Kamke differential equations. Mathematica 11.2 and Maple 2017.3

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Contents

1 Introduction and summary of results

This report gives the result of solving the 1,940 differential equations from Kamke book in Mathematica 11.2 and Maple 2017.3 on windows 7, 64 bit OS. The PC used is an Intel i7-3930k running at 3.20 GHz with 16 GB memory.

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

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

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

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

Table 1 below summarizes the performance of each CAS system

system	% solved	mean CPU time (sec)	mean leaf size of result	total CPU (minutes)	total leaf
Mathematica	75.77	5.17	172.57	126.76	25367
Maple	91.96	0.75	207.39	22.17	36998

Table 1: Summary of final results

Table 2 summarizes the Kamke equations used

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

Table 2: Kamke equation numbering

The following summarizes which equations are solved by each system

Not solved by Mathematica 16, 22, 47, 48, 49, 50, 55, 56, 63, 66, 70, 74, 79, 80, 81, 82, 83, 86, 87, 110, 121, 127, 188, 202, 203, 205, 206, 219, 234, 237, 250, 253, 265, 266, 269, 331, 340, 365, 366, 367, 368, 370, 383, 385, 394, 395, 400, 402, 404, 413, 414, 416, 428, 429, 451, 452, 460, 461, 465, 467, 468, 470, 476, 479, 480, 482, 485, 487, 489, 494, 503, 504, 506, 508, 509, 510, 513, 515, 523, 524, 527, 528, 530, 531, 532, 533, 534, 535, 537, 538, 541, 542, 543, 544, 546, 550, 555, 561, 562, 566, 567, 570, 572, 575, 576, 592, 607, 608, 613, 620, 638, 639, 640, 672, 696, 701, 702, 703, 704, 706, 707, 710, 714, 730, 733, 735, 743, 745, 746, 747, 752, 759, 765, 766, 769, 776, 782, 783, 784, 785, 786, 788, 789, 790, 791, 792, 807, 835, 837, 854, 855, 862, 865, 885, 889, 892, 894, 909, 913, 915, 916, 917, 918, 919, 922, 923, 925, 929, 932, 942, 953, 961, 993, 996, 1000, 1015, 1019, 1026, 1027, 1028, 1029, 1030, 1031, 1032, 1038, 1072, 1073, 1074, 1075, 1076, 1077, 1080, 1081, 1082, 1083, 1084, 1085, 1099, 1126, 1128, 1156, 1157, 1177, 1205, 1212, 1216, 1219, 1232, 1233, 1236, 1248, 1261, 1263, 1268, 1270, 1278, 1303, 1306, 1323, 1329, 1330, 1341, 1343, 1348, 1362, 1367, 1372, 1373, 1398, 1402, 1403, 1406, 1407, 1408, 1413, 1418, 1419, 1427, 1439, 1440, 1441, 1442, 1443, 1444, 1445, 1450, 1457, 1458, 1459, 1460, 1461, 1462, 1463, 1470, 1471, 1472, 1473, 1474, 1476, 1482, 1484, 1487, 1489, 1500, 1505, 1506, 1507, 1510, 1515, 1516, 1520, 1526, 1527, 1529, 1530, 1531, 1540, 1541, 1542, 1543, 1544, 1547, 1552, 1569, 1572, 1573, 1574, 1575, 1576, 1578, 1581, 1583, 1586, 1590, 1593, 1595, 1596, 1598, 1599, 1601, 1603, 1605, 1606, 1608, 1609, 1610, 1611, 1612, 1613, 1614, 1615, 1616, 1617, 1618, 1619, 1620, 1621, 1622, 1623, 1624, 1625, 1626, 1627, 1628, 1629, 1631, 1633, 1634, 1635, 1636, 1637, 1638, 1639, 1640, 1642, 1643, 1644, 1645, 1648, 1649, 1652, 1656, 1658, 1659, 1660, 1662, 1663, 1664, 1665, 1666, 1667, 1672, 1673, 1675, 1677, 1678, 1680, 1681, 1682, 1684, 1685, 1686, 1688, 1690, 1691, 1692, 1693, 1695, 1696, 1702, 1704, 1705, 1706, 1708, 1709, 1710, 1711, 1713, 1719, 1720, 1721, 1729, 1732, 1734, 1735, 1737, 1738, 1739, 1742, 1746, 1751, 1755, 1757, 1760, 1761, 1762, 1776, 1777, 1779, 1780, 1787, 1788, 1789, 1797, 1798, 1801, 1802, 1806, 1807, 1809, 1811, 1813, 1815, 1816, 1817, 1818, 1819, 1820, 1821, 1823, 1825, 1827, 1831, 1832, 1833, 1834, 1836, 1837, 1838, 1839, 1840, 1841, 1844, 1845, 1848, 1850, 1851, 1853, 1854, 1855, 1875, 1880, 1885, 1890, 1893, 1894, 1905, 1911, 1912, 1915, 1916, 1917, 1918, 1919, 1920, 1921, 1922, 1925, 1926, 1927, 1928, 1929, 1932, 1933, 1934, 1935, 1936, 1937, 1939, 1940

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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	✓	1.195	1117	✓	0.45	1089	Linear first order, To Do
Kamke 2	✓	0.032	33	✓	0.163	25	Linear first order, integrating factor $y'(x)+ay(x)=f(x)$
Kamke 3	✓	0.05	40	✓	0.211	37	Linear first order, integrating factor $y'(x)+ay(x)=f(x)$
Kamke 4	✓	0.01	24	✓	0.006	18	Linear first order, integrating factor $y'(x)+g(x)y(x)=f(x)$
Kamke 5	✓	3.586	31	✓	1.103	21	Linear first order, integrating factor $y'(x)+g(x)y(x)=f(x)$
Kamke 6	✓	0.025	18	✓	0.05	15	Linear first order, integrating factor $y'(x)+g(x)y(x)=f(x)$
Kamke 7	✓	0.026	16	✓	0.007	13	Linear first order, integrating factor $y'(x)+g(x)y(x)=f(x)$
Kamke 8	✓	0.026	15	✓	0.056	13	Linear first order, integrating factor $y'(x)+g(x)y(x)=f(x)$
Kamke 9	✓	0.017	17	✓	0.028	14	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 10	✓	0.009	18	✓	0.012	15	Linear first order, integrating factor $y'(x) + g(x)y(x) = f(x)$
Kamke 11	✓	0.496	48	✓	0.117	24	Linear first order, integrating factor $y'(x) + g(x)y(x) = f(x)$
Kamke 12	✓	0.09	34	✓	0.203	8	Non-linear first order, Riccati, separable $y'(x) + y^2(x) = 1$
Kamke 13	✓	0.072	69	✓	1.201	79	Non-linear first order, Riccati, transform to second order Airy ODE using $y = -\frac{u'(x)}{uR(x)}$
Kamke 14	✓	0.019	253	✓	0.393	187	Non-linear first order, Riccati, transform to second order Airy ODE using $y = -\frac{u'(x)}{uR(x)}$
Kamke 15	✓	0.022	25	✓	0.887	33	Non-linear first order, Riccati, transform to separable first order
Kamke 16	✗	0	0	✓	0.345	49	Non-linear first order, Riccati, transform to first order separable using $y = y_p + \frac{1}{u}$
Kamke 17	✓	0.025	30	✓	0.143	24	Non-linear first order, Riccati, transform to second order standard ODE using $y = -\frac{u'(x)}{uR(x)}$

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 18	✓	0.025	49	✓	0.107	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	✓	0.011	30	✓	0.074	16	Non-linear first order, Riccati, transform to first order separable
Kamke 20	✓	0.717	48	✓	0.122	34	Non-linear first order, Riccati, transform to Bernoulli first order non-linear first order then solve Bernoulli
Kamke 21	✓	7.281	57	✓	0.21	25	Non-linear first order, Riccati, transform to first order ODE solved using integrating factor using transformtion $y = y_p + \frac{1}{u}$
Kamke 22	✗	0	0	✓	1.644	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	✓	5.203	32	✓	0.052	23	Non-linear first order, Riccati, Separable
Kamke 24	✓	0.135	276	✓	0.111	201	Non-linear first order, Riccati, transform to second order Emden-Fowler ODE using $y = -\frac{u'(x)}{uR(x)}$ solution in terms of Bessel functions
Kamke 25	✓	3.855	516	✓	0.512	348	Non-linear first order, Riccati. To do

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Table 3 – continued from previous page

#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 26	✓	0.362	56	✓	0.115	45	Non-Linear first order, Riccati, transform to second order standard ODE using $y=-\frac{u'(x)}{uR(x)}$
Kamke 27	✓	20.706	88	✓	0.342	72	Non-linear first order, Riccati, transform to Bernoulli first order non-linear first order then solve Bernoulli
Kamke 28	✓	0.376	63	✓	0.291	51	Non-linear first order, Riccati, transform to Bernoulli first order non-linear first order then solve Bernoulli
Kamke 29	✓	0.024	39	✓	0.015	19	Non-linear first order, Bernoulli
Kamke 30	✓	0.289	197	✓	0.097	54	Non-Linear first order, Riccati, transform to second order Bessel like ODE using $y=-\frac{u'(x)}{uR(x)}$, solution uses Bessel functions
Kamke 31	✓	1.102	21	✓	0.066	23	Non-Linear first order, Riccati, separable
Kamke 32	✓	0.169	26	✓	0.396	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	✓	42.837	114	✓	0.846	58	Non-Linear first order, Riccati. Complicated algebra, will do later
Kamke 34	✓	0.56	51	✓	0.031	28	Non-Linear first order, Bernoulli. Standard method.

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 35	✓	0.062	48	✓	0.073	35	Non-Linear first order, Riccati. Transform to second order ODE using $y(x) = -\frac{u'(x)}{u(x)R(x)}$
Kamke 36	✓	0.607	171	✓	0.236	62	Non-Linear first order of Abel first kind with None constant invariant. Transform to a reverse Riccati then Solve the resulting second order Airy ODE, and transform solution back. Lots of algebra involved. Hardest ODE so far
Kamke 37	✓	1.016	73	✓	0.101	50	To Do
Kamke 38	✓	0.117	99	✓	0.085	34	Non-Linear first order. smart transformation makes it proper Abel first kind
Kamke 39	✓	0.058	54	✓	0.016	30	To Do
Kamke 40	✓	0.456	161	✓	0.08	48	To Do
Kamke 41	✓	0.16	98	✓	0.309	103	To Do
Kamke 42	✓	1.79	136	✓	0.044	40	To Do
Kamke 43	✓	10.334	352	✓	2.198	373	To Do
Kamke 44	✓	0.019	65	✓	0.024	53	Non-Linear first order Bernoulli. Solved using standard method of solving Bernoulli.
Kamke 45	✓	0.796	120	✓	0.186	123	To Do
Kamke 46	✓	0.316	254	✓	0.167	956	To Do
Kamke 47	✗	0	0	✗	0	0	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 48	✗	0	0	✗	0	0	To Do
Kamke 49	✗	0	0	✗	0	0	To Do
Kamke 50	✗	0	0	✗	0	0	To Do
Kamke 51	✓	0.864	322	✓	0.235	237	To Do
Kamke 52	✓	175.47	109	✓	0.271	61	To Do
Kamke 53	✓	105.501	95	✓	0.07	281	To Do
Kamke 54	✓	0.163	74	✓	0.236	38	To Do
Kamke 55	✗	0	0	✗	0	0	To Do
Kamke 56	✗	0	0	✗	0	0	To Do
Kamke 57	✓	168.671	263	✓	0.138	31	To Do
Kamke 58	✓	0.24	114	✓	0.107	68	To Do
Kamke 59	✓	0.195	96	✓	0.076	26	To Do
Kamke 60	✓	0.051	44	✓	0.018	29	Non-Linear first order, separable.
Kamke 61	✓	0.188	75	✓	0.015	50	To Do
Kamke 62	✓	4.176	36	✓	0.424	34	Non-Linear first order, special transformation makes it exact differential.
Kamke 63	✗	0	0	✓	6.707	35	To Do
Kamke 64	✓	0.193	90	✓	0.109	124	To Do
Kamke 65	✓	1.679	312	✓	0.054	47	To Do
Kamke 66	✗	0	0	✓	0.126	40	To Do
Kamke 67	✓	0.065	14	✓	0.015	51	To Do
Kamke 68	✓	0.942	373	✓	0.072	77	To Do
Kamke 69	✓	99.195	1	✓	0.213	111	To Do
Kamke 70	✗	0	0	✓	0.198	113	To Do

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#	Mathematica			Maple			note on solution
	solved	cpu	leaf	solved	cpu	leaf	
Kamke 71	✓	4.81	2237	✓	0.157	113	To Do
Kamke 72	✓	0.927	84	✓	0.013	64	To Do
Kamke 73	✓	1.826	733	✓	0.43	91	To Do
Kamke 74	✗	0	0	✗	0	0	To Do
Kamke 75	✓	0.02	18	✓	0.192	20	Non-Linear first order, Separable
Kamke 76	✓	0.106	51	✓	0.075	41	Non-Linear first order, Separable, integral requires the tangent half-angle substitution (Weierstrass substitution)
Kamke 77	✓	0.32	58	✓	0.086	54	Non-Linear first order, transform to Separable, becomes same as problem 76 above. Transform back after soluion.
Kamke 78	✓	0.922	86	✓	2.266	89	Non-Linear first order, transform to Separable, integral requires the tangent half-angle substitution (Weierstrass substitution). Kamke calls this d'Alembertsche differential equation
Kamke 79	✗	0	0	✗	0	0	To Do
Kamke 80	✗	0	0	✓	1.477	41	To Do
Kamke 81	✗	0	0	✓	1.403	78	To Do
Kamke 82	✗	0	0	✗	0	0	To Do
Kamke 83	✗	0	0	✓	0.445	44	To Do
Kamke 84	✓	11.049	108	✓	0.042	37	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 85	✓	201.532	160	✓	0.557	153	To Do
Kamke 86	✗	0	0	✓	0.657	52	To Do
Kamke 87	✗	0	0	✗	0	0	To Do
Kamke 88	✓	0.304	2479	✓	0.26	256	Non-Linear first order, Riccati, Solved using $y = -\frac{u'}{uR(x)}$ substitution. Convert to second order Bessel ODE
Kamke 89	✓	0.033	46	✓	0.019	56	Linear first order, separable. Integration tricky. requires tangent half-angle substitution
Kamke 90	✓	0.014	19	✓	0.013	17	Linear first order, separable. integrating factor
Kamke 91	✓	0.007	13	✓	0.007	11	To Do
Kamke 92	✓	0.012	14	✓	0.007	12	Linear first order, separable. integrating factor
Kamke 93	✓	0.02	14	✓	0.018	12	To Do
Kamke 94	✓	0.017	25	✓	0.01	23	Linear first order, separable. integrating factor
Kamke 95	✓	0.015	30	✓	0.073	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	✓	0.023	33	✓	0.052	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	✓	0.027	36	✓	0.044	25	Non-Linear first order, Riccati, smart substitution transfer it to separable first order, so easy to solve by direct integration
Kamke 98	✓	0.026	123	✓	0.06	38	To Do
Kamke 99	✓	0.019	243	✓	0.129	171	To Do
Kamke 100	✓	0.009	133	✓	0.085	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	✓	0.01	18	✓	0.012	16	Non-Linear first order, Bernoulli, standard method of solving Bernoulli
Kamke 102	✓	0.021	30	✓	0.049	22	Non-Linear first order, Riccati, but transformed using smart substitution $y=xv$ to separable first order which is easily solved
Kamke 103	✓	0.103	72	✓	0.06	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	✓	0.018	43	✓	0.077	63	Non-Linear first order, Riccati, conversion using smart transformation to separable first order

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#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 105	✓	0.186	301	✓	0.336	844	To Do
Kamke 106	✓	0.04	40	✓	0.053	41	To Do
Kamke 107	✓	0.272	1286	✓	0.294	174	To Do
Kamke 108	✓	0.012	15	✓	0.022	13	Non-Linear first order, Bernoulli, standard method of solving Bernoulli, leads to first order separable
Kamke 109	✓	0.012	17	✓	0.014	15	Non-Linear first order, Bernoulli, standard method of solving Bernoulli, leads to first order separable
Kamke 110	✗	0	0	✗	0	0	Non-Linear first order, Riccati, has known particular solution. Using $y = y_p + \frac{1}{u}$ convert it to first order separable ODE
Kamke 111	✓	0.42	55	✓	0.144	54	To Do
Kamke 112	✓	0.022	13	✓	0.043	27	Non-Linear first order, smart transformation $y(x) = xv(x)$ makes it separable
Kamke 113	✓	0.024	16	✓	0.032	33	Non-Linear first order, very similar to 112. Smart transformation $y(x) = xv(x)$ makes it separable
Kamke 114	✓	0.021	12	✓	2.558	28	Non-Linear first order, very similar to 113. Smart transformation $y(x) = xv(x)$ makes it separable

