] + Derivative[2][g][x]/Derivative[1][g][x]) + Deriva
```

✓ **Maple** : cpu = 0.103 (sec), leaf count = 74

$$\left\{y(x)=e^{-ig(x)}(g(x))^{2m}\left(U\left(\frac{i}{2}m^2-\frac{i}{2}v^2+m+\frac{1}{2},1+2m,2ig(x)\right)\_C2+M\left(\frac{i}{2}m^2-\frac{i}{2}v^2+m+\frac{1}{2},1\right.\right.$$

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 = 0.68243 (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 = 0.072 (sec), leaf count = 31

$$\left\{y(x)=\sqrt{\frac{f(x)g(x)}{\frac{d}{dx}g(x)}}(Y_v(g(x))\_C2+J_v(g(x))\_C1)\right\}$$

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 = 0.729259 (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 = 0.059 (sec), leaf count = 20

$$\{y(x)=f(x)\left(Y_v(g(x))\_C2+J_v(g(x))\_C1\right)\}$$

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 = 0.760194 (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 = 0.058 (sec), leaf count = 24

$$\{y(x)=h(x)\,(g(x))^v\left(Y_v(g(x))\_C2+J_v(g(x))\_C1\right)\}$$

2.1086 ODE No. 1086

$$4y''(x)+9xy(x)=0$$

✓ **Mathematica** : cpu = 0.0040121 (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 = 0.018 (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

$$4y''(x) - (a + x^2)\, y(x) = 0$$

✓ **Mathematica** : cpu = 0.0062891 (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 = 0.062 (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 = 0.0683472 (sec), leaf count = 180

$$\left\{\left\{y(x) \to -\frac{(-1)^{7/8} 2^{5/8} c_1}{\sqrt[8]{-8\cos^2(2x) - 16\cos(2x) - 8}} + \frac{3(-1)^{5/8} c_2 \left(4\sqrt[4]{-1}2^{3/4}\sinh^{-1}\left(\frac{1}{2}\sqrt[4]{-\frac{1}{2}}\sqrt[4]{-8\cos^2(2x) - 1\right.\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.098 (sec), leaf count = 31

$$\left\{y(x) = \left(i\cos(x)\sin(x)\_C2 - \ln(\sin(x) + i\cos(x))\_C2 + \_C1\right)\frac{1}{\sqrt{\cos(x)}}\right\}$$

2.1089 ODE No. 1089

$$-y'(x)(ab + c + x) + ay''(x) + y(x)(b(c + x) + d) = 0$$

✓ **Mathematica** : cpu = 0.0311281 (sec), leaf count = 99

$$\left\{\left\{y(x) \to c_1 e^{bx} H_d\left(\frac{x}{\sqrt{2}\sqrt{a}} - \frac{ab - c}{\sqrt{2}\sqrt{a}}\right) + c_2 e^{bx}\, {}_1F_1\left(-\frac{d}{2}; \frac{1}{2}; \left(\frac{x}{\sqrt{2}\sqrt{a}} - \frac{ab - c}{\sqrt{2}\sqrt{a}}\right)^2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.036 (sec), leaf count = 58

$$\left\{y(x) = e^{bx}\left(U\left(-\frac{d}{2}, \frac{1}{2}, \frac{(ab - c - x)^2}{2a}\right)\_C2 + M\left(-\frac{d}{2}, \frac{1}{2}, \frac{(ab - c - x)^2}{2a}\right)\_C1\right)\right\}$$

2.1090 ODE No. 1090

$$a(a^2 - 2be^{-ax})\, y'(x) + a^2 y''(x) + b^2 e^{-2ax} y(x) = 0$$

✓ **Mathematica** : cpu = 0.0247447 (sec), leaf count = 50

$$\left\{\left\{y(x) \to c_1 e^{-\frac{be^{-ax}}{a^2}} - \frac{bc_2 e^{-\frac{be^{-ax}}{a^2} - ax}}{a^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.033 (sec), leaf count = 40

$$\left\{y(x) = \mathrm{e}^{-\frac{a^3 x + 2\, be^{-ax}}{2\, a^2}} \left(\sinh\left(\frac{ax}{2}\right)\_C1 + \cosh\left(\frac{ax}{2}\right)\_C2\right)\right\}$$

2.1091 ODE No. 1091

$$x(y''(x) + y(x)) - \cos(x) = 0$$

✓ **Mathematica** : cpu = 0.0175922 (sec), leaf count = 41

$$\left\{\left\{y(x) \to \frac{1}{2}(\mathrm{Ci}(2x)\sin(x) - \mathrm{Si}(2x)\cos(x) + \log(x)\sin(x)) + c_2 \sin(x) + c_1 \cos(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.032 (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 = 0.0663236 (sec), leaf count = 72

$$\left\{\left\{y(x) \to c_2 e^{-ix} x\, {}_1F_1\left(1 - \frac{1}{4}i(-2(a-2) - 4); 2; 2ix\right) + c_1 e^{-ix} x U\left(1 - \frac{1}{4}i(-2(a-2) - 4), 2, 2ix\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.05 (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 = 0.006742 (sec), leaf count = 13

$$\{\{y(x) \to c_1 \log(x) + c_2\}\}$$

✓ **Maple** : cpu = 0.004 (sec), leaf count = 10

$$\{y(x) = \_C2 \, \ln(x) + \_C1\}$$

2.1094 ODE No. 1094

$$ay(x) + xy''(x) + y'(x) = 0$$

✓ **Mathematica** : cpu = 0.0161235 (sec), leaf count = 41

$$\left\{\left\{y(x) \to c_1 J_0\left(2\sqrt{a}\sqrt{x}\right) + 2c_2 Y_0\left(2\sqrt{a}\sqrt{x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.007 (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 = 0.0066534 (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 = 0.022 (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 = 0.0089645 (sec), leaf count = 61

$$\left\{\left\{y(x)\to c_1e^{-ix}U\left(\frac{1}{2}i(a-i),1,2ix\right)+c_2e^{-ix}L_{-\frac{1}{2}i(a-i)}(2ix)\right\}\right\}$$

✓ **Maple** : cpu = 0.055 (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 = 0.0195839 (sec), leaf count = 46

$$\left\{\left\{y(x)\to 2ac_1xJ_2\left(2\sqrt{a}\sqrt{x}\right)-2ac_2xY_2\left(2\sqrt{a}\sqrt{x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.007 (sec), leaf count = 31

$$\left\{y(x)=x\left(Y_2\left(2\sqrt{a}\sqrt{x}\right)\_C2+J_2\left(2\sqrt{a}\sqrt{x}\right)\_C1\right)\right\}$$

2.1098 ODE No. 1098

$$-ax^3y(x)+xy''(x)-y'(x)=0$$

✓ **Mathematica** : cpu = 0.0070218 (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 = 0.007 (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 = 0.88984 (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 = 0.038 (sec), leaf count = 25

$$\left\{y(x)=\_C1\,J_v\left(\mathrm{e}^{\frac{x^2}{2}}\right)+\_C2\,Y_v\left(\mathrm{e}^{\frac{x^2}{2}}\right)\right\}$$

2.1100 ODE No. 1100

$$xy''(x)+2y'(x)-xy(x)-e^x=0$$

✓ **Mathematica** : cpu = 0.0142998 (sec), leaf count = 44

$$\left\{\left\{y(x)\to\frac{c_1e^{-x}}{x}+\frac{c_2e^x}{2x}+\frac{e^x(2x-1)}{4x}\right\}\right\}$$

✓ **Maple** : cpu = 0.033 (sec), leaf count = 23

$$\left\{y(x)=\frac{\sinh(x)\_C2}{x}+\frac{\cosh(x)\_C1}{x}+\frac{\mathrm{e}^x}{2}\right\}$$

Hand solution

$$xy''+2y'-xy=e^x \tag{1}$$

First method, much shorter, using transformation. Let $y_h=\frac{u(x)}{x}$, hence (now we are solving only the homogeneous part).

$$\begin{aligned}y'&=\frac{u'}{x}-\frac{u}{x^2}\\y''&=\frac{u''}{x}-\frac{u'}{x^2}-\frac{u'}{x^2}+2\frac{u}{x^3}\end{aligned}$$

And (1) becomes

$$
\begin{aligned}
x\left(\frac{u''}{x}-\frac{u'}{x^2}-\frac{u'}{x^2}+2\frac{u}{x^3}\right)+2\left(\frac{u'}{x}-\frac{u}{x^2}\right)-x\left(\frac{u}{x}\right)&=0\\
u''-2\frac{u'}{x}+2\frac{u}{x^2}+\frac{2u'}{x}-\frac{2u}{x^2}-u&=0\\
u''-u&=0
\end{aligned}
$$

Hence the roots of the characteristic equation are ± 1 and the solution is

$$
u=Ae^x+Be^{-x}
$$

Hence

$$
y_h=\frac{1}{x}\left(Ae^x+Be^{-x}\right)
$$

The particular solution is found below, and given in the second method. The transformation method is much simpler.

The second method, which is much longer, using series method. This is used if a transformation is not known or can not be found. There is singularity at $x=0$. We need to check if the singularity is regular or not. Writing in standard form $y''+p(x)\,y'+q(x)\,y=0$ gives (we are looking at the homogeneous part now only)

$$
y''+\frac{2}{x}y'-y=0
$$

Hence $\lim_{x\to 0} xp(x)=\lim_{x\to 0} x\frac{2}{x}=2$ which is analytic at $x=0$. And $\lim_{x\to 0} x^2q(x)=\lim_{x\to 0} -x^2=0$ 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

$$
\begin{aligned}
y_{r=0} &= \sum_{n=0}^{\infty} c_n x^n = c_0 + c_1 x^1 + c_2 x^2 + c_3 x^3 + \cdots \\
&= c_0 + \frac{c_0}{6} x^2 + \frac{c_0}{120} x^4 + \cdots \\
&= A\left(1 + \frac{1}{6} x^2 + \frac{1}{120} x^4 + \cdots\right) \qquad (3)
\end{aligned}
$$

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

$$y_h=\frac{1}{x}\left(A_0e^x+B_0e^{-x}\right)$$

We see this is the same solution using the transformation method given above. We now need to find particular solution. Let $y_1=\frac{e^x}{x},y_2=\frac{e^{-x}}{x}$, hence $y_1'=\frac{e^x}{x}-\frac{e^x}{x^2}$ and $y_2'=\frac{-e^{-x}}{x^2}-\frac{e^{-x}}{x}$, hence the Wronskian is

$$\begin{aligned}W&=\begin{vmatrix}y_1&y_2\\y_1'&y_2'\end{vmatrix}\\&=\begin{vmatrix}\frac{e^x}{x}&\frac{e^{-x}}{x}\\\frac{e^x}{x}-\frac{e^x}{x^2}&\frac{-e^{-x}}{x^2}-\frac{e^{-x}}{x}\end{vmatrix}\\&=\frac{e^x}{x}\left(\frac{-e^{-x}}{x^2}-\frac{e^{-x}}{x}\right)-\frac{e^{-x}}{x}\left(\frac{e^x}{x}-\frac{e^x}{x^2}\right)\\&=\left(\frac{-1}{x^3}-\frac{1}{x^2}\right)-\left(\frac{1}{x^2}-\frac{1}{x^3}\right)\\&=-\frac{2}{x^2}\end{aligned}$$

Therefore, let $y_p = u_1 y_1 + u_2 y_2$ and hence

$$u_1 = -\int \frac{y_2}{aW} e^x dx$$

Where $a = x$ since the original ODE is $xy'' + 2y' - xy = e^x$, and a is the coefficient of y'' always. Hence the above becomes

$$u_1 = -\int \frac{\frac{e^{-x}}{x}}{x\left(-\frac{2}{x^2}\right)} e^x dx = \int \frac{e^{-x}}{2} e^x dx = \int \frac{1}{2} dx = \frac{x}{2}$$

And

$$u_2 = \int \frac{\frac{e^x}{x}}{x\left(-\frac{2}{x^2}\right)} e^x dx = -\int \frac{\frac{e^x}{x}}{\frac{2}{x}} e^x dx = -\frac{1}{2}\int e^{2x} dx = -\frac{1}{2}\frac{e^{2x}}{2} = \frac{-1}{4} e^{2x}$$

Hence

$$\begin{aligned} y_p &= u_1 y_1 + u_2 y_2 \\ &= \frac{x}{2}\frac{e^x}{x} - \frac{1}{4} e^{2x} \frac{e^{-x}}{x} \\ &= \frac{1}{2} e^x - \frac{1}{4x} e^x \end{aligned}$$

Therefore

$$y_p = e^x \left(\frac{1}{2} - \frac{1}{4x}\right)$$

Hence the general solution is

$$\begin{aligned} y &= y_h + y_p \\ &= \frac{1}{x}\left(A_0 e^x + B_0 e^{-x}\right) + e^x \left(\frac{1}{2} - \frac{1}{4x}\right) \end{aligned}$$

Verification

```
restart;
ode:=x*diff(diff(y(x),x),x)+2*diff(y(x),x)-x*y(x)=exp(x);
y0:=1/x*( _C1* exp(x)+ _C2*exp(-x))+ (1/2-1/(4*x))*exp(x);
odetest(y(x)=y0,ode);
0
```

2.1101 ODE No. 1101

$$axy(x) + xy''(x) + 2y'(x) = 0$$

✓ **Mathematica** : cpu = 0.0179366 (sec), leaf count = 52

$$\left\{\left\{y(x) \to \frac{c_1 e^{-i\sqrt{a}x}}{x} - \frac{ic_2 e^{i\sqrt{a}x}}{2\sqrt{a}x}\right\}\right\}$$

✓ **Maple** : cpu = 0.027 (sec), leaf count = 29

$$\left\{y(x) = \frac{1}{x}\left(\_C1 \sinh\left(\sqrt{-a}x\right) + \_C2 \cosh\left(\sqrt{-a}x\right)\right)\right\}$$

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

$$\sum (n+r)\,(n+r-1)\,c_n x^{n+r-1} + \sum 2(n+r)\,c_n x^{n+r-1} + \sum a c_n x^{n+r+1} = 0$$

Adjusting so that all have same power x^{n+r} gives

$$\sum (n+r+1)\,(n+r)\,c_{n+1} x^{n+r} + \sum 2(n+r+1)\,c_{n+1} x^{n+r} + \sum a c_{n-1} x^{n+r} = 0$$

Hence

$$\begin{aligned} (n+r+1)\,(n+r)\,c_{n+1} + 2(n+r+1)\,c_{n+1} + ac_{n-1} &= 0 \\ (n+r+1)\,(2+(n+r))\,c_{n+1} + ac_{n-1} &= 0 \end{aligned} \tag{2}$$

We want equation with c_0 in it. Hence let $n = -1$

$$(-1+r+1)\,(2+(-1+r))\,c_0 + ac_{-2} = 0$$

But $c_n = 0$ for all $n < 0$ hence

$$(-1+r+1)\,(2+(-1+r))\,c_0 = 0$$

But $c_0 \neq 0$, as this is the basis for this method. Therefore, we obtain the indicial equation for r

$$\begin{aligned}(-1+r+1)(2+(-1+r)) &= 0\\ r(r+1) &= 0\end{aligned}$$

Hence $r=0$ or $r=-1$ are the roots. Now for each r we find a solution. Using $r=0$, we go back the recurrence equation (2)

$$\begin{aligned}(n+1)(2+n)c_{n+1}+ac_{n-1} &= 0\\ c_{n+1} &= \frac{-ac_{n-1}}{(n+1)(2+n)}\end{aligned}$$

For $n=0$

$$c_1 = \frac{-ac_{-1}}{(n+1)(2+n)} = 0$$

For $n=1$

$$c_2 = \frac{-ac_0}{(2)(3)}$$

For $n=2$

$$c_3 = \frac{-ac_1}{(n+1)(2+n)} = 0$$

For $n=3$

$$c_4 = \frac{-ac_2}{(4)(5)} = \frac{-a(-ac_0)}{(2)(3)(4)(5)} = \frac{a^2c_0}{(2)(3)(4)(5)}$$

And so on. Hence, for $r=0$ we have

$$\begin{aligned}y_{r=0} &= \sum_{n=0}^{\infty} c_n x^n = c_0 + c_1x^1 + c_2x^2 + c_3x^3 + \cdots\\ &= c_0 - a\frac{c_0}{6}x^2 + a^2\frac{c_0}{120}x^4 + \cdots\\ &= A\left(1 - a\frac{1}{6}x^2 + a^2\frac{1}{120}x^4 + \cdots\right) \qquad (3)\end{aligned}$$

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 = 0.0050941 (sec), leaf count = 42

$$\left\{\left\{y(x) \to \frac{c_1 \text{Ai}\left(-\frac{ax}{(-a)^{2/3}}\right)}{x} + \frac{c_2 \text{Bi}\left(-\frac{ax}{(-a)^{2/3}}\right)}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.028 (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)

$$c_8 = \frac{-ac_5}{(7)(8)} = 0$$

For $n=7$, from (3)

$$c_9 = \frac{-ac_6}{(8)(9)} = \frac{-a}{(8)(9)}\left(\frac{a^2 c_0}{(2)(3)(5)(6)}\right) = \frac{-a^3 c_0}{(2)(3)(5)(6)(8)(9)}$$

For $n=8$, from (3)

$$c_{10} = \frac{-ac_7}{(9)(10)} = \frac{-a}{(9)(10)}\left(\frac{a^2 c_1}{(3)(4)(6)(7)}\right) = \frac{-a^3 c_1}{(3)(4)(6)(7)(9)(10)}$$

And so on. Hence,

$$\begin{aligned}
u &= \sum_{n=0}^{\infty} c_n x^n = c_0 + c_1 x^1 + c_2 x^2 + c_3 x^3 + \cdots \\
&= c_0 + c_1 x + 0 + c_3 x^3 + c_4 x^4 + 0 + c_6 x^6 + c_7 x^7 + 0 + c_9 x^9 + \cdots \\
&= c_0 + c_1 x - \frac{ac_0}{(2)(3)} x^3 - \frac{ac_1}{(3)(4)} x^4 + \frac{a^2 c_0}{(2)(3)(5)(6)} x^6 + \frac{a^2 c_1}{(3)(4)(6)(7)} x^7 - \frac{a^3 c_0}{(2)(3)(5)(6)(8)(9)} x^9 - \frac{}{(3} \\
&= c_0\left(1 - \frac{a}{6}x^3 + \frac{a^2}{180}x^6 - \frac{a^3}{12\,960}x^9 + \cdots\right) + xc_1\left(1 - \frac{a}{12}x^3 + \frac{a^2}{504}x^6 - \frac{a^3}{45\,360}x^9 + \cdots\right) \\
&= c_0\left(1 - \frac{1}{6}\left(a^{\frac{1}{3}}x\right)^3 + \frac{1}{180}\left(a^{\frac{1}{3}}x\right)^6 - \frac{1}{12\,960}\left(a^{\frac{1}{3}}x\right)^9 + \cdots\right) + xc_1\left(1 - \frac{1}{12}\left(a^{\frac{1}{3}}x\right)^3 + \frac{1}{504}\left(a^{\frac{1}{3}}x\right)^6 - \frac{1}{45\,3}\right.
\end{aligned}$$

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 = 0.0199716 (sec), leaf count = 64

$$\left\{\left\{y(x) \to 6a^{3/2}c_1x^{3/2}J_3\left(2\sqrt{a}\sqrt{x}\right) - 2ia^{3/2}c_2x^{3/2}Y_3\left(2\sqrt{a}\sqrt{x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.008 (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 = 0.0262799 (sec), leaf count = 104

$$\left\{\left\{y(x) \to c_2a^{\frac{v-1}{2}-v+1}x^{\frac{v-1}{2}-v+1}\Gamma(2-v)J_{1-v}\left(2\sqrt{a}\sqrt{x}\right) + c_1a^{\frac{1-v}{2}}x^{\frac{1-v}{2}}\Gamma(v)J_{v-1}\left(2\sqrt{a}\sqrt{x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.01 (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 = 0.0146605 (sec), leaf count = 64

$$\left\{\left\{y(x)\to c_1 x^{\frac{1-a}{2}} J_{\frac{a-1}{2}}\left(\sqrt{b}x\right) + c_2 x^{\frac{1-a}{2}} Y_{\frac{a-1}{2}}\left(\sqrt{b}x\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.027 (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 = 0.0364709 (sec), leaf count = 441

$$\left\{\left\{y(x)\to c_1\left(\frac{1}{\mathrm{a1}}+1\right)^{\frac{a}{\left(\frac{1}{\mathrm{a1}}+1\right)\mathrm{a1}}-\frac{1}{\left(\frac{1}{\mathrm{a1}}+1\right)\mathrm{a1}}}\mathrm{a1}^{\frac{a}{\left(\frac{1}{\mathrm{a1}}+1\right)\mathrm{a1}}-\frac{1}{\left(\frac{1}{\mathrm{a1}}+1\right)\mathrm{a1}}}b^{\frac{1}{2}\left(\frac{1}{\left(\frac{1}{\mathrm{a1}}+1\right)\mathrm{a1}}-\frac{a}{\left(\frac{1}{\mathrm{a1}}+1\right)\mathrm{a1}}\right)}\left(x^{\mathrm{a1}}\right)^{\frac{1}{2}\left(\frac{1}{\mathrm{a1}}+1\right)\left(\frac{1}{\left(\frac{1}{\mathrm{a1}}+1\right)\mathrm{a1}}-\right.}\right.\right.$$

✓ **Maple** : cpu = 0.072 (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 = 0.0204938 (sec), leaf count = 40

$$\left\{\left\{y(x)\to c_1 e^{-x}U(b-a,b,x) + c_2 e^{-x}L_{a-b}^{b-1}(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.054 (sec), leaf count = 30

$$\left\{y(x) = \mathrm{e}^{-x}\left(M(-a+b,\,b,\,x)\_C1 + U(-a+b,\,b,\,x)\_C2\right)\right\}$$

2.1108 ODE No. 1108

$$(a+b+x)y'(x)+ay(x)+xy''(x)=0$$

✓ **Mathematica** : cpu = 0.0249678 (sec), leaf count = 37

$$\left\{\left\{y(x)\to c_1e^{-x}U(b,a+b,x)+c_2e^{-x}L_{-b}^{a+b-1}(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.056 (sec), leaf count = 26

$$\left\{y(x)=\mathrm{e}^{-x}(M(b,\,a+b,\,x)\_C1+U(b,\,a+b,\,x)\_C2)\right\}$$

2.1109 ODE No. 1109

$$xy''(x)-xy'(x)-y(x)-e^x x(x+1)=0$$

✓ **Mathematica** : cpu = 0.119487 (sec), leaf count = 45

$$\left\{\left\{y(x)\to c_2(-e^x x\mathrm{Ei}(-x)-1)+c_1e^x x+e^x\left(x^2+x-x\log(-x)-1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.02 (sec), leaf count = 33

$$\left\{y(x)=\mathrm{e}^{x}\left(-Ei(1,x)\,x\_C1+x^2+\_C2\,x-x\ln(x)+\mathrm{e}^{-x}\_C1-1\right)\right\}$$

2.1110 ODE No. 1110

$$-ay(x)+xy''(x)-xy'(x)=0$$

✓ **Mathematica** : cpu = 0.0315684 (sec), leaf count = 36

$$\left\{\left\{y(x)\to c_2G_{1,2}^{2,0}\left(-x\middle|\begin{array}{c}1-a\\0,1\end{array}\right)+c_1x\,{}_1F_1(a+1;2;x)\right\}\right\}$$

✓ **Maple** : cpu = 0.039 (sec), leaf count = 23

$$\{y(x)=x(U(a+1,\,2,\,x)\_C2+M(a+1,\,2,\,x)\_C1)\}$$

2.1111 ODE No. 1111

$$xy''(x) - (x+1)y'(x) + y(x) = 0$$

✓ **Mathematica** : cpu = 0.0160403 (sec), leaf count = 20

$$\{\{y(x) \to c_1 e^x + c_2(-x-1)\}\}$$

✓ **Maple** : cpu = 0.016 (sec), leaf count = 13

$$\{y(x) = \_C2\, e^x + \_C1\, x + \_C1\}$$

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

$$
\begin{aligned}
-\left(2sY+s^2Y'-A\right)-\left(-Y-sY'+sY-A\right)+Y&=0\\
-2sY-s^2Y'+A+Y+sY'-sY+A+Y&=0\\
Y'\left(s-s^2\right)+Y(-2s+1-s+1)&=-2A\\
Y'\left(s^2-s\right)+Y(3s-2)&=2A\\
Y'+\frac{(3s-2)}{s\,(s-1)}Y&=\frac{2A}{s\,(s-1)}
\end{aligned}
$$

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

$$
\begin{aligned}
d\left((s-1)\,s^2Y\right)&=(s-1)\,s^2\frac{2A}{s\,(s-1)}\\
(s-1)\,s^2Y&=2A\int s ds+c_1\\
(s-1)\,s^2Y&=2A\frac{s^2}{2}+c_1\\
Y&=\frac{As^2+c_1}{(s-1)\,s^2}
\end{aligned}
$$

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 = 0.0206862 (sec), leaf count = 30

$$\left\{\left\{y(x) \to c_1 e^{2x} - \frac{1}{9} c_2 e^{-x}(3x+1)\right\}\right\}$$

✓ **Maple** : cpu = 0.026 (sec), leaf count = 22

$$\{y(x) = \_C1\, e^{2x} + \_C2\, e^{-x}(3x+1)\}$$

2.1113 ODE No. 1113

$$-ay(x) + (b-x)y'(x) + xy''(x) = 0$$

✓ **Mathematica** : cpu = 0.0146392 (sec), leaf count = 24

$$\{\{y(x) \to c_1 U(a,b,x) + c_2 L_{-a}^{b-1}(x)\}\}$$

✓ **Maple** : cpu = 0.05 (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 = 0.0351361 (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 = 0.036 (sec), leaf count = 34

$$\{y(x) = (\_C2\, K_1(-x) - \_C2\, K_0(-x) + \_C1\, (I_0(x) - I_1(x)))\, e^x\}$$

2.1115 ODE No. 1115

$$xy''(x) - (3x-2)y'(x) - (2x-3)y(x) = 0$$

✓ **Mathematica** : cpu = 0.0469112 (sec), leaf count = 76

$$\left\{\left\{y(x) \to c_2 e^{-\frac{1}{2}\left(\sqrt{17}-3\right)x} {}_1F_1\left(1-\frac{6}{\sqrt{17}};2;\sqrt{17}x\right) + c_1 e^{-\frac{1}{2}\left(\sqrt{17}-3\right)x} U\left(1-\frac{6}{\sqrt{17}},2,\sqrt{17}x\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.736 (sec), leaf count = 47

$$\left\{y(x) = \mathrm{e}^{-\frac{x\left(-3+\sqrt{17}\right)}{2}}\left(U\left(1-\frac{6\sqrt{17}}{17},\, 2,\, \sqrt{17}x\right)\_C2 + M\left(1-\frac{6\sqrt{17}}{17},\, 2,\, \sqrt{17}x\right)\_C1\right)\right\}$$

2.1116 ODE No. 1116

$$y'(x)(ax+b+n) + any(x) + xy''(x) = 0$$

✓ **Mathematica** : cpu = 0.0407504 (sec), leaf count = 43

$$\left\{\left\{y(x) \to c_1 e^{-ax} U(b, b+n, ax) + c_2 e^{-ax} L_{-b}^{b+n-1}(ax)\right\}\right\}$$

✓ **Maple** : cpu = 0.061 (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 = 0.0621021 (sec), leaf count = 107

$$\left\{\left\{y(x) \to c_1 U\left(-\frac{-a^2-ba-a+b}{a-b}, a+b+2, (a-b)x\right) e^{(a+b+1)\log(x)+bx} + c_2 L_{\frac{-a^2-ba-a+b}{a-b}}^{a+b+1}((a-b)x) e^{(a+b}$$

✓ **Maple** : cpu = 0.082 (sec), leaf count = 82

$$\left\{y(x) = \mathrm{e}^{bx} x^{a+b+1}\left(U\left(\frac{a^2+ab+a-b}{a-b},\, a+b+2,\, x(a-b)\right)\_C2 + M\left(\frac{a^2+ab+a-b}{a-b},\, a+b+2,\, x(a\right.\right.$$

2.1118 ODE No. 1118

$$y'(x)(x(a+b)+m+n)+y(x)(abx+an+bm)+xy''(x)=0$$

✓ **Mathematica** : cpu = 0.0614819 (sec), leaf count = 51

$$\left\{\left\{y(x)\to c_1e^{-ax}U(m,m+n,(a-b)x)+c_2e^{-ax}L_{-m}^{m+n-1}((a-b)x)\right\}\right\}$$

✓ **Maple** : cpu = 0.068 (sec), leaf count = 39

$$\{y(x)=\mathrm{e}^{-ax}(U(m,\,m+n,\,x(a-b))\_C2+M(m,\,m+n,\,x(a-b))\_C1)\}$$

2.1119 ODE No. 1119

$$y(x)\left(a^2x+2ab\right)-2(ax+b)y'(x)+xy''(x)=0$$

✓ **Mathematica** : cpu = 0.11322 (sec), leaf count = 77

$$\left\{\left\{y(x)\to c_1e^{ax}x^{b-\frac{1}{2}\sqrt{(2b+1)^2}+\frac{1}{2}}+\frac{c_2e^{ax}x^{b+\frac{1}{2}\sqrt{(2b+1)^2}+\frac{1}{2}}}{\sqrt{(2b+1)^2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.03 (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 = 0.0412815 (sec), leaf count = 168

$$\left\{\left\{y(x)\to c_1e^{-\frac{1}{2}x\sqrt{a^2-4c}-\frac{ax}{2}}U\left(-\frac{-ab-\sqrt{a^2-4c}b+2d}{2\sqrt{a^2-4c}},b,\sqrt{a^2-4c}x\right)+c_2e^{-\frac{1}{2}x\sqrt{a^2-4c}-\frac{ax}{2}}L^{b-1}_{\frac{-ab-\sqrt{a^2-4c}b+2d}{2\sqrt{a^2-4c}}}\right.\right.$$

✓ **Maple** : cpu = 0.151 (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 = 0.177073 (sec), leaf count = 41

$$\left\{\left\{y(x)\to c_2x\int_1^x \frac{e^{\frac{K[1]^2}{2}-K[1]}}{K[1]^2}dK[1]+c_1x\right\}\right\}$$

✓ **Maple** : cpu = 0.019 (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 = 0.179816 (sec), leaf count = 57

$$\left\{\left\{y(x)\to c_2e^{\frac{x^2}{2}}\int_1^x \frac{e^{-\frac{1}{2}K[1]^2-K[1]}}{K[1]^2}dK[1]+c_1e^{\frac{x^2}{2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.112 (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 = 0.0089976 (sec), leaf count = 91

$$\left\{\left\{y(x)\to c_1e^{\frac{1}{2}\sqrt{b}x^2\left(\frac{a}{\sqrt{b}}-\frac{\sqrt{a^2-b}}{\sqrt{b}}\right)}+c_2e^{\frac{1}{2}\sqrt{b}x^2\left(\frac{\sqrt{a^2-b}}{\sqrt{b}}+\frac{a}{\sqrt{b}}\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.039 (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 = 0.0526193 (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 = 0.059 (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

$$-4x^5-4x^3y(x)+\left(4x^2-1\right)y'(x)+xy''(x)=0$$

✓ **Mathematica** : cpu = 0.102178 (sec), leaf count = 84

$$\left\{\left\{y(x)\to c_1e^{-\left(1-\sqrt{2}\right)x^2}+c_2e^{-\left(1+\sqrt{2}\right)x^2}-\frac{3\sqrt{2}x^2+4x^2+6\sqrt{2}+8}{\sqrt{2}\left(3+2\sqrt{2}\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.033 (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

$$\left(a^2x^3+a\right)y(x)+\left(2ax^3-1\right)y'(x)+xy''(x)=0$$

✗ **Mathematica** : cpu = 0.793863 (sec), leaf count = 0 , DifferentialRoot result

$$\{\{y(x)\to \mathrm{DifferentialRoot}\left(\{y,x\},\left\{\left(a^2x^3+a\right)y(x)+\left(2x^3a-1\right)y'(x)+xy''(x)=0,y(1)=c_1,y'(1)=\right.\right.$$

✓ **Maple** : cpu = 0.027 (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 = 0.027028 (sec), leaf count = 36

$$\left\{\left\{y(x)\to c_1e^{ax}x^{-ax}+c_2e^{ax}x^{-ax}\log(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.013 (sec), leaf count = 21

$$\left\{y(x)=x^{-ax}\mathrm{e}^{ax}(\ln(x)\_C2+\_C1)\right\}$$

2.1128 ODE No. 1128

$$(xf(x)+2)y'(x)+f(x)y(x)+xy''(x)=0$$

✓ **Mathematica** : cpu = 0.0184435 (sec), leaf count = 40

$$\left\{\left\{y(x)\to\frac{c_2\int_1^x\exp\left(-\int_1^{K[2]}f(K[1])dK[1]\right)dK[2]}{x}+\frac{c_1}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.181 (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 = 0.0554315 (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 = 0.024 (sec), leaf count = 30

$$\left\{y(x)=\mathrm{e}^{x}\_C1+\_C2\,\mathrm{e}^{3x}\left(4x^3-42x^2+150x-183\right)\right\}$$

2.1130 ODE No. 1130

$$ay(x) + 2xy''(x) + y'(x) = 0$$

✓ **Mathematica** : cpu = 0.0084929 (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 = 0.013 (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 = 0.0078418 (sec), leaf count = 58

$$\left\{\left\{y(x) \to c_1\sqrt{x}U\left(\frac{1}{2}(1-2a), \frac{3}{2}, \frac{x}{2}\right) + c_2\sqrt{x}L_{\frac{1}{2}(2a-1)}^{\frac{1}{2}}\left(\frac{x}{2}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.058 (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 = 0.0081265 (sec), leaf count = 48

$$\left\{\left\{y(x) \to c_1\sqrt{x}U\left(\frac{1-a}{2}, \frac{3}{2}, x\right) + c_2\sqrt{x}L_{\frac{a-1}{2}}^{\frac{1}{2}}(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.059 (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 = 0.0466157 (sec), leaf count = 52

$$\left\{\left\{y(x)\to 2^{5/8}c_1e^{x-\frac{1}{2}}-\frac{c_2e^{x-\frac{1}{2}}\Gamma\left(-\frac{1}{4},\frac{1}{4}(2x-1)\right)}{4\sqrt[8]{2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.075 (sec), leaf count = 37

$$\left\{y(x)=1e^{\frac{x}{2}}\left(U\left(1,\frac{3}{4},\frac{x}{2}-\frac{1}{4}\right)\_C2+M\left(1,\frac{3}{4},\frac{x}{2}-\frac{1}{4}\right)\_C1\right)\frac{1}{\sqrt[4]{2x-1}}\right\}$$

2.1134 ODE No. 1134

$$4xy''(x)-(a+x)y(x)=0$$

✓ **Mathematica** : cpu = 0.0691336 (sec), leaf count = 78

$$\left\{\left\{y(x)\to\frac{1}{4}c_2e^{-x/2}x\,{}_1F_1\left(\frac{1}{128}(-32(-a-4i)-128i)+1;2;x\right)+\frac{1}{4}c_1e^{-x/2}xU\left(\frac{1}{128}(-32(-a-4i)-12\right.\right.\right.$$

✓ **Maple** : cpu = 0.033 (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 = 0.0071604 (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 = 0.007 (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 = 0.0180427 (sec), leaf count = 30

$$\left\{\left\{y(x) \to c_2 e^{x/2}\text{Ei}(-x) + c_1 e^{x/2}\right\}\right\}$$

✓ **Maple** : cpu = 0.022 (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 = 0.0693734 (sec), leaf count = 74

$$\left\{\left\{y(x) \to \frac{1}{4}c_2 e^{-x/2}x\, {}_1F_1\left(\frac{1}{128}(-32(l+(2-4i)) - 128i) + 1; 2; x\right) + \frac{1}{4}c_1 e^{-x/2}xU\left(\frac{1}{128}(-32(l+(2-4$$

✓ **Maple** : cpu = 0.036 (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 = 0.0208002 (sec), leaf count = 38

$$\left\{\left\{y(x) \to c_1 e^{-x/2}U(-n,m,x) + c_2 e^{-x/2}L_n^{m-1}(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.054 (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 = 0.0097252 (sec), leaf count = 74

$$\left\{\left\{y(x)\to c_1e^{\frac{1}{4}(2\log(x)-x)}U\left(\frac{a+6}{8},\frac{3}{2},\frac{x}{2}\right)+c_2e^{\frac{1}{4}(2\log(x)-x)}L_{\frac{1}{8}(-a-6)}^{\frac{1}{2}}\left(\frac{x}{2}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.059 (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 = 0.0341202 (sec), leaf count = 190

$$\left\{\left\{y(x)\to c_1a^{\frac{1}{2}\left(\frac{b}{a}-1\right)}c^{\frac{1}{2}\left(1-\frac{b}{a}\right)}x^{\frac{1}{2}\left(1-\frac{b}{a}\right)}\Gamma\left(\frac{b}{a}\right)J_{\frac{b}{a}-1}\left(\frac{2\sqrt{c}\sqrt{x}}{\sqrt{a}}\right)+c_2a^{\frac{1}{2}\left(1-\frac{b}{a}\right)-\frac{a-b}{a}}c^{\frac{a-b}{a}+\frac{1}{2}\left(\frac{b}{a}-1\right)}x^{\frac{a-b}{a}+\frac{1}{2}\left(\frac{b}{a}-1\right)}\Gamma\left(\right.\right.\right.$$

✓ **Maple** : cpu = 0.017 (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 = 0.091415 (sec), leaf count = 79

$$\left\{\left\{y(x)\to c_1e^{-\frac{bx}{a}}-\frac{c_2e^{-\frac{bx}{a}}\left(a^2e^{\frac{bx}{a}}-b^2x^2\mathrm{Ei}\left(\frac{bx}{a}\right)+abxe^{\frac{bx}{a}}\right)}{2a^2x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.034 (sec), leaf count = 55

$$\left\{y(x)=\frac{1}{x^2}\left(Ei\left(1,-\frac{bx}{a}\right)\mathrm{e}^{-\frac{bx}{a}}\_C2\,b^2x^2+\_C1\,\mathrm{e}^{-\frac{bx}{a}}x^2+a\_C2\,(bx+a)\right)\right\}$$

2.1142 ODE No. 1142

$$cy(x)\sqrt[5]{ax+b}+5(ax+b)y''(x)+8ay'(x)=0$$

✓ **Mathematica** : cpu = 0.0330418 (sec), leaf count = 108

$$\left\{\left\{y(x)\to\frac{3ac_2\sin\left(\frac{\sqrt{5}\sqrt{c}(ax+b)^{3/5}}{3a}\right)}{\sqrt{5}\sqrt{c}(ax+b)^{3/5}}+\frac{6ac_1\cos\left(\frac{\sqrt{5}\sqrt{c}(ax+b)^{3/5}}{3a}\right)}{\sqrt{5}\sqrt{c}(ax+b)^{3/5}}\right\}\right\}$$

✓ **Maple** : cpu = 0.078 (sec), leaf count = 53

$$\left\{y(x)=1\left(\_C2\ \cosh\left(\frac{1}{3\,a}(ax+b)^{\frac{3}{5}}\sqrt{-5\,c}\right)+\_C1\ \sinh\left(\frac{1}{3\,a}(ax+b)^{\frac{3}{5}}\sqrt{-5\,c}\right)\right)(ax+b)^{-\frac{3}{5}}\right\}$$

2.1143 ODE No. 1143

$$(a+bx)y'(x)+2axy''(x)+cy(x)=0$$

✓ **Mathematica** : cpu = 0.0300589 (sec), leaf count = 93

$$\left\{\left\{y(x)\to c_1e^{\frac{a\log(x)-bx}{2a}}U\left(-\frac{c-b}{b},\frac{3}{2},\frac{bx}{2a}\right)+c_2e^{\frac{a\log(x)-bx}{2a}}L_{\frac{c-b}{b}}^{\frac{1}{2}}\left(\frac{bx}{2a}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.075 (sec), leaf count = 57

$$\left\{y(x)=\sqrt{x}\mathrm{e}^{-\frac{bx}{2\,a}}\left(U\left(\frac{b-c}{b},\frac{3}{2},\frac{bx}{2\,a}\right)\_C2+M\left(\frac{b-c}{b},\frac{3}{2},\frac{bx}{2\,a}\right)\_C1\right)\right\}$$

2.1144 ODE No. 1144

$$(3a+bx)y'(x)+2axy''(x)+cy(x)=0$$

✓ **Mathematica** : cpu = 0.0265059 (sec), leaf count = 88

$$\left\{\left\{y(x)\to c_1e^{-\frac{bx}{2a}}U\left(-\frac{2c-3b}{2b},\frac{3}{2},\frac{bx}{2a}\right)+c_2e^{-\frac{bx}{2a}}L_{\frac{2c-3b}{2b}}^{\frac{1}{2}}\left(\frac{bx}{2a}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.062 (sec), leaf count = 60

$$\left\{y(x)=\mathrm{e}^{-\frac{bx}{2\,a}}\left(U\left(\frac{3\,b-2\,c}{2\,b},\frac{3}{2},\frac{bx}{2\,a}\right)\_C2+M\left(\frac{3\,b-2\,c}{2\,b},\frac{3}{2},\frac{bx}{2\,a}\right)\_C1\right)\right\}$$

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 = 0.258906 (sec), leaf count = 386

$$\left\{\left\{y(x) \to c_1 U\left(-\frac{\mathrm{b2a1}^2 - \mathrm{a2b1a1} - \sqrt{\mathrm{a1}^2 - 4\mathrm{a0a2}}\mathrm{b2a1} + 2\mathrm{a2}^2\mathrm{b0} + \mathrm{a2}\sqrt{\mathrm{a1}^2 - 4\mathrm{a0a2}}\mathrm{b1} - 2\mathrm{a0a2b2} - 2\mathrm{a}}{2\mathrm{a2}^2\sqrt{\mathrm{a1}^2 - 4\mathrm{a0a2}}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.122 (sec), leaf count = 248

$$\left\{y(x) = (a2\,x + b2)^{\frac{a1\,b2 + a2^2 - a2\,b1}{a2^2}}\,\mathrm{e}^{-\frac{x}{2\,a2}\left(\sqrt{-4\,a0\,a2 + a1^2} + a1\right)}\left(M\left(\frac{1}{2\,a2^2}\left(\left(a1\,b2 + 2\,a2^2 - a2\,b1\right)\sqrt{-4\,a0\,a}\right.\right.\right.\right.$$

2.1146 ODE No. 1146

$$x^2y''(x) - 6y(x) = 0$$

✓ **Mathematica** : cpu = 0.0032943 (sec), leaf count = 18

$$\left\{\left\{y(x) \to c_2x^3 + \frac{c_1}{x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.005 (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 = 0.0034287 (sec), leaf count = 18

$$\left\{\left\{y(x) \to c_2x^4 + \frac{c_1}{x^3}\right\}\right\}$$

✓ **Maple** : cpu = 0.006 (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 = 0.0071491 (sec), leaf count = 77

$$\left\{\left\{y(x)\to c_1x^{\frac{1}{2}\left(\frac{1}{\sqrt{a}}-\frac{\sqrt{1-4a}}{\sqrt{a}}\right)\sqrt{a}}+c_2x^{\frac{1}{2}\left(\frac{\sqrt{1-4a}}{\sqrt{a}}+\frac{1}{\sqrt{a}}\right)\sqrt{a}}\right\}\right\}$$

✓ **Maple** : cpu = 0.009 (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 = 0.0458717 (sec), leaf count = 212

$$\left\{\left\{y(x)\to c_2a^{\frac{1}{2}\left(\sqrt{1-4b}+1\right)-\frac{1}{2}\sqrt{1-4b}}x^{\frac{1}{2}\left(\sqrt{1-4b}+1\right)-\frac{1}{2}\sqrt{1-4b}}\Gamma\left(\sqrt{1-4b}+1\right)J_{\sqrt{1-4b}}\left(2\sqrt{a}\sqrt{x}\right)+c_1a^{\frac{1}{2}\left(1-\sqrt{1-4b}\right)+\frac{1}{2}\sqrt{}}\right.\right.$$

✓ **Maple** : cpu = 0.012 (sec), leaf count = 45

$$\left\{y(x) = \sqrt{x}\left(Y_{\sqrt{1-4\,b}}\left(2\,\sqrt{a}\sqrt{x}\right)\_C2 + J_{\sqrt{1-4\,b}}\left(2\,\sqrt{a}\sqrt{x}\right)\_C1\right)\right\}$$

2.1150 ODE No. 1150

$$x^2y''(x) + \left(x^2-2\right)y(x) = 0$$

✓ **Mathematica** : cpu = 0.006845 (sec), leaf count = 53

$$\left\{\left\{y(x)\to\sqrt{\frac{2}{\pi}}c_2\left(-\sin(x)-\frac{\cos(x)}{x}\right)+\sqrt{\frac{2}{\pi}}c_1\left(\frac{\sin(x)}{x}-\cos(x)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.05 (sec), leaf count = 27

$$\left\{y(x) = \frac{\left(\_C1\,x+\_C2\right)\cos\left(x\right)+\sin\left(x\right)\left(\_C2\,x-\_C1\right)}{x}\right\}$$

2.1151 ODE No. 1151

$$x^2y''(x) - (ax^2 + 2)\, y(x) = 0$$

✓ **Mathematica** : cpu = 0.0123186 (sec), leaf count = 129

$$\left\{\left\{y(x) \to \frac{\sqrt{\frac{2}{\pi}}c_2\sqrt{x}\left(i\sinh\left(\sqrt{a}x\right) - \frac{i\cosh\left(\sqrt{a}x\right)}{\sqrt{a}x}\right)}{\sqrt{-i\sqrt{a}x}} + \frac{\sqrt{\frac{2}{\pi}}c_1\sqrt{x}\left(\frac{\sinh\left(\sqrt{a}x\right)}{\sqrt{a}x} - \cosh\left(\sqrt{a}x\right)\right)}{\sqrt{-i\sqrt{a}x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.06 (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

$$\left(a^2x^2 - 6\right) y(x) + x^2y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0130603 (sec), leaf count = 114

$$\left\{\left\{y(x) \to \frac{\sqrt{\frac{2}{\pi}}c_1\sqrt{x}\left(\frac{3\sin(ax)}{a^2x^2} - \sin(ax) - \frac{3\cos(ax)}{ax}\right)}{\sqrt{ax}} + \frac{\sqrt{\frac{2}{\pi}}c_2\sqrt{x}\left(-\frac{3\cos(ax)}{a^2x^2} - \frac{3\sin(ax)}{ax} + \cos(ax)\right)}{\sqrt{ax}}\right\}\right\}$$

✓ **Maple** : cpu = 0.159 (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 = 0.0221002 (sec), leaf count = 56

$$\left\{\left\{y(x) \to c_1\sqrt{x}J_{\frac{1}{2}(2v-1)}\left(\sqrt{a}x\right) + c_2\sqrt{x}Y_{\frac{1}{2}(2v-1)}\left(\sqrt{a}x\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.02 (sec), leaf count = 31

$$\left\{y(x) = \sqrt{x}\left(Y_{v-\frac{1}{2}}\left(\sqrt{a}x\right)\_C2 + J_{v-\frac{1}{2}}\left(\sqrt{a}x\right)\_C1\right)\right\}$$

2.1154 ODE No. 1154

$$y(x)\left(ax^2+bx+c\right)+x^2y''(x)=0$$

✓ **Mathematica** : cpu = 0.0141277 (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 = 0.094 (sec), leaf count = 57

$$\left\{y(x)=\_C1\ M_{-\frac{i}{2}b\frac{1}{\sqrt{a}},\,\frac{1}{2}\sqrt{1-4\,c}}(2\,i\sqrt{a}x)+\_C2\ W_{-\frac{i}{2}b\frac{1}{\sqrt{a}},\,\frac{1}{2}\sqrt{1-4\,c}}(2\,i\sqrt{a}x)\right\}$$

2.1155 ODE No. 1155

$$y(x)\left(ax^k-(b-1)b\right)+x^2y''(x)=0$$

✓ **Mathematica** : cpu = 0.0354846 (sec), leaf count = 225

$$\left\{\left\{y(x)\to c_1k^{-\frac{2(1-b)}{k}-\frac{2b}{k}+\frac{1}{k}}a^{\frac{1-b}{k}+\frac{1}{2}\left(\frac{2b}{k}-\frac{1}{k}\right)}\left(x^k\right)^{\frac{1-b}{k}+\frac{1}{2}\left(\frac{2b}{k}-\frac{1}{k}\right)}\Gamma\left(-\frac{2b}{k}+\frac{1}{k}+1\right)J_{\frac{1-2b}{k}}\left(\frac{2\sqrt{a}\sqrt{x^k}}{k}\right)+c_2k^{-1/k}$$

✓ **Maple** : cpu = 0.036 (sec), leaf count = 67

$$\left\{y(x)=\sqrt{x}\left(Y_{\frac{1}{k}\sqrt{(2\,b-1)^2}}\left(2\,\frac{\sqrt{a}x^{k/2}}{k}\right)\_C2+J_{\frac{1}{k}\sqrt{(2\,b-1)^2}}\left(2\,\frac{\sqrt{a}x^{k/2}}{k}\right)\_C1\right)\right\}$$

2.1156 ODE No. 1156

$$x^2y''(x)+\frac{y(x)}{\log(x)}-e^xx(x\log(x)+2)=0$$

✓ **Mathematica** : cpu = 0.0896086 (sec), leaf count = 33

$$\left\{\left\{y(x)\to c_2\log(x)\left(\text{Ei}(\log(x))-\frac{x}{\log(x)}\right)+c_1\log(x)+e^x\log(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.093 (sec), leaf count = 71

$$\left\{y(x)=\ln(x)\_C2-(Ei(1,-\ln(x))\ln(x)+x)\_C1-\left(-\int\frac{(Ei(1,-\ln(x))\ln(x)+x)\,e^x(2+x\ln(x)}{x}\right.$$

2.1157 ODE No. 1157

$$ay'(x) + x^2y''(x) - xy(x) = 0$$

✗ **Mathematica** : cpu = 0.467125 (sec), leaf count = 0 , DifferentialRoot result

$$\{\{y(x) \to \text{DifferentialRoot}(\{y, x\}, \{y''(x)x^2 - y(x)x + ay'(x) = 0, y(1) = c_1, y'(1) = c_2\})(x)\}\}$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x) = DESol\left(\left\{\frac{d^2}{dx^2}\_Y(x) + \frac{a\frac{d}{dx}\_Y(x)}{x^2} - \frac{\_Y(x)}{x}\right\}, \{\_Y(x)\}\right)\right\}$$

2.1158 ODE No. 1158

$$-y(x)\left(ab + b^2x^2\right) + ay'(x) + x^2y''(x) = 0$$

✓ **Mathematica** : cpu = 0.116283 (sec), leaf count = 43

$$\left\{\left\{y(x) \to c_2e^{bx}\int_1^x e^{\frac{a}{K[1]}-2bK[1]}dK[1] + c_1e^{bx}\right\}\right\}$$

✓ **Maple** : cpu = 0.174 (sec), leaf count = 178

$$\left\{y(x) = \sqrt{x}\left(e^{bx}HeunD\left(-4\sqrt{2}\sqrt{ab}, -1 - 4\sqrt{2}\sqrt{ab}, 8\sqrt{2}\sqrt{ab}, -4\sqrt{2}\sqrt{ab} + 1, 1\left(\sqrt{2}\sqrt{ab}x - a\right)\left(\sqrt{2}\sqrt{a}\right.\right.\right.\right.$$

2.1159 ODE No. 1159

$$-ax^2 + x^2y''(x) + xy'(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 0.0056152 (sec), leaf count = 24

$$\left\{\left\{y(x) \to \frac{ax^2}{3} + c_2x + \frac{c_1}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.009 (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 = 0.0067497 (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 = 0.01 (sec), leaf count = 23

$$\left\{y(x)=\_C1\,\sin\left(\sqrt{a}\ln\left(x\right)\right)+\_C2\,\cos\left(\sqrt{a}\ln\left(x\right)\right)\right\}$$

2.1161 ODE No. 1161

$$-(a+x)y(x) + x^2y''(x) + xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.0343208 (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 = 0.009 (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 = 0.0410505 (sec), leaf count = 18

$$\{\{y(x)\to c_1J_v(x)+c_2Y_v(x)\}\}$$

✓ **Maple** : cpu = 0.007 (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 = 0.107017 (sec), leaf count = 72

$$\left\{\left\{y(x)\to J_v(x)\int_1^x-\frac{\pi Y_v(K[1])f(K[1])}{2K[1]}dK[1]+Y_v(x)\int_1^x\frac{\pi J_v(K[2])f(K[2])}{2K[2]}dK[2]+c_1J_v(x)+c_2Y_v(x)\right.\right.$$

✓ **Maple** : cpu = 0.024 (sec), leaf count = 49

$$\left\{y(x)=-\frac{J_v(x)\pi}{2}\int\frac{Y_v(x)f(x)}{x}\,\mathrm{d}x+\frac{Y_v(x)\pi}{2}\int\frac{J_v(x)f(x)}{x}\,\mathrm{d}x+Y_v(x)\_C1+J_v(x)\_C2\right\}$$

2.1164 ODE No. 1164

$$y(x)\left(lx^2-v^2\right)+x^2y''(x)+xy'(x)=0$$

✓ **Mathematica** : cpu = 0.0153555 (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 = 0.02 (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 = 0.0536049 (sec), leaf count = 26

$$\left\{\left\{y(x)\to\frac{c_2(a+x)}{a^2}+c_1xe^{a/x}\right\}\right\}$$

✓ **Maple** : cpu = 0.01 (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 = 0.0099262 (sec), leaf count = 23

$$\left\{\left\{y(x) \to c_1x + c_2x\log(x) + \frac{3x^3}{4}\right\}\right\}$$

✓ **Maple** : cpu = 0.01 (sec), leaf count = 21

$$\left\{y(x) = \frac{x(4\_C1\ \ln(x) + 3\,x^2 + 4\_C2)}{4}\right\}$$

2.1167 ODE No. 1167

$$y(x)\left(ax^m + b\right) + x^2y''(x) - xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.0548052 (sec), leaf count = 326

$$\left\{\left\{y(x) \to c_1 m^{-\frac{2(m-i\sqrt{b-1}m)}{m^2}-\frac{2i\sqrt{b-1}}{m}} a^{\frac{m-i\sqrt{b-1}m}{m^2}+\frac{i\sqrt{b-1}}{m}} (x^m)^{\frac{m-i\sqrt{b-1}m}{m^2}+\frac{i\sqrt{b-1}}{m}} \Gamma\left(1 - \frac{2i\sqrt{b-1}}{m}\right) J_{-\frac{2i\sqrt{b-1}}{m}}\left(\frac{2\sqrt{a}\sqrt{}}{m}\right.\right.\right.$$

✓ **Maple** : cpu = 0.02 (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 = 0.0068953 (sec), leaf count = 15

$$\left\{\left\{y(x) \to c_2 - \frac{c_1}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.007 (sec), leaf count = 11

$$\left\{y(x) = \_C1 + \frac{\_C2}{x}\right\}$$

2.1169 ODE No. 1169

$$y(x)\left(ax-b^2\right)+x^2y''(x)+2xy'(x)=0$$

✓ **Mathematica** : cpu = 0.049169 (sec), leaf count = 236

$$\left\{\left\{y(x)\to c_1a^{\frac{1}{2}\left(-\sqrt{4b^2+1}-1\right)+\frac{1}{2}\sqrt{4b^2+1}}x^{\frac{1}{2}\left(-\sqrt{4b^2+1}-1\right)+\frac{1}{2}\sqrt{4b^2+1}}\Gamma\left(1-\sqrt{4b^2+1}\right)J_{-\sqrt{4b^2+1}}\left(2\sqrt{a}\sqrt{x}\right)+c_2a^{\frac{1}{2}\left(\sqrt{\right.}\right.}\right.\right.$$

✓ **Maple** : cpu = 0.02 (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 = 0.0159677 (sec), leaf count = 58

$$\left\{\left\{y(x)\to c_1j_{\frac{1}{2}\left(\sqrt{1-4b}-1\right)}\left(\sqrt{a}x\right)+c_2y_{\frac{1}{2}\left(\sqrt{1-4b}-1\right)}\left(\sqrt{a}x\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.026 (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 = 0.0355618 (sec), leaf count = 142

$$\left\{\left\{y(x)\to c_1e^{n\log(x)-i\sqrt{l}x}U\left(\frac{i\left(a-2i\sqrt{l}n-2i\sqrt{l}\right)}{2\sqrt{l}},2n+2,2i\sqrt{l}x\right)+c_2e^{n\log(x)-i\sqrt{l}x}L_{-\frac{i\left(a-2i\sqrt{l}n-2i\sqrt{l}\right)}{2\sqrt{l}}}^{2n+1}\left(2i\sqrt{\right.}\right.\right.\right.$$

✓ **Maple** : cpu = 0.096 (sec), leaf count = 49

$$\left\{y(x)=\frac{1}{x}\left(\_C1\,M_{-\frac{i}{2}a\frac{1}{\sqrt{l}},n+\frac{1}{2}}\left(2\,i\sqrt{l}x\right)+\_C2\,W_{-\frac{i}{2}a\frac{1}{\sqrt{l}},n+\frac{1}{2}}\left(2\,i\sqrt{l}x\right)\right)\right\}$$

2.1172 ODE No. 1172

$$ay(x) + x^2y''(x) + 2(x-1)y'(x) = 0$$

✓ **Mathematica** : cpu = 0.0470415 (sec), leaf count = 158

$$\left\{\left\{y(x) \to 2^{\frac{1}{2}\left(1-\sqrt{1-4a}\right)} c_1 \left(\frac{1}{x}\right)^{\frac{1}{2}\left(1-\sqrt{1-4a}\right)} {}_1F_1\left(\frac{1}{2} - \frac{1}{2}\sqrt{1-4a}; 1-\sqrt{1-4a}; -\frac{2}{x}\right) + 2^{\frac{1}{2}\left(\sqrt{1-4a}+1\right)} c_2 \left(\frac{1}{x}\right)^{\frac{1}{2}(}\right.\right.$$

✓ **Maple** : cpu = 0.023 (sec), leaf count = 47

$$\left\{y(x) = \mathrm{e}^{-x^{-1}}\sqrt{x^{-1}}\left(K_{\frac{1}{2}\sqrt{1-4\,a}}\left(x^{-1}\right)\_C2 + I_{\frac{1}{2}\sqrt{1-4\,a}}\left(x^{-1}\right)\_C1\right)\right\}$$

2.1173 ODE No. 1173

$$2(a+x)y'(x) - (b-1)by(x) + x^2y''(x) = 0$$

✓ **Mathematica** : cpu = 0.07063 (sec), leaf count = 74

$$\left\{\left\{y(x) \to (-2)^{1-b} c_1 a^{1-b} \left(\frac{1}{x}\right)^{1-b} {}_1F_1\left(1-b; 2-2b; \frac{2a}{x}\right) + (-2)^b c_2 a^b \left(\frac{1}{x}\right)^b {}_1F_1\left(b; 2b; \frac{2a}{x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.057 (sec), leaf count = 37

$$\left\{y(x) = 1\mathrm{e}^{\frac{a}{x}}\left(I_{b-\frac{1}{2}}\left(\frac{a}{x}\right)\_C1 + K_{b-\frac{1}{2}}\left(\frac{a}{x}\right)\_C2\right)\frac{1}{\sqrt{x}}\right\}$$

2.1174 ODE No. 1174

$$x^5(-\log(x)) + x^2y''(x) - 2xy'(x) + 2y(x) = 0$$

✓ **Mathematica** : cpu = 0.0066633 (sec), leaf count = 33

$$\left\{\left\{y(x) \to c_2x^2 + c_1x + \frac{1}{144}\left(12x^5\log(x) - 7x^5\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.017 (sec), leaf count = 25

$$\left\{y(x) = \frac{x^5 \ln(x)}{12} - \frac{7\,x^5}{144} + x^2\_C2 + \_C1\,x\right\}$$

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 = 0.198414 (sec), leaf count = 38

$$\left\{\left\{y(x)\to \frac{-2a\sin(x)-ax\cos(x)-\sin(x)}{x}+c_2x^4+\frac{c_1}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.036 (sec), leaf count = 29

$$\left\{y(x)=\frac{(-2\,a-1)\sin\left(x\right)+x^5\_C2-ax\cos\left(x\right)+\_C1}{x}\right\}$$

2.1176 ODE No. 1176

$$x^2y''(x)+\left(x^2+2\right)y(x)-2xy'(x)=0$$

✓ **Mathematica** : cpu = 0.0135326 (sec), leaf count = 33

$$\left\{\left\{y(x)\to c_1e^{-ix}x-\frac{1}{2}ic_2e^{ix}x\right\}\right\}$$

✓ **Maple** : cpu = 0.02 (sec), leaf count = 15

$$\{y(x)=x(\cos\left(x\right)\_C2+\sin\left(x\right)\_C1)\}$$

2.1177 ODE No. 1177

$$x^2y''(x)+\left(x^2+2\right)y'(x)+x^2(-\sec(x))-2xy'(x)=0$$

✓ **Mathematica** : cpu = 0.751451 (sec), leaf count = 141

$$\left\{\left\{y(x)\to c_2\int_1^x e^{\frac{2}{K[1]}-K[1]}K[1]^2dK[1]+\int_1^x e^{\frac{2}{K[1]}-K[1]}K[1]^2dK[1]\int_1^x \frac{e^{K[3]-\frac{2}{K[3]}}\sec(K[3])}{K[3]^2}dK[3]+\int_1^x -\right.\right.$$

✓ **Maple** : cpu = 0.049 (sec), leaf count = 34

$$\left\{y(x)=x\left(-\cos\left(x\right)\int\frac{\sin\left(x\right)}{\cos\left(x\right)x}\,dx+\cos\left(x\right)\_C1+\sin\left(x\right)\left(\_C2+\ln\left(x\right)\right)\right)\right\}$$

2.1178 ODE No. 1178

$$x^3(-\sec(x)) + x^2y''(x) + (x^2+2)\,y(x) - 2xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.0369433 (sec), leaf count = 74

$$\left\{\left\{y(x) \to c_1e^{-ix}x - \frac{1}{2}ic_2e^{ix}x + \frac{1}{2}e^{-ix}x\left(e^{2ix}\log\left(1+e^{-2ix}\right) + \log\left(1+e^{2ix}\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.016 (sec), leaf count = 23

$$\{y(x) = x(\cos(x)\ln(\cos(x)) + \cos(x)\_C1 + \sin(x)(x + \_C2))\}$$

2.1179 ODE No. 1179

$$(a^2x^2+2)\,y(x) + x^2y''(x) - 2xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.0168626 (sec), leaf count = 38

$$\left\{\left\{y(x) \to c_1xe^{-iax} - \frac{ic_2xe^{iax}}{2a}\right\}\right\}$$

✓ **Maple** : cpu = 0.023 (sec), leaf count = 19

$$\{y(x) = x(\cos(ax)\_C2 + \sin(ax)\_C1)\}$$

2.1180 ODE No. 1180

$$-f(x) + (-v^2+x^2+1)\,y(x) + x^2y''(x) + 3xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.0587207 (sec), leaf count = 75

$$\left\{\left\{y(x) \to \frac{J_v(x)\int_1^x -\frac{1}{2}\pi Y_v(K[1])f(K[1])dK[1] + Y_v(x)\int_1^x \frac{1}{2}\pi J_v(K[2])f(K[2])dK[2]}{x} + \frac{c_1J_v(x)}{x} + \frac{c_2Y_v(x}{x}$$

✓ **Maple** : cpu = 0.033 (sec), leaf count = 49

$$\left\{y(x) = \frac{-J_v(x)\pi\int Y_v(x)f(x)\,\mathrm{d}x + Y_v(x)\pi\int J_v(x)f(x)\,\mathrm{d}x + 2\,Y_v(x)\_C1 + 2\,J_v(x)\_C2}{2\,x}\right\}$$

2.1181 ODE No. 1181

$$x^2y''(x) + (3x - 1)y'(x) + y(x) = 0$$

✓ **Mathematica** : cpu = 0.0308515 (sec), leaf count = 37

$$\left\{\left\{y(x) \to \frac{c_1 e^{-1/x}}{x} - \frac{c_2 e^{-1/x} \text{Ei}\left(\frac{1}{x}\right)}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.014 (sec), leaf count = 25

$$\left\{y(x) = \frac{1}{x e^{x^{-1}}} \left(\_C1\ Ei\left(1, -x^{-1}\right) + \_C2\right)\right\}$$

2.1182 ODE No. 1182

$$x^2y''(x) - 3xy'(x) + 4y(x) - 5x = 0$$

✓ **Mathematica** : cpu = 0.0113202 (sec), leaf count = 24

$$\left\{\left\{y(x) \to c_1x^2 + 2c_2x^2 \log(x) + 5x\right\}\right\}$$

✓ **Maple** : cpu = 0.009 (sec), leaf count = 20

$$\left\{y(x) = x^2\_C2 + x^2 \ln(x)\_C1 + 5\,x\right\}$$

2.1183 ODE No. 1183

$$x^2y''(x) + x^2(-\log(x)) - 3xy'(x) - 5y(x) = 0$$

✓ **Mathematica** : cpu = 0.0070076 (sec), leaf count = 27

$$\left\{\left\{y(x) \to c_2x^5 + \frac{c_1}{x} - \frac{1}{9}x^2 \log(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.01 (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 = 0.0065802 (sec), leaf count = 38

$$\left\{\left\{y(x)\to c_2x^3+c_1x^2+\frac{1}{2}\left(x^4+2x^2+2x^2\log(x)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.019 (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 = 0.026313 (sec), leaf count = 67

$$\left\{\left\{y(x)\to\frac{3\sqrt[3]{6}c_2K_0\left(\frac{2}{3}\sqrt{2}x^{3/2}\right)}{x^2}-\frac{3\sqrt[3]{-3}c_1I_0\left(\frac{2}{3}\sqrt{2}x^{3/2}\right)}{2^{2/3}x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.019 (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 = 0.0137269 (sec), leaf count = 42

$$\left\{\left\{y(x)\to\frac{1}{2}\left(x^4\mathrm{Ci}(x)-x^3\sin(x)+x^2\cos(x)\right)+c_2x^4+c_1x^2\right\}\right\}$$

✓ **Maple** : cpu = 0.019 (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 = 0.0084673 (sec), leaf count = 99

$$\left\{\left\{y(x)\to c_1x^{\frac{1}{2}\sqrt{b}\left(-\frac{\sqrt{a^2-2a-4b+1}}{\sqrt{b}}-\frac{a-1}{\sqrt{b}}\right)}+c_2x^{\frac{1}{2}\sqrt{b}\left(\frac{\sqrt{a^2-2a-4b+1}}{\sqrt{b}}-\frac{a-1}{\sqrt{b}}\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.01 (sec), leaf count = 53

$$\left\{y(x) = \_C1\,x^{-\frac{a}{2}+\frac{1}{2}+\frac{1}{2}\sqrt{a^2-2\,a-4\,b+1}}+\_C2\,x^{-\frac{a}{2}+\frac{1}{2}-\frac{1}{2}\sqrt{a^2-2\,a-4\,b+1}}\right\}$$

2.1188 ODE No. 1188

$$(ax+b)y'(x) + cy(x) + x^2y''(x) = 0$$

✓ **Mathematica** : cpu = 0.10789 (sec), leaf count = 266

$$\left\{\left\{y(x)\to c_1i^{-\sqrt{a^2-2a-4c+1}+a-1}b^{\frac{1}{2}\left(-\sqrt{a^2-2a-4c+1}+a-1\right)}\left(\frac{1}{x}\right)^{\frac{1}{2}\left(-\sqrt{a^2-2a-4c+1}+a-1\right)}\,{}_1F_1\left(\frac{a}{2}-\frac{1}{2}\sqrt{a^2-2a-4c\right.\right.\right.$$

✓ **Maple** : cpu = 0.122 (sec), leaf count = 114

$$\left\{y(x) = x^{-\frac{1}{2}\sqrt{a^2-2\,a-4\,c+1}-\frac{a}{2}+\frac{1}{2}}\left(M\left(-\frac{1}{2}+\frac{1}{2}\sqrt{a^2-2\,a-4\,c+1}+\frac{a}{2},\,1+\sqrt{a^2-2\,a-4\,c+1},\,\frac{b}{x}\right)\_C1+\right.\right.$$

2.1189 ODE No. 1189

$$axy'(x) + y(x)\left(bx^m + c\right) + x^2y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0492563 (sec), leaf count = 445

$$\left\{\left\{y(x)\to c_1m^{-\frac{-\sqrt{a^2-2a-4c+1}-a+1}{m}-\frac{\sqrt{a^2-2a-4c+1}}{m}}b^{\frac{-\sqrt{a^2-2a-4c+1}-a+1}{2m}+\frac{\sqrt{a^2-2a-4c+1}}{2m}}\left(x^m\right)^{\frac{-\sqrt{a^2-2a-4c+1}-a+1}{2m}+\frac{\sqrt{a^2-2a-4c+1}}{2m}}\right.\right.$$

✓ **Maple** : cpu = 0.026 (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 = 0.0218274 (sec), leaf count = 122

$$\left\{\left\{y(x)\to c_1e^{\frac{1}{2}\left(\left(\sqrt{1-4b}+1\right)\log(x)-2x\right)}U\left(\frac{1}{2}\left(-2a+\sqrt{1-4b}+1\right),\sqrt{1-4b}+1,x\right)+c_2e^{\frac{1}{2}\left(\left(\sqrt{1-4b}+1\right)\log(x)-2x\right)}\right.\right.$$

✓ **Maple** : cpu = 0.073 (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 = 0.0071295 (sec), leaf count = 110

$$\left\{\left\{y(x)\to\frac{2c_2e^{\frac{1}{2}(\log(x)-x)}\left(i\sinh\left(\frac{x}{2}\right)-\frac{2i\cosh\left(\frac{x}{2}\right)}{x}\right)}{\sqrt{\pi}\sqrt{-ix}}+\frac{2c_1e^{\frac{1}{2}(\log(x)-x)}\left(\frac{2\sinh\left(\frac{x}{2}\right)}{x}-\cosh\left(\frac{x}{2}\right)\right)}{\sqrt{\pi}\sqrt{-ix}}\right\}\right\}$$

✓ **Maple** : cpu = 0.011 (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 = 0.0616836 (sec), leaf count = 40

$$\left\{\left\{y(x)\to c_2e^{-x}\int_1^x e^{K[1]-\frac{1}{K[1]}}dK[1]+c_1e^{-x}\right\}\right\}$$

✓ **Maple** : cpu = 0.103 (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 = 0.19406 (sec), leaf count = 44

$$\left\{\left\{y(x)\to \frac{c_1((x-8)x+20)}{x^3} - \frac{c_2e^{-x}(x^3+9x^2+36x+60)}{x^3}\right\}\right\}$$

✓ **Maple** : cpu = 0.026 (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 = 0.0924335 (sec), leaf count = 65

$$\left\{\left\{y(x)\to c_1e^{-x}(x-3)x - \frac{c_2e^{-x}(x^3(-\mathrm{Ei}(x)) + 3x^2\mathrm{Ei}(x) + e^xx^2 - 2e^xx - e^x)}{6x}\right\}\right\}$$

✓ **Maple** : cpu = 0.034 (sec), leaf count = 48

$$\left\{y(x) = \frac{x^2\_C2\,\mathrm{e}^{-x}(x-3)\,Ei(1,-x) + \_C1\,x^2(x-3)\,\mathrm{e}^{-x} + \_C2\,(x^2-2\,x-1)}{x}\right\}$$

2.1195 ODE No. 1195

$$x^2y''(x) + (x+3)xy'(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 0.0209772 (sec), leaf count = 80

$$\left\{\left\{y(x)\to c_1U\left(2+\sqrt{2}, 1+2\sqrt{2}, x\right)e^{\left(\sqrt{2}-1\right)\log(x)-x} + c_2L_{-2-\sqrt{2}}^{2\sqrt{2}}(x)e^{\left(\sqrt{2}-1\right)\log(x)-x}\right\}\right\}$$

✓ **Maple** : cpu = 0.083 (sec), leaf count = 93

$$\left\{y(x) = -1\mathrm{e}^{-\frac{x}{2}}\left(-\_C1\,\left(\sqrt{2}+x+1\right)I_{-\frac{1}{2}+\sqrt{2}}\left(\frac{x}{2}\right) - \_C1\,\left(-\sqrt{2}+x+1\right)I_{\frac{1}{2}+\sqrt{2}}\left(\frac{x}{2}\right) + \_C2\,\left(\left(-x-\sqrt{}\right.\right.\right.$$

2.1196 ODE No. 1196

$$x^2y''(x) - (x-1)xy'(x) + (x-1)y(x) = 0$$

✓ **Mathematica** : cpu = 0.02644 (sec), leaf count = 37

$$\left\{\left\{y(x) \to \frac{c_2(x^2\text{Ei}(x) - e^x x - e^x)}{2x} + c_1 x\right\}\right\}$$

✓ **Maple** : cpu = 0.026 (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 = 0.0133549 (sec), leaf count = 78

$$\left\{\left\{y(x) \to c_1 e^{\frac{1}{2}(x-\log(x))} J_{\frac{1}{2}\sqrt{4a+1}}\left(-\frac{ix}{2}\right) + c_2 e^{\frac{1}{2}(x-\log(x))} Y_{\frac{1}{2}\sqrt{4a+1}}\left(-\frac{ix}{2}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.031 (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 = 0.0344521 (sec), leaf count = 41

$$\left\{\left\{y(x) \to c_1 e^x x - \frac{c_2(e^x x^3\text{Ei}(-x) + x^2 - x + 2)}{6x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.028 (sec), leaf count = 37

$$\left\{y(x) = \frac{\mathrm{e}^x Ei(1,x)\_C2\,x^3 + \_C1\,x^3\mathrm{e}^x - \_C2\,(x^2 - x + 2)}{x^2}\right\}$$

2.1199 ODE No. 1199

$$x^2y''(x) - (x+4)xy'(x) + 4y(x) = 0$$

✓ **Mathematica** : cpu = 0.0130047 (sec), leaf count = 41

$$\left\{\left\{y(x) \to c_2e^x x^4 - \frac{1}{6}c_1 x\left(e^x x^3 \text{Ei}(-x) + x^2 - x + 2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.016 (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 = 0.015292 (sec), leaf count = 62

$$\left\{\left\{y(x) \to c_1e^{-x}\sqrt{x}J_{\frac{1}{2}(2v-1)}(-ix) + c_2e^{-x}\sqrt{x}Y_{\frac{1}{2}(2v-1)}(-ix)\right\}\right\}$$

✓ **Maple** : cpu = 0.012 (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 = 0.106754 (sec), leaf count = 44

$$\left\{\left\{y(x) \to \frac{c_1e^{-2x}(2x+3)}{2x^2} + \frac{c_2(2x^2-4x+3)}{4x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.015 (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 = 0.0108188 (sec), leaf count = 22

$$\left\{\left\{y(x) \to c_1x + \frac{1}{2}c_2e^{2x}x\right\}\right\}$$

✓ **Maple** : cpu = 0.023 (sec), leaf count = 14

$$\left\{y(x) = x\left(\mathrm{e}^{2x}\_C2 + \_C1\right)\right\}$$

2.1203 ODE No. 1203

$$ax^2y'(x) + x^2y''(x) - 2y(x) = 0$$

✓ **Mathematica** : cpu = 0.015127 (sec), leaf count = 124

$$\left\{\left\{y(x) \to \frac{2c_2e^{\frac{1}{2}(\log(x)-ax)}\left(i\sinh\left(\frac{ax}{2}\right) - \frac{2i\cosh\left(\frac{ax}{2}\right)}{ax}\right)}{\sqrt{\pi}\sqrt{-iax}} + \frac{2c_1e^{\frac{1}{2}(\log(x)-ax)}\left(\frac{2\sinh\left(\frac{ax}{2}\right)}{ax} - \cosh\left(\frac{ax}{2}\right)\right)}{\sqrt{\pi}\sqrt{-iax}}\right\}\right\}$$

✓ **Maple** : cpu = 0.015 (sec), leaf count = 28

$$\left\{y(x) = \frac{\_C2\,(ax+2)\,\mathrm{e}^{-ax} + \_C1\,(ax-2)}{x}\right\}$$

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 = 0.0159988 (sec), leaf count = 132

$$\left\{\left\{y(x) \to \frac{2c_2e^{\frac{1}{2}(-ax-2bx+\log(x))}\left(i\sinh\left(\frac{ax}{2}\right) - \frac{2i\cosh\left(\frac{ax}{2}\right)}{ax}\right)}{\sqrt{\pi}\sqrt{-iax}} + \frac{2c_1e^{\frac{1}{2}(-ax-2bx+\log(x))}\left(\frac{2\sinh\left(\frac{ax}{2}\right)}{ax} - \cosh\left(\frac{ax}{2}\right)\right)}{\sqrt{\pi}\sqrt{-iax}}\right\}\right\}$$

✓ **Maple** : cpu = 0.036 (sec), leaf count = 35

$$\left\{y(x) = \frac{\_C2\,(ax+2)\,\mathrm{e}^{-(a+b)x} + \_C1\,\mathrm{e}^{-bx}(ax-2)}{x}\right\}$$

2.1205 ODE No. 1205

$$ax^2y'(x) + f(x)y(x) + x^2y''(x) = 0$$

✗ **Mathematica** : cpu = 0.221293 (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 = 0.0752464 (sec), leaf count = 120

$$\left\{\left\{y(x) \to c_1e^{\frac{1}{2}(-2ax-(b-1)\log(x))}J_{\frac{1}{2}\sqrt{b^2-2b-4d+1}}\left(-i\sqrt{a^2-cx}\right) + c_2e^{\frac{1}{2}(-2ax-(b-1)\log(x))}Y_{\frac{1}{2}\sqrt{b^2-2b-4d+1}}\left(-i\sqrt{a^2\right.\right.\right.$$

✓ **Maple** : cpu = 0.044 (sec), leaf count = 76

$$\left\{y(x) = e^{-ax}x^{-\frac{b}{2}+\frac{1}{2}}\left(Y_{\frac{1}{2}\sqrt{b^2-2b-4d+1}}\left(\sqrt{-a^2+cx}\right)\_C2 + J_{\frac{1}{2}\sqrt{b^2-2b-4d+1}}\left(\sqrt{-a^2+cx}\right)\_C1\right)\right\}$$

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 = 0.0837621 (sec), leaf count = 294

$$\left\{\left\{y(x) \to c_1U\left(-\frac{-ab + 2\mathrm{b1} - \sqrt{a^2 - 4\mathrm{a1}} - \sqrt{a^2 - 4\mathrm{a1}}\sqrt{b^2 - 2b - 4\mathrm{c1} + 1}}{2\sqrt{a^2 - 4\mathrm{a1}}}, \sqrt{b^2 - 2b - 4\mathrm{c1} + 1} + 1, \sqrt{a\right.\right.\right.$$

✓ **Maple** : cpu = 0.159 (sec), leaf count = 110

$$\left\{y(x) = e^{-\frac{ax}{2}}x^{-\frac{b}{2}}\left(M_{-\frac{ab-2b1}{2}\frac{1}{\sqrt{a^2-4a1}}, \frac{1}{2}\sqrt{b^2-2b-4c1+1}}\left(\sqrt{a^2-4a1}x\right)\_C1 + W_{-\frac{ab-2b1}{2}\frac{1}{\sqrt{a^2-4a1}}, \frac{1}{2}\sqrt{b^2-2b-4c1+1}}\right.\right.$$

2.1208 ODE No. 1208

$$x^3y'(x) + x^2y''(x) + (x^2 - 2)\,y(x) = 0$$

✓ **Mathematica** : cpu = 0.0370824 (sec), leaf count = 59

$$\left\{\left\{y(x) \to \frac{c_2 e^{-\frac{x^2}{2}}\left(\sqrt{2\pi}e^{\frac{x^2}{2}}\operatorname{erf}\left(\frac{x}{\sqrt{2}}\right) - 2x\right)}{2x} + \frac{c_1}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.033 (sec), leaf count = 35

$$\left\{y(x) = \frac{1}{x}\left(\mathit{Erf}\left(\frac{\sqrt{2}x}{2}\right)\sqrt{2}\sqrt{\pi}\_C2 - 2\,e^{-1/2\,x^2}\_C2\,x + \_C1\right)\right\}$$

2.1209 ODE No. 1209

$$x^2y''(x) + (x^2 + 2)\,xy'(x) + (x^2 - 2)\,y(x) = 0$$

✓ **Mathematica** : cpu = 0.0174899 (sec), leaf count = 67

$$\left\{\left\{y(x) \to \frac{c_1 e^{-\frac{x^2}{2}}\left(e^{\frac{x^2}{2}}x - \sqrt{\frac{\pi}{2}}\operatorname{erfi}\left(\frac{x}{\sqrt{2}}\right)\right)}{x^2} + \frac{c_2 e^{-\frac{x^2}{2}}}{x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.036 (sec), leaf count = 40

$$\left\{y(x) = \frac{1}{x^2}\left(\left(\mathit{Erf}\left(\frac{i}{2}\sqrt{2}x\right)\pi\_C2 + \_C1\right)e^{-\frac{x^2}{2}} - i\sqrt{2}\sqrt{\pi}\_C2\,x\right)\right\}$$

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 = 0.195225 (sec), leaf count = 252

$$\left\{\left\{y(x) \to c_1(-1)^{\frac{1}{4}\left(-\sqrt{4a^2-4a(-1)^n+1}-2a+1\right)}x^{\frac{1}{2}\left(-\sqrt{4a^2-4a(-1)^n+1}-2a+1\right)}\,{}_1F_1\left(-\frac{a}{2} - \frac{n}{2} - \frac{1}{4}\sqrt{4a^2 - 4(-1)^n a +\right.\right.\right.$$

✓ **Maple** : cpu = 0.146 (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

$$4x^3y'(x) + x^2y''(x) + (4x^4 + 2x^2 + 1)\, y(x) = 0$$

✓ **Mathematica** : cpu = 0.0391403 (sec), leaf count = 68

$$\left\{\left\{y(x) \to c_1 e^{-x^2} x^{\frac{1}{2}-\frac{i\sqrt{3}}{2}} - \frac{i c_2 e^{-x^2} x^{\frac{1}{2}+\frac{i\sqrt{3}}{2}}}{\sqrt{3}}\right\}\right\}$$

✓ **Maple** : cpu = 0.039 (sec), leaf count = 36

$$\left\{y(x) = \mathrm{e}^{-x^2}\left(x^{\frac{1}{2}-\frac{i}{2}\sqrt{3}}\_C2 + x^{\frac{1}{2}+\frac{i}{2}\sqrt{3}}\_C1\right)\right\}$$

2.1212 ODE No. 1212

$$x(ax^2 + b)\, y'(x) + f(x)y(x) + x^2y''(x) = 0$$

✗ **Mathematica** : cpu = 0.404678 (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

$$\left\{y(x) = DESol\left(\left\{\frac{f(x)\_Y(x)}{x^2} + \frac{(ax^2+b)\frac{\mathrm{d}}{\mathrm{d}x}\_Y(x)}{x} + \frac{\mathrm{d}^2}{\mathrm{d}x^2}\_Y(x)\right\}, \{\_Y(x)\}\right)\right\}$$

2.1213 ODE No. 1213

$$(x^3 + 1)\, xy'(x) + x^2y''(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 0.0639934 (sec), leaf count = 54

$$\left\{\left\{y(x) \to \frac{\sqrt[3]{3} c_1\, {}_1F_1\left(-\frac{1}{3}; \frac{1}{3}; -\frac{x^3}{3}\right)}{x} + \frac{c_2 x\, {}_1F_1\left(\frac{1}{3}; \frac{5}{3}; -\frac{x^3}{3}\right)}{\sqrt[3]{3}}\right\}\right\}$$

✓ **Maple** : cpu = 0.038 (sec), leaf count = 53

$$\left\{y(x) = \left(\_C1\, I_{-\frac{1}{6}}\left(\frac{x^3}{6}\right) + \_C1\, I_{\frac{5}{6}}\left(\frac{x^3}{6}\right) - \_C2\left(K_{\frac{1}{6}}\left(\frac{x^3}{6}\right) - K_{\frac{5}{6}}\left(\frac{x^3}{6}\right)\right)\right) \mathrm{e}^{-\frac{x^3}{6}} x^{\frac{3}{2}}\right\}$$

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 = 0.209819 (sec), leaf count = 260

$$\left\{\left\{y(x)\to\frac{c_1e^{-\frac{x^2}{2}}2^{\frac{1}{4}\left(\sqrt{4a^2-4a(-1)^n+1}+2\right)}\left(x^2\right)^{\frac{1}{4}\left(\sqrt{4a^2-4a(-1)^n+1}+2\right)}U\left(\frac{1}{4}\left(-2a-2n+\sqrt{4a^2-4(-1)^na+1}+\right.\right.}{\sqrt{x}}\right.\right.$$

✓ **Maple** : cpu = 0.112 (sec), leaf count = 71

$$\left\{y(x)=1\left(\_C1\ M_{\frac{n}{2}+\frac{a}{2}+\frac{1}{4},\,\frac{1}{4}\sqrt{1-4\,(-1)^na+4\,a^2}}\left(x^2\right)+\_C2\ W_{\frac{n}{2}+\frac{a}{2}+\frac{1}{4},\,\frac{1}{4}\sqrt{1-4\,(-1)^na+4\,a^2}}\left(x^2\right)\right)\frac{1}{\sqrt{x}}\right\}$$

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 = 0.111124 (sec), leaf count = 664

$$\left\{\left\{y(x)\to c_1x^{\frac{1-n}{2}}2^{\frac{\sqrt{b^2n^2-2bn^2-4\mathrm{c1}n^2+n^2}+n^2}{2n^2}}\left(x^n\right)^{\frac{\sqrt{b^2n^2-2bn^2-4\mathrm{c1}n^2+n^2}+n^2}{2n^2}}\exp\left(\frac{1}{2}\left(-\frac{ax^n}{n}-b\log(x)\right)-\frac{\sqrt{a^2-4a}}{2n}\right.\right.\right.$$

✓ **Maple** : cpu = 0.114 (sec), leaf count = 148

$$\left\{y(x)=\mathrm{e}^{-\frac{ax^n}{2\,n}}x^{-\frac{b}{2}-\frac{n}{2}+\frac{1}{2}}\left(W_{-\frac{(b+n-1)a-2\,b1}{2\,n}\frac{1}{\sqrt{a^2-4\,a1}},\,\frac{1}{2\,n}\sqrt{b^2-2\,b-4\,c1+1}}\left(\frac{x^n}{n}\sqrt{a^2-4\,a1}\right)\_C2+M_{-\frac{(b+n-1)a-2\,b1}{2\,n}\frac{1}{\sqrt{a}}}\right.\right.$$

2.1216 ODE No. 1216

$$xy'(x)\left(ax^{\text{a1}}+b\right)+y(x)\left(Ax^{2\text{a1}}+Bx^{\text{a1}}+Cx^{\text{b1}}+\text{DD}\right)+x^2y''(x)=0$$

✗ **Mathematica** : cpu = 1.12322 (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

$$\left\{y(x)=DESol\left(\left\{\frac{d^2}{dx^2}\_Y(x)+\frac{\left(ax^{a1}+b\right)\frac{d}{dx}\_Y(x)}{x}+\frac{\left(Ax^{2\,a1}+Bx^{a1}+Cx^{b1}+DD\right)\_Y(x)}{x^2}\right\},\{\_Y$$

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 = 0.0978416 (sec), leaf count = 30

$$\left\{\left\{y(x)\to c_1\sec(x)J_{\sqrt{a}}(x)+c_2\sec(x)Y_{\sqrt{a}}(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.026 (sec), leaf count = 24

$$\left\{y(x)=\frac{1}{\cos(x)}\left(\_C1\,J_{\sqrt{a}}(x)+\_C2\,Y_{\sqrt{a}}(x)\right)\right\}$$

2.1218 ODE No. 1218

$$y(x)(a+x\cot(x))+x^2y''(x)+\left(2x^2\cot(x)+x\right)y'(x)=0$$

✓ **Mathematica** : cpu = 0.100488 (sec), leaf count = 38

$$\left\{\left\{y(x)\to c_1\csc(x)J_{i\sqrt{a}}(x)+c_2\csc(x)Y_{i\sqrt{a}}(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.027 (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 = 0.102068 (sec), leaf count = 218

$$\left\{\left\{y(x)\to c_1U\left(-\frac{-ib-\sqrt{a}-\sqrt{a}\sqrt{1-4c}}{2\sqrt{a}},\sqrt{1-4c}+1,2i\sqrt{a}x\right)\exp\left(\int_1^x\frac{-2f(K[1])-2i\sqrt{a}K[1]+\sqrt{}}{2K[1]}\right.\right.\right.$$

✓ **Maple** : cpu = 0.066 (sec), leaf count = 69

$$\left\{y(x)=\mathrm{e}^{-\int\frac{f(x)}{x}\,\mathrm{d}x}\left(W_{-\frac{i}{2}b\frac{1}{\sqrt{a}},\,\frac{1}{2}\sqrt{1-4c}}(2\,i\sqrt{a}x)\_C2+M_{-\frac{i}{2}b\frac{1}{\sqrt{a}},\,\frac{1}{2}\sqrt{1-4c}}(2\,i\sqrt{a}x)\_C1\right)\right\}$$

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 = 0.040686 (sec), leaf count = 98

$$\left\{\left\{y(x)\to c_1J_{\frac{1}{2}(2v-1)}(\sqrt{a}x)\exp\left(\int_1^x\frac{1-2f(K[1])K[1]}{2K[1]}dK[1]\right)+c_2Y_{\frac{1}{2}(2v-1)}(\sqrt{a}x)\exp\left(\int_1^x\frac{1-2f(K[1}{2K[1}\right.\right.\right.$$

✓ **Maple** : cpu = 0.013 (sec), leaf count = 40

$$\left\{y(x)=\sqrt{x}\mathrm{e}^{-\frac{\int 2\,f(x)\,\mathrm{d}x}{2}}\left(Y_{v-\frac{1}{2}}(\sqrt{a}x)\_C2+J_{v-\frac{1}{2}}(\sqrt{a}x)\_C1\right)\right\}$$

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 = 0.0232734 (sec), leaf count = 42

$$\left\{\left\{y(x)\to c_1J_v(x)\exp\left(\int_1^x f(K[1])dK[1]\right)+c_2Y_v(x)\exp\left(\int_1^x f(K[1])dK[1]\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.016 (sec), leaf count = 35

$$\left\{y(x)=\sqrt{x}\mathrm{e}^{-\frac{1}{2}\int\frac{-2\,xf(x)+1}{x}\,\mathrm{d}x}(J_v(x)\_C1+Y_v(x)\_C2)\right\}$$

2.1222 ODE No. 1222

$$(x^2+1)\,y''(x)+xy'(x)+2y(x)=0$$

✓ **Mathematica** : cpu = 0.0143825 (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 = 0.013 (sec), leaf count = 23

$$\left\{y(x)=\_C1\ \sin\left(\sqrt{2}\mathit{Arcsinh}(x)\right)+\_C2\ \cos\left(\sqrt{2}\mathit{Arcsinh}(x)\right)\right\}$$

2.1223 ODE No. 1223

$$(x^2+1)\,y''(x)+xy'(x)-9y(x)=0$$

✓ **Mathematica** : cpu = 0.0131393 (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 = 0.011 (sec), leaf count = 19

$$\{y(x)=\_C1\ \sinh(3\,\mathit{Arcsinh}(x))+\_C2\ \cosh(3\,\mathit{Arcsinh}(x))\}$$

2.1224 ODE No. 1224

$$ay(x)+(x^2+1)\,y''(x)+xy'(x)=0$$

✓ **Mathematica** : cpu = 0.0130039 (sec), leaf count = 30

$$\left\{\left\{y(x)\to c_2\sin\left(\sqrt{a}\sinh^{-1}(x)\right)+c_1\cos\left(\sqrt{a}\sinh^{-1}(x)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.01 (sec), leaf count = 23

$$\left\{y(x)=\_C1\ \sin\left(\sqrt{a}\mathit{Arcsinh}(x)\right)+\_C2\ \cos\left(\sqrt{a}\mathit{Arcsinh}(x)\right)\right\}$$

2.1225 ODE No. 1225

$$\left(x^2+1\right) y''(x)-xy'(x)+y(x)=0$$

✓ **Mathematica** : cpu = 0.0197583 (sec), leaf count = 29

$$\left\{\left\{y(x)\to c_2\left(x\sinh^{-1}(x)-\sqrt{x^2+1}\right)+c_1x\right\}\right\}$$

✓ **Maple** : cpu = 0.027 (sec), leaf count = 23

$$\left\{y(x)=-\sqrt{x^2+1}\_C2+x(\_C2\ Arcsinh(x)+\_C1)\right\}$$

2.1226 ODE No. 1226

$$-(v-1)vy(x)+\left(x^2+1\right) y''(x)+2xy'(x)=0$$

✓ **Mathematica** : cpu = 0.0124397 (sec), leaf count = 30

$$\{\{y(x)\to c_1P_{v-1}(ix)+c_2Q_{v-1}(ix)\}\}$$

✓ **Maple** : cpu = 0.029 (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 = 0.0242813 (sec), leaf count = 21

$$\left\{\left\{y(x)\to c_2x-c_1(x-i)^2\right\}\right\}$$

✓ **Maple** : cpu = 0.01 (sec), leaf count = 16

$$\left\{y(x)=\_C2\ x^2+\_C1\ x-\_C2\right\}$$

2.1228 ODE No. 1228

$$ay(x) + (x^2 + 1)\, y''(x) + 3xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.0111699 (sec), leaf count = 82

$$\left\{\left\{y(x) \to \frac{c_1 P_{\frac{1}{2}\left(2\sqrt{1-a}-1\right)}^{\frac{1}{2}}(ix)}{\sqrt[4]{x^2+1}} + \frac{c_2 Q_{\frac{1}{2}\left(2\sqrt{1-a}-1\right)}^{\frac{1}{2}}(ix)}{\sqrt[4]{x^2+1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.063 (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

$$(x^2 + 1)\, y''(x) + 4xy'(x) + 2y(x) + 2x - 2\cos(x) = 0$$

✓ **Mathematica** : cpu = 0.027938 (sec), leaf count = 48

$$\left\{\left\{y(x) \to \frac{c_1}{x^2+1} + \frac{c_2 x}{x^2+1} + \frac{-x^3 - 6\cos(x)}{3\,(x^2+1)}\right\}\right\}$$

✓ **Maple** : cpu = 0.012 (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 = 0.0183465 (sec), leaf count = 82

$$\left\{\left\{y(x) \to c_1 (x^2+1)^{\frac{2-a}{4}}\, P_{\frac{a-4}{2}}^{\frac{a-2}{2}}(ix) + c_2 (x^2+1)^{\frac{2-a}{4}}\, Q_{\frac{a-4}{2}}^{\frac{a-2}{2}}(ix)\right\}\right\}$$

✓ **Maple** : cpu = 0.079 (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 = 0.0548795 (sec), leaf count = 58

$$\left\{\left\{y(x)\to c_1\,{}_2F_1\left(-\frac{v}{2}-\frac{1}{2},\frac{v}{2};\frac{1}{2};x^2\right)+ic_2x\,{}_2F_1\left(\frac{v}{2}+\frac{1}{2},-\frac{v}{2};\frac{3}{2};x^2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.036 (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 = 11.6511 (sec), leaf count = 6628

$$\left\{\left\{y(x)\to c_1\,{}_2F_1\left(-\frac{n}{2}-\frac{1}{2},\frac{n}{2};\frac{1}{2};x^2\right)+\int_1^x\left(\frac{}{4\left({}_2F_1\left(\frac{1}{2}(-n-1),\frac{n}{2};\frac{1}{2};K[1]^2\right)\,{}_2F_1\left(1-\frac{n}{2},\frac{n+3}{2};\frac{5}{2};K[1]^2\right)\right.}\right.\right.\right.$$

✓ **Maple** : cpu = 0.117 (sec), leaf count = 409

$$\left\{y(x)=-3\,(1+x)\left(-{}_2\mathrm{F}_1(n/2+1,-n/2+1/2;\,1/2;\,x^2)(n+1)\int-1/3\,\frac{}{(1+x)^3\,(({}_2\mathrm{F}_1(n/2+1,-n/2}\right.\right.$$

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 = 0.549204 (sec), leaf count = 6628

$$\left\{\left\{y(x)\to c_1\,{}_2F_1\left(-\frac{n}{2}-\frac{1}{2},\frac{n}{2};\frac{1}{2};x^2\right)+\int_1^x\left(\frac{}{4\left({}_2F_1\left(\frac{1}{2}(-n-1),\frac{n}{2};\frac{1}{2};K[1]^2\right)\,{}_2F_1\left(1-\frac{n}{2},\frac{n+3}{2};\frac{5}{2};K[1]^2\right)\right.}\right.\right.\right.$$

✓ **Maple** : cpu = 0.098 (sec), leaf count = 409

$$\left\{y(x)=3\,(1+x)\,(x-1)\left(-{}_2\mathrm{F}_1(n/2+1,-n/2+1/2;\,1/2;\,x^2)(n+1)\int1/3\,\frac{}{(1+x)^3\,(x-1)^3\,(({}_2\mathrm{F}_1(n/2}\right.\right.$$

2.1234 ODE No. 1234

$$\left(x^2-1\right)y''(x)+xy'(x)+2=0$$

✓ **Mathematica** : cpu = 0.0581591 (sec), leaf count = 48

$$\left\{\left\{y(x)\to c_2-\frac{1}{4}\left(c_1+\log\left(1-\frac{x}{\sqrt{x^2-1}}\right)-\log\left(\frac{x}{\sqrt{x^2-1}}+1\right)\right)^2\right\}\right\}$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve((x^2-1)*diff(diff(y(x),x),x)+x*diff(y(x),x)+2=0,y(x))
```

2.1235 ODE No. 1235

$$ay(x)+\left(x^2-1\right)y''(x)+xy'(x)=0$$

✓ **Mathematica** : cpu = 0.0343005 (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 = 0.059 (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

$$f(x)y(x)+\left(x^2-1\right)y''(x)+xy'(x)=0$$

✗ **Mathematica** : cpu = 0.387549 (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

$$\left(x^2-1\right) y''(x)+2 x y'(x)=0$$

✓ **Mathematica** : cpu = 0.011335 (sec), leaf count = 30

$$\left\{\left\{y(x)\to c_1\left(\frac{1}{2}\log(1-x)-\frac{1}{2}\log(x+1)\right)+c_2\right\}\right\}$$

✓ **Maple** : cpu = 0.026 (sec), leaf count = 20

$$\left\{y(x)=\_C1-\frac{(-\ln(x-1)+\ln(1+x))\_C2}{2}\right\}$$

2.1238 ODE No. 1238

$$-a+\left(x^2-1\right) y''(x)+2 x y'(x)=0$$

✓ **Mathematica** : cpu = 0.0166395 (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 = 0.019 (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

$$-l y(x)+\left(x^2-1\right) y''(x)+2 x y'(x)=0$$

✓ **Mathematica** : cpu = 0.009825 (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 = 0.058 (sec), leaf count = 35

$$\left\{y(x)=\_C1\ \mathit{LegendreP}\left(\frac{1}{2}\sqrt{1+4\,l}-\frac{1}{2},x\right)+\_C2\ \mathit{LegendreQ}\left(\frac{1}{2}\sqrt{1+4\,l}-\frac{1}{2},x\right)\right\}$$

2.1240 ODE No. 1240

$$-v(v+1)y(x)+\left(x^2-1\right)y''(x)+2xy'(x)=0$$

✓ **Mathematica** : cpu = 0.0124625 (sec), leaf count = 18

$$\{\{y(x)\to c_1P_v(x)+c_2Q_v(x)\}\}$$

✓ **Maple** : cpu = 0.033 (sec), leaf count = 15

$$\{y(x)=\_C1\ LegendreP(v,x)+\_C2\ LegendreQ(v,x)\}$$

2.1241 ODE No. 1241

$$-(v-1)(v+2)y(x)+\left(x^2-1\right)y''(x)-2xy'(x)=0$$

✓ **Mathematica** : cpu = 0.0109906 (sec), leaf count = 30

$$\left\{\left\{y(x)\to c_1\left(x^2-1\right)P_v^2(x)+c_2\left(x^2-1\right)Q_v^2(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.036 (sec), leaf count = 24

$$\{y(x)=(1+x)\,(x-1)\,(\_C1\ LegendreP(v,2,x)+\_C2\ LegendreQ(v,2,x))\}$$

2.1242 ODE No. 1242

$$\left(x^2-1\right)y''(x)-\left(x^2-x\right)y(x)-(3x+1)y'(x)=0$$

✓ **Mathematica** : cpu = 0.201538 (sec), leaf count = 68

$$\left\{\left\{y(x)\to c_1e^{-x}(x+1)^2-c_2e^{-x-2}\left(x^2(-\text{Ei}(2(x+1)))-2x\text{Ei}(2(x+1))-\text{Ei}(2(x+1))+2e^{2x+2}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.066 (sec), leaf count = 41

$$\left\{y(x)=\_C2\ \mathrm{e}^{-2-x}(1+x)^2\ Ei(1,-2\,x-2)+\_C1\ \mathrm{e}^{-x}(1+x)^2+2\,\mathrm{e}^{x}\_C2\right\}$$

2.1243 ODE No. 1243

$$\left(x^2-1\right)y''(x)+\left(x^2+1\right)y(x)+4xy'(x)=0$$

✓ **Mathematica** : cpu = 0.0227192 (sec), leaf count = 45

$$\left\{\left\{y(x)\to \frac{c_1e^{-ix}}{x^2-1}-\frac{ic_2e^{ix}}{2\left(x^2-1\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.046 (sec), leaf count = 21

$$\left\{y(x)=\frac{\_C2\ \cos(x)+\_C1\ \sin(x)}{x^2-1}\right\}$$

2.1244 ODE No. 1244

$$-(v-n)(n+v+1)y(x)+2(n+1)xy'(x)+\left(x^2-1\right)y''(x)=0$$

✓ **Mathematica** : cpu = 0.019699 (sec), leaf count = 42

$$\left\{\left\{y(x)\to c_1\left(x^2-1\right)^{-n/2}P_v^n(x)+c_2\left(x^2-1\right)^{-n/2}Q_v^n(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.055 (sec), leaf count = 27

$$\left\{y(x)=\left(x^2-1\right)^{-\frac{n}{2}}\left(LegendreP(v,n,x)\_C1+LegendreQ(v,n,x)\_C2\right)\right\}$$

2.1245 ODE No. 1245

$$-(-n+v+1)(n+v)y(x)-2(n-1)xy'(x)+\left(x^2-1\right)y''(x)=0$$

✓ **Mathematica** : cpu = 0.0152274 (sec), leaf count = 42

$$\left\{\left\{y(x)\to c_1\left(x^2-1\right)^{n/2}P_v^n(x)+c_2\left(x^2-1\right)^{n/2}Q_v^n(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.033 (sec), leaf count = 27

$$\left\{y(x)=\left(x^2-1\right)^{\frac{n}{2}}\left(LegendreP(v,n,x)\_C1+LegendreQ(v,n,x)\_C2\right)\right\}$$

2.1246 ODE No. 1246

$$-2(v-1)xy'(x) - 2vy(x) + (x^2-1)\,y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0141261 (sec), leaf count = 42

$$\left\{\left\{y(x) \to c_1 (x^2-1)^{v/2} P_v^v(x) + c_2 (x^2-1)^{v/2} Q_v^v(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.146 (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 = 0.154895 (sec), leaf count = 128

$$\left\{\left\{y(x) \to \frac{c_2\sqrt{1-x^2}(x+1)^{\sqrt{(a-1)^2}} (x^2-1)^{-a/2} (1-x)^{-\sqrt{(a-1)^2}} e^{-\sqrt{(a-1)^2}\tanh^{-1}(x)}}{2\sqrt{(a-1)^2}} + c_1\sqrt{1-x^2}(x^2-1)^{-}\right.\right.$$

✓ **Maple** : cpu = 0.02 (sec), leaf count = 27

$$\left\{y(x) = \_C1\, (x-1)^{1-a} + \_C2\, (1+x)^{1-a}\right\}$$

2.1248 ODE No. 1248

$$axy'(x) + y(x)\left(bx^2 + cx + d\right) + (x^2-1)\,y''(x) = 0$$

✗ **Mathematica** : cpu = 1.57644 (sec), leaf count = 0 , DifferentialRoot result

$$\{\{y(x) \to \text{DifferentialRoot}(\{y, x\}, \{(bx^2+cx+d)\,y(x) + xay'(x) + (x^2-1)\,y''(x) = 0, y(0) = c_1, y'(0)$$

✓ **Maple** : cpu = 0.177 (sec), leaf count = 134

$$\left\{y(x) = \mathrm{e}^{\sqrt{-b}x}(x^2-1)^{-\frac{a}{4}} \left(\left(\frac{1}{2}+\frac{x}{2}\right)^{-\frac{a}{4}+1} \mathit{HeunC}\left(4\sqrt{-b}, 1-\frac{a}{2}, \frac{a}{2}-1, 2\,c, d-c-\frac{a^2}{8}+b+\frac{1}{2}, \frac{1}{2}+\frac{x}{2}\right)\right.\right.$$

2.1249 ODE No. 1249

$$(ax+b)y'(x)+cy(x)+\left(x^2-1\right)y''(x)=0$$

✓ **Mathematica** : cpu = 0.116317 (sec), leaf count = 193

$$\left\{\left\{y(x)\to c_2 2^{\frac{1}{2}(a+b-2)}(x-1)^{\frac{1}{2}(-a-b+2)}\,{}_2F_1\left(-\frac{b}{2}-\frac{1}{2}\sqrt{a^2-2a-4c+1}+\frac{1}{2},-\frac{b}{2}+\frac{1}{2}\sqrt{a^2-2a-4c+1}+\right.\right.\right.$$

✓ **Maple** : cpu = 0.052 (sec), leaf count = 134

$$\left\{y(x)=\_C1\,{}_2\mathrm{F}_1(-\frac{1}{2}+\frac{a}{2}-\frac{1}{2}\sqrt{a^2-2\,a-4\,c+1},-\frac{1}{2}+\frac{a}{2}+\frac{1}{2}\sqrt{a^2-2\,a-4\,c+1};\frac{a}{2}-\frac{b}{2};\frac{1}{2}+\frac{x}{2})+\_\right.$$

2.1250 ODE No. 1250

$$\left(x^2-a^2\right)y''(x)+8xy'(x)+12y(x)=0$$

✓ **Mathematica** : cpu = 0.0368101 (sec), leaf count = 41

$$\left\{\left\{y(x)\to\frac{c_2(a^2+3x^2)}{3(a-x)^3(a+x)^3}+\frac{c_1}{(a+x)^3}\right\}\right\}$$

✓ **Maple** : cpu = 0.02 (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 = 0.0253234 (sec), leaf count = 25

$$\{\{y(x)\to c_1(x-1)+c_2(x\log(x)-\log(x)-4)\}\}$$

✓ **Maple** : cpu = 0.024 (sec), leaf count = 20

$$\{y(x)=\_C2\,(x-1)\ln(x)-4\_C2+\_C1\,(x-1)\}$$

2.1252 ODE No. 1252

$$(ax+b)y'(x)+cy(x)+x(x+1)y''(x)=0$$

✓ **Mathematica** : cpu = 0.10678 (sec), leaf count = 151

$$\left\{\left\{y(x)\to c_2x^{1-b}\,{}_2F_1\left(\frac{a}{2}-b-\frac{1}{2}\sqrt{a^2-2a-4c+1}+\frac{1}{2},\frac{a}{2}-b+\frac{1}{2}\sqrt{a^2-2a-4c+1}+\frac{1}{2};2-b;-x\right)+\right.\right.$$

✓ **Maple** : cpu = 0.034 (sec), leaf count = 124

$$\left\{y(x)=\_C1\,{}_2\mathrm{F}_1(-\frac{1}{2}+\frac{a}{2}-\frac{1}{2}\sqrt{a^2-2\,a-4\,c+1},-\frac{1}{2}+\frac{a}{2}+\frac{1}{2}\sqrt{a^2-2\,a-4\,c+1};\,a-b;\,1+x)+\_C\right.$$

2.1253 ODE No. 1253

$$x(x+1)y''(x)+(3x+2)y'(x)+y(x)=0$$

✓ **Mathematica** : cpu = 0.0192418 (sec), leaf count = 34

$$\left\{\left\{y(x)\to\frac{\sqrt{2}c_1}{x}+\frac{c_2\log(2x+2)}{\sqrt{2}x}\right\}\right\}$$

✓ **Maple** : cpu = 0.003 (sec), leaf count = 16

$$\left\{y(x)=\frac{\ln(1+x)\_C1+\_C2}{x}\right\}$$

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 = 0.13895 (sec), leaf count = 69

$$\left\{\left\{y(x)\to\frac{1}{5}c_2e^{-3x-5}\left(195e^{5x}x\mathrm{Ei}(5-5x)-195e^{5x}\mathrm{Ei}(5-5x)+e^5x+44e^5\right)-c_1e^{2x}(x-1)\right\}\right\}$$

✓ **Maple** : cpu = 0.049 (sec), leaf count = 43

$$\left\{y(x)=195\,\_C2\,\mathrm{e}^{-5+2\,x}(x-1)\,Ei(1,5\,x-5)-\_C2\,(x+44)\,\mathrm{e}^{-3\,x}+\_C1\,\mathrm{e}^{2\,x}(x-1)\right\}$$

2.1255 ODE No. 1255

$$ay'(x) + (x-1)xy''(x) - 2y(x) = 0$$

✓ **Mathematica** : cpu = 0.635284 (sec), leaf count = 360

$$\left\{\left\{y(x)\to \frac{c_2 x^a (a^2+2ax-a+2x^2-2x)(1-x)^{-a}\left(-\frac{a\,{}_2F_1\left(1,-a;1-a;\frac{\left(-a+\sqrt{1-a^2}+1\right)(x-1)}{\left(-a+\sqrt{1-a^2}-1\right)x}\right)}{(1-a^2)^{3/2}}+\frac{a\,{}_2F_1\left(1,-a;1-a;\right.}{(1-}\right.}{2}\right.\right.$$

✓ **Maple** : cpu = 0.016 (sec), leaf count = 42

$$\left\{y(x) = \left(a^2 + a(2x-1) + 2x^2 - 2x\right)\_C1 + \frac{\_C2\, x^a x(x-1)}{(x-1)^a}\right\}$$

2.1256 ODE No. 1256

$$-v(v+1)y(x) + (x-1)xy''(x) + (2x-1)y'(x) = 0$$

✓ **Mathematica** : cpu = 0.0167243 (sec), leaf count = 26

$$\{\{y(x)\to c_1 P_v(2x-1) + c_2 Q_v(2x-1)\}\}$$

✓ **Maple** : cpu = 0.075 (sec), leaf count = 51

$$\left\{y(x) = \_C1\,{}_2\mathrm{F}_1(-v,-v;\,-2v;\,x^{-1})x^v + \_C2\,{}_2\mathrm{F}_1(v+1,v+1;\,2v+2;\,x^{-1})x^{-v-1}\right\}$$

2.1257 ODE No. 1257

$$((a+1)x+b)y'(x) + (x-1)xy''(x) = 0$$

✓ **Mathematica** : cpu = 0.0288396 (sec), leaf count = 33

$$\left\{\left\{y(x)\to \frac{c_1 x^{b+1}\,{}_2F_1(b+1,a+b+1;b+2;x)}{b+1} + c_2\right\}\right\}$$

✓ **Maple** : cpu = 0.169 (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 = 0.117177 (sec), leaf count = 146

$$\left\{\left\{y(x)\to(-1)^{b+1}c_2x^{b+1}\,{}_2F_1\left(\frac{a}{2}+b-\frac{1}{2}\sqrt{a^2-2a-4c+1}+\frac{1}{2},\frac{a}{2}+b+\frac{1}{2}\sqrt{a^2-2a-4c+1}+\frac{1}{2};b+2\right.\right.\right.$$

✓ **Maple** : cpu = 0.029 (sec), leaf count = 110

$$\left\{y(x)=\_C1\,{}_2\mathrm{F}_1(-\frac{1}{2}+\frac{a}{2}-\frac{1}{2}\sqrt{a^2-2\,a-4\,c+1},-\frac{1}{2}+\frac{a}{2}+\frac{1}{2}\sqrt{a^2-2\,a-4\,c+1};\,-b;\,x)+\_C2\,x^{b+1}\right.$$

2.1259 ODE No. 1259

$$((a+1)x+b)y'(x)-ly(x)+(x-1)xy''(x)=0$$

✓ **Mathematica** : cpu = 0.0998341 (sec), leaf count = 120

$$\left\{\left\{y(x)\to(-1)^{b+1}c_2x^{b+1}\,{}_2F_1\left(\frac{a}{2}+b-\frac{1}{2}\sqrt{a^2+4l}+1,\frac{a}{2}+b+\frac{1}{2}\sqrt{a^2+4l}+1;b+2;x\right)+c_1\,{}_2F_1\left(\frac{a}{2}-\right.\right.\right.$$

✓ **Maple** : cpu = 0.035 (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 = 0.202342 (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 = 0.31 (sec), leaf count = 76

$$\left\{y(x)=\int\left(-a1\;b1\;(signum(x-1))^{a1+b1-d1}\,(-signum(x-1))^{-a1-b1+d1}\,{}_2\mathrm{F}_1(d1,-a1-b1+d1;\,1+\right.\right.$$

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 = 1.90593 (sec), leaf count = 0 , DifferentialRoot result

$$\{\{y(x)\to \text{DifferentialRoot}(\{y,x\},\{(-2xl-2xnl+2xpl+2pl+m)y(x)+2(-lx^2-2lx+nx+x+n$$

✓ **Maple** : cpu = 0.132 (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 = 0.226536 (sec), leaf count = 88

$$\left\{\left\{y(x)\to c_2e^{-x}\int_1^x \exp\left(-\frac{K[1]^2}{K[1]+1}-\frac{K[1]}{K[1]+1}+2K[1]-\frac{1}{K[1]+1}\right)(K[1]+1)^{\frac{K[1]}{K[1]+1}+\frac{1}{K[1]+1}}dK[1]+c\right.\right.$$

✓ **Maple** : cpu = 0.158 (sec), leaf count = 53

$$\left\{y(x)=(1+x)\left(\_C1\,\mathrm{e}^{-x}HeunD\left(4,4,-8,12,\frac{x}{x+2}\right)+\_C2\,HeunD\left(-4,4,-8,12,\frac{x}{x+2}\right)\mathrm{e}^{\frac{x-1}{2\,x+2}}\right)\right\}$$

2.1263 ODE No. 1263

$$-(20x+30)\left(x^2+3x\right)^{7/3}+x(x+3)y''(x)+(3x-1)y'(x)+y(x)=0$$

✓ **Mathematica** : cpu = 0.373196 (sec), leaf count = 276

$$\left\{\left\{y(x)\to \frac{4x^{4/3}\int_1^x\left(45\sqrt[3]{3}\,{}_2F_1\left(-\frac{4}{3},-\frac{4}{3};-\frac{1}{3};-\frac{K[1]}{3}\right)\sqrt[3]{K[1](K[1]+3)}K[1]^{11/3}+\frac{675}{2}\sqrt[3]{3}\,{}_2F_1\left(-\frac{4}{3},-\frac{4}{3};-\frac{1}{3}\right.\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.052 (sec), leaf count = 52

$$\left\{y(x)=1\left(\_C2+\int\frac{1}{x^2+3\,x}(x+3)^{\frac{7}{3}}\left(\_C1+3\left(x^2+3\,x\right)^{7/3}x(x+3)\right)x^{-\frac{4}{3}}\,\mathrm{d}x\right)x^{\frac{4}{3}}(x+3)^{-\frac{7}{3}}\right\}$$

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 = 0.0532353 (sec), leaf count = 23

$$\left\{\left\{y(x)\to c_2\left(x^2+x+3\right)+c_1e^{-x}\right\}\right\}$$

✓ **Maple** : cpu = 0.026 (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 = 0.0315748 (sec), leaf count = 64

$$\left\{\left\{y(x)\to c_1\left(x^2-3x+2\right)P_{\frac{1}{2}\left(-1+\sqrt{5}\right)}^2(2x-3)+c_2\left(x^2-3x+2\right)Q_{\frac{1}{2}\left(-1+\sqrt{5}\right)}^2(2x-3)\right\}\right\}$$

✓ **Maple** : cpu = 0.227 (sec), leaf count = 93

$$\left\{y(x)=(x-2)^2\left(\_C1\,{}_2\mathrm{F}_1(\frac{5}{2}-\frac{\sqrt{5}}{2},\frac{1}{2}-\frac{\sqrt{5}}{2};-\sqrt{5}+1;\,(x-1)^{-1})(x-1)^{\frac{\sqrt{5}}{2}-\frac{1}{2}}+\_C2\,{}_2\mathrm{F}_1(\frac{1}{2}+\frac{\sqrt{5}}{2},\frac{5}{2}\right.$$

2.1266 ODE No. 1266

$$(x-2)^2y''(x)-(x-2)y'(x)-3y(x)=0$$

✓ **Mathematica** : cpu = 0.0217364 (sec), leaf count = 22

$$\left\{\left\{y(x)\to c_1(x-2)^3+\frac{c_2}{x-2}\right\}\right\}$$

✓ **Maple** : cpu = 0.007 (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 = 0.345119 (sec), leaf count = 166

$$\left\{\left\{y(x)\to\frac{c_1e^{x-\frac{l}{2x}}}{\sqrt{x}}-\frac{\sqrt{\frac{\pi}{2}}c_2e^{-\frac{l}{2x}-\sqrt{2}\sqrt{-l}+x}\left(\operatorname{erf}\left(\frac{\sqrt{-l}}{\sqrt{2}\sqrt{x}}-\sqrt{x}\right)+e^{2\sqrt{2}\sqrt{-l}}\operatorname{erf}\left(\frac{\sqrt{-l}}{\sqrt{2}\sqrt{x}}+\sqrt{x}\right)-e^{2\sqrt{2}\sqrt{-l}}+1\right)}{\sqrt{-l}\sqrt{x}}\right.\right.$$

✓ **Maple** : cpu = 0.045 (sec), leaf count = 41

$$\left\{y(x)=\mathrm{e}^{x}\left(\_C1\int\frac{1}{2\,\mathrm{e}^{x}}\mathrm{e}^{\frac{l}{2\,x}}x^{-\frac{3}{2}}\,\mathrm{d}x+\_C2\right)\left(\mathrm{e}^{\frac{l}{2\,x}}\right)^{-1}\frac{1}{\sqrt{x}}\right\}$$

2.1268 ODE No. 1268

$$y(x)(ax+b)+2(x-1)xy''(x)+(2x-1)y'(x)=0$$

✗ **Mathematica** : cpu = 1.17703 (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 = 0.073 (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 = 0.0643468 (sec), leaf count = 60

$$\left\{\left\{y(x)\to c_1\,{}_2F_1\left(\frac{1}{2},v+1;v+\frac{3}{2};x\right)+c_2i^{-2v-1}x^{\frac{1}{2}(-2v-1)}\,{}_2F_1\left(\frac{1}{2},-v;\frac{1}{2}-v;x\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.049 (sec), leaf count = 40

$$\left\{y(x)=\_C1\;{}_2\mathrm{F}_1\left(\frac{1}{2},v+1;\;\frac{3}{2}+v;\;x\right)+\_C2\;x^{-\frac{1}{2}-v}{}_2\mathrm{F}_1\left(\frac{1}{2},-v;\;\frac{1}{2}-v;\;x\right)\right\}$$

2.1270 ODE No. 1270

$$(2x^2 + 6x + 4) y''(x) + (10x^2 + 21x + 8) y'(x) + (12x^2 + 17x + 8) y(x) = 0$$

✓ **Mathematica** : cpu = 1.85336 (sec), leaf count = 58

$$\left\{\left\{y(x) \to c_2 e^{-3x}(x+2)^4 \int_1^x \frac{e^{K[1]}(K[1]+1)^{3/2}}{(K[1]+2)^5} dK[1] + c_1 e^{-3x}(x+2)^4\right\}\right\}$$

✓ **Maple** : cpu = 0.107 (sec), leaf count = 46

$$\left\{y(x) = \mathrm{e}^{-2\,x}(x+2)^4 \left(\_C2\ HeunC\left(-1, \frac{5}{2}, 4, -\frac{7}{4}, \frac{7}{2}, -1-x\right)(1+x)^{\frac{5}{2}} + \_C1\ HeunC\left(-1, -\frac{5}{2}, 4, -\frac{7}{4}, \right.\right.$$

2.1271 ODE No. 1271

$$4x^2 y''(x) + y(x) = 0$$

✓ **Mathematica** : cpu = 0.0079645 (sec), leaf count = 27

$$\left\{\left\{y(x) \to c_1\sqrt{x} + \frac{1}{2} c_2 \sqrt{x}\log(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.004 (sec), leaf count = 14

$$\left\{y(x) = \sqrt{x}(\ln(x)\_C2 + \_C1)\right\}$$

2.1272 ODE No. 1272

$$(4a^2x^2 + 1) y(x) + 4x^2 y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0084318 (sec), leaf count = 32

$$\{\{y(x) \to c_1\sqrt{x} J_0(ax) + c_2\sqrt{x} Y_0(ax)\}\}$$

✓ **Maple** : cpu = 0.031 (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 = 0.0121755 (sec), leaf count = 20

$$\{\{y(x) \to c_1 M_{k,m}(x) + c_2 W_{k,m}(x)\}\}$$

✓ **Maple** : cpu = 0.058 (sec), leaf count = 17

$$\{y(x) = \_C1\ M_{k,\,m}(x) + \_C2\ W_{k,\,m}(x)\}$$

2.1274 ODE No. 1274

$$\left(x - v^2\right)y(x) + 4x^2y''(x) + 4xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.0306805 (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 = 0.009 (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 = 0.0245469 (sec), leaf count = 120

$$\left\{\left\{y(x) \to c_1 e^{\frac{1}{2}\left(\sqrt{m^2-1}\log(x)-x\right)}U\left(\frac{1}{2}\left(-2l + m + \sqrt{m^2-1}\right), \sqrt{m^2-1}+1, x\right) + c_2 e^{\frac{1}{2}\left(\sqrt{m^2-1}\log(x)-x\right)}L^{\sqrt{m}}_{\frac{1}{2}(2}\right.\right.$$

✓ **Maple** : cpu = 0.103 (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 = 0.0284909 (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 = 0.049 (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 = 0.0203516 (sec), leaf count = 51

$$\left\{\left\{y(x)\to \frac{c_1e^{-\frac{\sqrt{a}x}{2}}}{\sqrt{x}}+\frac{c_2e^{\frac{\sqrt{a}x}{2}}}{\sqrt{a}\sqrt{x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.038 (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 = 0.336196 (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 = 0.108683 (sec), leaf count = 74

$$\left\{\left\{y(x) \to c_2 x^{\frac{1}{2}\left(\frac{\sqrt{17}}{4}-\frac{1}{4}\right)} + c_1 x^{\frac{1}{2}\left(-\frac{1}{4}-\frac{\sqrt{17}}{4}\right)} - \frac{256(\log(x)+1)}{\left(\sqrt{17}-1\right)^2\left(1+\sqrt{17}\right)^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.13 (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 = 0.0436703 (sec), leaf count = 52

$$\left\{\left\{y(x) \to \frac{c_2e^{-x}\left(4e^{2x}x^2\mathrm{Ei}(-2x)+2x-1\right)}{2x^{3/2}} + c_1e^x\sqrt{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.033 (sec), leaf count = 40

$$\left\{y(x) = (4\,\mathrm{e}^x Ei(1,2\,x)\_C2\,x^2 + (-2\,x+1)\_C2\,\mathrm{e}^{-x} + \_C1\,x^2\mathrm{e}^x)x^{-\frac{3}{2}}\right\}$$

2.1281 ODE No. 1281

$$4x^2y''(x) + \left(4x^2-4x-1\right)y(x) - 4(2x-1)xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.0145298 (sec), leaf count = 28

$$\left\{\left\{y(x) \to \frac{c_1e^x}{\sqrt{x}} + c_2e^x\sqrt{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.028 (sec), leaf count = 15

$$\left\{y(x) = \mathrm{e}^x(x\_C2 + \_C1)\frac{1}{\sqrt{x}}\right\}$$

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 = 0.015557 (sec), leaf count = 39

$$\left\{\left\{y(x)\to \frac{c_1e^{-\frac{x^2}{4}}}{x^2}+\frac{1}{5}c_2e^{-\frac{x^2}{4}}x^3\right\}\right\}$$

✓ **Maple** : cpu = 0.026 (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 = 0.0597582 (sec), leaf count = 90

$$\left\{\left\{y(x)\to c_1e^{x/2}x^{-\frac{x}{2}-1}+\frac{1}{3}c_2e^{x/2}x^{2-\frac{x}{2}}+\frac{1}{9}\left(3x^2\sqrt{e^xx^{-x}}\log(x)-x^2\sqrt{e^xx^{-x}}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.091 (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 = 0.0291083 (sec), leaf count = 47

$$\left\{\left\{y(x)\to c_1(2x+1)^3+\frac{c_2}{2x+1}+\frac{-72x^2-56x-7}{192(2x+1)}\right\}\right\}$$

✓ **Maple** : cpu = 0.012 (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 = 1.28375 (sec), leaf count = 269

$$\left\{\left\{y(x)\to c_2x^{-a/2}\left(\sqrt{4x-1}+i\right)^{\frac{1}{2}+\frac{1}{2}i\sqrt{-(a-1)^2}}\left(-\sqrt{4x-1}+i\right)^{\frac{1}{2}-\frac{1}{2}i\sqrt{-(a-1)^2}}\int_1^x-\frac{\left(i-\sqrt{4K[1]-1}\right)^{i\sqrt{-(}}}{\sqrt{1-4K}}\right.\right.$$

✓ **Maple** : cpu = 0.066 (sec), leaf count = 52

$$\left\{y(x)=\_C1\,{}_2\mathrm{F}_1(\frac{a}{2},\frac{a}{2}-\frac{1}{2};\,a;\,4\,x)+\_C2\,x^{1-a}{}_2\mathrm{F}_1(1-\frac{a}{2},-\frac{a}{2}+\frac{1}{2};\,-a+2;\,4\,x)\right\}$$

2.1286 ODE No. 1286

$$(3x-1)^2y''(x)+3(3x-1)y'(x)-9y(x)-\log^2(3x-1)=0$$

✓ **Mathematica** : cpu = 0.0889154 (sec), leaf count = 101

$$\left\{\left\{y(x)\to\frac{c_1((1-3x)^2+1)}{2(1-3x)}+\frac{ic_2((1-3x)^2-1)}{2(1-3x)}+\frac{-6x-3x\log^2(3x-1)+\log^2(3x-1)+\log(3x-1}{9(3x-1)}\right.\right.$$

✓ **Maple** : cpu = 0.013 (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 = 0.0134879 (sec), leaf count = 83

$$\left\{\left\{y(x)\to c_2\sqrt[3]{1-x}\sqrt[3]{x}Q_1^{\frac{2}{3}}(2x-1)-\frac{c_1(2-2x)^{2/3}\sqrt[3]{1-x}x^{2/3}(6x-5)}{3\,2^{2/3}(x-1)\Gamma\left(\frac{4}{3}\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.017 (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 = 0.0247938 (sec), leaf count = 47

$$\left\{\left\{y(x)\to c_1e^{i\sqrt{x}}\sqrt[4]{x}+ic_2e^{-i\sqrt{x}}\sqrt[4]{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.02 (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 = 0.104433 (sec), leaf count = 53

$$\left\{\left\{y(x)\to\frac{c_2e^{-\sqrt{x}}\left(\sqrt{x}+1\right)}{x^{5/4}}-\frac{c_1e^{\sqrt{x}}\left(\sqrt{x}-1\right)}{x^{5/4}}\right\}\right\}$$

✓ **Maple** : cpu = 0.062 (sec), leaf count = 33

$$\left\{y(x)=1\left(\_C2\left(\sqrt{x}+1\right)e^{-\sqrt{x}}+\_C1\,e^{\sqrt{x}}\left(\sqrt{x}-1\right)\right)x^{-\frac{5}{4}}\right\}$$

2.1290 ODE No. 1290

$$\left(27x^2+4\right)y''(x)+27xy'(x)-3y(x)=0$$

✓ **Mathematica** : cpu = 0.111139 (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 = 0.018 (sec), leaf count = 29

$$\left\{y(x)=\_C1\ \sinh\left(\frac{1}{3}Arcsinh\left(\frac{3\sqrt{3}x}{2}\right)\right)+\_C2\ \cosh\left(\frac{1}{3}Arcsinh\left(\frac{3\sqrt{3}x}{2}\right)\right)\right\}$$

2.1291 ODE No. 1291

$$48(x-1)xy''(x)+(152x-40)y'(x)+53y(x)=0$$

✓ **Mathematica** : cpu = 0.0573672 (sec), leaf count = 92

$$\left\{\left\{y(x)\to c_1\,{}_2F_1\left(\frac{13}{12}-\frac{\sqrt{\frac{5}{2}}}{6},\frac{13}{12}+\frac{\sqrt{\frac{5}{2}}}{6};\frac{5}{6};x\right)+\sqrt[6]{-1}c_2\sqrt[6]{x}\,{}_2F_1\left(\frac{5}{4}-\frac{\sqrt{\frac{5}{2}}}{6},\frac{5}{4}+\frac{\sqrt{\frac{5}{2}}}{6};\frac{7}{6};x\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.046 (sec), leaf count = 50

$$\left\{y(x)=\_C1\ {}_2\mathrm{F}_1(\frac{13}{12}-\frac{\sqrt{10}}{12},\frac{13}{12}+\frac{\sqrt{10}}{12};\ \frac{5}{6};\ x)+\_C2\ \sqrt[6]{x}{}_2\mathrm{F}_1(\frac{5}{4}-\frac{\sqrt{10}}{12},\frac{5}{4}+\frac{\sqrt{10}}{12};\ \frac{7}{6};\ x)\right\}$$

2.1292 ODE No. 1292

$$50(x-1)xy''(x)+25(2x-1)y'(x)-2y(x)=0$$

✓ **Mathematica** : cpu = 0.0325845 (sec), leaf count = 42

$$\left\{\left\{y(x)\to c_2\sin\left(\frac{2}{5}\sin^{-1}\left(\sqrt{1-x}\right)\right)+c_1\cos\left(\frac{2}{5}\sin^{-1}\left(\sqrt{1-x}\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.036 (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 = 0.249076 (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 = 0.038 (sec), leaf count = 33

$$\left\{y(x)=\sqrt[3]{x}\left(\mathit{LegendreQ}\left(-\frac{1}{2},\frac{2}{3},\sqrt{1-x}\right)\_C2+\mathit{LegendreP}\left(-\frac{1}{2},\frac{2}{3},\sqrt{1-x}\right)\_C1\right)\right\}$$

2.1294 ODE No. 1294

$$144(x-1)xy''(x)+(168x-96)y'(x)+y(x)=0$$

✓ **Mathematica** : cpu = 0.051031 (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 = 0.036 (sec), leaf count = 33

$$\left\{y(x)=\sqrt[6]{x}\left(\mathit{LegendreQ}\left(-\frac{1}{2},\frac{1}{3},\sqrt{1-x}\right)\_C2+\mathit{LegendreP}\left(-\frac{1}{2},\frac{1}{3},\sqrt{1-x}\right)\_C1\right)\right\}$$

2.1295 ODE No. 1295

$$ax^2y''(x)+bxy'(x)+y(x)\left(cx^2+dx+f\right)=0$$

✓ **Mathematica** : cpu = 0.18624 (sec), leaf count = 310

$$\left\{\left\{y(x)\to c_1U\left(-\frac{-\sqrt{c}a-id\sqrt{a}-\sqrt{c}\sqrt{a^2-2ba-4fa+b^2}}{2a\sqrt{c}},\frac{\sqrt{a^2-2ba-4fa+b^2}}{a}+1,\frac{2i\sqrt{c}x}{\sqrt{a}}\right)\exp\left(\right.\right.\right.$$