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 115	✓	0.129	81	✓	0.247	49	Non-Linear first order, Smart transformation $y(x) = xv(x)$ makes it separable
Kamke 116	✓	0.615	142	✓	0.243	86	To Do
Kamke 117	✓	0.026	21	✓	0.121	20	To Do
Kamke 118	✓	0.011	13	✓	0.059	8	To Do
Kamke 119	✓	0.031	17	✓	0.071	14	To Do
Kamke 120	✓	0.054	20	✓	0.216	17	To Do
Kamke 121	✗	0	0	✗	0	0	To Do
Kamke 122	✓	0.08	19	✓	0.451	16	To Do
Kamke 123	✓	0.06	19	✓	0.06	44	To Do
Kamke 124	✓	0.028	16	✓	0.033	12	To Do
Kamke 125	✓	0.04	16	✓	0.069	14	To Do
Kamke 126	✓	19.954	84	✓	0.026	29	To Do
Kamke 127	✗	0	0	✓	0.137	39	To Do
Kamke 128	✓	4.389	39	✓	0.318	33	To Do
Kamke 129	✓	0.032	37	✓	0.033	33	To Do
Kamke 130	✓	0.007	21	✓	0.008	15	To Do
Kamke 131	✓	0.018	20	✓	0.218	31	To Do
Kamke 132	✓	0.012	115	✓	0.031	153	To Do
Kamke 133	✓	0.007	22	✓	0.011	16	To Do
Kamke 134	✓	0.012	21	✓	0.012	17	To Do
Kamke 135	✓	0.007	14	✓	0.005	11	To Do
Kamke 136	✓	0.013	24	✓	0.018	18	To Do
Kamke 137	✓	0.009	16	✓	0.014	14	To Do

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#	Mathematica			Maple			note on solution
	solved	cpu	leaf	solved	cpu	leaf	
Kamke 138	✓	0.014	13	✓	0.069	11	To Do
Kamke 139	✓	0.138	397	✓	0.157	219	To Do
Kamke 140	✓	0.01	17	✓	0.049	20	To Do
Kamke 141	✓	0.027	61	✓	0.076	51	To Do
Kamke 142	✓	0.122	71	✓	0.114	52	To Do
Kamke 143	✓	0.01	51	✓	0.079	41	To Do
Kamke 144	✓	0.181	1588	✓	0.126	219	To Do
Kamke 145	✓	0.675	239	✓	0.128	117	To Do
Kamke 146	✓	0.787	73	✓	0.189	84	To Do
Kamke 147	✓	0.943	279	✓	0.222	178	To Do
Kamke 148	✓	0.013	20	✓	0.011	16	To Do
Kamke 149	✓	0.012	27	✓	0.012	20	To Do
Kamke 150	✓	0.008	25	✓	0.007	23	To Do
Kamke 151	✓	0.6	161	✓	0.062	85	To Do
Kamke 152	✓	0.253	39	✓	0.999	25	To Do
Kamke 153	✓	0.017	21	✓	0.015	20	To Do
Kamke 154	✓	0.015	18	✓	0.011	16	To Do
Kamke 155	✓	0.018	47	✓	0.111	14	To Do
Kamke 156	✓	0.018	21	✓	0.033	20	To Do
Kamke 157	✓	0.092	32	✓	0.299	231	To Do
Kamke 158	✓	0.038	31	✓	0.018	22	To Do
Kamke 159	✓	0.018	17	✓	0.137	13	To Do
Kamke 160	✓	0.021	27	✓	0.029	21	To Do
Kamke 161	✓	0.015	34	✓	0.015	27	To Do
Kamke 162	✓	0.286	99	✓	0.219	58	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 163	✓	0.014	43	✓	0.048	26	To Do
Kamke 164	✓	0.086	76	✓	0.249	102	To Do
Kamke 165	✓	0.018	22	✓	0.025	17	To Do
Kamke 166	✓	0.077	63	✓	0.199	97	To Do
Kamke 167	✓	0.023	29	✓	0.036	20	To Do
Kamke 168	✓	0.099	99	✓	0.19	140	To Do
Kamke 169	✓	2.903	110	✓	0.176	153	To Do
Kamke 170	✓	0.022	22	✓	0.018	23	To Do
Kamke 171	✓	0.01	17	✓	0.011	15	To Do
Kamke 172	✓	0.042	27	✓	0.285	26	To Do
Kamke 173	✓	0.017	25	✓	0.057	27	To Do
Kamke 174	✓	0.008	17	✓	0.005	13	To Do
Kamke 175	✓	0.022	23	✓	0.021	20	To Do
Kamke 176	✓	0.131	73	✓	0.131	30	To Do
Kamke 177	✓	0.018	20	✓	0.029	17	To Do
Kamke 178	✓	0.079	52	✓	0.178	63	To Do
Kamke 179	✓	1.71	1619	✓	0.188	112	To Do
Kamke 180	✓	0.135	104	✓	0.083	58	To Do
Kamke 181	✓	0.013	100	✓	0.085	28	To Do
Kamke 182	✓	0.186	24	✓	0.158	18	To Do
Kamke 183	✓	0.016	22	✓	0.012	18	To Do
Kamke 184	✓	1.619	612	✓	0.415	493	To Do
Kamke 185	✓	0.493	106	✓	0.051	63	To Do
Kamke 186	✓	0.031	19	✓	0.05	17	To Do
Kamke 187	✓	0.074	154	✓	0.087	60	To Do

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#	Mathematica			Maple			note on solution
	solved	cpu	leaf	solved	cpu	leaf	
Kamke 188	✗	0	0	✓	0.032	32	To Do
Kamke 189	✓	108.645	90	✓	0.277	60	To Do
Kamke 190	✓	0.051	44	✓	0.007	29	To Do
Kamke 191	✓	0.032	48	✓	0.019	16	To Do
Kamke 192	✓	0.03	42	✓	0.019	36	To Do
Kamke 193	✓	0.009	16	✓	0.008	14	To Do
Kamke 194	✓	0.077	30	✓	0.023	23	To Do
Kamke 195	✓	0.059	24	✓	0.124	28	To Do
Kamke 196	✓	0.061	40	✓	0.166	29	To Do
Kamke 197	✓	0.052	98	✓	0.123	237	To Do
Kamke 198	✓	0.026	15	✓	0.015	13	To Do
Kamke 199	✓	0.195	15	✓	0.191	102	To Do
Kamke 200	✓	0.052	59	✓	0.064	53	To Do
Kamke 201	✓	0.078	38	✓	0.049	23	To Do
Kamke 202	✗	0	0	✗	0	0	To Do
Kamke 203	✗	0	0	✗	0	0	To Do
Kamke 204	✓	0.117	67	✓	0.335	92	To Do
Kamke 205	✗	0	0	✗	0	0	To Do
Kamke 206	✗	0	0	✗	0	0	To Do
Kamke 207	✓	0.013	47	✓	0.024	37	To Do
Kamke 208	✓	0.083	120	✓	0.08	106	To Do
Kamke 209	✓	0.023	58	✓	0.012	21	To Do
Kamke 210	✓	0.017	47	✓	0.023	33	To Do
Kamke 211	✓	53.821	38	✓	0.035	31	To Do
Kamke 212	✓	30.002	92	✓	0.137	30	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 213	✓	0.144	71	✓	0.771	66	To Do
Kamke 214	✓	0.155	78	✓	0.184	48	To Do
Kamke 215	✓	0.162	80	✓	0.218	51	To Do
Kamke 216	✓	0.14	82	✓	0.204	51	To Do
Kamke 217	✓	0.02	29	✓	0.035	23	To Do
Kamke 218	✓	0.105	232	✓	0.226	57	To Do
Kamke 219	✗	0	0	✗	0	0	To Do
Kamke 220	✓	0.015	57	✓	0.025	43	To Do
Kamke 221	✓	0.019	30	✓	0.069	21	To Do
Kamke 222	✓	0.079	65	✓	0.06	32	To Do
Kamke 223	✓	0.026	55	✓	0.194	51	To Do
Kamke 224	✓	0.019	29	✓	0.064	35	To Do
Kamke 225	✓	0.017	26	✓	0.053	20	To Do
Kamke 226	✓	0.017	28	✓	0.054	21	To Do
Kamke 227	✓	0.013	71	✓	0.21	33	To Do
Kamke 228	✓	0.308	1677	✓	0.405	271	To Do
Kamke 229	✓	0.014	77	✓	0.206	32	To Do
Kamke 230	✓	0.127	96	✓	0.065	100	To Do
Kamke 231	✓	3.371	252	✓	0.258	178	To Do
Kamke 232	✓	0.01	46	✓	0.019	39	To Do
Kamke 233	✓	0.025	38	✓	0.028	30	To Do
Kamke 234	✗	0	0	✗	0	0	To Do
Kamke 235	✓	0.074	33	✓	0.057	30	To Do
Kamke 236	✓	0.018	84	✓	0.071	141	To Do
Kamke 237	✗	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 238	✓	0.049	176	✓	0.088	93	To Do
Kamke 239	✓	0.031	54	✓	0.203	59	To Do
Kamke 240	✓	0.011	39	✓	0.024	34	To Do
Kamke 241	✓	0.01	37	✓	0.016	33	To Do
Kamke 242	✓	0.016	60	✓	0.019	39	To Do
Kamke 243	✓	15.04	451	✓	0.155	391	To Do
Kamke 244	✓	15.005	457	✓	0.139	391	To Do
Kamke 245	✓	0.459	1453	✓	0.367	31	To Do
Kamke 246	✓	0.032	71	✓	0.077	63	To Do
Kamke 247	✓	15.002	590	✓	0.261	517	To Do
Kamke 248	✓	0.015	83	✓	0.025	75	To Do
Kamke 249	✓	6.08	103	✓	0.221	232	To Do
Kamke 250	✗	0	0	✗	0	0	To Do
Kamke 251	✓	0.013	57	✓	0.024	51	To Do
Kamke 252	✓	14.806	501	✓	0.942	1338	To Do
Kamke 253	✗	0	0	✗	0	0	To Do
Kamke 254	✓	0.018	81	✓	0.034	59	To Do
Kamke 255	✓	5.217	30	✓	0.266	74	To Do
Kamke 256	✓	0.021	21	✓	0.056	31	To Do
Kamke 257	✓	0.424	39	✓	0.122	98	To Do
Kamke 258	✓	0.015	43	✓	0.024	33	To Do
Kamke 259	✓	0.023	50	✓	0.031	51	To Do
Kamke 260	✓	0.016	74	✓	0.035	59	To Do
Kamke 261	✓	1.084	32	✓	0.146	18	To Do
Kamke 262	✓	0.07	101	✓	0.371	65	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 263	✓	0.044	120	✓	0.238	179	To Do
Kamke 264	✓	0.403	680	✓	0.681	574	To Do
Kamke 265	✗	0	0	✗	0	0	To Do
Kamke 266	✗	0	0	✓	1.788	57	To Do
Kamke 267	✓	0.039	36	✓	0.028	32	To Do
Kamke 268	✓	1.064	140	✓	0.09	118	To Do
Kamke 269	✗	0	0	✗	0	0	To Do
Kamke 270	✓	4.31	326	✓	0.028	319	To Do
Kamke 271	✓	1.818	372	✓	0.222	352	To Do
Kamke 272	✓	1.787	39	✓	0.172	43	To Do
Kamke 273	✓	0.021	294	✓	0.026	401	To Do
Kamke 274	✓	0.141	396	✓	0.039	657	To Do
Kamke 275	✓	0.219	16	✓	0.091	30	To Do
Kamke 276	✓	0.137	61	✓	0.069	47	To Do
Kamke 277	✓	0.024	53	✓	0.397	41	To Do
Kamke 278	✓	0.267	32	✓	0.061	28	To Do
Kamke 279	✓	1.852	106	✓	0.186	116	To Do
Kamke 280	✓	0.054	20	✓	0.061	24	To Do
Kamke 281	✓	0.092	75	✓	0.092	55	To Do
Kamke 282	✓	0.208	1089	✓	0.303	71	To Do
Kamke 283	✓	0.065	497	✓	0.072	407	To Do
Kamke 284	✓	0.114	59	✓	0.142	21	To Do
Kamke 285	✓	0.049	382	✓	0.086	432	To Do
Kamke 286	✓	0.367	3501	✓	1.233	1337	To Do
Kamke 287	✓	1.913	69	✓	0.081	56	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 288	✓	0.023	518	✓	0.034	579	To Do
Kamke 289	✓	0.04	115	✓	0.04	115	To Do
Kamke 290	✓	0.315	744	✓	0.109	1388	To Do
Kamke 291	✓	1.044	39	✓	0.189	50	To Do
Kamke 292	✓	63.265	760	✓	0.055	115	To Do
Kamke 293	✓	0.11	661	✓	0.419	35	To Do
Kamke 294	✓	0.042	65	✓	0.106	112	To Do
Kamke 295	✓	0.063	30	✓	0.22	29	To Do
Kamke 296	✓	0.613	88	✓	0.821	135	To Do
Kamke 297	✓	0.062	216	✓	0.379	29	To Do
Kamke 298	✓	0.011	72	✓	0.02	73	To Do
Kamke 299	✓	0.022	328	✓	0.238	276	To Do
Kamke 300	✓	0.01	99	✓	0.022	83	To Do
Kamke 301	✓	0.044	64	✓	0.249	25	To Do
Kamke 302	✓	0.021	60	✓	0.192	133	To Do
Kamke 303	✓	0.072	24	✓	0.191	34	To Do
Kamke 304	✓	45.245	45	✓	0.283	44	To Do
Kamke 305	✓	0.108	1211	✓	0.026	21	To Do
Kamke 306	✓	0.055	201	✓	0.42	231	To Do
Kamke 307	✓	0.023	149	✓	0.056	125	To Do
Kamke 308	✓	0.007	48	✓	0.025	37	To Do
Kamke 309	✓	0.014	151	✓	0.045	113	To Do
Kamke 310	✓	0.065	159	✓	0.168	125	To Do
Kamke 311	✓	0.192	2201	✓	0.104	50	To Do
Kamke 312	✓	0.287	190	✓	1.678	240	To Do

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#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 313	✓	0.094	520	✓	0.248	748	To Do
Kamke 314	✓	0.052	164	✓	0.056	158	To Do
Kamke 315	✓	0.134	331	✓	0.104	376	To Do
Kamke 316	✓	0.068	41	✓	0.057	53	To Do
Kamke 317	✓	0.364	23	✓	0.133	29	To Do
Kamke 318	✓	0.161	2353	✓	0.022	28	To Do
Kamke 319	✓	0.026	302	✓	0.039	35	To Do
Kamke 320	✓	0.061	76	✓	0.1	78	To Do
Kamke 321	✓	0.325	42	✓	0.18	42	To Do
Kamke 322	✓	0.216	2097	✓	0.033	29	To Do
Kamke 323	✓	0.05	484	✓	0.143	630	To Do
Kamke 324	✓	0.056	672	✓	0.143	815	To Do
Kamke 325	✓	0.063	133	✓	0.665	124	To Do
Kamke 326	✓	5.326	1	✓	0.519	160	To Do
Kamke 327	✓	0.431	575	✓	0.196	583	To Do
Kamke 328	✓	0.13	35	✓	0.214	33	To Do
Kamke 329	✓	0.43	97	✓	0.385	71	To Do
Kamke 330	✓	46.946	49	✓	0.033	22	To Do
Kamke 331	✗	0	0	✗	0	0	To Do
Kamke 332	✓	0.133	23	✓	0.063	33	To Do
Kamke 333	✓	0.278	53	✓	0.185	32	To Do
Kamke 334	✓	0.038	39	✓	0.1	19	To Do
Kamke 335	✓	0.19	75	✓	0.06	50	To Do
Kamke 336	✓	0.081	43	✓	0.085	41	To Do
Kamke 337	✓	0.062	52	✓	0.302	28	To Do

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#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 338	✓	102.095	1	✓	1.892	129	To Do
Kamke 339	✓	0.131	27	✓	0.466	27	To Do
Kamke 340	✗	0	0	✗	0	0	To Do
Kamke 341	✓	0.054	33	✓	0.318	33	To Do
Kamke 342	✓	0.279	163	✓	0.156	17	To Do
Kamke 343	✓	0.067	22	✓	0.151	27	To Do
Kamke 344	✓	0.021	23	✓	0.119	19	To Do
Kamke 345	✓	0.075	23	✓	0.293	36	To Do
Kamke 346	✓	0.089	20	✓	0.678	19	To Do
Kamke 347	✓	0.133	32	✓	1.312	16	To Do
Kamke 348	✓	0.055	17	✓	0.223	15	To Do
Kamke 349	✓	0.041	15	✓	0.175	17	To Do
Kamke 350	✓	0.621	53	✓	1.27	226	To Do
Kamke 351	✓	0.395	61	✓	0.677	55	To Do
Kamke 352	✓	0.154	32	✓	0.543	33	To Do
Kamke 353	✓	0.021	14	✓	0.642	12	To Do
Kamke 354	✓	0.067	145	✓	0.137	108	To Do
Kamke 355	✓	0.055	17	✓	0.222	15	To Do
Kamke 356	✓	0.073	21	✓	0.216	19	To Do
Kamke 357	✓	0.336	35	✓	0.72	13	To Do
Kamke 358	✓	0.05	29	✓	0.68	11	To Do
Kamke 359	✓	0.061	42	✓	0.15	28	To Do
Kamke 360	✓	55.301	6218	✓	0.686	48	To Do
Kamke 361	✓	0.354	23	✓	0.358	22	To Do
Kamke 362	✓	0.093	20	✓	2.012	23	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 363	✓	0.046	28	✓	0.189	35	To Do
Kamke 364	✓	0.079	27	✓	0.337	23	To Do
Kamke 365	✗	0	0	✓	1.713	42	To Do
Kamke 366	✗	0	0	✓	0.377	45	To Do
Kamke 367	✗	0	0	✗	0	0	To Do
Kamke 368	✗	0	0	✗	0	0	To Do
Kamke 369	✓	0.052	99	✓	0.463	68	To Do
Kamke 370	✗	0	0	✗	0	0	To Do
Kamke 371	✓	0.026	35	✓	0.229	20	To Do
Kamke 372	✓	0.005	27	✓	0.108	232	To Do
Kamke 373	✓	0.101	71	✓	5.012	49	To Do
Kamke 374	✓	0.067	73	✓	0.089	85	To Do
Kamke 375	✓	0.047	68	✓	0.068	49	To Do
Kamke 376	✓	0.339	110	✓	6.309	219	To Do
Kamke 377	✓	0.005	17	✓	0.042	24	To Do
Kamke 378	✓	0.005	13	✓	0.023	20	To Do
Kamke 379	✓	0.005	15	✓	0.02	22	To Do
Kamke 380	✓	0.45	1445	✓	0.096	619	To Do
Kamke 381	✓	0.462	1445	✓	0.09	579	To Do
Kamke 382	✓	0.313	186	✓	0.098	146	To Do
Kamke 383	✗	0	0	✗	0	0	To Do
Kamke 384	✓	2.196	133	✓	0.099	50	To Do
Kamke 385	✗	0	0	✓	0.711	169	To Do
Kamke 386	✓	0.216	56	✓	0.892	27	To Do
Kamke 387	✓	0.91	133	✓	1.761	115	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 388	✓	0.802	41	✓	0.21	223	To Do
Kamke 389	✓	0.046	55	✓	3.801	71	To Do
Kamke 390	✓	2.395	82	✓	1.667	281	To Do
Kamke 391	✓	0.006	29	✓	0.059	22	To Do
Kamke 392	✓	0.27	25	✓	3.054	50	To Do
Kamke 393	✓	0.035	31	✓	0.284	77	To Do
Kamke 394	✗	0	0	✓	9.915	164	To Do
Kamke 395	✗	0	0	✗	0	0	To Do
Kamke 396	✓	0.009	29	✓	0.065	20	To Do
Kamke 397	✓	0.669	136	✓	0.977	128	To Do
Kamke 398	✓	1.086	169	✓	2.724	137	To Do
Kamke 399	✓	0.005	15	✓	0.021	22	To Do
Kamke 400	✗	0	0	✓	0.398	74	To Do
Kamke 401	✓	0.353	1093	✓	0.089	580	To Do
Kamke 402	✗	0	0	✓	0.256	101	To Do
Kamke 403	✓	0.325	116	✓	5.659	197	To Do
Kamke 404	✗	0	0	✓	0.62	389	To Do
Kamke 405	✓	1.357	40	✓	0.545	378	To Do
Kamke 406	✓	1.038	38	✓	0.175	262	To Do
Kamke 407	✓	0.018	41	✓	0.083	39	To Do
Kamke 408	✓	1.066	163	✓	0.136	73	To Do
Kamke 409	✓	30.838	39	✓	0.189	63	To Do
Kamke 410	✓	31.465	40	✓	0.193	64	To Do
Kamke 411	✓	1.132	180	✓	0.125	65	To Do
Kamke 412	✓	29.009	1	✓	0.125	146	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 413	✗	0	0	✓	0.338	269	To Do
Kamke 414	✗	0	0	✓	0.341	269	To Do
Kamke 415	✓	0.235	133	✓	0.582	95	To Do
Kamke 416	✗	0	0	✓	0.118	136	To Do
Kamke 417	✓	0.439	183	✓	0.063	35	To Do
Kamke 418	✓	0.902	158	✓	0.097	42	To Do
Kamke 419	✓	1.588	6977	✓	0.093	109	To Do
Kamke 420	✓	1.85	9391	✓	0.147	689	To Do
Kamke 421	✓	0.034	27	✓	0.065	32	To Do
Kamke 422	✓	0.051	29	✓	0.066	30	To Do
Kamke 423	✓	0.083	51	✓	0.074	44	To Do
Kamke 424	✓	0.665	223	✓	0.308	193	To Do
Kamke 425	✓	0.287	57	✓	0.069	45	To Do
Kamke 426	✓	0.486	150	✓	0.084	51	To Do
Kamke 427	✓	0.714	300	✓	0.07	60	To Do
Kamke 428	✗	0	0	✓	0.144	66	To Do
Kamke 429	✗	0	0	✓	0.144	72	To Do
Kamke 430	✓	274.077	296	✓	2.235	1602	To Do
Kamke 431	✓	0.044	103	✓	0.452	62	To Do
Kamke 432	✓	2.016	49	✓	10.625	242	To Do
Kamke 433	✓	0.605	22	✓	0.405	34	To Do
Kamke 434	✓	0.035	27	✓	0.03	7	To Do
Kamke 435	✓	0.041	55	✓	0.6	22	To Do
Kamke 436	✓	0.038	26	✓	5.81	61	To Do
Kamke 437	✓	0.344	47	✓	0.128	36	To Do

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#	Mathematica			Maple			note on solution
	solved	cpu	leaf	solved	cpu	leaf	
Kamke 438	✓	0.008	21	✓	0.037	17	To Do
Kamke 439	✓	0.016	49	✓	0.132	33	To Do
Kamke 440	✓	0.007	19	✓	0.037	15	To Do
Kamke 441	✓	0.08	59	✓	7.494	83	To Do
Kamke 442	✓	0.01	26	✓	0.04	21	To Do
Kamke 443	✓	0.617	1921	✓	10.76	221	To Do
Kamke 444	✓	0.167	73	✓	7.15	120	To Do
Kamke 445	✓	0.011	49	✓	0.074	35	To Do
Kamke 446	✓	0.568	167	✓	0.134	57	To Do
Kamke 447	✓	0.019	41	✓	0.057	33	To Do
Kamke 448	✓	0.096	88	✓	301.962	166	To Do
Kamke 449	✓	0.011	27	✓	0.045	23	To Do
Kamke 450	✓	0.508	26	✓	1.02	51	To Do
Kamke 451	✗	0	0	✓	0.241	78	To Do
Kamke 452	✗	0	0	✓	2.113	37	To Do
Kamke 453	✓	0.875	369	✓	4.434	229	To Do
Kamke 454	✓	0.18	113	✓	0.318	106	To Do
Kamke 455	✓	0.46	123	✓	1.044	66	To Do
Kamke 456	✓	0.141	61	✓	0.998	33	To Do
Kamke 457	✓	1.371	406	✓	6.479	45	To Do
Kamke 458	✓	0.076	139	✓	0.08	90	To Do
Kamke 459	✓	3.367	241	✓	1.371	65	To Do
Kamke 460	✗	0	0	✗	0	0	To Do
Kamke 461	✗	0	0	✗	0	0	To Do
Kamke 462	✓	0.02	43	✓	0.117	27	To Do

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#	Mathematica			Maple			note on solution
	solved	cpu	leaf	solved	cpu	leaf	
Kamke 463	✓	0.023	47	✓	0.29	50	To Do
Kamke 464	✓	0.074	52	✓	2.278	70	To Do
Kamke 465	✗	0	0	✓	0.164	210	To Do
Kamke 466	✓	0.282	119	✓	1.99	71	To Do
Kamke 467	✗	0	0	✓	0.132	148	To Do
Kamke 468	✗	0	0	✓	0.145	181	To Do
Kamke 469	✓	0.592	245	✓	0.303	264	To Do
Kamke 470	✗	0	0	✓	0.925	87	To Do
Kamke 471	✓	0.011	47	✓	0.078	33	To Do
Kamke 472	✓	0.209	121	✓	2.295	121	To Do
Kamke 473	✓	0.423	137	✓	3.27	71	To Do
Kamke 474	✓	0.263	135	✓	1.901	152	To Do
Kamke 475	✓	0.08	57	✓	2.297	67	To Do
Kamke 476	✗	0	0	✓	0.89	87	To Do
Kamke 477	✓	0.353	136	✓	0.979	622	To Do
Kamke 478	✓	0.197	141	✓	0.36	88	To Do
Kamke 479	✗	0	0	✓	0.444	929	To Do
Kamke 480	✗	0	0	✗	0	0	To Do
Kamke 481	✓	0.013	49	✓	0.083	35	To Do
Kamke 482	✗	0	0	✗	0	0	To Do
Kamke 483	✓	0.187	69	✓	0.148	103	To Do
Kamke 484	✓	0.179	79	✓	0.148	115	To Do
Kamke 485	✗	0	0	✗	0	0	To Do
Kamke 486	✓	0.032	89	✓	0.311	54	To Do
Kamke 487	✗	0	0	✓	0.81	100	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 488	✓	0.419	85	✓	1.032	111	To Do
Kamke 489	✗	0	0	✓	4.255	551	To Do
Kamke 490	✓	0.677	63	✓	1.035	145	To Do
Kamke 491	✓	1.181	65	✓	1.466	195	To Do
Kamke 492	✓	0.309	111	✓	3.062	122	To Do
Kamke 493	✓	10.589	393	✓	1.814	111	To Do
Kamke 494	✗	0	0	✓	0.338	161	To Do
Kamke 495	✓	0.177	79	✓	4.303	61	To Do
Kamke 496	✓	96.096	53	✓	0.603	130	To Do
Kamke 497	✓	0.2	203	✓	1.111	203	To Do
Kamke 498	✓	0.121	107	✓	1.844	99	To Do
Kamke 499	✓	0.339	126	✓	0.361	189	To Do
Kamke 500	✓	1.528	86	✓	1.695	220	To Do
Kamke 501	✓	37.135	613	✓	8.695	215	To Do
Kamke 502	✓	2.006	71	✓	1.055	195	To Do
Kamke 503	✗	0	0	✗	0	0	To Do
Kamke 504	✗	0	0	✓	1.739	247	To Do
Kamke 505	✓	0.02	73	✓	0.096	52	To Do
Kamke 506	✗	0	0	✗	0	0	To Do
Kamke 507	✓	32.699	408	✗	0	0	To Do
Kamke 508	✗	0	0	✓	2.657	60	To Do
Kamke 509	✗	0	0	✓	2.011	212	To Do
Kamke 510	✗	0	0	✗	0	0	To Do
Kamke 511	✓	2.015	225	✓	9.744	199	To Do
Kamke 512	✓	6.255	713	✓	10.134	135	To Do

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#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 513	✗	0	0	✓	5.087	1134	To Do
Kamke 514	✓	17.754	605	✓	1.559	87	To Do
Kamke 515	✗	0	0	✓	5.88	113	To Do
Kamke 516	✓	4.262	229	✓	3.192	139	To Do
Kamke 517	✓	4.472	253	✓	3.203	157	To Do
Kamke 518	✓	0.919	236	✓	0.363	126	To Do
Kamke 519	✓	2.265	473	✓	2.371	197	To Do
Kamke 520	✓	237.16	3323	✓	0.276	245	To Do
Kamke 521	✓	0.007	14	✓	0.066	33	To Do
Kamke 522	✓	0.007	17	✓	0.079	44	To Do
Kamke 523	✗	0	0	✓	0.092	231	To Do
Kamke 524	✗	0	0	✓	0.218	270	To Do
Kamke 525	✓	8.382	121	✓	0.19	122	To Do
Kamke 526	✓	0.949	43	✓	0.077	32	To Do
Kamke 527	✗	0	0	✓	1.056	43	To Do
Kamke 528	✗	0	0	✓	0.219	86	To Do
Kamke 529	✓	64.643	1484	✓	0.129	1251	To Do
Kamke 530	✗	0	0	✓	0.165	370	To Do
Kamke 531	✗	0	0	✗	0	0	To Do
Kamke 532	✗	0	0	✓	0.37	944	To Do
Kamke 533	✗	0	0	✓	0.04	76	To Do
Kamke 534	✗	0	0	✓	0.163	84	To Do
Kamke 535	✗	0	0	✓	0.139	51	To Do
Kamke 536	✓	0.028	64	✓	0.094	52	To Do
Kamke 537	✗	0	0	✗	0	0	To Do

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#	Mathematica			Maple			note on solution
	solved	cpu	leaf	solved	cpu	leaf	
Kamke 538	✗	0	0	✓	5.689	1532	To Do
Kamke 539	✓	0.041	45	✓	0.451	32	To Do
Kamke 540	✓	0.022	61	✓	0.147	109	To Do
Kamke 541	✗	0	0	✓	1.383	103	To Do
Kamke 542	✗	0	0	✓	0.59	107	To Do
Kamke 543	✗	0	0	✓	1.73	277	To Do
Kamke 544	✗	0	0	✓	1.227	4201	To Do
Kamke 545	✓	0.783	383	✓	0.365	144	To Do
Kamke 546	✗	0	0	✓	0.211	171	To Do
Kamke 547	✓	1.946	321	✓	0.46	118	To Do
Kamke 548	✓	1.14	569	✓	0.592	250	To Do
Kamke 549	✓	0.468	360	✓	0.285	553	To Do
Kamke 550	✗	0	0	✓	0.569	60	To Do
Kamke 551	✓	0.409	79	✓	0.893	55	To Do
Kamke 552	✓	0.198	39	✓	0.106	43	To Do
Kamke 553	✓	0.201	51	✓	0.056	36	To Do
Kamke 554	✓	0.13	44	✓	0.418	32	To Do
Kamke 555	✗	0	0	✓	0.025	15	To Do
Kamke 556	✓	7.632	50	✓	0.485	581	To Do
Kamke 557	✓	0.019	37	✓	0.227	74	To Do
Kamke 558	✓	0.869	369	✓	0.246	223	To Do
Kamke 559	✓	0.354	126	✓	0.394	215	To Do
Kamke 560	✓	24.656	86	✓	1.208	1120	To Do
Kamke 561	✗	0	0	✓	2.638	50	To Do
Kamke 562	✗	0	0	✓	0.171	3306	To Do