✓ **Maple** : cpu = 0.196 (sec), leaf count = 106

$$\left\{y(x)=x^{-\frac{b}{2a}}\left(M_{-\frac{i}{2}d\frac{1}{\sqrt{a}}\frac{1}{\sqrt{c}},\frac{1}{2a}\sqrt{a^2+(-2b-4f)a+b^2}}\left(2ix\sqrt{c}\frac{1}{\sqrt{a}}\right)\_C1+W_{-\frac{i}{2}d\frac{1}{\sqrt{a}}\frac{1}{\sqrt{c}},\frac{1}{2a}\sqrt{a^2+(-2b-4f)a+b^2}}\left(2ix\sqrt{\right.\right.\right.$$

2.1296 ODE No. 1296

$$y(x)\left(\mathrm{a0}x^2+\mathrm{b0}x+\mathrm{c0}\right)+\left(\mathrm{a1}x^2+\mathrm{b1}x\right)y'(x)+\mathrm{a2}x^2y''(x)=0$$

✓ **Mathematica** : cpu = 0.3581 (sec), leaf count = 356

$$\left\{\left\{y(x)\to c_1U\left(-\frac{2\mathrm{b0}\mathrm{a2}-\sqrt{\mathrm{a1}^2-4\mathrm{a0}\mathrm{a2}}\mathrm{a2}-\mathrm{a1}\mathrm{b1}-\sqrt{\mathrm{a1}^2-4\mathrm{a0}\mathrm{a2}}\sqrt{\mathrm{a2}^2-2\mathrm{b1}\mathrm{a2}-4\mathrm{c0}\mathrm{a2}+\mathrm{b1}^2}}{2\mathrm{a2}\sqrt{\mathrm{a1}^2-4\mathrm{a0}\mathrm{a2}}},\sqrt{\mathrm{a}\right.\right.\right.$$

✓ **Maple** : cpu = 0.224 (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 = 0.0241098 (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 = 0.017 (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

$$\left(ax^2+1\right)y''(x)+bxy'(x)+cy(x)=0$$

✓ **Mathematica** : cpu = 0.0537818 (sec), leaf count = 162

$$\left\{\left\{y(x)\to c_1\left(ax^2+1\right)^{\frac{2a-b}{4a}}P_{\frac{\sqrt{a^2-2ba-4ca+b^2}-a}{2a}}^{\frac{b-2a}{2a}}\left(i\sqrt{a}x\right)+c_2\left(ax^2+1\right)^{\frac{2a-b}{4a}}Q_{\frac{\sqrt{a^2-2ba-4ca+b^2}-a}{2a}}^{\frac{b-2a}{2a}}\left(i\sqrt{a}x\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.083 (sec), leaf count = 124

$$\left\{y(x)=\left(ax^2+1\right)^{\frac{2a-b}{4a}}\left(LegendreP\left(\frac{1}{2a}\left(\sqrt{a^2+(-2b-4c)a+b^2}-a\right),\frac{2a-b}{2a},\sqrt{-a}x\right)\_C1+Legen\right.\right.$$

2.1299 ODE No. 1299

$$\left(a^2x^2-1\right)y''(x)+2a^2xy'(x)=0$$

✓ **Mathematica** : cpu = 0.0143287 (sec), leaf count = 19

$$\left\{\left\{y(x)\to c_2-\frac{c_1\tanh^{-1}(ax)}{a}\right\}\right\}$$

✓ **Maple** : cpu = 0.01 (sec), leaf count = 27

$$\left\{y(x)=\_C1-\frac{\left(-\ln\left(ax-1\right)+\ln\left(ax+1\right)\right)\_C2}{2a}\right\}$$

2.1300 ODE No. 1300

$$(a^2x^2-1)\,y''(x)+2a^2xy'(x)-2a^2y(x)=0$$

✓ **Mathematica** : cpu = 0.0104688 (sec), leaf count = 41

$$\left\{\left\{y(x)\to ac_1x+c_2\left(ax\left(\frac{1}{2}\log(ax+1)-\frac{1}{2}\log(1-ax)\right)-1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.029 (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 = 0.0228979 (sec), leaf count = 31

$$\left\{\left\{y(x)\to\frac{c_2(ax+b)^3}{3ax}+\frac{c_1}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.012 (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 = 0.059428 (sec), leaf count = 243

$$\left\{\left\{y(x)\to c_1\left(\frac{2b}{a}+2x\right)^{\frac{\mathrm{A1}}{2a\mathrm{A2}}}(2a\mathrm{A2}x+2\mathrm{A2}b)^{-\frac{\mathrm{A1}}{2a\mathrm{A2}}}\left(-\frac{\mathrm{A0}\left(\frac{b}{a}+x\right)}{a\mathrm{A2}}\right)^{\frac{1}{2}-\frac{\mathrm{A1}}{2a\mathrm{A2}}}I_{\frac{\mathrm{A1}}{a\mathrm{A2}}-1}\left(2\sqrt{-\frac{\mathrm{A0}\left(\frac{b}{a}+x\right)}{a\mathrm{A2}}}\right)+\right.\right.$$

✓ **Maple** : cpu = 0.043 (sec), leaf count = 98

$$\left\{y(x)=(ax+b)^{-\frac{-aA2+A1}{2\,aA2}}\left(J_{\frac{aA2-A1}{aA2}}\left(2\sqrt{A0}\sqrt{\frac{ax+b}{a^2A2}}\right)\_C1+Y_{\frac{aA2-A1}{aA2}}\left(2\sqrt{A0}\sqrt{\frac{ax+b}{a^2A2}}\right)\_C2\right)\right\}$$

2.1303 ODE No. 1303

$$y''(x)\left(ax^2+bx+c\right)+(dx+f)y'(x)+gy(x)=0$$

✗ **Mathematica** : cpu = 9.49692 (sec), leaf count = 0 , DifferentialRoot result

$$\left\{\left\{y(x)\to \text{DifferentialRoot}\left(\{y,x\},\left\{gy(x)+(xd+f)y'(x)+\left(ax^2+bx+c\right)y''(x)=0,y(0)=c_1,y'(0)=\right.\right.\right.$$

✓ **Maple** : cpu = 0.133 (sec), leaf count = 501

$$\left\{y(x)=\_C1\,{}_2F_1\left(\frac{1}{2\,a}\left(-a+d+\sqrt{a^2+(-2\,d-4\,g)\,a+d^2}\right),-\frac{1}{2\,a}\left(a-d+\sqrt{a^2+(-2\,d-4\,g)\,a+d^2}\right)\right.\right.$$

2.1304 ODE No. 1304

$$x^3y''(x)+xy'(x)-(2x+3)y(x)=0$$

✓ **Mathematica** : cpu = 0.0374322 (sec), leaf count = 50

$$\left\{\left\{y(x)\to \frac{c_2\left(e^{\frac{1}{x}}\text{Ei}\left(-\frac{1}{x}\right)+2x^3-x^2+x\right)}{6x}+\frac{c_1e^{\frac{1}{x}}}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.035 (sec), leaf count = 38

$$\left\{y(x)=\frac{1}{x}\left(Ei\left(1,x^{-1}\right)e^{x^{-1}}\_C2+\_C1\,e^{x^{-1}}-2\_C2\,x\left(x^2-x/2+1/2\right)\right)\right\}$$

2.1305 ODE No. 1305

$$x^3y''(x)+2xy'(x)-y(x)=0$$

✓ **Mathematica** : cpu = 0.0624227 (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 = 0.044 (sec), leaf count = 44

$$\left\{y(x)=e^{x^{-1}}\left(-\_C2\,K_1\left(-x^{-1}\right)+\_C2\,K_0\left(-x^{-1}\right)+\_C1\,\left(I_0\left(x^{-1}\right)-I_1\left(x^{-1}\right)\right)\right)\right\}$$

2.1306 ODE No. 1306

$$y(x)\left(ax^2+a+bx\right)+x^3y''(x)+x^2y'(x)=0$$

✗ **Mathematica** : cpu = 0.839426 (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 = 0.11 (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 = 0.0899807 (sec), leaf count = 54

$$\left\{\left\{y(x)\to\frac{c_1e^{\frac{1}{x}}(x+1)}{x}-\frac{c_2\left(e^{\frac{1}{x}}x\text{Ei}\left(-\frac{1}{x}\right)+e^{\frac{1}{x}}\text{Ei}\left(-\frac{1}{x}\right)+x\right)}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.034 (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 = 0.0132192 (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 = 0.012 (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 = 0.0674043 (sec), leaf count = 84

$$\left\{\left\{y(x)\to c_2G_{1,2}^{2,0}\left(-\frac{1}{2x^2}\middle|\begin{array}{c}1\\-\frac{1}{2},-\frac{1}{2}\end{array}\right)+\sqrt{2}c_1e^{\frac{1}{4x^2}}x\left(\left(1-\frac{1}{2x^2}\right)I_0\left(\frac{1}{4x^2}\right)+\frac{I_1\left(\frac{1}{4x^2}\right)}{2x^2}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.059 (sec), leaf count = 85

$$\left\{y(x)=\frac{\_C1}{x}\mathrm{e}^{\frac{1}{4x^2}}\left(2\,x^2I_0(1/4\,x^{-2})+I_1\left(\frac{1}{4\,x^2}\right)-I_0\left(\frac{1}{4\,x^2}\right)\right)+\frac{\_C2}{x}\mathrm{e}^{\frac{1}{4x^2}}\left(2\,K_0(-1/4\,x^{-2})x^2-K_0\right(-\right.$$

2.1310 ODE No. 1310

$$x^3y''(x) + 3x^2y'(x) + xy(x) - 1 = 0$$

✓ **Mathematica** : cpu = 0.0078678 (sec), leaf count = 31

$$\left\{\left\{y(x)\to\frac{c_1}{x}+\frac{c_2\log(x)}{x}+\frac{\log^2(x)}{2x}\right\}\right\}$$

✓ **Maple** : cpu = 0.007 (sec), leaf count = 20

$$\left\{y(x)=\frac{1}{x}\left(\_C1\,\ln(x)+\frac{(\ln(x))^2}{2}+\_C2\right)\right\}$$

2.1311 ODE No. 1311

$$-v(v+1)xy(x) + x(x^2+1)\,y''(x) + (2x^2+1)\,y'(x) = 0$$

✓ **Mathematica** : cpu = 0.0915081 (sec), leaf count = 63

$$\left\{\left\{y(x)\to c_2G_{2,2}^{2,0}\left(-x^2\middle|\begin{array}{c}\frac{1-v}{2},\frac{v+2}{2}\\0,0\end{array}\right)+c_1\,{}_2F_1\left(\frac{v}{2}+\frac{1}{2},-\frac{v}{2};1;-x^2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.098 (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

$$x\left(x^2+1\right)y''(x)+2\left(x^2-1\right)y'(x)-2xy(x)=0$$

✓ **Mathematica** : cpu = 0.0168132 (sec), leaf count = 32

$$\left\{\left\{y(x)\to\frac{c_1}{x^2+1}+\frac{c_2x^3}{3\left(x^2+1\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.013 (sec), leaf count = 19

$$\left\{y(x)=\frac{\_C2\,x^3+\_C1}{x^2+1}\right\}$$

2.1313 ODE No. 1313

$$x(-(v-n))(n+v+1)y(x)+\left(2(n+1)x^2+2n+1\right)y'(x)+x\left(x^2+1\right)y''(x)=0$$

✓ **Mathematica** : cpu = 0.14554 (sec), leaf count = 87

$$\left\{\left\{y(x)\to c_1\,{}_2F_1\left(\frac{n}{2}-\frac{v}{2},\frac{n}{2}+\frac{v}{2}+\frac{1}{2};n+1;-x^2\right)+c_2x^{-2n}\,{}_2F_1\left(-\frac{n}{2}-\frac{v}{2},-\frac{n}{2}+\frac{v}{2}+\frac{1}{2};1-n;-x^2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.052 (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

$$x(n-v-1)(n+v)y(x)-\left(2(n-1)x^2+2n-1\right)y'(x)+x\left(x^2+1\right)y''(x)=0$$

✓ **Mathematica** : cpu = 0.133159 (sec), leaf count = 87

$$\left\{\left\{y(x)\to c_1\,{}_2F_1\left(-\frac{n}{2}-\frac{v}{2},-\frac{n}{2}+\frac{v}{2}+\frac{1}{2};1-n;-x^2\right)+c_2x^{2n}\,{}_2F_1\left(\frac{n}{2}-\frac{v}{2},\frac{n}{2}+\frac{v}{2}+\frac{1}{2};n+1;-x^2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.045 (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 = 0.0187241 (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 = 0.013 (sec), leaf count = 45

$$\left\{y(x) = \_C1\ \sin\left((1+x)(x-1)\sqrt{a}\frac{1}{\sqrt{x^2-1}}\right)+\_C2\ \cos\left((1+x)(x-1)\sqrt{a}\frac{1}{\sqrt{x^2-1}}\right)\right\}$$

2.1316 ODE No. 1316

$$x(x^2-1)\,y''(x) + (x^2-1)\,y'(x) - xy(x) = 0$$

✓ **Mathematica** : cpu = 0.0653708 (sec), leaf count = 38

$$\left\{\left\{y(x)\to c_2G_{2,2}^{2,0}\left(x^2\middle|\begin{array}{c}\frac{1}{2},\frac{3}{2}\\0,0\end{array}\right)+\frac{2c_1E(x^2)}{\pi}\right\}\right\}$$

✓ **Maple** : cpu = 0.026 (sec), leaf count = 18

$$\{y(x) = \_C1\ EllipticE(x) + \_C2\ (EllipticCE(x) - EllipticCK(x))\}$$

2.1317 ODE No. 1317

$$x(x^2-1)\,y''(x) + (3x^2-1)\,y'(x) + xy(x) = 0$$

✓ **Mathematica** : cpu = 0.0827074 (sec), leaf count = 38

$$\left\{\left\{y(x)\to c_2G_{2,2}^{2,0}\left(x^2\middle|\begin{array}{c}\frac{1}{2},\frac{1}{2}\\0,0\end{array}\right)+\frac{2c_1K(x^2)}{\pi}\right\}\right\}$$

✓ **Maple** : cpu = 0.024 (sec), leaf count = 13

$$\{y(x) = \_C1\ EllipticK(x) + \_C2\ EllipticCK(x)\}$$

2.1318 ODE No. 1318

$$(ax^2+b)\,y'(x)+cxy(x)+x(x^2-1)\,y''(x)=0$$

✓ **Mathematica** : cpu = 0.205496 (sec), leaf count = 172

$$\left\{\left\{y(x)\to c_1\,{}_2F_1\left(\frac{a}{4}-\frac{1}{4}\sqrt{a^2-2a-4c+1}-\frac{1}{4},\frac{a}{4}+\frac{1}{4}\sqrt{a^2-2a-4c+1}-\frac{1}{4};\frac{1}{2}-\frac{b}{2};x^2\right)+i^{b+1}c_2x^{b+1}\right.\right.$$

✓ **Maple** : cpu = 0.067 (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 = 0.0469194 (sec), leaf count = 60

$$\left\{\left\{y(x)\to c_1x^{3/2}\left(x^2+2\right)^{3/4}-\frac{c_2(x^2+2)^{3/4}\,{}_2F_1\left(-\frac{3}{4},\frac{7}{4};\frac{1}{4};-\frac{x^2}{2}\right)}{3\;2^{3/4}}\right\}\right\}$$

✓ **Maple** : cpu = 0.072 (sec), leaf count = 31

$$\left\{y(x)=\left(x^2+2\right)^{\frac{3}{4}}\left(x^{\frac{3}{2}}\_C1+{}_2\mathrm{F}_1(-\frac{3}{4},\frac{7}{4};\frac{1}{4};-\frac{x^2}{2})\_C2\right)\right\}$$

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 = 0.0653842 (sec), leaf count = 21

$$\{\{y(x)\to c_1e^xx^2+c_2(x-1)\}\}$$

✓ **Maple** : cpu = 0.027 (sec), leaf count = 17

$$\{y(x)=\_C1\,(x-1)+\_C2\,\mathrm{e}^xx^2\}$$

2.1321 ODE No. 1321

$$(x+1)x^2y''(x) - (2x+1)xy'(x) + (2x+1)y(x) = 0$$

✓ **Mathematica** : cpu = 0.0184189 (sec), leaf count = 18

$$\{\{y(x) \to c_1x + c_2x(x + \log(x))\}\}$$

✓ **Maple** : cpu = 0.014 (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 = 0.0281078 (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 = 0.016 (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 = 0.649503 (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 = 0.01 (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 = 0.0206923 (sec), leaf count = 25

$$\{\{y(x) \to c_1x^3 - c_2x^2(x\log(x)+1)\}\}$$

✓ **Maple** : cpu = 0.017 (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 = 0.180463 (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 = 0.07 (sec), leaf count = 86

$$\Big\{y(x) = (x-1)^{1-a-\alpha-b-\beta}\left({}_2\mathrm{F}_1(1-b-\beta,1-a-\beta;\,1+\alpha-\beta;\,x)x^\alpha\_C1 + {}_2\mathrm{F}_1(1-a-\alpha,1-\alpha-b;\,1\right.$$

2.1326 ODE No. 1326

$$y''(x) = -\frac{y'(x)}{x+1} - \frac{y(x)}{x(x+1)^2}$$

✓ **Mathematica** : cpu = 0.017492 (sec), leaf count = 29

$$\left\{\left\{y(x) \to \frac{c_1x}{x+1} + \frac{c_2(x\log(x)-1)}{x+1}\right\}\right\}$$

✓ **Maple** : cpu = 0.017 (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 = 0.127915 (sec), leaf count = 104

$$\left\{\left\{y(x) \to \left(-\frac{1}{2}\right)^{-\frac{1}{\sqrt{2}}} c_1 x^{-\frac{1}{\sqrt{2}}} {}_2F_1\left(-\frac{1}{\sqrt{2}}, -1-\frac{1}{\sqrt{2}}; 1-\sqrt{2}; \frac{x}{2}\right) + \left(-\frac{1}{2}\right)^{\frac{1}{\sqrt{2}}} c_2 x^{\frac{1}{\sqrt{2}}} {}_2F_1\left(\frac{1}{\sqrt{2}}, -1+\frac{1}{\sqrt{2}}; 1\right.\right.\right.$$

✓ **Maple** : cpu = 0.197 (sec), leaf count = 81

$$\left\{y(x) = (x-2)^2 \left(\_C2\ {}_2\mathrm{F}_1(2+\frac{\sqrt{2}}{2}, 1+\frac{\sqrt{2}}{2}; 1+\sqrt{2}; \frac{x}{2})x^{\frac{\sqrt{2}}{2}} + \_C1\ {}_2\mathrm{F}_1(2-\frac{\sqrt{2}}{2}, 1-\frac{\sqrt{2}}{2}; 1-\sqrt{2}; \frac{x}{2})\right.\right.$$

2.1328 ODE No. 1328

$$y''(x) = \frac{2y(x)}{(x-1)^2 x}$$

✓ **Mathematica** : cpu = 0.0153982 (sec), leaf count = 36

$$\left\{\left\{y(x) \to \frac{c_2(-x^2+2x\log(x)+1)}{x-1} - \frac{c_1 x}{x-1}\right\}\right\}$$

✓ **Maple** : cpu = 0.016 (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

$$y''(x) = -\frac{y'(x)\left(-x(a(\delta+\text{gamma1})+\alpha+\beta-\delta+1)+a\text{gamma1}+x^2(\alpha+\beta+1)\right)}{(x-1)x(x-a)} - \frac{y(x)(\alpha\beta x-q)}{(x-1)x(x-a)}$$

✗ **Mathematica** : cpu = 4.56007 (sec), leaf count = 0 , DifferentialRoot result

$$\{\{y(x) \to \text{DifferentialRoot}(\{y,x\}, \{(x\alpha\beta-q)y(x) + (\alpha x^2+\beta x^2+x^2-\alpha x-\beta x-a\delta x+\delta x-agamma$$

✓ **Maple** : cpu = 0.184 (sec), leaf count = 64

$$\{y(x) = \_C1\ HeunG(a,q,\alpha,\beta,\gamma1,\delta,x) + \_C2\ x^{1-\gamma1} HeunG(a, q-(-1+\gamma1)(\delta(a-1)+\alpha+\beta-\gamma1+$$

2.1330 ODE No. 1330

$$y''(x) = -\frac{y'(x)\left(Ax^2+Bx+C\right)}{(x-a)(x-b)(x-c)} - \frac{(\mathrm{DD}x+e)y(x)}{(x-a)(x-b)(x-c)}$$

✗ **Mathematica** : cpu = 111.392 (sec), leaf count = 0 , DifferentialRoot result

$$\left\{\left\{y(x)\to \text{DifferentialRoot}\left(\{y,x\},\left\{(x\mathrm{DD}+e)y(x)+\left(Ax^2+Bx+C\right)y'(x)-(a-x)(b-x)(c-x)y''(x\right.\right.\right.$$

✓ **Maple** : cpu = 0.707 (sec), leaf count = 1147

$$\left\{y(x) = \_C1\ HeunG\left(\frac{a-c}{a-b}, \frac{DD\,a+E}{a-b}, \frac{A}{2}-\frac{1}{2}+\frac{1}{2}\sqrt{A^2-2\,A-4\,DD+1}, 1\left(\left(A(b-c)\,a-Abc-Bc-\right.\right.\right.\right.$$

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 = 0.0322935 (sec), leaf count = 55

$$\left\{\left\{y(x)\to \frac{c_1\sqrt[4]{x-2}\sqrt{x}}{\sqrt[4]{2-x}} + \frac{2c_2(x-2)^{3/4}\sqrt{x}}{\sqrt[4]{2-x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.016 (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 = 0.0176087 (sec), leaf count = 26

$$\left\{\left\{y(x)\to c_1\sqrt{x} + c_2\sqrt{x}(x+\log(x))\right\}\right\}$$

✓ **Maple** : cpu = 0.013 (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 = 0.0760837 (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 = 0.043 (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 = 0.142146 (sec), leaf count = 114

$$\left\{\left\{y(x) \to i^{-c} c_1 x^{-c/2}\, {}_2F_1\left(\frac{a}{2} - \frac{b}{2} - \frac{c}{2}, \frac{a}{2} + \frac{b}{2} - \frac{c}{2}; 1 - c; x\right) + i^c c_2 x^{c/2}\, {}_2F_1\left(\frac{a}{2} - \frac{b}{2} + \frac{c}{2}, \frac{a}{2} + \frac{b}{2} + \frac{c}{2}; c + 1\right.\right.\right.$$

✓ **Maple** : cpu = 0.044 (sec), leaf count = 89

$$\left\{y(x) = (x-1)^{1-a}\left(x^{\frac{c}{2}}\, {}_2\mathrm{F}_1(-\frac{a}{2} - \frac{b}{2} + \frac{c}{2} + 1, -\frac{a}{2} + \frac{b}{2} + \frac{c}{2} + 1;\ 1 + c;\ x)\_C1 + {}_2\mathrm{F}_1(-\frac{a}{2} + \frac{b}{2} - \frac{c}{2} + 1, -\right.\right.$$

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 = 0.226111 (sec), leaf count = 893

$$\left\{\left\{y(x) \to e^{\frac{1}{4}(-2\log(1-x)-\log(x))}\sqrt[4]{x} c_1\, {}_2F_1\left(\frac{1}{4}\left(\sqrt{-8a - 4b - 4\sqrt{4a^2 + 4ba - a - b} + 1} + 1\right), \frac{(-8a - 4b -}{}\right.\right.\right.$$

✓ **Maple** : cpu = 0.038 (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 = 0.0351568 (sec), leaf count = 70

$$\{\{y(x) \to c_2\sqrt{1-2x}(2x\log(2(x-1)+1) - 2\log(2(x-1)+1) - 2x\log(x-1) + 2\log(x-1) - 1) - c_1$$

✓ **Maple** : cpu = 0.029 (sec), leaf count = 42

$$\left\{y(x) = \sqrt{2\,x-1}(-2\,\_C2\,(x-1)\ln{(2\,x-1)} + 2\,\_C2\,(x-1)\ln{(x-1)} + \_C1\,x - \_C1 + \_C2)\right\}$$

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 = 0.0517003 (sec), leaf count = 62

$$\left\{\left\{y(x) \to \frac{c_1}{\sqrt{\frac{b+x}{a-b}+1}} + \frac{c_2\sqrt{b+x}}{\sqrt{a-b}\sqrt{\frac{b+x}{a-b}+1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.026 (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 = 0.0398033 (sec), leaf count = 40

$$\left\{\left\{y(x)\to \frac{3}{935}c_2x\left(18x^2-102x+187\right)+c_1\sqrt[6]{x}(2-x)^{17/6}\right\}\right\}$$

✓ **Maple** : cpu = 0.023 (sec), leaf count = 27

$$\left\{y(x)=\_C2\,\sqrt[6]{x}(x-2)^{\frac{17}{6}}+18\,x\left(x^2-\frac{17\,x}{3}+\frac{187}{18}\right)\_C1\right\}$$

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 = 0.188441 (sec), leaf count = 66

$$\left\{\left\{y(x)\to c_1a^{-c}x^{-c}\,{}_2F_1(1-c,b-c;-c-d+1;-ax)+c_2a^dx^d\,{}_2F_1(d+1,b+d;c+d+1;-ax)\right\}\right\}$$

✓ **Maple** : cpu = 0.074 (sec), leaf count = 76

$$\Big\{y(x)=(ax+1)^{-b+c-d}\left({}_2\mathrm{F}_1(-d,1-b-d;\,1-d-c;\,-ax)x^{-c}\_C2+{}_2\mathrm{F}_1(c,1-b+c;\,1+d+c;\,-ax)x$$

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 = 0.0255379 (sec), leaf count = 32

$$\left\{\left\{y(x)\to \frac{c_2x^3}{ax+b}+\frac{c_1x^2}{ax+b}\right\}\right\}$$

✓ **Maple** : cpu = 0.017 (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 = 61.8602 (sec), leaf count = 2924

$$\left\{\left\{y(x) \to \frac{axc_1\,{}_2F_1\left(\frac{3}{2} - \frac{1}{2}\sqrt{1-4v}, \frac{1}{2}\sqrt{1-4v} + \frac{3}{2}; 3; -\frac{ax}{b}\right)}{b} + c_2 G_{2,2}^{2,0}\left(-\frac{ax}{b} \middle| \begin{array}{c} \frac{1}{2}\left(1 - \sqrt{1-4v}\right), \frac{1}{2}\left(\sqrt{1-4v}\right. \\ -1, 1 \end{array}\right.\right.\right.$$

✓ **Maple** : cpu = 0.114 (sec), leaf count = 201

$$\left\{y(x) = \frac{1}{a^2(v+6)(v+2)(v+12)}\left(x^{-\frac{1}{2}+\frac{1}{2}\sqrt{1-4v}} a^2 \_C2\,(v+6)(v+2)(v+12)\,{}_2\mathrm{F}_1\left(\frac{3}{2} - \frac{1}{2}\sqrt{1-4v}, -\frac{1}{2}\right.\right.\right.$$

2.1342 ODE No. 1342

$$y''(x) = -\frac{ay(x)}{x^4}$$

✓ **Mathematica** : cpu = 0.0519943 (sec), leaf count = 52

$$\left\{\left\{y(x) \to c_1 x e^{\frac{i\sqrt{a}}{x}} - \frac{ic_2 x e^{-\frac{i\sqrt{a}}{x}}}{2\sqrt{a}}\right\}\right\}$$

✓ **Maple** : cpu = 0.036 (sec), leaf count = 31

$$\left\{y(x) = x\left(\cosh\left(\frac{1}{x}\sqrt{-a}\right)\_C2 + \sinh\left(\frac{1}{x}\sqrt{-a}\right)\_C1\right)\right\}$$

2.1343 ODE No. 1343

$$y''(x) = -\frac{y(x)\left((1-a)ax^2 - b(b+x)\right)}{x^4}$$

✗ **Mathematica** : cpu = 0.544853 (sec), leaf count = 0 , DifferentialRoot result

$$\left\{\left\{y(x) \to \text{DifferentialRoot}\left(\{y,x\},\left\{y''(x)x^4 + \left(-a^2x^2 + ax^2 - bx - b^2\right)y(x) = 0, y(1) = c_1, y'(1) = c_2\right\}\right)\right.\right.$$

✓ **Maple** : cpu = 0.069 (sec), leaf count = 58

$$\left\{y(x) = I_{a+1}\left(\frac{b}{x}\right)\_C1\, b - K_{a+1}\left(\frac{b}{x}\right)\_C2\, b + 2\,(ax + b/2)\left(\_C1\, I_a\left(\frac{b}{x}\right) + \_C2\, K_a\left(\frac{b}{x}\right)\right)\right\}$$

2.1344 ODE No. 1344

$$y''(x) = -\frac{\left(e^{2/x} - v^2\right)y(x)}{x^4}$$

✓ **Mathematica** : cpu = 0.446925 (sec), leaf count = 173

$$\left\{\left\{y(x) \to \frac{c_1 2^{v+\frac{v+1}{2}}\left(e^{2/x}\right)^{\frac{v+1}{2}-\frac{1}{2}}\left(-e^{2/x}\right)^{\frac{1}{2}(-v-1)+\frac{1}{2}} I_v\left(\sqrt{-e^{2/x}}\right)}{\log\left(e^{2/x}\right)} + \frac{c_2(-1)^{-v}2^{v+\frac{v+1}{2}}\left(e^{2/x}\right)^{\frac{v+1}{2}-\frac{1}{2}}\left(-e^{2/x}\right)^{\frac{1}{2}(\cdots}}{\log\left(e^{2/x}\right)}\right.\right.$$

✓ **Maple** : cpu = 0.043 (sec), leaf count = 23

$$\left\{y(x) = x\left(J_v\left(e^{x^{-1}}\right)\_C1 + Y_v\left(e^{x^{-1}}\right)\_C2\right)\right\}$$

2.1345 ODE No. 1345

$$y''(x) = \frac{2y(x)}{x^4} - \frac{y'(x)}{x^3}$$

✓ **Mathematica** : cpu = 0.0328943 (sec), leaf count = 52

$$\left\{\left\{y(x) \to c_1 e^{\frac{1}{2x^2}} x - \sqrt{\frac{\pi}{2}} c_2 e^{\frac{1}{2x^2}} x \operatorname{erf}\left(\frac{1}{\sqrt{2}x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.032 (sec), leaf count = 25

$$\left\{y(x) = x e^{\frac{1}{2x^2}}\left(\mathit{Erf}\left(\frac{\sqrt{2}}{2\,x}\right)\_C2 + \_C1\right)\right\}$$

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 = 0.0630303 (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 = 0.033 (sec), leaf count = 25

$$\left\{y(x) = x\left(\mathrm{e}^{-\frac{b}{x}}\_C2 + \mathrm{e}^{-\frac{a}{x}}\_C1\right)\right\}$$

2.1347 ODE No. 1347

$$y''(x) = -\frac{y(x)}{x^4} - \frac{y'(x)}{x}$$

✓ **Mathematica** : cpu = 0.0839685 (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 = 0.017 (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 = 1.12217 (sec), leaf count = 0 , DifferentialRoot result

$$\{\{y(x) \to \mathrm{DifferentialRoot}\left(\{y,x\}, \{y''(x)x^4 + y'(x)x^3 + \left(ax^4+bx^2+a\right)y(x) = 0, y(1) = c_1, y'(1) = c_2\}$$

✓ **Maple** : cpu = 0.125 (sec), leaf count = 73

$$\left\{y(x) = HeunD\left(0, 2\,a+b, 0, 2\,a-b, \frac{x^2+1}{x^2-1}\right)\left(\int \frac{1}{x}\left(HeunD\left(0, 2\,a+b, 0, 2\,a-b, \frac{x^2+1}{x^2-1}\right)\right)^{-2} \mathrm{d}x\_C2\right.\right.$$

2.1349 ODE No. 1349

$$y''(x) = -\frac{y(x)}{x^4} - \frac{(x^2+1)\,y'(x)}{x^3}$$

✓ **Mathematica** : cpu = 0.0837524 (sec), leaf count = 76

$$\left\{\left\{y(x)\to c_2 G_{1,2}^{2,0}\left(-\frac{1}{2x^2}\middle|\begin{array}{c}\frac{3}{2}\\0,0\end{array}\right)+c_1 e^{\frac{1}{4x^2}}\left(\left(1-\frac{1}{2x^2}\right)I_0\left(\frac{1}{4x^2}\right)+\frac{I_1\left(\frac{1}{4x^2}\right)}{2x^2}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.046 (sec), leaf count = 85

$$\left\{y(x) = \frac{\_C1}{x^2}\mathrm{e}^{\frac{1}{4\,x^2}}\left(2\,x^2 I_0(1/4\,x^{-2}) + I_1\left(\frac{1}{4\,x^2}\right) - I_0\left(\frac{1}{4\,x^2}\right)\right) + \frac{\_C2}{x^2}\mathrm{e}^{\frac{1}{4\,x^2}}\left(2\,K_0(-1/4\,x^{-2})x^2 - K_0\left(-\right.\right.\right.$$

2.1350 ODE No. 1350

$$y''(x) = -\frac{a^2 y(x)}{x^4} - \frac{2y'(x)}{x}$$

✓ **Mathematica** : cpu = 0.0078448 (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 = 0.007 (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 = 0.0176943 (sec), leaf count = 50

$$\left\{\left\{y(x)\to c_1 e^{\frac{1}{2x^2}} - \sqrt{\frac{\pi}{2}}c_2 e^{\frac{1}{2x^2}}\operatorname{erf}\left(\frac{1}{\sqrt{2}x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.02 (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 = 0.0104785 (sec), leaf count = 89

$$\left\{\left\{y(x) \to c_1 e^{-\frac{\sqrt{b}\left(-\frac{\sqrt{a^2-b}}{\sqrt{b}}-\frac{a}{\sqrt{b}}\right)}{x}} + c_2 e^{-\frac{\sqrt{b}\left(\frac{\sqrt{a^2-b}}{\sqrt{b}}-\frac{a}{\sqrt{b}}\right)}{x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.034 (sec), leaf count = 43

$$\left\{y(x) = \_C1\, e^{\frac{1}{x}\left(a-\sqrt{a^2-b}\right)} + \_C2\, e^{\frac{1}{x}\left(a+\sqrt{a^2-b}\right)}\right\}$$

2.1353 ODE No. 1353

$$y''(x) = \frac{(2x^2-1)\,y'(x)}{x^3} - \frac{y(x)}{x^4}$$

✓ **Mathematica** : cpu = 0.87181 (sec), leaf count = 119

$$\left\{\left\{y(x) \to c_1\left(x^3+2x-\frac{1}{x}\right) - \frac{c_2\left(\sqrt{2\pi}x^4\text{erfi}\left(\frac{1}{\sqrt{2}x}\right) + 2\sqrt{2\pi}x^2\text{erfi}\left(\frac{1}{\sqrt{2}x}\right) - \sqrt{2\pi}\text{erfi}\left(\frac{1}{\sqrt{2}x}\right) + 2e^{\frac{1}{2x^2}}x - 2\right.}{16x}\right.\right.$$

✓ **Maple** : cpu = 0.18 (sec), leaf count = 67

$$\left\{y(x) = \frac{1}{x}\left(-\_C1\,\sqrt{2}\sqrt{\pi}\left(x^4+2\,x^2-1\right)\mathit{erfi}\left(\frac{\sqrt{2}}{2\,x}\right) + \left(2\_C1\,x^3 - 2\_C1\,x\right)e^{\frac{1}{2\,x^2}} + \_C2\,\left(x^4+2\,x^2 -\right.\right.\right.$$

2.1354 ODE No. 1354

$$y''(x) = \frac{(2x^2-1)\,y'(x)}{x^3} - \frac{2y(x)}{x^4}$$

✓ **Mathematica** : cpu = 0.225552 (sec), leaf count = 108

$$\left\{\left\{y(x) \to \frac{c_2\left(-5\sqrt{2\pi}x^2\text{erfi}\left(\frac{1}{\sqrt{2}x}\right) + \sqrt{2\pi}\text{erfi}\left(\frac{1}{\sqrt{2}x}\right) - 2e^{\frac{1}{2x^2}}x + 4e^{\frac{1}{2x^2}}x^5 + 8e^{\frac{1}{2x^2}}x^3\right)}{12x^2} + c_1\left(1-\frac{1}{5x^2}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.234 (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 = 0.235685 (sec), leaf count = 51

$$\left\{\left\{y(x)\to\frac{1}{2}c_{2}\sqrt[3]{x^{3}+1}x^{2}\,{}_{2}F_{1}\left(\frac{2}{3},\frac{4}{3};\frac{5}{3};-x^{3}\right)+c_{1}\sqrt[3]{x^{3}+1}\right\}\right\}$$

✓ **Maple** : cpu = 0.08 (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

$$y''(x)=-\frac{y(x)\,(-n^{2}-v(v+1)x^{2})}{x^{2}\,(x^{2}+1)}-\frac{(2x^{2}+1)\,y'(x)}{x\,(x^{2}+1)}$$

✓ **Mathematica** : cpu = 0.219516 (sec), leaf count = 90

$$\left\{\left\{y(x)\to c_{1}x^{-n}\,{}_{2}F_{1}\left(-\frac{n}{2}-\frac{v}{2},-\frac{n}{2}+\frac{v}{2}+\frac{1}{2};1-n;-x^{2}\right)+c_{2}x^{n}\,{}_{2}F_{1}\left(\frac{n}{2}-\frac{v}{2},\frac{n}{2}+\frac{v}{2}+\frac{1}{2};n+1;-x^{2}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.045 (sec), leaf count = 29

$$\left\{y(x)=\_C1\;LegendreP\left(v,n,\sqrt{x^{2}+1}\right)+\_C2\;LegendreQ\left(v,n,\sqrt{x^{2}+1}\right)\right\}$$

2.1357 ODE No. 1357

$$y''(x) = -\frac{(ax^2 + a - 1)\, y'(x)}{x\,(x^2 + 1)} - \frac{y(x)\,(bx^2 + c)}{x^2\,(x^2 + 1)}$$

✓ **Mathematica** : cpu = 0.500163 (sec), leaf count = 288

$$\left\{\left\{y(x) \to c_1 x^{\frac{1}{2}\left(-\sqrt{a^2-4a-4c+4}-a+2\right)}\, {}_2F_1\left(-\frac{1}{4}\sqrt{a^2-2a-4b+1} - \frac{1}{4}\sqrt{a^2-4a-4c+4} + \frac{1}{4}, \frac{1}{4}\sqrt{a^2-2a-\right.\right.\right.$$

✓ **Maple** : cpu = 0.069 (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

$$y''(x) = \frac{(x^2 - 2)\, y'(x)}{x\,(x^2 - 1)} - \frac{(x^2 - 2)\, y(x)}{x^2\,(x^2 - 1)}$$

✓ **Mathematica** : cpu = 0.0464735 (sec), leaf count = 89

$$\left\{\left\{y(x) \to \frac{c_1 x \sqrt[4]{x^2 - 1}}{\sqrt[4]{1 - x^2}} - \frac{c_2 x \sqrt[4]{x^2 - 1}\left(\log\left(1 - \frac{x}{\sqrt{x^2-1}}\right) - \log\left(\frac{x}{\sqrt{x^2-1}} + 1\right)\right)}{2\sqrt[4]{1 - x^2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.039 (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 = 0.0769748 (sec), leaf count = 86

$$\left\{\left\{y(x) \to c_1 i^{-v} x^{-v}\, {}_2F_1\left(\frac{1}{2} - \frac{v}{2}, -\frac{v}{2}; \frac{1}{2} - v; x^2\right) + c_2 i^{v+1} x^{v+1}\, {}_2F_1\left(\frac{v}{2} + \frac{1}{2}, \frac{v}{2} + 1; v + \frac{3}{2}; x^2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.052 (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 = 0.0702283 (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 = 0.04 (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 = 0.352708 (sec), leaf count = 38

$$\left\{\left\{y(x) \to c_1 x^{-a} + c_2\left(-2ax^2 + 2a - x^2 + 3\right) x^{a+1}\right\}\right\}$$

✓ **Maple** : cpu = 0.022 (sec), leaf count = 33

$$\left\{y(x) = \_C1\ x^{-a} + \_C2\ x^{a+1}\left(2\,ax^2 + x^2 - 2\,a - 3\right)\right\}$$

2.1362 ODE No. 1362

$$y''(x) = \frac{2xy'(x)}{x^2-1} - \frac{y(x)\left((x^2-1)\,x^2(a-n)(a+n+1)+2ax^2+n(n+1)\left(x^2-1\right)\right)}{x^2\left(x^2-1\right)}$$

✗ **Mathematica** : cpu = 9.96565 (sec), leaf count = 0 , DifferentialRoot result

$$\{\{y(x) \to \text{DifferentialRoot}(\{y,x\},\{-2y'(x)x^3+\left(a^2x^4-n^2x^4+ax^4-nx^4-a^2x^2+2n^2x^2+ax^2+2nx$$

✓ **Maple** : cpu = 0.136 (sec), leaf count = 109

$$\left\{y(x) = \_C1\ HeunC\left(0,-n-\frac{1}{2},-2,-\frac{a^2}{4}+\frac{n^2}{4}-\frac{a}{4}+\frac{n}{4},-\frac{n^2}{4}-\frac{n}{4}+\frac{3}{4}+\frac{a^2}{4}-\frac{a}{4},x^2\right)x^{-n}+\_C2\ Heu$$

2.1363 ODE No. 1363

$$y''(x) = -\frac{(ax^2+a-2)\,y'(x)}{x\left(x^2-1\right)} - \frac{by(x)}{x^2}$$

✓ **Mathematica** : cpu = 0.555293 (sec), leaf count = 236

$$\left\{\left\{y(x) \to c_1(-1)^{\frac{1}{4}\left(-\sqrt{a^2-2a-4b+1}+a-1\right)}x^{\frac{1}{2}\left(-\sqrt{a^2-2a-4b+1}+a-1\right)}\,{}_2F_1\left(\frac{a}{2}-\frac{1}{2},\frac{a}{2}-\frac{1}{2}\sqrt{a^2-2a-4b+1}-\frac{1}{2};1\right.\right.\right.$$

✓ **Maple** : cpu = 0.076 (sec), leaf count = 161

$$\left\{y(x) = \left(x^2-1\right)^{-a+2}\left({}_2\mathrm{F}_1(-\frac{a}{2}+\frac{3}{2},-\frac{a}{2}+\frac{3}{2}+\frac{1}{2}\sqrt{a^2-2\,a-4\,b+1};\,1+\frac{1}{2}\sqrt{a^2-2\,a-4\,b+1};\,x^2)x^{\frac{a}{2}-}\right.\right.$$

2.1364 ODE No. 1364

$$y''(x) = \frac{y'(x)\left(2(a-1)x^2-2a+2bc(x^2-1)\,x^c\right)}{x\left(x^2-1\right)} - \frac{y(x)\left(bc(2a-c-1)x^{c+2}-bc(2a-c+1)x^c+x^2((a-\right.}{x^2\left(x^2-\right.}$$

✓ **Mathematica** : cpu = 0.120261 (sec), leaf count = 42

$$\{\{y(x) \to c_1P_v(x)e^{a\log(x)+bx^c}+c_2Q_v(x)e^{a\log(x)+bx^c}\}\}$$

✓ **Maple** : cpu = 0.065 (sec), leaf count = 25

$$\{y(x) = x^a\mathrm{e}^{bx^c}(LegendreP(v,x)\_C1+LegendreQ(v,x)\_C2)\}$$

2.1365 ODE No. 1365

$$y''(x) = -\frac{ay(x)}{(x^2+1)^2}$$

✓ **Mathematica** : cpu = 0.0756184 (sec), leaf count = 104

$$\left\{\left\{y(x) \to \frac{ic_2\sqrt{x^2+1}(1-ix)^{\sqrt{a+1}}(1+ix)^{-\sqrt{a+1}}e^{i\sqrt{a+1}\tan^{-1}(x)}}{2\sqrt{a+1}} + c_1\sqrt{x^2+1}e^{i\sqrt{a+1}\tan^{-1}(x)}\right\}\right\}$$

✓ **Maple** : cpu = 0.04 (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

$$y''(x) = -\frac{2xy'(x)}{x^2+1} - \frac{y(x)}{(x^2+1)^2}$$

✓ **Mathematica** : cpu = 0.0176026 (sec), leaf count = 31

$$\left\{\left\{y(x) \to \frac{c_1}{\sqrt{x^2+1}} + \frac{c_2 x}{\sqrt{x^2+1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.007 (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 = 1.70092 (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 = 0.14 (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

$$y''(x)=-\frac{axy'(x)}{x^{2}+1}-\frac{by(x)}{\left(x^{2}+1\right)^{2}}$$

✓ **Mathematica** : cpu = 0.0198983 (sec), leaf count = 106

$$\left\{\left\{y(x)\to c_{1}\left(x^{2}+1\right)^{\frac{2-a}{4}}P_{\frac{a-2}{2}}^{\frac{1}{2}\sqrt{a^{2}-4a+4b+4}}(ix)+c_{2}\left(x^{2}+1\right)^{\frac{2-a}{4}}Q_{\frac{a-2}{2}}^{\frac{1}{2}\sqrt{a^{2}-4a+4b+4}}(ix)\right\}\right\}$$

✓ **Maple** : cpu = 0.05 (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

$$y''(x)=-\frac{ay(x)}{\left(x^{2}-1\right)^{2}}$$

✓ **Mathematica** : cpu = 0.0766993 (sec), leaf count = 106

$$\left\{\left\{y(x)\to\frac{c_{2}\sqrt{1-x^{2}}(x+1)^{\sqrt{1-a}}(1-x)^{-\sqrt{1-a}}e^{-\sqrt{1-a}\tanh^{-1}(x)}}{2\sqrt{1-a}}+c_{1}\sqrt{1-x^{2}}e^{-\sqrt{1-a}\tanh^{-1}(x)}\right\}\right\}$$

✓ **Maple** : cpu = 0.033 (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

$$y''(x) = \frac{a^2 y(x)}{(x^2-1)^2} - \frac{2xy'(x)}{x^2-1}$$

✓ **Mathematica** : cpu = 0.0208797 (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 = 0.007 (sec), leaf count = 19

$$\{y(x) = \_C1\ \sinh(a\mathit{Artanh}(x)) + \_C2\ \cosh(a\mathit{Artanh}(x))\}$$

2.1371 ODE No. 1371

$$y''(x) = -\frac{y(x)\left(-a^2-\lambda(x^2-1)\right)}{(x^2-1)^2} - \frac{2xy'(x)}{x^2-1}$$

✓ **Mathematica** : cpu = 0.0158983 (sec), leaf count = 48

$$\left\{\left\{y(x)\to c_1 P^{a}_{\frac{1}{2}\left(\sqrt{4\lambda+1}-1\right)}(x)+c_2 Q^{a}_{\frac{1}{2}\left(\sqrt{4\lambda+1}-1\right)}(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.031 (sec), leaf count = 37

$$\left\{y(x) = \_C1\ \mathit{LegendreP}\left(\frac{1}{2}\sqrt{1+4\lambda}-\frac{1}{2},a,x\right)+\_C2\ \mathit{LegendreQ}\left(\frac{1}{2}\sqrt{1+4\lambda}-\frac{1}{2},a,x\right)\right\}$$

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 = 2.95066 (sec), leaf count = 0 , DifferentialRoot result

$$\{\{y(x)\to \text{DifferentialRoot}(\{y,x\},\{\left(ax^4+bx^3-ax^2+cx^2-bx-k^2-c\right)y(x)+\left(2x^3-2x\right)y'(x)+(x$$

✓ **Maple** : cpu = 0.174 (sec), leaf count = 110

$$\left\{y(x) = \mathrm{e}^{\sqrt{-a}x}\left(\sqrt{2x-2}(1+x)^{-\frac{k}{2}}(x-1)^{\frac{k}{2}-\frac{1}{2}}\mathit{HeunC}\left(4\sqrt{-a},-k,k,2b,\frac{k^2}{2}+a-b+c,\frac{1}{2}+\frac{x}{2}\right)\_C2\ -\right.\right.$$

2.1373 ODE No. 1373

$$y''(x) = -\frac{y(x)\left(-a^2(x^2-1)^2 - m^2 - n(n+1)(x^2-1)\right)}{(x^2-1)^2} - \frac{2xy'(x)}{x^2-1}$$

✗ **Mathematica** : cpu = 1.73094 (sec), leaf count = 0 , DifferentialRoot result

$$\{\{y(x) \to \text{DifferentialRoot}(\{y,x\},\{(-a^2x^4 + 2a^2x^2 - n^2x^2 - nx^2 - a^2 - m^2 + n^2 + n)\, y(x) + (2x^3 - 2$$

✓ **Maple** : cpu = 0.127 (sec), leaf count = 84

$$\left\{y(x) = (x^2-1)^{\frac{m}{2}}\left(HeunC\left(0, \frac{1}{2}, m, -\frac{a^2}{4}, \frac{1}{4} + \frac{a^2}{4} + \frac{m^2}{4} - \frac{n^2}{4} - \frac{n}{4}, x^2\right)\_C2\, x + HeunC\left(0, -\frac{1}{2}, m, -\right.\right.$$

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 = 0.025258 (sec), leaf count = 32

$$\{\{y(x) \to c_1(x^2-1)^a P_v(x) + c_2(x^2-1)^a Q_v(x)\}\}$$

✓ **Maple** : cpu = 0.033 (sec), leaf count = 23

$$\{y(x) = (x^2-1)^a (LegendreQ(v,x)\_C2 + LegendreP(v,x)\_C1)\}$$

2.1375 ODE No. 1375

$$y''(x) = -\frac{y(x)\left(4ax^2(a-n) - (x^2-1)(2a + (v-n)(n+v+1))\right)}{(x^2-1)^2} - \frac{2x(-2a+n+1)y'(x)}{x^2-1}$$

✓ **Mathematica** : cpu = 0.0335379 (sec), leaf count = 54

$$\left\{\left\{y(x) \to c_1(x^2-1)^{\frac{1}{2}(2a-n)} P_v^n(x) + c_2(x^2-1)^{\frac{1}{2}(2a-n)} Q_v^n(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.039 (sec), leaf count = 29

$$\left\{y(x) = (x^2-1)^{a-\frac{n}{2}} (LegendreQ(v,n,x)\_C2 + LegendreP(v,n,x)\_C1)\right\}$$

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 = 0.0326371 (sec), leaf count = 69

$$\left\{\left\{y(x)\to c_1\cos\left(\frac{\sqrt{b}\tanh^{-1}\left(\frac{\sqrt{a+x^2}}{\sqrt{a}}\right)}{\sqrt{a}}\right)-c_2\sin\left(\frac{\sqrt{b}\tanh^{-1}\left(\frac{\sqrt{a+x^2}}{\sqrt{a}}\right)}{\sqrt{a}}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.026 (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

$$y''(x) = -\frac{b^2y(x)}{(a^2+x^2)^2}$$

✓ **Mathematica** : cpu = 0.178233 (sec), leaf count = 163

$$\left\{\left\{y(x)\to\frac{ic_2\sqrt{a^2+x^2}\left(1-\frac{ix}{a}\right)^{\sqrt{\frac{a^2+b^2}{a^2}}}\left(1+\frac{ix}{a}\right)^{-\sqrt{\frac{a^2+b^2}{a^2}}}e^{i\sqrt{\frac{a^2+b^2}{a^2}}\tan^{-1}\left(\frac{x}{a}\right)}}{2a\sqrt{\frac{a^2+b^2}{a^2}}}+c_1\sqrt{a^2+x^2}e^{i\sqrt{\frac{b^2}{a^2}+1}\tan^{-1}\left(\frac{x}{a}\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.084 (sec), leaf count = 83

$$\left\{y(x)=\sqrt{a^2+x^2}\left(\left(\frac{ix-a}{ix+a}\right)^{-\frac{1}{2\,a}\sqrt{a^2+b^2}}\_C2+\left(\frac{ix-a}{ix+a}\right)^{\frac{1}{2\,a}\sqrt{a^2+b^2}}\_C1\right)\right\}$$

2.1378 ODE No. 1378

$$y''(x) = -\frac{2(x^2-1)\,y'(x)}{(x-1)^2 x} - \frac{(-2x^2+2x+2)\,y(x)}{(x-1)^2 x^2}$$

✓ **Mathematica** : cpu = 0.0380964 (sec), leaf count = 65

$$\left\{\left\{y(x)\to \frac{c_1 x^2}{1-x} + \frac{c_2 x(2x^2\log(1-x) - 2x^2\log(x) + 2x - 2x\log(1-x) + 2x\log(x) - 1)}{(x-1)^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.03 (sec), leaf count = 48

$$\left\{y(x) = \frac{x}{(x-1)^2}\left(-\_C2\,x(x-1)\ln(x-1) + \_C2\,x(x-1)\ln(x) + \_C1\,x^2 + (-\_C1 - \_C2)\,x + \frac{}{}\right.$$

2.1379 ODE No. 1379

$$y''(x) = \frac{12y(x)}{(x+1)^2(x^2+2x+3)}$$

✓ **Mathematica** : cpu = 0.0528595 (sec), leaf count = 99

$$\left\{\left\{y(x)\to \frac{c_2\left(2x^3+4x^2-3\sqrt{2}x^2\tan^{-1}\left(\frac{x+1}{\sqrt{2}}\right)+8x-6\sqrt{2}x\tan^{-1}\left(\frac{x+1}{\sqrt{2}}\right)-9\sqrt{2}\tan^{-1}\left(\frac{x+1}{\sqrt{2}}\right)+2\right)}{2(x+1)^2} + c\right.\right.$$

✓ **Maple** : cpu = 0.043 (sec), leaf count = 59

$$\left\{y(x) = \frac{1}{(1+x)^2}\left(-3\_C2\,(x^2+2\,x+3)\arctan\left(1/2\,(1+x)\sqrt{2}\right) + \_C2\,(x^3+2\,x^2+4\,x+1)\sqrt{2} + \_\right.$$

2.1380 ODE No. 1380

$$y''(x) = -\frac{by(x)}{x^2(x-a)^2}$$

✓ **Mathematica** : cpu = 0.198875 (sec), leaf count = 132

$$\left\{\left\{y(x)\to \frac{c_2(x-a)^{\frac{1}{2}\sqrt{\frac{a^2-4b}{a^2}}+\frac{1}{2}}x^{\frac{1}{2}-\frac{1}{2}\sqrt{\frac{a^2-4b}{a^2}}}}{a\sqrt{\frac{a^2-4b}{a^2}}}+c_1(x-a)^{\frac{1}{2}-\frac{1}{2}\sqrt{1-\frac{4b}{a^2}}}x^{\frac{1}{2}\sqrt{1-\frac{4b}{a^2}}+\frac{1}{2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.056 (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 = 0.269888 (sec), leaf count = 589

$$\left\{\left\{y(x)\to -\frac{2cx^2(a-x)\left(1-\frac{x}{a}\right)^{-\frac{1}{2}\sqrt{\frac{a^2-4b}{a^2}}}\left(\sqrt{\frac{a^2-4b}{a^2}}\left(1-\frac{x}{a}\right)^{\sqrt{\frac{a^2-4b}{a^2}}}\ {}_2F_1\left(\frac{1}{2}\sqrt{1-\frac{4b}{a^2}}-\frac{1}{2},\frac{1}{2}\sqrt{1-\frac{4b}{a^2}}+\frac{3}{2};\frac{1}{2}\right.\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.126 (sec), leaf count = 175

$$\left\{y(x)=1\left(\left(\_C2\sqrt{a^2-4b}-\int\sqrt{x(a-x)}\left(\frac{a-x}{x}\right)^{-\frac{1}{2a}\sqrt{a^2-4b}}\mathrm{d}xc\right)\left(\frac{a-x}{x}\right)^{\frac{1}{2a}\sqrt{a^2-4b}}+\left(\frac{x}{a-x}\right)^{\frac{1}{2a}}\right.\right.$$

2.1382 ODE No. 1382

$$y''(x)=\frac{cy(x)}{(x-a)^2(x-b)^2}$$

✓ **Mathematica** : cpu = 0.467329 (sec), leaf count = 154

$$\left\{\left\{y(x)\to c_1(x-a)^{\frac{1}{2}\left(\sqrt{\frac{4c}{(a-b)^2}+1}+1\right)}(x-b)^{\frac{1}{2}\left(1-\sqrt{\frac{4c}{(a-b)^2}+1}\right)}-\frac{c_2(x-a)^{\frac{1}{2}-\frac{1}{2}\sqrt{\frac{4c}{(a-b)^2}+1}}(x-b)^{\frac{1}{2}\sqrt{\frac{4c}{(a-b)^2}+1}+\frac{1}{2}}}{(a-b)\sqrt{\frac{4c}{(a-b)^2}+1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.076 (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 = 0.0942452 (sec), leaf count = 50

$$\left\{\left\{y(x) \to c_1 e^{\alpha(\log(x-a)-\log(x-b))} + c_2 e^{\beta(\log(x-a)-\log(x-b))}\right\}\right\}$$

✓ **Maple** : cpu = 0.029 (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 = 0.0238864 (sec), leaf count = 110

$$\left\{\left\{y(x) \to c_1 M_{\frac{(a+3)b}{2\sqrt{a^2-1}}, \frac{\sqrt{b(b^2+1)}}{2\sqrt{b}}}\left(\sqrt{a^2-1}x\right) + c_2 W_{\frac{(a+3)b}{2\sqrt{a^2-1}}, \frac{\sqrt{b(b^2+1)}}{2\sqrt{b}}}\left(\sqrt{a^2-1}x\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.167 (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 = 0.0151598 (sec), leaf count = 78

$$\left\{\left\{y(x) \to c_1\sqrt{x^2+1}P_{\frac{1}{2}(\sqrt{1-a}-1)}^{\frac{1}{2}}(ix) + c_2\sqrt{x^2+1}Q_{\frac{1}{2}(\sqrt{1-a}-1)}^{\frac{1}{2}}(ix)\right\}\right\}$$

✓ **Maple** : cpu = 0.042 (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 = 0.0633781 (sec), leaf count = 108

$$\left\{\left\{y(x) \to \frac{c_1(x^2+x+1)}{(2x+1)^2} + \frac{c_2\left(16x^3+24x^2-12\sqrt{3}x^2\tan^{-1}\left(\frac{2x+1}{\sqrt{3}}\right)+30x-12\sqrt{3}x\tan^{-1}\left(\frac{2x+1}{\sqrt{3}}\right)-12\right.}{(2x+1)^2}\right.\right.$$

✓ **Maple** : cpu = 0.048 (sec), leaf count = 58

$$\left\{y(x) = \frac{1}{(2\,x+1)^2}\left(36\_C2\,(x^2+x+1)\arctan\left(1/3\,(2\,x+1)\sqrt{3}\right) - 16\_C2\left(x^3+x^2+\frac{11\,x}{8}+3/16\right)\right.\right.$$

2.1387 ODE No. 1387

$$y''(x) = \frac{3y(x)}{4\,(x^2+x+1)^2}$$

✓ **Mathematica** : cpu = 0.0276848 (sec), leaf count = 50

$$\left\{\left\{y(x) \to c_1\sqrt{x^2+x+1} + \frac{2c_2\sqrt{x^2+x+1}\tan^{-1}\left(\frac{2x+1}{\sqrt{3}}\right)}{\sqrt{3}}\right\}\right\}$$

✓ **Maple** : cpu = 0.018 (sec), leaf count = 28

$$\left\{y(x) = \sqrt{x^2+x+1}\left(\arctan\left(\frac{(2x+1)\sqrt{3}}{3}\right)\_C2 + \_C1\right)\right\}$$

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 = 0.226583 (sec), leaf count = 235

$$\left\{\left\{y(x) \to c_2(-1)^{\frac{1}{2}(-2v-3)+1}x^{\frac{1}{4}(-2v-3)+1}e^{\frac{1}{4}(-2\log(1-x)-\log(x))}(x-1)^{\frac{1}{2}\left(\frac{1}{2}(a+v+1)+\frac{1}{2}(a+v+2)+\frac{1}{2}(-2v-3)+1\right)}\,{}_2F_1\left(\frac{1}{2}(\right.\right.\right.$$

✓ **Maple** : cpu = 0.04 (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 = 0.27325 (sec), leaf count = 217

$$\left\{\left\{y(x) \to c_2(-1)^{\frac{1}{2}(-2v-3)+1}x^{\frac{1}{4}(-2v-3)+1}e^{\frac{1}{4}(-2\log(1-x)-\log(x))}(x-1)^{\frac{1}{2}\left(n+\frac{1}{2}(2n+1)+\frac{1}{2}(-2v-3)+v+2\right)}\,{}_2F_1\left(\frac{1}{2}(2n+1\right.\right.\right.$$

✓ **Maple** : cpu = 0.04 (sec), leaf count = 68

$$\left\{y(x) = (x-1)^{-n}\left(x^{-\frac{v}{2}}{}_2\mathrm{F}_1(-v-n,\frac{1}{2}-n;\ \frac{1}{2}-v;\ x)\_C1 + x^{\frac{1}{2}+\frac{v}{2}}{}_2\mathrm{F}_1(v-n+1,\frac{1}{2}-n;\ \frac{3}{2}+v;\ x)\_C2\right.\right.$$

2.1390 ODE No. 1390

$$y''(x) = -\frac{3y(x)}{16(x-1)^2x^2}$$

✓ **Mathematica** : cpu = 0.0256193 (sec), leaf count = 41

$$\left\{\left\{y(x)\to 2c_2\sqrt[4]{1-x}x^{3/4}+c_1(1-x)^{3/4}\sqrt[4]{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.023 (sec), leaf count = 25

$$\left\{y(x) = \_C1\, x^{\frac{3}{4}}\sqrt[4]{x-1} + \_C2\,\sqrt[4]{x}(x-1)^{\frac{3}{4}}\right\}$$

2.1391 ODE No. 1391

$$y''(x) = \frac{(7ax^2+5)\,y'(x)}{x\,(ax^2+1)} - \frac{(15ax^2+5)\,y(x)}{x^2\,(ax^2+1)}$$

✓ **Mathematica** : cpu = 0.0405212 (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 = 0.017 (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 = 62.053 (sec), leaf count = 1763961

Too large to display

✓ **Maple** : cpu = 0.125 (sec), leaf count = 561

$$\left\{y(x) = \left(-\frac{1}{2}+\frac{x}{2}\right)^{\frac{1}{4\,a}\left(2\,a+\sqrt{4\,a^2+(-4\,b-4\,c-4\,d-4\,e)a+b^2}\right)}\left(x^2-1\right)^{-\frac{b}{4\,a}}\left({}_2\mathrm{F}_1(-\frac{1}{4\,a}\left(-\sqrt{4\,a^2+(-4\,b-4\,c-4\right.\right.\right.$$

2.1393 ODE No. 1393

$$y''(x) = -\frac{y(x)\,(bx^2 + cx + d)}{a(x-1)^2x^2}$$

✓ **Mathematica** : cpu = 13.8347 (sec), leaf count = 413606

Too large to display

✓ **Maple** : cpu = 0.099 (sec), leaf count = 299

$$\left\{y(x) = \_C1\, x^{\frac{1}{2}(\sqrt{a-4\,d}+\sqrt{a})\frac{1}{\sqrt{a}}}(x-1)^{\frac{1}{2}(\sqrt{a}-\sqrt{a-4\,b-4\,c-4\,d})\frac{1}{\sqrt{a}}}\,{}_2\mathrm{F}_1(\frac{1}{2}\Big(-\sqrt{a-4\,b-4\,c-4\,d}+\sqrt{a}+\sqrt{a-4\right.$$

2.1394 ODE No. 1394

$$y''(x) = -\frac{cy(x)}{x^2(ax+b)^2} - \frac{2y'(x)}{x}$$

✓ **Mathematica** : cpu = 0.0331779 (sec), leaf count = 115

$$\left\{\left\{y(x) \to c_1 \exp\left(\frac{\sqrt{c}\left(-\frac{\sqrt{b^2-4c}}{\sqrt{c}} - \frac{b}{\sqrt{c}}\right)(\log(x) - \log(ax+b))}{2b}\right) + c_2 \exp\left(\frac{\sqrt{c}\left(\frac{\sqrt{b^2-4c}}{\sqrt{c}} - \frac{b}{\sqrt{c}}\right)(\log(x) -}{2b}\right.\right.\right.$$

✓ **Maple** : cpu = 0.067 (sec), leaf count = 79

$$\left\{y(x) = \sqrt{\frac{ax+b}{x}}\left(\left(\frac{x}{ax+b}\right)^{-\frac{a}{2\,b}\sqrt{\frac{b^2-4\,c}{a^2}}}\_C2 + \left(\frac{x}{ax+b}\right)^{\frac{a}{2\,b}\sqrt{\frac{b^2-4\,c}{a^2}}}\_C1\right)\right\}$$

2.1395 ODE No. 1395

$$y''(x) = -\frac{y(x)}{(ax+b)^4}$$

✓ **Mathematica** : cpu = 0.0570896 (sec), leaf count = 59

$$\left\{\left\{y(x) \to c_1 e^{\frac{i}{a(ax+b)}}(ax+b) - \frac{1}{2}ic_2 e^{-\frac{i}{a(ax+b)}}(ax+b)\right\}\right\}$$

✓ **Maple** : cpu = 0.04 (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 = 0.940832 (sec), leaf count = 211

$$\left\{\left\{y(x) \to \frac{c_2\sqrt{ax^2+bx+c}\exp\left(-\frac{\sqrt{4ac-b^2}\sqrt{1-\frac{4A}{b^2-4ac}}\tan^{-1}\left(\frac{2ax+b}{\sqrt{4ac-b^2}}\right)}{\sqrt{b^2-4ac}}\right)}{\sqrt{b^2-4ac}\sqrt{1-\frac{4A}{b^2-4ac}}} + c_1\sqrt{x(ax+b)+c}\exp\left(\frac{\sqrt{4ac-}}{}\right.\right.\right.$$