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#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 563	✓	0.171	52	✓	0.157	66	To Do
Kamke 564	✓	0.057	21	✓	0.024	32	To Do
Kamke 565	✓	0.014	24	✓	0.18	17	To Do
Kamke 566	✗	0	0	✓	0.077	16	To Do
Kamke 567	✗	0	0	✓	0.03	18	To Do
Kamke 568	✓	0.056	27	✓	0.165	32	To Do
Kamke 569	✓	0.044	59	✓	1.012	147	To Do
Kamke 570	✗	0	0	✓	0.065	30	To Do
Kamke 571	✓	0.125	67	✓	0.421	169	To Do
Kamke 572	✗	0	0	✗	0	0	To Do
Kamke 573	✓	0.015	42	✓	0.2	16	To Do
Kamke 574	✓	0.016	62	✓	0.15	41	To Do
Kamke 575	✗	0	0	✗	0	0	To Do
Kamke 576	✗	0	0	✗	0	0	To Do
Kamke 577	✓	17.245	141	✓	0.053	28	To Do
Kamke 578	✓	22.408	88	✓	0.137	22	To Do
Kamke 579	✓	17.894	162	✓	0.135	35	To Do
Kamke 580	✓	34.78	161	✓	0.215	31	To Do
Kamke 581	✓	52.427	107	✓	0.102	32	To Do
Kamke 582	✓	23.817	103	✓	0.234	30	To Do
Kamke 583	✓	56.566	111	✓	0.154	31	To Do
Kamke 584	✓	26.655	107	✓	0.072	35	To Do
Kamke 585	✓	166.81	141	✓	0.679	122	To Do
Kamke 586	✓	181.076	395	✓	0.278	39	To Do
Kamke 587	✓	264.88	109	✓	0.158	29	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 588	✓	41.61	99	✓	0.133	53	To Do
Kamke 589	✓	26.718	118	✓	0.161	38	To Do
Kamke 590	✓	41.438	91	✓	0.155	28	To Do
Kamke 591	✓	26.763	160	✓	0.219	108	To Do
Kamke 592	✗	0	0	✓	0.204	33	To Do
Kamke 593	✓	38.131	149	✓	0.375	35	To Do
Kamke 594	✓	24.728	188	✓	0.227	67	To Do
Kamke 595	✓	25.745	127	✓	0.165	72	To Do
Kamke 596	✓	252.776	103	✓	0.098	26	To Do
Kamke 597	✓	36.2	112	✓	0.453	37	To Do
Kamke 598	✓	0.11	35	✓	0.024	29	To Do
Kamke 599	✓	30.937	92	✓	0.11	57	To Do
Kamke 600	✓	28.752	119	✓	0.238	38	To Do
Kamke 601	✓	43.971	116	✓	0.143	61	To Do
Kamke 602	✓	249.048	111	✓	0.144	33	To Do
Kamke 603	✓	22.77	102	✓	0.149	27	To Do
Kamke 604	✓	31.68	97	✓	0.163	30	To Do
Kamke 605	✓	223.991	103	✓	0.138	29	To Do
Kamke 606	✓	84.612	180	✓	0.944	34	To Do
Kamke 607	✗	0	0	✓	0.102	22	To Do
Kamke 608	✗	0	0	✓	0.213	40	To Do
Kamke 609	✓	65.881	107	✓	0.182	22	To Do
Kamke 610	✓	0.082	24	✓	0.014	20	To Do
Kamke 611	✓	50.118	116	✓	0.09	28	To Do
Kamke 612	✓	60.557	169	✓	0.16	27	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 613	✗	0	0	✓	0.112	23	To Do
Kamke 614	✓	91.371	144	✓	0.464	60	To Do
Kamke 615	✓	20.792	74	✓	0.135	26	To Do
Kamke 616	✓	60.828	126	✓	0.094	26	To Do
Kamke 617	✓	285.052	302	✓	0.304	47	To Do
Kamke 618	✓	0.102	25	✓	0.481	34	To Do
Kamke 619	✓	270.489	195	✓	0.535	81	To Do
Kamke 620	✗	0	0	✓	0.307	37	To Do
Kamke 621	✓	0.104	445	✓	0.324	59	To Do
Kamke 622	✓	0.479	140	✓	0.325	77	To Do
Kamke 623	✓	0.22	77	✓	0.408	49	To Do
Kamke 624	✓	55.363	1	✓	2.204	46	To Do
Kamke 625	✓	0.322	67	✓	0.354	53	To Do
Kamke 626	✓	0.253	88	✓	0.621	115	To Do
Kamke 627	✓	1.08	25	✓	0.822	35	To Do
Kamke 628	✓	0.086	32	✓	0.493	23	To Do
Kamke 629	✓	0.806	38	✓	0.226	62	To Do
Kamke 630	✓	0.625	101	✓	0.329	98	To Do
Kamke 631	✓	0.094	31	✓	0.218	23	To Do
Kamke 632	✓	0.215	65	✓	0.266	54	To Do
Kamke 633	✓	0.244	85	✓	0.941	52	To Do
Kamke 634	✓	0.191	31	✓	0.248	26	To Do
Kamke 635	✓	0.128	33	✓	0.178	22	To Do
Kamke 636	✓	0.054	24	✓	0.168	19	To Do
Kamke 637	✓	16.155	53	✓	3.133	84	To Do

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#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 638	✗	0	0	✓	0.171	35	To Do
Kamke 639	✗	0	0	✓	0.201	48	To Do
Kamke 640	✗	0	0	✓	0.332	47	To Do
Kamke 641	✓	0.185	33	✓	0.209	26	To Do
Kamke 642	✓	0.141	95	✓	0.275	286	To Do
Kamke 643	✓	0.123	31	✓	0.183	22	To Do
Kamke 644	✓	0.286	34	✓	0.365	27	To Do
Kamke 645	✓	0.053	20	✓	0.1	14	To Do
Kamke 646	✓	0.191	35	✓	0.258	23	To Do
Kamke 647	✓	0.417	117	✓	0.355	460	To Do
Kamke 648	✓	0.362	96	✓	0.669	41	To Do
Kamke 649	✓	0.182	36	✓	0.21	27	To Do
Kamke 650	✓	0.248	39	✓	0.234	28	To Do
Kamke 651	✓	0.034	15	✓	0.077	13	To Do
Kamke 652	✓	2.002	103	✓	0.197	27	To Do
Kamke 653	✓	0.187	31	✓	0.173	24	To Do
Kamke 654	✓	0.18	37	✓	0.25	23	To Do
Kamke 655	✓	20.302	79	✓	0.659	66	To Do
Kamke 656	✓	0.042	20	✓	0.076	15	To Do
Kamke 657	✓	0.195	37	✓	0.213	26	To Do
Kamke 658	✓	0.257	46	✓	0.306	28	To Do
Kamke 659	✓	0.45	51	✓	0.271	41	To Do
Kamke 660	✓	0.273	42	✓	0.231	29	To Do
Kamke 661	✓	0.465	54	✓	0.221	39	To Do
Kamke 662	✓	0.206	37	✓	0.214	26	To Do

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#	Mathematica			Maple			note on solution
	solved	cpu	leaf	solved	cpu	leaf	
Kamke 663	✓	2.324	103	✓	0.183	27	To Do
Kamke 664	✓	0.198	34	✓	0.194	25	To Do
Kamke 665	✓	0.317	39	✓	0.532	28	To Do
Kamke 666	✓	0.073	29	✓	0.165	24	To Do
Kamke 667	✓	1.136	84	✓	0.236	82	To Do
Kamke 668	✓	0.644	59	✓	0.754	58	To Do
Kamke 669	✓	0.857	222	✓	0.22	72	To Do
Kamke 670	✓	0.503	83	✓	0.365	70	To Do
Kamke 671	✓	0.403	162	✓	0.233	237	To Do
Kamke 672	✗	0	0	✓	0.317	36	To Do
Kamke 673	✓	0.101	23	✓	0.485	17	To Do
Kamke 674	✓	0.242	32	✓	0.296	27	To Do
Kamke 675	✓	0.055	45	✓	0.074	37	To Do
Kamke 676	✓	0.334	120	✓	0.543	43	To Do
Kamke 677	✓	0.036	51	✓	0.053	48	To Do
Kamke 678	✓	0.285	90	✓	0.314	37	To Do
Kamke 679	✓	0.041	44	✓	0.056	37	To Do
Kamke 680	✓	0.243	39	✓	0.295	28	To Do
Kamke 681	✓	0.045	54	✓	0.067	45	To Do
Kamke 682	✓	0.128	33	✓	0.331	28	To Do
Kamke 683	✓	0.655	72	✓	0.197	152	To Do
Kamke 684	✓	0.026	18	✓	3.446	30	To Do
Kamke 685	✓	0.04	62	✓	0.187	48	To Do
Kamke 686	✓	15.877	49	✓	2.537	85	To Do
Kamke 687	✓	0.069	111	✓	0.174	39	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 688	✓	0.121	45	✓	0.098	42	To Do
Kamke 689	✓	0.079	55	✓	0.062	25	To Do
Kamke 690	✓	0.419	106	✓	0.342	40	To Do
Kamke 691	✓	0.09	21	✓	0.719	17	To Do
Kamke 692	✓	0.029	18	✓	2.707	30	To Do
Kamke 693	✓	0.221	143	✓	0.134	40	To Do
Kamke 694	✓	0.304	43	✓	0.309	30	To Do
Kamke 695	✓	0.08	34	✓	0.061	39	To Do
Kamke 696	✗	0	0	✓	0.073	32	To Do
Kamke 697	✓	0.16	112	✓	0.118	40	To Do
Kamke 698	✓	0.172	104	✓	0.093	34	To Do
Kamke 699	✓	0.27	90	✓	0.302	36	To Do
Kamke 700	✓	0.069	72	✓	0.122	62	To Do
Kamke 701	✗	0	0	✓	6.424	71	To Do
Kamke 702	✗	0	0	✓	0.1	35	To Do
Kamke 703	✗	0	0	✓	0.531	44	To Do
Kamke 704	✗	0	0	✓	0.067	38	To Do
Kamke 705	✓	0.063	30	✓	0.21	24	To Do
Kamke 706	✗	0	0	✓	0.517	65	To Do
Kamke 707	✗	0	0	✓	0.555	105	To Do
Kamke 708	✓	0.341	82	✓	37.689	229	To Do
Kamke 709	✓	6.048	143	✓	0.301	39	To Do
Kamke 710	✗	0	0	✓	2.651	31	To Do
Kamke 711	✓	0.081	24	✓	0.148	31	To Do
Kamke 712	✓	0.317	102	✓	0.399	38	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 713	✓	0.137	607	✓	0.453	86	To Do
Kamke 714	✗	0	0	✓	2.726	96	To Do
Kamke 715	✓	0.305	89	✓	0.298	39	To Do
Kamke 716	✓	6.285	133	✓	0.354	37	To Do
Kamke 717	✓	0.368	44	✓	0.42	33	To Do
Kamke 718	✓	0.174	123	✓	0.082	44	To Do
Kamke 719	✓	0.132	44	✓	0.265	57	To Do
Kamke 720	✓	6.494	272	✓	0.26	48	To Do
Kamke 721	✓	0.023	27	✓	0.092	19	To Do
Kamke 722	✓	92.894	490	✓	0.355	70	To Do
Kamke 723	✓	0.081	672	✓	0.083	856	To Do
Kamke 724	✓	78.018	422	✓	0.056	18	To Do
Kamke 725	✓	0.35	19	✓	0.964	25	To Do
Kamke 726	✓	0.095	607	✓	0.315	83	To Do
Kamke 727	✓	0.576	29	✓	0.515	25	To Do
Kamke 728	✓	0.485	72	✓	0.351	50	To Do
Kamke 729	✓	0.41	315	✓	0.11	404	To Do
Kamke 730	✗	0	0	✓	2.064	41	To Do
Kamke 731	✓	0.347	42	✓	0.182	42	To Do
Kamke 732	✓	0.549	105	✓	0.396	43	To Do
Kamke 733	✗	0	0	✗	0	0	To Do
Kamke 734	✓	0.133	37	✓	0.154	39	To Do
Kamke 735	✗	0	0	✓	0.076	78	To Do
Kamke 736	✓	0.119	30	✓	0.2	43	To Do
Kamke 737	✓	0.037	36	✓	0.091	29	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 738	✓	0.601	1200	✓	0.868	1054	To Do
Kamke 739	✓	0.372	34	✓	0.181	35	To Do
Kamke 740	✓	0.075	74	✓	0.107	72	To Do
Kamke 741	✓	3.971	172	✓	1.056	246	To Do
Kamke 742	✓	5.982	221	✓	1.905	239	To Do
Kamke 743	✗	0	0	✓	0.509	264	To Do
Kamke 744	✓	0.058	534	✓	0.224	621	To Do
Kamke 745	✗	0	0	✓	0.074	78	To Do
Kamke 746	✗	0	0	✓	0.485	232	To Do
Kamke 747	✗	0	0	✓	0.564	75	To Do
Kamke 748	✓	0.413	286	✓	0.106	404	To Do
Kamke 749	✓	0.117	102	✓	0.155	192	To Do
Kamke 750	✓	0.417	68	✓	0.325	49	To Do
Kamke 751	✓	0.09	29	✓	0.118	26	To Do
Kamke 752	✗	0	0	✓	1.526	723	To Do
Kamke 753	✓	0.146	41	✓	0.186	38	To Do
Kamke 754	✓	0.034	47	✓	0.02	26	To Do
Kamke 755	✓	0.222	2213	✓	0.11	44	To Do
Kamke 756	✓	0.11	93	✓	0.036	37	To Do
Kamke 757	✓	0.036	33	✓	0.068	26	To Do
Kamke 758	✓	1.17	459	✓	0.238	41	To Do
Kamke 759	✗	0	0	✓	0.655	305	To Do
Kamke 760	✓	2.383	85	✓	1.388	137	To Do
Kamke 761	✓	0.03	26	✓	0.066	18	To Do
Kamke 762	✓	0.072	26	✓	0.114	22	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 763	✓	0.071	21	✓	0.106	14	To Do
Kamke 764	✓	0.11	46	✓	0.125	36	To Do
Kamke 765	✗	0	0	✓	0.236	106	To Do
Kamke 766	✗	0	0	✓	0.258	89	To Do
Kamke 767	✓	0.028	35	✓	0.069	26	To Do
Kamke 768	✓	1.117	66	✓	0.127	26	To Do
Kamke 769	✗	0	0	✓	0.49	251	To Do
Kamke 770	✓	0.151	687	✓	0.141	1105	To Do
Kamke 771	✓	0.035	48	✓	0.148	84	To Do
Kamke 772	✓	0.069	21	✓	0.125	18	To Do
Kamke 773	✓	0.079	59	✓	0.305	48	To Do
Kamke 774	✓	0.032	46	✓	0.105	51	To Do
Kamke 775	✓	0.107	943	✓	0.096	44	To Do
Kamke 776	✗	0	0	✓	1.05	96	To Do
Kamke 777	✓	0.143	34	✓	0.145	51	To Do
Kamke 778	✓	0.092	95	✓	0.029	37	To Do
Kamke 779	✓	0.048	51	✓	0.105	50	To Do
Kamke 780	✓	0.027	15	✓	0.451	27	To Do
Kamke 781	✓	0.559	82	✓	0.345	61	To Do
Kamke 782	✗	0	0	✓	2.376	96	To Do
Kamke 783	✗	0	0	✓	0.311	75	To Do
Kamke 784	✗	0	0	✓	30.444	24	To Do
Kamke 785	✗	0	0	✓	88.591	24	To Do
Kamke 786	✗	0	0	✓	0.078	33	To Do
Kamke 787	✓	36.827	488	✓	0.485	191	To Do

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#	Mathematica			Maple			note on solution
	solved	cpu	leaf	solved	cpu	leaf	
Kamke 788	✗	0	0	✓	0.713	108	To Do
Kamke 789	✗	0	0	✗	0	0	To Do
Kamke 790	✗	0	0	✗	0	0	To Do
Kamke 791	✗	0	0	✓	22.337	306	To Do
Kamke 792	✗	0	0	✓	0.711	112	To Do
Kamke 793	✓	20.832	399	✓	0.182	32	To Do
Kamke 794	✓	0.112	66	✓	3.16	32	To Do
Kamke 795	✓	0.267	106	✓	0.028	37	To Do
Kamke 796	✓	17.129	103	✓	1.164	143	To Do
Kamke 797	✓	2.641	146	✓	0.446	252	To Do
Kamke 798	✓	0.712	25	✓	0.148	30	To Do
Kamke 799	✓	0.497	50	✓	0.398	147	To Do
Kamke 800	✓	0.267	118	✓	0.027	41	To Do
Kamke 801	✓	0.146	124	✓	0.069	63	To Do
Kamke 802	✓	0.087	88	✓	0.119	27	To Do
Kamke 803	✓	0.101	234	✓	0.488	65	To Do
Kamke 804	✓	0.656	43	✓	1.263	38	To Do
Kamke 805	✓	0.559	35	✓	0.671	42	To Do
Kamke 806	✓	0.251	22	✓	0.699	22	To Do
Kamke 807	✗	0	0	✓	0.719	43	To Do
Kamke 808	✓	1.801	149	✓	0.106	45	To Do
Kamke 809	✓	0.239	118	✓	0.024	41	To Do
Kamke 810	✓	0.019	18	✓	0.047	16	To Do
Kamke 811	✓	2.527	29	✓	2.411	32	To Do
Kamke 812	✓	0.383	76	✓	0.272	30	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 813	✓	0.566	64	✓	0.592	40	To Do
Kamke 814	✓	0.018	70	✓	0.042	38	To Do
Kamke 815	✓	18.185	100	✓	0.829	168	To Do
Kamke 816	✓	0.172	72	✓	0.925	190	To Do
Kamke 817	✓	0.428	59	✓	0.77	27	To Do
Kamke 818	✓	0.083	34	✓	0.148	34	To Do
Kamke 819	✓	0.266	63	✓	0.25	30	To Do
Kamke 820	✓	0.378	59	✓	0.738	27	To Do
Kamke 821	✓	0.18	1993	✓	0.159	27	To Do
Kamke 822	✓	0.048	32	✓	0.127	25	To Do
Kamke 823	✓	0.477	35	✓	0.139	38	To Do
Kamke 824	✓	0.094	66	✓	0.424	61	To Do
Kamke 825	✓	0.306	144	✓	0.111	48	To Do
Kamke 826	✓	0.694	70	✓	0.343	51	To Do
Kamke 827	✓	0.135	93	✓	0.243	49	To Do
Kamke 828	✓	0.408	46	✓	0.297	54	To Do
Kamke 829	✓	0.452	81	✓	0.312	34	To Do
Kamke 830	✓	0.547	34	✓	0.141	38	To Do
Kamke 831	✓	5.101	79	✓	0.369	35	To Do
Kamke 832	✓	3.631	2405	✓	0.203	31	To Do
Kamke 833	✓	0.14	87	✓	0.183	49	To Do
Kamke 834	✓	0.847	90	✓	0.347	60	To Do
Kamke 835	✗	0	0	✗	0	0	To Do
Kamke 836	✓	17.295	379	✓	0.229	73	To Do
Kamke 837	✗	0	0	✗	0	0	To Do