✓ **Maple** : cpu = 0.116 (sec), leaf count = 178

$$\left\{y(x) = \sqrt{ax^2+bx+c}\left(\left(1\left(i\sqrt{4\,ca-b^2}-2\,ax-b\right)\left(2\,ax+b+i\sqrt{4\,ca-b^2}\right)^{-1}\right)^{\frac{a}{2}\sqrt{\frac{-4\,ca+b^2-4\,A}{a^2}}\frac{1}{\sqrt{-4\,ca+b^2}}}\right.\right.$$

2.1397 ODE No. 1397

$$y''(x) = \frac{y(x)}{x^5} - \frac{y'(x)}{x^4}$$

✓ **Mathematica** : cpu = 0.0283605 (sec), leaf count = 38

$$\left\{\left\{y(x) \to \frac{c_2\Gamma\left(\frac{1}{3}, -\frac{1}{3x^3}\right)}{3^{2/3}\sqrt[3]{-\frac{1}{x^3}}} + c_1x\right\}\right\}$$

✓ **Maple** : cpu = 0.066 (sec), leaf count = 27

$$\left\{y(x) = x\left(-\sqrt{3}\Gamma\left(\frac{2}{3}\right)\Gamma\left(\frac{1}{3}, -\frac{1}{3\,x^3}\right)\_C2 + 2\,\pi\,\_C2 + \_C1\right)\right\}$$

2.1398 ODE No. 1398

$$y''(x) = -\frac{(-(2v+1)^2 + x^2 - 1)\, y(x)}{(x^2-1)^2} - \frac{(3x^2-1)\, y'(x)}{x\,(x^2-1)}$$

✗ **Mathematica** : cpu = 1.15923 (sec), leaf count = 0 , DifferentialRoot result

$$\{\{y(x) \to \text{DifferentialRoot}(\{y,x\}, \{x(x^2-4v^2-4v-2)\, y(x) + (3x^4-4x^2+1)\, y'(x) + (x^5-2x^3+x)$$

✓ **Maple** : cpu = 0.111 (sec), leaf count = 69

$$\left\{y(x) = \_C1\, (x^2-1)^{-\frac{1}{2}-v}\, {}_2F_1(-v,-v;\, -2\,v;\, -x^2+1) + \_C2\, (x^2-1)^{v+\frac{1}{2}}\, {}_2F_1(v+1,v+1;\, 2\,v+2;\, -$$

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 = 0.0363696 (sec), leaf count = 72

$$\left\{\left\{y(x) \to c_1 e^{\frac{1}{2}(3\log(1-x)+\log(3x+5))} + \frac{1}{2} c_2 e^{\frac{1}{2}(3\log(1-x)+\log(3x+5))}(3\log(1-x)+\log(3x+5))\right\}\right\}$$

✓ **Maple** : cpu = 0.04 (sec), leaf count = 34

$$\left\{y(x) = (x-1)^{\frac{3}{2}} \sqrt{3\,x+5}(\_C2\, \ln(3\,x+5) + 3\,\_C2\, \ln(x-1) + \_C1)\right\}$$

2.1400 ODE No. 1400

$$y''(x) = \frac{y'(x)}{x} - \frac{ay(x)}{x^6}$$

✓ **Mathematica** : cpu = 0.0589265 (sec), leaf count = 60

$$\left\{\left\{y(x) \to c_1 x^2 e^{\frac{i\sqrt{a}}{2x^2}} - \frac{ic_2 x^2 e^{-\frac{i\sqrt{a}}{2x^2}}}{2\sqrt{a}}\right\}\right\}$$

✓ **Maple** : cpu = 0.029 (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 = 0.009739 (sec), leaf count = 93

$$\left\{\left\{y(x)\to c_1 e^{-\frac{\sqrt{b}\left(-\frac{\sqrt{a^2-4b}}{\sqrt{b}}-\frac{a}{\sqrt{b}}\right)}{4x^2}} + c_2 e^{-\frac{\sqrt{b}\left(\frac{\sqrt{a^2-4b}}{\sqrt{b}}-\frac{a}{\sqrt{b}}\right)}{4x^2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.032 (sec), leaf count = 45

$$\left\{y(x) = \_C1\,\mathrm{e}^{-\frac{1}{4x^2}\left(-a+\sqrt{a^2-4b}\right)} + \_C2\,\mathrm{e}^{\frac{1}{4x^2}\left(a+\sqrt{a^2-4b}\right)}\right\}$$

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 = 3.74061 (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 = 0.166 (sec), leaf count = 58

$$\left\{y(x) = (x^2-1)^a\,(x^2-1)\left(\_C2\,x^{-v}\,\mathit{HeunC}\left(0,-v,1,\frac{1}{4},\frac{a}{2}+\frac{1}{4},x^2\right) + \_C1\,x^{v}\,\mathit{HeunC}\left(0,v,1,\frac{1}{4},\frac{a}{2}+\frac{1}{4}\right.\right.$$

2.1403 ODE No. 1403

$$y''(x) = -y'(x)\left(\frac{-\mathrm{a1}-\mathrm{b1}+1}{x-\mathrm{c1}} + \frac{-\mathrm{a2}-\mathrm{b2}+1}{x-\mathrm{c2}} + \frac{-\mathrm{a3}-\mathrm{b3}+1}{x-\mathrm{c3}}\right) - \frac{y(x)\left(\frac{\mathrm{a1b1(c1-c2)(c1-c3)}}{x-\mathrm{c1}} + \frac{\mathrm{a2b2(c2-c1)(c}}{x-\mathrm{c2}}\right.}{(x-\mathrm{c1})(x-\mathrm{c2})(}$$

✗ **Mathematica** : cpu = 64.4706 (sec), leaf count = 0 , DifferentialRoot result

$$\{\{y(x)\to \text{DifferentialRoot}(\{y,x\},\{(\mathrm{c1}-x)^2(\mathrm{c2}-x)^2y''(x)(\mathrm{c3}-x)^2+(\mathrm{c1}-x)(\mathrm{c2}-x)\left(\mathrm{a1}x^2+\mathrm{a2}x^2+\right.$$

✓ **Maple** : cpu = 0.52 (sec), leaf count = 298

$$\left\{y(x) = (x - c2)^{a2} (x - c3)^{b3} \left((x - c1)^{b1}\, HeunG\left(\frac{c1 - c3}{c1 - c2}, \frac{((-2\, a1 - a3 - b2 + 2)\, c1 + (a1 + a3 -\right.\right.\right.$$

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 = 0.0167071 (sec), leaf count = 33

$$\left\{\left\{y(x) \to \frac{c_1 e^{\frac{1}{4x^2}}}{x} + c_2 e^{\frac{1}{4x^2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.027 (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 = 0.0511717 (sec), leaf count = 77

$$\left\{\left\{y(x) \to c_1 e^{-\frac{1}{4x^2}} x^{\frac{3}{2} - \frac{\sqrt{9-a}}{2}} + \frac{c_2 e^{-\frac{1}{4x^2}} x^{\frac{\sqrt{9-a}}{2} + \frac{3}{2}}}{\sqrt{9 - a}}\right\}\right\}$$

✓ **Maple** : cpu = 0.041 (sec), leaf count = 42

$$\left\{y(x) = \mathrm{e}^{-\frac{1}{4\, x^2}} \left(x^{\frac{3}{2} - \frac{1}{2}\sqrt{-a+9}}\, \_C2 + x^{\frac{3}{2} + \frac{1}{2}\sqrt{-a+9}}\, \_C1\right)\right\}$$

2.1406 ODE No. 1406

$$y''(x) = -\frac{27xy(x)}{16\left(x^3-1\right)^2}$$

✓ **Mathematica** : cpu = 2.06959 (sec), leaf count = 258

$$\left\{\left\{y(x)\to\frac{\sqrt{2}c_2(1-x)^{3/4}\sqrt[4]{x^2+x+1}\int_1^x\frac{\sqrt{\sqrt{3}K[1]+\sqrt{2K[1]-i\sqrt{3}+1}\sqrt{2K[1]+i\sqrt{3}+1}+\sqrt{3}}}{2(1-K[1])^{3/2}\sqrt{K[1]^2+K[1]+1}}dK[1]}{\sqrt[4]{\sqrt{3}x+\sqrt{2x-i\sqrt{3}+1}\sqrt{2x+i\sqrt{3}+1}+\sqrt{3}}}+\frac{\sqrt{2}c_1}{\sqrt[4]{\sqrt{3}x+\sqrt{2x}}}\right.\right.$$

✓ **Maple** : cpu = 0.112 (sec), leaf count = 44

$$\left\{y(x)=\sqrt{x}\sqrt[4]{x^3-1}\left(LegendreQ\left(-\frac{1}{6},\frac{1}{3},\sqrt{-x^3+1}\right)\_C2+LegendreP\left(-\frac{1}{6},\frac{1}{3},\sqrt{-x^3+1}\right)\_C1\right)\right\}$$

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 = 280.612 (sec), leaf count = 0 , DifferentialRoot result

$$\{\{y(x)\to\mathrm{DifferentialRoot}(\{y,x\},\{(\mathrm{a1}-x\mathrm{b1})^2(\mathrm{a2}-x\mathrm{b2})^2y''(x)(\mathrm{a3}-x\mathrm{b3})^2+(\mathrm{a1}-x\mathrm{b1})(\mathrm{a2}-x\mathrm{b2})\,(\mathrm{a}$$

✓ **Maple** : cpu = 1.261 (sec), leaf count = 2603

$$\left\{y(x)=(b2\,x-a2)^{\frac{al2}{2}+\frac{bl2}{2}+\frac{1}{2}\sqrt{al2^2+6\,al2\,bl2+bl2^2}}\,(b3\,x-a3)^{\frac{1}{2}\left((al3+bl3)\sqrt{al1^2+(2\,al2+2\,al3+2\,bl1+2\,bl2+2\,bl3-4)\,al1+}\right.}\right.$$

2.1408 ODE No. 1408

$$y''(x) = -\frac{y(x)\left(Ax^2+B\right)}{x\left(x^2-\mathrm{a1}\right)\left(x^2-\mathrm{a2}\right)\left(x^2-\mathrm{a3}\right)} - \frac{y'(x)\left(x^2\left(\left(x^2-\mathrm{a1}\right)\left(x^2-\mathrm{a2}\right)+\left(x^2-\mathrm{a1}\right)\left(x^2-\mathrm{a3}\right)+\left(x^2-\mathrm{a2}\right.\right.\right.}{x\left(x^2-\mathrm{a1}\right)\left(x^2-\mathrm{a2}\right)\left(x^2\right.}$$

✗ **Mathematica** : cpu = 49.2965 (sec), leaf count = 0 , DifferentialRoot result

$$\left\{\left\{y(x)\to \text{DifferentialRoot}\left(\{y,x\},\left\{\left(Ax^2+B\right)y(x)+\left(2x^6-\mathrm{a1}x^4-\mathrm{a2}x^4-\mathrm{a3}x^4+\mathrm{a1a2a3}\right)y'(x)-x(\right.\right.\right.\right.$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x)=DESol\left(\left\{\frac{\mathrm{d}^2}{\mathrm{d}x^2}\_Y(x)+\frac{\left(x^2\left(\left(x^2-a1\right)\left(x^2-a2\right)+\left(x^2-a2\right)\left(x^2-a3\right)+\left(x^2-a3\right)\left(x^2-a1\right)\right)\right.}{\left(x^2-a1\right)\left(x^2-a2\right)x\left(x^2-a\right.}\right.\right.\right.$$

2.1409 ODE No. 1409

$$y''(x) = -b^2x^{-2a}y(x) - \frac{ay'(x)}{x}$$

✓ **Mathematica** : cpu = 0.0187334 (sec), leaf count = 43

$$\left\{\left\{y(x)\to c_1\cos\left(\frac{bx^{1-a}}{a-1}\right)-c_2\sin\left(\frac{bx^{1-a}}{a-1}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.012 (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 = 0.0934959 (sec), leaf count = 481

$$\left\{\left\{y(x)\to c_1 i^{\frac{-\sqrt{q^2+2q+4s+1}+q+1}{b}}a^{\frac{-\sqrt{q^2+2q+4s+1}+q+1}{2b}}\left(x^b\right)^{\frac{-\sqrt{q^2+2q+4s+1}+q+1}{2b}}\,{}_2F_1\left(\frac{p}{2b}+\frac{q}{2b}-\frac{\sqrt{p^2-2p-4r+1}}{2b}-\right.\right.\right.$$

✓ **Maple** : cpu = 0.159 (sec), leaf count = 253

$$\left\{y(x)=\_C1\,{}_2\mathrm{F}_1\left(\frac{1}{2b}\left(p+q+\sqrt{q^2+2q+4s+1}-\sqrt{p^2-2p-4r+1}\right),\frac{1}{2b}\left(p+q+\sqrt{q^2+2q+4s\right.\right.\right.$$

2.1411 ODE No. 1411

$$y''(x) = \frac{y(x)}{e^x + 1}$$

✓ **Mathematica** : cpu = 0.271635 (sec), leaf count = 42

$$\left\{\left\{y(x) \to c_1\left(e^{-x}+1\right) + c_2 e^{-x}\left(e^x \log\left(e^x+1\right) + \log\left(e^x+1\right) + 1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.013 (sec), leaf count = 27

$$\left\{y(x) = \frac{\_C1\ (e^x+1)\ln(e^x+1) + \_C2\ e^x + \_C1 + \_C2}{e^x}\right\}$$

2.1412 ODE No. 1412

$$y''(x) = \frac{y'(x)}{x\log(x)} + y(x)\log^2(x)$$

✓ **Mathematica** : cpu = 0.0111821 (sec), leaf count = 29

$$\{\{y(x) \to c_1 \cosh(x(\log(x)-1)) + ic_2 \sinh(x(\log(x)-1))\}\}$$

✓ **Maple** : cpu = 0.007 (sec), leaf count = 23

$$\{y(x) = \_C1\ \sinh(x(\ln(x)-1)) + \_C2\ \cosh(x(\ln(x)-1))\}$$

2.1413 ODE No. 1413

$$y''(x) = \frac{y'(x)}{x(\log(x)-1)} - \frac{y(x)}{x^2(\log(x)-1)}$$

✓ **Mathematica** : cpu = 0.0457763 (sec), leaf count = 16

$$\{\{y(x) \to c_1 x - c_2 \log(x)\}\}$$

✓ **Maple** : cpu = 0.036 (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 = 0.781015 (sec), leaf count = 231

$$\left\{\left\{y(x) \to \frac{c_2(-1)^{\frac{1}{2}(-2n-1)+1}\tanh^2(x)^{\frac{1}{4}(-2n-1)+1}\left(\tanh^2(x)-1\right)^{\frac{1}{2}\left(\frac{a+n}{2}+\frac{1}{2}(a+n+1)+\frac{1}{2}(-2n-1)+1\right)-\frac{1}{2}}\ {}_2F_1\left(\frac{1}{2}(-2n\right.}{\sqrt{\tanh(x)}}\right.\right.$$

✓ **Maple** : cpu = 0.18 (sec), leaf count = 97

$$\left\{y(x) = \_C1\ (\sinh(x))^n\ {}_2\mathrm{F}_1(-\frac{a}{2}+\frac{n}{2}, \frac{a}{2}+\frac{n}{2}; \frac{1}{2}; \frac{\cosh(2x)}{2}+\frac{1}{2}) + \_C2\ (\sinh(x))^n\ (2\cosh(2x)+2)^{\frac{3}{4}}\ {}_2\right.$$

2.1415 ODE No. 1415

$$y''(x) = -\left(n^2-a^2\right)y(x) - 2n\coth(x)y'(x)$$

✓ **Mathematica** : cpu = 0.671113 (sec), leaf count = 273

$$\left\{\left\{y(x) \to \frac{c_2(-1)^{\frac{1}{2}(-2n-1)+1}\tanh^2(x)^{\frac{1}{4}(-2n-1)+1}\left(\tanh^2(x)-1\right)^{\frac{1}{2}\left(\frac{a+n}{2}+\frac{1}{2}(a+n+1)+\frac{1}{2}(-2n-1)+1\right)}\ {}_2F_1\left(\frac{1}{2}(-2n-\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.095 (sec), leaf count = 36

$$\left\{y(x) = (\sinh(x))^{\frac{1}{2}-n}\left(\mathit{LegendreP}\left(-\frac{1}{2}+a, n-\frac{1}{2}, \cosh(x)\right)\_C1 + \mathit{LegendreQ}\left(-\frac{1}{2}+a, n-\frac{1}{2}, \cosh(\right.\right.\right.$$

2.1416 ODE No. 1416

$$y''(x) = -(v-n)(n+v+1)y(x) - (2n+1)\cot(x)y'(x)$$

✓ **Mathematica** : cpu = 0.151611 (sec), leaf count = 46

$$\left\{\left\{y(x) \to c_1\left(\cos^2(x)-1\right)^{-n/2}P_v^n(\cos(x)) + c_2\left(\cos^2(x)-1\right)^{-n/2}Q_v^n(\cos(x))\right\}\right\}$$

✓ **Maple** : cpu = 0.128 (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 = 0.123742 (sec), leaf count = 52

$$\left\{\left\{y(x) \to c_1 e^{\frac{\cos(x)}{2}} \cos\left(\frac{1}{2}\sqrt{3}\cos(x)\right) + c_2 e^{\frac{\cos(x)}{2}} \sin\left(\frac{1}{2}\sqrt{3}\cos(x)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.098 (sec), leaf count = 31

$$\left\{y(x) = e^{\frac{\cos(x)}{2}}\left(\sin\left(\frac{\sqrt{3}\cos(x)}{2}\right)\_C1 + \cos\left(\frac{\sqrt{3}\cos(x)}{2}\right)\_C2\right)\right\}$$

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 = 0.120646 (sec), leaf count = 15

$$\{\{y(x) \to c_1 x + c_2 \sin(x)\}\}$$

✓ **Maple** : cpu = 2.694 (sec), leaf count = 59

$$\left\{y(x) = \sin(x)\left(\int e^{\int \frac{-2(\cos(x))^3 x + 3(\cos(x))^2 \sin(x) - \sin(x)}{\cos(x)(\cos(x)x - \sin(x))\sin(x)}\,dx} \cos(x)\,dx\_C2 + \_C1\right)\right\}$$

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 = 0.955153 (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 = 0.142 (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 = 0.328498 (sec), leaf count = 134

$$\left\{\left\{y(x) \to c_1 i^{1-n}\cos^{1-n}(x)\,{}_2F_1\left(-\frac{n}{2} - \frac{i\sqrt{a}}{2} + \frac{1}{2}, -\frac{n}{2} + \frac{i\sqrt{a}}{2} + \frac{1}{2}; \frac{3}{2} - n; \cos^2(x)\right) + c_2 i^n \cos^n(x)\,{}_2F_1\left(\frac{n}{2}\right.\right.\right.$$

✓ **Maple** : cpu = 0.221 (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 = 0.14984 (sec), leaf count = 81

$$\left\{\left\{y(x) \to c_1 e^{-iax}\cos^{n-1}(ax) - \frac{ic_2 e^{2iax}\left(\frac{1}{2}e^{-iax} + \frac{1}{2}e^{iax}\right)^n}{a\left(1 + e^{2iax}\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.05 (sec), leaf count = 27

$$\left\{y(x) = \_C1\ (\cos(ax))^n + \_C2\ (\cos(ax))^{n-1}\sin(ax)\right\}$$

2.1422 ODE No. 1422

$$y''(x) = 2y(x)\csc^2(x)$$

✓ **Mathematica** : cpu = 0.0769243 (sec), leaf count = 58

$$\left\{\left\{y(x) \to \frac{c_1\cos(x)}{\sqrt{\cos^2(x) - 1}} + \frac{c_2\left(\cos(x)\left(-\sin^{-1}(\cos(x))\right) - \sqrt{1 - \cos^2(x)}\right)}{\sqrt{1 - \cos^2(x)}}\right\}\right\}$$

✓ **Maple** : cpu = 0.155 (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 = 0.0552478 (sec), leaf count = 70

$$\left\{\left\{y(x)\to c_1\sqrt[4]{\cos^2(x)-1}P_{-\frac{1}{2}}^{\frac{1}{2}\sqrt{1-4a}}(\cos(x))+c_2\sqrt[4]{\cos^2(x)-1}Q_{-\frac{1}{2}}^{\frac{1}{2}\sqrt{1-4a}}(\cos(x))\right\}\right\}$$

✓ **Maple** : cpu = 0.183 (sec), leaf count = 132

$$\left\{y(x)=1\sqrt{-2\cos(2x)+2}\sqrt[4]{2\cos(2x)+2}\left(\frac{\cos(2x)}{2}-\frac{1}{2}\right)^{\frac{1}{4}\sqrt{1-4a}}\left({}_2\mathrm{F}_1(\frac{1}{4}\sqrt{1-4a}+\frac{3}{4},\frac{1}{4}\sqrt{1-4a}+\right.\right.$$

2.1424 ODE No. 1424

$$\sin^2(x)y''(x)-y(x)\left(a\sin^2(x)+(n-1)n\right)=0$$

✓ **Mathematica** : cpu = 0.127731 (sec), leaf count = 90

$$\left\{\left\{y(x)\to c_1\sqrt[4]{\cos^2(x)-1}P_{\frac{1}{2}i(2\sqrt{a}+i)}^{\frac{1}{2}(2n-1)}(\cos(x))+c_2\sqrt[4]{\cos^2(x)-1}Q_{\frac{1}{2}i(2\sqrt{a}+i)}^{\frac{1}{2}(2n-1)}(\cos(x))\right\}\right\}$$

✓ **Maple** : cpu = 0.183 (sec), leaf count = 120

$$\left\{y(x)=1\left(\frac{\cos(2x)}{2}-\frac{1}{2}\right)^{\frac{n}{2}}\left(\sqrt[4]{-2\cos(2x)+2}(2\cos(2x)+2)^{\frac{3}{4}}{}_2\mathrm{F}_1(\frac{1}{2}+\frac{i}{2}\sqrt{a}+\frac{n}{2},\frac{1}{2}-\frac{i}{2}\sqrt{a}+\frac{n}{2};\frac{3}{2};\right.\right.$$

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 = 1.25375 (sec), leaf count = 385

$$\left\{\left\{y(x)\to\frac{(2a+1)c_2(-2a(\cos(x)-1)+\cos(x)-1)(-2a\cos}{(1-2a)^2a(\cos(x)+1)\left((3-2a)^2\left(-F_1\left(2a+1;a-\frac{1}{2},a+\frac{1}{2};2a+2;\frac{3-2a}{-2a\cos(x)+\cos(x)+2},\frac{}{-2a\cos}\right.\right.\right.}\right.\right.$$

✓ **Maple** : cpu = 0.303 (sec), leaf count = 93

$$\left\{y(x)=1\left(\_C2\,{}_2\mathrm{F}_1(-\frac{1}{2}+a,-a-\frac{1}{2};-a+\frac{3}{2};\frac{\cos(x)}{2}+\frac{1}{2})(\cos(x)+1)^{-\frac{1}{4}-\frac{a}{2}}\sqrt{2\cos(x)+2}(-\cos(x)\right.\right.$$

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 = 4.24952 (sec), leaf count = 4128

$$\left\{\left\{y(x) \to \frac{c_1(\cos(x)+1)^{\frac{1}{2}\left(-\frac{8a^2}{-16a^2+48a-36}+\frac{24a}{-16a^2+48a-36}+a-\frac{-32a^2+96a+\sqrt{\left(32a^2-96a+72\right)^2-4\left(-16a^2+48a-36\right)\left(16a^4+16ba^2-88a\right.}}{2\left(-16a^2+48a-36\right)}\right.}}{}\right.\right.$$

✓ **Maple** : cpu = 0.37 (sec), leaf count = 549

$$\left\{y(x) = 1\left(\frac{\cos(x)}{2} - \frac{1}{2}\right)^{\frac{1}{8a-12}\left(4a-6+\sqrt{4b^2+16(a-3/2)^2b+16a^4-72a^2+81}\right)}\left({}_2\mathrm{F}_1\left(\frac{1}{8a-12}\left(8a^2+\sqrt{4b^2+16(a\right.\right.\right.\right.$$

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 = 200.739 (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 = 1.004 (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 = 0.277973 (sec), leaf count = 104

$$\left\{\left\{y(x) \to c_1 \sqrt[4]{\cos^2(x) - 1} P_{\frac{1}{2}(2\sqrt{b-a}-1)}^{\frac{1}{2}\sqrt{-4a-4c+1}}(\cos(x)) + c_2 \sqrt[4]{\cos^2(x) - 1} Q_{\frac{1}{2}(2\sqrt{b-a}-1)}^{\frac{1}{2}\sqrt{-4a-4c+1}}(\cos(x))\right\}\right\}$$

✓ **Maple** : cpu = 0.202 (sec), leaf count = 183

$$\left\{y(x) = 1\sqrt{-2\cos(2x) + 2}\sqrt[4]{2\cos(2x) + 2}\left(\frac{\cos(2x)}{2} - \frac{1}{2}\right)^{\frac{1}{4}\sqrt{-4a+1-4c}}\left({}_2\mathrm{F}_1(\frac{1}{4}\sqrt{-4a+1-4c} + \frac{1}{2}\sqrt{\right.\right.$$

2.1429 ODE No. 1429

$$y''(x) = y(x)\csc^2(x) - \cot(x)y'(x)$$

✓ **Mathematica** : cpu = 0.0399909 (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 = 0.024 (sec), leaf count = 25

$$\left\{y(x) = \frac{\sin(x)\_C1}{\cos(x) - 1} + \frac{(\cos(x) - 1)\_C2}{\sin(x)}\right\}$$

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 = 0.312992 (sec), leaf count = 22

$$\{\{y(x) \to c_1 P_v^n(\cos(x)) + c_2 Q_v^n(\cos(x))\}\}$$

✓ **Maple** : cpu = 0.23 (sec), leaf count = 101

$$\left\{y(x) = 1\left(\frac{\cos(2x)}{2} - \frac{1}{2}\right)^{\frac{n}{2}}\left({}_2\mathrm{F}_1(1 + \frac{v}{2} + \frac{n}{2}, \frac{1}{2} - \frac{v}{2} + \frac{n}{2}; \frac{3}{2}; \frac{\cos(2x)}{2} + \frac{1}{2})\sin(2x)\_C1 + {}_2\mathrm{F}_1(-\frac{v}{2} + \frac{n}{2}\right.\right.$$

2.1431 ODE No. 1431

$$y''(x) = \cot(2x)y'(x) - 2y(x)$$

✓ **Mathematica** : cpu = 0.151661 (sec), leaf count = 80

$$\left\{\left\{y(x) \to c_1\left(\cos^2(x) - \frac{1}{2}\right) - \frac{2}{3}c_2\cos^{\frac{3}{2}}(x)\left(2\cos^2(x)\,{}_2F_1\left(\frac{1}{4},\frac{3}{4};\frac{7}{4};\cos^2(x)\right) - {}_2F_1\left(\frac{1}{4},\frac{3}{4};\frac{7}{4};\cos^2(x)\right) +\right.\right.\right.$$

✓ **Maple** : cpu = 0.155 (sec), leaf count = 30

$$\left\{y(x) = (\sin(2x))^{\frac{3}{4}}\left(LegendreQ\left(\frac{1}{4},\frac{3}{4},\cos(2x)\right)\_C2 + LegendreP\left(\frac{1}{4},\frac{3}{4},\cos(2x)\right)\_C1\right)\right\}$$

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 = 0.0632961 (sec), leaf count = 37

$$\left\{\left\{y(x) \to \frac{c_1 e^{-2x}}{\sqrt{\sin(x)}} + \frac{c_2 e^{2x}}{4\sqrt{\sin(x)}}\right\}\right\}$$

✓ **Maple** : cpu = 0.026 (sec), leaf count = 22

$$\left\{y(x) = (\_C1\ \sinh(2x) + \_C2\ \cosh(2x))\frac{1}{\sqrt{\sin(x)}}\right\}$$

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 = 0.138866 (sec), leaf count = 46

$$\left\{\left\{y(x) \to \frac{1}{5}c_2x^3\sqrt{\cos(x)} + \frac{c_1\sqrt{\cos(x)}}{x^2} - \frac{1}{4}x^2\sqrt{\cos(x)}\right\}\right\}$$

✓ **Maple** : cpu = 0.069 (sec), leaf count = 28

$$\left\{y(x) = \frac{4x^5\_C1 - x^4 + 4\_C2}{4x^2}\sqrt{\cos(x)}\right\}$$

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 = 70.893 (sec), leaf count = 1596424

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✓ **Maple** : cpu = 0.405 (sec), leaf count = 517

$$\left\{y(x) = (\sin(x))^{-\frac{a+b}{2a}}\left(\frac{\cos(x)}{2} - \frac{1}{2}\right)^{\frac{1}{4a}\left(2a+\sqrt{a^2+(-2b-4c-4d-4e)a+b^2}\right)}\left({}_2F_1(-\frac{1}{4a}\left(2i\sqrt{4ca-b^2} + \sqrt{a^2+\right.\right.\right.$$

2.1435 ODE No. 1435

$$y''(x) = -4y(x)\sin(3x)\csc^3(x)$$

✓ **Mathematica** : cpu = 0.104257 (sec), leaf count = 70

$$\left\{\left\{y(x) \to c_1\sqrt[4]{\cos^2(x)-1}P_{-\frac{1}{2}+4i}^{\frac{i\sqrt{47}}{2}}(\cos(x)) + c_2\sqrt[4]{\cos^2(x)-1}Q_{-\frac{1}{2}+4i}^{\frac{i\sqrt{47}}{2}}(\cos(x))\right\}\right\}$$

✓ **Maple** : cpu = 0.092 (sec), leaf count = 38

$$\left\{y(x) = \sqrt{\sin(x)}\left(LegendreQ\left(-\frac{1}{2}+4i, \frac{i}{2}\sqrt{47}, \cos(x)\right)\_C2 + LegendreP\left(-\frac{1}{2}+4i, \frac{i}{2}\sqrt{47}, \cos(x)\right)\_\right.\right.$$

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 = 0.3637 (sec), leaf count = 42

$$\left\{\left\{y(x) \to c_1\sqrt[4]{\cos^2(x)-1}P_v^n(\cos(x)) + c_2\sqrt[4]{\cos^2(x)-1}Q_v^n(\cos(x))\right\}\right\}$$

✓ **Maple** : cpu = 0.174 (sec), leaf count = 113

$$\left\{y(x) = 1\sqrt{-2\cos(2x)+2}\sqrt[4]{2\cos(2x)+2}\left(\frac{\cos(2x)}{2} - \frac{1}{2}\right)^{\frac{n}{2}}\left(\sqrt{2\cos(2x)+2}{}_2F_1(1+\frac{v}{2}+\frac{n}{2}, \frac{1}{2}-\frac{v}{2}\right.\right.$$

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 = 0.199781 (sec), leaf count = 42

$$\left\{\left\{y(x)\to c_2\cos^{\frac{1}{2}\left(\sqrt{13}-3\right)}(x)+c_1\cos^{\frac{1}{2}\left(-3-\sqrt{13}\right)}(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.112 (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 = 0.635893 (sec), leaf count = 615

$$\left\{\left\{y(x)\to \frac{c_2(-1)^{\frac{1}{2}(-2m-1)+1}\cos^2(x)^{\frac{1}{4}(-2m-1)+1}\left(\cos^2(x)-1\right)^{\frac{1}{2}\left(\frac{4am+4\sqrt{-a}n^2+4an-4\sqrt{-a}n+4(-a)^{3/2}+8\sqrt{-a}a+\sqrt{-a}+4mn}{8a+8n^2-8n+2}\right.}}{}\right.\right.$$

✓ **Maple** : cpu = 0.131 (sec), leaf count = 102

$$\left\{y(x) = (\sin(x))^n\left((\cos(x))^{-m+1}\,{}_2F_1\left(\frac{n}{2}-\frac{m}{2}+\frac{i}{2}\sqrt{a}+\frac{1}{2},\frac{n}{2}-\frac{m}{2}-\frac{i}{2}\sqrt{a}+\frac{1}{2};\frac{3}{2}-m;(\cos(x))^2\right)\_C2\right.\right.$$

2.1439 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 = 0.644057 (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 = 0.677969 (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 = 1.20813 (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 = 0.0522746 (sec), leaf count = 46

$$\left\{\left\{y(x) \to c_2 x \int_1^x \frac{\exp\left(-\int_1^{K[2]} \frac{K[1]}{f(K[1])} dK[1]\right)}{K[2]^2} dK[2] + c_1 x\right\}\right\}$$

✓ **Maple** : cpu = 0.039 (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 = 0.280083 (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

$$\left\{y(x) = DESol\left(\left\{\frac{g(x)\_Y(x)}{f(x)} + \frac{\left(\frac{d}{dx}f(x)\right)\frac{d}{dx}\_Y(x)}{2\,f(x)} + \frac{d^2}{dx^2}\_Y(x)\right\}, \{\_Y(x)\}\right)\right\}$$

2.1444 ODE No. 1444

$$y''(x) = -by(x)f(x)^{2a} - \frac{af'(x)y'(x)}{f(x)}$$

✗ **Mathematica** : cpu = 1.08393 (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 = 0.016 (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 = 1.04693 (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 = 0.133 (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 = 0.0276999 (sec), leaf count = 33

$$\left\{\left\{y(x) \to c_1 e^{-1/x} - c_2 e^{-1/x}\mathrm{Ei}\left(\frac{2}{x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.03 (sec), leaf count = 22

$$\left\{y(x) = \mathrm{e}^{-x^{-1}}\left(Ei\left(1, -2\,x^{-1}\right)\_C2 + \_C1\right)\right\}$$

2.1447 ODE No. 1447

$$y''(x) = -\frac{(-x-1)y(x)}{x^4} - \frac{y'(x)}{x}$$

✓ **Mathematica** : cpu = 0.0270002 (sec), leaf count = 29

$$\left\{\left\{y(x) \to c_1 e^{\frac{1}{x}} - c_2 e^{\frac{1}{x}}\mathrm{Ei}\left(-\frac{2}{x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.027 (sec), leaf count = 20

$$\left\{y(x) = \mathrm{e}^{x^{-1}}\left(Ei\left(1, 2\,x^{-1}\right)\_C2 + \_C1\right)\right\}$$

2.1448 ODE No. 1448

$$y''(x) = -\frac{b^2 y(x)}{(x^2 - a^2)^2}$$

✓ **Mathematica** : cpu = 0.210899 (sec), leaf count = 149

$$\left\{\left\{y(x) \to c_1 (x-a)^{\frac{1}{2}\sqrt{1-\frac{b^2}{a^2}}+\frac{1}{2}} (a+x)^{\frac{1}{2}-\frac{1}{2}\sqrt{1-\frac{b^2}{a^2}}} - \frac{c_2 (x-a)^{\frac{1}{2}-\frac{1}{2}\sqrt{\frac{a^2-b^2}{a^2}}} (a+x)^{\frac{1}{2}\sqrt{\frac{a^2-b^2}{a^2}}+\frac{1}{2}}}{2a\sqrt{\frac{a^2-b^2}{a^2}}}\right\}\right\}$$

✓ **Maple** : cpu = 0.065 (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 = 0.005375 (sec), leaf count = 53

$$\left\{\left\{y(x) \to c_1 e^{(-1)^{2/3}\sqrt[3]{\lambda} x} + c_2 e^{-\sqrt[3]{-1}\sqrt[3]{\lambda} x} + c_3 e^{\sqrt[3]{\lambda} x}\right\}\right\}$$

✓ **Maple** : cpu = 0.013 (sec), leaf count = 47

$$\left\{y(x) = \_C1\, \mathrm{e}^{-\frac{(i\sqrt{3}+1)x}{2}\sqrt[3]{\lambda}} + \_C2\, \mathrm{e}^{\frac{(i\sqrt{3}-1)x}{2}\sqrt[3]{\lambda}} + \_C3\, \mathrm{e}^{\sqrt[3]{\lambda} x}\right\}$$

2.1450 ODE No. 1450

$$ax^3 y(x) - bx + y^{(3)}(x) = 0$$

✗ **Mathematica** : cpu = 0.0723516 (sec), leaf count = 0 , DifferentialRoot result

$$\{\{y(x) \to \text{DifferentialRoot}(\{y, x\}, \{ay(x)x^3 - bx + y^{(3)}(x) = 0, y(0) = c_1, y'(0) = c_2, y''(0) = c_3\})(x)\}\}$$

✓ **Maple** : cpu = 0.174 (sec), leaf count = 1616

$$\left\{y(x) = \int -11211200\, bx^3 \left(\left(-5/8\, x^6 {}_0\mathrm{F}_2(\,;\, \frac{13}{6}, 7/3;\, -\frac{x^6 a}{216})a + 35\, {}_0\mathrm{F}_2(\,;\, 7/6, 4/3;\, -\frac{x^6 a}{216})\right) {}_0\mathrm{F}_2(\,;\, 5/6, 7/\right.$$

2.1451 ODE No. 1451

$$y^{(3)}(x) - ax^b y(x) = 0$$

✓ **Mathematica** : cpu = 0.0140444 (sec), leaf count = 168

$$\left\{\left\{y(x) \to (-1)^{\frac{1}{b+3}}(b+3)^{-\frac{3}{b+3}} c_2 x a^{\frac{1}{b+3}} {}_0F_2\left(;1-\frac{1}{b+3},1+\frac{1}{b+3};\frac{ax^{b+3}}{(b+3)^3}\right) + (-1)^{\frac{2}{b+3}}(b+3)^{-\frac{6}{b+3}} c_3 x^2 a^{b}\right.\right.$$

✓ **Maple** : cpu = 0.066 (sec), leaf count = 114

$$\left\{y(x) = \_C1\ {}_0\mathrm{F}_2\left(\ ;\ \frac{b+2}{b+3}, \frac{b+1}{b+3}; \frac{x^{b+3}a}{(b+3)^3}\right) + \_C2\ x\,{}_0\mathrm{F}_2\left(\ ;\ \frac{b+4}{b+3}, \frac{b+2}{b+3}; \frac{x^{b+3}a}{(b+3)^3}\right) + \_C3\ x^2\,{}_0\mathrm{F}_2\left(\ ;\ \frac{b+5}{b+3}\right.\right.$$

2.1452 ODE No. 1452

$$y^{(3)}(x) + 3y'(x) - 4y(x) = 0$$

✓ **Mathematica** : cpu = 0.0056233 (sec), leaf count = 54

$$\left\{\left\{y(x) \to c_3 e^x + c_1 e^{-x/2} \sin\left(\frac{\sqrt{15}x}{2}\right) + c_2 e^{-x/2} \cos\left(\frac{\sqrt{15}x}{2}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.006 (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 = 1.10099 (sec), leaf count = 128

$$\left\{\left\{y(x) \to \frac{e^{-ax}(-9(a^2-4)\,a^4 e^{3ax}\cos(2x) - 3(11a^2-4)\,a^3 e^{3ax}\sin(2x) + (9a^6+49a^4+56a^2+16)\,(12a^2}{12a^3\,(9a^6+49a^4+56a^2+16)}\right.\right.$$

✓ **Maple** : cpu = 0.109 (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 = 0.0072917 (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 = 0.036 (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 = 0.0204216 (sec), leaf count = 127

$$\left\{\left\{y(x) \to \sqrt[3]{-\frac{1}{3}}c_2 x\, {}_2F_2\left(\frac{1}{3} - \frac{a}{3}, \frac{1}{3} - \frac{b}{3}; \frac{2}{3}, \frac{4}{3}; \frac{x^3}{3}\right) + c_1\, {}_2F_2\left(-\frac{a}{3}, -\frac{b}{3}; \frac{1}{3}, \frac{2}{3}; \frac{x^3}{3}\right) + \left(-\frac{1}{3}\right)^{2/3} c_3 x^2\, {}_2F_2\left(\frac{2}{3}\right.\right.\right.$$

✓ **Maple** : cpu = 0.079 (sec), leaf count = 71

$$\left\{y(x) = \_C1\, {}_2\text{F}_2(-\frac{a}{3}, -\frac{b}{3}; \frac{1}{3}, \frac{2}{3}; \frac{x^3}{3}) + \_C2\, x^2{}_2\text{F}_2(-\frac{b}{3} + \frac{2}{3}, -\frac{a}{3} + \frac{2}{3}; \frac{4}{3}, \frac{5}{3}; \frac{x^3}{3}) + \_C3\, {}_2\text{F}_2(\frac{1}{3} - \frac{a}{3}, \frac{1}{3} -\right.$$

2.1456 ODE No. 1456

$$x^{2c-2}y'(x) + (c-1)x^{2c-3}y(x) + y^{(3)}(x) = 0$$

✓ **Mathematica** : cpu = 0.024968 (sec), leaf count = 183

$$\left\{\left\{y(x) \to c_1\, {}_1F_2\left(\frac{1}{2} - \frac{1}{2c}; 1 - \frac{1}{c}, 1 - \frac{1}{2c}; -\frac{x^{2c}}{4c^2}\right) + 4^{-1/c}c^{-2/c}c_3\left(x^{2c}\right)^{\frac{1}{c}}\, {}_1F_2\left(\frac{1}{2} + \frac{1}{2c}; 1 + \frac{1}{2c}, 1 + \frac{1}{c}; -\frac{x^{2c}}{4c^2}\right.\right.\right.$$

✓ **Maple** : cpu = 0.042 (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 = 0.0107705 (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

$$\left\{y(x)=DESol\left(\left\{\frac{\mathrm{d}^3}{\mathrm{d}x^3}\_Y(x)+(-6\,WeierstrassP(x,g2,g3)-3\,a)\frac{\mathrm{d}}{\mathrm{d}x}\_Y(x)+b\_Y(x)\right\},\{\_Y(x)\}\right)\right.$$

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 = 0.0140337 (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

$$\left\{y(x)=DESol\left(\left\{\frac{\mathrm{d}^3}{\mathrm{d}x^3}\_Y(x)+\left(-WeierstrassP(x,g2,g3)\,n^2+WeierstrassP(x,g2,g3)\right)\frac{\mathrm{d}}{\mathrm{d}x}\_Y(x)+\right.\right.\right.$$

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 = 0.0129924 (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

$$\left\{y(x)=\left(DESol\left(\left\{\frac{\mathrm{d}^2}{\mathrm{d}x^2}\_Y(x)+\left(-WeierstrassP(x,g2,g3)\,n^2-n\,WeierstrassP(x,g2,g3)-\frac{a}{4}\right)\_Y(\right.\right.\right.$$

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 = 0.0099156 (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

$$\left\{y(x) = \mathit{DESol}\left(\left\{\frac{\mathrm{d}^3}{\mathrm{d}x^3}\_Y(x) + (A\,\mathit{WeierstrassP}(x, g2, g3) + a)\,\frac{\mathrm{d}}{\mathrm{d}x}\_Y(x) + B\,\mathit{WeierstrassPPrime}(x, g2\right.\right.\right.$$

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 = 0.0205206 (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

$$\left\{y(x) = \mathit{DESol}\left(\left\{\frac{\mathrm{d}^3}{\mathrm{d}x^3}\_Y(x) + \left(-3\,k^2(\mathit{JacobiSN}(z, x))^2 - a\right)\frac{\mathrm{d}}{\mathrm{d}x}\_Y(x) + \left(b + c(\mathit{JacobiSN}(z, x))^2 - 3\right.\right.\right.\right.$$

2.1462 ODE No. 1462

$$-y'(x)\left(a + 6k^2\sin^2(x)\right) + by(x) + y^{(3)}(x) = 0$$

✗ **Mathematica** : cpu = 0.0156785 (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

$$\left\{y(x) = \mathit{DESol}\left(\left\{\frac{\mathrm{d}^3}{\mathrm{d}x^3}\_Y(x) + \left(-6\,k^2(\sin(x))^2 - a\right)\frac{\mathrm{d}}{\mathrm{d}x}\_Y(x) + b\_Y(x)\right\}, \{\_Y(x)\}\right)\right\}$$

2.1463 ODE No. 1463

$$y(x)f'(x) + 2f(x)y'(x) + y^{(3)}(x) = 0$$

✗ **Mathematica** : cpu = 0.0453776 (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

$$\left\{y(x) = \left(DESol\left(\left\{\frac{\mathrm{d}^2}{\mathrm{d}x^2}\_Y(x) + \frac{f(x)\_Y(x)}{2}\right\}, \{\_Y(x)\}\right)\right)^2\right\}$$

2.1464 ODE No. 1464

$$y^{(3)}(x) - 2y''(x) - 3y'(x) + 10y(x) = 0$$

✓ **Mathematica** : cpu = 0.0046187 (sec), leaf count = 34

$$\left\{\left\{y(x) \to c_3e^{-2x} + c_1e^{2x}\sin(x) + c_2e^{2x}\cos(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.004 (sec), leaf count = 27

$$\left\{y(x) = \_C1\, \mathrm{e}^{-2\,x} + \_C2\, \mathrm{e}^{2\,x}\sin(x) + \_C3\, \mathrm{e}^{2\,x}\cos(x)\right\}$$

2.1465 ODE No. 1465

$$-a^2y'(x) + 2a^2y(x) + y^{(3)}(x) - 2y''(x) - \sinh(x) = 0$$

✓ **Mathematica** : cpu = 0.0863302 (sec), leaf count = 95

$$\left\{\left\{y(x) \to \frac{e^{-x}(3a^2e^{2x} - a^2 - 3e^{2x} - 12e^x\sinh(x) - 6e^x\cosh(x) + 1)}{6(a-2)(a+2)(a^2-1)} + c_1e^{-ax} + c_3e^{ax} + c_2e^{2x}\right\}\right\}$$

✓ **Maple** : cpu = 0.121 (sec), leaf count = 89

$$\left\{y(x) = \frac{1}{6\,a^4 - 30\,a^2 + 24}\left(-9\,\mathrm{e}^{ax}\left(\mathrm{e}^{x} - 1/3\,\mathrm{e}^{-x}\right)\mathrm{e}^{-ax} + 3\,(a+1)\,(a-1)\left(\mathrm{e}^{-x} - 1/3\,\cosh(3\,x) + 1/3\,\mathrm{sinh}\right.\right.$$

2.1466 ODE No. 1466

$$a^3(-y(x)) + 3a^2y'(x) - 3ay''(x) - e^{ax} + y^{(3)}(x) = 0$$

✓ **Mathematica** : cpu = 0.0083792 (sec), leaf count = 46

$$\left\{\left\{y(x) \to c_3x^2e^{ax} + c_2xe^{ax} + c_1e^{ax} + \frac{1}{6}x^3e^{ax}\right\}\right\}$$

✓ **Maple** : cpu = 0.011 (sec), leaf count = 27

$$\left\{y(x) = \frac{e^{ax}(6\_C3\,x^2 + x^3 + 6\_C2\,x + 6\_C1)}{6}\right\}$$

2.1467 ODE No. 1467

$$\text{a0}y(x) + \text{a1}y'(x) + \text{a2}y''(x) + y^{(3)}(x) = 0$$

✓ **Mathematica** : cpu = 0.0048726 (sec), leaf count = 84

$$\left\{\left\{y(x) \to c_1e^{x\text{Root}[\#1^3+\#1^2\text{a2}+\#1\text{a1}+\text{a0}\&,1]} + c_2e^{x\text{Root}[\#1^3+\#1^2\text{a2}+\#1\text{a1}+\text{a0}\&,2]} + c_3e^{x\text{Root}[\#1^3+\#1^2\text{a2}+\#1\text{a1}+\text{a0}\&,3]}\right.\right.$$

✓ **Maple** : cpu = 0.02 (sec), leaf count = 590

$$\left\{y(x) = \_C1\, e^{-x\left(\left(\frac{i}{12}\sqrt{3}+\frac{1}{12}\right)\left(36\,a1\,a2-108\,a0-8\,a2^3+12\sqrt{12\,a0\,a2^3-3\,a1^2a2^2-54\,a1\,a2\,a0+12\,a1^3+81\,a0^2}\right)^{\frac{2}{3}}+\frac{a2}{3}\sqrt[3]{36\,a1\,a2-\right.\right.}}\right.$$

2.1468 ODE No. 1468

$$2\left(2a + 4x^2 - 1\right)y'(x) - 8axy(x) + y^{(3)}(x) - 6xy''(x) = 0$$

✓ **Mathematica** : cpu = 0.0570111 (sec), leaf count = 57

$$\left\{\left\{y(x) \to c_2H_{\frac{a}{2}}(x)\,{}_1F_1\left(-\frac{a}{4};\frac{1}{2};x^2\right) + c_1H_{\frac{a}{2}}(x)^2 + c_3\,{}_1F_1\left(-\frac{a}{4};\frac{1}{2};x^2\right)^2\right\}\right\}$$

✓ **Maple** : cpu = 0.081 (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 = 0.0124438 (sec), leaf count = 72

$$\left\{\left\{y(x) \to c_1 e^{-\frac{ax^2}{2}} + c_2 e^{-\frac{ax^2}{2}-\sqrt{3}\sqrt{a}x} + c_3 e^{\sqrt{3}\sqrt{a}x-\frac{ax^2}{2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.02 (sec), leaf count = 37

$$\left\{y(x) = \mathrm{e}^{-\frac{ax^2}{2}}\left(\_C1 + \_C2\,\mathrm{e}^{\sqrt{3}\sqrt{a}x} + \_C3\,\mathrm{e}^{-\sqrt{3}\sqrt{a}x}\right)\right\}$$

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 = 2.71327 (sec), leaf count = 64

$$\left\{\left\{y(x) \to e^{-\cos(x)} \int_1^x \frac{1}{4} e^{\cos(K[1])} \left(2\log(K[1])K[1]^2 - 3K[1]^2 + 4c_1K[1] + 4c_2\right) dK[1] + c_3 e^{-\cos(x)}\right\}\right\}$$

✓ **Maple** : cpu = 0.062 (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 = 0.0523386 (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 = 0.088 (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 = 0.0530117 (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 = 0.103 (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 = 0.0099427 (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

$$\left\{y(x)=DESol\left(\left\{\frac{d^3}{dx^3}\_Y(x)+f(x)\frac{d^2}{dx^2}\_Y(x)+g(x)\frac{d}{dx}\_Y(x)+\left(f(x)\,g(x)+\frac{d}{dx}g(x)\right)\_Y(x)\right\},\{\right.$$

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 = 0.0110377 (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 = 0.0252897 (sec), leaf count = 38

$$\{\{y(x) \to c_1 e^{-x/2} + c_2 e^{-x/2} x + c_3 e^{3x} + e^x\}\}$$

✓ **Maple** : cpu = 0.013 (sec), leaf count = 23

$$\left\{y(x) = (\_C3\, x + \_C2)\, e^{-\frac{x}{2}} + \_C1\, e^{3\,x} + e^x\right\}$$

2.1476 ODE No. 1476

$$-36n^2 y'(x)\wp(x; \mathrm{g2}, \mathrm{g3}) - 2(n+3)(4n-3)ny(x)\phi'(x) + 27y^{(3)}(x) = 0$$

✗ **Mathematica** : cpu = 0.0835904 (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

$$\left\{y(x) = DESol\left(\left\{27\,\frac{d^3}{dx^3}\_Y(x) - 36\, WeierstrassP(x, g2, g3)\, n^2 \frac{d}{dx}\_Y(x) + (-8\, WeierstrassPPrime(x\right.\right.\right.$$

2.1477 ODE No. 1477

$$xy^{(3)}(x) + 3y''(x) + xy(x) = 0$$

✓ **Mathematica** : cpu = 0.128312 (sec), leaf count = 48

$$\left\{\left\{y(x) \to \frac{c_1 e^{-x}}{x} + \frac{c_2 e^{\sqrt[3]{-1}x}}{x} + \frac{c_3 e^{-(-1)^{2/3}x}}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.012 (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 = 0.0243025 (sec), leaf count = 104

$$\left\{\left\{y(x) \to -\frac{2(-1)^{3/4}\sqrt{2}c_1\,{}_0F_2\left(;\frac{1}{2},\frac{3}{4};\frac{ax^4}{64}\right)}{\sqrt[4]{a}x} + c_2\,{}_0F_2\left(;\frac{3}{4},\frac{5}{4};\frac{ax^4}{64}\right) + \frac{\sqrt[4]{-1}\sqrt[4]{a}c_3x\,{}_0F_2\left(;\frac{5}{4},\frac{3}{2};\frac{ax^4}{64}\right)}{2\sqrt{2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.066 (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 = 0.10718 (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 = 0.131 (sec), leaf count = 92

$$\left\{y(x) = \_C1\,{}_1\mathrm{F}_2(\frac{a}{2};\ \frac{1}{2},\frac{a}{2}+\frac{b}{2};\ \frac{x^2}{4}) + \_C2\,x{}_1\mathrm{F}_2(\frac{a}{2}+\frac{1}{2};\ \frac{3}{2},\frac{a}{2}+\frac{b}{2}+\frac{1}{2};\ \frac{x^2}{4}) + \_C3\,x^{-a-b+2}{}_1\mathrm{F}_2(1-\frac{b}{2};\ 2$$

2.1480 ODE No. 1480

$$-(2v+x)y''(x) - (-2v+x-1)y'(x) + xy^{(3)}(x) + (x-1)y(x) = 0$$

✓ **Mathematica** : cpu = 0.175109 (sec), leaf count = 93

$$\left\{\left\{y(x) \to \frac{c_3e^xx^{2v+2}\Gamma\left(v+\frac{3}{2}\right)\,{}_1\tilde{F}_1\left(v+\frac{3}{2};2v+3;-2x\right)}{\Gamma\left(\frac{1}{2}-v\right)} + c_2 2^{-2v-2}e^xG_{2,3}^{2,1}\left(2x\middle|\begin{array}{c}1,v+\frac{3}{2}\\1,2(v+1),0\end{array}\right) + c_1e^x\right\}\right\}$$

✓ **Maple** : cpu = 0.138 (sec), leaf count = 35

$$\left\{y(x) = \_C1\,\mathrm{e}^x + \_C2\,x^{v+1}I_{-v-1}(x) + \_C3\,x^{v+1}K_{v+1}(x)\right\}$$

2.1481 ODE No. 1481

$$-f(x)+\left(x^2-3\right)y''(x)+xy^{(3)}(x)+4xy'(x)+2y(x)=0$$

✓ **Mathematica** : cpu = 0.393147 (sec), leaf count = 432

$$\left\{\left\{y(x)\to -\frac{1}{240}e^{-\frac{x^2}{2}}\left(-240x^5\int_1^x\left(-\frac{1}{240}\left(15\text{Ei}\left(\frac{K[1]^2}{2}\right)+16e^{\frac{K[1]^2}{2}}\right)f(K[1])+\frac{1}{15}\sqrt{\frac{\pi}{2}}\text{erfi}\left(\frac{K[1]}{\sqrt{2}}\right)K\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.042 (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 = 0.410708 (sec), leaf count = 0 , DifferentialRoot result

$$\{\{y(x)\to \text{DifferentialRoot}(\{y,x\},\{-b+xay(x)+3y''(x)+2xy^{(3)}(x)=0,y(1)=c_1,y'(1)=c_2,y''(1)=$$

✓ **Maple** : cpu = 0.228 (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 = 0.11159 (sec), leaf count = 112

$$\left\{\left\{y(x)\to \frac{c_3e^x x\Gamma\left(\frac{5}{2}-3\nu\right)\left(\frac{2\,{}_1\tilde{F}_1\left(\frac{3}{2}-3\nu;1-2\nu;-x\right)}{3(2\nu-1)x}+\frac{2}{3x\Gamma(2-2\nu)}\right)}{\Gamma\left(\frac{3}{2}-\nu\right)}+c_2e^xG_{2,3}^{2,1}\left(x\,\middle|\,\begin{array}{c}1,3\nu-\frac{1}{2}\\1,2\nu,0\end{array}\right)+c_1e^x\right\}\right\}$$

✓ **Maple** : cpu = 0.145 (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 = 62.1639 (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

$$\left\{y(x)=DESol\left(\left\{(3\,bk+2\,cx)\,\_Y(x)+(6\,ak+6\,bx)\,\frac{d}{dx}\_Y(x)+(6\,ax+3\,k)\,\frac{d^2}{dx^2}\_Y(x)+2\,x\frac{d^3}{dx^3}\_Y\right.\right.\right.$$

2.1485 ODE No. 1485

$$(x-2)xy^{(3)}(x)-(x-2)xy''(x)-2y'(x)+2y(x)=0$$

✓ **Mathematica** : cpu = 0.161081 (sec), leaf count = 64

$$\left\{\left\{y(x)\to \frac{1}{4}c_3x^2\left(-\frac{4e^{x-2}\text{Ei}(2-x)}{x^2}+\frac{2}{x^2}+\frac{2}{x}+\log(2-x)-\log(x)\right)+c_1x^2+c_2e^x\right\}\right\}$$

✓ **Maple** : cpu = 0.207 (sec), leaf count = 51

$$\left\{y(x)=\_C3\;Ei(1,x-2)\,e^{x-2}+\frac{\_C3\;x^2\ln(x-2)}{4}+\_C2\;e^x-\frac{\_C3\;x^2\ln(x)}{4}+\frac{(2\,x+2)\,\_C3}{4}+\_C1\right.$$

2.1486 ODE No. 1486

$$(2x-1)y^{(3)}(x)-8xy'(x)+8y(x)=0$$

✓ **Mathematica** : cpu = 0.317132 (sec), leaf count = 65

$$\left\{\left\{y(x)\to \frac{1}{4}c_3x\left(\frac{e^{2x-2}\text{Ei}(2-4x)}{x}-\frac{2\text{Ei}(1-2x)}{e}-\frac{e^{-2x}}{x}\right)+c_1x-c_2e^{2x}\right\}\right\}$$

✓ **Maple** : cpu = 0.144 (sec), leaf count = 51

$$\left\{y(x)=\_C1\;x+\_C2\;e^{2\,x}-\frac{\_C3\;(2\,xe^{-1}Ei(1,2\,x-1)-Ei(1,4\,x-2)\,e^{2\,x-2}-e^{-2\,x})}{4}\right\}$$

2.1487 ODE No. 1487

$$(2x-1)y^{(3)}(x)+(x+4)y''(x)+2y'(x)=0$$

✓ **Mathematica** : cpu = 0.679361 (sec), leaf count = 87

$$\left\{\left\{y(x)\to\int_1^x\left(\frac{e^{-\frac{K[1]}{2}}c_1\left(1+\frac{1}{4\left(\frac{K[1]}{2}-\frac{1}{4}\right)}\right)}{\sqrt[4]{\frac{K[1]}{2}-\frac{1}{4}}}+e^{-\frac{K[1]}{2}}c_2L_{-\frac{1}{4}}^{\frac{5}{4}}\left(\frac{K[1]}{2}-\frac{1}{4}\right)\right)dK[1]+c_3\right\}\right\}$$

✓ **Maple** : cpu = 0.062 (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 = 0.40061 (sec), leaf count = 102

$$\left\{\left\{y(x)\to\frac{c_1e^{-\sqrt[3]{a}x}\left(\sqrt[3]{a}x+2\right)}{x}+\frac{c_2e^{\sqrt[3]{-1}\sqrt[3]{a}x}\left(\sqrt[3]{a}x+2(-1)^{2/3}\right)}{x}+\frac{c_3e^{-(-1)^{2/3}\sqrt[3]{a}x}\left(\sqrt[3]{a}x-2\sqrt[3]{-1}\right)}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.326 (sec), leaf count = 132

$$\left\{y(x)=\frac{1}{x}\left(-\_C2\left(\left(-i-\sqrt{3}\right)\left(-a^4\right)^{\frac{2}{3}}+ia^3x\right)\mathrm{e}^{\frac{-\frac{i}{2}\left(\sqrt{3}-i\right)x}{a}\sqrt[3]{-a^4}}+\left(\left(\sqrt{3}-i\right)\left(-a^4\right)^{\frac{2}{3}}+ia^3x\right)\_C3\,\mathrm{e}^{\frac{i}{2}(\sqrt{}}\right.$$

2.1489 ODE No. 1489

$$x^2y^{(3)}(x)+(x+1)y''(x)-y(x)=0$$

✗ **Mathematica** : cpu = 0.571371 (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

$$\left\{y(x)=DESol\left(\left\{-\_Y(x)+(1+x)\frac{\mathrm{d}^2}{\mathrm{d}x^2}\_Y(x)+x^2\frac{\mathrm{d}^3}{\mathrm{d}x^3}\_Y(x)\right\},\{\_Y(x)\}\right)\right\}$$

2.1490 ODE No. 1490

$$x^2y^{(3)}(x) + \left(x^2+1\right)y'(x) - xy''(x) = 0$$

✓ **Mathematica** : cpu = 0.0248448 (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 = 0.035 (sec), leaf count = 18

$$\{y(x) = \_C1 + \_C2\,xJ_1(x) + \_C3\,xY_1(x)\}$$

2.1491 ODE No. 1491

$$\left(-4a^2\nu^2 + 4a^2x^{2a} + 1\right)y'(x) + x^2y^{(3)}(x) + 3xy''(x) = 4a^3x^{2a-1}y(x)$$

✓ **Mathematica** : cpu = 0.0322949 (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 = 0.054 (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

$$\left(4x(n-m) + m(2m-1) + 2x^2\right)y'(x) - 2n(-2m+2x+1)y(x) - 3x(x-m)y''(x) + x^2y^{(3)}(x) = 0$$

✓ **Mathematica** : cpu = 0.284176 (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 = 0.071 (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 = 1.16514 (sec), leaf count = 2585

$$\left\{\left\{y(x)\to J_0(x)c_1+2Y_0(x)c_2+\frac{2c_3\,{}_1F_2\left(1;\frac{1}{2},\frac{1}{2};-\frac{x^2}{4}\right)}{x}+\frac{xJ_0(x)\int_1^x\left(\frac{-16J_1(K[1])Y_0(K[1])^2f(K[1])\,{}_1F_2(3;\frac{5}{2},\frac{5}{2};-\frac{1}{4}K\right.}{}\right.$$

✓ **Maple** : cpu = 0.183 (sec), leaf count = 1033

$$\left\{y(x)=\frac{1}{x}\left(\int-9\frac{}{((-9\,x^2J_0\,(x)-36\,xJ_1\,(x)+27\,J_0\,(x))\,{}_1\mathrm{F}_2(1;\,1/2,1/2;\,-1/4\,x^2)+4\,x^2\,(9/4\,J_0\,(x)\,(x^2\right.\right.$$

2.1494 ODE No. 1494

$$x^2y^{(3)}(x)+5xy''(x)+4y'(x)-\log(x)=0$$

✓ **Mathematica** : cpu = 0.0198399 (sec), leaf count = 43

$$\left\{\left\{y(x)\to-\frac{c_1}{x}-\frac{2c_2}{x}-\frac{2c_2\log(x)}{x}+c_3-\frac{x}{2}+\frac{1}{4}x\log(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.01 (sec), leaf count = 32

$$\left\{y(x)=\frac{\left(x^2+4\_C2\right)\ln(x)-2\,x^2+4\_C1\,x+4\_C3}{4\,x}\right\}$$

2.1495 ODE No. 1495

$$x^2y^{(3)}(x)+6xy''(x)+6y'(x)=0$$

✓ **Mathematica** : cpu = 0.0059515 (sec), leaf count = 24

$$\left\{\left\{y(x)\to-\frac{c_1}{2x^2}-\frac{c_2}{x}+c_3\right\}\right\}$$

✓ **Maple** : cpu = 0.007 (sec), leaf count = 16

$$\left\{y(x)=\_C1+\frac{\_C2}{x}+\frac{\_C3}{x^2}\right\}$$

2.1496 ODE No. 1496

$$ax^2y(x) + x^2y^{(3)}(x) + 6xy''(x) + 6y'(x) = 0$$

✓ **Mathematica** : cpu = 0.2048 (sec), leaf count = 63

$$\left\{\left\{y(x) \to \frac{c_1 e^{-\sqrt[3]{a}x}}{x^2} + \frac{c_2 e^{\sqrt[3]{-1}\sqrt[3]{a}x}}{x^2} + \frac{c_3 e^{-(-1)^{2/3}\sqrt[3]{a}x}}{x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.014 (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 = 0.365762 (sec), leaf count = 135

$$\left\{\left\{y(x) \to c_1\, {}_0F_2\left(;\frac{2}{3}-p,\frac{1}{3}-q;\frac{x^3}{27}\right) + c_2(-1)^{\frac{1}{3}(3p+1)}3^{-3p-1}x^{3p+1}\, {}_0F_2\left(;p+\frac{4}{3},p-q+\frac{2}{3};\frac{x^3}{27}\right) + c_3(-1)^{\frac{1}{3}}\right.\right.$$

✓ **Maple** : cpu = 0.152 (sec), leaf count = 77

$$\left\{y(x) = \_C1\, {}_0\mathrm{F}_2(\,;\, -p+\frac{2}{3}, -q+\frac{1}{3};\, \frac{x^3}{27}) + \_C2\, x^{1+3\,p}{}_0\mathrm{F}_2(\,;\, p+\frac{4}{3}, \frac{2}{3}-q+p;\, \frac{x^3}{27}) + \_C3\, x^{2+3\,q}{}_0\mathrm{F}_2(\,;\,\right.$$

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 = 9.6336 (sec), leaf count = 584

$$\left\{\left\{y(x) \to -\frac{\pi c_3 2^{-n-\frac{3}{2}}x\left(\sqrt{a}x\right)^{-n-\frac{1}{2}}\left(-a^{3/2}2^{2n}x^3\sec(\pi n)\Gamma\left(\frac{3}{2}-n\right)\Gamma\left(n+\frac{3}{2}\right)J_{\frac{1}{2}(2n+1)}\left(\sqrt{a}x\right)\, {}_1\tilde{F}_2\left(\frac{3}{2}-n;\frac{1}{2}\right.\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.141 (sec), leaf count = 53

$$\left\{y(x) = \_C1\, x^{n+\frac{1}{2}}J_{-n-\frac{1}{2}}\left(\sqrt{a}x\right) + \_C2\, x^{n+\frac{1}{2}}Y_{-n-\frac{1}{2}}\left(\sqrt{a}x\right) + \_C3\,\left(ax^2+4\,n-2\right)\right\}$$