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#	Mathematica			Maple			note on solution
	solved	cpu	leaf	solved	cpu	leaf	
Kamke 838	✓	0.033	29	✓	0.11	25	To Do
Kamke 839	✓	0.084	28	✓	0.079	19	To Do
Kamke 840	✓	0.099	28	✓	0.07	19	To Do
Kamke 841	✓	1.474	208	✓	0.338	97	To Do
Kamke 842	✓	0.152	44	✓	0.027	43	To Do
Kamke 843	✓	0.139	44	✓	0.027	43	To Do
Kamke 844	✓	19.83	386	✓	0.205	97	To Do
Kamke 845	✓	5.833	218	✓	0.261	44	To Do
Kamke 846	✓	1.56	174	✓	0.201	40	To Do
Kamke 847	✓	0.422	69	✓	0.295	34	To Do
Kamke 848	✓	0.126	91	✓	0.643	27	To Do
Kamke 849	✓	0.381	73	✓	0.286	33	To Do
Kamke 850	✓	0.236	114	✓	1.313	32	To Do
Kamke 851	✓	0.227	136	✓	0.073	42	To Do
Kamke 852	✓	0.216	136	✓	0.075	42	To Do
Kamke 853	✓	0.021	75	✓	0.044	63	To Do
Kamke 854	✗	0	0	✓	0.229	51	To Do
Kamke 855	✗	0	0	✓	0.214	51	To Do
Kamke 856	✓	1.073	100	✓	0.307	65	To Do
Kamke 857	✓	0.4	77	✓	0.29	32	To Do
Kamke 858	✓	0.222	136	✓	0.073	42	To Do
Kamke 859	✓	1.528	102	✓	0.29	63	To Do
Kamke 860	✓	0.175	35	✓	2.414	29	To Do
Kamke 861	✓	2.047	137	✓	0.187	26	To Do
Kamke 862	✗	0	0	✓	0.231	27	To Do

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#	Mathematica			Maple			note on solution
	solved	cpu	leaf	solved	cpu	leaf	
Kamke 863	✓	0.04	26	✓	5.871	38	To Do
Kamke 864	✓	0.047	98	✓	0.097	162	To Do
Kamke 865	✗	0	0	✓	0.229	23	To Do
Kamke 866	✓	0.565	85	✓	0.362	37	To Do
Kamke 867	✓	0.082	75	✓	0.07	30	To Do
Kamke 868	✓	0.062	77	✓	0.066	28	To Do
Kamke 869	✓	0.041	42	✓	0.1	37	To Do
Kamke 870	✓	1.887	32	✓	1.105	30	To Do
Kamke 871	✓	0.03	22	✓	0.08	26	To Do
Kamke 872	✓	0.051	92	✓	0.07	49	To Do
Kamke 873	✓	0.719	48	✓	0.264	50	To Do
Kamke 874	✓	0.1	95	✓	0.05	40	To Do
Kamke 875	✓	0.33	213	✓	0.279	73	To Do
Kamke 876	✓	0.021	89	✓	0.053	41	To Do
Kamke 877	✓	0.019	47	✓	0.051	73	To Do
Kamke 878	✓	0.338	128	✗	0	0	To Do
Kamke 879	✓	0.174	109	✓	0.24	55	To Do
Kamke 880	✓	0.171	126	✓	0.085	41	To Do
Kamke 881	✓	0.021	57	✓	0.055	77	To Do
Kamke 882	✓	0.103	106	✓	0.062	41	To Do
Kamke 883	✓	1.638	159	✓	0.753	352	To Do
Kamke 884	✓	0.624	71	✓	0.379	107	To Do
Kamke 885	✗	0	0	✗	0	0	To Do
Kamke 886	✓	0.077	79	✓	0.035	42	To Do
Kamke 887	✓	0.029	91	✓	0.059	72	To Do

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#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 888	✓	0.021	67	✓	0.063	79	To Do
Kamke 889	✗	0	0	✓	1.322	49	To Do
Kamke 890	✓	0.167	103	✓	1.057	34	To Do
Kamke 891	✓	0.027	86	✓	0.065	56	To Do
Kamke 892	✗	0	0	✓	0.653	40	To Do
Kamke 893	✓	0.084	77	✓	0.034	41	To Do
Kamke 894	✗	0	0	✗	0	0	To Do
Kamke 895	✓	0.028	63	✓	0.068	79	To Do
Kamke 896	✓	0.259	102	✓	0.832	63	To Do
Kamke 897	✓	0.029	65	✓	0.086	87	To Do
Kamke 898	✓	0.026	95	✓	0.05	87	To Do
Kamke 899	✓	0.106	101	✓	0.041	47	To Do
Kamke 900	✓	0.105	381	✓	0.079	48	To Do
Kamke 901	✓	0.164	29	✓	0.546	30	To Do
Kamke 902	✓	0.118	195	✓	0.271	183	To Do
Kamke 903	✓	0.056	19	✓	0.083	48	To Do
Kamke 904	✓	0.065	23	✓	0.052	64	To Do
Kamke 905	✓	0.089	83	✓	0.053	46	To Do
Kamke 906	✓	0.062	326	✓	0.368	37	To Do
Kamke 907	✓	0.057	21	✓	0.164	20	To Do
Kamke 908	✓	1.716	1003	✓	0.458	1742	To Do
Kamke 909	✗	0	0	✗	0	0	To Do
Kamke 910	✓	0.1	95	✓	0.036	42	To Do
Kamke 911	✓	4.025	53	✓	0.587	30	To Do
Kamke 912	✓	1.767	199	✗	0	0	To Do

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#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 913	✗	0	0	✓	0.075	43	To Do
Kamke 914	✓	1.845	401	✓	3.481	71	To Do
Kamke 915	✗	0	0	✓	0.075	43	To Do
Kamke 916	✗	0	0	✓	0.352	73	To Do
Kamke 917	✗	0	0	✓	0.24	38	To Do
Kamke 918	✗	0	0	✓	1.508	41	To Do
Kamke 919	✗	0	0	✓	0.232	61	To Do
Kamke 920	✓	0.261	301	✗	0	0	To Do
Kamke 921	✓	3.076	47	✓	0.277	30	To Do
Kamke 922	✗	0	0	✓	0.257	47	To Do
Kamke 923	✗	0	0	✓	0.296	36	To Do
Kamke 924	✓	1.058	53	✓	0.154	46	To Do
Kamke 925	✗	0	0	✓	0.299	38	To Do
Kamke 926	✓	0.03	77	✓	0.077	67	To Do
Kamke 927	✓	0.154	100	✓	0.134	68	To Do
Kamke 928	✓	1.527	22	✓	0.441	20	To Do
Kamke 929	✗	0	0	✓	0.052	42	To Do
Kamke 930	✓	1.771	38	✓	0.664	36	To Do
Kamke 931	✓	0.026	53	✓	0.052	73	To Do
Kamke 932	✗	0	0	✓	0.171	54	To Do
Kamke 933	✓	0.103	93	✓	0.05	39	To Do
Kamke 934	✓	0.135	101	✓	0.086	39	To Do
Kamke 935	✓	21.91	117	✓	0.232	55	To Do
Kamke 936	✓	0.126	85	✓	0.086	39	To Do
Kamke 937	✓	0.029	57	✓	0.07	79	To Do

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#	Mathematica			Maple			note on solution
	solved	cpu	leaf	solved	cpu	leaf	
Kamke 938	✓	0.099	101	✓	0.041	39	To Do
Kamke 939	✓	0.452	137	✓	0.146	70	To Do
Kamke 940	✓	0.023	49	✓	0.058	63	To Do
Kamke 941	✓	0.405	53	✓	0.061	35	To Do
Kamke 942	✗	0	0	✓	0.663	43	To Do
Kamke 943	✓	0.451	53	✓	0.065	40	To Do
Kamke 944	✓	1.808	233	✓	0.097	47	To Do
Kamke 945	✓	1.385	213	✓	0.079	41	To Do
Kamke 946	✓	0.088	75	✓	0.187	85	To Do
Kamke 947	✓	0.117	28	✓	0.288	44	To Do
Kamke 948	✓	0.381	39	✓	0.209	68	To Do
Kamke 949	✓	0.023	55	✓	0.058	81	To Do
Kamke 950	✓	0.215	138	✓	0.109	42	To Do
Kamke 951	✓	0.193	137	✓	0.095	41	To Do
Kamke 952	✓	0.15	141	✓	0.382	62	To Do
Kamke 953	✗	0	0	✓	0.416	145	To Do
Kamke 954	✓	0.118	108	✓	0.095	53	To Do
Kamke 955	✓	0.144	73	✓	0.113	101	To Do
Kamke 956	✓	0.232	28	✓	0.096	79	To Do
Kamke 957	✓	0.222	28	✓	0.061	79	To Do
Kamke 958	✓	0.089	80	✓	0.051	40	To Do
Kamke 959	✓	0.048	20	✓	0.085	15	To Do
Kamke 960	✓	0.041	14	✓	0.057	11	To Do
Kamke 961	✗	0	0	✓	0.453	45	To Do
Kamke 962	✓	7.264	1191	✓	2.286	79	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 963	✓	0.152	101	✓	0.251	39	To Do
Kamke 964	✓	6.275	247	✓	3.786	80	To Do
Kamke 965	✓	0.064	29	✓	0.075	26	To Do
Kamke 966	✓	0.557	292	✓	0.749	50	To Do
Kamke 967	✓	0.185	143	✓	0.1	91	To Do
Kamke 968	✓	0.092	30	✓	0.088	22	To Do
Kamke 969	✓	0.063	19	✓	0.093	15	To Do
Kamke 970	✓	0.567	66	✓	0.879	181	To Do
Kamke 971	✓	0.188	124	✓	0.332	86	To Do
Kamke 972	✓	0.028	32	✓	0.11	27	To Do
Kamke 973	✓	0.23	143	✓	0.39	136	To Do
Kamke 974	✓	0.012	39	✓	0.045	57	To Do
Kamke 975	✓	0.013	47	✓	0.048	59	To Do
Kamke 976	✓	0.107	101	✓	0.283	57	To Do
Kamke 977	✓	0.255	135	✓	0.233	122	To Do
Kamke 978	✓	0.087	58	✓	0.183	71	To Do
Kamke 979	✓	0.014	37	✓	0.053	57	To Do
Kamke 980	✓	0.016	44	✓	0.02	35	To Do
Kamke 981	✓	0.02	49	✓	0.028	41	To Do
Kamke 982	✓	0.159	130	✓	0.468	145	To Do
Kamke 983	✓	0.522	176	✓	0.317	233	To Do
Kamke 984	✓	6.396	341	✓	0.308	40	To Do
Kamke 985	✓	0.266	96	✓	0.045	43	To Do
Kamke 986	✓	0.016	41	✓	0.029	36	To Do
Kamke 987	✓	0.101	34	✓	0.056	22	To Do

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#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 988	✓	0.286	77	✓	0.047	29	To Do
Kamke 989	✓	0.11	44	✓	0.047	29	To Do
Kamke 990	✓	0.477	48	✓	0.515	44	To Do
Kamke 991	✓	0.26	75	✓	0.039	29	To Do
Kamke 992	✓	0.11	36	✓	0.043	25	To Do
Kamke 993	✗	0	0	✓	0.027	35	To Do
Kamke 994	✓	0.137	44	✓	0.027	43	To Do
Kamke 995	✓	0.018	17	✓	0.132	14	To Do
Kamke 996	✗	0	0	✓	0.074	15	To Do
Kamke 997	✓	0.033	18	✓	0.067	16	To Do
Kamke 998	✓	0.466	26	✓	0.575	27	To Do
Kamke 999	✓	0.026	24	✓	0.064	36	To Do
Kamke 1000	✗	0	0	✓	0.163	19	To Do
Kamke 1001	✓	0.005	12	✓	0.004	9	Linear second order, homogeneous, constant coefficient. First problem. Direct integration
Kamke 1002	✓	0.005	16	✓	0.005	13	Linear second order, homogeneous, constant coefficient. Direct method
Kamke 1003	✓	0.145	29	✓	0.082	26	Linear second order, Non-homogeneous, constant coefficient. variation of parameters
Kamke 1004	✓	0.107	30	✓	0.051	27	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 1005	✓	0.591	159	✓	0.115	82	Linear second order, Non-homogeneous, constant coefficient. variation of parameters
Kamke 1006	✓	0.005	20	✓	0.008	15	Linear second order, homogeneous, constant coefficient
Kamke 1007	✓	0.074	36	✓	0.054	26	Linear second order, Non-homogeneous, constant coefficient. variation of parameters
Kamke 1008	✓	0.045	46	✓	0.088	41	To Do
Kamke 1009	✓	0.006	28	✓	0.017	21	To Do
Kamke 1010	✓	0.02	42	✓	0.039	31	Linear second order, homogeneous, variable coefficient. Airy ODE with plus sign, series solution
Kamke 1011	✓	0.307	33	✓	0.032	17	Linear second order, homogeneous, variable coefficient. power series solution
Kamke 1012	✓	0.012	47	✓	0.175	29	To Do
Kamke 1013	✓	0.023	43	✓	0.042	22	To Do
Kamke 1014	✓	0.046	119	✓	0.122	63	To Do
Kamke 1015	✗	0	0	✗	0	0	To Do
Kamke 1016	✓	0.233	225	✓	0.243	91	To Do
Kamke 1017	✓	0.032	46	✓	0.047	17	To Do
Kamke 1018	✓	0.025	55	✓	0.057	39	To Do
Kamke 1019	✗	0	0	✗	0	0	To Do
Kamke 1020	✓	0.72	136	✓	0.215	58	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1021	✓	0.051	40	✓	0.299	39	To Do
Kamke 1022	✓	0.033	28	✓	0.239	21	To Do
Kamke 1023	✓	0.018	40	✓	0.229	29	To Do
Kamke 1024	✓	0.194	54	✓	0.149	30	To Do
Kamke 1025	✓	1.204	158	✓	0.243	102	To Do
Kamke 1026	✗	0	0	✗	0	0	To Do
Kamke 1027	✗	0	0	✓	0.482	69	To Do
Kamke 1028	✗	0	0	✗	0	0	To Do
Kamke 1029	✗	0	0	✓	0.142	22	To Do
Kamke 1030	✗	0	0	✗	0	0	To Do
Kamke 1031	✗	0	0	✗	0	0	To Do
Kamke 1032	✗	0	0	✓	0.125	48	To Do
Kamke 1033	✓	0.019	37	✓	0.012	27	Linear second order, homogeneous, variable coefficient. smart substitution turns it to second order with constant coefficient
Kamke 1034	✓	0.013	20	✓	0.01	15	Linear second order, homogeneous, variable coefficient. smart substitution turns it to second order with constant coefficient
Kamke 1035	✓	0.006	47	✓	0.014	41	To Do
Kamke 1036	✓	0.543	150	✓	0.112	124	To Do
Kamke 1037	✓	0.053	74	✓	0.104	64	To Do
Kamke 1038	✗	0	0	✗	0	0	To Do
Kamke 1039	✓	0.013	41	✓	0.017	25	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1040	✓	0.084	45	✓	0.045	33	To Do
Kamke 1041	✓	0.01	47	✓	0.08	41	To Do
Kamke 1042	✓	0.009	53	✓	0.075	41	To Do
Kamke 1043	✓	0.06	54	✓	0.255	39	Linear second order, homogeneous, variable coefficient. power series solution
Kamke 1044	✓	0.01	39	✓	0.077	35	To Do
Kamke 1045	✓	0.035	39	✓	0.01	21	To Do
Kamke 1046	✓	0.008	31	✓	0.08	31	To Do
Kamke 1047	✓	0.016	20	✓	0.034	16	Linear second order, homogeneous, variable coefficient. power series solution
Kamke 1048	✓	0.012	37	✓	0.079	37	To Do
Kamke 1049	✓	0.073	105	✓	0.193	66	To Do
Kamke 1050	✓	0.014	18	✓	0.029	14	To Do
Kamke 1051	✓	0.041	34	✓	0.039	27	To Do
Kamke 1052	✓	0.023	67	✓	0.095	58	To Do
Kamke 1053	✓	0.033	56	✓	0.048	35	To Do
Kamke 1054	✓	0.056	132	✓	0.051	98	To Do
Kamke 1055	✓	0.239	305	✓	0.24	262	To Do
Kamke 1056	✓	0.052	51	✓	0.13	48	To Do
Kamke 1057	✓	0.836	43	✓	0.22	50	To Do
Kamke 1058	✓	0.897	43	✓	0.138	29	To Do
Kamke 1059	✓	0.071	49	✓	0.084	56	To Do
Kamke 1060	✓	0.039	81	✓	0.194	81	To Do
Kamke 1061	✓	0.101	45	✓	0.09	28	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1062	✓	0.031	30	✓	0.029	19	To Do
Kamke 1063	✓	0.05	28	✓	0.347	61	To Do
Kamke 1064	✓	0.685	502	✓	0.297	125	To Do
Kamke 1065	✓	0.178	83	✓	0.265	60	To Do
Kamke 1066	✓	0.038	18	✓	0.075	15	To Do
Kamke 1067	✓	0.036	21	✓	0.051	17	To Do
Kamke 1068	✓	0.149	20	✓	0.246	45	To Do
Kamke 1069	✓	0.039	19	✓	0.105	15	To Do
Kamke 1070	✓	0.355	129	✓	0.196	60	To Do
Kamke 1071	✓	0.089	43	✓	0.063	24	To Do
Kamke 1072	✗	0	0	✗	0	0	To Do
Kamke 1073	✗	0	0	✗	0	0	To Do
Kamke 1074	✗	0	0	✓	0.031	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	✓	0.072	68	✓	0.033	33	To Do
Kamke 1079	✓	0.265	135	✓	0.023	37	To Do
Kamke 1080	✗	0	0	✓	0.355	74	To Do
Kamke 1081	✗	0	0	✗	0	0	To Do
Kamke 1082	✗	0	0	✓	0.153	74	To Do
Kamke 1083	✗	0	0	✓	0.108	31	To Do
Kamke 1084	✗	0	0	✓	0.088	20	To Do
Kamke 1085	✗	0	0	✓	0.081	24	To Do
Kamke 1086	✓	0.006	42	✓	0.031	29	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1087	✓	0.01	36	✓	0.103	33	To Do
Kamke 1088	✓	0.115	97	✓	0.149	31	To Do
Kamke 1089	✓	0.048	63	✓	0.054	58	To Do
Kamke 1090	✓	0.035	45	✓	0.053	40	To Do
Kamke 1091	✓	0.029	41	✓	0.046	35	To Do
Kamke 1092	✓	0.098	53	✓	0.059	29	To Do
Kamke 1093	✓	0.006	13	✓	0.007	10	To Do
Kamke 1094	✓	0.024	41	✓	0.01	29	To Do
Kamke 1095	✓	0.009	30	✓	0.035	23	To Do
Kamke 1096	✓	0.014	55	✓	0.076	39	To Do
Kamke 1097	✓	0.028	45	✓	0.012	31	To Do
Kamke 1098	✓	0.011	41	✓	0.01	27	To Do
Kamke 1099	✗	0	0	✓	0.055	25	To Do
Kamke 1100	✓	0.032	37	✓	0.041	23	Linear second order, non-homogeneous, variable coefficient. Singularity, Frobenius series solution and also using smart transformation. Variation of parameters.
Kamke 1101	✓	0.024	52	✓	0.035	29	Linear second order, homogeneous, variable coefficient. Singularity, Frobenius series solution and also using smart transformation