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 = 0.19394 (sec), leaf count = 97

$$\left\{\left\{y(x)\to\frac{c_3e^xx^{\nu+\frac{1}{2}}\Gamma\left(\nu+\frac{1}{2}\right)\,{}_1\tilde{F}_1\left(\nu+\frac{1}{2};2\nu+1;-2x\right)}{\Gamma\left(\frac{3}{2}-\nu\right)}+c_22^{-\nu-\frac{1}{2}}e^xG_{2,3}^{2,1}\left(2x\middle|\begin{array}{c}1,0\\\frac{1}{2}-\nu,\nu+\frac{1}{2},0\end{array}\right)+c_1e^x\right\}$$

✓ **Maple** : cpu = 0.146 (sec), leaf count = 25

$$\left\{y(x)=\_C1\,e^x+\_C2\,\sqrt{x}I_\nu(x)+\_C3\,\sqrt{x}K_\nu(x)\right\}$$

2.1500 ODE No. 1500

$$\nu(2x+1)y'(x)-\nu(x+1)y(x)-x(v+x)y''(x)+x^2y^{(3)}(x)=0$$

✗ **Mathematica** : cpu = 32.0597 (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 = 0.126 (sec), leaf count = 55

$$\left\{y(x)=\_C1\,e^x+\_C2\,x^{\frac{\nu}{2}+\frac{1}{2}}J_{-\nu-1}\left(2\sqrt{\nu}\sqrt{x}\right)+\_C3\,x^{\frac{\nu}{2}+\frac{1}{2}}Y_{-\nu-1}\left(2\sqrt{\nu}\sqrt{x}\right)\right\}$$

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 = 0.160389 (sec), leaf count = 86

$$\left\{\left\{y(x)\to\frac{c_3e^xx^{\nu+\frac{1}{2}}\Gamma\left(\nu+\frac{1}{2}\right)\,{}_1\tilde{F}_1\left(\nu+\frac{1}{2};2\nu+1;-x\right)}{\Gamma\left(\frac{3}{2}-\nu\right)}+c_2e^xG_{2,3}^{2,1}\left(x\middle|\begin{array}{c}1,0\\\frac{1}{2}-\nu,\nu+\frac{1}{2},0\end{array}\right)+c_1e^x\right\}\right\}$$

✓ **Maple** : cpu = 0.127 (sec), leaf count = 37

$$\left\{y(x)=\_C1\,e^x+\_C2\,e^{\frac{x}{2}}\sqrt{x}I_\nu\left(\frac{x}{2}\right)+\_C3\,e^{\frac{x}{2}}\sqrt{x}K_\nu\left(\frac{x}{2}\right)\right\}$$

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 = 0.0589441 (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 = 0.27 (sec), leaf count = 103

$$\left\{y(x)=\frac{1}{x^2}\left(\_C2\int e^{\frac{x^3}{6}}\sqrt{x}\left(I_{\frac{1}{6}}\left(-\frac{x^3}{6}\right)x^3+I_{-\frac{5}{6}}\left(-\frac{x^3}{6}\right)x^3-2\,I_{1/6}\left(-1/6\,x^3\right)\right)\,dx+\_C3\int e^{\frac{x^3}{6}}\sqrt{x}\left(K\right.\right.$$

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 = 0.470428 (sec), leaf count = 258

$$\left\{\left\{y(x)\to c_3+\frac{1}{225}\left(-\frac{225c_2x}{x^2+1}-\frac{150c_2x}{\left(x^2+1\right)^2}-\frac{225c_1}{4\left(x^2+1\right)^2}+\frac{75c_2}{x-i}+\frac{75c_2}{x+i}+\frac{225}{2}ic_2\log(1-ix)-\frac{225}{2}ic_2\right.\right.\right.$$

✓ **Maple** : cpu = 0.014 (sec), leaf count = 67

$$\left\{y(x)=\frac{\left(45\,x^5+150\,x^3+225\,x\right)\ln(x)-9\,x^5+225\,\_C1\,x^4+\left(225\,\_C2-50\right)x^3+450\,\_C1\,x^2+(675\,\_}{225\left(x^2+1\right)^2}\right.$$

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 = 0.10529 (sec), leaf count = 43

$$\left\{\left\{y(x)\to \frac{c_1x^2}{2}+\frac{1}{2}ic_2e^{-ix}-\frac{1}{4}c_3e^{ix}\right\}\right\}$$

✓ **Maple** : cpu = 0.11 (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 = 61.5046 (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 = 0.087 (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 = 0.291299 (sec), leaf count = 150

$$\left\{\left\{y(x)\to c_2e^{\frac{1}{4}\left(-x-\frac{1}{x}+2\log(x)\right)}\int_1^x e^{\frac{K[1]^2-10\log(K[1])K[1]+1}{4K[1]}}dK[1]-\sqrt{\pi}c_3\left(e\text{erfi}\left(\frac{1-x}{2\sqrt{x}}\right)+\text{erfi}\left(\frac{x+1}{2\sqrt{x}}\right)-i(e-\right.\right.\right.$$

✓ **Maple** : cpu = 0.035 (sec), leaf count = 43

$$\left\{y(x)=\left(\_C3+\int\frac{2\_C1\,x+\_C2}{4}\mathrm{e}^{\frac{x}{4}}\mathrm{e}^{\frac{1}{4x}}x^{-\frac{5}{2}}\,\mathrm{d}x\right)\mathrm{e}^{-\frac{x}{4}}\mathrm{e}^{-\frac{1}{4x}}\sqrt{x}\right\}$$

2.1507 ODE No. 1507

$$xy^{(3)}(x)(ax+b)+(\alpha x+\beta)y''(x)-f(x)+xy'(x)+y(x)=0$$

✗ **Mathematica** : cpu = 2.03112 (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 = 0.415 (sec), leaf count = 1209

$$\left\{y(x)=-\left(HeunC\left(0,\frac{2\,b-\beta}{b},\frac{(2\,b+\beta)\,a-\alpha\,b}{ab},-\frac{b}{a^2},\frac{(4\,a-\alpha)\,b^2-\alpha\,\beta\,b+a\beta^2}{2\,ab^2},-\frac{ax}{b}\right)\left(\int(\_C1+\int\right.\right.\right.$$

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 = 0.638743 (sec), leaf count = 143

$$\left\{\left\{y(x)\to c_2 3^{\nu-1}a^{\frac{1-\nu}{3}}x^{1-\nu}\,{}_0F_2\left(;1-\frac{2\nu}{3},1-\frac{\nu}{3};-\frac{ax^3}{27}\right)+c_3 3^{-\nu-1}a^{\frac{\nu+1}{3}}x^{\nu+1}\,{}_0F_2\left(;\frac{\nu}{3}+1,\frac{2\nu}{3}+1;-\frac{ax^3}{27}\right)\right.\right.$$

✓ **Maple** : cpu = 0.078 (sec), leaf count = 81

$$\left\{y(x)=\_C1\,x\,{}_0\mathrm{F}_2(\,;\,-\frac{\nu}{3}+1,\frac{\nu}{3}+1;\,-\frac{ax^3}{27})+\_C2\,x^{-\nu+1}{}_0\mathrm{F}_2(\,;\,1-\frac{2\,\nu}{3},-\frac{\nu}{3}+1;\,-\frac{ax^3}{27})+\_C3\,x^{\nu+1}{}_0\mathrm{F}\right.$$

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 = 0.0081141 (sec), leaf count = 34

$$\{\{y(x)\to c_1xJ_\nu(x)^2+c_3xY_\nu(x)^2+c_2xJ_\nu(x)Y_\nu(x)\}\}$$

✓ **Maple** : cpu = 0.032 (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 = 0.0603342 (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

$$\left\{y(x)=DESol\left(\left\{x^3\frac{d^3}{dx^3}\_Y(x)+\left(x^{2\,\nu}ax-\nu^2x+x\right)\frac{d}{dx}\_Y(x)+\left(x^{2\,\nu}a\nu-ax^{2\,\nu}+bx^{3\,\nu}+\nu^2-1\right)\_Y\right.\right.\right.$$

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 = 0.0491939 (sec), leaf count = 51

$$\left\{\left\{y(x) \to \frac{c_1}{x^2} + c_2x + c_3x\log(x) + \frac{1}{450}\left(-50x^4 + 50x^4\log(x) - 18x^3 - 135x^3\log(x)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.019 (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

$$(1-a^2)\,xy'(x) + x^3y^{(3)}(x) + 3x^2y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0328694 (sec), leaf count = 29

$$\left\{\left\{y(x) \to -\frac{c_1x^{-a}}{a} + \frac{c_2x^a}{a} + c_3\right\}\right\}$$

✓ **Maple** : cpu = 0.009 (sec), leaf count = 18

$$\{y(x) = \_C1 + x^a\_C2 + \_C3\,x^{-a}\}$$

2.1513 ODE No. 1513

$$x^3y^{(3)}(x) - 4x^2y''(x) + (x^2+8)\,xy'(x) - 2(x^2+4)\,y(x) = 0$$

✓ **Mathematica** : cpu = 0.0767326 (sec), leaf count = 25

$$\{\{y(x) \to c_1x^2 - c_2x\sin(x) + c_3x\cos(x)\}\}$$

✓ **Maple** : cpu = 0.117 (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 = 0.550514 (sec), leaf count = 102

$$\left\{\left\{y(x)\to\frac{c_1e^{-\sqrt[3]{a}x}\left(\sqrt[3]{a}x+2\right)}{x^3}+\frac{c_2e^{\sqrt[3]{-1}\sqrt[3]{a}x}\left(\sqrt[3]{a}x+2(-1)^{2/3}\right)}{x^3}+\frac{c_3e^{-(-1)^{2/3}\sqrt[3]{a}x}\left(\sqrt[3]{a}x-2\sqrt[3]{-1}\right)}{x^3}\right\}\right\}$$

✓ **Maple** : cpu = 0.287 (sec), leaf count = 132

$$\left\{y(x)=\frac{1}{x^3}\left(-\_C2\left(\left(-i-\sqrt{3}\right)\left(-a^4\right)^{\frac{2}{3}}+ia^3x\right)e^{\frac{-\frac{i}{2}\left(\sqrt{3}-i\right)x}{a}\sqrt[3]{-a^4}}+\left(\left(\sqrt{3}-i\right)\left(-a^4\right)^{\frac{2}{3}}+ia^3x\right)\_C3\,e^{\frac{i}{2}(}\right.\right.$$

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 = 0.144626 (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 = 304.153 (sec), leaf count = 0 , timed out

```
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```

✓ **Maple** : cpu = 0.263 (sec), leaf count = 188

$$\left\{y(x)=\frac{\_C3\,e^{-x}(x^8+28\,x^7+450\,x^6+5100\,x^5+42900\,x^4+267120\,x^3+1179360\,x^2+3326400\,x+453}{}\right.$$

2.1517 ODE No. 1517

$$x^3y^{(3)}(x) - 2x^3 + x^2y''(x) + 2xy'(x) - y(x) + \log(x) = 0$$

✓ **Mathematica** : cpu = 0.302559 (sec), leaf count = 30686

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✓ **Maple** : cpu = 0.326 (sec), leaf count = 866

$$\left\{ y(x) = -\int -\frac{\sqrt[3]{44+12\sqrt{69}}\left(3\sqrt{69}\sqrt[3]{44+12\sqrt{69}} - 11\sqrt[3]{44+12\sqrt{69}} + 100\right)\left(x^{\frac{\left(11-3\sqrt{69}\right)\left(44+12\sqrt{69}\right)^{\frac{2}{3}}}{1200}} + \cdots\right.}{13800\,x^3}\right.$$

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 = 0.246408 (sec), leaf count = 104

$$\left\{\left\{y(x) \to \frac{1}{3}c_1\left(2x^2+1\right) + \frac{1}{3}c_2x\sqrt{x^2+1} - \frac{c_3(2x^2+1)\left(3(x^4+x^2)\tanh^{-1}\left(\sqrt{x^2+1}\right) - \sqrt{x^2+1}(3x^2+1\cdots\right.}{6\sqrt{x^2+1}\left(2x^3+x\right)}\right.\right.$$

✓ **Maple** : cpu = 0.24 (sec), leaf count = 60

$$\left\{y(x) = \frac{1}{x}\left(3\sqrt{x^2+1}Artanh\left(\frac{1}{\sqrt{x^2+1}}\right)\_C2\,x^2 + \_C1\,x^2\sqrt{x^2+1} + 2\,\_C3\,x^3 - 3\,\_C2\,x^2 + \_C3\,x - \cdots\right.\right.$$

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 = 0.0233223 (sec), leaf count = 65

$$\left\{\left\{y(x) \to \frac{1}{4}c_1\left(x^3-3x^2+3x+3\right) + \frac{1}{2}c_2\left(-x^3+3x^2-x-1\right) + \frac{1}{8}c_3\left(3x^3-5x^2+x+1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.082 (sec), leaf count = 19

$$\left\{y(x) = \_C2\,x^3 + \_C1\,x^2 + \_C3\,x + \_C3\right\}$$

2.1520 ODE No. 1520

$y''(x)\left(-6x(\text{a1}+\text{a2}+\text{a3})+3\text{a1a2}+3\text{a1a3}+3\text{a2a3}+9x^2\right)+2(x-\text{a1})(x-\text{a2})(x-\text{a3})y^{(3)}(x)-2\left(b+\left(n^2+\right.\right.$

✗ **Mathematica** : cpu = 68.0512 (sec), leaf count = 0 , DifferentialRoot result

$\{\{y(x)\to \text{DifferentialRoot}(\{y,x\},\{-n(n+1)y(x)-2\left(xn^2+xn-3x+b\right)y'(x)+3\left(3x^2-2\text{a1}x-2\text{a2}\right.$

✓ **Maple** : cpu = 0.298 (sec), leaf count = 288

$$\left\{y(x)=-\_C2\,(x-a1)\left(HeunG\left(\frac{-a3+a1}{-a2+a1},\frac{(-n^2-n+3)\,a1-b}{-4\,a2+4\,a1},1+\frac{n}{2},-\frac{n}{2}+\frac{1}{2},\frac{3}{2},\frac{1}{2},\frac{-x+a1}{-a2+a1}\right)\right.\right.$$

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 = 0.0487205 (sec), leaf count = 35

$$\left\{\left\{y(x)\to c_1x^2+c_3x^2\left(x+\frac{1}{x}+\log^2(x)\right)+c_2x^2\log(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.237 (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 = 0.0136424 (sec), leaf count = 44

$$\left\{\left\{y(x)\to\frac{c_1x^2}{2}-\frac{c_2x^2}{4}+\frac{1}{2}c_2x^2\log(x)+c_3-\frac{1}{36x}\right\}\right\}$$

✓ **Maple** : cpu = 0.024 (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 = 0.280317 (sec), leaf count = 74

$$\left\{\left\{y(x)\to c_1\left(-x^3+3x^2-x\right)+\frac{1}{2}c_2\left(x^3-2x^2+x\right)-\frac{c_3x\left(-x^3+3x^2-x\right)\left(\log(x)+1\right)}{2\left(x^2-3x+1\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.231 (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 = 0.133262 (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 = 0.302 (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 = 0.341388 (sec), leaf count = 102

$$\left\{\left\{y(x)\to c_1e^{\frac{\sqrt[3]{a}}{x}}\left(2x-\sqrt[3]{a}\right)+c_2e^{\frac{(-1)^{2/3}\sqrt[3]{a}}{x}}\left(x-\frac{1}{2}(-1)^{2/3}\sqrt[3]{a}\right)+c_3e^{-\frac{\sqrt[3]{-1}\sqrt[3]{a}}{x}}\left(\frac{1}{2}\sqrt[3]{-1}\sqrt[3]{a}+x\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.363 (sec), leaf count = 287

$$\left\{y(x)=\_C1\left(-8\,x^3+a\right)^4\mathrm{e}^{-\frac{1}{ax}\sqrt[3]{-a^4}}\left(2\,ax+\sqrt[3]{-a^4}\right)^{-3}\left(4\,a^2x^2-2\,x\sqrt[3]{-a^4}a+\left(-a^4\right)^{\frac{2}{3}}\right)^{-4}+\_C2\left(-8\,x^3\right.\right.$$

2.1526 ODE No. 1526

$$(x^4+2x^2+2x+1)\,x^2y^{(3)}(x)-(2x^6+3x^4-6x^2-6x-1)\,y''(x)+(x^6-6x^3-15x^2-12x-2)\,y'(x)+(x$$

✗ **Mathematica** : cpu = 300.113 (sec), leaf count = 0 , timed out

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✓ **Maple** : cpu = 0.131 (sec), leaf count = 19

$$\left\{y(x)=\_C2\,\mathrm{e}^{x^{-1}}+\mathrm{e}^{x}(\_C3\,x+\_C1)\right\}$$

2.1527 ODE No. 1527

$$(x-a)^3(x-b)^3y^{(3)}(x)-cy(x)=0$$

✗ **Mathematica** : cpu = 133.251 (sec), leaf count = 0 , DifferentialRoot result

$$\{\{y(x)\to \text{DifferentialRoot}(\{y,x\},\{(a-x)^3(b-x)^3y^{(3)}(x)-cy(x)=0,y(0)=c_1,y'(0)=c_2,y''(0)=c_3$$

✓ **Maple** : cpu = 0.337 (sec), leaf count = 437

$$\left\{y(x)=(x-a)^{-2\,\frac{b}{a-b}}\,(x-b)^{2\,\frac{a}{a-b}}\left((b-x)^{-\frac{RootOf\left(\_Z^3+(-3\,a-3\,b)\_Z^2+\left(2\,a^2+8\,ab+2\,b^2\right)\_Z-4\,a^2b-4\,ab^2-c,index=1\right)}{a-b}}\,(a-x)^{-\frac{R}{}}\right.\right.$$

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 = 0.886252 (sec), leaf count = 72

$$\left\{\left\{y(x)\to\frac{\sin\left(\frac{x}{2}\right)\left(\sqrt{2}(c_2x\sin\left(\frac{x}{2}\right)+\cos\left(\frac{x}{2}\right)(c_2\log(2(\cos(x)+1))+2c_1))-2\cos\left(\frac{x}{2}\right)\sin^{-1}(\cos(x))\right)}{\cos(x)-1}+\right.\right.$$

✓ **Maple** : cpu = 0.125 (sec), leaf count = 71

$$\left\{y(x)=\frac{1}{\sin(x)(\cos(x)-1)}\left((\sin(x))^2\ln\left(\frac{-\cos(x)+1}{\sin(x)}\right)\_C1-\ln(\sin(x))(\sin(x))^2\_C1+(\sin(x))^{2}\right.\right.$$

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 = 0.0522392 (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 = 0.046 (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 = 0.1084 (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 = 0.153 (sec), leaf count = 113

$$\left\{y(x)=\_C1\left({}_2F_1(-\frac{\nu}{2},\frac{\nu}{2}+\frac{1}{2};\frac{1}{2};\frac{\cos(2x)}{2}+\frac{1}{2})\right)^2+\_C2\,(\cos(2x)+1)\left({}_2F_1(1+\frac{\nu}{2},\frac{1}{2}-\frac{\nu}{2};\frac{3}{2};\frac{\cos(2}{2}\right.\right.$$

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 = 0.0208718 (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

$$\left\{y(x)=DESol\left(\left\{f(x)\frac{d^3}{dx^3}\_Y(x)+\left(\frac{d}{dx}f(x)+g(x)+A(x)\,f(x)\right)\frac{d^2}{dx^2}\_Y(x)+\left(\frac{d}{dx}g(x)+h(x)+A\right.\right.\right.$$

2.1532 ODE No. 1532

$$ny(x) + y^{(3)}(x) + xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.0117751 (sec), leaf count = 103

$$\left\{\left\{y(x) \to \frac{c_2 x\, {}_1F_2\left(\frac{n}{3}+\frac{1}{3};\frac{2}{3},\frac{4}{3};-\frac{x^3}{9}\right)}{3^{2/3}} + c_1\, {}_1F_2\left(\frac{n}{3};\frac{1}{3},\frac{2}{3};-\frac{x^3}{9}\right) + \frac{c_3 x^2\, {}_1F_2\left(\frac{n}{3}+\frac{2}{3};\frac{4}{3},\frac{5}{3};-\frac{x^3}{9}\right)}{3\sqrt[3]{3}}\right\}\right\}$$

✓ **Maple** : cpu = 0.058 (sec), leaf count = 58

$$\left\{y(x) = \_C1\, {}_1\mathrm{F}_2(\frac{n}{3};\frac{1}{3},\frac{2}{3};-\frac{x^3}{9}) + \_C2\, x {}_1\mathrm{F}_2(\frac{1}{3}+\frac{n}{3};\frac{2}{3},\frac{4}{3};-\frac{x^3}{9}) + \_C3\, x^2 {}_1\mathrm{F}_2(\frac{2}{3}+\frac{n}{3};\frac{4}{3},\frac{5}{3};-\frac{x^3}{9})\right\}$$

2.1533 ODE No. 1533

$$-ny(x) + y^{(3)}(x) - xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.0120248 (sec), leaf count = 113

$$\left\{\left\{y(x) \to \frac{\sqrt[3]{-1} c_2 x\, {}_1F_2\left(\frac{n}{3}+\frac{1}{3};\frac{2}{3},\frac{4}{3};\frac{x^3}{9}\right)}{3^{2/3}} + c_1\, {}_1F_2\left(\frac{n}{3};\frac{1}{3},\frac{2}{3};\frac{x^3}{9}\right) + \frac{(-1)^{2/3} c_3 x^2\, {}_1F_2\left(\frac{n}{3}+\frac{2}{3};\frac{4}{3},\frac{5}{3};\frac{x^3}{9}\right)}{3\sqrt[3]{3}}\right\}\right\}$$

✓ **Maple** : cpu = 0.05 (sec), leaf count = 58

$$\left\{y(x) = \_C1\, {}_1\mathrm{F}_2(\frac{n}{3};\frac{1}{3},\frac{2}{3};\frac{x^3}{9}) + \_C2\, x {}_1\mathrm{F}_2(\frac{1}{3}+\frac{n}{3};\frac{2}{3},\frac{4}{3};\frac{x^3}{9}) + \_C3\, x^2 {}_1\mathrm{F}_2(\frac{2}{3}+\frac{n}{3};\frac{4}{3},\frac{5}{3};\frac{x^3}{9})\right\}$$

2.1534 ODE No. 1534

$$y^{(4)}(x) = 0$$

✓ **Mathematica** : cpu = 0.0036549 (sec), leaf count = 24

$$\{\{y(x) \to c_4 x^3 + c_3 x^2 + c_2 x + c_1\}\}$$

✓ **Maple** : cpu = 0.008 (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 = 0.348502 (sec), leaf count = 223

$$\left\{\left\{y(x) \to e^{-x}\left(\cos(x)\int_1^x \frac{1}{8}e^{K[1]}f(K[1])(\cos(K[1]) - \sin(K[1]))\left(\cos^2(K[1]) + \sin^2(K[1])\right)dK[1] + \sin(x\right.\right.\right.$$

✓ **Maple** : cpu = 0.013 (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 = 0.0037967 (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 = 0.01 (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 = 1.00329 (sec), leaf count = 1722

$$\left\{\left\{y(x) \to \frac{1}{12}e^{-\left(\sqrt{2\left(3-\sqrt{6}\right)}-x\right)x-\sqrt{2\left(3+\sqrt{6}\right)}x-\sqrt{2\left(3-\sqrt{6}\right)}x}\left(-2\sqrt{3+\sqrt{6}}e^{\sqrt{2\left(3+\sqrt{6}\right)}x+2\sqrt{2\left(3-\sqrt{6}\right)}x}x^3 + 2\sqrt{3+\right.\right.\right.$$

✓ **Maple** : cpu = 0.09 (sec), leaf count = 67

$$\left\{y(x) = e^{x^2} + \_C1\, e^{\sqrt{6-2\sqrt{6}}x} + \_C2\, e^{\sqrt{6+2\sqrt{6}}x} + \_C3\, e^{-\sqrt{6-2\sqrt{6}}x} + \_C4\, e^{-\sqrt{6+2\sqrt{6}}x}\right\}$$

2.1538 ODE No. 1538

$$a^4y(x) + 2a^2y''(x) - \cosh(ax) + y^{(4)}(x) = 0$$

✓ **Mathematica** : cpu = 0.170429 (sec), leaf count = 66

$$\left\{\left\{y(x) \to \frac{\cos^2(ax)\cosh(ax) + \sin^2(ax)\cosh(ax)}{4a^4} + c_3\sin(ax) + c_4x\sin(ax) + c_1\cos(ax) + c_2x\cos(ax)\right\}\right.$$

✓ **Maple** : cpu = 0.359 (sec), leaf count = 51

$$\left\{y(x) = \frac{e^{-ax} + (8\_C3\,x + 8\_C1)\,a^4\cos(ax) + (8\_C4\,x + 8\_C2)\,a^4\sin(ax) + e^{ax}}{8\,a^4}\right\}$$

2.1539 ODE No. 1539

$$a^4\lambda y(x) + a^2(\lambda+1)y''(x) + y^{(4)}(x) = 0$$

✓ **Mathematica** : cpu = 0.0062766 (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 = 0.019 (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 = 0.266418 (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

$$\left\{y(x) = DESol\left(\left\{\lambda\_Y(x) + ab\frac{d}{dx}\_Y(x) + a(bx-1)\frac{d^2}{dx^2}\_Y(x) + \frac{d^4}{dx^4}\_Y(x)\right\},\{\_Y(x)\}\right)\right\}$$

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 = 80.1613 (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 = 0.0201287 (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 = 0.0654751 (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 = 0.0110015 (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 = 0.01 (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 = 0.725697 (sec), leaf count = 40

$$\left\{\left\{y(x)\to c_1e^{-2x}+c_2e^{-2x}x+c_3e^x+c_4e^xx+\sin(2x)\right\}\right\}$$

✓ **Maple** : cpu = 0.079 (sec), leaf count = 27

$$\left\{y(x)=\left(\_C4\,x+\_C2\right)\mathrm{e}^{-2\,x}+\sin\left(2\,x\right)+\left(\_C3\,x+\_C1\right)\mathrm{e}^{x}\right\}$$

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 = 0.538687 (sec), leaf count = 300

$$\left\{\left\{y(x)\to\frac{2(\sqrt{6}-3)\sqrt{-(\sqrt{6}-3)\,a}c_3\exp\left(-\frac{ax^2}{2}-\sqrt{-(\sqrt{6}-3)\,a}x-\frac{\left(-3+\sqrt{3}+\sqrt{6}\right)ax}{\sqrt{-\left(\sqrt{6}-3\right)a}}\right)}{\left(-3-\sqrt{3}+\sqrt{6}\right)\left(-3+\sqrt{3}+\sqrt{6}\right)a}-\frac{2(\sqrt{6}-3)}{}\right.\right.$$

✓ **Maple** : cpu = 0.029 (sec), leaf count = 73

$$\left\{y(x)=\mathrm{e}^{-\frac{ax^2}{2}}\left(\_C2\,\mathrm{e}^{\sqrt{-a\left(-3+\sqrt{6}\right)}x}+\_C4\,\mathrm{e}^{\sqrt{\left(3+\sqrt{6}\right)ax}}+\_C1\,\mathrm{e}^{-\sqrt{-a\left(-3+\sqrt{6}\right)}x}+\_C3\,\mathrm{e}^{-\sqrt{\left(3+\sqrt{6}\right)ax}}\right)\right\}$$

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 = 0.0237531 (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 = 0.011 (sec), leaf count = 87

$$\left\{y(x)=\sum_{\_a=1}^{4}\mathrm{e}^{RootOf\left(\_Z^4+6f\_Z^3+(11f^2+4df+10g)\_Z^2+(6f^3+7dff+30fg+ddf+10dg)\_Z+18f^2g+6dfg+15dgf+9g^2+3ddg,\right.}\right.$$

2.1548 ODE No. 1548

$$4y^{(4)}(x)-12y^{(3)}(x)+11y''(x)-3y'(x)-4\cos(x)=0$$

✓ **Mathematica** : cpu = 0.0815867 (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 = 0.052 (sec), leaf count = 32

$$\left\{y(x)=\_C1\,\mathrm{e}^x+2\_C2\,\mathrm{e}^{x/2}+\frac{2\_C3}{3}\mathrm{e}^{\frac{3x}{2}}+\frac{18\sin(x)}{65}-\frac{14\cos(x)}{65}+\_C4\right\}$$

2.1549 ODE No. 1549

$$xy^{(4)}(x)+5y^{(3)}(x)-24=0$$

✓ **Mathematica** : cpu = 0.0122743 (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 = 0.014 (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 = 3.08225 (sec), leaf count = 270

$$\left\{\left\{y(x) \to c_3e^{\frac{x^2}{2}}\int_1^x \frac{e^{\frac{K[1]^2}{2}}\left(\int \frac{\exp\left(\frac{1}{4}\sqrt{5}K[1]^2+\frac{1}{2}\left(-\frac{1}{2}K[1]^2-2\log(K[1])\right)\right)U\left(-\frac{-9+\sqrt{5}}{4\sqrt{5}},-\frac{1}{2},-\frac{1}{2}\sqrt{5}K[1]^2\right)}{\sqrt{K[1]}\sqrt[4]{K[1]^2}}dK[1]\right)K[1]}{\sqrt[4]{2}}dK[1\right.\right.$$

✓ **Maple** : cpu = 1.279 (sec), leaf count = 157

$$\left\{y(x) = -e^{x^2}\int 1W_{\frac{9\sqrt{5}}{20},\frac{3}{4}}\left(\frac{\sqrt{5}x^2}{2}\right)e^{-\frac{x^2}{4}}x^{-\frac{3}{2}}\,dx\_C4 - e^{x^2}\int 1M_{\frac{9\sqrt{5}}{20},\frac{3}{4}}\left(\frac{\sqrt{5}x^2}{2}\right)e^{-\frac{x^2}{4}}x^{-\frac{3}{2}}\,dx\_C3 + \int 1W_{\frac{9}{}}\right.$$

2.1551 ODE No. 1551

$$-2\left(\nu^2x^2+6\right)y''(x) + \nu^2\left(\nu^2x^2+4\right)y(x) + x^2y^{(4)}(x) = 0$$

✓ **Mathematica** : cpu = 0.30286 (sec), leaf count = 110

$$\left\{\left\{y(x) \to \frac{c_3(1-x)e^{-\nu x}(\nu^2x^2+\nu^2x+\nu^2+6\nu x+6\nu+15)}{x} + \frac{c_4(1-x)e^{\nu x}(\nu^2x^2+\nu^2x+\nu^2-6\nu x-6\nu}{x}\right.\right.$$

✓ **Maple** : cpu = 0.144 (sec), leaf count = 62

$$\left\{y(x) = \frac{(\_C4\,\nu^2x^3+6\_C4\,\nu\,x^2+15\_C4\,x+\_C2)\,e^{-\nu\,x}+e^{\nu\,x}(\_C3\,\nu^2x^3-6\_C3\,\nu\,x^2+15\_C3\,x+}{x}\right.$$

2.1552 ODE No. 1552

$$ay(x) - bx^2 + x^2y^{(4)}(x) + 2xy^{(3)}(x) = 0$$

✗ **Mathematica** : cpu = 300.003 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.049 (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 = 0.0092852 (sec), leaf count = 29

$$\{\{y(x) \to c_2(-x) + c_4x + c_2x\log(x) - c_1\log(x) + c_3\}\}$$

✓ **Maple** : cpu = 0.007 (sec), leaf count = 17

$$\{y(x) = (\_C2\ x + \_C4)\ln(x) + \_C1\ x + \_C3\}$$

2.1554 ODE No. 1554

$$x^2y^{(4)}(x) + 6xy^{(3)}(x) + 6y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0088841 (sec), leaf count = 29

$$\left\{\left\{y(x) \to c_4x + \frac{1}{2}\left(\frac{c_1}{x} - 2c_2\log(x)\right) + c_3\right\}\right\}$$

✓ **Maple** : cpu = 0.009 (sec), leaf count = 18

$$\left\{y(x) = \_C1 + \_C2\ \ln(x) + \frac{\_C3}{x} + \_C4\ x\right\}$$

2.1555 ODE No. 1555

$$\lambda^2(-y(x)) + x^2y^{(4)}(x) + 6xy^{(3)}(x) + 6y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0473522 (sec), leaf count = 156

$$\left\{\left\{y(x) \to c_4 G_{0,4}^{2,0}\left(\frac{\lambda^2x^2}{16}\middle| \begin{array}{c} \\ -\frac{1}{2},\frac{1}{2},0,0 \end{array}\right) + c_2 G_{0,4}^{2,0}\left(\frac{\lambda^2x^2}{16}\middle| \begin{array}{c} \\ 0,0,-\frac{1}{2},\frac{1}{2} \end{array}\right) + \frac{c_1\left(J_1\left(2\sqrt{\lambda}\sqrt{x}\right) + I_1\left(2\sqrt{\lambda}\sqrt{x}\right)\right)}{2\sqrt{\lambda}\sqrt{x}}\right.\right.$$

✓ **Maple** : cpu = 0.097 (sec), leaf count = 61

$$\left\{y(x) = 1\left(\_C4\ Y_1\left(2\sqrt{-\lambda}\sqrt{x}\right) + \_C3\ J_1\left(2\sqrt{-\lambda}\sqrt{x}\right) + \_C2\ Y_1\left(2\sqrt{\lambda}\sqrt{x}\right) + \_C1\ J_1\left(2\sqrt{\lambda}\sqrt{x}\right)\right)\frac{1}{\sqrt{x}}\right.$$

2.1556 ODE No. 1556

$$x^2y^{(4)}(x) + 8xy^{(3)}(x) + 12y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0092124 (sec), leaf count = 30

$$\left\{\left\{y(x) \to \frac{1}{6}\left(\frac{c_1}{x^2} + \frac{3c_2}{x}\right) + c_4x + c_3\right\}\right\}$$

✓ **Maple** : cpu = 0.009 (sec), leaf count = 19

$$\left\{y(x) = \_C1 + \frac{\_C2}{x^2} + \frac{\_C3}{x} + \_C4\ x\right\}$$

2.1557 ODE No. 1557

$$\lambda^2(-y(x)) + x^2y^{(4)}(x) + 8xy^{(3)}(x) + 12y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0506758 (sec), leaf count = 146

$$\left\{\left\{y(x) \to c_4 G_{0,4}^{2,0}\left(\frac{\lambda^2x^2}{16}\middle| \begin{array}{c} \\ -1,0,-\frac{1}{2},\frac{1}{2} \end{array}\right) + c_2 G_{0,4}^{2,0}\left(\frac{\lambda^2x^2}{16}\middle| \begin{array}{c} \\ -\frac{1}{2},\frac{1}{2},-1,0 \end{array}\right) - \frac{3ic_1\left(I_2\left(2\sqrt{\lambda}\sqrt{x}\right) - J_2\left(2\sqrt{\lambda}\right.\right.}{4\lambda x}\right.\right.$$

✓ **Maple** : cpu = 0.07 (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 = 0.113166 (sec), leaf count = 319

$$\left\{\left\{y(x) \to c_4 i^{-n+\nu+1}2^{3n-3\nu-3}b^{2(-n+\nu+1)+n-\nu-2}x^{\frac{1}{2}(n-\nu-2)-n+\nu+1}\Gamma(-n+\nu+2)\left(I_{\nu-n}(b\sqrt{x}) - J_{\nu-n}(b\sqrt{x})\right)\right.\right.$$

✓ **Maple** : cpu = 0.102 (sec), leaf count = 67

$$\left\{y(x) = x^{-\frac{n}{2}+\frac{\nu}{2}}\left(Y_{n-\nu}(b\sqrt{x})\_C4 + J_{n-\nu}(b\sqrt{x})\_C2 + K_{n-\nu}(b\sqrt{x})\_C3 + I_{n-\nu}(b\sqrt{x})\_C1\right)\right\}$$

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 = 0.203156 (sec), leaf count = 100

$$\left\{\left\{y(x) \to c_4 G_{0,4}^{2,0}\left(\frac{a^4x^4}{256}\middle|\ 0,0,\tfrac{1}{2},\tfrac{1}{2}\right) + c_2 G_{0,4}^{2,0}\left(\frac{a^4x^4}{256}\middle|\ \tfrac{1}{2},\tfrac{1}{2},0,0\right) + \frac{1}{8}ic_1(I_0(ax) - J_0(ax)) + \frac{1}{2}c_3(J_0(ax)\right.\right.$$

✓ **Maple** : cpu = 0.102 (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 = 0.0069091 (sec), leaf count = 29

$$\left\{\left\{y(x) \to c_4x + \frac{1}{2}\left(\frac{c_1}{x} - 2c_2\log(x)\right) + c_3\right\}\right\}$$

✓ **Maple** : cpu = 0.006 (sec), leaf count = 18

$$\left\{y(x) = \_C1 + \_C2\ \ln(x) + \frac{\_C3}{x} + \_C4\ x\right\}$$

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 = 2.9797 (sec), leaf count = 400

$$\left\{\left\{y(x)\to c_1\left(-2^{n-\frac{5}{2}}\right)\sqrt{x}a^{\frac{2-n}{4}+\frac{1}{4}\left(n-\frac{3}{2}\right)}\Gamma\left(\frac{3}{2}-n\right)\left(\cos\left(\frac{3}{4}\pi\left(\frac{3}{2}-n\right)\right)\mathrm{ber}_{-n-\frac{1}{2}}(\sqrt[4]{a}x)+\sin\left(\frac{3}{4}\pi\left(\frac{3}{2}-\right.\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.167 (sec), leaf count = 69

$$\left\{y(x)=\sqrt{x}\left(Y_{n+\frac{1}{2}}(\sqrt[4]{-a}x)\_C2+J_{n+\frac{1}{2}}(\sqrt[4]{-a}x)\_C1+Y_{n+\frac{1}{2}}\left(\sqrt{-\sqrt{-a}}x\right)\_C4+J_{n+\frac{1}{2}}\left(\sqrt{-\sqrt{-a}}x\right)\_\right.\right.$$

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 = 0.831439 (sec), leaf count = 140

$$\left\{\left\{y(x)\to c_1\,{}_0F_3\left(;\frac{1}{2},1-\frac{n}{2},\frac{n}{2}+1;\frac{x^4}{64}\right)+\frac{1}{8}ic_2x^2\,{}_0F_3\left(;\frac{3}{2},\frac{3}{2}-\frac{n}{2},\frac{n}{2}+\frac{3}{2};\frac{x^4}{64}\right)+c_3\left(\frac{i}{2}\right)^{-n}\Gamma(1-n)^2\,(\mathrm{b}\right.\right.$$

✓ **Maple** : cpu = 0.228 (sec), leaf count = 77

$$\left\{y(x)=\left(Y_n\left(\left(\frac{1}{2}-\frac{i}{2}\right)\sqrt{2}x\right)\_C3+J_n\left(\left(\frac{1}{2}-\frac{i}{2}\right)\sqrt{2}x\right)\_C1\right)J_n\left(\left(\frac{1}{2}+\frac{i}{2}\right)\sqrt{2}x\right)+Y_n\left(\left(\frac{1}{2}+\frac{i}{2}\right)\right.\right.$$

2.1563 ODE No. 1563

$$\left(4n^2-4x^4-1\right)y(x)-\left(4n^2-1\right)x^2y''(x)-\left(4n^2-1\right)xy'(x)+x^4y^{(4)}(x)+4x^3y^{(3)}(x)=0$$

✓ **Mathematica** : cpu = 1.51146 (sec), leaf count = 232

$$\left\{\left\{y(x)\to\frac{\sqrt[4]{-1}c_2x\,{}_0F_3\left(;\frac{3}{2},1-\frac{n}{2},\frac{n}{2}+1;\frac{x^4}{64}\right)}{2\sqrt{2}}-\frac{2(-1)^{3/4}\sqrt{2}c_1\,{}_0F_3\left(;\frac{1}{2},\frac{1}{2}-\frac{n}{2},\frac{n}{2}+\frac{1}{2};\frac{x^4}{64}\right)}{x}+c_3(-1)^{\frac{1}{4}(1-2n}\right.\right.$$

✓ **Maple** : cpu = 0.16 (sec), leaf count = 87

$$\left\{y(x)=\frac{1}{x}\left(\_C4\,{}_0\mathrm{F}_3(\,;\frac{1}{2},-\frac{n}{2}+\frac{1}{2},\frac{n}{2}+\frac{1}{2};\frac{x^4}{64})+\left(\_C3\,{}_0\mathrm{F}_3(\,;\frac{3}{2},1+\frac{n}{2},1-\frac{n}{2};\frac{x^4}{64})+\_C2\,(\mathrm{bei}_{-n}(x))^2\right.\right.\right.$$

2.1564 ODE No. 1564

$$-\left(12n^2+4x^4-3\right)y(x)-\left(4n^2+3\right)x^2y''(x)+\left(12n^2-3\right)xy'(x)+x^4y^{(4)}(x)+4x^3y^{(3)}(x)=0$$

✓ **Mathematica** : cpu = 1.00919 (sec), leaf count = 230

$$\left\{\left\{y(x)\to\frac{\sqrt[4]{-1}c_1x\,{}_0F_3\left(;\frac{1}{2},\frac{3}{2}-\frac{n}{2},\frac{n}{2}+\frac{3}{2};\frac{x^4}{64}\right)}{2\sqrt{2}}+c_3(-1)^{\frac{1}{4}(-2n-1)}2^{2n+\frac{1}{2}(2n+1)+1}x^{-2n-1}\,{}_0F_3\left(;1-n,\frac{1}{2}-\frac{n}{2},\right.\right.\right.$$

✓ **Maple** : cpu = 0.138 (sec), leaf count = 88

$$\left\{y(x)=\frac{1}{x}\left(\_C4\,x^2{}_0\mathrm{F}_3(\,;\,\frac{1}{2},\frac{3}{2}+\frac{n}{2},\frac{3}{2}-\frac{n}{2};\,\frac{x^4}{64})+\_C3\,x^4{}_0\mathrm{F}_3(\,;\,\frac{3}{2},2-\frac{n}{2},2+\frac{n}{2};\,\frac{x^4}{64})+\_C2\,(\mathrm{bei}_{-n}(x))\right.\right.$$

2.1565 ODE No. 1565

$$\left(x\left(-\rho^2-\sigma^2+1\right)+16x^3\right)y'(x)+y(x)\left(\rho^2\sigma^2+8x^2\right)+\left(x^2\left(-\rho^2-\sigma^2+7\right)+4x^4\right)y''(x)+x^4y^{(4)}(x)+6x^3y^{(3)}$$

✓ **Mathematica** : cpu = 0.385456 (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 = 0.231 (sec), leaf count = 71

$$\left\{y(x)=\left(Y_{\frac{\rho}{2}-\frac{\sigma}{2}}(x)\_C2+\_C1\,J_{\frac{\rho}{2}-\frac{\sigma}{2}}(x)\right)J_{\frac{\rho}{2}+\frac{\sigma}{2}}(x)+Y_{\frac{\rho}{2}+\frac{\sigma}{2}}(x)\left(Y_{\frac{\rho}{2}-\frac{\sigma}{2}}(x)\_C4+J_{\frac{\rho}{2}-\frac{\sigma}{2}}(x)\_C3\right)\right\}$$

2.1566 ODE No. 1566

$$\left(x\left(-2\mu^2-2\nu^2+1\right)+16x^3\right)y'(x)+y(x)\left(\left(\mu^2-\nu^2\right)^2+8x^2\right)+\left(x^2\left(-2\mu^2-2\nu^2+7\right)+4x^4\right)y''(x)+x^4y^{(4)}($$

✓ **Mathematica** : cpu = 0.454169 (sec), leaf count = 238

$$\left\{\left\{y(x)\to c_1x^{-\mu-\nu}\,{}_2F_3\left(-\frac{\mu}{2}-\frac{\nu}{2}+\frac{1}{2},-\frac{\mu}{2}-\frac{\nu}{2}+1;1-\mu,1-\nu,-\mu-\nu+1;-x^2\right)+c_2x^{\mu-\nu}\,{}_2F_3\left(\frac{\mu}{2}-\right.\right.\right.$$

✓ **Maple** : cpu = 0.207 (sec), leaf count = 35

$$\{y(x)=(Y_\mu(x)\_C2+J_\mu(x)\_C1)\,J_\nu(x)+Y_\nu(x)(Y_\mu(x)\_C4+\_C3\,J_\mu(x))\}$$

2.1567 ODE No. 1567

$$x^4y^{(4)}(x) + 8x^3y^{(3)}(x) + 12x^2y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0094639 (sec), leaf count = 30

$$\left\{\left\{y(x) \to \frac{1}{6}\left(\frac{c_1}{x^2} + \frac{3c_2}{x}\right) + c_4x + c_3\right\}\right\}$$

✓ **Maple** : cpu = 0.009 (sec), leaf count = 19

$$\left\{y(x) = \_C1 + \frac{\_C2}{x^2} + \frac{\_C3}{x} + \_C4\,x\right\}$$

2.1568 ODE No. 1568

$$ay(x) + x^4y^{(4)}(x) + 8x^3y^{(3)}(x) + 12x^2y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0087693 (sec), leaf count = 122

$$\left\{\left\{y(x) \to c_1x^{\frac{1}{2}\left(-\sqrt{5-4\sqrt{1-a}}-1\right)} + c_2x^{\frac{1}{2}\left(\sqrt{5-4\sqrt{1-a}}-1\right)} + c_3x^{\frac{1}{2}\left(-\sqrt{4\sqrt{1-a}+5}-1\right)} + c_4x^{\frac{1}{2}\left(\sqrt{4\sqrt{1-a}+5}-1\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.019 (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 = 300.047 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.29 (sec), leaf count = 63

$$\{y(x) = \left(\left(J_{\mu}(x^cb)\_C2 + Y_{\mu}(x^cb)\_C3\right)J_{\nu}(x^cb) + Y_{\nu}(x^cb)(\_C4\,Y_{\mu}(x^cb) + \_C1\,J_{\mu}(x^cb))\right)x^a\}$$

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 = 0.101622 (sec), leaf count = 470

$$\left\{\left\{y(x)\to c_1\Gamma(1-\nu)(-1)^{\frac{a-c\nu}{4c}}2^{-\frac{2(a-c\nu)}{c}-\nu-1}b^{\frac{a-c\nu}{c}+\nu}\left(x^{4c}\right)^{\frac{a-c\nu}{4c}+\frac{\nu}{4}}\left(J_{-\nu}\left(b\sqrt[4]{x^{4c}}\right)+I_{-\nu}\left(b\sqrt[4]{x^{4c}}\right)\right)+c_2\Gamma(2-\right.\right.$$

✓ **Maple** : cpu = 0.062 (sec), leaf count = 49

$$\{y(x)=x^a(Y_\nu(x^cb)\_C2+Y_\nu(ibx^c)\_C4+J_\nu(ibx^c)\_C3+J_\nu(x^cb)\_C1)\}$$

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 = 0.0633978 (sec), leaf count = 390

$$\left\{\left\{y(x)\to c_1\,{}_0F_3\left(;1-\frac{v}{2},1-\frac{v}{2\nu},-\frac{v}{2\nu}-\frac{v}{2}+1;\frac{b^4v^4x^{2/v}}{256\nu^4}\right)+c_2\left(\frac{i}{16}\right)^v v^{2v}b^{2v}\nu^{-2v}\left(x^{2/v}\right)^{v/2}\,{}_0F_3\left(;\frac{v}{2}+1,\right.\right.\right.$$

✓ **Maple** : cpu = 0.144 (sec), leaf count = 143

$$\left\{y(x)=\sqrt{x}\left(Y_{(\lfloor\nu^{-1}\rfloor)^{-1}}\left(\frac{1}{\lfloor\nu^{-1}\rfloor}\sqrt{\frac{b^2}{\nu^2}}x^{\frac{\lfloor\nu^{-1}\rfloor}{2}}\right)\_C2+J_{(\lfloor\nu^{-1}\rfloor)^{-1}}\left(\frac{1}{\lfloor\nu^{-1}\rfloor}\sqrt{\frac{b^2}{\nu^2}}x^{\frac{\lfloor\nu^{-1}\rfloor}{2}}\right)\_C1+Y_{(\lfloor\nu^{-1}\rfloor)^{-1}}\left(\frac{}{\lfloor\nu\right.\right.\right.$$

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 = 90.1062 (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 = 0.251 (sec), leaf count = 35

$$\{y(x)=(LegendreQ(\mu,x)\_C2+LegendreP(\mu,x)\_C1)\,LegendreP(\nu,x)+LegendreQ(\nu,x)\,(LegendreQ($$

2.1573 ODE No. 1573

$$-\frac{1}{x^5} + (2x + e^x)\, y^{(4)}(x) + 4(e^x + 2)\, y^{(3)}(x) + 6e^x y''(x) + 4e^x y'(x) + e^x y(x) = 0$$

✗ **Mathematica** : cpu = 0.0395448 (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 = 0.026 (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 = 0.133596 (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 = 0.508 (sec), leaf count = 252

$$\left\{ y(x) = \sin(x) \left({}_2F_1\left(\frac{3}{4} + \frac{1}{4}\sqrt{-4\sqrt{-(a-1)(a+1)(a^2+1)} + 5}, \frac{3}{4} - \frac{1}{4}\sqrt{-4\sqrt{-(a-1)(a+1)(a^2+\right.\right.\right.$$

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 = 0.0441519 (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 = 0.519 (sec), leaf count = 638

$$\left\{ y(x) = \frac{1}{48\,(e^{2ix} - 1)^4 \sin(x)} \left(12\, f\left(e^{6ix} - 1/4\, e^{8ix} + e^{2ix} - 3/2\, e^{4ix} - 1/4\right) \left(x^2 + \frac{20}{3}\right) x \ln\left(1 - e^{ix}\right) - \right.\right.$$

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 = 0.158001 (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 = 0.016 (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 = 0.0569354 (sec), leaf count = 46

$$\left\{\left\{y(x)\to\int_1^x\int_1^{K[2]}\left(\frac{c_1}{f(K[1])}+\frac{c_2K[1]}{f(K[1])}\right)dK[1]dK[2]+c_4x+c_3\right\}\right\}$$

✓ **Maple** : cpu = 0.004 (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 = 47.2958 (sec), leaf count = 141

$$\left\{\left\{y(x)\to c_3e^{-ax}\int_1^x 2ae^{2aK[1]}\int e^{-aK[1]}\mathrm{Ai}\left(\frac{a^2+\lambda K[1]a-b\lambda}{(a\lambda)^{2/3}}\right)dK[1]dK[1]+c_4e^{-ax}\int_1^x 2ae^{2aK[2]}\int e^{-}$$

✓ **Maple** : cpu = 0.287 (sec), leaf count = 89

$$\left\{y(x)=e^{ax}\left(\int e^{-2\,ax}\left(\int e^{ax}\left(\_C4\,\mathrm{Bi}\left(-\frac{\lambda\,(ax-b)+a^2}{a\lambda}\sqrt[3]{-a\lambda}\right)+\mathrm{Ai}\left(-\frac{\lambda\,(ax-b)+a^2}{a\lambda}\sqrt[3]{-a\lambda}\right)\_C3\right)\right.\right.\right.$$

2.1579 ODE No. 1579

$$-ax - b\sin(x) - c\cos(x) + y^{(n)}(x) + 2y^{(3)}(x) + y'(x) = 0$$

✓ **Mathematica** : cpu = 0.911319 (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 = 0.283 (sec), leaf count = 69

$$\left\{y(x) = \frac{(bx^2 + (-4c - 8\_C4)x - 6b - 8\_C2 + 8\_C3)\cos(x)}{8} + \frac{(-cx^2 + (-4b + 8\_C3)x + 6c + 8}{8}\right.$$

2.1580 ODE No. 1580

$$y^{(6)}(x) + y(x) - \sin\left(\frac{x}{2}\right)\sin\left(\frac{3x}{2}\right) = 0$$

✓ **Mathematica** : cpu = 2.38973 (sec), leaf count = 234

$$\left\{\left\{y(x) \to c_4e^{-\frac{\sqrt{3}x}{2}}\sin\left(\frac{x}{2}\right) + c_6e^{\frac{\sqrt{3}x}{2}}\sin\left(\frac{x}{2}\right) + c_5\sin(x) + c_1e^{\frac{\sqrt{3}x}{2}}\cos\left(\frac{x}{2}\right) + c_3e^{-\frac{\sqrt{3}x}{2}}\cos\left(\frac{x}{2}\right) + c_2\cos(x)\right.\right.$$

✓ **Maple** : cpu = 0.659 (sec), leaf count = 79

$$\left\{y(x) = \frac{1}{504}(504\cos(x/2)\_C3 + 504\sin(x/2)\_C4)\,\mathrm{e}^{-\frac{\sqrt{3}x}{2}} + \frac{1}{504}(504\cos(x/2)\_C5 + 504\sin(x/2)\_\right.$$

2.1581 ODE No. 1581

$$-axy(x) - b + y^{(5)}(x) = 0$$

✗ **Mathematica** : cpu = 0.133685 (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 = 0.117428 (sec), leaf count = 787

$$\left\{\left\{y(x)\to c_5\left(\frac{4}{\nu}+1\right)^{-\frac{16}{\nu+4}}\nu^{-\frac{16}{\nu+4}}a^{\frac{4}{\nu+4}}(x^{\nu})^{\frac{4\left(\frac{4}{\nu}+1\right)}{\nu+4}}\,{}_1F_4\left(\frac{4}{\nu\left(1+\frac{4}{\nu}\right)}+\frac{1}{1+\frac{4}{\nu}};1+\frac{1}{\left(1+\frac{4}{\nu}\right)\nu},1+\frac{2}{\left(1+\frac{4}{\nu}\right)\nu},\right.\right.\right.$$

✗ **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 = 0.0937416 (sec), leaf count = 92

$$\left\{\left\{y(x)\to\int_1^x\int_1^{K[5]}\int_1^{K[4]}\int_1^{K[3]}\left(e^{-aK[2]}c_1+e^{-aK[2]}\int_1^{K[2]}e^{aK[1]}f(K[1])dK[1]\right)dK[2]dK[3]dK[4]dK[5\right.\right.$$

✓ **Maple** : cpu = 0.023 (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 = 2.13808 (sec), leaf count = 216

$$\left\{\left\{y(x)\to c_5 5^{-5m-4}a^{\frac{1}{5}(5m+4)}x^{5m+4}\,{}_0F_4\left(;m+\frac{6}{5},m+\frac{7}{5},m+\frac{8}{5},m+\frac{9}{5};-\frac{ax^5}{3125}\right)+\frac{1}{125}a^{3/5}c_4x^3\,{}_0F_4\left(;\frac{6}{5},\right.\right.\right.$$

✓ **Maple** : cpu = 0.142 (sec), leaf count = 118

$$\left\{y(x)=\_C1\,{}_0F_4(\,;\frac{2}{5},\frac{3}{5},\frac{4}{5},\frac{1}{5}-m;-\frac{x^5a}{3125})+\_C2\,x\,{}_0F_4(\,;\frac{3}{5},\frac{4}{5},\frac{6}{5},\frac{2}{5}-m;-\frac{x^5a}{3125})+\_C3\,x^2{}_0F_4(\,;\frac{4}{5},\right.$$

2.1585 ODE No. 1585

$$xy(x)\left(ay'(x)+by''(x)+cy^{(3)}(x)+ey^{(4)}(x)\right)=0$$

✓ **Mathematica** : cpu = 0.160597 (sec), leaf count = 214

$$\left\{\{y(x)\to 0\},\left\{y(x)\to \frac{c_1 e^{x\text{Root}\left[\#1^3+\frac{\#1^2 c}{e}+\frac{\#1 b}{e}+\frac{a}{e}\&,1\right]}}{\text{Root}\left[\#1^3+\frac{\#1^2 c}{e}+\frac{\#1 b}{e}+\frac{a}{e}\&,1\right]}+\frac{c_2 e^{x\text{Root}\left[\#1^3+\frac{\#1^2 c}{e}+\frac{\#1 b}{e}+\frac{a}{e}\&,2\right]}}{\text{Root}\left[\#1^3+\frac{\#1^2 c}{e}+\frac{\#1 b}{e}+\frac{a}{e}\&,2\right]}+\frac{c_3 e}{\text{Root}}\right.\right.$$

✓ **Maple** : cpu = 0.027 (sec), leaf count = 679

$$\left\{y(x)=0,y(x)=\_C4\ \mathrm{e}^{\frac{x}{6e}\left(\left(12\sqrt{3}\sqrt{27a^2e^2+(-18abc+4b^3)e+4c^3a-b^2c^2}e-108ae^2+36bce-8c^3\right)^{\frac{2}{3}}-2c\sqrt[3]{12\sqrt{3}\sqrt{27a^2e^2+(-18}}\right.}\right.$$

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 = 83.0705 (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

$$\left\{y(x)=\int DESol\left(\left\{-\frac{(axA_2-xA_1+A_2)\_Y(x)}{x}-\frac{(axA_3-xA_2+A_3)\frac{\mathrm{d}}{\mathrm{d}x}\_Y(x)}{x}-\frac{(axA_4-xA_3+A}{x}\right.\right.\right.$$

2.1587 ODE No. 1587

$$x^5y^{(10)}(x)-ay(x)=0$$

✓ **Mathematica** : cpu = 0.268886 (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 = 0.306 (sec), leaf count = 154

$$\left\{y(x) = x^{\frac{5}{2}}\left(\_C10\, Y_5\left(2\,(-1)^{\frac{9}{10}}\, a^{1/10}\sqrt{x}\right) + \_C8\, Y_5\left(2\,(-1)^{3/10}\, a^{1/10}\sqrt{x}\right) + \_C9\, Y_5\left(2\,(-1)^{\frac{7}{10}}\, a^{1/10}\sqrt{x}\right) \right.\right.$$

2.1588 ODE No. 1588

$$x^{10}y^{(5)}(x) - ay(x) = 0$$

✓ **Mathematica** : cpu = 10.0839 (sec), leaf count = 114

$$\left\{\left\{y(x) \to c_1x^4e^{-\frac{\sqrt[5]{a}}{x}} + c_2x^4e^{\frac{\sqrt[5]{-1}\,\sqrt[5]{a}}{x}} + c_3x^4e^{-\frac{(-1)^{2/5}\,\sqrt[5]{a}}{x}} + c_4x^4e^{\frac{(-1)^{3/5}\,\sqrt[5]{a}}{x}} + c_5x^4e^{-\frac{(-1)^{4/5}\,\sqrt[5]{a}}{x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.082 (sec), leaf count = 90

$$\left\{y(x) = \_C1\; {}_0\mathrm{F}_4(\;;\frac{6}{5},\frac{7}{5},\frac{8}{5},\frac{9}{5};-\frac{a}{3125\,x^5}) + \_C2\; x\,{}_0\mathrm{F}_4(\;;\frac{4}{5},\frac{6}{5},\frac{7}{5},\frac{8}{5};-\frac{a}{3125\,x^5}) + \_C3\; x^2\,{}_0\mathrm{F}_4(\;;\frac{3}{5},\frac{4}{5},\frac{6}{5}\right.$$

2.1589 ODE No. 1589

$$x^{11/2}y^{(11)}(x) - ay(x) = 0$$

✓ **Mathematica** : cpu = 0.0327609 (sec), leaf count = 670

$$\left\{\left\{y(x) \to \frac{4}{121}(-1)^{2/11}a^{2/11}c_2x\,{}_0F_{10}\left(;-\frac{7}{11},-\frac{5}{11},-\frac{3}{11},-\frac{1}{11},\frac{1}{11},\frac{3}{11},\frac{5}{11},\frac{7}{11},\frac{9}{11},\frac{13}{11};\frac{2048ax^{11/2}}{285311670611}\right) - \right.\right.$$

✓ **Maple** : cpu = 11.161 (sec), leaf count = 4355

2.1590 ODE No. 1590

$$(x-a)^5(x-b)^5y^{(5)}(x)-cy(x)=0$$

✗ **Mathematica** : cpu = 300.001 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 1.386 (sec), leaf count = 553

$$\left\{y(x)=\mathit{ODESolStruc}\left(\mathrm{e}^{\int -4\,\frac{\_g(\_f)\left((-b-\_f/4)\mathrm{e}^{\left(\int \_g(\_f)\,\mathrm{d}\_f+\_C1\right)(a-b)}+a+\_f/4\right)}{\mathrm{e}^{\left(\int \_g(\_f)\,\mathrm{d}\_f+\_C1\right)(a-b)}-1}\,\mathrm{d}\_f+\_C2},\left[\left\{\frac{1}{\left(\_g\left(\_f\right)\right)^{2}}\left(\left(\frac{\mathrm{d}^3}{\mathrm{d}\_f^3}\_g(\right.\right.\right.\right.\right.\right.$$

2.1591 ODE No. 1591

$$y''(x)-y(x)^2=0$$

✓ **Mathematica** : cpu = 0.0286731 (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 = 0.015 (sec), leaf count = 12

$$\{y(x)=6\ \mathit{WeierstrassP}(x+\_C1,0,\_C2)\}$$

2.1592 ODE No. 1592

$$y''(x)-6y(x)^2=0$$

✓ **Mathematica** : cpu = 0.0220555 (sec), leaf count = 14

$$\{\{y(x)\to\wp(x+c_1;0,c_2)\}\}$$

✓ **Maple** : cpu = 0.008 (sec), leaf count = 10

$$\{y(x)=\mathit{WeierstrassP}(x+\_C1,0,\_C2)\}$$

2.1593 ODE No. 1593

$$y''(x) - 6y(x)^2 - x = 0$$

✗ **Mathematica** : cpu = 18.6699 (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 = 0.331716 (sec), leaf count = 373

$$\text{Solve}\left[\frac{4\left(\text{Root}\left[4\#1^3 - 4\#1^2 + c_1\&, 2\right] - \text{Root}\left[4\#1^3 - 4\#1^2 + c_1\&, 3\right]\right)\left(y(x) - \text{Root}\left[4\#1^3 - 4\#1^2 + c_1\right.\right.}{\left(c_1 + 4y(x)^3 - 4y(x)^2\right)\left(\text{Root}\left[4\right.\right.}\right.$$

✓ **Maple** : cpu = 0.079 (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 = 20.0873 (sec), leaf count = 0 , could not solve

```
DSolve[c + b*x + a*y[x]^2 + Derivative[2][y][x] == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(diff(y(x),x),x)+a*y(x)^2+b*x+c=0,y(x))
```

2.1596 ODE No. 1596

$$a + y''(x) - 2y(x)^3 - xy(x) = 0$$

✗ **Mathematica** : cpu = 20.3806 (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 = 1.60292 (sec), leaf count = 242

$$\left\{\left\{y(x) \to -\frac{\sqrt[4]{2}\sqrt{c_1}\sqrt{\frac{i\sqrt{a}}{\sqrt{c_1}}}\operatorname{sn}\left(\frac{(-1)^{3/4}\sqrt{\sqrt{2}\sqrt{a}\sqrt{c_1}x^2+2\sqrt{2}\sqrt{a}\sqrt{c_1}c_2x+\sqrt{2}\sqrt{a}\sqrt{c_1}{c_2}^2}}{\sqrt{2}}\middle| -1\right)}{\sqrt{a}}\right\}, \left\{y(x) \to \frac{\sqrt[4]{2}\sqrt{c_1}\sqrt{\frac{i\sqrt{}}{\sqrt{c}}}}{}\right.\right.$$

✓ **Maple** : cpu = 0.017 (sec), leaf count = 21

$$\left\{y(x) = \_C2 \; JacobiSN\left(\left(\frac{x}{2}\sqrt{-2\,a} + \_C1\right)\_C2, i\right)\right\}$$

2.1598 ODE No. 1598

$$-2a^2y(x)^3 + 2abxy(x) - b + y''(x) = 0$$

✗ **Mathematica** : cpu = 21.6951 (sec), leaf count = 0 , could not solve

```
DSolve[-b + 2*a*b*x*y[x] - 2*a^2*y[x]^3 + Derivative[2][y][x] == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(diff(y(x),x),x)-2*a^2*y(x)^3+2*a*b*x*y(x)-b=0,y(x))
```

2.1599 ODE No. 1599

$$ay(x)^3 + bxy(x) + cy(x) + d + y''(x) = 0$$

✗ **Mathematica** : cpu = 20.6015 (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 = 1.69335 (sec), leaf count = 1017

$$\text{Solve}\left[\frac{4F\left(\sin^{-1}\left(\sqrt{\frac{(\text{Root}[3a\#1^4+4b\#1^3+6c\#1^2+12d\#1-6c_1\&,2]-\text{Root}[3a\#1^4+4b\#1^3+6c\#1^2+12d\#1-6c_1\&,4])(y(x)-\text{Root}[3a}{(\text{Root}[3a\#1^4+4b\#1^3+6c\#1^2+12d\#1-6c_1\&,1]-\text{Root}[3a\#1^4+4b\#1^3+6c\#1^2+12d\#1-6c_1\&,4])(y(x)-\text{Root}[3a}}\right.\right.\right.}{}\right.$$

✓ **Maple** : cpu = 0.056 (sec), leaf count = 89

$$\left\{\int^{y(x)} -6\frac{1}{\sqrt{-18\,a\_a^4-24\,b\_a^3-36\,c\_a^2-72\,d\_a+36\_C1}}d\_a - x - \_C2 = 0, \int^{y(x)} 6\frac{}{\sqrt{-18\,a\_a}}\right.$$

2.1601 ODE No. 1601

$$ax^r y(x)^n + y''(x) = 0$$

✗ **Mathematica** : cpu = 0.0277487 (sec), leaf count = 0 , could not solve

```
DSolve[a*x^r*y[x]^n + Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 2.981 (sec), leaf count = 151

$$\left\{y(x) = ODESolStruc\left(\_a\,e^{\int -\_b(\_a)\,d\_a + \_C1}, [\left\{\frac{d}{d\_a}\_b(\_a) = \frac{(a\_b(\_a)(n-1)^2\_a^n + (\_a(r+1+n}{(r}\right.\right.\right.$$

2.1602 ODE No. 1602

$$(n+1)a^{2n}y(x)^{2n+1}+y''(x)-y(x)=0$$

✓ **Mathematica** : cpu = 0.124669 (sec), leaf count = 47

$$\text{Solve}\left[\int_1^{y(x)}\frac{1}{\sqrt{c_1-K[1]^2\left(a^{2n}K[1]^{2n}-1\right)}}dK[1]^2=(c_2+x)^2,y(x)\right]$$