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1102	✓	0.007	36	✓	0.037	33	Linear second order, homogeneous, variable coefficient. Use smart transformation to convert to Emden-Fowler then use Power series solution
Kamke 1103	✓	0.028	56	✓	0.011	33	To Do
Kamke 1104	✓	0.038	77	✓	0.015	41	To Do
Kamke 1105	✓	0.024	54	✓	0.053	39	To Do
Kamke 1106	✓	0.056	165	✓	0.109	71	To Do
Kamke 1107	✓	0.033	36	✓	0.089	30	To Do
Kamke 1108	✓	0.039	33	✓	0.084	26	To Do
Kamke 1109	✓	0.061	45	✓	0.033	33	To Do
Kamke 1110	✓	0.046	36	✓	0.05	23	To Do
Kamke 1111	✓	0.021	19	✓	0.026	13	Linear second order, homogeneous, variable coefficient. Solved using Laplace transform instead of series method
Kamke 1112	✓	0.029	30	✓	0.034	22	To Do
Kamke 1113	✓	0.023	24	✓	0.064	17	To Do
Kamke 1114	✓	0.084	39	✓	0.069	34	To Do
Kamke 1115	✓	0.07	63	✓	0.644	47	To Do
Kamke 1116	✓	0.07	38	✓	0.092	31	To Do
Kamke 1117	✓	0.105	87	✓	0.127	82	To Do
Kamke 1118	✓	0.109	46	✓	0.112	39	To Do
Kamke 1119	✓	0.189	75	✓	0.046	20	To Do
Kamke 1120	✓	0.068	135	✓	0.219	109	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1121	✓	11.58	36	✓	0.029	23	To Do
Kamke 1122	✓	11.3	44	✓	0.19	28	To Do
Kamke 1123	✓	0.014	53	✓	0.057	45	To Do
Kamke 1124	✓	0.09	65	✓	0.09	29	To Do
Kamke 1125	✓	0.215	45	✓	0.053	36	To Do
Kamke 1126	✗	0	0	✓	0.043	19	To Do
Kamke 1127	✓	0.044	25	✓	0.022	21	To Do
Kamke 1128	✗	0	0	✓	0.256	32	To Do
Kamke 1129	✓	0.043	42	✓	0.041	30	To Do
Kamke 1130	✓	0.013	46	✓	0.015	31	To Do
Kamke 1131	✓	0.012	48	✓	0.086	33	To Do
Kamke 1132	✓	0.012	44	✓	0.085	29	To Do
Kamke 1133	✓	0.101	78	✓	0.122	37	To Do
Kamke 1134	✓	0.1	44	✓	0.052	21	To Do
Kamke 1135	✓	0.011	27	✓	0.013	17	To Do
Kamke 1136	✓	0.023	23	✓	0.035	16	To Do
Kamke 1137	✓	0.103	48	✓	0.061	25	To Do
Kamke 1138	✓	0.033	32	✓	0.078	26	To Do
Kamke 1139	✓	0.015	59	✓	0.085	37	To Do
Kamke 1140	✓	0.052	120	✓	0.026	66	To Do
Kamke 1141	✓	0.132	63	✓	0.056	55	To Do
Kamke 1142	✓	0.073	89	✓	0.123	53	To Do
Kamke 1143	✓	0.048	70	✓	0.117	57	To Do
Kamke 1144	✓	0.049	69	✓	0.092	60	To Do
Kamke 1145	✓	0.435	301	✓	0.212	248	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1146	✓	0.028	18	✓	0.009	15	To Do
Kamke 1147	✓	0.019	18	✓	0.009	15	To Do
Kamke 1148	✓	0.011	42	✓	0.013	35	To Do
Kamke 1149	✓	0.07	95	✓	0.015	45	To Do
Kamke 1150	✓	0.011	42	✓	0.078	27	To Do
Kamke 1151	✓	0.021	88	✓	0.094	43	To Do
Kamke 1152	✓	0.021	79	✓	0.263	53	To Do
Kamke 1153	✓	0.037	44	✓	0.032	31	To Do
Kamke 1154	✓	0.022	88	✓	0.135	57	To Do
Kamke 1155	✓	0.062	116	✓	0.052	67	To Do
Kamke 1156	✗	0	0	✓	0.147	71	To Do
Kamke 1157	✗	0	0	✗	0	0	To Do
Kamke 1158	✓	16.902	37	✓	0.268	178	To Do
Kamke 1159	✓	0.016	39	✓	0.015	19	To Do
Kamke 1160	✓	0.011	30	✓	0.014	23	To Do
Kamke 1161	✓	0.053	78	✓	0.013	31	To Do
Kamke 1162	✓	0.064	18	✓	0.012	15	To Do
Kamke 1163	✓	0.37	70	✓	0.119	49	To Do
Kamke 1164	✓	0.024	30	✓	0.031	23	To Do
Kamke 1165	✓	0.086	26	✓	0.016	19	To Do
Kamke 1166	✓	0.015	23	✓	0.016	21	To Do
Kamke 1167	✓	0.09	130	✓	0.033	63	To Do
Kamke 1168	✓	0.006	15	✓	0.009	11	To Do
Kamke 1169	✓	0.076	103	✓	0.029	49	To Do
Kamke 1170	✓	0.026	58	✓	0.042	43	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1171	✓	0.059	92	✓	0.133	49	To Do
Kamke 1172	✓	0.072	145	✓	0.037	47	To Do
Kamke 1173	✓	0.126	74	✓	0.094	37	To Do
Kamke 1174	✓	0.024	32	✓	0.047	25	To Do
Kamke 1175	✓	0.19	33	✓	0.06	29	To Do
Kamke 1176	✓	0.02	33	✓	0.034	15	To Do
Kamke 1177	✗	0	0	✓	0.08	34	To Do
Kamke 1178	✓	0.065	63	✓	0.03	23	To Do
Kamke 1179	✓	0.023	38	✓	0.034	19	To Do
Kamke 1180	✓	0.241	66	✓	0.052	49	To Do
Kamke 1181	✓	0.053	27	✓	0.02	25	To Do
Kamke 1182	✓	0.019	20	✓	0.015	20	To Do
Kamke 1183	✓	0.032	27	✓	0.013	22	To Do
Kamke 1184	✓	0.022	30	✓	0.028	25	To Do
Kamke 1185	✓	0.042	65	✓	0.031	33	To Do
Kamke 1186	✓	0.035	37	✓	0.028	36	To Do
Kamke 1187	✓	0.014	57	✓	0.018	53	To Do
Kamke 1188	✓	0.153	243	✓	0.177	114	To Do
Kamke 1189	✓	0.078	168	✓	0.033	79	To Do
Kamke 1190	✓	0.034	95	✓	0.102	38	To Do
Kamke 1191	✓	0.011	72	✓	0.017	23	To Do
Kamke 1192	✓	11.859	34	✓	0.15	51	To Do
Kamke 1193	✓	0.055	42	✓	0.039	38	To Do
Kamke 1194	✓	0.065	66	✓	0.054	48	To Do
Kamke 1195	✓	0.03	63	✓	0.121	93	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1196	✓	0.033	34	✓	0.038	31	To Do
Kamke 1197	✓	0.021	67	✓	0.046	43	To Do
Kamke 1198	✓	0.034	41	✓	0.043	37	To Do
Kamke 1199	✓	0.014	41	✓	0.02	35	To Do
Kamke 1200	✓	0.024	45	✓	0.016	27	To Do
Kamke 1201	✓	0.061	44	✓	0.02	34	To Do
Kamke 1202	✓	0.016	21	✓	0.034	14	To Do
Kamke 1203	✓	0.024	80	✓	0.023	28	To Do
Kamke 1204	✓	0.023	84	✓	0.052	35	To Do
Kamke 1205	✗	0	0	✗	0	0	To Do
Kamke 1206	✓	0.124	102	✓	0.069	76	To Do
Kamke 1207	✓	0.135	223	✓	0.232	110	To Do
Kamke 1208	✓	0.06	49	✓	0.049	35	To Do
Kamke 1209	✓	0.024	59	✓	0.061	41	To Do
Kamke 1210	✓	0.301	231	✓	0.664	81	To Do
Kamke 1211	✓	0.06	60	✓	0.067	36	To Do
Kamke 1212	✗	0	0	✗	0	0	To Do
Kamke 1213	✓	0.094	54	✓	0.057	53	To Do
Kamke 1214	✓	0.333	191	✓	0.606	71	To Do
Kamke 1215	✓	0.17	410	✓	0.198	148	To Do
Kamke 1216	✗	0	0	✗	0	0	To Do
Kamke 1217	✓	0.158	29	✓	0.042	24	To Do
Kamke 1218	✓	0.161	37	✓	0.042	30	To Do
Kamke 1219	✗	0	0	✓	0.095	69	To Do
Kamke 1220	✓	200.107	61	✓	0.02	40	To Do

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#	Mathematica			Maple			note on solution
	solved	cpu	leaf	solved	cpu	leaf	
Kamke 1221	✓	0.062	30	✓	0.027	35	To Do
Kamke 1222	✓	0.022	30	✓	0.015	23	To Do
Kamke 1223	✓	0.021	25	✓	0.017	39	To Do
Kamke 1224	✓	0.02	30	✓	0.019	23	To Do
Kamke 1225	✓	0.034	29	✓	0.04	23	To Do
Kamke 1226	✓	0.02	30	✓	0.046	25	To Do
Kamke 1227	✓	0.036	21	✓	0.016	16	To Do
Kamke 1228	✓	0.016	66	✓	0.099	53	To Do
Kamke 1229	✓	0.045	33	✓	0.018	31	To Do
Kamke 1230	✓	0.027	68	✓	0.147	36	To Do
Kamke 1231	✓	0.081	56	✓	0.057	52	To Do
Kamke 1232	✗	0	0	✓	0.309	409	To Do
Kamke 1233	✗	0	0	✓	0.174	409	To Do
Kamke 1234	✓	0.032	38	✗	0	0	To Do
Kamke 1235	✓	0.032	50	✓	0.023	45	To Do
Kamke 1236	✗	0	0	✗	0	0	To Do
Kamke 1237	✓	0.012	27	✓	0.033	20	To Do
Kamke 1238	✓	0.022	36	✓	0.02	26	To Do
Kamke 1239	✓	0.015	46	✓	0.058	35	To Do
Kamke 1240	✓	0.02	18	✓	0.044	15	To Do
Kamke 1241	✓	0.017	26	✓	0.052	24	To Do
Kamke 1242	✓	0.085	50	✓	0.078	41	To Do
Kamke 1243	✓	0.033	41	✓	0.046	21	To Do
Kamke 1244	✓	0.032	32	✓	0.083	27	To Do
Kamke 1245	✓	0.024	32	✓	0.057	27	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1246	✓	0.022	32	✓	0.186	28	To Do
Kamke 1247	✓	0.239	87	✓	0.03	27	To Do
Kamke 1248	✗	0	0	✓	0.265	134	To Do
Kamke 1249	✓	0.195	190	✓	0.081	134	To Do
Kamke 1250	✓	0.058	38	✓	0.031	41	To Do
Kamke 1251	✓	0.04	23	✓	0.043	20	To Do
Kamke 1252	✓	0.182	131	✓	0.059	124	To Do
Kamke 1253	✓	0.029	28	✓	0.009	16	To Do
Kamke 1254	✓	0.103	52	✓	0.083	43	To Do
Kamke 1255	✓	0.244	87	✓	0.023	42	To Do
Kamke 1256	✓	0.025	26	✓	0.117	51	To Do
Kamke 1257	✓	0.054	33	✓	0.256	27	To Do
Kamke 1258	✓	0.182	130	✓	0.059	110	To Do
Kamke 1259	✓	0.159	112	✓	0.064	92	To Do
Kamke 1260	✓	0.21	65	✓	0.49	76	To Do
Kamke 1261	✗	0	0	✓	0.247	105	To Do
Kamke 1262	✓	39.567	45	✓	0.25	53	To Do
Kamke 1263	✗	0	0	✓	0.087	52	To Do
Kamke 1264	✓	0.068	23	✓	0.047	19	To Do
Kamke 1265	✓	0.047	57	✓	0.704	93	To Do
Kamke 1266	✓	0.031	22	✓	0.012	19	To Do
Kamke 1267	✓	0.415	154	✓	0.081	41	To Do
Kamke 1268	✗	0	0	✓	0.123	39	To Do
Kamke 1269	✓	0.098	59	✓	0.096	40	To Do
Kamke 1270	✗	0	0	✓	0.192	46	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1271	✓	0.013	24	✓	0.009	14	To Do
Kamke 1272	✓	0.014	28	✓	0.039	23	To Do
Kamke 1273	✓	0.018	20	✓	0.081	17	To Do
Kamke 1274	✓	0.045	38	✓	0.013	19	To Do
Kamke 1275	✓	0.04	97	✓	0.164	53	To Do
Kamke 1276	✓	0.064	55	✓	0.074	31	To Do
Kamke 1277	✓	0.029	49	✓	0.064	27	To Do
Kamke 1278	✗	0	0	✗	0	0	To Do
Kamke 1279	✓	0.184	45	✓	0.334	32	To Do
Kamke 1280	✓	0.042	52	✓	0.061	40	To Do
Kamke 1281	✓	0.021	21	✓	0.051	15	To Do
Kamke 1282	✓	0.024	32	✓	0.049	21	To Do
Kamke 1283	✓	0.114	89	✓	0.156	48	To Do
Kamke 1284	✓	0.046	41	✓	0.023	41	To Do
Kamke 1285	✓	0.341	119	✓	0.119	52	To Do
Kamke 1286	✓	0.111	80	✓	0.023	32	To Do
Kamke 1287	✓	0.02	51	✓	0.029	27	To Do
Kamke 1288	✓	0.038	43	✓	0.03	21	To Do
Kamke 1289	✓	0.085	51	✓	0.095	33	To Do
Kamke 1290	✓	0.174	103	✓	0.022	47	To Do
Kamke 1291	✓	0.083	82	✓	0.075	62	To Do
Kamke 1292	✓	0.042	53	✓	0.062	31	To Do
Kamke 1293	✓	0.356	44	✓	0.07	33	To Do
Kamke 1294	✓	0.223	44	✓	0.07	33	To Do
Kamke 1295	✓	0.305	229	✓	0.317	106	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1296	✓	0.597	272	✓	0.359	150	To Do
Kamke 1297	✓	0.038	52	✓	0.024	63	To Do
Kamke 1298	✓	0.085	135	✓	0.144	124	To Do
Kamke 1299	✓	0.015	19	✓	0.019	27	To Do
Kamke 1300	✓	0.059	39	✓	0.048	31	To Do
Kamke 1301	✓	0.034	30	✓	0.024	19	To Do
Kamke 1302	✓	0.087	165	✓	0.079	98	To Do
Kamke 1303	✗	0	0	✓	0.25	501	To Do
Kamke 1304	✓	0.058	50	✓	0.039	38	To Do
Kamke 1305	✓	0.086	47	✓	0.063	44	To Do
Kamke 1306	✗	0	0	✓	0.255	69	To Do
Kamke 1307	✓	0.106	44	✓	0.059	36	To Do
Kamke 1308	✓	0.023	41	✓	0.02	40	To Do
Kamke 1309	✓	0.101	77	✓	0.103	85	To Do
Kamke 1310	✓	0.013	27	✓	0.013	20	To Do
Kamke 1311	✓	0.144	61	✓	0.157	52	To Do
Kamke 1312	✓	0.026	26	✓	0.023	19	To Do
Kamke 1313	✓	0.226	75	✓	0.096	35	To Do
Kamke 1314	✓	0.205	75	✓	0.084	33	To Do
Kamke 1315	✓	0.03	44	✓	0.022	45	To Do
Kamke 1316	✓	0.098	38	✓	0.044	18	To Do
Kamke 1317	✓	0.133	38	✓	0.045	13	To Do
Kamke 1318	✓	0.322	146	✓	0.145	122	To Do
Kamke 1319	✓	0.115	69	✓	0.116	31	To Do
Kamke 1320	✓	0.075	21	✓	0.052	17	To Do