✓ **Maple** : cpu = 0.181 (sec), leaf count = 73

$$\left\{\int^{y(x)}\frac{1}{\sqrt{-a^{2n}\_a^{2n+2}+\_a^2+\_C1}}d\_a-x-\_C2=0,\int^{y(x)}-\frac{1}{\sqrt{-a^{2n}\_a^{2n+2}+\_a^2+\_C1}}d\_a-x$$

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 = 60.3824 (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 = 25.336 (sec), leaf count = 8427

2.1604 ODE No. 1604

$$y''(x)-e^{y(x)}=0$$

✓ **Mathematica** : cpu = 0.0408383 (sec), leaf count = 34

$$\left\{\left\{y(x)\to\log\left(\frac{1}{2}c_1\left(\tanh^2\left(\frac{1}{2}\sqrt{c_1(c_2+x)^2}\right)-1\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.18 (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 = 20.1625 (sec), leaf count = 0 , could not solve

```
DSolve[a*E^x*Sqrt[y[x]] + Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 0.942 (sec), leaf count = 107

$$\left\{y(x) = ODESolStruc\left(\frac{\_a}{\mathrm{e}^{-2\int \_b(\_a)\,\mathrm{d}\_a - 2\_C1}}, [\left\{\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a) = (\_b(\_a))^2\left(\sqrt{\_a}\_b(\_a)\,a + 4\_a\_b(\_\right.\right.\right.$$

2.1606 ODE No. 1606

$$y''(x) + e^x\sin(y(x)) = 0$$

✗ **Mathematica** : cpu = 20.5749 (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 = 0.0795254 (sec), leaf count = 79

$$\left\{\left\{y(x)\to -2\mathrm{am}\left(\frac{1}{2}\sqrt{(2a+c_1)(x+c_2)^2}|\frac{4a}{2a+c_1}\right)\right\},\left\{y(x)\to 2\mathrm{am}\left(\frac{1}{2}\sqrt{(2a+c_1)(x+c_2)^2}|\frac{4a}{2a+c_1}\right)\right.\right.$$

✓ **Maple** : cpu = 0.109 (sec), leaf count = 49

$$\left\{\int^{y(x)}\frac{1}{\sqrt{2\cos(\_a)\,a+\_C1}}d\_a - x - \_C2 = 0, \int^{y(x)} -\frac{1}{\sqrt{2\cos(\_a)\,a+\_C1}}d\_a - x - \_C2 = 0\right\}$$

2.1608 ODE No. 1608

$$a^2 \sin(y(x)) - b\sin(x) + y''(x) = 0$$

✗ **Mathematica** : cpu = 0.0344509 (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 = 0.0241782 (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 = 3.01079 (sec), leaf count = 754

$$\left\{\text{Solve}\left[\int_1^{y(x)} \frac{2}{\sqrt{x}\sqrt{\frac{K[3]^2+4xc_1+8x\int_1^{\frac{K[3]}{\sqrt{x}}} h(K[2])dK[2]}{x}}}dK[3] - \int_1^x \left(\frac{2\left(\frac{y(x)}{2\sqrt{K[4]}} - \frac{\sqrt{\frac{y(x)^2}{2K[4]}+2c_1+4\int_1^{\frac{y(x)}{\sqrt{K[4]}}} h(K[2])dK[2]}}{\sqrt{2}}\right.}{K[4]\sqrt{\frac{y(x)^2+4c_1K[4]+8K[4]\int_1^{\frac{y(x)}{\sqrt{K[4]}}} h(K[2])dK[2]}{K[4]}}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.183 (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 = 3.42827 (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 = 0.526 (sec), leaf count = 57

$$\left\{y(x) = ODESolStruc\left(\_a, [\left\{\left(\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a)\right)\_b(\_a) - 3\_b(\_a) - \_a^2 - 2\_a = 0\right\}, \left\{\_a = y(x), \_\right.\right.\right.$$

2.1612 ODE No. 1612

$$y''(x) - 7y'(x) - y(x)^{3/2} + 12y(x) = 0$$

✗ **Mathematica** : cpu = 21.4916 (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 = 0.983 (sec), leaf count = 57

$$\left\{y(x) = ODESolStruc\left(\_a, [\left\{\left(\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a)\right)\_b(\_a) - 7\_b(\_a) - \_a^{\frac{3}{2}} + 12\_a = 0\right\}, \left\{\_a = y(x), \right.\right.\right.$$

2.1613 ODE No. 1613

$$6a^2y(x) + 5ay'(x) + y''(x) - 6y(x)^2 = 0$$

✗ **Mathematica** : cpu = 1.85929 (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 = 0.017 (sec), leaf count = 27

$$\left\{y(x) = WeierstrassP\left(-\frac{\mathrm{e}^{-ax}}{a} + \_C1, 0, \_C2\right)\left(\mathrm{e}^{-ax}\right)^2\right\}$$

2.1614 ODE No. 1614

$$2a^2y(x) + 3ay'(x) + y''(x) - 2y(x)^3 = 0$$

✗ **Mathematica** : cpu = 0.941164 (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 = 0.052 (sec), leaf count = 33

$$\left\{y(x) = \frac{\_C2}{e^{ax}} JacobiSN\left(\left(-\frac{1}{a}\sqrt{-e^{-2\,ax}} + \_C1\right)\_C2, i\right)\right\}$$

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 = 76.2803 (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 = 3.733 (sec), leaf count = 91

$$\left\{y(x) = ODESolStruc\left(\_a, [\left\{\frac{1}{n^2}\left(-2\,(n+2)\,(n+1)\,\_a\,\_a^{\frac{n}{n+1}} + \left(\frac{d}{d\_a}\_b(\_a)\right)\_b(\_a)\,n^2 + (-3\,n^2\right.\right.\right.$$

2.1616 ODE No. 1616

$$\frac{1}{4}\left(a^2 - 1\right)y(x) + ay'(x) + by(x)^n + y''(x) = 0$$

✗ **Mathematica** : cpu = 16.6146 (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 = 0.85 (sec), leaf count = 63

$$\left\{y(x) = ODESolStruc\left(\_a, [\left\{\left(\frac{d}{d\_a}\_b(\_a)\right)\_b(\_a) + a\_b(\_a) + b\_a^n + \frac{\_a\,a^2}{4} - \frac{\_a}{4} = 0\right\}, \left\{\_a =\right.\right.\right.$$

2.1617 ODE No. 1617

$$ay'(x) + bx^r y(x)^n + y''(x) = 0$$

✗ **Mathematica** : cpu = 0.0320168 (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 = 26.6012 (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 = 1.241 (sec), leaf count = 56

$$\left\{y(x) = ODESolStruc\left(\_a, [\left\{\left(\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a)\right)\_b(\_a) + a\_b(\_a) + b\mathrm{e}^{\_a} - 2\,a = 0\right\}, \left\{\_a = y(x), \_b(\right.\right.\right.$$

2.1619 ODE No. 1619

$$ay'(x) + f(x)\sin(y(x)) + y''(x) = 0$$

✗ **Mathematica** : cpu = 0.0417926 (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 = 2.8407 (sec), leaf count = 492

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[\int_1^{\#1} \frac{2}{\frac{e^{6c_1}K[1]^4}{\sqrt[3]{e^{18c_1}K[1]^6 - 2e^{12c_1} + 2\sqrt{e^{24c_1} - e^{30c_1}K[1]^6}}} - K[1]^2 + e^{-6c_1}\sqrt[3]{e^{18c_1}K[1]^6 - 2e^{12c}\right.\right.\right.$$

✓ **Maple** : cpu = 0.086 (sec), leaf count = 253

$$\left\{\int^{y(x)} \left(\frac{\_a^2}{2} + \frac{1}{2}\left(\sqrt[3]{\_C1 + \sqrt{\_a^6 + \_C1^2}} - \_a^2 \frac{1}{\sqrt[3]{\_C1 + \sqrt{\_a^6 + \_C1^2}}}\right)\right)^2\right)^{-1} d\_a - x - \_C2 =$$

2.1621 ODE No. 1621

$$ay(x) + y''(x) + y(x)y'(x) - y(x)^3 = 0$$

✓ **Mathematica** : cpu = 9.43759 (sec), leaf count = 990

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[\int_1^{\#1} \frac{}{\frac{e^{6c_1}(a-K[1]^2)^2}{2\sqrt[3]{e^{18c_1}K[1]^6-3ae^{18c_1}K[1]^4+3a^2e^{18c_1}K[1]^2-2e^{12c_1}-a^3e^{18c_1}+2\sqrt{-e^{30c_1}K[1]^6+3ae^{30c_1}K[1}}}}\right.\right.\right.$$

✓ **Maple** : cpu = 1.922 (sec), leaf count = 1088

$$\left\{\int^{y(x)} \frac{1}{-63\_a^2 + 63\,a}\left(\frac{\left(\frac{i}{2}\sqrt{3} - \frac{1}{2}\right)^3}{2}\left(126\frac{1}{-\_a^6 + 3\,a\_a^4 - 3\_a^2a^2 + 80\_C1^3 + a^3}\sqrt[3]{-4\left(\_C1\sqrt{5}\right.}\right.\right.\right.$$

2.1622 ODE No. 1622

$$2a^2y(x) + (3a + y(x))y'(x) + ay(x)^2 + y''(x) - y(x)^3 = 0$$

✗ **Mathematica** : cpu = 24.0901 (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 = 0.244 (sec), leaf count = 415

$$\left\{y(x) = \frac{1}{e^{ax}} RootOf\left(\int^{\_Z} \frac{1}{-\_f^6 + \_C1}\left(\_f^8 - \_C1\,\_f^2 + \left((-\_f^6 + \_C1)^2\left(\sqrt{\frac{\_C1}{-\_f^6 + \_C1}} - 1\right.\right.\right.\right.\right.$$

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 = 0.123667 (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 = 0.667678 (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 = 1.295 (sec), leaf count = 131

$$\left\{y(x)=ODESolStruc\left(f\left(RootOf\left(\int \_b(\_a)\,\mathrm{d}\_a+\_C1-\int^{\_Z} f(\_f)\,d\_f\right)\right)\_a,[\left\{\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a)=\right.$$

2.1625 ODE No. 1625

$$y'(x)\left(y(x)-\frac{3f'(x)}{2f(x)}\right)-\frac{y(x)^2f'(x)}{2f(x)}+y(x)\left(-\frac{f''(x)}{2f(x)}+\frac{f'(x)^2}{f(x)^2}+f(x)\right)+y''(x)-y(x)^3=0$$

✗ **Mathematica** : cpu = 0.388766 (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 = 28.1201 (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 = 0.17 (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 = 0.128153 (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 = 0.612 (sec), leaf count = 58

$$\left\{y(x)=ODESolStruc\left(\_b(\_a),[\left\{-\int e^{\int f(\_a)\,d\_a}g(\_a)\,d\_a+\left((\_b(\_a))^2+\frac{d}{d\_a}\_b(\_a)\right)e^{\int f(\_a)\,d\_a}\right.\right.\right.$$

2.1628 ODE No. 1628

$$f(x)y(x)-g(x)+y''(x)+3y(x)y'(x)+y(x)^3=0$$

✗ **Mathematica** : cpu = 4.99384 (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 = 0.0240628 (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 = 0.027 (sec), leaf count = 38

$$\left\{ y(x) = \frac{\int \_C1\, \mathrm{e}^{-\int f(x)\,\mathrm{d}x}\,\mathrm{d}x + \_C2}{\iint \_C1\, \mathrm{e}^{-\int f(x)\,\mathrm{d}x}\,\mathrm{d}x\,\mathrm{d}x + \_C2\, x + 1} \right\}$$

2.1630 ODE No. 1630

$$-4a^2y(x)-3ay(x)^2-b+y''(x)-3y(x)y'(x)=0$$

✓ **Mathematica** : cpu = 7.4608 (sec), leaf count = 3227

$$\left\{\left\{y(x)\to -\frac{2\left((-1)^{\frac{a^{3/2}\sqrt{4a^3-3b}-2a^3}{4a^3}+1}2^{-\frac{3\left(a^{3/2}\sqrt{4a^3-3b}-2a^3\right)}{4a^3}+\frac{3\sqrt{4a^6-3a^3b}}{4a^3}+1}3^{\frac{a^{3/2}\sqrt{4a^3-3b}-2a^3}{4a^3}-\frac{\sqrt{4a^6-3a^3b}}{4a^3}}a^{-\frac{a^{3/2}\sqrt{4a^3-3b}}{2a^3}}\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.424 (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 = 0.0195061 (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 = 0.04 (sec), leaf count = 38

$$\left\{ y(x) = \frac{-\int \_C1\, \mathrm{e}^{\int f(x)\,\mathrm{d}x}\,\mathrm{d}x - \_C2}{\iint \_C1\, \mathrm{e}^{\int f(x)\,\mathrm{d}x}\,\mathrm{d}x\,\mathrm{d}x + \_C2\, x + 1} \right\}$$

2.1632 ODE No. 1632

$$y''(x) - 2ay(x)y'(x) = 0$$

✓ **Mathematica** : cpu = 0.0502729 (sec), leaf count = 46

$$\left\{\left\{y(x) \to \frac{\sqrt{c_1}\tan\left(\sqrt{a}\sqrt{c_1}x + \sqrt{a}\sqrt{c_1}c_2\right)}{\sqrt{a}}\right\}\right\}$$

✓ **Maple** : cpu = 0.075 (sec), leaf count = 23

$$\left\{y(x) = \frac{1}{a}\tan\left(\sqrt{a\_C1}(\_C2 + x)\right)\sqrt{a\_C1}\right\}$$

2.1633 ODE No. 1633

$$ay(x)y'(x) + by(x)^3 + y''(x) = 0$$

✗ **Mathematica** : cpu = 33.2699 (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 = 0.231 (sec), leaf count = 97

$$\left\{\int^{y(x)}\left(RootOf\left(-2\,a\_a^2 Artanh\left(\frac{\_a^2 a + 4\_Z}{\sqrt{\_a^4\left(a^2 - 8\,b\right)}}\right) + \_C1\,\sqrt{\_a^4\left(a^2 - 8\,b\right)} - \ln\left(\_a^4 b + \_Z\,\_a^2 a +\right.\right.\right.\right.$$

2.1634 ODE No. 1634

$$y'(x)h(x, y(x)) + j(x, y(x)) + y''(x) = 0$$

✗ **Mathematica** : cpu = 0.107367 (sec), leaf count = 0 , could not solve

```
DSolve[j[x, y[x]] + h[x, y[x]]*Derivative[1][y][x] + Derivative[2][y][x] == 0, y[x], x
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(diff(y(x),x),x)+h(x,y(x))*diff(y(x),x)+j(x,y(x))=0,y(x))
```

2.1635 ODE No. 1635

$$ay'(x)^2 + by(x) + y''(x) = 0$$

✓ **Mathematica** : cpu = 0.579576 (sec), leaf count = 104

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[\int_1^{\#1} -\frac{\sqrt{2}a}{\sqrt{2e^{-2aK[1]}c_1a^2 - 2bK[1]a + b}}dK[1]\&\right][c_2 + x]\right\}, \left\{y(x) \to \text{Inverse}\right.\right.$$

✓ **Maple** : cpu = 0.154 (sec), leaf count = 79

$$\left\{\int^{y(x)} -2\,\frac{a}{\sqrt{4\,\mathrm{e}^{-2\,a\_a}\_C1\,a^2 - 4\,b\_a\,a + 2\,b}}d\_a - x - \_C2 = 0, \int^{y(x)} 2\,\frac{a}{\sqrt{4\,\mathrm{e}^{-2\,a\_a}\_C1\,a^2 - 4\,b\_a\,a + }}\right.$$

2.1636 ODE No. 1636

$$ay'(x)\,|y'(x)| + by'(x) + cy(x) + y''(x) = 0$$

✗ **Mathematica** : cpu = 8.63707 (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 = 0.667 (sec), leaf count = 59

$$\left\{y(x) = ODESolStruc\left(\_a, [\left\{\left(\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a)\right)\_b(\_a) + a\_b(\_a)\,|\_b(\_a)| + \_b(\_a)\,b + c\_a = 0\right\}, \left\{\right.\right.\right.$$

2.1637 ODE No. 1637

$$ay'(x)^2 + by'(x) + cy(x) + y''(x) = 0$$

✗ **Mathematica** : cpu = 19.505 (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 = 0.401 (sec), leaf count = 58

$$\left\{y(x) = ODESolStruc\left(\_a, [\left\{\left(\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a)\right)\_b(\_a) + a(\_b(\_a))^2 + \_b(\_a)\,b + c\_a = 0\right\}, \left\{\_a = \right.\right.\right.$$

2.1638 ODE No. 1638

$$ay'(x)^2 + b\sin(y(x)) + y''(x) = 0$$

✓ **Mathematica** : cpu = 4.59654 (sec), leaf count = 146

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[\int_1^{\#1} -\frac{\sqrt{4a^2+1}}{\sqrt{4e^{-2aK[1]}c_1a^2 - 4b\sin(K[1])a + e^{-2aK[1]}c_1 + 2b\cos(K[1])}}dK[1]\&\right]\right.\right.$$

✓ **Maple** : cpu = 0.161 (sec), leaf count = 115

$$\left\{\int^{y(x)} (-4\,a^2-1)\frac{1}{\sqrt{16\_C1\,\left(a^2+1/4\right)^2 e^{-2\,a\_a} - 16\,\left(a^2+1/4\right)\left(a\sin\left(\_a\right) - 1/2\,\cos\left(\_a\right)\right)b}}d\_a - x -\right.$$

2.1639 ODE No. 1639

$$ay'(x)\left|y'(x)\right| + b\sin(y(x)) + y''(x) = 0$$

✗ **Mathematica** : cpu = 40.5905 (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 = 2.365 (sec), leaf count = 56

$$\left\{y(x) = ODESolStruc\left(\_a, [\left\{\left(\frac{d}{d\_a}\_b(\_a)\right)\_b(\_a) + a\_b(\_a)\left|\_b(\_a)\right| + b\sin\left(\_a\right) = 0\right\}, \left\{\_a = \right.\right.\right.$$

2.1640 ODE No. 1640

$$ay(x)y'(x)^2 + by(x) + y''(x) = 0$$

✓ **Mathematica** : cpu = 0.464532 (sec), leaf count = 96

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[\int_1^{\#1} -\frac{\sqrt{a}}{\sqrt{e^{2ac_1 - aK[1]^2} - b}}dK[1]\&\right][c_2 + x]\right\}, \left\{y(x) \to \text{InverseFunction}\left[\int_1^{\#1}\right.\right.\right.$$

✓ **Maple** : cpu = 0.171 (sec), leaf count = 70

$$\left\{\int^{y(x)} a\frac{1}{\sqrt{a\left(e^{-\_a^2 a}\_C1\,a - b\right)}}d\_a - x - \_C2 = 0, \int^{y(x)} -a\frac{1}{\sqrt{a\left(e^{-\_a^2 a}\_C1\,a - b\right)}}d\_a - x - \_C2 = \right.$$

2.1641 ODE No. 1641

$$g(x)y'(x) + h(y(x))y'(x)^2 + y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0523782 (sec), leaf count = 61

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[\int_1^{\#1} \exp\left(-\int_1^{K[4]} -h(K[1])dK[1]\right) dK[4]\&\right]\left[\int_1^x -\exp\left(-\int_1^{K[5]} g(K[2]\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.026 (sec), leaf count = 29

$$\left\{\int^{y(x)} \mathrm{e}^{\int h(\_b)\,\mathrm{d}\_b} d\_b - \_C1 \int \mathrm{e}^{-\int g(x)\,\mathrm{d}x}\,\mathrm{d}x - \_C2 = 0\right\}$$

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 = 0.323725 (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 = 0.127049 (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 = 82.1647 (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 = 0.381 (sec), leaf count = 56

$$\left\{y(x) = ODESolStruc\left(\_a, [\left\{\left(\frac{d}{d\_a}\_b(\_a)\right)\_b(\_a) + h(\_a)\left(\_b(\_a)\right)^2 + \_b(\_a) + k(\_a) = 0\right\}, \left\{\right.$$

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 = 0.0779904 (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 = 10.6375 (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 = 0.149 (sec), leaf count = 94

$$\left\{\int^{y(x)} a\left(\_a^2 + 2\_C1\right)\frac{1}{\sqrt{-\left(\_a^2 + 2\_C1\right)a\left(-1 + a\left(\_a^2 + 2\_C1\right)\right)}}d\_a - x - \_C2 = 0, \int^{y(x)} -a(\_\right.$$

2.1647 ODE No. 1647

$$y''(x) - a(xy'(x) - y(x))^r = 0$$

✓ **Mathematica** : cpu = 0.421663 (sec), leaf count = 91

$$\left\{\left\{y(x) \to x\left(c_2 - x\left(2 - \frac{a(r-1)x^2}{c_1}\right)^{\frac{1}{r-1}}\left(x^{2r-2}\left(2c_1 - a(r-1)x^2\right)\right)^{\frac{1}{1-r}}{}_2F_1\left(-\frac{1}{2}, \frac{1}{r-1}; \frac{1}{2}; \frac{a(r-1)x^2}{2c_1}\right)\right.\right.\right.$$

✓ **Maple** : cpu = 0.432 (sec), leaf count = 60

$$\left\{y(x) = \left(\int -\frac{x^2(r-1)\,a - \_C1}{2\,x^2}\left(-\left(x^2(r-1)\,a - \_C1\right)^{-1}\right)^{\frac{r}{r-1}} 2^{\frac{r}{r-1}}\,\mathrm{d}x + \_C2\right) x\right\}$$

2.1648 ODE No. 1648

$$y''(x) - kx^a y(x)^b y'(x)^c = 0$$

✗ **Mathematica** : cpu = 0.0613868 (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 = 1.137 (sec), leaf count = 205

$$\left\{y(x) = ODESolStruc\left(\_a\,\mathrm{e}^{\int \_b(\_a)\,\mathrm{d}\_a + \_C1}, [\left\{\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a) = \frac{(\_b(\_a))^2}{(a-c+2)^2}\left(-k\_a^b\_b(\_a)\,(b+c-1)^2\right.\right.\right.\right.$$

2.1649 ODE No. 1649

$$h(x, y(x))\left(y'(x) - \frac{y(x)}{x}\right)^a + y''(x) = 0$$

✗ **Mathematica** : cpu = 2.15881 (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 = 0.0998381 (sec), leaf count = 30

$$\left\{\left\{y(x) \to \frac{\sinh(c_1)\sinh(ax)}{a} + \frac{\cosh(c_1)\cosh(ax)}{a} + c_2\right\}\right\}$$

✓ **Maple** : cpu = 0.224 (sec), leaf count = 16

$$\left\{y(x) = \frac{\cosh\left(a(\_C1 + x)\right)}{a} + \_C2\right\}$$

2.1651 ODE No. 1651

$$a\left(-\sqrt{y'(x)^2 + 1}\right) - b + y''(x) = 0$$

✓ **Mathematica** : cpu = 0.327977 (sec), leaf count = 414

$$\left\{\left\{y(x) \to \frac{a\text{InverseFunction}\left[\frac{\frac{b\tan^{-1}\left(\frac{\#1b}{\sqrt{\#1^2+1}\sqrt{a^2-b^2}}\right)}{\sqrt{a^2-b^2}} - \frac{b\tan^{-1}\left(\frac{\#1a}{\sqrt{a^2-b^2}}\right)}{\sqrt{a^2-b^2}} + \sinh^{-1}(\#1)}{a}\&\right][c_1 + x]^2 - b\sqrt{\text{InverseFu}}}{a^2 \sqrt{}}\right.\right.$$

✓ **Maple** : cpu = 0.135 (sec), leaf count = 31

$$\left\{y(x) = \int RootOf\left(x - \int^{\_Z}\left(a\sqrt{\_f^2 + 1} + b\right)^{-1} d\_f + \_C1\right) \mathrm{d}x + \_C2\right\}$$

2.1652 ODE No. 1652

$$y''(x) - a\sqrt{by(x)^2 + y'(x)^2} = 0$$

✗ **Mathematica** : cpu = 0.291901 (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 = 0.226 (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 = 0.139065 (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 = 0.104 (sec), leaf count = 41

$$\left\{y(x) = \frac{1}{a}\left(\left(-1 + (\_C1 + x)^2 a^2\right)\sqrt{-\left(-1 + (\_C1 + x)^2 a^2\right)^{-1}} + \_C2\, a\right)\right\}$$

2.1654 ODE No. 1654

$$y''(x) - 2ax\left(y'(x)^2 + 1\right)^{3/2} = 0$$

✓ **Mathematica** : cpu = 10.3147 (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 = 0.181 (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 = 10.6982 (sec), leaf count = 350

$$\left\{\left\{y(x)\to \text{InverseFunction}\left[-\frac{\sqrt{\frac{\#1^2a+2c_1-2}{c_1-1}}\sqrt{\frac{\#1^2a+2c_1+2}{c_1+1}}\left(F\left(i\sinh^{-1}\left(\sqrt{\frac{a}{2c_1+2}}\#1\right)|\frac{c_1+1}{c_1-1}\right)+(c_1-1)E\left(i\right.\right.}{\sqrt{\frac{a}{2c_1+2}}\sqrt{\#1^4a^2+4\#1^2ac_1+4c_1{}^2-4}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.197 (sec), leaf count = 84

$$\left\{\int^{y(x)} a\left(\_a^2+2\_C1\right)\frac{1}{\sqrt{4-a^2\left(\_a^2+2\_C1\right)^2}}d\_a - x - \_C2 = 0, \int^{y(x)} -a\left(\_a^2+2\_C1\right)\frac{}{\sqrt{4-a}}\right.$$

2.1656 ODE No. 1656

$$y''(x) - a\left(y'(x)^2+1\right)^{3/2}(bx+c+y(x)) = 0$$

✓ **Mathematica** : cpu = 41.1467 (sec), leaf count = 9706

$$\left\{\text{Solve}\left[\int_1^x\left(\frac{1}{b^2+1} - \frac{b\sqrt{-a^2\left(c^2+2bK[1]c+2y(x)c+b^2K[1]^2+y(x)^2-2c_1+2bK[1]y(x)\right)^2\left(a^2c^4+4\right.}}{\left(b^2+1\right)\left(a^2c^4+4a^2bK[1]c^3+4a^2y(x)c^3+6a^2b^2K\right.}\right.\right.\right.$$

✓ **Maple** : cpu = 0.528 (sec), leaf count = 771

$$\left\{y(x) = -bx + RootOf\left(-x + \int^{\_Z}\frac{1}{\left(\_f^4a^2+4\_f^3a^2c+4\_f^2a^2c^2-4\_C1\_f^2a^2-8\_C1\_f a^2c+4\right.}\right.\right.$$

2.1657 ODE No. 1657

$$y''(x) + y(x)^3 y'(x) - y(x)y'(x)\sqrt{4y'(x) + y(x)^4} = 0$$

✓ **Mathematica** : cpu = 0.298539 (sec), leaf count = 192

$$\left\{\left\{y(x) \to -\frac{i(\sinh(c_1) + \cosh(c_1))(\cos(2(c_2 + x)(\sinh(3c_1) + \cosh(3c_1))) + i\sin(2(c_2 + x)(\sinh(3c_1) + \text{co}}{\cos(2(c_2 + x)(\sinh(3c_1) + \cosh(3c_1))) + i\sin(2(c_2 + x)(\sinh(3c_1) + \cosh(3c_1))) -}\right.\right.$$

✓ **Maple** : cpu = 0.193 (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 = 0.168427 (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 = 0.125 (sec), leaf count = 115

$$\left\{y(x) = ODESolStruc\left(-\frac{a\left(\int \_b(\_a)\, \mathrm{d}\_a + \_C1\right) - b\_a}{b}, [\left\{\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a) = -h\left(\frac{-a\_b(\_a) + b}{\_b(\_a)\, b}, b\_a\right.\right.\right.\right.$$

2.1659 ODE No. 1659

$$y''(x) - y(x)h\left(x, \frac{y'(x)}{y(x)}\right) = 0$$

✗ **Mathematica** : cpu = 7.71447 (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 = 0.076 (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 = 2.38357 (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 = 0.609 (sec), leaf count = 125

$$\left\{y(x) = ODESolStruc\left(\frac{\_a}{e^{-\left(\int \_b(\_a)\,\mathrm{d}\_a + \_C1\right)n}}, [\left\{\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a) = (\_b(\_a))^2\left(-\_b(\_a)\,h\left(\_a, \frac{\_b(\_a)\,\_}{\_b\,(\_}\right.\right.\right.\right.$$

2.1661 ODE No. 1661

$$8y''(x) + 9y'(x)^4 = 0$$

✓ **Mathematica** : cpu = 0.0694049 (sec), leaf count = 92

$$\left\{\left\{y(x) \to c_2 - \frac{1}{3}\sqrt[3]{-\frac{1}{3}}(9x - 8c_1)^{2/3}\right\}, \left\{y(x) \to \frac{(9x - 8c_1)^{2/3}}{3\sqrt[3]{3}} + c_2\right\}, \left\{y(x) \to \frac{(-1)^{2/3}(9x - 8c_1)^{2/3}}{3\sqrt[3]{3}} +\right.\right.$$

✓ **Maple** : cpu = 0.063 (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 = 0.846618 (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 = 0.306 (sec), leaf count = 56

$$\left\{y(x) = ODESolStruc\left(\_a, [\left\{\left(\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a)\right)\_b(\_a) + \frac{h(\_b(\_a)) + c\_a}{a} = 0\right\}, \left\{\_a = y(x), \_b(\_a\right.\right.\right.$$

2.1663 ODE No. 1663

$$-xy(x)^n + xy''(x) + 2y'(x) = 0$$

✗ **Mathematica** : cpu = 0.0231406 (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 = 0.782 (sec), leaf count = 125

$$\left\{y(x) = ODESolStruc\left(\_a\,\mathrm{e}^{\int -\_b(\_a)\,\mathrm{d}\_a + \_C1}, [\left\{\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a) = -\frac{(\_b(\_a))^2\,(\_b(\_a)\,(n-1)^2\,\_a^n + 2\_}{4}\right.\right.\right.$$

2.1664 ODE No. 1664

$$ax^m y(x)^n + xy''(x) + 2y'(x) = 0$$

✗ **Mathematica** : cpu = 0.169789 (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 = 3.152 (sec), leaf count = 155

$$\left\{y(x) = ODESolStruc\left(\_a\,\mathrm{e}^{\int -\_b(\_a)\,\mathrm{d}\_a + \_C1}, [\left\{\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a) = \frac{(\_b(\_a))^2\,(a\_b(\_a)\,(n-1)^2\,\_a^n + (\_a}{(r}\right.\right.\right.$$

2.1665 ODE No. 1665

$$xy''(x) + 2y'(x) + xe^{y(x)} = 0$$

✗ **Mathematica** : cpu = 0.0944043 (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 = 0.519 (sec), leaf count = 84

$$\left\{y(x) = ODESolStruc\left(\_a - 2\int \_b(\_a)\,\mathrm{d}\_a - 2\_C1, [\left\{\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a) = (\mathrm{e}^{-\_a} - 2)\,(\_b(\_a))^3 + (\_b(\right.\right.\right.$$

2.1666 ODE No. 1666

$$ay'(x) + bxe^{y(x)} + xy''(x) = 0$$

✗ **Mathematica** : cpu = 0.258859 (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 = 0.776 (sec), leaf count = 93

$$\left\{y(x) = ODESolStruc\left(\_a - 2\int \_b(\_a)\,\mathrm{d}\_a - 2\_C1, [\left\{\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a) = (b\mathrm{e}^{-\_a} - 2\,a + 2)\,(\_b(\_a))^3 -\right.\right.\right.$$

2.1667 ODE No. 1667

$$bx^{5-2a}e^{y(x)} + ay'(x) + xy''(x) = 0$$

✗ **Mathematica** : cpu = 0.326493 (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 = 1.117 (sec), leaf count = 121

$$\left\{y(x) = ODESolStruc\left((2\,a - 6)\int \_b(\_a)\,\mathrm{d}\_a + 2\,a\_C1 + \_a - 6\_C1, [\left\{\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a) = (b\mathrm{e}^{-\_a} + 2\,a\right.\right.\right.$$

2.1668 ODE No. 1668

$$xy''(x) - (1 - y(x))y'(x) = 0$$

✓ **Mathematica** : cpu = 0.0545519 (sec), leaf count = 60

$$\left\{\left\{y(x) \to \sqrt{2}\sqrt{c_1+2}\tanh\left(\frac{1}{2}\left(\sqrt{2}\sqrt{c_1+2}\log(x) - 2\sqrt{2}\sqrt{c_1+2}c_2\right)\right) + 2\right\}\right\}$$

✓ **Maple** : cpu = 0.112 (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 = 0.452957 (sec), leaf count = 160

$$\text{Solve}\left[\int_1^{y(x)} -\frac{x}{e^{xK[1]}c_1 + 2xK[1] + 1}dK[1] - \int_1^x \left(\int_1^{y(x)} \left(\frac{\left(e^{K[1]K[2]}c_1K[1] + 2K[1]\right)K[2]}{\left(e^{K[1]K[2]}c_1 + 2K[1]K[2] + 1\right)^2} - \frac{}{e^{K[1]K[2]}c_1 +}\right.\right.\right.$$

✓ **Maple** : cpu = 0.085 (sec), leaf count = 32

$$\left\{y(x) = \frac{1}{x}RootOf\left(-\ln(x) + \_C2 + \int^{\_Z} -\left(e^{\_f}\_C1 - 2\_f - 1\right)^{-1}d\_f\right)\right\}$$

2.1670 ODE No. 1670

$$a(xy'(x) - y(x))^2 - b + xy''(x) = 0$$

✓ **Mathematica** : cpu = 7.3633 (sec), leaf count = 51

$$\left\{\left\{y(x) \to x\left(\int_1^x \frac{\sqrt{-\frac{b}{a}}\tan\left(c_1 - a\sqrt{-\frac{b}{a}}K[2]\right)}{K[2]^2}dK[2] + c_2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.353 (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 = 0.101041 (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 = 0.061 (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 = 11.9325 (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 = 0.8 (sec), leaf count = 65

$$\left\{y(x) = ODESolStruc\left(\_a, [\left\{\frac{d}{d\_a}\_b(\_a) = (\_b(\_a))^2 (\_a\_b(\_a)\, a - \_b(\_a)\,\_a^n a - 1)\right\}, \left\{\_a = \right.$$

2.1673 ODE No. 1673

$$a\left(e^{y(x)} - 1\right) + x^2y''(x) = 0$$

✗ **Mathematica** : cpu = 25.4792 (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 = 0.61 (sec), leaf count = 60

$$\left\{y(x) = ODESolStruc\left(\_a, [\left\{\frac{d}{d\_a}\_b(\_a) = (\_b(\_a))^2 (-1 + a(e^{-\_a} - 1)\,\_b(\_a))\right\}, \left\{\_a = y(x), \_b\right.$$

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 = 0.0415502 (sec), leaf count = 106

$$\left\{\left\{y(x) \to c_2 2^{-\frac{a+b}{b}} c^{\frac{a+b}{b}-1} \left(x^{2b}\right)^{\frac{a+b}{2b}-\frac{1}{2}} \sin\left(c\sqrt{x^{2b}}\right) + c_1 2^{-\frac{a}{b}} c^{a/b} \left(x^{2b}\right)^{\frac{a}{2b}} \cos\left(c\sqrt{x^{2b}}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.049 (sec), leaf count = 25

$$\left\{y(x) = x^a \left(\cos\left(x^b c\right) \_C2 + \sin\left(x^b c\right) \_C1\right)\right\}$$

2.1675 ODE No. 1675

$$x^k\left(-h\left(x^k y(x), ky(x) + xy'(x)\right)\right) + (a+1)xy'(x) + x^2y''(x) = 0$$

✗ **Mathematica** : cpu = 1.46913 (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 = 0.301902 (sec), leaf count = 134

$$\left\{\left\{y(x) \to x\left(c_2 + \int_1^x \frac{i\sqrt{a}\sqrt{b}Y_1\left(-i\sqrt{a}\sqrt{b}K[2]\right) - i\sqrt{a}\sqrt{b}J_1\left(i\sqrt{a}\sqrt{b}K[2]\right)c_1}{a\left(Y_0\left(-i\sqrt{a}\sqrt{b}K[2]\right) + J_0\left(i\sqrt{a}\sqrt{b}K[2]\right)c_1\right)K[2]}dK[2]\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.211 (sec), leaf count = 72

$$\left\{y(x) = \left(\int -\frac{1}{ax}\sqrt{-ab}\left(\_C1\, Y_1\left(\sqrt{-ab}x\right) + J_1\left(\sqrt{-ab}x\right)\right)\left(\_C1\, Y_0\left(\sqrt{-ab}x\right) + J_0\left(\sqrt{-ab}x\right)\right)^{-1} dx +$$

2.1677 ODE No. 1677

$$ay(x)y'(x)^2 + bx + x^2y''(x) = 0$$

✗ **Mathematica** : cpu = 46.8871 (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 = 1.272 (sec), leaf count = 101

$$\left\{y(x) = ODESolStruc\left(\_a\, e^{\int -\_b(\_a)\, d\_a + \_C1}, [\left\{\frac{d}{d\_a}\_b(\_a) = \left(a\_a^3 + b\right)(\_b(\_a))^3 + \left(2\_a^2 a + 1\right)(\_$$

2.1678 ODE No. 1678

$$x^2y''(x) - \sqrt{ax^2y'(x)^2 + by(x)^2} = 0$$

✗ **Mathematica** : cpu = 1.10214 (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 = 0.203 (sec), leaf count = 60

$$\left\{y(x) - e^{\int^{\ln(x)} RootOf\left(\int^{\_Z} -y(x)\left(\_a^2 y(x) - \_a\, y(x) - \sqrt{(y(x))^2 (\_a^2 a + b)}\right)^{-1} d\_a - \_b + \_C1\right) d\_b + \_C2} = 0\right\}$$

2.1679 ODE No. 1679

$$(x^2+1)\, y''(x) + y'(x)^2 + 1 = 0$$

✓ **Mathematica** : cpu = 0.16134 (sec), leaf count = 33

$$\{\{y(x) \to -x\cot(c_1) + \csc^2(c_1)\log(-x\sin(c_1) - \cos(c_1)) + c_2\}\}$$

✓ **Maple** : cpu = 0.159 (sec), leaf count = 27

$$\left\{y(x) = \frac{x}{\_C1} + \ln(\_C1\, x - 1) + \frac{\ln(\_C1\, x - 1)}{\_C1^2} + \_C2\right\}$$

2.1680 ODE No. 1680

$$x^4(-y'(x)^2) + 4x^2y''(x) + 4y(x) = 0$$

✗ **Mathematica** : cpu = 7.12934 (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 = 0.54 (sec), leaf count = 103

$$\left\{y(x) = ODESolStruc\left(\frac{\_a}{\left(e^{\int \_b(\_a)\, d\_a + \_C1}\right)^2}, [\left\{\frac{d}{d\_a}\_b(\_a) = (-\_a^2 + 7\_a)(\_b(\_a))^3 + (\_a - 5)(\_\right.\right.\right.$$

2.1681 ODE No. 1681

$$ay(x)^3 + 9x^2y''(x) + 2y(x) = 0$$

✗ **Mathematica** : cpu = 2.67007 (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 = 0.037 (sec), leaf count = 31

$$\left\{y(x) = \_C2\ JacobiSN\left(\left(\frac{\sqrt{2}}{2\,x^3}\sqrt{x^{\frac{20}{3}}a} + \_C1\right)\_C2, i\right)\sqrt[3]{x}\right\}$$

2.1682 ODE No. 1682

$$x^3\left(y''(x) + y(x)y'(x) - y(x)^3\right) + 12xy(x) + 24 = 0$$

✗ **Mathematica** : cpu = 21.9063 (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 = 0.828 (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 = 0.0678282 (sec), leaf count = 26

$$\left\{\left\{y(x) \to -\frac{x\log\left(a\left(-\frac{c_1}{x} - c_2\right)\right)}{a}\right\}\right\}$$

✓ **Maple** : cpu = 0.042 (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 = 47.1829 (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 = 1.04 (sec), leaf count = 100

$$\left\{y(x)=ODESolStruc\left(\_a\,e^{\int-\_b(\_a)\,d\_a+\_C1},\left[\left\{\frac{d}{d\_a}\_b(\_a)=\frac{(\_b(\_a))^2\left((-2\_a^3+\_a^2+(a-5)\_a\right.}{2}\right.\right.\right.$$

2.1685 ODE No. 1685

$$axy(x)+b-\left(kx^{k-1}-12x^2\right)\left(3y'(x)+y(x)^2\right)+2\left(4x^3-x^k\right)\left(y''(x)+y(x)y'(x)-y(x)^3\right)=0$$

✗ **Mathematica** : cpu = 2.80939 (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 = 0.0226879 (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 = 0.987 (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

$$x^4y''(x) - x(x^2 + 2y(x))\,y'(x) + 4y(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.0703762 (sec), leaf count = 262

$$\left\{\left\{y(x) \to -\frac{x^3\left(i\left(-\frac{\sqrt{-c_1-1}}{\sqrt{c_1}} + \frac{i}{\sqrt{c_1}}\right)\sqrt{c_1}c_2x^{-1+i\left(-\frac{\sqrt{-c_1-1}}{\sqrt{c_1}}+\frac{i}{\sqrt{c_1}}\right)\sqrt{c_1}} + i\left(\frac{\sqrt{-c_1-1}}{\sqrt{c_1}} + \frac{i}{\sqrt{c_1}}\right)\sqrt{c_1}x^{-1+i\left(\frac{\sqrt{-c_1-1}}{\sqrt{c_1}}+\right.}\right.}{c_2x^{i\left(-\frac{\sqrt{-c_1-1}}{\sqrt{c_1}}+\frac{i}{\sqrt{c_1}}\right)\sqrt{c_1}} + x^{i\left(\frac{\sqrt{-c_1-1}}{\sqrt{c_1}}+\frac{i}{\sqrt{c_1}}\right)\sqrt{c_1}}}\right.\right.$$

✓ **Maple** : cpu = 0.083 (sec), leaf count = 21

$$\{y(x) = x^2(\tanh(\_C1\,(\_C2 - \ln(x)))\,\_C1 + 1)\}$$

2.1688 ODE No. 1688

$$x^4y''(x) - x^2y'(x)\,(y'(x) + x) + 4y(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.513437 (sec), leaf count = 189

$$\text{Solve}\left[\int_1^{y(x)} \frac{1}{-e^{\frac{K[1]}{x^2}}c_1x^2 + 2x^2 + 4K[1]}dK[1] - \int_1^x \left(\frac{K[2]\left(e^{\frac{y(x)}{K[2]^2}}c_1 + 2\left(-\frac{y(x)}{K[2]^2} - 1\right)\right)}{-e^{\frac{y(x)}{K[2]^2}}c_1K[2]^2 + 2K[2]^2 + 4y(x)} + \int_1^{y(x)} -\frac{2e^{\frac{K[1]}{K[2]^2}}}{\left(-e^{\frac{K}{K}}\right.}\right.\right.$$

✓ **Maple** : cpu = 0.076 (sec), leaf count = 32

$$\left\{y(x) = RootOf\left(-\ln(x) + \_C2 - \int^{\_Z}\left(e^{\_f}\_C1 + 4\_f + 2\right)^{-1}d\_f\right)x^2\right\}$$

2.1689 ODE No. 1689

$$x^4y''(x) + (xy'(x) - y(x))^3 = 0$$

✓ **Mathematica** : cpu = 0.251311 (sec), leaf count = 104

$$\left\{\left\{y(x)\to -ix\log\left(\frac{\frac{e^{c_2}}{x}-\frac{\sqrt{e^{2c_2}-8ic_1x^2}}{x}}{4c_1}\right)\right\},\left\{y(x)\to -ix\log\left(\frac{\frac{e^{c_2}}{x}+\frac{\sqrt{e^{2c_2}-8ic_1x^2}}{x}}{4c_1}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.105 (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 = 21.7741 (sec), leaf count = 0 , could not solve

```
DSolve[-y[x]^(3/2) + Sqrt[x]*Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 0.414 (sec), leaf count = 99

$$\left\{y(x)=ODESolStruc\left(\frac{\_a}{\left(e^{\int \_b(\_a)\,d\_a+\_C1}\right)^3},[\left\{\frac{d}{d\_a}\_b(\_a)=-(\_b(\_a))^3\,\_a^{\frac{3}{2}}+12\,(\_b(\_a))^3\,\_a-7\right.$$

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 = 60.6763 (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 = 0.69 (sec), leaf count = 254

$$\left\{y(x)=RootOf\left(-2\int^{\_Z}\frac{a}{\sqrt{4\_C1\,a^2-4\,c\_g^2a+b^2\_g^2+8\int F(\_g)\,d\_g}}d\_g\sqrt{4\,ca-b^2}+\_C2\,\sqrt{4\,c\right.$$

2.1692 ODE No. 1692

$$x^{\frac{n}{n+1}}y''(x) - y(x)^{\frac{2n+1}{n+1}} = 0$$

✗ **Mathematica** : cpu = 0.0583277 (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 = 3.769 (sec), leaf count = 156

$$\left\{ y(x) = ODESolStruc\left(\_a\left(e^{\frac{(\int \_b(\_a)\,d\_a + \_C1)(n+2)}{n}}\right)^{-1}, [\left\{ \frac{d}{d\_a}\_b(\_a) = 2\,\frac{(\_b(\_a))^2}{n^2}\left(-1/2\,\_b(\_a)\,\_a^{\frac{2\,n}{n+}}\right.\right.\right.$$

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 = 0.485914 (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 = 0.217 (sec), leaf count = 68

$$\left\{ y(x) = ODESolStruc\left(\_a, [\left\{ \frac{d}{d\_a}\_b(\_a) = -h\left(\_a, (\_b(\_a))^{-1}\right)(\_b(\_a))^3 \right\}, \left\{ \_a = y(x)\,, \_b(\_a)\right.\right.\right.$$

2.1694 ODE No. 1694

$$y(x)y''(x) - a = 0$$

✓ **Mathematica** : cpu = 0.113438 (sec), leaf count = 115

$$\left\{ \left\{ y(x) \to \exp\left(\frac{-c_1 - 2a\text{erf}^{-1}\left(-i\sqrt{\frac{2}{\pi}}\sqrt{ae^{\frac{c_1}{a}}(c_2+x)^2}\right)^2}{2a} \right) \right\}, \left\{ y(x) \to \exp\left(\frac{-c_1 - 2a\text{erf}^{-1}\left(i\sqrt{\frac{2}{\pi}}\sqrt{\right.\right.}{2a}\right.\right.$$

✓ **Maple** : cpu = 0.109 (sec), leaf count = 54

$$\left\{ \int^{y(x)} \frac{1}{\sqrt{2\,\ln(\_a)\,a - 2\,a\_C1}} d\_a - x - \_C2 = 0, \int^{y(x)} -\frac{1}{\sqrt{-2\,a\,(\_C1 - \ln(\_a))}} d\_a - x - \_C2 =\right.$$

2.1695 ODE No. 1695

$$y(x)y''(x) - ax = 0$$

✗ **Mathematica** : cpu = 18.6101 (sec), leaf count = 0 , could not solve

```
DSolve[-(a*x) + y[x]*Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 0.55 (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 = 17.1261 (sec), leaf count = 0 , could not solve

```
DSolve[-(a*x^2) + y[x]*Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 0.457 (sec), leaf count = 100

$$\left\{ y(x) = ODESolStruc\left(\_a \left(e^{\int \_b(\_a)\, d\_a + \_C1} \right)^{2}, [\left\{ \frac{d}{d\_a}\_b(\_a) = \frac{(2\_a^2 - a)\, (\_b(\_a))^3}{\_a} + 3\, (\_b(\_a))\right.\right.\right.$$

2.1697 ODE No. 1697

$$-a + y(x)y''(x) + y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.162683 (sec), leaf count = 94

$$\left\{ \left\{ y(x) \to -\frac{\sqrt{2a^2c_2x + a^2c_2{}^2 + a^2x^2 - e^{2c_1}}}{\sqrt{a}} \right\}, \left\{ y(x) \to \frac{\sqrt{2a^2c_2x + a^2c_2{}^2 + a^2x^2 - e^{2c_1}}}{\sqrt{a}} \right\} \right\}$$

✓ **Maple** : cpu = 0.03 (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 = 0.0296774 (sec), leaf count = 72

$$\left\{\left\{y(x) \to -\frac{\sqrt{ax^3 + 3bx^2 + 3c_2x + 6c_1}}{\sqrt{3}}\right\}, \left\{y(x) \to \frac{\sqrt{ax^3 + 3bx^2 + 3c_2x + 6c_1}}{\sqrt{3}}\right\}\right\}$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(diff(y(x),x),x)*y(x)+y(x)^2-a*x-b=0,y(x))
```

2.1699 ODE No. 1699

$$y(x)y''(x) + y'(x)^2 - y'(x) = 0$$

✓ **Mathematica** : cpu = 0.112607 (sec), leaf count = 40

$$\left\{\left\{y(x) \to c_1\left(-W\left(-\frac{e^{-\frac{x}{c_1}-\frac{c_2}{c_1}-1}}{c_1}\right)\right) - c_1\right\}\right\}$$

✓ **Maple** : cpu = 0.076 (sec), leaf count = 33

$$\left\{y(x) = -\_C1\left(\mathit{lambertW}\left(-\frac{\mathrm{e}^{-1}}{\_C1}\left(\mathrm{e}^{\frac{\_C2}{\_C1}}\right)^{-1}\left(\mathrm{e}^{\frac{x}{\_C1}}\right)^{-1}\right) + 1\right)\right\}$$

2.1700 ODE No. 1700

$$y(x)y''(x) - y'(x)^2 + 1 = 0$$

✓ **Mathematica** : cpu = 0.155016 (sec), leaf count = 44

$$\{\{y(x) \to -e^{-c_1}\sinh\left(e^{c_1}(c_2 + x)\right)\}, \{y(x) \to e^{-c_1}\sinh\left(e^{c_1}(c_2 + x)\right)\}\}$$

✓ **Maple** : cpu = 0.246 (sec), leaf count = 86

$$\left\{y(x) = \frac{1}{2}\left(-\_C1\left(\mathrm{e}^{\frac{x}{\_C1}}\right)^2\left(\mathrm{e}^{\frac{\_C2}{\_C1}}\right)^2 + \_C1\right)\left(\mathrm{e}^{\frac{\_C2}{\_C1}}\right)^{-1}\left(\mathrm{e}^{\frac{x}{\_C1}}\right)^{-1}, y(x) = \frac{1}{2}\left(\_C1\left(\mathrm{e}^{\frac{x}{\_C1}}\right)^2\left(\mathrm{e}^{\frac{\_C2}{\_C1}}\right)^2 - \right.\right.$$

2.1701 ODE No. 1701

$$y(x)y''(x) - y'(x)^2 - 1 = 0$$

✓ **Mathematica** : cpu = 0.169659 (sec), leaf count = 80

$$\left\{\left\{y(x) \to -\frac{e^{-c_1}\tanh\left(e^{c_1}(c_2+x)\right)}{\sqrt{\tanh^2\left(e^{c_1}(c_2+x)\right)-1}}\right\}, \left\{y(x) \to \frac{e^{-c_1}\tanh\left(e^{c_1}(c_2+x)\right)}{\sqrt{\tanh^2\left(e^{c_1}(c_2+x)\right)-1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.211 (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

$$e^{2x}\left(ay(x)^4+b\right) + e^x y(x)\left(cy(x)^2+d\right) + y(x)y''(x) - y'(x)^2 = 0$$

✗ **Mathematica** : cpu = 1.04067 (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 = 0.291192 (sec), leaf count = 77

$$\left\{\left\{y(x) \to \exp\left(-\frac{1}{2}\sqrt{c_1}e^{-c_2-x}\left(e^{2c_2+2x}-1\right)\right)\right\}, \left\{y(x) \to \exp\left(\frac{1}{2}\sqrt{c_1}e^{-c_2-x}\left(e^{2c_2+2x}-1\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.048 (sec), leaf count = 21

$$\left\{y(x) = e^{\frac{e^{-2x}\_C1\,e^x}{2}}e^{-\frac{\_C2\,e^x}{2}}\right\}$$

2.1704 ODE No. 1704

$$y(x)^2\left(\frac{f''(x)}{f(x)}-\frac{f'(x)^2}{f(x)^2}\right)+f(x)y(x)^3+y(x)y''(x)-y'(x)^2-y'(x)=0$$

✗ **Mathematica** : cpu = 21.3642 (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 = 0.269456 (sec), leaf count = 252

$$\left\{\left\{y(x)\to -\frac{\exp\left(c_2-\int_1^x \frac{y(K[2])^3+c_1{}^2y(K[2])^2+\int_1^{K[2]}\frac{-y(K[1])^3-f'(K[1])y(K[1])+f(K[1])y'(K[1])}{y(K[1])^2}dK[1]^2y(K[2])^2+2c_1\int_1^{K[2]}\frac{-y(K[\cdots}{\cdots}}{y(K[2])^2\left(c_1+\int_1^{K[2]}\frac{-y(K[1])^3-f'(K[1])y(K[1\cdots}{y(K[1])^2}\cdots\right.}\cdots\right.}{\int_1^x\frac{-y(K[1])^3-f'(K[1])y(K[1])+f(K[1])y'(K\cdots}{y(K[1])^2}\cdots}\right.\right.$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(diff(y(x),x),x)*y(x)-diff(y(x),x)^2+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 = 0.50232 (sec), leaf count = 308

$$\left\{\left\{y(x)\to -\frac{\exp\left(c_2-\int_1^x \frac{y(K[2])^4-f(K[2])y(K[2])^3+c_1{}^2y(K[2])^2+\int_1^{K[2]}\frac{-y(K[1])^4+f(K[1])y(K[1])^3-f''(K[1])y(K[1])+f'(K[1])y'(K[\cdots}{y(K[1])^2}\cdots}{y(K[2])^2\left(c_1+\int_1^{K[2]}\frac{-y(K\cdots}{\cdots}\cdots\right.}\cdots\right.}{\int_1^x\frac{-y(K[1])^4+f(K[1])y(K[\cdots}{\cdots}\cdots}\right.\right.$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(diff(y(x),x),x)*y(x)-diff(y(x),x)^2+diff(f(x),x)*diff(y(x),x)-
diff(diff(f(x),x),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 = 0.057242 (sec), leaf count = 31

$$\left\{\left\{y(x) \to c_2 e^{-\frac{bx}{a} - \frac{c_1 e^{-ax}}{a}}\right\}\right\}$$

✓ **Maple** : cpu = 0.056 (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 = 43.5142 (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 = 0.806 (sec), leaf count = 73

$$\left\{y(x) = ODESolStruc\left(\_a, [\left\{\left(\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a)\right)\_b(\_a) - \frac{(\_b(\_a))^2 - \_a\_b(\_a)\,a - b\_a^3 + 2\_a^2 a}{\_a} =\right.\right.\right.$$

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 = 53.6854 (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 = 1.599 (sec), leaf count = 84

$$\left\{y(x) = ODESolStruc\left(\_a, [\left\{\left(\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a)\right)\_b(\_a) - \frac{2\,b^2\_a^3 - 2\_a^2a^2 + \_a\_b(\_a)\,a + (\_b(\_a)}{\_a}\right.\right.\right.$$

2.1710 ODE No. 1710

$$-y(x)(y(x)+1)\left(b^2y(x)^2-a^2\right)+(ay(x)-1)y'(x)+y(x)y''(x)-y'(x)^2=0$$

✗ **Mathematica** : cpu = 90.4283 (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 = 2.415 (sec), leaf count = 91

$$\left\{y(x) = ODESolStruc\left(\_a, [\left\{\left(\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a)\right)\_b(\_a) - \frac{b^2\_a^4 + b^2\_a^3 - \_a^2a^2 - \_a\_b(\_a)\,a - \_a\right.\right.\right.}{\_a}$$

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 = 22.0926 (sec), leaf count = 9987

$$\left\{\left\{y(x) \to \frac{(-1)^{1-n}2}{c_1 + \int_1^x \frac{(-1)^{1-n}2^{n-2}(\cos^2(K[1])-1)^{-\frac{n}{2}-\frac{1}{2}}\sec(K[1])\left(12\sqrt{2}n^2K_n\left(\sqrt{\cos^2(K[1])-1}\right)\cos^3(K[1])\log(y(K[1]))y(K[1])(2\cos^2(}{}}\right.\right.$$

✓ **Maple** : cpu = 0.385 (sec), leaf count = 81

$$\left\{y(x) = 1\mathrm{e}^{\frac{Y_n(\sin(x))\_C2}{\sin(x)\left(J_n(\sin(x))Y_{n+1}(\sin(x))-J_{n+1}(\sin(x))Y_n(\sin(x))\right)}}\left(\mathrm{e}^{\frac{J_n(\sin(x))\_C1}{\sin(x)\left(J_n(\sin(x))Y_{n+1}(\sin(x))-J_{n+1}(\sin(x))Y_n(\sin(x))\right)}}\right)^{-1}\right\}$$

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 = 0.0576697 (sec), leaf count = 75

$$\left\{\left\{y(x) \to c_2 \exp\left(\int_1^x \left(\exp\left(\int_1^{K[3]} f(K[1])dK[1]\right) c_1 + \exp\left(\int_1^{K[3]} f(K[1])dK[1]\right) \int_1^{K[3]} \exp\left(-\int_1^{K$$

✓ **Maple** : cpu = 0.067 (sec), leaf count = 61

$$\left\{y(x) = \frac{\_C2}{e^{\_C1 \int e^{\int f(x)\,dx}\,dx}} e^{\int e^{\int f(x)\,dx}\,dx \int \frac{g(x)}{e^{\int f(x)\,dx}}\,dx} \left(e^{\int \frac{g(x) \int e^{\int f(x)\,dx}\,dx}{e^{\int f(x)\,dx}}\,dx}\right)^{-1}\right\}$$

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 = 20.7969 (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 = 0.223 (sec), leaf count = 54

$$\left\{y(x) = ODESolStruc\left(\_b(\_a), [\left\{\frac{f(\_a)(\_b(\_a))^2 + \_C1\,\_b(\_a) + \frac{d}{d\_a}\_b(\_a) - g(\_a)}{\_b(\_a)} = 0\right\}, \{\_a$$

2.1714 ODE No. 1714

$$y(x)y''(x) + 3y(x)y'(x) - 3y'(x)^2 - y(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.123121 (sec), leaf count = 25

$$\left\{\left\{y(x) \to \frac{c_2 e^x}{\sqrt{1 - 2e^{c_1 + x}}}\right\}\right\}$$

✓ **Maple** : cpu = 0.05 (sec), leaf count = 68

$$\left\{y(x) = \frac{\sqrt{2}}{2\,\_C1\,e^x - 2\,\_C2}\sqrt{(\_C1\,e^x - \_C2)\,e^{2x}}, y(x) = -\frac{\sqrt{2}}{2\,\_C1\,e^x - 2\,\_C2}\sqrt{(\_C1\,e^x - \_C2)\,e^{2x}}\right\}$$

2.1715 ODE No. 1715

$$y(x)y''(x) - ay'(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.113931 (sec), leaf count = 26

$$\left\{\left\{y(x)\to c_2(-ax-c_1+x)^{\frac{1}{1-a}}\right\}\right\}$$

✓ **Maple** : cpu = 0.042 (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 = 0.537614 (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 = 0.167 (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 = 1.11553 (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 = 0.21 (sec), leaf count = 107

$$\left\{\int^{y(x)}(2\,a+3)\,\_a^{2\,a}\frac{1}{\sqrt{-(2\,a+3)\,\_a^{2\,a}\left(2\,b\_a^{2\,a+3}-\_C1\right)}}d\_a-x-\_C2=0,\int^{y(x)}(-2\,a-3)\,\_a^{2\,a}\right.$$

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 = 1.27197 (sec), leaf count = 744

$$\left\{\left\{y(x)\to\left(\frac{abc_1\exp\left(-\frac{x\left(b\sqrt{-4ac+b^2-4c}-4(a+1)c+b^2\right)}{\sqrt{-4ac+b^2-4c}+b}-\frac{2(a+1)cx}{\sqrt{-4ac+b^2-4c}+b}\right)}{b\sqrt{-4ac+b^2-4c}-4ac+b^2-4c}+\frac{bc_1\exp\left(-\frac{x\left(b\sqrt{-4ac+b^2-4c}-4(a+1)\right.}{\sqrt{-4ac+b^2-4c}+b}\right.}{b\sqrt{-4ac+b^2-4c}-}\right.\right.\right.$$

✓ **Maple** : cpu = 0.207 (sec), leaf count = 133

$$\left\{y(x)=e^{-\frac{x}{2a+2}\sqrt{(-4a-4)c+b^2}}e^{-\frac{bx}{2a+2}}\left(\left((-4a-4)c^3+b^2c^2\right)\left(de^{\frac{x}{2}\left(b+\sqrt{(-4a-4)c+b^2}\right)}\sqrt{(-4a-4)c+b^2}+\left(e\right.\right.\right.\right.$$

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 = 41.8596 (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 = 0.405 (sec), leaf count = 70

$$\left\{y(x)=ODESolStruc\left(e^{\int\_b(\_a)\,d\_a+\_C1},[\left\{\frac{d}{d\_a}\_b(\_a)=(-a-1)\left(\_b(\_a)\right)^2-f(\_a)\_b(\_a)-g(\_\right.\right.\right.$$

2.1720 ODE No. 1720

$$ay'(x)^2+by(x)^2y'(x)+cy(x)^4+y(x)y''(x)=0$$

✗ **Mathematica** : cpu = 192.713 (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 = 0.287 (sec), leaf count = 173

$$\left\{\int^{y(x)}(2a+4)\left(\tan\left(RootOf\left(2\_Zb\_a^2-2a\ln(\_a)\sqrt{4\_a^4ac-b^2\_a^4+8c\_a^4}-\ln\left(\frac{\_a^4((\tan(\_}{}\right.\right.\right.\right.\right.$$

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 = 21.2417 (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 = 11.2093 (sec), leaf count = 697

$$\left\{\left\{y(x)\to \text{InverseFunction}\left[-\frac{\sqrt{1-\frac{2\#1^2a^2}{-2ac_1+\sqrt{1-4ac_1}+1}}\sqrt{\frac{2\#1^2a^2}{2ac_1+\sqrt{1-4ac_1}-1}+1}\left(\left(-2ac_1+\sqrt{1-4ac_1}+1\right)E\left(\right.\right.}{}\right.\right.\right.$$

✓ **Maple** : cpu = 0.325 (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 = 0.697331 (sec), leaf count = 130

$$\left\{\left\{y(x)\to\frac{1}{2}\left(-\sqrt{2}e^{-2c_1}\sqrt{4e^{3c_1}x+e^{2c_1}+4e^{3c_1}c_2}+e^{-c_1}+4c_2+2x\right)\right\},\left\{y(x)\to\frac{1}{2}\left(\sqrt{2}e^{-2c_1}\sqrt{4e^{3c_1}x+e\right.\right.\right.$$

✓ **Maple** : cpu = 0.092 (sec), leaf count = 16

$$\left\{y(x)=\sqrt{\_C1+2x}\_C2+\_C1+x\right\}$$

2.1724 ODE No. 1724

$$(x-y(x))y''(x)+2y'(x)\left(y'(x)+1\right)=0$$

✓ **Mathematica** : cpu = 0.28907 (sec), leaf count = 38

$$\left\{\left\{y(x)\to -\frac{e^{-c_1}\left(e^{c_1}c_2x+e^{c_1}{c_2}^2+1\right)}{c_2+x}\right\}\right\}$$

✓ **Maple** : cpu = 0.467 (sec), leaf count = 21

$$\left\{y(x)=\frac{\_C2^2-\_C2\,x+\_C1}{\_C2-x}\right\}$$

2.1725 ODE No. 1725

$$(x-y(x))y''(x)-\left(y'(x)+1\right)\left(y'(x)^2+1\right)=0$$

✓ **Mathematica** : cpu = 2.24135 (sec), leaf count = 75

$$\left\{\left\{y(x)\to -\sqrt{-2c_2x+e^{2c_1}-{c_2}^2-x^2}-c_2\right\},\left\{y(x)\to \sqrt{-2c_2x+e^{2c_1}-{c_2}^2-x^2}-c_2\right\}\right\}$$

✓ **Maple** : cpu = 0.438 (sec), leaf count = 105

$$\left\{y(x)=x+RootOf\left(-x+\int^{\_Z}\left(\_C1^2\_f^2-1\right)\left(-\_C1^2\_f^2+\_C1\sqrt{-\_C1^2\_f^2+2\_f+2}\right)^{-1}d\_f\right.\right.$$

2.1726 ODE No. 1726

$$(x-y(x))y''(x)-h(y'(x))=0$$

✓ **Mathematica** : cpu = 0.251773 (sec), leaf count = 77

$$\text{Solve}\left[\left\{x=\int\frac{\exp\left(-\int_1^{\text{K\$11120816}}\frac{K[3]-1}{h(K[3])}dK[3]-c_1\right)}{h(\text{K\$11120816})}d\text{K\$11120816}+c_2,y(x)=x-\exp\left(-\int_1^{\text{K\$11120816}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.082 (sec), leaf count = 39

$$\left\{y(x)=x+RootOf\left(-x+\int^{\_Z}\left(-1+RootOf\left(\int^{\_Z}\frac{\_a-1}{h\left(\_a\right)}d\_a+\ln\left(-\_g\right)+\_C1\right)\right)^{-1}d\_g+\_C2\right.\right.$$

2.1727 ODE No. 1727

$$2y(x)y''(x) + y'(x)^2 + 1 = 0$$

✓ **Mathematica** : cpu = 0.353967 (sec), leaf count = 166

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[-\frac{\sqrt{\#1}(\#1 - e^{2c_1}) + e^{3c_1}\sqrt{1 - \#1e^{-2c_1}}\sin^{-1}\left(\sqrt{\#1}e^{-c_1}\right)}{\sqrt{e^{2c_1} - \#1}}\&\right][c_2 + x]\right\}, \left\{y(\right.\right.$$

✓ **Maple** : cpu = 0.322 (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 = 0.0043437 (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 = 0.026 (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 = 0.0157692 (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 = 0.726331 (sec), leaf count = 135

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[-\frac{2\sqrt{\#1}\sqrt{\frac{4\#1^2}{c_1}+1}\,{}_2F_1\left(\frac{1}{4},\frac{1}{2};\frac{5}{4};-\frac{4\#1^2}{c_1}\right)}{\sqrt{4\#1^2+c_1}}\&\right][c_2+x]\right\},\left\{y(x) \to \text{InverseFun}\right.\right.$$

✓ **Maple** : cpu = 0.063 (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 = 1.00095 (sec), leaf count = 351

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[-\frac{i\#1\sqrt{\frac{2c_1}{\#1-\#1\sqrt{1-c_1}}+4}\sqrt{\frac{c_1}{\#1\sqrt{1-c_1}+\#1}+2}F\left(i\sinh^{-1}\left(\frac{\sqrt{\frac{c_1}{2\sqrt{1-c_1}+2}}}{\sqrt{\#1}}\right)|\frac{\sqrt{1-c_1}+}{1-\sqrt{1-c}}\right.}{\sqrt{\frac{c_1}{\sqrt{1-c_1}+1}}\sqrt{4\#1^2+4\#1+c_1}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.085 (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 = 1.16667 (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 = 1.91986 (sec), leaf count = 437

$$\left\{\left\{y(x)\to \text{InverseFunction}\left[-\frac{i\sqrt{2}\#1^{3/2}\sqrt{\frac{4c_1}{\#1\left(\sqrt{2ac_1+b^2}-b\right)}+2}\sqrt{1-\frac{2c_1}{\#1\left(\sqrt{2ac_1+b^2}+b\right)}}F\left(i\sinh^{-1}\left(\frac{\sqrt{2}\sqrt{\sqrt{b^2}}}{\sqrt{}}\right.\right.}{\sqrt{\frac{c_1}{\sqrt{2ac_1+b^2}-b}}\sqrt{-\#1\left(\#1^2a+2\#1b-2c_1\right)}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.069 (sec), leaf count = 71

$$\left\{\int^{y(x)}-2\frac{1}{\sqrt{-2\,a\_a^3-4\,b\_a^2+4\_a\_C1}}d\_a-x-\_C2=0,\int^{y(x)}2\frac{1}{\sqrt{-2\,a\_a^3-4\,b\_a^2+4\_a\_C}}\right.$$

2.1734 ODE No. 1734

$$ay(x)^3 + 2y(x)y''(x) - y'(x)^2 + 2xy(x)^2 + 1 = 0$$

✗ **Mathematica** : cpu = 2.19422 (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 = 0.869864 (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] == (
```

✗ **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 = 6.14685 (sec), leaf count = 129

$$\left\{\left\{y(x)\to \text{InverseFunction}\left[-\frac{2\sqrt{\#1}\sqrt{\frac{\#1^3}{c_1}+1}\,{}_2F_1\left(\frac{1}{6},\frac{1}{2};\frac{7}{6};-\frac{\#1^3}{c_1}\right)}{\sqrt{\#1^3+c_1}}\&\right][c_2+x]\right\},\left\{y(x)\to \text{InverseFunc}\right.\right.$$

✓ **Maple** : cpu = 0.069 (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 = 20.6132 (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 = 0.439297 (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 = 0.043625 (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 = 0.0911895 (sec), leaf count = 16

$$\left\{\left\{y(x)\to\frac{c_2}{(2c_1+x)^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.029 (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 = 0.108879 (sec), leaf count = 17

$$\{\{y(x) \to c_2 \sec^2(2c_1 + x)\}\}$$

✓ **Maple** : cpu = 0.056 (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 = 7.22299 (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 = 0.158 (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 = 18.0484 (sec), leaf count = 2761

$$\left\{\text{Solve}\left[-\frac{4\left(F\left(\sin^{-1}\left(\sqrt{\frac{(\text{Root}[4c_1\#1^4+4a\#1^3+1\&,2]-\text{Root}[4c_1\#1^4+4a\#1^3+1\&,4])(y(x)-\text{Root}[4c_1\#1^4+4a\#1^3+1\&,1])}{(\text{Root}[4c_1\#1^4+4a\#1^3+1\&,1]-\text{Root}[4c_1\#1^4+4a\#1^3+1\&,4])(y(x)-\text{Root}[4c_1\#1^4+4a\#1^3+1\&,2])}}\right)\right|\right.\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.073 (sec), leaf count = 71

$$\left\{\int^{y(x)} -2\frac{1}{\sqrt{4\_C1\_a^4 + 4a\_a^3 + 1}\_a}d\_a - x - \_C2 = 0, \int^{y(x)} 2\frac{1}{\sqrt{4\_C1\_a^4 + 4a\_a^3 + 1}\_a}d\_a\right.$$

2.1744 ODE No. 1744

$$2y(x)y''(x) - y'(x)^2 \left(y'(x)^2 + 1\right) = 0$$

✓ **Mathematica** : cpu = 0.533004 (sec), leaf count = 155

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[-ie^{-c_1}\sqrt{\#1e^{2c_1}-1}\left(\frac{e^{-c_1}\sin^{-1}\left(\sqrt{\#1}e^{c_1}\right)}{\sqrt{1-\#1e^{2c_1}}}+\sqrt{\#1}\right)\&\right][c_2+x]\right\},\left\{y(x)\right.\right.$$

✓ **Maple** : cpu = 0.308 (sec), leaf count = 823

$$\left\{y(x) = \frac{\left(-RootOf\left((\tan(\_Z))^2 \_C1^2 \_Z^2 - 4(\tan(\_Z))^2 \_C1 \_C2 \_Z - 4(\tan(\_Z))^2 \_C1\, x \_Z + \right.\right.}{}\right.$$

2.1745 ODE No. 1745

$$2(y(x) - a)y''(x) + y'(x)^2 + 1 = 0$$

✓ **Mathematica** : cpu = 0.704168 (sec), leaf count = 251

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[-\frac{2\sqrt{a-\#1}(2\#1-2a+e^{2c_1})-\sqrt{2}e^{3c_1}\sqrt{e^{-2c_1}\left(2\#1-2a+e^{2c_1}\right)}\sin^{-1}\left(\sqrt{2}\right.}{2\sqrt{2}\sqrt{2\#1-2a+e^{2c_1}}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.402 (sec), leaf count = 117

$$\left\{-\frac{\_C1}{2}\arctan\left(1\left(y(x)-a-\frac{\_C1}{2}\right)\frac{1}{\sqrt{-\left(-y\left(x\right)+a\right)\left(a+\_C1-y\left(x\right)\right)}}\right)-x-\_C2+\sqrt{-\left(-y\left(x\right.\right.}\right.$$

2.1746 ODE No. 1746

$$-ax^2 - bx - c + 3y(x)y''(x) - 2y'(x)^2 = 0$$

✗ **Mathematica** : cpu = 0.0285032 (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 = 0.305 (sec), leaf count = 207

$$\left\{y(x) = RootOf\left(-2\int^{\_Z}\frac{b}{\sqrt{4\_f^{4/3}\_C1\,b^2 - 36\,c\_f^2 a + 9\,b^2\_f^2 - 2}}d\_f\sqrt{4\,ca-b^2} - 2\,b\arctan\left(\frac{2\,a}{\sqrt{4\,c}}\right.\right.\right.$$

2.1747 ODE No. 1747

$$3y(x)y''(x) - 5y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.0985333 (sec), leaf count = 20

$$\left\{\left\{y(x) \to \frac{c_2}{(3c_1 + 2x)^{3/2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.013 (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 = 0.179417 (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 = 0.099 (sec), leaf count = 67

$$\left\{-4\,\frac{\sqrt{\_C1\,\left(y\left(x\right)\right)^{3/2} + 4\,y\left(x\right)}}{\sqrt{y\left(x\right)}\_C1} - x - \_C2 = 0, 4\,\frac{\sqrt{\_C1\,\left(y\left(x\right)\right)^{3/2} + 4\,y\left(x\right)}}{\sqrt{y\left(x\right)}\_C1} - x - \_C2 = 0, y(x) = 0\right.$$

2.1749 ODE No. 1749

$$4y(x)y''(x) - 3y'(x)^2 - 12y(x)^3 = 0$$

✓ **Mathematica** : cpu = 0.457493 (sec), leaf count = 153

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[-\frac{4\#1\sqrt{\frac{4\#1^{3/2}}{c_1} + 1}\,{}_2F_1\left(\frac{1}{6}, \frac{1}{2}; \frac{7}{6}; -\frac{4\#1^{3/2}}{c_1}\right)}{\sqrt{\#1^{3/2}\left(4\#1^{3/2} + c_1\right)}}\&\right][c_2 + x]\right\}, \left\{y(x) \to \text{InverseFu}\right.\right.$$

✓ **Maple** : cpu = 0.295 (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 = 3.56493 (sec), leaf count = 2281

$$\left\{ \text{Solve} \left[-\frac{4F\left(\sin^{-1}\left(\sqrt{\frac{(\text{Root}[a\#1^4+3b\#1^2-3c_1\#1-3c\&,2]-\text{Root}[a\#1^4+3b\#1^2-3c_1\#1-3c\&,4])\left(\sqrt{y(x)}-\text{Root}[a\#1^4+3b\#1^2-\right.}{(\text{Root}[a\#1^4+3b\#1^2-3c_1\#1-3c\&,1]-\text{Root}[a\#1^4+3b\#1^2-3c_1\#1-3c\&,4])\left(\sqrt{y(x)}-\text{Root}[a\#1^4+3b\#1^2-\right.}}\right.\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.313 (sec), leaf count = 87

$$\left\{ \int^{y(x)} -3 \frac{1}{\sqrt{9\_C1\_a^{3/2} - 3a\_a^3 - 9b\_a^2 + 9c\_a}} d\_a - x - \_C2 = 0, \int^{y(x)} 3 \frac{1}{\sqrt{9\_C1\_a^{3/2} - 3a\_}}\right.$$

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 = 9.28954 (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 = 0.150738 (sec), leaf count = 26

$$\left\{ \left\{ y(x) \to c_2 \text{sech}^4\left(\frac{1}{4}\sqrt{a}(x - 4c_1)\right) \right\} \right\}$$

✓ **Maple** : cpu = 0.074 (sec), leaf count = 33

$$\left\{ y(x) = 16 \frac{\left(e^{1/4\sqrt{a}x}\right)^4 a^2}{\left(e^{1/2\sqrt{a}x}\_C1 - \_C2\right)^4} \right\}$$

2.1753 ODE No. 1753

$$12y(x)y''(x) - 15y'(x)^2 + 8y(x)^3 = 0$$

✓ **Mathematica** : cpu = 0.304864 (sec), leaf count = 43

$$\left\{\left\{y(x) \to \frac{2304c_1{}^2}{\left(3c_1{}^2x^2 + 6c_2c_1{}^2x + 3c_2{}^2c_1{}^2 + 128\right){}^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.105 (sec), leaf count = 147

$$\left\{-12\frac{y(x)\left(8\sqrt{y(x)} - \_C1\right)\sqrt{8\,y(x) - \_C1\,\sqrt{y(x)}}}{\sqrt{-24\,(y(x))^3 + 3\_C1\,(y(x))^{5/2}}\_C1\,\sqrt{\sqrt{y(x)}\left(8\sqrt{y(x)} - \_C1\right)}} - x - \_C2 = 0, 12\frac{}{\sqrt{-24\,(}}\right.$$

2.1754 ODE No. 1754

$$ny(x)y''(x) - (n-1)y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.110062 (sec), leaf count = 17

$$\{\{y(x) \to c_2(x - c_1n)^n\}\}$$

✓ **Maple** : cpu = 0.032 (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 = 6.29888 (sec), leaf count = 716

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[\int_1^{\#1} -\frac{}{\sqrt{4b^5c_1K[1]^{-\frac{2b}{a}} + 20ab^4c_1K[1]^{-\frac{2b}{a}} + 35a^2b^3c_1K[1]^{-\frac{2b}{a}} + 25a^3b^2c_1K[1}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.217 (sec), leaf count = 418

$$\left\{\int^{y(x)}(2\,a+b)\,(3\,a+2\,b)\,(a+b)\,(a+2\,b)\,b\_a^{2\,\frac{b}{a}}\frac{}{\sqrt{-36\_a^{2\,\frac{b}{a}}\,(a+b/2)\,(a+b)\,\left(2/3\,(a+b/2)\,(a+b)\,(a\right.}}\right.$$

2.1756 ODE No. 1756

$$ay(x)y''(x)+by'(x)^2-\frac{y(x)y'(x)}{\sqrt{c^2+x^2}}=0$$

✓ **Mathematica** : cpu = 0.631381 (sec), leaf count = 211

$$\left\{\left\{y(x)\to c_2\exp\left(\int_1^x-\frac{\left(\frac{K[2]}{\sqrt{c^2+K[2]^2}}+1\right)^{\frac{1}{2}/a}}{\left(1-\frac{K[2]}{\sqrt{c^2+K[2]^2}}\right)^{\frac{1}{2}/a}\int_1^{K[2]}\frac{\exp\left(\frac{\frac{1}{2}\log\left(\frac{K[1]}{\sqrt{c^2+K[1]^2}}+1\right)-\frac{1}{2}\log\left(1-\frac{K[1]}{\sqrt{c^2+K[1]^2}}\right)}{a}\right)\left(-\sqrt{c^2+K[1]^2}a-b\right.}{a\sqrt{c^2+K[1]^2}}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.115 (sec), leaf count = 75

$$\left\{y(x)=\left(\left(\frac{a}{a+b}\left(\frac{\_C1\,\sqrt[a]{2}ax^{a^{-1}+1}}{a+1}{}_2\mathrm{F}_1(-\frac{1}{2\,a},-\frac{1}{2\,a}-\frac{1}{2};\,1-a^{-1};\,-\frac{c^2}{x^2})+\_C2\right)^{-1}\right)^{\frac{a}{a+b}}\right)^{-1}\right\}$$

2.1757 ODE No. 1757

$$(a+2)f(x)y(x)^2y'(x)+ay(x)y''(x)+ay(x)^3y'(x)-(a-1)y'(x)^2+f(x)^2y(x)^4=0$$

✗ **Mathematica** : cpu = 9.5957 (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

$$y''(x)(ay(x)+b)+cy'(x)^2=0$$

✓ **Mathematica** : cpu = 0.32749 (sec), leaf count = 36

$$\left\{\left\{y(x)\to \frac{(c_1(-(a+c))(-c_2-x))^{\frac{a}{a+c}}-b}{a}\right\}\right\}$$

✓ **Maple** : cpu = 0.05 (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 = 0.130957 (sec), leaf count = 18

$$\left\{\left\{y(x)\to c_2\sqrt{c_1+x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.023 (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 = 0.0778341 (sec), leaf count = 108

$$\left\{\left\{y(x)\to -\sqrt{2}\sqrt{\int_1^x -K[2]^{-a}\left(c_1+\int_1^{K[2]} f(K[1])K[1]^{a-1}dK[1]\right)dK[2]+c_2}\right\},\left\{y(x)\to \sqrt{2}\sqrt{\int_1^x -\right.\right.$$

✓ **Maple** : cpu = 0.056 (sec), leaf count = 114

$$\left\{y(x)=\frac{\sqrt{2}}{a-1}\sqrt{(a-1)\left(x^{1-a}\int\frac{x^a f(x)}{x}\,\mathrm{d}x+x^{1-a}\_C1-\int f(x)\,\mathrm{d}x-\_C2\right)},y(x)=-\frac{\sqrt{2}}{a-1}\sqrt{(a-1\right.$$

2.1761 ODE No. 1761

$$x\left(ay(x)^4+d\right)+y(x)\left(by(x)^2+c\right)+xy(x)y''(x)-xy'(x)^2+y(x)y'(x)=0$$

✗ **Mathematica** : cpu = 1.08001 (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*Derivativ`

✗ **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 = 48.1856 (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 = 0.703 (sec), leaf count = 108

$$\left\{y(x)=ODESolStruc\left(\frac{\_a}{\left(e^{\int \_b(\_a)\,d\_a+\_C1}\right)^2},[\left\{\frac{d}{d\_a}\_b(\_a)=-2\,\frac{\_b(\_a)\left(1/2+\_a^2(-1/2\,b\_a+a-\right.}{}\right.\right.\right.$$

2.1763 ODE No. 1763

$$ay(x)y'(x)+xy(x)y''(x)+2xy'(x)^2=0$$

✓ **Mathematica** : cpu = 0.220945 (sec), leaf count = 40

$$\left\{\left\{y(x)\to c_2\left(3x^{1-a}-(a-1)c_1\right)^{-\frac{a-1}{3(1-a)}}\right\}\right\}$$

✓ **Maple** : cpu = 0.045 (sec), leaf count = 148

$$\left\{y(x)=\frac{\sqrt[3]{3}}{(a-1)\,x^a}\sqrt[3]{(a-1)^2\,(x^a)^2\,(\_C2\ (a-1)\,x^a-\_C1\ x)},y(x)=\frac{\sqrt[3]{3}(i\sqrt{3}-1)}{(2\,a-2)\,x^a}\sqrt[3]{(a-1)^2\,(x^a)^2\,(\_\right.$$

2.1764 ODE No. 1764

$$xy(x)y''(x) - 2xy'(x)^2 + (y(x)+1)y'(x) = 0$$

✓ **Mathematica** : cpu = 0.0508407 (sec), leaf count = 52

$$\left\{\left\{y(x) \to \frac{\tan\left(\frac{1}{2}\left(\sqrt{2}\sqrt{c_1}\log(x) - \sqrt{2}\sqrt{c_1}c_2\right)\right)}{\sqrt{2}\sqrt{c_1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.135 (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 = 0.2399 (sec), leaf count = 34

$$\left\{\left\{y(x) \to c_2\left((a-1)c_1 + x^{1-a}\right)^{\frac{a-1}{1-a}}\right\}\right\}$$

✓ **Maple** : cpu = 0.025 (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 = 0.140616 (sec), leaf count = 21

$$\left\{\left\{y(x) \to \frac{c_2 x}{\sqrt[3]{c_1 x^3 + 1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.029 (sec), leaf count = 64

$$\left\{y(x) = x\frac{1}{\sqrt[3]{-3\_C2\,x^3 + \_C1}}, y(x) = \frac{(i\sqrt{3}-1)\,x}{2}\frac{1}{\sqrt[3]{-3\_C2\,x^3 + \_C1}}, y(x) = -\frac{(i\sqrt{3}+1)\,x}{2}\frac{1}{\sqrt[3]{-3\_}}\right.$$

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 = 0.263143 (sec), leaf count = 55

$$\left\{\left\{y(x)\to c_2\exp\left(\frac{c_1\log\left(a\sqrt{b^2-x^2}-c_1\right)}{a^2}+\frac{\sqrt{b^2-x^2}}{a}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.276 (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 = 0.0388935 (sec), leaf count = 53

$$\left\{\left\{y(x)\to-\sqrt{2c_2x^2+c_1+x^2}-x\right\},\left\{y(x)\to\sqrt{2c_2x^2+c_1+x^2}-x\right\}\right\}$$

✓ **Maple** : cpu = 0.04 (sec), leaf count = 43

$$\left\{y(x)=-x-\sqrt{\left(-\_C2+1\right)x^2+\_C1},y(x)=-x+\sqrt{\left(-\_C2+1\right)x^2+\_C1}\right\}$$

2.1769 ODE No. 1769

$$2xy(x)y''(x)-xy'(x)^2+y(x)y'(x)=0$$

✓ **Mathematica** : cpu = 0.132861 (sec), leaf count = 18

$$\left\{\left\{y(x)\to c_2\left(c_1+\sqrt{x}\right)^2\right\}\right\}$$

✓ **Maple** : cpu = 0.033 (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 = 0.584841 (sec), leaf count = 28

$$\left\{\left\{y(x)\to \frac{1}{x^2\left(-\frac{c_1}{x}+c_2-\frac{1}{x^2}\right)}+1\right\}\right\}$$

✓ **Maple** : cpu = 0.045 (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 = 0.100415 (sec), leaf count = 21

$$\left\{\left\{y(x)\to c_2xe^{\frac{c_1}{x}}-x\right\}\right\}$$

✓ **Maple** : cpu = 0.128 (sec), leaf count = 22

$$\left\{y(x)=-\frac{x}{\_C1}\left(-\mathrm{e}^{\frac{\_C2}{x}}\mathrm{e}^{-1}+\_C1\right)\right\}$$

2.1772 ODE No. 1772

$$a(xy'(x)-y(x))^2+x^2(x-y(x))y''(x)=0$$

✓ **Mathematica** : cpu = 0.559772 (sec), leaf count = 37

$$\left\{\left\{y(x)\to x\left(\left((a-1)\left(\frac{(-1)^{a+1}c_1}{x}-c_2\right)\right)^{\frac{1}{1-a}}+1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.116 (sec), leaf count = 37

$$\left\{\left(x^ay(x)-x^{a+1}\right)(x-y(x))^{-a}-x(a-1)\_C1+\_C2=0\right\}$$

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 = 0.30985 (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 = 0.026 (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 = 1.28417 (sec), leaf count = 92

$$\left\{\left\{y(x)\to c_2\exp\left(-\frac{\log(x)\left(a\left(\sqrt{\frac{a^2-2a(c+2d)-4bd+c^2}{a^2}}-1\right)+c\right)-2a\log\left(x^{\sqrt{\frac{a^2-2a(c+2d)-4bd+c^2}{a^2}}}+c_1\right)}{2(a+b)}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.191 (sec), leaf count = 136

$$\left\{y(x)=x^{-\frac{1}{2a+2b}\sqrt{(-4a-4b)d+(a-c)^2}}x^{\frac{a}{2a+2b}}x^{-\frac{c}{2a+2b}}\left(\frac{a^2+(-2c-4d)a-4db+c^2}{(a+b)^2}\left(x^{\frac{1}{a}\sqrt{(-4a-4b)d+(a-c)^2}}\_C\right.\right.\right.$$

2.1775 ODE No. 1775

$$-a(x+2)y(x)^2 + x(x+1)^2 y(x)y''(x) - x(x+1)^2 y'(x)^2 + 2(x+1)^2 y(x)y'(x) = 0$$

✓ **Mathematica** : cpu = 0.107727 (sec), leaf count = 29

$$\left\{\left\{y(x) \to c_2 e^{\frac{-a-c_1}{x}+a\log(x+1)}\right\}\right\}$$

✓ **Maple** : cpu = 0.071 (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

$$8\left(1-x^3\right) y(x)y''(x) - 4\left(1-x^3\right) y'(x)^2 - 12x^2 y(x)y'(x) + 3xy(x)^2 = 0$$

✓ **Mathematica** : cpu = 8.09905 (sec), leaf count = 1743

$$\left\{\left\{y(x) \to e^{\int_1^x -\frac{2\left(-\frac{3(1-K[2])^{3/4}\sqrt[4]{K[2]^2+K[2]+1}\int_1^{K[2]}\frac{\sqrt{\sqrt{3}K[1]+\sqrt{2K[1]-i\sqrt{3}+1}\sqrt{2K[1]+i\sqrt{3}+1}+\sqrt{3}}}{2(1-K[1])^{3/2}\sqrt{K[1]^2+K[1]+1}}dK[1]K[2]^2}{2\sqrt{2}\left(K[2]^3-1\right)^{5/4}\sqrt[4]{\sqrt{3}K[2]+\sqrt{2K[2]-i\sqrt{3}+1}\sqrt{2K[2]+i\sqrt{3}+1}+\sqrt{3}}}+c_1\left(-\frac{3(1-K[2\cdots}{2\sqrt{2}\left(K[2]^3-1\right)^{5/4}\sqrt[4]{\sqrt{3}\cdots}}\cdots\right.\cdots\right)}{\cdots}}\right.\right.$$

✓ **Maple** : cpu = 0.233 (sec), leaf count = 49

$$\left\{y(x) = \frac{x}{\_C1}\left(\_C1\ LegendreQ\left(-\frac{1}{6}, \frac{1}{3}, \sqrt{-(x-1)\left(x^2+x+1\right)}\right) + \frac{\_C2}{2} LegendreP\left(-\frac{1}{6}, \frac{1}{3}, \sqrt{-(x-\cdots}\right.\right.\right.$$

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 = 46.5017 (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 = 0.507 (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 = 0.19161 (sec), leaf count = 65

$$\text{Solve}\left[\left(\frac{y(x)\sqrt{c_1 - \frac{2a}{y(x)}}}{c_1} + \frac{2a\tanh^{-1}\left(\frac{\sqrt{c_1 - \frac{2a}{y(x)}}}{\sqrt{c_1}}\right)}{c_1{}^{3/2}}\right)^2 = (c_2 + x)^2, y(x)\right]$$

✓ **Maple** : cpu = 0.426 (sec), leaf count = 245

$$\left\{y(x) = \frac{\_C1\left(a\_C1 + \mathrm{e}^{RootOf\left(csgn(\_C1^{-1})\_C1^4a^2 - 2\_Z\_C1^3a\mathrm{e}^{\_Z} - csgn(\_C1^{-1})(\mathrm{e}^{\_Z})^2\_C1^2 - 2\,csgn(\_C1^{-1})\mathrm{e}^{\_Z}\_C2 -\right.}\right.}{2\,\mathrm{e}^{RootOf\left(csgn(\_C1^{-1})\_C1^4a^2 - 2\_Z\_C1^3a\mathrm{e}^{\_Z} - csgn(\_C1^{-1})(\mathrm{e}^{\_Z})^2\_C1^2 - 2\,csgn(\_C1^{-1})\mathrm{e}^{\_Z}\_C2 - 2\,csgn(\right.}}\right.$$

2.1779 ODE No. 1779

$$ax + y(x)^2y''(x) + y(x)y'(x)^2 = 0$$

✗ **Mathematica** : cpu = 22.2545 (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 = 0.4 (sec), leaf count = 112

$$\left\{\ln(x) - \int^{\frac{y(x)}{x}} \frac{\_g^2}{2\_g^3 + 2a}\left(\sqrt[3]{\frac{a}{\_g^3}}\sqrt{3}\tan\left(RootOf\left(-2\_Z\sqrt{3} + \ln\left(\frac{(\tan(\_Z))^2 + 1}{(\tan(\_Z))^2 + 2\sqrt{3}\tan(\_Z) + 3}\right.\right.\right.\right.\right.$$

2.1780 ODE No. 1780

$$-ax - b + y(x)^2 y''(x) + y(x) y'(x)^2 = 0$$

✗ **Mathematica** : cpu = 20.3137 (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 = 0.44 (sec), leaf count = 160

$$\left\{ \frac{b \ln(ax+b)}{a} - \int^{\frac{y(x)}{ax+b}} -\frac{\_g^2 b\sqrt{3}}{6\_g^3 a^2 - 6} \left(-3 \tan\left(RootOf\left(6\, b^2 \int \frac{\_g^2}{\_g^3 a^2 - 1} \left(-\frac{a}{b^3 \_g^3} \right)^{2/3} \mathrm{d}\_g - 2\_Z \sqrt{\right.\right.\right.\right.$$

2.1781 ODE No. 1781

$$\left(y(x)^2 + 1\right) y''(x) + (1 - 2y(x)) y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.179918 (sec), leaf count = 46

$$\left\{ \left\{ y(x) \to \frac{i(1 - c_1{}^{2i}(c_2 + x)^{2i})}{1 + c_1{}^{2i}(c_2 + x)^{2i}} \right\} \right\}$$

✓ **Maple** : cpu = 0.042 (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 = 0.155657 (sec), leaf count = 93

$$\left\{ \left\{ y(x) \to -\frac{ic_1(c_2 + x)}{\sqrt{c_1{}^2 x^2 + 2c_2 c_1{}^2 x + c_2{}^2 c_1{}^2 - 1}} \right\}, \left\{ y(x) \to \frac{ic_1(c_2 + x)}{\sqrt{c_1{}^2 x^2 + 2c_2 c_1{}^2 x + c_2{}^2 c_1{}^2 - 1}} \right\} \right\}$$

✓ **Maple** : cpu = 0.04 (sec), leaf count = 33

$$\left\{ y(x) = \sqrt{-\left(\_C1^2 x^2 + 2\_C1\,\_C2\, x + \_C2^2 - 1\right)^{-1}} (\_C1\, x + \_C2) \right\}$$

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 = 1.03469 (sec), leaf count = 26

$$\text{Solve}\left[x=c_2e^{e^{-c_1y(x)}}-y(x)^2,y(x)\right]$$

✓ **Maple** : cpu = 0.125 (sec), leaf count = 23

$$\left\{\frac{-y(x)\_C1+\ln\left(x+(y(x))^2\right)+\_C2+2}{y(x)}=0\right\}$$

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 = 0.259395 (sec), leaf count = 74

$$\text{Solve}\left[\frac{1}{2}\left(i\cot(c_1)\left(\log\left(1-\frac{iy(x)}{x}\right)-\log\left(1+\frac{iy(x)}{x}\right)\right)+\log\left(1-\frac{iy(x)}{x}\right)+\log\left(1+\frac{iy(x)}{x}\right)\right)=c_2$$

✓ **Maple** : cpu = 0.639 (sec), leaf count = 82

$$\left\{y(x)=\tan\left(RootOf\left(-\left(e^{\frac{i\_C1\_Z}{-1+\_C1}}\right)^2\left(e^{\frac{\_C2\_C1}{-1+\_C1}}\right)^2\left(x^{\frac{\_C1}{-1+\_C1}}\right)^2\left(e^{\frac{i\_Z}{-1+\_C1}}\right)^2+(\cos(\_Z))^2\left(e^{\frac{\_C2}{-1+\_C1}}\right)^2\left(x^{(-1}\right.\right.\right.\right.$$

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 = 0.315481 (sec), leaf count = 95

$$\left\{\left\{y(x)\to\frac{1}{2}\left(-\sqrt{4x\left(e^{c_2}-x\right)+e^{2c_2}\cot^2(c_1)}-e^{c_2}\cot(c_1)\right)\right\},\left\{y(x)\to\frac{1}{2}\left(\sqrt{4x\left(e^{c_2}-x\right)+e^{2c_2}\cot^2(c_1\right.\right.\right.$$

✓ **Maple** : cpu = 0.279 (sec), leaf count = 83

$$\left\{y(x)=\frac{1}{2\_C2}\left(\_C1+1-\sqrt{\_C1^2+(4i\_C2x+2)\_C1-4\_C2^2x^2-4i\_C2x+1}\right),y(x)=\frac{1}{2\_C}\right.$$

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 = 0.0597954 (sec), leaf count = 53

$$\left\{\left\{y(x)\to 1-\sin^2\left(\frac{1}{2}\left(-\int_1^x -\exp\left(-\int_1^{K[3]}\frac{1}{2}f(K[1])dK[1]\right)c_1dK[3]-c_2\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.138 (sec), leaf count = 42

$$\left\{y(x)=\frac{1}{8\_C2}\left(2\,\mathrm{e}\_C1\int \mathrm{e}^{-1/2\int f(x)\,\mathrm{d}x}\,\mathrm{d}x\_C2+1\right)^2\left(\mathrm{e}\_C1\int \mathrm{e}^{-\frac{\int f(x)\,\mathrm{d}x}{2}}\,\mathrm{d}x\right)^{-1}\right\}$$

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 = 0.908003 (sec), leaf count = 170

$$\left\{\left\{y(x)\to \text{InverseFunction}\left[\int_1^{\#1}-\frac{1}{(K[2]-1)\sqrt{K[2]}\sqrt{c_1+2\int_1^{K[2]}\frac{e^{-2\left(\log(1-K[1])+\frac{1}{2}\log(K[1])\right)}h(K[1])}{2(K[1]-1)K[1]}dK[1]}}dK\right.\right.\right.$$

✓ **Maple** : cpu = 0.244 (sec), leaf count = 80

$$\left\{\int^{y(x)}\frac{1}{\_b-1}\frac{1}{\sqrt{\_b\left(\_C1+\int\frac{h(\_b)}{\_b^2(\_b-1)^3}\,\mathrm{d}\_b\right)}}d\_b-x-\_C2=0,\int^{y(x)}-\frac{1}{\_b-1}\frac{1}{\sqrt{\_b\left(\_C1+\int\frac{}{\_b^2}\right.}}\right.$$

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 = 1.36113 (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 = 2.34524 (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 = 0.615835 (sec), leaf count = 186

$$\left\{\left\{y(x)\to\text{InverseFunction}\left[\int_1^{\#1}-\frac{1}{(1-K[2])^{2/3}K[2]^{2/3}\sqrt{c_1+2\int_1^{K[2]}-\frac{\exp\left(-2\left(\frac{2}{3}\log(1-K[1])+\frac{2}{3}\log(K[1])\right)\right)h(K}{3(K[1]-1)K[1]}}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.229 (sec), leaf count = 119

$$\left\{\int^{y(x)}-\frac{\sqrt{9}}{3}\frac{1}{\sqrt{(\_b-1)\_b\sqrt[3]{\_b\,(\_b-1)}\left(\_C1-\frac{2}{3}\int\frac{h(\_b)}{\_b\,(\_b-1)}\left(\_b^2-\_b\right)^{-\frac{4}{3}}d\_b\right)}}d\_b-x-\_C2=\right.$$

2.1791 ODE No. 1791

$$-h(y(x)) + (1 - y(x))y''(x) - 3(1 - 2y(x))y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.733166 (sec), leaf count = 168

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[\int_1^{\#1} -\frac{e^{\frac{1}{2}(12-12K[2])}}{(K[2]-1)^3\sqrt{c_1 + 2\int_1^{K[2]} -\frac{\exp(-2(6(K[1]-1)+3\log(K[1]-1)))h(K[1])}{K[1]-1}dK[1]}}d\right.\right.\right.$$

✓ **Maple** : cpu = 0.246 (sec), leaf count = 90

$$\left\{\int^{y(x)} \frac{1}{(\_b-1)^3 (\mathrm{e}^{\_b})^6} \frac{1}{\sqrt{-2\int \frac{h(\_b)}{(\mathrm{e}^{\_b})^{12}(\_b-1)^7}\,\mathrm{d}\_b + \_C1}} d\_b - x - \_C2 = 0, \int^{y(x)} -\frac{1}{(\_b-1)^3 (\mathrm{e}^{\_b})^6} -\right.$$

2.1792 ODE No. 1792

$$a(y(x) - 1)y(x)y''(x) + y'(x)^2(by(x) + c) + h(y(x)) = 0$$

✓ **Mathematica** : cpu = 1.16179 (sec), leaf count = 226

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[\int_1^{\#1} -\frac{(1-K[2])^{\frac{1}{2}\left(\frac{2b}{a}+\frac{2c}{a}\right)}K[2]^{-\frac{c}{a}}}{\sqrt{c_1 + 2\int_1^{K[2]} -\frac{\exp\left(-\frac{2(c\log(K[1])-(b+c)\log(1-K[1]))}{a}\right)h(K[1])}{a(K[1]-1)K[1]}dK[1]}}dK[2]\&\right][c\right.\right.$$

✓ **Maple** : cpu = 0.351 (sec), leaf count = 194

$$\left\{\int^{y(x)} a\frac{1}{\sqrt{a\left(a\_C1 - 2\int \frac{h(\_b)}{\_b(\_b-1)}\left((\_b-1)^{\frac{b}{a}}\right)^2\left((\_b-1)^{\frac{c}{a}}\right)^2\left(\_b^{\frac{c}{a}}\right)^{-2}\mathrm{d}\_b\right)}}\left(\_b^{\frac{c}{a}}\right)^{-1}\left((\_b-1)^{\frac{-b-c}{a}}\right.\right.$$

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 = 0.126445 (sec), leaf count = 83

$$\left\{\left\{y(x)\to \text{InverseFunction}\left[a\#1^{-1/a}(-(\#1-1)\#1)^{\frac{1}{a}}\,{}_2F_1\left(\frac{1}{a},\frac{a-1}{a};1+\frac{1}{a};1-\#1\right)\&\right]\left[\int_1^x \exp\left(-\int_1\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.049 (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 = 0.142216 (sec), leaf count = 69

$$\left\{\left\{y(x)\to \text{InverseFunction}\left[-a\#1^{\frac{1}{a}}\,{}_2F_1\left(\frac{1}{a},1-\frac{1}{b};1+\frac{1}{a};\#1\right)\&\right]\left[\int_1^x \exp\left(-\int_1^{K[3]}\frac{f(K[1])}{ab}dK[1]\right)c\right.\right.\right.$$

✓ **Maple** : cpu = 0.062 (sec), leaf count = 46

$$\left\{\_C1\,\mathrm{e}^{-\frac{fx}{ab}}-\_C2+\int^{y(x)}\frac{\sqrt[b]{\_a-1}\sqrt[a]{\_a}}{\_a\,(\_a-1)}d\_a=0\right\}$$

2.1795 ODE No. 1795

$$xy(x)^2y''(x)-a=0$$

✓ **Mathematica** : cpu = 0.235919 (sec), leaf count = 116

$$\text{Solve}\left[-\frac{\sqrt{-\frac{2ay(x)}{x}-\frac{2c_1y(x)^2}{x^2}}}{2c_1}-\frac{a\tan^{-1}\left(\frac{\sqrt{2}\sqrt{c_1}\left(\frac{a}{2c_1}+\frac{y(x)}{x}\right)}{\sqrt{-\frac{2ay(x)}{x}-\frac{2c_1y(x)^2}{x^2}}}\right)}{2\sqrt{2}{c_1}^{3/2}}-c_2-\frac{1}{x}=0,y(x)\right]$$

✓ **Maple** : cpu = 1.019 (sec), leaf count = 529

$$\left\{y(x) = \frac{\left(9\,a\_C1 + \mathrm{e}^{RootOf\left(243\, csgn(\_C1^{-1})\_C1^4 a^2 x - 54\_Z\,\mathrm{e}^{\_Z} a x\_C1^3 - 3\, csgn(\_C1^{-1})\left(\mathrm{e}^{\_Z}\right)^2\_C1^2 x - 6\, csgn(\_C1^{-1})\mathrm{e}^{\_Z}\right.}\right.}{2\,\mathrm{e}^{RootOf\left(243\, csgn(\_C1^{-1})\_C1^4 a^2 x - 54\_Z\,\mathrm{e}^{\_Z} a x\_C1^3 - 3\, csgn(\_C1^{-1})\left(\mathrm{e}^{\_Z}\right)^2\_C1^2 x - 6\, csgn(\_C1^{-1})\mathrm{e}^{\_Z}\right.}}\right.$$

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 = 0.245113 (sec), leaf count = 363

$$\left\{\left\{y(x) \to -\frac{1}{2} e^{-c_2}\left(1 - \frac{x}{\sqrt{x^2 - a^2}}\right)^{-\frac{c_1}{2}}\left(\frac{x}{\sqrt{x^2 - a^2}} + 1\right)^{-\frac{c_1}{2}}\sqrt{2a^2 e^{2c_2}\left(1 - \frac{x}{\sqrt{x^2 - a^2}}\right)^{c_1}\left(\frac{x}{\sqrt{x^2 - a^2}} +\right.}\right.\right.$$

✓ **Maple** : cpu = 0.185 (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

$$(y(x)-1)^3\left(ay(x)^2 + b\right) + cxy(x)^2(y(x)-1) + dx^2 y(x)^2(y(x)+1) + 2x^2 y(x)(y(x)-1)y''(x) - x^2(3y(x)-1)y'(x)$$

✗ **Mathematica** : cpu = 11.1626 (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

$$x^3y(x)^2y''(x) + (y(x) + x)\,(xy'(x) - y(x))^3 = 0$$

✗ **Mathematica** : cpu = 35.5125 (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 = 0.179 (sec), leaf count = 166

$$\left\{y(x) = RootOf\left(-2\ln(x) - \int^{\_Z} 1\left(i\sqrt{3}Y_{i\sqrt{3}}\left(2\sqrt{\_f}\right)\_C1\,\sqrt{\_f} + i\sqrt{3}J_{i\sqrt{3}}\left(2\sqrt{\_f}\right)\sqrt{\_f} + Y_{i\sqrt{3}}\left(2\sqrt{\right.\right.\right.$$

2.1799 ODE No. 1799

$$y(x)^3y''(x) - a = 0$$

✓ **Mathematica** : cpu = 1.38341 (sec), leaf count = 88

$$\left\{\left\{y(x) \to -\frac{\sqrt{a + c_1{}^2x^2 + 2c_2c_1{}^2x + c_2{}^2c_1{}^2}}{\sqrt{c_1}}\right\}, \left\{y(x) \to \frac{\sqrt{a + c_1{}^2x^2 + 2c_2c_1{}^2x + c_2{}^2c_1{}^2}}{\sqrt{c_1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.099 (sec), leaf count = 46

$$\left\{y(x) = \frac{1}{\_C1}\sqrt{\left((\_C2 + x)^2\,\_C1^2 + a\right)\_C1}, y(x) = -\frac{1}{\_C1}\sqrt{\left((\_C2 + x)^2\,\_C1^2 + a\right)\_C1}\right\}$$

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 = 0.469405 (sec), leaf count = 84

$$\left\{\left\{y(x) \to -\frac{\sqrt{-2c_1x - 2c_2c_1 - 1}}{\sqrt{2}\sqrt{c_1x + c_2c_1}}\right\}, \left\{y(x) \to \frac{\sqrt{-2c_1x - 2c_2c_1 - 1}}{\sqrt{2}\sqrt{c_1x + c_2c_1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.036 (sec), leaf count = 60

$$\left\{y(x) = \frac{1}{2\,\_C1\,x + 2\,\_C2}\sqrt{-4\,(\_C1\,x + \_C2 + 1/2)\,(\_C1\,x + \_C2)}, y(x) = -\frac{1}{2\,\_C1\,x + 2\,\_C2}\sqrt{-\right.$$

2.1801 ODE No. 1801

$$-a^2xy(x)^2 + 2y(x)^3y''(x) + y(x)^4 - 1 = 0$$

✗ **Mathematica** : cpu = 3.60406 (sec), leaf count = 0 , could not solve

```
DSolve[-1 - a^2*x*y[x]^2 + y[x]^4 + 2*y[x]^3*Derivative[2][y][x] == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(2*y(x)^3*diff(diff(y(x),x),x)+y(x)^4-a^2*x*y(x)^2-1=0,y(x))
```

2.1802 ODE No. 1802

$$-ax^2 - bx - c + 2y(x)^3y''(x) + y(x)^2y'(x)^2 = 0$$

✗ **Mathematica** : cpu = 0.255074 (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 = 21.9758 (sec), leaf count = 10387

$$\left\{\text{Solve}\left[-\frac{2F\left(\sin^{-1}\left(\sqrt{\frac{(\text{Root}\left[\mathrm{a0}\#1^4+(-a\mathrm{a0}-b\mathrm{a0}-c\mathrm{a0}-c_1)\#1^3+(-\mathrm{a1}-\mathrm{a2}-\mathrm{a3}+a\mathrm{a0}b+a\mathrm{a0}c+\mathrm{a0}bc+ac_1+bc_1+cc_1)\#1^2+(a\mathrm{a2}+c\mathrm{a2}+\right.}{(\text{Root}\left[\mathrm{a0}\#1^4+(-a\mathrm{a0}-b\mathrm{a0}-c\mathrm{a0}-c_1)\#1^3+(-\mathrm{a1}-\mathrm{a2}-\mathrm{a3}+a\mathrm{a0}b+a\mathrm{a0}c+\mathrm{a0}bc+ac_1+bc_1+cc_1)\#1^2+(a\mathrm{a2}+c\mathrm{a2}+\right.}}\right.\right.}{}\right.\right.$$

✓ **Maple** : cpu = 1.712 (sec), leaf count = 115620

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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 = 2.43793 (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 = 0.026 (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

$$\left(-ay(x)-b+4y(x)^3\right)\left(f(x)y'(x)+y''(x)\right)-\left(6y(x)^2-\frac{a}{2}\right)y'(x)^2=0$$

✓ **Mathematica** : cpu = 0.323416 (sec), leaf count = 438

$$\text{Solve}\left[\frac{2\sqrt{\frac{y(x)-\text{Root}\left[4\#1^3-\#1a-b\&,1\right]}{\text{Root}\left[4\#1^3-\#1a-b\&,3\right]-\text{Root}\left[4\#1^3-\#1a-b\&,1\right]}}\sqrt{\frac{y(x)-\text{Root}\left[4\#1^3-\#1a-b\&,2\right]}{\text{Root}\left[4\#1^3-\#1a-b\&,3\right]-\text{Root}\left[4\#1^3-\#1a-b\&,2\right]}}\left(y(x)-\text{Root}\left[4\right.\right.}{\sqrt{ay(x)+b-4y(x)^3}}\right.$$

✓ **Maple** : cpu = 0.033 (sec), leaf count = 34

$$\left\{\_C1\,\mathrm{e}^{-fx}-\_C2+\int^{y(x)}\frac{1}{\sqrt{4\_a^3-a\_a-b}}d\_a=0\right\}$$

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 = 14.0866 (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 = 2.356 (sec), leaf count = 733

$$\left\{-\frac{\_C1}{2}\,eval\left(\int\frac{1}{x-1}e^{\int\frac{1}{x(x-1)}EllipticE(\sqrt{x})\,(EllipticK(\sqrt{x}))^{-1}\,dx}\int 1\int\frac{1}{(x-y)^2\,y\,(-1+y)}\sqrt{-y\,(-1+y)\,(x-$$

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 = 23.6759 (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

$b\sqrt{(1-y(x)^2)\,(1-a^2y(x)^2)}y'(x)^2+\left(y(x)^2-1\right)\left(a^2y(x)^2-1\right)y''(x)+y(x)\left(-2a^2y(x)^2+a^2+1\right)y'(x)^2=$

✓ **Mathematica** : cpu = 1.03828 (sec), leaf count = 124

$$\left\{\left\{y(x)\to\text{InverseFunction}\left[\int_1^{\#1}\frac{\exp\left(\frac{b\sqrt{1-K[1]^2}\sqrt{1-a^2K[1]^2}F(\sin^{-1}(K[1])|a^2)}{\sqrt{(K[1]^2-1)(a^2K[1]^2-1)}}+\frac{1}{2}(-\log(1-K[1])-\log(K[1\right.}{c_1}\right.\right.\right.$$

✓ **Maple** : cpu = 0.105 (sec), leaf count = 72

$$\left\{\int^{y(x)}e^{\int\frac{1}{(\_b^2-1)(\_b^2a^2-1)}\left(-2\_b^3a^2+a^2\_b+b\sqrt{(\_b^2-1)(\_b^2a^2-1)}+\_b\right)d\_b}d\_b-\_C1\,x-\_C2=0\right\}$$

2.1809 ODE No. 1809

$$y''(x)\left(ax^2+2bx+c+y(x)^2\right)^2+dy(x)=0$$

✗ **Mathematica** : cpu = 19.7812 (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 = 0.342 (sec), leaf count = 336

$$\left\{y(x)=RootOf\left(-a\arctan\left((ax+b)\frac{1}{\sqrt{ca-b^2}}\right)-\int^{\_Z}\frac{a}{-\_f^4ac+\_f^4b^2+\_C1\ \_f^2a^2-c\_f^2a+b^2\_\right.$$

2.1810 ODE No. 1810

$$\sqrt{y(x)}y''(x)-a=0$$

✓ **Mathematica** : cpu = 0.0773425 (sec), leaf count = 1677

$$\left\{\left\{y(x)\to\frac{3c_1{}^2}{16a^2}+\frac{\sqrt[3]{-\frac{221184c_1{}^6}{a^6}+\frac{159252480x^2c_1{}^3}{a^2}+\frac{159252480c_2{}^2c_1{}^3}{a^2}+\frac{318504960xc_2c_1{}^3}{a^2}+2293235712a^2x^4+229}}{}\right.\right.$$

✓ **Maple** : cpu = 0.095 (sec), leaf count = 91

$$\left\{\frac{1}{12\,a^2}\left(-3\_C1\,\sqrt{4\,a\sqrt{y\,(x)}-\_C1}-\left(4\,a\sqrt{y\,(x)}-\_C1\right)^{\frac{3}{2}}\right)-x-\_C2=0,\frac{1}{12\,a^2}\left(3\_C1\,\sqrt{4\,a\sqrt{y}}\right.\right.$$

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 = 300.029 (sec), leaf count = 0 , timed out

```
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```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve((y(x)^2+x^2)^(1/2)*diff(diff(y(x),x),x)-a*(diff(y(x),x)^2+1)^(3/2)=0,y(x))
```

2.1812 ODE No. 1812

$$y(x)y''(x)(1-\log(y(x)))+y'(x)^2(\log(y(x))+1)=0$$

✓ **Mathematica** : cpu = 0.263911 (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 = 0.092 (sec), leaf count = 19

$$\left\{y(x)=e^{\frac{\_C1\,x+\_C2-1}{\_C1\,x+\_C2}}\right\}$$

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 = 31.5321 (sec), leaf count = 176

$$\left\{\left\{y(x)\to \text{InverseFunction}\left[\int_1^{\#1}-\frac{\sqrt{2}\sqrt{\cos(2K[1])a-a-2b}}{\sqrt{2aAK[1]^2+4AcK[1]^2-2aA\sin(2K[1])K[1]+2c_1-aA\cos(2K[1\right.\right.\right.$$

✓ **Maple** : cpu = 0.32 (sec), leaf count = 138

$$\left\{\int^{y(x)}\sqrt{2}\left(b+a(\sin(\_a))^2\right)\frac{1}{\sqrt{-\left(b+a(\sin(\_a))^2\right)\left(Aa(\sin(\_a))^2-2\,Aa\_a\,\cos(\_a)\sin(\_a)+\_a^2\,(\right.}}\right.$$

2.1814 ODE No. 1814

$$ah(y(x))y'(x)^2+h(y(x))y''(x)+j(y(x))=0$$

✓ **Mathematica** : cpu = 0.345112 (sec), leaf count = 120

$$\left\{\left\{y(x)\to \text{InverseFunction}\left[\int_1^{\#1}-\frac{e^{aK[2]}}{\sqrt{c_1+2\int_1^{K[2]}-\frac{e^{2aK[1]}j(K[1])}{h(K[1])}dK[1]}}dK[2]\&\right][c_2+x]\right\},\left\{y(x)\to \text{Inv}\right.\right.$$

✓ **Maple** : cpu = 0.118 (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 = 0.966021 (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 = 0.707 (sec), leaf count = 71

$$\left\{y(x)=\mathit{ODESolStruc}\left(\mathit{RootOf}\left(\int \_b(\_a)\,\mathrm{d}\_a+\_\mathit{C1}-\int^{\_Z}(h(\_f))^{-1}\,d\_f\right),[\left\{\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a)=1\right\}\right.$$

2.1816 ODE No. 1816

$$x^2(-y(x))y'(x)+y'(x)y''(x)-xy(x)^2=0$$

✗ **Mathematica** : cpu = 55.0609 (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 = 1.441 (sec), leaf count = 46

$$\left\{y(x)=\mathit{ODESolStruc}\left(\_b(\_a),[\left\{-\_a^2(\_b(\_a))^2+\left(\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a)\right)^2+\_\mathit{C1}=0\right\},\{\_a=x,\_b(\_a\right.$$

2.1817 ODE No. 1817

$$4y'(x)^2+(xy'(x)-y(x))\,y''(x)=0$$

✗ **Mathematica** : cpu = 13.81 (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 = 0.322 (sec), leaf count = 40

$$\left\{y(x)=\mathrm{e}^{\int^{\ln(x)}\mathrm{e}^{\mathit{RootOf}\left(\ln\left(\mathrm{e}^{\_Z}-1\right)\mathrm{e}^{\_Z}+\_\mathit{C1}\,\mathrm{e}^{\_Z}-\_Z\,\mathrm{e}^{\_Z}-\_b\,\mathrm{e}^{\_Z}+2\right)}-1d\_b+\_\mathit{C2}}\right\}$$

2.1818 ODE No. 1818

$$(xy'(x) - y(x))\, y''(x) - \left(y'(x)^2 + 1\right)^2 = 0$$

✗ **Mathematica** : cpu = 0.874707 (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 = 0.299 (sec), leaf count = 66

$$\left\{ y(x) = RootOf\left(-\ln(x) + \int^{-\_Z} \frac{-\_f + RootOf\left(-\_C1\, \tan\left(\_Z^{-1}\right)\_Z + \_f\,\_C1\, \tan\left(\_Z^{-1}\right) + \_C1}{\_f^2 +} \right.\right.$$

2.1819 ODE No. 1819

$$ax^3 y'(x) y''(x) + by(x)^2 = 0$$

✗ **Mathematica** : cpu = 21.1134 (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 = 0.039 (sec), leaf count = 42

$$\left\{ y(x) = \mathrm{e}^{\int^{\ln(x)} RootOf\left(-\int^{-\_Z} \frac{a\_a}{\_a^3 a - a\_a^2 + b} d\_a - \_b + \_C1\right) d\_b + \_C2} \right\}$$

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 = 307.64 (sec), leaf count = 0 , timed out

```
$Aborted
```

✓ **Maple** : cpu = 0.684 (sec), leaf count = 88

$$\left\{ y(x) = ODESolStruc\left(\mathrm{e}^{\int \_b(\_a)\, \mathrm{d}\_a + \_C1}, \left[\left\{ \frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a) = \frac{-(\_b(\_a))^3 f1 + (-f2 - f3)(\_b(\_a))^2 - f}{\_b(\_a) f1 + f2} \right.\right.\right.$$

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 = 41.9174 (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 = 2.261 (sec), leaf count = 54

$$\left\{y(x)=ODESolStruc\left(\_b(\_a),[\left\{(\_b(\_a))^2\left(\frac{d}{d\_a}\_b(\_a)\right)^2+\_a^2\frac{d}{d\_a}\_b(\_a)+\_b(\_a)\_a+\_C\right.\right.$$

2.1822 ODE No. 1822

$$\left(y'(x)^2+y(x)^2\right)y''(x)+y(x)^3=0$$

✓ **Mathematica** : cpu = 0.861177 (sec), leaf count = 371

$$\left\{\left\{y(x)\to c_2\exp\left(\frac{1}{12}\left(-2\sqrt{3}\tan^{-1}\left(\frac{1+2\text{InverseFunction}\left[\frac{\left(\sqrt{3}-i\right)\tan^{-1}\left(\frac{\#1}{\sqrt{\frac{1}{2}\left(1-i\sqrt{3}\right)}}\right)}{\sqrt{6\left(1-i\sqrt{3}\right)}}+\frac{\left(\sqrt{3}+i\right)\tan^{-1}\left(\right.}{\sqrt{6\left(1+i\sqrt{3}\right.}}\right.}{\sqrt{3}}\right.\right.\right.\right.\right.$$

✓ **Maple** : cpu = 1.137 (sec), leaf count = 291

$$\left\{y(x)=\left(\_C1+\tan\left(\sqrt{3}x\right)\right)^{\left(2\_C1^2+2\right)^{-1}}\_C2\left(\_C1+\tan\left(\sqrt{3}x\right)\right)^{\frac{\_C1^2}{2\_C1^2+2}}\left(1+\left(\tan\left(\sqrt{3}x\right)\right)^2\right)^{-\frac{\_C}{4\_C}}\right.$$

2.1823 ODE No. 1823

$$y''(x)\left(a(xy'(x)-y(x))+y'(x)^2\right)-b=0$$

✗ **Mathematica** : cpu = 0.114387 (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 = 0.382 (sec), leaf count = 289

$$\left\{y(x)=-\frac{ax^2}{4}+RootOf\left(-x-\int^{\_Z}\frac{1}{\_f^2a^2-4\_f\,b+2\_C1}\sqrt{\left(\_f^2a^2-4\_f\,b+2\_C1\right)\left(\_f\,a+\sqrt{4\right.}\right.}\right.\right.$$

2.1824 ODE No. 1824

$$y''(x)\left(a\sqrt{y'(x)^2+1}-xy'(x)\right)-y'(x)^2-1=0$$

✓ **Mathematica** : cpu = 0.720772 (sec), leaf count = 347

$$\left\{\left\{y(x)\to\frac{-2\sqrt{x^2\left(a^2+c_1{}^2-x^2\right)}+c_1x\log\left(-c_1\left(\sqrt{x^2\left(a^2+c_1{}^2-x^2\right)}+c_1x\right)+a^2(-x)+ax^2\right)+c_1x\,l}{\right.\right.$$

✓ **Maple** : cpu = 0.667 (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 = 0.0298853 (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 = 0.793 (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 = 0.796439 (sec), leaf count = 201

$$\left\{\text{Solve}\left[\frac{(ay(x)+b)^2\left(1-\frac{4(ay(x)+b)^{3/2}}{3ac_1}\right)\,{}_2F_1\left(\frac{1}{2},\frac{2}{3};\frac{5}{3};\frac{4(b+ay(x))^{3/2}}{3ac_1}\right)^2}{a^2\left(c_1-\frac{4(ay(x)+b)^{3/2}}{3a}\right)}=(c_2+x)^2,y(x)\right],\text{Solve}\left[\frac{(ay(x)+b\right.$$

✓ **Maple** : cpu = 0.305 (sec), leaf count = 173

$$\left\{\int^{y(x)} a\sqrt{3}\frac{1}{\sqrt{a\left(4\_a\sqrt{\_a\,a+b}a+4\sqrt{\_a\,a+b}b-\_C1\right)}}d\_a - x - \_C2 = 0, \int^{y(x)} -3\frac{}{\sqrt{-12\,a\left((\_a\right.}}\right.$$

2.1827 ODE No. 1827

$$a^2y''(x)^2 - 2axy''(x) + y'(x) = 0$$

✗ **Mathematica** : cpu = 0.899081 (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 = 2.044 (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

$$2\left(x^2+1\right)y''(x)^2 + 2y'(x)\left(y'(x)+x\right) - x\left(4y'(x)+x\right)y''(x) - 2y(x) = 0$$

✓ **Mathematica** : cpu = 0.007598 (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 = 0.498 (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 = 0.0056858 (sec), leaf count = 24

$$\left\{\left\{y(x) \to \frac{c_1{}^2x^2}{c_2} + c_1x + c_2\right\}\right\}$$

✓ **Maple** : cpu = 0.256 (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 = 0.0233418 (sec), leaf count = 24

$$\left\{\left\{y(x) \to \frac{c_1{}^2x^3}{c_2} + c_1x + c_2\right\}\right\}$$

✓ **Maple** : cpu = 0.403 (sec), leaf count = 308

$$\left\{y(x) = 0, y(x) = \frac{27\_C1\;\sqrt{5}\sqrt{4}x}{4}\left((9\,x-1)\sqrt{9} + 9\sqrt{9\,x^2-2\,x}\right)^{-\frac{2\sqrt{9}}{9}}\left((9\,x-1)\sqrt{9} + 9\sqrt{9\,x^2-2\,x}\right)^{-}\right.$$

2.1831 ODE No. 1831

$$y(x)(xF(0,2)+xF(2,0))y''(x)+xF(2,2)y''(x)^2+xF(1,1)y''(x)+y'(x)\left((xF(1,2)+xF(2,1))y''(x)+y(x)(\right.$$

✗ **Mathematica** : cpu = 300.011 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 1.269 (sec), leaf count = 163

$$\left\{y(x) = ODESolStruc\left(e^{\int \_b(\_a)\,d\_a + \_C1}, [\left\{\frac{d}{d\_a}\_b(\_a) = \frac{1}{2\,(F_{2,2})(\_a)}\left(\sqrt{(((F_{2,1})(\_a))^2 + 2\,(F_{2,1})(\_\right.\right.\right.\right.$$

2.1832 ODE No. 1832

$$y(x)y''(x)^2 - ae^{2x} = 0$$

✗ **Mathematica** : cpu = 20.2342 (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 = 0.852 (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 = 300.035 (sec), leaf count = 0 , timed out

```
$Aborted
```

✓ **Maple** : cpu = 6.394 (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 = 16.0658 (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 = 0.424 (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 = 0.0799617 (sec), leaf count = 143

$$\left\{\left\{y(x)\to\frac{1}{4}\left(-\frac{8c_1{}^3}{\sqrt[3]{3}\sqrt[3]{\sqrt{3}\sqrt{27c_1{}^{10}c_2{}^{10}-64c_1{}^9c_2{}^9}-9c_1{}^5c_2{}^5}}+\frac{c_1{}^2}{c_2}-\frac{2\sqrt[3]{\sqrt{3}\sqrt{27c_1{}^{10}c_2{}^{10}-64c_1{}^9c_2{}^9}-9c_1{}^5}}{3^{2/3}c_2{}^3}\right.\right.\right.$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve((2*diff(diff(y(x),x),x)*y(x)-diff(y(x),x)^2)^3+32*diff(diff(y(x),x),x)*(x*diff(
diff(y(x),x))^3=0,y(x))
```

2.1836 ODE No. 1836

$$\sqrt{ay''(x)^2+by'(x)^2}+cy(x)y''(x)+dy'(x)^2=0$$

✗ **Mathematica** : cpu = 9.51262 (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 = 1.033 (sec), leaf count = 116

$$\left\{y(x)=0,y(x)=\_C1,y(x)=\_C1\,x+\_C2,y(x)=ODESolStruc\left(\_a,[\left\{\frac{\_b(\_a)}{-c^2\_a^2+a}\left(\left(\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a\right.\right.\right.\right.\right.$$

2.1837 ODE No. 1837

$$y^{(3)}(x)-a^2\left(y'(x)^5+2y'(x)^3+y'(x)\right)=0$$

✗ **Mathematica** : cpu = 10.6967 (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 = 0.487 (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 = 0.0176279 (sec), leaf count = 0 , could not solve