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#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 1321	✓	0.029	17	✓	0.023	15	To Do
Kamke 1322	✓	0.036	44	✓	0.03	44	To Do
Kamke 1323	✗	0	0	✓	0.021	17	To Do
Kamke 1324	✓	0.032	24	✓	0.031	18	To Do
Kamke 1325	✓	0.284	52	✓	0.155	86	To Do
Kamke 1326	✓	0.027	26	✓	0.029	22	To Do
Kamke 1327	✓	0.204	105	✓	0.528	81	To Do
Kamke 1328	✓	0.025	33	✓	0.03	27	To Do
Kamke 1329	✗	0	0	✓	0.365	64	To Do
Kamke 1330	✗	0	0	✓	1.19	1147	To Do
Kamke 1331	✓	0.049	41	✓	0.029	19	To Do
Kamke 1332	✓	0.027	21	✓	0.023	17	To Do
Kamke 1333	✓	0.121	70	✓	0.081	45	To Do
Kamke 1334	✓	0.225	89	✓	0.097	89	To Do
Kamke 1335	✓	0.367	510	✓	0.064	57	To Do
Kamke 1336	✓	0.057	51	✓	0.052	44	To Do
Kamke 1337	✓	0.092	53	✓	0.043	27	To Do
Kamke 1338	✓	0.074	40	✓	0.037	27	To Do
Kamke 1339	✓	0.289	66	✓	0.164	76	To Do
Kamke 1340	✓	0.04	23	✓	0.032	20	To Do
Kamke 1341	✗	0	0	✓	0.199	201	To Do
Kamke 1342	✓	0.099	52	✓	0.031	31	To Do
Kamke 1343	✗	0	0	✓	0.125	58	To Do
Kamke 1344	✓	0.606	100	✓	0.054	23	To Do
Kamke 1345	✓	0.053	45	✓	0.057	25	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1346	✓	0.107	37	✓	0.06	25	To Do
Kamke 1347	✓	0.113	31	✓	0.033	19	To Do
Kamke 1348	✗	0	0	✓	0.237	73	To Do
Kamke 1349	✓	0.12	73	✓	0.08	85	To Do
Kamke 1350	✓	0.011	25	✓	0.012	21	To Do
Kamke 1351	✓	0.041	44	✓	0.038	24	To Do
Kamke 1352	✓	0.015	51	✓	0.047	43	To Do
Kamke 1353	✓	0.135	77	✓	0.221	66	To Do
Kamke 1354	✓	0.096	78	✓	0.336	33	To Do
Kamke 1355	✓	0.142	57	✓	0.133	30	To Do
Kamke 1356	✓	0.337	78	✓	0.088	29	To Do
Kamke 1357	✓	0.785	264	✓	0.13	97	To Do
Kamke 1358	✓	0.072	45	✓	0.049	20	To Do
Kamke 1359	✓	0.126	84	✓	0.102	57	To Do
Kamke 1360	✓	0.108	68	✓	0.084	47	To Do
Kamke 1361	✓	0.595	36	✓	0.039	33	To Do
Kamke 1362	✗	0	0	✓	0.256	109	To Do
Kamke 1363	✓	0.899	211	✓	0.148	161	To Do
Kamke 1364	✓	0.181	29	✓	0.115	25	To Do
Kamke 1365	✓	0.104	66	✓	0.064	59	To Do
Kamke 1366	✓	0.026	22	✓	0.01	17	To Do
Kamke 1367	✗	0	0	✓	0.258	88	To Do
Kamke 1368	✓	0.03	92	✓	0.082	71	To Do
Kamke 1369	✓	0.111	67	✓	0.069	55	To Do
Kamke 1370	✓	0.033	53	✓	0.013	19	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1371	✓	0.024	48	✓	0.061	37	To Do
Kamke 1372	✗	0	0	✓	0.303	110	To Do
Kamke 1373	✗	0	0	✓	0.237	84	To Do
Kamke 1374	✓	0.039	26	✓	0.06	23	To Do
Kamke 1375	✓	0.057	34	✓	0.077	29	To Do
Kamke 1376	✓	0.109	82	✓	0.033	73	To Do
Kamke 1377	✓	0.259	97	✓	0.129	83	To Do
Kamke 1378	✓	0.06	56	✓	0.051	48	To Do
Kamke 1379	✓	0.085	71	✓	0.072	60	To Do
Kamke 1380	✓	0.341	121	✓	0.1	67	To Do
Kamke 1381	✓	0.815	371	✓	0.204	175	To Do
Kamke 1382	✓	0.793	141	✓	0.141	104	To Do
Kamke 1383	✓	0.155	44	✓	0.056	39	To Do
Kamke 1384	✓	0.036	106	✓	0.269	73	To Do
Kamke 1385	✓	0.021	70	✓	0.074	55	To Do
Kamke 1386	✓	0.098	68	✓	0.074	58	To Do
Kamke 1387	✓	0.042	45	✓	0.033	28	To Do
Kamke 1388	✓	0.339	109	✓	0.086	76	To Do
Kamke 1389	✓	0.429	91	✓	0.082	68	To Do
Kamke 1390	✓	0.045	49	✓	0.038	25	To Do
Kamke 1391	✓	0.066	27	✓	0.03	20	To Do
Kamke 1392	✓	106.83	1	✓	0.243	561	To Do
Kamke 1393	✓	20.861	1	✓	0.176	299	To Do
Kamke 1394	✓	0.058	73	✓	0.133	79	To Do
Kamke 1395	✓	0.166	49	✓	0.073	39	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1396	✓	1.601	199	✓	0.168	178	To Do
Kamke 1397	✓	0.053	38	✓	0.081	30	To Do
Kamke 1398	✗	0	0	✓	0.217	69	To Do
Kamke 1399	✓	0.06	51	✓	0.069	34	To Do
Kamke 1400	✓	0.092	58	✓	0.053	35	To Do
Kamke 1401	✓	0.016	56	✓	0.059	45	To Do
Kamke 1402	✗	0	0	✓	0.308	58	To Do
Kamke 1403	✗	0	0	✓	0.914	298	To Do
Kamke 1404	✓	0.026	25	✓	0.052	19	To Do
Kamke 1405	✓	0.083	70	✓	0.086	42	To Do
Kamke 1406	✗	0	0	✓	0.174	44	To Do
Kamke 1407	✗	0	0	✓	2.454	2597	To Do
Kamke 1408	✗	0	0	✗	0	0	To Do
Kamke 1409	✓	0.028	44	✓	0.023	39	To Do
Kamke 1410	✓	0.147	405	✓	0.312	253	To Do
Kamke 1411	✓	0.371	36	✓	0.025	27	To Do
Kamke 1412	✓	0.018	29	✓	0.011	23	To Do
Kamke 1413	✗	0	0	✓	0.058	12	To Do
Kamke 1414	✓	1.259	127	✓	0.286	97	To Do
Kamke 1415	✓	0.923	145	✓	0.169	36	To Do
Kamke 1416	✓	0.212	35	✓	0.227	26	To Do
Kamke 1417	✓	0.155	45	✓	0.292	31	To Do
Kamke 1418	✗	0	0	✓	13.562	59	To Do
Kamke 1419	✗	0	0	✓	0.239	12	To Do
Kamke 1420	✓	0.484	126	✓	0.368	123	To Do

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#	Mathematica			Maple			note on solution
	solved	cpu	leaf	solved	cpu	leaf	
Kamke 1421	✓	0.246	65	✓	0.079	27	To Do
Kamke 1422	✓	0.097	43	✓	0.265	50	To Do
Kamke 1423	✓	0.076	61	✓	0.322	132	To Do
Kamke 1424	✓	0.185	65	✓	0.325	120	To Do
Kamke 1425	✓	0.808	194	✓	0.517	91	To Do
Kamke 1426	✓	6.682	1362	✓	0.648	549	To Do
Kamke 1427	✗	0	0	✓	1.825	179	To Do
Kamke 1428	✓	0.427	87	✓	0.358	183	To Do
Kamke 1429	✓	0.063	51	✓	0.038	25	To Do
Kamke 1430	✓	0.49	22	✓	0.399	101	To Do
Kamke 1431	✓	0.209	64	✓	0.304	30	To Do
Kamke 1432	✓	0.1	33	✓	0.047	22	To Do
Kamke 1433	✓	0.256	35	✓	0.112	28	To Do
Kamke 1434	✓	119.334	1	✓	0.732	517	To Do
Kamke 1435	✓	0.157	61	✓	0.159	38	To Do
Kamke 1436	✓	0.661	33	✓	0.317	113	To Do
Kamke 1437	✓	0.303	36	✓	0.189	29	To Do
Kamke 1438	✓	1.066	158	✓	0.212	102	To Do
Kamke 1439	✗	0	0	✗	0	0	To Do
Kamke 1440	✗	0	0	✗	0	0	To Do
Kamke 1441	✗	0	0	✗	0	0	To Do
Kamke 1442	✗	0	0	✓	0.074	30	To Do
Kamke 1443	✗	0	0	✗	0	0	To Do
Kamke 1444	✗	0	0	✓	0.014	37	To Do
Kamke 1445	✗	0	0	✓	0.305	20	To Do

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#	Mathematica			Maple			note on solution
	solved	cpu	leaf	solved	cpu	leaf	
Kamke 1446	✓	0.058	26	✓	0.051	22	To Do
Kamke 1447	✓	0.035	24	✓	0.053	20	To Do
Kamke 1448	✓	0.368	142	✓	0.116	77	To Do
Kamke 1449	✓	0.055	53	✓	0.04	47	To Do
Kamke 1450	✗	0	0	✓	0.437	1616	To Do
Kamke 1451	✓	0.024	164	✓	0.123	114	To Do
Kamke 1452	✓	0.008	52	✓	0.01	35	To Do
Kamke 1453	✓	0.689	128	✓	0.135	122	To Do
Kamke 1454	✓	0.01	79	✓	0.06	55	To Do
Kamke 1455	✓	0.029	127	✓	0.161	71	To Do
Kamke 1456	✓	0.038	183	✓	0.077	73	To Do
Kamke 1457	✗	0	0	✗	0	0	To Do
Kamke 1458	✗	0	0	✗	0	0	To Do
Kamke 1459	✗	0	0	✗	0	0	To Do
Kamke 1460	✗	0	0	✗	0	0	To Do
Kamke 1461	✗	0	0	✗	0	0	To Do
Kamke 1462	✗	0	0	✗	0	0	To Do
Kamke 1463	✗	0	0	✗	0	0	To Do
Kamke 1464	✓	0.006	34	✓	0.01	27	To Do
Kamke 1465	✓	0.1	52	✓	0.1	214	To Do
Kamke 1466	✓	0.017	34	✓	0.023	27	To Do
Kamke 1467	✓	0.007	84	✓	0.029	590	To Do
Kamke 1468	✓	0.092	57	✓	0.091	59	To Do
Kamke 1469	✓	0.019	68	✓	0.031	37	To Do
Kamke 1470	✗	0	0	✓	0.093	36	To Do

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#	Mathematica			Maple			note on solution
	solved	cpu	leaf	solved	cpu	leaf	
Kamke 1471	✗	0	0	✓	0.223	36	To Do
Kamke 1472	✗	0	0	✓	0.299	33	To Do
Kamke 1473	✗	0	0	✗	0	0	To Do
Kamke 1474	✗	0	0	✗	0	0	To Do
Kamke 1475	✓	0.028	37	✓	0.022	23	To Do
Kamke 1476	✗	0	0	✗	0	0	To Do
Kamke 1477	✓	0.18	43	✓	0.022	41	To Do
Kamke 1478	✓	0.035	90	✓	0.134	48	To Do
Kamke 1479	✓	0.158	153	✓	0.264	92	To Do
Kamke 1480	✓	0.24	91	✓	0.282	35	To Do
Kamke 1481	✓	1.139	340	✓	0.056	44	To Do
Kamke 1482	✗	0	0	✓	0.451	1616	To Do
Kamke 1483	✓	0.16	105	✓	0.288	37	To Do
Kamke 1484	✗	0	0	✗	0	0	To Do
Kamke 1485	✓	0.158	59	✓	0.411	51	To Do
Kamke 1486	✓	0.191	63	✓	0.27	51	To Do
Kamke 1487	✗	0	0	✓	0.091	38	To Do
Kamke 1488	✓	0.609	97	✓	0.638	135	To Do
Kamke 1489	✗	0	0	✗	0	0	To Do
Kamke 1490	✓	0.038	33	✓	0.072	18	To Do
Kamke 1491	✓	0.051	102	✓	0.098	88	To Do
Kamke 1492	✓	0.446	43	✓	0.123	39	To Do
Kamke 1493	✓	8.328	868	✓	0.367	1033	To Do
Kamke 1494	✓	0.033	43	✓	0.023	32	To Do
Kamke 1495	✓	0.02	24	✓	0.013	16	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1496	✓	0.293	58	✓	0.028	57	To Do
Kamke 1497	✓	0.54	127	✓	0.284	77	To Do
Kamke 1498	✓	12.268	353	✓	0.291	53	To Do
Kamke 1499	✓	0.262	91	✓	0.298	25	To Do
Kamke 1500	✗	0	0	✓	0.247	55	To Do
Kamke 1501	✓	0.21	80	✓	0.258	37	To Do
Kamke 1502	✓	0.093	98	✓	0.49	103	To Do
Kamke 1503	✓	0.125	62	✓	0.031	67	To Do
Kamke 1504	✓	0.122	41	✓	0.226	18	To Do
Kamke 1505	✗	0	0	✓	0.175	79	To Do
Kamke 1506	✗	0	0	✓	0.063	43	To Do
Kamke 1507	✗	0	0	✓	0.727	1211	To Do
Kamke 1508	✓	0.98	143	✓	0.158	81	To Do
Kamke 1509	✓	0.012	33	✓	0.06	29	To Do
Kamke 1510	✗	0	0	✗	0	0	To Do
Kamke 1511	✓	0.043	52	✓	0.035	49	To Do
Kamke 1512	✓	0.043	29	✓	0.015	18	To Do
Kamke 1513	✓	0.086	23	✓	0.216	18	To Do
Kamke 1514	✓	0.82	97	✓	0.525	135	To Do
Kamke 1515	✗	0	0	✗	0	0	To Do
Kamke 1516	✗	0	0	✓	0.497	188	To Do
Kamke 1517	✓	0.449	1656	✓	0.531	866	To Do
Kamke 1518	✓	0.268	96	✓	0.483	60	To Do
Kamke 1519	✓	0.034	58	✓	0.162	19	To Do
Kamke 1520	✗	0	0	✓	0.549	288	To Do