```
DSolve[1 - Derivative[1][y][x]^2 + y[x]*Derivative[2][y][x] + Derivative[3][y][x] == 0
```

✓ **Maple** : cpu = 0.593 (sec), leaf count = 73

$$\left\{y(x) = ODESolStruc\left(\_a, [\left\{\left(\frac{d^2}{d\_a^2}\_b(\_a)\right)(\_b(\_a))^2 + \left(\frac{d}{d\_a}\_b(\_a)\right)^2\_b(\_a) + \left(\frac{d}{d\_a}\_b(\_a)\right.\right.\right.$$

2.1839 ODE No. 1839

$$y^{(3)}(x) - y(x)y''(x) + y'(x)^2 = 0$$

✗ **Mathematica** : cpu = 0.0175349 (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 = 0.998 (sec), leaf count = 116

$$\left\{y(x) = ODESolStruc\left(e^{\int \_g(\_f)\,d\_f + \_C2}, [\left\{\frac{d}{d\_f}\_g(\_f) = 6\,\frac{(1/6 + (\_f - 1/6)\,\_g(\_f))\,(\_g(\_f)\,\_f + 1}{\_f}\right.\right.\right.$$

2.1840 ODE No. 1840

$$ay(x)y''(x) + y^{(3)}(x) = 0$$

✗ **Mathematica** : cpu = 0.0199495 (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 = 0.885 (sec), leaf count = 129

$$\left\{y(x) = ODESolStruc\left(e^{\int \_g(\_f)\,d\_f + \_C2}, [\left\{\frac{d}{d\_f}\_g(\_f) = \frac{\_g(\_f)\left(6\,(\_g(\_f))^2\,\_f^2 + 2\,(\_g(\_f))^2\,\_f\,a\right.}{\_f}\right.\right.\right.$$

2.1841 ODE No. 1841

$$-f(x)+x^2y^{(3)}(x)+xy''(x)+(2xy(x)-1)y'(x)+y(x)^2=0$$

✗ **Mathematica** : cpu = 0.079572 (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 = 0.363 (sec), leaf count = 60

$$\left\{y(x)=ODESolStruc\left(\_b(\_a),[\left\{\_a^2\frac{d^2}{d\_a^2}\_b(\_a)+\_a(\_b(\_a))^2-\left(\frac{d}{d\_a}\_b(\_a)\right)\_a-\int f(\_a)\right.\right.\right.$$

2.1842 ODE No. 1842

$$x^2y^{(3)}(x)+x(y(x)-1)y''(x)+xy'(x)^2+(1-y(x))y'(x)=0$$

✓ **Mathematica** : cpu = 0.160437 (sec), leaf count = 286

$$\left\{\left\{y(x)\to\frac{2x\left(c_3\left(J_{\frac{\sqrt{c_2+2}}{\sqrt{2}}}\left(-\frac{1}{2}ix\sqrt{c_1}\right)-\frac{1}{4}i\sqrt{c_1}x\left(J_{\frac{\sqrt{c_2+2}}{\sqrt{2}}-1}\left(-\frac{1}{2}ix\sqrt{c_1}\right)-J_{\frac{\sqrt{c_2+2}}{\sqrt{2}}+1}\left(-\frac{1}{2}ix\sqrt{c_1}\right)\right)\right)+Y_{\frac{\sqrt{c_2}}{\sqrt{2}}}\right.}{c_3xJ_{\frac{\sqrt{c_2+2}}{\sqrt{2}}}\left(-\frac{1}{2}ix\sqrt{c_1}\right)+xY_{\frac{\sqrt{c_2+2}}{\sqrt{2}}}}\right.\right.$$

✓ **Maple** : cpu = 0.569 (sec), leaf count = 190

$$\left\{\ln(x)+2\int^{y(x)}\left(2\left(RootOf\left(-2\sqrt{4+\_C1}Y_{1/2\sqrt{4+\_C1}}\left(1/2\sqrt{2}\_Z\right)\_C2+2Y_{1/2\sqrt{4+\_C1}}\left(1/2\sqrt{2}\_Z\right)\right.\right.\right.\right.$$

2.1843 ODE No. 1843

$$y^{(3)}(x)y(x)+y(x)^3y'(x)-y'(x)y''(x)=0$$

✓ **Mathematica** : cpu = 2.03794 (sec), leaf count = 409

$$\left\{\left\{y(x)\to\text{InverseFunction}\left[-\frac{2i\sqrt{\frac{\#1^2}{2\left(\sqrt{c_2{}^2-c_1}-c_2\right)}+1}\sqrt{1-\frac{\#1^2}{2\left(c_2+\sqrt{c_2{}^2-c_1}\right)}}F\left(i\sinh^{-1}\left(\frac{\sqrt{\frac{1}{\sqrt{c_2{}^2-c_1}-c_2}}\#1}{\sqrt{2}}\right)\right|\right.}{\sqrt{\frac{1}{\sqrt{c_2{}^2-c_1}-c_2}}\sqrt{-\frac{\#1^4}{2}+2\#1^2c_2-2c_1}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.251 (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 = 0.0808882 (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 = 0.197 (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 = 0.0800461 (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 = 0.135 (sec), leaf count = 22

$$\left\{y(x)=\_C3\left(\_C2^2+2\,\_C2\,x+x^2-9\,\_C1\right)^{-\frac{3}{2}}\right\}$$

2.1846 ODE No. 1846

$$2y^{(3)}(x)y'(x)-3y'(x)^2=0$$

✓ **Mathematica** : cpu = 0.0355457 (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 = 0.008 (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 = 0.172683 (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 = 0.148 (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 = 0.403484 (sec), leaf count = 187

$$\left\{\left\{y(x)\to c_3-\frac{\left(1-i\text{InverseFunction}\left[\frac{(\#1-a)e^{-a\tan^{-1}(\#1)}}{\sqrt{\#1^2+1}(a^2+1)c_1}\&\right][c_2+x]\right)^{-\frac{1}{2}-\frac{ia}{2}}\left(1+i\text{InverseFunction}\left[\frac{(\#1-a}{\sqrt{\#1}}\right.\right.}{(a^2+1)}\right.\right.$$

✓ **Maple** : cpu = 1.139 (sec), leaf count = 789

$$\left\{y(x)=\int\frac{\sin\left(RootOf\left(\mathrm{e}^{2a\_Z}\_C1^2\_C2^2a^4+2\,\mathrm{e}^{2a\_Z}\_C1^2\_C2\,a^4x+\mathrm{e}^{2a\_Z}\_C1^2a^4x^2+2\,\mathrm{e}^{2a\_Z}\_C1^2\right.\right.}{\cos\left(RootOf\left(\mathrm{e}^{2a\_Z}\_C1^2\_C2^2a^4+2\,\mathrm{e}^{2a\_Z}\_C1^2\_C2\,a^4x+\mathrm{e}^{2a\_Z}\_C1^2a^4x^2+2\,\mathrm{e}^{2a\_Z}\_C1^2\right.\right.}\right.$$

2.1849 ODE No. 1849

$$y^{(3)}(x)y''(x)-a\sqrt{b^2y''(x)^2+1}=0$$

✓ **Mathematica** : cpu = 0.608399 (sec), leaf count = 426

$$\left\{\left\{y(x)\to\frac{\frac{(a^2b^4x^2+2ab^4c_1x+b^4c_1{}^2-1)^{3/2}}{3ab^2}+\frac{\sqrt{a^2b^4x^2+2ab^4c_1x+b^4c_1{}^2-1}}{ab^2}-\frac{c_1\log\left(\sqrt{a^2b^4x^2+2ab^4c_1x+b^4c_1{}^2-1}+ab^2x+b^2c_1\right)}{a}-x}{2ab^3}\right.\right.$$

✓ **Maple** : cpu = 0.115 (sec), leaf count = 197

$$\left\{y(x) = \_C2\,x + \int \frac{1}{2\,b}\left(-1\ln\left(\sqrt{(1+b^2\,(x+\_C1)\,a)\,(-1+b^2\,(x+\_C1)\,a)} + (x+\_C1)\,b^4a^2\frac{1}{\sqrt{a^2b^4}}\right.\right.\right.$$

2.1850 ODE No. 1850

$$y^{(4)}(x)y'(x) - y^{(3)}(x)y''(x) + y^{(3)}(x)y'(x)^3 = 0$$

✗ **Mathematica** : cpu = 0.0983595 (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 = 1.495 (sec), leaf count = 164

$$\left\{y(x) = ODESolStruc\left(\int \frac{\_j(\_h)}{e^{\int \_j(\_h)\,d\_h+\_C2}\,\_h}\,d\_h + \_C3, [\left\{\frac{d}{d\_h}\_j(\_h) = \frac{\_j(\_h)\,(12\,(\_j(\_h))^2\,\_h^2\right.\right.\right.$$

2.1851 ODE No. 1851

$$y'(x)^3\,(f'(x)y'(x) + f(x)y''(x)) - y''(x)\,\left(f''(x)y'(x) + 2f'(x)y''(x) + f(x)y^{(3)}(x)\right) + y'(x)\,\left(f^{(3)}(x)y'(x) + 3f\right.$$

✗ **Mathematica** : cpu = 0.393106 (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 = 0.107677 (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 = 0.128 (sec), leaf count = 28

$$\left\{y(x) = 3\,(\_C2 + x)\,\sqrt{6}\_C1\,\sqrt{-\frac{\_C1}{\_C2 + x}} + \_C3\,x + \_C4\right\}$$

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 = 0.0777351 (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 = 0.589 (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 = 0.007774 (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 = 0.0031354 (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 = 0.0068391 (sec), leaf count = 22

$$\{\{x(t) \to c_1 e^{at}, y(t) \to bt + c_2\}\}$$

✓ **Maple** : cpu = 0.029 (sec), leaf count = 19

$$\{\{x(t) = \_C1\, e^{at}, y(t) = bt + \_C2\}\}$$

2.1857 ODE No. 1857

$$\{x'(t) = ay(t), y'(t) = -ax(t)\}$$

✓ **Mathematica** : cpu = 0.0057232 (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 = 0.038 (sec), leaf count = 35

$$\{\{x(t) = \_C1\ \sin(at) + \_C2\ \cos(at), y(t) = -\sin(at)\,\_C2 + \cos(at)\,\_C1\}\}$$

2.1858 ODE No. 1858

$$\{x'(t) = ay(t), y'(t) = bx(t)\}$$

✓ **Mathematica** : cpu = 0.0071788 (sec), leaf count = 182

$$\left\{\left\{x(t) \to \frac{1}{2}c_1 e^{-\sqrt{a}\sqrt{b}t}\left(e^{2\sqrt{a}\sqrt{b}t} + 1\right) + \frac{\sqrt{a}c_2 e^{-\sqrt{a}\sqrt{b}t}\left(e^{2\sqrt{a}\sqrt{b}t} - 1\right)}{2\sqrt{b}}, y(t) \to \frac{\sqrt{b}c_1 e^{-\sqrt{a}\sqrt{b}t}\left(e^{2\sqrt{a}\sqrt{b}t} - 1\right)}{2\sqrt{a}} +\right.\right.$$

✓ **Maple** : cpu = 0.04 (sec), leaf count = 64

$$\left\{\left\{x(t) = \_C1\, e^{\sqrt{a}\sqrt{b}t} + \_C2\, e^{-\sqrt{a}\sqrt{b}t}, y(t) = 1\sqrt{b}\left(\_C1\, e^{\sqrt{a}\sqrt{b}t} - \_C2\, e^{-\sqrt{a}\sqrt{b}t}\right)\frac{1}{\sqrt{a}}\right\}\right\}$$

2.1859 ODE No. 1859

$$\{x'(t) = ax(t) - y(t), y'(t) = ay(t) + x(t)\}$$

✓ **Mathematica** : cpu = 0.0040766 (sec), leaf count = 51

$$\{\{x(t) \to c_1 e^{at} \cos(t) - c_2 e^{at} \sin(t), y(t) \to c_1 e^{at} \sin(t) + c_2 e^{at} \cos(t)\}\}$$

✓ **Maple** : cpu = 0.029 (sec), leaf count = 38

$$\{\{x(t) = \mathrm{e}^{at}(\_C2 \ \cos(t) + \_C1 \ \sin(t)), y(t) = -\mathrm{e}^{at}(\cos(t)\_C1 - \sin(t)\_C2)\}\}$$

2.1860 ODE No. 1860

$$\{x'(t) = ax(t) + by(t), y'(t) = by(t) + cx(t)\}$$

✓ **Mathematica** : cpu = 0.0316199 (sec), leaf count = 696

$$\left\{\left\{x(t) \to \frac{c_1\left(a\left(-e^{\frac{1}{2}t\left(-\sqrt{a^2-2ab+b^2+4bc}+a+b\right)}\right) + ae^{\frac{1}{2}t\left(\sqrt{a^2-2ab+b^2+4bc}+a+b\right)} + be^{\frac{1}{2}t\left(-\sqrt{a^2-2ab+b^2+4bc}+a+b\right)} + \sqrt{\ldots}\right.}{\ldots}\right.\right.$$

✓ **Maple** : cpu = 0.057 (sec), leaf count = 177

$$\left\{\left\{x(t) = \_C1 \ \mathrm{e}^{\frac{t}{2}\left(a+b+\sqrt{b^2+(-2a+4c)b+a^2}\right)} + \_C2 \ \mathrm{e}^{\frac{t}{2}\left(a+b-\sqrt{b^2+(-2a+4c)b+a^2}\right)}, y(t) = \frac{1}{2b}\left(-\_C2 \left(a - b + \sqrt{\ldots}\right.\right.\right.\right.$$

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 = 0.0090549 (sec), leaf count = 183

$$\left\{\left\{x(t) \to c_2 e^{\frac{t(a\alpha+b\beta)}{a^2+b^2}} \sin\left(\frac{t(a\beta-\alpha b)}{a^2+b^2}\right) + c_1 e^{\frac{t(a\alpha+b\beta)}{a^2+b^2}} \cos\left(\frac{t(a\beta-\alpha b)}{a^2+b^2}\right), y(t) \to c_2 e^{\frac{t(a\alpha+b\beta)}{a^2+b^2}} \cos\left(\frac{t(a\beta-\alpha b)}{a^2+b^2}\right.\right.\right.$$

✓ **Maple** : cpu = 0.077 (sec), leaf count = 152

$$\left\{\left\{x(t) = \_C1 \ \mathrm{e}^{\frac{((i\beta+\alpha)a-(i\alpha-\beta)b)t}{a^2+b^2}} + \_C2 \ \mathrm{e}^{-\frac{((i\beta-\alpha)a-(i\alpha+\beta)b)t}{a^2+b^2}}, y(t) = i\left(\_C1 \ \mathrm{e}^{\frac{((i\beta+\alpha)a-(i\alpha-\beta)b)t}{a^2+b^2}} - \_C2 \ \mathrm{e}^{-\frac{((i\beta-\alpha)a-\ldots}{a^2+\ldots}}\right.\right.\right.$$

2.1862 ODE No. 1862

$$\{x'(t) = -y(t), y'(t) = 2x(t) + 2y(t)\}$$

✓ **Mathematica** : cpu = 0.009715 (sec), leaf count = 52

$$\{\{x(t) \to c_1 e^t(\cos(t) - \sin(t)) - c_2 e^t \sin(t), y(t) \to 2c_1 e^t \sin(t) + c_2 e^t(\sin(t) + \cos(t))\}\}$$

✓ **Maple** : cpu = 0.027 (sec), leaf count = 39

$$\{\{x(t) = \mathrm{e}^t(\cos(t)\_C2 + \sin(t)\_C1), y(t) = -((\_C1 + \_C2)\cos(t) + \sin(t)(\_C1 - \_C2))\mathrm{e}^t\}\}$$

2.1863 ODE No. 1863

$$\{x'(t) + 3x(t) + 4y(t) = 0, 2x(t) + y'(t) + 5y(t) = 0\}$$

✓ **Mathematica** : cpu = 0.0055977 (sec), leaf count = 84

$$\left\{\left\{x(t) \to \frac{1}{3}c_1 e^{-7t}\left(2e^{6t} + 1\right) - \frac{2}{3}c_2 e^{-7t}\left(e^{6t} - 1\right), y(t) \to \frac{1}{3}c_2 e^{-7t}\left(e^{6t} + 2\right) - \frac{1}{3}c_1 e^{-7t}\left(e^{6t} - 1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.024 (sec), leaf count = 35

$$\left\{\left\{x(t) = \_C1\,\mathrm{e}^{-t} + \_C2\,\mathrm{e}^{-7t}, y(t) = -\frac{\_C1\,\mathrm{e}^{-t}}{2} + \_C2\,\mathrm{e}^{-7t}\right\}\right\}$$

2.1864 ODE No. 1864

$$\{x'(t) = -5x(t) - 2y(t), y'(t) = x(t) - 7y(t)\}$$

✓ **Mathematica** : cpu = 0.0086381 (sec), leaf count = 59

$$\{\{x(t) \to c_1 e^{-6t}(\sin(t) + \cos(t)) - 2c_2 e^{-6t} \sin(t), y(t) \to c_1 e^{-6t} \sin(t) + c_2 e^{-6t}(\cos(t) - \sin(t))\}\}$$

✓ **Maple** : cpu = 0.029 (sec), leaf count = 44

$$\left\{\left\{x(t) = \mathrm{e}^{-6t}(\cos(t)\_C2 + \sin(t)\_C1), y(t) = -\frac{((\_C1 - \_C2)\cos(t) - \sin(t)(\_C1 + \_C2))\mathrm{e}^{-6t}}{2}\right.\right.$$

2.1865 ODE No. 1865

$$\{x'(t)=\mathrm{a1}x(t)+\mathrm{b1}y(t)+\mathrm{c1},y'(t)=\mathrm{a2}x(t)+\mathrm{b2}y(t)+\mathrm{c2}\}$$

✓ **Mathematica** : cpu = 0.804293 (sec), leaf count = 2062

$$\left\{\left\{x(t)\to -\frac{\mathrm{b1}e^{-\frac{1}{2}\left(\mathrm{a1}+\mathrm{b2}+\sqrt{\mathrm{a1}^2-2\mathrm{b2}\mathrm{a1}+\mathrm{b2}^2+4\mathrm{a2}\mathrm{b1}}\right)t}\left(\frac{2\left(\left(\mathrm{a1}-\mathrm{b2}+\sqrt{\mathrm{a1}^2-2\mathrm{b2}\mathrm{a1}+\mathrm{b2}^2+4\mathrm{a2}\mathrm{b1}}\right)\mathrm{c2}-2\mathrm{a2}\mathrm{c1}\right)e^{\sqrt{\mathrm{a1}^2-2\mathrm{b2}\mathrm{a1}+\mathrm{b2}^2+4\mathrm{a2}\mathrm{b}}}}{-\mathrm{a1}-\mathrm{b2}+\sqrt{\mathrm{a1}^2-2\mathrm{b2}\mathrm{a1}+\mathrm{b2}^2+4\mathrm{a2}\mathrm{b1}}}\right.}{2\,(\mathrm{a}}\right.\right.$$

✓ **Maple** : cpu = 0.094 (sec), leaf count = 224

$$\left\{\left\{x(t)=\mathrm{e}^{\frac{t}{2}\left(a1+b2+\sqrt{a1^2-2\,a1\,b2+4\,a2\,b1+b2^2}\right)}\_C2+\mathrm{e}^{\frac{t}{2}\left(a1+b2-\sqrt{a1^2-2\,a1\,b2+4\,a2\,b1+b2^2}\right)}\_C1+\frac{c2\,b1-b2\,c1}{a1\,b2-a2\,b1}\right.\right.$$

2.1866 ODE No. 1866

$$\{x'(t)+2y(t)=3t,y'(t)-2x(t)=4\}$$

✓ **Mathematica** : cpu = 0.0373126 (sec), leaf count = 132

$$\left\{\left\{x(t)\to -c_2\sin(2t)+c_1\cos(2t)+\cos(2t)\left(\frac{3}{2}t\sin(2t)-\frac{5}{4}\cos(2t)\right)-\sin(2t)\left(\frac{5}{4}\sin(2t)+\frac{3}{2}t\cos(2t)\right)\right.\right.$$

✓ **Maple** : cpu = 0.025 (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

$$\left\{-t^2+x'(t)+y(t)+6t+1=0,y'(t)-x(t)=-3t^2+3t+1\right\}$$

✓ **Mathematica** : cpu = 0.0878752 (sec), leaf count = 124

$$\{\{x(t)\to -c_2\sin(t)+c_1\cos(t)+\cos(t)\left(\left(3t^2-t-13\right)\cos(t)+(t-12)t\sin(t)\right)-\sin(t)\left(\left(-3t^2+t+13\right.\right.$$

✓ **Maple** : cpu = 0.026 (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 = 0.0767294 (sec), leaf count = 162

$$\left\{\left\{x(t)\to c_1e^{-4t}(t+1)+c_2e^{-4t}t-e^t(t+1)\left(\frac{t}{5}+\frac{1}{36}e^t(6t-7)-\frac{1}{25}\right)+e^tt\left(\frac{t}{5}+\frac{1}{36}e^t(6t-1)+\frac{4}{25}\right),\right.\right.$$

✓ **Maple** : cpu = 0.053 (sec), leaf count = 64

$$\left\{\left\{x(t)=\mathrm{e}^{-4t}\_C2+\mathrm{e}^{-4t}t\_C1+\frac{\mathrm{e}^t}{25}+\frac{7\,\mathrm{e}^{2t}}{36},y(t)=-\frac{\mathrm{e}^{2t}}{36}-\mathrm{e}^{-4t}\_C2-\mathrm{e}^{-4t}t\_C1+\frac{4\,\mathrm{e}^t}{25}+\mathrm{e}^{-4t}\_C1\right\}\right.$$

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 = 0.0843591 (sec), leaf count = 118

$$\left\{\left\{x(t)\to\frac{5}{72}\left(c_1e^{-7t/5}+\frac{12(5712t+833e^t+2352e^{2t}-5508)}{20825}\right)+\frac{1}{5}\left(t-e^t+e^{2t}+1\right),y(t)\to\frac{5}{48}\left(c_1e^{-7\right.\right.\right.$$

✓ **Maple** : cpu = 0.046 (sec), leaf count = 51

$$\left\{\left\{x(t)=\frac{3\,t}{7}-\frac{1}{49}-\frac{\mathrm{e}^t}{6}+\frac{5\,\mathrm{e}^{2t}}{17}+\mathrm{e}^{-\frac{7t}{5}}\_C1,y(t)=-\frac{\mathrm{e}^{2t}}{17}+\frac{\mathrm{e}^t}{4}+\frac{t}{7}-\frac{26}{49}+\frac{3\_C1}{2}\mathrm{e}^{-\frac{7t}{5}}\right\}\right\}$$

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 = 0.138365 (sec), leaf count = 122

$$\left\{\left\{x(t)\to-\frac{3}{4}c_2\left(e^{4t}-1\right)+c_1+\frac{1}{68}e^{-4t}\left(e^{4t}-1\right)\left(34e^t+3\sin(t)-12\cos(t)\right)+\frac{1}{4}\left(2e^{-3t}+2e^t+\frac{3}{17}e^{-4t}\right.\right.\right.$$

✓ **Maple** : cpu = 0.082 (sec), leaf count = 47

$$\left\{\left\{x(t)=\frac{\_C1\,\mathrm{e}^{4t}}{4}+\frac{5\sin(t)}{17}-\frac{3\cos(t)}{17}+\mathrm{e}^t+\_C2,y(t)=-\frac{\_C1\,\mathrm{e}^{4t}}{3}+\frac{4\cos(t)}{17}-\frac{\sin(t)}{17}-\frac{2\,\mathrm{e}^t}{3}\right\}\right\}$$

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 = 0.317186 (sec), leaf count = 180

$$\left\{\left\{x(t) \to -c_2 e^{-4t}\sin(t) + c_1 e^{-4t}(\cos(t) - \sin(t)) + \frac{1}{442}\left(3\left(153e^t - 754\right)\sin(t) + 31\left(17e^t - 78\right)\cos(t)\right)(c\right.\right.$$

✓ **Maple** : cpu = 0.065 (sec), leaf count = 62

$$\left\{\left\{x(t) = e^{-4\,t}\sin(t)\_C2 + e^{-4\,t}\cos(t)\_C1 - \frac{93}{17} + \frac{31\,e^t}{26}, y(t) = \frac{((-221\_C1 - 221\_C2)\cos(t) + 221}{221}\right.\right.$$

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 = 0.114329 (sec), leaf count = 162

$$\left\{\left\{x(t) \to -c_1 e^{-4t}(t-1) - c_2 e^{-4t}t - e^t t\left(-\frac{4t}{5} + \frac{1}{36}e^t(30t+19) - \frac{11}{25}\right) - e^t(t-1)\left(\frac{4t}{5} - \frac{1}{36}e^t(30t+49\right.\right.\right.$$

✓ **Maple** : cpu = 0.049 (sec), leaf count = 65

$$\left\{\left\{x(t) = e^{-4\,t}\_C2 + e^{-4\,t}t\_C1 + \frac{31\,e^t}{25} - \frac{49\,e^{2\,t}}{36}, y(t) = \frac{19\,e^{2\,t}}{36} - \frac{11\,e^t}{25} - e^{-4\,t}\_C2 - e^{-4\,t}t\_C1 - e^{-4\,t}\_\right.\right.$$

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 = 0.090829 (sec), leaf count = 322

$$\left\{\left\{x(t) \to \frac{1}{5}c_1 e^{-6t}\left(4e^{5t}+1\right) - \frac{1}{5}c_2 e^{-6t}\left(e^{5t}-1\right) - \frac{1}{5}e^{-6t}\left(e^{5t}-1\right)\left(\frac{16}{5}e^{6t}\left(\frac{t}{6} - \frac{1}{36}\right) + 4e^{2t} - \frac{4e^{7t}}{7} - \frac{31}{5}e\right.\right.\right.$$

✓ **Maple** : cpu = 0.046 (sec), leaf count = 52

$$\left\{\left\{x(t) = e^{-6\,t}\_C2 + \_C1\,e^{-t} - \frac{56}{9} - \frac{29\,e^t}{7} + \frac{19\,t}{3}, y(t) = 4\,e^{-6\,t}\_C2 - \_C1\,e^{-t} + \frac{24\,e^t}{7} + \frac{55}{9} - \frac{17\,t}{3}\right\}\right\}$$

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 = 0.0073409 (sec), leaf count = 115

$$\left\{\left\{x(t) \to c_2 \exp\left(\int_1^t f(K[2])dK[2]\right) \sin\left(\int_1^t g(K[1])dK[1]\right) + c_1 \exp\left(\int_1^t f(K[2])dK[2]\right) \cos\left(\int_1^t g(K\right.\right.$$

✓ **Maple** : cpu = 0.317 (sec), leaf count = 57

$$\left\{\left\{x(t) = e^{\int \tan(\_C1 - \int g(t)\, dt)g(t) + f(t)\, dt}\_C2, y(t) = \tan\left(\_C1 - \int g(t)\, dt\right) e^{\int \tan(\_C1 - \int g(t)\, dt)g(t) + f(t)\, dt}\_C2\right.\right.$$

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 = 0.0055809 (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 = 1.095 (sec), leaf count = 2606

$$\left\{\left\{x(t) = e^{\int -\frac{f(t)}{2a+2d}\left(\tan\left(\frac{-1+(a+d)\int f(t)\, dt}{2(a+d)^2}\sqrt{-a^4-4a^2bc+2a^2d^2-8abcd-4bcd^2-d^4}\right)\sqrt{-a^4-4a^2bc+2a^2d^2-8abcd-4bcd^2-d^4}+(a+d)^2\right.}\right.\right.$$

2.1876 ODE No. 1876

$$\{x'(t) = x(t)\cos(t), y'(t) = x(t)e^{-\sin(t)}\}$$

✓ **Mathematica** : cpu = 0.016993 (sec), leaf count = 39

$$\left\{\left\{x(t) \to c_1 e^{\sin(t)}, y(t) \to c_1 \int_1^t e^{\sin(K[1]) - \sin(K[1])} dK[1] + c_2\right\}\right\}$$

✓ **Maple** : cpu = 0.105 (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 = 0.0041038 (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 = 0.024 (sec), leaf count = 31

$$\left\{\left\{x(t) = \frac{\_C1\, t^2 + \_C2}{t}, y(t) = \frac{-\_C1\, t^2 + \_C2}{t}\right\}\right\}$$

2.1878 ODE No. 1878

$$\{tx'(t) + 2x(t) = t, -(t+2)x(t) + ty'(t) - ty(t) = -t\}$$

✓ **Mathematica** : cpu = 0.0096072 (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 = 0.042 (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 = 0.0167366 (sec), leaf count = 58

$$\left\{\left\{x(t) \to \frac{c_1}{t^4} + \frac{c_2}{t^3} + \frac{1}{30} t(2t+9), y(t) \to -\frac{c_1}{t^4} - \frac{c_2}{2t^3} + \frac{1}{60} t(8t-3)\right\}\right\}$$

✓ **Maple** : cpu = 0.035 (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 = 0.0154514 (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 = 0.059 (sec), leaf count = 23

$$\{\{x(t) = t(\_C2\, t + \_C1), y(t) = \sin(t)\,\_C1 + \_C2\, t\}\}$$

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 = 0.0063628 (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 = 0.021 (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 = 1.62941 (sec), leaf count = 928

$$\left\{\left\{x(t) \to \frac{1}{46}e^{t/2}c_1\left(23\cos\left(\frac{\sqrt{23}t}{2}\right) + 23e^{t/2} - 3\sqrt{23}\sin\left(\frac{\sqrt{23}t}{2}\right)\right) + \frac{e^{3t/2}\left(23e^{t/2}\cos\left(\frac{\sqrt{23}t}{2}\right) - 7\sqrt{23}e\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.062 (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 = 0.935835 (sec), leaf count = 602

$$\left\{\left\{x(t)\to \frac{1}{16}c_1e^{-3t}\left(20e^{4t}t+7e^{4t}+9\right)+\frac{1}{16}c_2e^{-3t}\left(4e^{4t}t+3e^{4t}-3\right)-\frac{3}{16}c_3e^{-3t}\left(4e^{4t}t-e^{4t}+1\right)+\frac{e^{-4t}(2\right.\right.$$

✓ **Maple** : cpu = 0.086 (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 = 0.451006 (sec), leaf count = 224

$$\left\{\left\{x(t)\to 7\left(c_2+t^2-\frac{1}{2}\sin(2t)\right)+8\left(c_1e^{t/2}+c_2\left(e^{t/2}-1\right)+\frac{1}{136}e^{-t/2}\left(2e^{t/2}\cos(2t)-4\left(34e^{t/2}t^2+17e^{t/}\right.\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.073 (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 = 0.0171677 (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 = 0.075 (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

$$\{ay(t) + x''(t) = 0, y''(t) - a^2y(t) = 0\}$$

✓ **Mathematica** : cpu = 0.0150121 (sec), leaf count = 115

$$\left\{\left\{x(t) \to -\frac{c_4e^{-at}(-2ate^{at} + e^{2at} - 1)}{2a^2} - \frac{c_3e^{-at}(e^{at} - 1)^2}{2a} + c_2t + c_1, y(t) \to \frac{1}{2}c_3e^{-at}\left(e^{2at} + 1\right) + \frac{c_4e^{-at}(\right.$$

✓ **Maple** : cpu = 0.041 (sec), leaf count = 49

$$\left\{\left\{x(t) = \frac{-\_C4\,\mathrm{e}^{-at} - \_C3\,\mathrm{e}^{at} + a(\_C1\,t + \_C2)}{a}, y(t) = \_C3\,\mathrm{e}^{at} + \_C4\,\mathrm{e}^{-at}\right\}\right\}$$

2.1887 ODE No. 1887

$$\{x''(t) = ax(t) + by(t), y''(t) = cx(t) + dy(t)\}$$

✓ **Mathematica** : cpu = 0.354281 (sec), leaf count = 5748

$$\left\{\left\{x(t) \to \frac{e^{-\frac{\sqrt{a+d-\sqrt{a^2-2da+d^2+4bc}t}}{\sqrt{2}}-\frac{\sqrt{a+d+\sqrt{a^2-2da+d^2+4bc}t}}{\sqrt{2}}}\left(e^{\frac{\sqrt{a+d-\sqrt{a^2-2da+d^2+4bc}t}}{\sqrt{2}}}a - e^{\frac{\sqrt{a+d+\sqrt{a^2-2da+d^2+4bc}t}}{\sqrt{2}}}a - e^{\sqrt{}}\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.086 (sec), leaf count = 360

$$\left\{\left\{x(t) = \_C1\,\mathrm{e}^{-\frac{t}{2}\sqrt{-2\sqrt{a^2-2\,ad+4\,bc+d^2}+2\,a+2\,d}} + \_C2\,\mathrm{e}^{\frac{t}{2}\sqrt{-2\sqrt{a^2-2\,ad+4\,bc+d^2}+2\,a+2\,d}} + \_C3\,\mathrm{e}^{-\frac{t}{2}\sqrt{2\sqrt{a^2-2\,ad+4}}}\right.\right.$$

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 = 16.1028 (sec), leaf count = 35330

Too large to display

✓ **Maple** : cpu = 0.141 (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 = 0.202563 (sec), leaf count = 554

$$\left\{\left\{x(t)\to -\frac{1}{4}c_4e^{-t}\left(e^{2t}t+t-e^{2t}+1\right)-\frac{1}{2}c_1e^{-t}\left(e^{2t}t-t-e^{2t}-1\right)-\frac{1}{2}c_2e^{-t}\left(e^{2t}t+t-2e^{2t}+2\right)-\frac{1}{4}c_3e\right.\right.$$

✓ **Maple** : cpu = 0.033 (sec), leaf count = 60

$$\{\{x(t)=(\_C4\,t+\_C2)\,e^{-t}+18+(\_C3\,t+\_C1)\,e^{t},y(t)=((-2\,t+2)\,\_C4-2\,\_C2)\,e^{-t}-23+((-$$

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 = 0.0068577 (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

$$\left\{\left\{x(t)=DESol\left(\left(\left\{\frac{d^4}{dt^4}\_Y(t)+\left(2\,\frac{\sin(atb)\,ab}{\cos(atb)}-2\,\frac{ab\cos(atb)}{\sin(atb)}\right)\frac{d^3}{dt^3}\_Y(t)+\left(2\,\frac{(\sin(atb))^2\,b^2a^2}{(\cos(atb))^2}+2\right.\right.\right.\right.\right.$$

2.1891 ODE No. 1891

$$\{x''(t)+6x(t)+7y(t)=0,3x(t)+y''(t)+2y(t)=2t\}$$

✓ **Mathematica** : cpu = 0.913797 (sec), leaf count = 742

$$\left\{\left\{x(t)\to -\frac{7}{60}c_4e^{-t}\left(3e^{2t}-2e^{t}\sin(3t)-3\right)+\frac{1}{60}c_2e^{-t}\left(9e^{2t}+14e^{t}\sin(3t)-9\right)-\frac{7}{20}c_3e^{-t}\left(e^{2t}-2e^{t}\cos(3\right.\right.\right.$$

✓ **Maple** : cpu = 0.033 (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 = 0.261118 (sec), leaf count = 4815

$$\left\{\left\{x(t) \to \frac{e^{-\frac{\sqrt{-a^2-2b-\sqrt{a^2(a^2+4b)}}\,t}{\sqrt{2}}-\frac{\sqrt{-a^2-2b+\sqrt{a^2(a^2+4b)}}\,t}{\sqrt{2}}}\left(e^{\frac{\sqrt{-a^2-2b-\sqrt{a^2(a^2+4b)}}\,t}{\sqrt{2}}}a^2 - e^{\frac{\sqrt{-a^2-2b+\sqrt{a^2(a^2+4b)}}\,t}{\sqrt{2}}}a^2 - e^{\sqrt{2}\sqrt{}}\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.095 (sec), leaf count = 463

$$\left\{\left\{x(t) = \_C1\, e^{-\frac{t}{2}\sqrt{-2a^2-2\sqrt{a^2(a^2+4b)}-4b}} + \_C2\, e^{\frac{t}{2}\sqrt{-2a^2-2\sqrt{a^2(a^2+4b)}-4b}} + \_C3\, e^{-\frac{t}{2}\sqrt{-2a^2+2\sqrt{a^2(a^2+4b)}-4b}}\right.\right.$$

2.1893 ODE No. 1893

$$\{-\mathrm{A0}y'(t) + \mathrm{a1}x''(t) + \mathrm{b1}x'(t) + \mathrm{c1}x(t) = \mathrm{B0}e^{i\omega t}, \mathrm{A0}x'(t) + \mathrm{a2}y''(t) + \mathrm{b2}y'(t) + \mathrm{c2}y(t) = 0\}$$

✓ **Mathematica** : cpu = 0.442546 (sec), leaf count = 5546

✓ **Maple** : cpu = 0.711 (sec), leaf count = 1579

$$\left\{\left\{x(t) = \frac{\_C1\left(a2\ a1\ (RootOf(a1\ a2\ \_Z^4 + (a1\ b2 + a2\ b1)\_Z^3 + (A^2 + a1\ c2 + a2\ c1 + b1\ b2)\_Z\right.}{}\right.\right.$$

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 = 0.449676 (sec), leaf count = 3386

$$\left\{\left\{x(t)\to -a\mathrm{b2}c_3\mathrm{RootSum}\left[\#1^4+2a\#1^3+\mathrm{b1}\#1^2+\mathrm{b2}\#1^2+a\mathrm{b1}\#1+a\mathrm{b2}\#1+\mathrm{b1}\mathrm{b2}\&,\frac{}{4\#1^3+6a\#}\right.\right.\right.$$

✓ **Maple** : cpu = 0.506 (sec), leaf count = 1056

$$\left\{\left\{x(t)=\frac{e^{i\omega t}\left(-c1\,\omega^2+i(c1+c2)\,a\omega+b2\,c1\right)}{\omega^4-2\,ia\omega^3+(-b1-b2)\,\omega^2+i\,(b1+b2)\,a\omega+b1\,b2}+\_C1\,e^{RootOf(\_Z^4+2\,a\_Z^3+(b1+b2)\_Z^2+(}\right.\right.$$

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 = 0.295145 (sec), leaf count = 7517

✓ **Maple** : cpu = 0.151 (sec), leaf count = 1008

$$\left\{\left\{x(t)=\sum_{\_a=1}^{4}e^{RootOf((a22\,a11-a21\,a12)\_Z^4+(a11\,b22-a12\,b21-a21\,b12+a22\,b11)\_Z^3+(a11\,c22-a12\,c21-a21\,c12+c11\,a22+}\right.\right.$$

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 = 0.496489 (sec), leaf count = 1132

$$\left\{\left\{x(t)\to\frac{1}{64}e^{-t}\left(2e^{2t}t^2-6e^{2t}t+7e^{2t}+1\right)\left(e^t(1-t)+e^{-t}\left(-2t^3-8t^2-17t-17\right)\right)+\frac{1}{64}e^{-t}\left(2e^{2t}t^2+6e\right.\right.\right.$$

✓ **Maple** : cpu = 0.039 (sec), leaf count = 67

$$\left\{\left\{x(t)=-\frac{2\_C2\,e^{-t}}{3}+\frac{\left(-9\_C5\,t^2-6\_C4\,t-3\_C3-18\_C5\right)e^t}{3}-t-2,y(t)=\_C2\,e^{-t}-2+(\_\right.\right.$$

2.1897 ODE No. 1897

$$\{x''(t) + y''(t) + y'(t) = \sinh(2t), 2x''(t) + y''(t) = 2t\}$$

✓ **Mathematica** : cpu = 0.212233 (sec), leaf count = 280

$$\left\{\left\{x(t) \to \frac{1}{4}c_4 e^{-2t}\left(2e^{2t}t - e^{2t} + 1\right) + c_2 t + c_1 + t\left(\frac{t^2}{2} + \frac{t}{2} - \frac{e^{4t}}{8} + e^{2t}\left(\frac{t}{2} - \frac{1}{4}\right)\right) + \frac{1}{48}\left(-4\left(4t^2 - 3t + 3\right)\right.\right.\right.$$

✓ **Maple** : cpu = 0.118 (sec), leaf count = 86

$$\left\{\left\{x(t) = \frac{(-12\,t + 12\_C2 - 15)\,e^{-2\,t}}{48} + \frac{t^3}{6} + \frac{t^2}{4} + \_C3\,t + \_C4 - \frac{\cosh(2\,t)}{16} - \frac{\sinh(2\,t)}{16}, y(t) = \frac{(4\,t -}{}\right.\right.$$

2.1898 ODE No. 1898

$$\{x''(t) - x'(t) + y'(t) = 0, x''(t) - x(t) + y''(t) = 0\}$$

✓ **Mathematica** : cpu = 0.0249872 (sec), leaf count = 420

$$\left\{\left\{x(t) \to -\frac{1}{5}c_1 e^{\frac{t}{2} - \frac{\sqrt{5}t}{2}}\left(\sqrt{5}e^{\sqrt{5}t} - 5e^{\frac{\sqrt{5}t}{2} + \frac{t}{2}} - \sqrt{5}\right) + \frac{c_2 e^{\frac{t}{2} - \frac{\sqrt{5}t}{2}}\left(e^{\sqrt{5}t} - 1\right)}{\sqrt{5}} - \frac{1}{10}c_4 e^{\frac{t}{2} - \frac{\sqrt{5}t}{2}}\left(5e^{\sqrt{5}t} + \sqrt{5}e^{\sqrt{5}t}\right.\right.\right.$$

✓ **Maple** : cpu = 0.046 (sec), leaf count = 71

$$\left\{\left\{x(t) = \frac{\_C4\,\left(\sqrt{5} - 1\right)}{2}e^{-\frac{\left(\sqrt{5}-1\right)t}{2}} - \frac{\_C3\,\left(\sqrt{5} + 1\right)}{2}e^{\frac{\left(\sqrt{5}+1\right)t}{2}} + \_C1\,e^{t}, y(t) = \_C2 + \_C3\,e^{\frac{\left(\sqrt{5}+1\right)t}{2}} + \_\right.\right.$$

2.1899 ODE No. 1899

$$\{x'(t) = 2x(t), y'(t) = 3x(t) - 2y(t), z'(t) = 2y(t) + 3z(t)\}$$

✓ **Mathematica** : cpu = 0.0080303 (sec), leaf count = 112

$$\left\{\left\{x(t) \to c_1 e^{2t}, y(t) \to \frac{3}{4}c_1 e^{-2t}\left(e^{4t} - 1\right) + c_2 e^{-2t}, z(t) \to \frac{3}{10}c_1 e^{-2t}\left(2e^{t} + 3e^{2t} + 4e^{3t} + 1\right)\left(e^{t} - 1\right)^2 + \frac{2}{5}c\right.\right.$$

✓ **Maple** : cpu = 0.056 (sec), leaf count = 52

$$\left\{\left\{x(t) = \_C3\,e^{2\,t}, y(t) = \frac{3\_C3\,e^{2\,t}}{4} + e^{-2\,t}\_C2, z(t) = \_C1\,e^{3\,t} - \frac{3\_C3\,e^{2\,t}}{2} - \frac{2\,e^{-2\,t}\_C2}{5}\right\}\right\}$$

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 = 0.0070964 (sec), leaf count = 94

$$\left\{\left\{x(t) \to c_1e^{4t}, y(t) \to \frac{1}{6}c_1e^{-2t}\left(e^{6t}-1\right) + c_2e^{-2t}, z(t) \to \frac{1}{9}c_1e^{-2t}\left(e^{3t}+e^{6t}-2\right) - \frac{4}{3}c_2e^{-2t}\left(e^{3t}-1\right) + c_3e\right.\right.$$

✓ **Maple** : cpu = 0.058 (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 = 0.0081381 (sec), leaf count = 105

$$\{\{x(t) \to c_2\left(e^t-1\right) + c_3\left(1-e^t\right) + c_1, y(t) \to c_1\left(e^t-1\right) + c_2\left(e^tt+1\right) + c_3\left(-e^tt+e^t-1\right), z(t) \to c_1\left(e^t\right.$$

✓ **Maple** : cpu = 0.049 (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 = 0.0167971 (sec), leaf count = 226

$$\{\{x(t) \to c_2\left(e^t-1\right) + c_3\left(1-e^t\right) + c_1 + e^{-t}\left(1-e^t\right)(-t-1) + e^{-t}\left(e^t-1\right)(-t-1), y(t) \to c_3\left(-e^tt+e^t\right.$$

✓ **Maple** : cpu = 0.047 (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 = 0.061549 (sec), leaf count = 1304

$$\left\{\left\{x(t) \to \frac{e^{-i\sqrt{a^2+b^2+c^2}t}\left(2e^{i\sqrt{a^2+b^2+c^2}t}a^2 + b^2e^{2i\sqrt{a^2+b^2+c^2}t} + c^2e^{2i\sqrt{a^2+b^2+c^2}t} + b^2 + c^2\right)c_1}{2\left(a^2+b^2+c^2\right)} - \frac{be^{-i\sqrt{a^2+b^2+c^2}t}}{}\right.\right.$$

✓ **Maple** : cpu = 0.111 (sec), leaf count = 299

$$\left\{\left\{x(t) = \_C1 + \_C2\,\sin\left(\sqrt{a^2+b^2+c^2}t\right) + \_C3\,\cos\left(\sqrt{a^2+b^2+c^2}t\right), y(t) = \frac{1}{b\left(b^2+c^2\right)}\left(\_C1\,b^3 + \right.\right.\right.$$

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 = 0.0455427 (sec), leaf count = 1445

$$\left\{\left\{x(t) \to \frac{e^{-\sqrt{-a^2-b^2-c^2}t}\left(2e^{\sqrt{-a^2-b^2-c^2}t}a^2 + b^2e^{2\sqrt{-a^2-b^2-c^2}t} + c^2e^{2\sqrt{-a^2-b^2-c^2}t} + b^2 + c^2\right)c_1}{2\left(a^2+b^2+c^2\right)} - \frac{e^{-\sqrt{-a^2-b^2-}}}{}\right.\right.$$

✓ **Maple** : cpu = 0.071 (sec), leaf count = 257

$$\left\{\left\{x(t) = \_C1 + \_C2\,\sin\left(\sqrt{a^2+b^2+c^2}t\right) + \_C3\,\cos\left(\sqrt{a^2+b^2+c^2}t\right), y(t) = \frac{1}{a\left(b^2+c^2\right)}\left(\left(-a^2b\_C\right.\right.\right.\right.$$

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 = 0.0054547 (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

$$\left\{\left\{x(t) = DESol\left(\left\{\frac{d^3}{dt^3}\_Y(t) + \left(-2\frac{h(t)\left(\frac{d}{dt}h(t)\right)f(t)}{\left(h(t)\right)^2f(t) + \left(g(t)\right)^2f(t) - h(t)\frac{d}{dt}g(t) + \left(\frac{d}{dt}h(t)\right)g(t)} - 2\frac{}{(h}\right.\right.\right.\right.\right.$$

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 = 0.0394689 (sec), leaf count = 278

$$\left\{\left\{x(t) \to \frac{1}{3}c_1e^t\left(2\cos\left(\sqrt{3}t\right)+1\right) - \frac{1}{3}c_2e^t\left(-\sqrt{3}\sin\left(\sqrt{3}t\right)+\cos\left(\sqrt{3}t\right)-1\right) - \frac{1}{3}c_3e^t\left(\sqrt{3}\sin\left(\sqrt{3}t\right)+\right.\right.\right.$$

✓ **Maple** : cpu = 0.055 (sec), leaf count = 120

$$\left\{\left\{x(t) = \mathrm{e}^t\left(\sin\left(\sqrt{3}t\right)\_C2 + \cos\left(\sqrt{3}t\right)\_C3 + \_C1\right), y(t) = \frac{\mathrm{e}^t\left(\_C2\sqrt{3} - \_C3\right)\cos\left(\sqrt{3}t\right)}{2} + \frac{\mathrm{e}^t(-\right.\right.$$

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 = 0.0082161 (sec), leaf count = 179

$$\{\{x(t) \to c_1\left(-e^t\right)\left(2e^{2t}-3\right) + 6c_2e^t\left(2e^t+3e^{2t}-5\right) - 2c_3e^t\left(4e^t+5e^{2t}-9\right), y(t) \to -2c_1e^t\left(e^{2t}-1\right) + c$$

✓ **Maple** : cpu = 0.046 (sec), leaf count = 66

$$\left\{\left\{x(t) = \_C1\,\mathrm{e}^t + \_C2\,\mathrm{e}^{3t} + \_C3\,\mathrm{e}^{2t}, y(t) = \frac{2\_C1\,\mathrm{e}^t}{3} + \_C2\,\mathrm{e}^{3t} + \frac{\_C3\,\mathrm{e}^{2t}}{4}, z(t) = \_C1\,\mathrm{e}^t + \frac{3\_C2}{2}\right.\right.$$

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 = 0.0142877 (sec), leaf count = 551

$$\left\{\left\{x(t) \to -36c_2\mathrm{RootSum}\left[\#1^3 - 40\#1^2 + 1714\#1 + 1404\&, \frac{2\#1e^{\#1t}+e^{\#1t}}{3\#1^2-80\#1+1714}\&\right] + 4c_3\mathrm{RootSum}\left[\right.\right.\right.$$

✓ **Maple** : cpu = 0.417 (sec), leaf count = 1225

$$\left\{\left\{x(t) = \_C2\,\mathrm{e}^{\frac{\left(-3542+\left(263474+18\sqrt{351406311}\right)^{\frac{2}{3}}+80\sqrt[3]{263474+18\sqrt{351406311}}\right)t}{6\sqrt[3]{263474+18\sqrt{351406311}}}}\sin\left(\frac{\sqrt{3}t\left(\sqrt[3]{4}\sqrt[3]{(131737+9\sqrt{35140631}}\right.}{6\sqrt[3]{263474+18\sqrt{351406}}}\right.\right.\right.$$

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 = 0.0407861 (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 = 14.222 (sec), leaf count = 33085

Too large to display

2.1910 ODE No. 1910

$$\{tx'(t) = 2x(t) - t, t^3y'(t) = t^2y(t) - x(t) + t, t^4z'(t) = t^3z(t) - t^2y(t) - x(t) + t\}$$

✓ **Mathematica** : cpu = 0.0072081 (sec), leaf count = 39

$$\left\{\left\{x(t) \to c_3t^2 + t, y(t) \to c_2t + c_3, z(t) \to c_1t + \frac{c_3}{t} + c_2\right\}\right\}$$

✓ **Maple** : cpu = 0.069 (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 = 0.0223375 (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 = 0.106 (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 = 0.0071159 (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]}, {x1[t], x2[t], x3[t], x4[t]}, t]
```

✓ **Maple** : cpu = 1.556 (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 = 0.0192355 (sec), leaf count = 64

$$\{\{y(t) \to -\sqrt{c_1}\cot\left(\sqrt{c_1}t - \sqrt{c_1}c_2\right), x(t) \to -\sqrt{c_1}\tan\left(\sqrt{c_1}t - \sqrt{c_1}c_2\right)\}\}$$

✓ **Maple** : cpu = 0.089 (sec), leaf count = 57

$$\left\{[\{x(t) = 0\}, \{y(t) = (-t + \_C1)^{-1}\}], [\left\{x(t) = \frac{1}{\_C1}\tanh\left(\frac{\_C2 + t}{\_C1}\right)\right\}, \left\{y(t) = \frac{-(x(t))^2 - \frac{\mathrm{d}}{\mathrm{d}t}x(t)}{x(t)}\right.\right.$$

2.1914 ODE No. 1914

$$\{x'(t) = x(t)(ay(t) + b), y'(t) = y(t)(cx(t) + d)\}$$

✓ **Mathematica** : cpu = 0.249054 (sec), leaf count = 204

$$\left\{\left\{y(t) \to \frac{bW\left(\frac{a\text{InverseFunction}\left[\int_1^{\#1} \frac{1}{K[1]\left(W\left(\frac{ae^{\frac{c_1}{b}+\frac{cK[1]}{b}}K[1]^{\frac{d}{b}}}{b}\right)+1\right)}dK[1]\&\right][bt+c_2]^{\frac{d}{b}}\exp\left(\frac{c\text{InverseFunction}\left[\int_1^{\#1}\frac{}{K[1]\left(W\left(\frac{ae^{\frac{c_1}{b}+}}{}\right.\right.}\right.}{b}\right.}{b}\right.}{a}\right.\right.$$

✓ **Maple** : cpu = 0.282 (sec), leaf count = 92

$$\left\{[\{x(t)=0\},\{y(t)=\_C1\,\mathrm{e}^{dt}\}],\left[\left\{x(t)=RootOf\left(-\int^{\_Z}\frac{1}{b\_a}\left(lambertW\left(\frac{\mathrm{e}^{-1}}{b}\mathrm{e}^{-\frac{ac}{b}}\_a^{\frac{d}{b}}\mathrm{e}^{-\frac{\_C1}{b}}\right)+1\right)^{-}\right.\right.\right.$$

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 = 300.06 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 2.968 (sec), leaf count = 147

$$\left\{[\{x(t) = 0\}, \left\{y(t) = \frac{\beta}{e^{-\beta t}\_C1\,\beta - qb}\right\}], [\left\{x(t) = ODESolStruc\left(\_b(\_a), [\left\{\left(\left(\frac{d}{d\_a}\_b(\_a)\right)(\_b(\_\right.\right.\right.\right.\right.$$

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 = 0.339965 (sec), leaf count = 557

$$\left\{\left\{y(t) \to b\left(ah - h\text{InverseFunction}\left[\int_1^{\#1} \frac{(h(a - K[1]))^{\frac{k}{h}}}{(a - K[1])\left(c_1(ah - hK[1])^{\frac{k}{h}}(h(a - K[1]))^{\frac{k}{h}} - c(h(a - K[1]\right.}\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.333 (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 = 213.617 (sec), leaf count = 3406

$$\left\{\left\{y(t) \to \frac{3\sqrt[3]{2}\cos\left(\text{InverseFunction}\left[\int_1^{\#1} \frac{(3c_1 -}{2\ 2^{2/3}\cos^2(K[1]) + 2\left(3c_1 + \sqrt{9c_1{}^2 - 4\cos^3(K[1])}\right)^{2/3}\cos(K[1]) + 3\sqrt[3]{}}\right.\right.}{\sqrt[3]{81c_1 + \sqrt{6561c_1{}^2 - 2916\cos^3\left(\text{InverseFunction}\left[\int_1^{\#1} \frac{}{2\ 2^{2/3}\cos^2(K[1]) + 2\left(3c_1 + \sqrt{9c_1{}^2 - 4\cos^3(K[1])}\right)^{2}}\right.\right.}}}\right.\right.$$

✓ **Maple** : cpu = 0.696 (sec), leaf count = 109

$$\left\{\left[\left\{x(t) = \mathit{RootOf}\left(2\int^{\_Z}\left(\tan\left(\mathit{RootOf}\left(-3\sqrt{-(\cos(\_f))^2}\ln\left(9/4\,\frac{(\cos(\_f))^2}{(\cos(\_Z))^2}\right) + 3\_C1\sqrt{-(\cos\right.\right.\right.\right.\right.\right.\right.$$

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 = 0.298385 (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 = 1.627 (sec), leaf count = 184

$$\left\{[\{x(t) = 0\}, \{y(t) = 0\}], \left[\left\{x(t) = \mathit{ODESolStruc}\left(\_a, \left[\left\{\frac{1}{2\_a^2}\left(\sqrt{(4\_a^2 - 4\_a\_b(\_a) + 1)(\_a^3 + \right.\right.\right.\right.\right.\right.$$

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 = 0.34649 (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 = 2.577 (sec), leaf count = 203

$$\left\{[\{x(t) = 0\}, \{y(t) = 0\}], \left[\left\{x(t) = \mathit{ODESolStruc}\left(\_a, \left[\left\{\frac{1}{2\_a^3}\left(\sqrt{-(4\_a^4 + 4\_a\_b(\_a) - 4\_a^2 - \right.\right.\right.\right.\right.\right.$$

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 = 0.275551 (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 = 2.559 (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

$$\left\{x'(t) = -y(t)\left(x(t)^2 + y(t)^2\right), y'(t) = \left(\begin{cases} x(t)^2 + y(t)^2 & x(t)^2 + y(t)^2 \geq 2x(t) \\ \left(x(t)^2 + y(t)^2\right)\left(\frac{x(t)}{2} - \frac{y(t)^2}{2x(t)}\right) & \text{True} \end{cases}\right)\right\}$$

✗ **Mathematica** : cpu = 2.13606 (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

$$\left\{x'(t) = \left(\begin{cases} \sin\left(\frac{1}{x(t)^2+y(t)^2}\right)x(t)\left(x(t)^2 + y(t)^2 - 1\right) & x(t)^2 + y(t)^2 \neq 1 \\ 0 & \text{True} \end{cases}\right) - y(t), y'(t) = \left(\begin{cases} \sin \right.\right.$$

✗ **Mathematica** : cpu = 8.96914 (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 , could not solve

```
dsolve({diff(x(t),t) = -y(t)+piecewise(x(t)^2+y(t)^2 <> 1,x(t)*(x(t)^2+y(t)^2-
1)*sin(1/(x(t)^2+y(t)^2))), diff(y(t),t) = x(t)+piecewise(x(t)^2+y(t)^2 <> 1,y(t)*(x(t
1)*sin(1/(x(t)^2+y(t)^2)))})
```

2.1923 ODE No. 1923

$$\{(t^2+1)\,x'(t)=y(t)-tx(t),(t^2+1)\,y'(t)=-x(t)-ty(t)\}$$

✓ **Mathematica** : cpu = 0.0094938 (sec), leaf count = 53

$$\left\{\left\{x(t)\to\frac{c_1}{t^2+1}+\frac{c_2t}{t^2+1},y(t)\to\frac{c_2}{t^2+1}-\frac{c_1t}{t^2+1}\right\}\right\}$$

✓ **Maple** : cpu = 0.03 (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 = 0.0518002 (sec), leaf count = 191

$$\left\{\left\{y(t)\to\frac{c_1\left(e^{c_2}-\sqrt{-4c_1{}^2t^2+e^{2c_2}-4t^2}\right)}{2\left(c_1{}^2+1\right)},x(t)\to\frac{e^{c_2}-\sqrt{-4c_1{}^2t^2+e^{2c_2}-4t^2}}{2\left(c_1{}^2+1\right)}\right\},\left\{y(t)\to\frac{c_1\left(\sqrt{-4c_1{}^2\right.}{2}\right.\right.$$

✓ **Maple** : cpu = 0.24 (sec), leaf count = 180

$$\left\{[\{x(t)=0\},\left\{y(t)=\frac{1}{2\_C1}\left(1+\sqrt{-4\_C1^2t^2+1}\right),y(t)=\frac{1}{2\_C1}\left(1-\sqrt{-4\_C1^2t^2+1}\right)\right\}],[\left\{x(t)\right.\right.$$

2.1925 ODE No. 1925

$$\{ay'(t)+tx'(t)-x(t)+y'(t)^2=0,x'(t)y'(t)+ty'(t)-y(t)=0\}$$

✗ **Mathematica** : cpu = 5.51649 (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 = 0.207 (sec), leaf count = 194

$$\left\{[\left\{x(t)=-\frac{t^2}{3}\right\},\left\{y(t)=-\frac{t^3}{27\,a}\right\}],[\{x(t)=\_C1\,t+\_C2\},\left\{y(t)=-\frac{\left(\frac{d}{dt}x(t)+t\right)\left(\left(\frac{d}{dt}x(t)\right)^2+t\frac{d}{dt}x\right.}{a}\right.\right.$$

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 = 0.0043313 (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 = 0.105 (sec), leaf count = 96

$$\left\{ [\left\{ \int RootOf\left(t\frac{\mathrm{d}}{\mathrm{d}t}y(t) + g\left(\_Z, \frac{\mathrm{d}}{\mathrm{d}t}y(t) \right) - y(t) \right) \mathrm{d}t + \_C1 = tRootOf\left(t\frac{\mathrm{d}}{\mathrm{d}t}y(t) + g\left(\_Z, \frac{\mathrm{d}}{\mathrm{d}t}y(t) \right) - y(\right.\right.\right.$$

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 = 0.0069965 (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 = 0.0053015 (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 , could not solve

```
dsolve({diff(diff(x(t),t),t) = k*x(t)/(x(t)^2+y(t)^2)^(3/2), diff(diff(y(t),t),t) = k*
```

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 = 0.0064354 (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 = 2.447 (sec), leaf count = 116

$$\left\{[\left\{y(t) = ODESolStruc\left(\_a, [\left\{\left(\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a)\right)\_b(\_a) + 1\left(C(\_a)\,f\left(\sqrt{(\_b\,(\_a))^2}\right)\_b(\_a) + g\sqrt{(\right.\right.\right.\right.\right.$$

2.1930 ODE No. 1930

$$\{x'(t) = y(t) - z(t), y'(t) = x(t)^2 + y(t), z'(t) = x(t)^2 + z(t)\}$$

✓ **Mathematica** : cpu = 0.0300623 (sec), leaf count = 308

$$\left\{\left\{x(t) \to e^{-c_3}\left(e^{c_3}c_1 + e^t\right), y(t) \to c_2\left(e^{-c_3}\left(e^{c_3}c_1 + e^t\right) - c_1\right) + \left(e^{-c_3}\left(e^{c_3}c_1 + e^t\right) - c_1\right)\left(-\frac{c_1{}^2}{e^{-c_3}\left(e^{c_3}c_1 + e^t\right.}\right.\right.\right.$$

✓ **Maple** : cpu = 0.04 (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 = 3.95197 (sec), leaf count = 10101

$$\left\{\left\{x(t) \to \frac{\frac{\sqrt{2}b^2\sqrt{a(a-c)}c_1 \operatorname{sn}\left(\frac{\frac{\sqrt{2}\sqrt{a}\sqrt{a-c}c\sqrt{c_2}t}{\sqrt{b}\sqrt{b-c}} - \frac{\sqrt{2}\sqrt{a}\sqrt{b}\sqrt{a-c}\sqrt{c_2}t}{\sqrt{b-c}} - \frac{\sqrt{2}\sqrt{a}\sqrt{a-c}c\sqrt{c_2}c_3}{\sqrt{b}\sqrt{b-c}} + \frac{\sqrt{2}\sqrt{a}\sqrt{b}\sqrt{a-c}\sqrt{c_2}c_3}{\sqrt{b-c}}}{a} \middle| -\frac{(a-b)bc_1}{(a-c)cc_2}\right)}{(a-c)\sqrt{b(b-c)c_1}} - \frac{\sqrt{2}b\sqrt{a(a-}}{}}{a}\right.\right.$$

✓ **Maple** : cpu = 0.513 (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 = 1.75962 (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 = 0.741 (sec), leaf count = 383

$$\left\{[\{x(t) = 0\}, \{y(t) = 0\}, \{z(t) = \_C1\}], \left[\{x(t) = 0\}, \left\{y(t) = \frac{\_C1\, e^{\_C2\,\_C1} e^{\_C1\, t}}{-1 + e^{\_C2\,\_C1} e^{\_C1\, t}}\right\}, \left\{z(t) = \frac{\frac{d}{dt}y(t)}{y(t)}\right\}\right.\right.$$

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 = 125.041 (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 = 1.892 (sec), leaf count = 17738

Too large to display

2.1934 ODE No. 1934

$$\left\{x'(t) = \frac{x(t)^2}{2} - \frac{y(t)}{24}, y'(t) = 2x(t)y(t) - 3z(t), z'(t) = 3x(t)z(t) - \frac{y(t)^2}{6}\right\}$$

✗ **Mathematica** : cpu = 64.1656 (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 = 1.137 (sec), leaf count = 377

$$\Bigg\{[\{y(t) = 0\}, \{x(t) = -2(-2\_C1 + t)^{-1}\}, \{z(t) = 0\}], [\{y(t) = 256(\_C1\,t + \_C2)^{-4}\}, \Bigg\{x(t) = \frac{1}{6\,y(}$$

2.1935 ODE No. 1935

$$\{x'(t) = x(t)\left(y(t)^2 - z(t)^2\right), y'(t) = y(t)\left(z(t)^2 - x(t)^2\right), z'(t) = z(t)\left(x(t)^2 - y(t)^2\right)\}$$

✗ **Mathematica** : cpu = 0.0372397 (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 = 1.381 (sec), leaf count = 741

$$\Bigg\{[\{x(t) = 0\}, \{y(t) = 0\}, \{z(t) = \_C1\}], [\{x(t) = 0\}, \Bigg\{y(t) = \frac{1}{(e^{\_C2\_C1})^2 (e^{\_C1\,t})^2 - 1}\sqrt{((e^{\_C2\_C1})^2 (}$$

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 = 0.0352716 (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 = 0.565 (sec), leaf count = 704

$$\left\{[\{x(t)=0\}, \{y(t)=0\}, \{z(t)=\_C1\}], [\{x(t)=0\}, \left\{y(t)=\frac{1}{(\mathrm{e}^{\_C2\,\_C1})^2(\mathrm{e}^{\_C1\,t})^2-1}\sqrt{-(\mathrm{e}^{\_C1\,t})^4\_\right.\right.$$

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 = 0.622445 (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 = 0.5 (sec), leaf count = 242

$$\left\{[\{x(t)=0\}, \{y(t)=0\}, \{z(t)=\_C1\}], \left[\left\{x(t)=ODESolStruc\left(\_a, \left[\left\{\frac{1}{2\_a^2}\left(\sqrt{(4\_a^2-4\_a\_b(\_\right.\right.\right.\right.\right.\right.$$

2.1938 ODE No. 1938

$$\left\{x''(t) = \frac{x(t)f'(r)}{r}, y''(t) = \frac{y(t)f'(r)}{r}, z''(t) = \frac{z(t)f'(r)}{r}\right\}$$

✓ **Mathematica** : cpu = 0.0066229 (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 = 0.093 (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 = 0.0074859 (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 = 1.106 (sec), leaf count = 899

$$\left\{\left[\left\{x(t)=\int 3\frac{f(t)}{\_C1^3+11664\_C2^2-23328\_C2\int f(t)\,dt+11664\left(\int f(t)\,dt\right)^2}\left(\left(-1-i\sqrt{3}\right)\left(\left(1+\right.\right.\right.\right.\right.\right.$$

2.1940 ODE No. 1940

$\{\mathrm{x1}'(t)\sin(\mathrm{x2}(t))=\mathrm{x4}(t)\sin(\mathrm{x3}(t))+\mathrm{x5}(t)\cos(\mathrm{x3}(t)),\mathrm{x2}'(t)=\mathrm{x4}(t)\cos(\mathrm{x3}(t))-\mathrm{x5}(t)\sin(\mathrm{x3}(t)),\mathrm{x1}'(t)\,c$

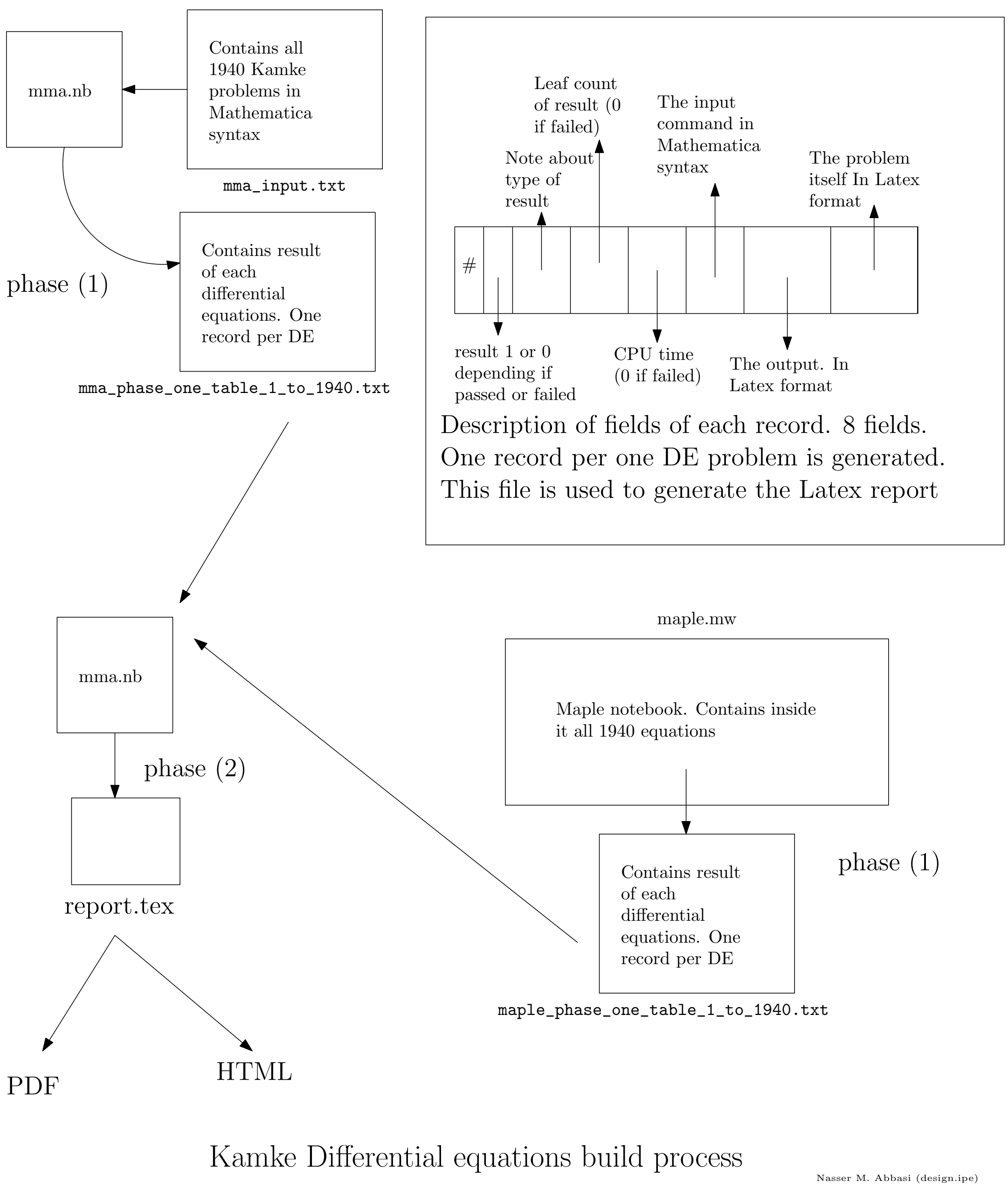
✗ **Mathematica** : cpu = 0.0067531 (sec), leaf count = 0 , could not solve

```
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 , could not solve

```
dsolve({diff(x1(t),t)*sin(x2(t)) = x4(t)*sin(x3(t))+x5(t)*cos(x3(t)), diff(x3(t),t)+di
(1-lambda)*a*x5(t) = -m*sin(x2(t))*cos(x3(t)), diff(x5(t),t)+(1-lambda)*a*x4(t) = m*si
x5(t)*sin(x3(t))})
```

3 Appendix



Kamke Differential equations build process