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#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 1521	✓	0.073	29	✓	0.469	28	To Do
Kamke 1522	✓	0.024	42	✓	0.046	34	To Do
Kamke 1523	✓	0.139	46	✓	0.475	23	To Do
Kamke 1524	✓	0.206	96	✓	0.551	98	To Do
Kamke 1525	✓	0.519	101	✓	0.654	291	To Do
Kamke 1526	✗	0	0	✓	0.253	19	To Do
Kamke 1527	✗	0	0	✓	0.589	437	To Do
Kamke 1528	✓	0.669	56	✓	0.221	71	To Do
Kamke 1529	✗	0	0	✓	0.094	25	To Do
Kamke 1530	✗	0	0	✓	0.26	113	To Do
Kamke 1531	✗	0	0	✗	0	0	To Do
Kamke 1532	✓	0.018	103	✓	0.109	58	To Do
Kamke 1533	✓	0.019	106	✓	0.113	58	To Do
Kamke 1534	✓	0.004	22	✓	0.028	21	To Do
Kamke 1535	✓	1.376	168	✓	0.024	36	To Do
Kamke 1536	✓	0.006	76	✓	0.015	50	To Do
Kamke 1537	✓	1.	93	✓	0.152	67	To Do
Kamke 1538	✓	0.276	41	✓	0.537	51	To Do
Kamke 1539	✓	0.008	44	✓	0.034	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	✓	0.019	41	To Do
Kamke 1545	✓	0.201	40	✓	0.143	27	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1546	✓	0.742	139	✓	0.059	73	To Do
Kamke 1547	✗	0	0	✓	0.026	87	To Do
Kamke 1548	✓	0.1	50	✓	0.073	32	To Do
Kamke 1549	✓	0.015	34	✓	0.026	26	To Do
Kamke 1550	✓	5.299	214	✓	2.543	157	To Do
Kamke 1551	✓	0.484	84	✓	0.274	62	To Do
Kamke 1552	✗	0	0	✓	0.076	89	To Do
Kamke 1553	✓	0.026	29	✓	0.012	17	To Do
Kamke 1554	✓	0.026	27	✓	0.013	18	To Do
Kamke 1555	✓	0.07	156	✓	0.193	61	To Do
Kamke 1556	✓	0.026	27	✓	0.016	19	To Do
Kamke 1557	✓	0.073	146	✓	0.146	61	To Do
Kamke 1558	✓	0.174	222	✓	0.2	67	To Do
Kamke 1559	✓	0.311	100	✓	0.191	33	To Do
Kamke 1560	✓	0.029	27	✓	0.014	18	To Do
Kamke 1561	✓	4.62	310	✓	0.288	69	To Do
Kamke 1562	✓	1.21	140	✓	0.419	77	To Do
Kamke 1563	✓	2.231	187	✓	0.317	87	To Do
Kamke 1564	✓	1.479	196	✓	0.273	88	To Do
Kamke 1565	✓	0.603	242	✓	0.463	71	To Do
Kamke 1566	✓	0.714	237	✓	0.417	35	To Do
Kamke 1567	✓	0.029	27	✓	0.016	19	To Do
Kamke 1568	✓	0.013	116	✓	0.035	89	To Do
Kamke 1569	✗	0	0	✓	0.566	63	To Do
Kamke 1570	✓	0.161	213	✓	0.102	49	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1571	✓	0.097	389	✓	0.251	143	To Do
Kamke 1572	✗	0	0	✓	0.487	35	To Do
Kamke 1573	✗	0	0	✓	0.053	41	To Do
Kamke 1574	✗	0	0	✓	0.902	252	To Do
Kamke 1575	✗	0	0	✓	0.508	638	To Do
Kamke 1576	✗	0	0	✓	0.032	67	To Do
Kamke 1577	✓	1.25	39	✓	0.012	21	To Do
Kamke 1578	✗	0	0	✓	1.365	89	To Do
Kamke 1579	✓	0.771	80	✓	0.452	69	To Do
Kamke 1580	✓	1.042	111	✓	0.819	147	To Do
Kamke 1581	✗	0	0	✗	0	0	To Do
Kamke 1582	✓	0.698	528	✗	0	0	To Do
Kamke 1583	✗	0	0	✓	0.036	40	To Do
Kamke 1584	✓	3.071	207	✓	0.266	118	To Do
Kamke 1585	✓	0.243	214	✓	0.039	679	To Do
Kamke 1586	✗	0	0	✗	0	0	To Do
Kamke 1587	✓	0.419	492	✓	0.522	174	To Do
Kamke 1588	✓	13.64	103	✓	0.174	90	To Do
Kamke 1589	✓	0.048	662	✓	9.182	4379	To Do
Kamke 1590	✗	0	0	✓	2.682	553	To Do
Kamke 1591	✓	0.04	26	✓	0.028	12	To Do
Kamke 1592	✓	0.028	14	✓	0.014	10	To Do
Kamke 1593	✗	0	0	✗	0	0	To Do
Kamke 1594	✓	0.53	200	✓	0.119	59	To Do
Kamke 1595	✗	0	0	✗	0	0	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1596	✗	0	0	✗	0	0	To Do
Kamke 1597	✓	2.209	131	✓	0.03	21	To Do
Kamke 1598	✗	0	0	✗	0	0	To Do
Kamke 1599	✗	0	0	✗	0	0	To Do
Kamke 1600	✓	2.447	869	✓	0.102	89	To Do
Kamke 1601	✗	0	0	✓	2.958	151	To Do
Kamke 1602	✓	123.928	45	✓	0.29	73	To Do
Kamke 1603	✗	0	0	✓	37.867	8411	To Do
Kamke 1604	✓	0.067	32	✓	0.437	23	To Do
Kamke 1605	✗	0	0	✓	1.438	107	To Do
Kamke 1606	✗	0	0	✗	0	0	To Do
Kamke 1607	✓	0.123	79	✓	0.128	49	To Do
Kamke 1608	✗	0	0	✗	0	0	To Do
Kamke 1609	✗	0	0	✗	0	0	To Do
Kamke 1610	✗	0	0	✓	0.292	92	To Do
Kamke 1611	✗	0	0	✓	0.58	57	To Do
Kamke 1612	✗	0	0	✓	1.341	57	To Do
Kamke 1613	✗	0	0	✓	0.026	27	To Do
Kamke 1614	✗	0	0	✓	0.082	33	To Do
Kamke 1615	✗	0	0	✓	4.639	91	To Do
Kamke 1616	✗	0	0	✓	1.328	63	To Do
Kamke 1617	✗	0	0	✗	0	0	To Do
Kamke 1618	✗	0	0	✓	1.735	56	To Do
Kamke 1619	✗	0	0	✗	0	0	To Do
Kamke 1620	✗	0	0	✓	0.119	291	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1621	✗	0	0	✓	1.744	1088	To Do
Kamke 1622	✗	0	0	✓	0.629	817	To Do
Kamke 1623	✗	0	0	✗	0	0	To Do
Kamke 1624	✗	0	0	✓	1.923	131	To Do
Kamke 1625	✗	0	0	✗	0	0	To Do
Kamke 1626	✗	0	0	✓	0.24	48	To Do
Kamke 1627	✗	0	0	✓	0.905	58	To Do
Kamke 1628	✗	0	0	✗	0	0	To Do
Kamke 1629	✗	0	0	✓	0.041	38	To Do
Kamke 1630	✓	11.553	1670	✓	0.702	783	To Do
Kamke 1631	✗	0	0	✓	0.053	38	To Do
Kamke 1632	✓	0.063	34	✓	0.108	23	To Do
Kamke 1633	✗	0	0	✓	0.327	97	To Do
Kamke 1634	✗	0	0	✗	0	0	To Do
Kamke 1635	✗	0	0	✓	0.195	79	To Do
Kamke 1636	✗	0	0	✓	1.023	59	To Do
Kamke 1637	✗	0	0	✓	0.581	58	To Do
Kamke 1638	✗	0	0	✓	0.199	115	To Do
Kamke 1639	✗	0	0	✓	3.523	56	To Do
Kamke 1640	✗	0	0	✓	0.2	70	To Do
Kamke 1641	✓	2.069	57	✓	0.053	29	To Do
Kamke 1642	✗	0	0	✗	0	0	To Do
Kamke 1643	✗	0	0	✗	0	0	To Do
Kamke 1644	✗	0	0	✓	0.556	56	To Do
Kamke 1645	✗	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 1646	✓	10.826	262	✓	0.174	94	To Do
Kamke 1647	✓	52.178	59	✓	0.559	60	To Do
Kamke 1648	✗	0	0	✓	1.788	205	To Do
Kamke 1649	✗	0	0	✗	0	0	To Do
Kamke 1650	✓	0.022	19	✓	0.288	16	To Do
Kamke 1651	✓	0.28	414	✓	0.185	31	To Do
Kamke 1652	✗	0	0	✓	0.329	36	To Do
Kamke 1653	✓	0.069	75	✓	0.143	41	To Do
Kamke 1654	✓	0.308	308	✓	0.194	38	To Do
Kamke 1655	✓	0.889	350	✓	0.231	84	To Do
Kamke 1656	✗	0	0	✓	0.804	771	To Do
Kamke 1657	✓	0.154	33	✓	0.281	35	To Do
Kamke 1658	✗	0	0	✓	0.146	115	To Do
Kamke 1659	✗	0	0	✓	0.097	60	To Do
Kamke 1660	✗	0	0	✓	0.86	125	To Do
Kamke 1661	✓	0.031	90	✓	0.089	51	To Do
Kamke 1662	✗	0	0	✓	0.401	56	To Do
Kamke 1663	✗	0	0	✓	0.948	125	To Do
Kamke 1664	✗	0	0	✓	3.003	155	To Do
Kamke 1665	✗	0	0	✓	0.605	84	To Do
Kamke 1666	✗	0	0	✓	0.973	93	To Do
Kamke 1667	✗	0	0	✓	1.575	121	To Do
Kamke 1668	✓	0.072	46	✓	0.172	24	To Do
Kamke 1669	✓	137.104	74	✓	0.129	32	To Do
Kamke 1670	✓	83.969	49	✓	0.414	35	To Do

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Table 3 – continued from previous page

#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 1671	✓	0.036	59	✓	0.095	35	To Do
Kamke 1672	✗	0	0	✓	0.997	65	To Do
Kamke 1673	✗	0	0	✓	0.814	60	To Do
Kamke 1674	✓	0.062	69	✓	0.084	25	To Do
Kamke 1675	✗	0	0	✗	0	0	To Do
Kamke 1676	✓	51.731	117	✓	0.29	72	To Do
Kamke 1677	✗	0	0	✓	1.937	101	To Do
Kamke 1678	✗	0	0	✓	0.289	60	To Do
Kamke 1679	✓	0.085	33	✓	0.157	27	To Do
Kamke 1680	✗	0	0	✓	0.626	103	To Do
Kamke 1681	✗	0	0	✓	0.06	31	To Do
Kamke 1682	✗	0	0	✓	0.641	94	To Do
Kamke 1683	✓	0.077	25	✓	0.062	23	To Do
Kamke 1684	✗	0	0	✓	1.661	100	To Do
Kamke 1685	✗	0	0	✗	0	0	To Do
Kamke 1686	✗	0	0	✓	1.169	128	To Do
Kamke 1687	✓	0.07	83	✓	0.135	21	To Do
Kamke 1688	✗	0	0	✓	0.118	32	To Do
Kamke 1689	✓	0.683	259	✓	0.164	37	To Do
Kamke 1690	✗	0	0	✓	0.908	99	To Do
Kamke 1691	✗	0	0	✓	1.253	254	To Do
Kamke 1692	✗	0	0	✓	4.051	156	To Do
Kamke 1693	✗	0	0	✓	0.31	68	To Do
Kamke 1694	✓	0.199	111	✓	0.146	54	To Do
Kamke 1695	✗	0	0	✓	0.662	103	To Do

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Table 3 – continued from previous page

#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1696	✗	0	0	✓	0.544	100	To Do
Kamke 1697	✓	0.066	68	✓	0.051	39	To Do
Kamke 1698	✓	0.042	63	✗	0	0	To Do
Kamke 1699	✓	0.038	32	✓	0.112	33	To Do
Kamke 1700	✓	0.084	44	✓	0.392	86	To Do
Kamke 1701	✓	0.193	79	✓	0.354	42	To Do
Kamke 1702	✗	0	0	✗	0	0	To Do
Kamke 1703	✓	0.098	63	✓	0.081	21	To Do
Kamke 1704	✗	0	0	✗	0	0	To Do
Kamke 1705	✗	0	0	✗	0	0	To Do
Kamke 1706	✗	0	0	✗	0	0	To Do
Kamke 1707	✓	0.076	28	✓	0.09	39	To Do
Kamke 1708	✗	0	0	✓	1.063	73	To Do
Kamke 1709	✗	0	0	✓	2.107	84	To Do
Kamke 1710	✗	0	0	✓	3.097	91	To Do
Kamke 1711	✗	0	0	✓	0.57	81	To Do
Kamke 1712	✓	10.792	57	✓	0.104	61	To Do
Kamke 1713	✗	0	0	✓	0.336	54	To Do
Kamke 1714	✓	0.067	25	✓	0.072	68	To Do
Kamke 1715	✓	0.034	26	✓	0.055	25	To Do
Kamke 1716	✓	0.688	172	✓	0.266	68	To Do
Kamke 1717	✓	1.957	49	✓	0.333	107	To Do
Kamke 1718	✓	1.638	396	✓	0.317	133	To Do
Kamke 1719	✗	0	0	✓	0.592	70	To Do
Kamke 1720	✗	0	0	✓	0.376	173	To Do

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Table 3 – continued from previous page

#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1721	✗	0	0	✗	0	0	To Do
Kamke 1722	✓	2.118	797	✓	0.423	98	To Do
Kamke 1723	✓	0.899	227	✓	0.129	16	To Do
Kamke 1724	✓	0.237	24	✓	0.662	21	To Do
Kamke 1725	✓	0.368	59	✓	0.638	105	To Do
Kamke 1726	✓	0.769	73	✓	0.125	39	To Do
Kamke 1727	✓	0.19	129	✓	0.441	823	To Do
Kamke 1728	✓	0.007	31	✓	0.039	24	To Do
Kamke 1729	✗	0	0	✗	0	0	To Do
Kamke 1730	✓	0.51	77	✓	0.104	53	To Do
Kamke 1731	✓	1.44	351	✓	0.106	61	To Do
Kamke 1732	✗	0	0	✗	0	0	To Do
Kamke 1733	✓	2.787	437	✓	0.109	71	To Do
Kamke 1734	✗	0	0	✗	0	0	To Do
Kamke 1735	✗	0	0	✗	0	0	To Do
Kamke 1736	✓	8.804	285	✓	0.105	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	✓	0.027	16	✓	0.037	13	To Do
Kamke 1741	✓	0.098	17	✓	0.089	34	To Do
Kamke 1742	✗	0	0	✓	0.203	60	To Do
Kamke 1743	✓	23.178	2761	✓	0.12	71	To Do
Kamke 1744	✓	1.012	173	✓	0.42	823	To Do
Kamke 1745	✓	0.325	204	✓	0.617	117	To Do

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Table 3 – continued from previous page

#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 1746	✗	0	0	✓	0.621	207	To Do
Kamke 1747	✓	0.028	20	✓	0.02	17	To Do
Kamke 1748	✓	0.1	43	✓	0.139	67	To Do
Kamke 1749	✓	0.559	181	✓	0.342	57	To Do
Kamke 1750	✓	4.734	2281	✓	0.405	87	To Do
Kamke 1751	✗	0	0	✗	0	0	To Do
Kamke 1752	✓	0.134	26	✓	0.124	33	To Do
Kamke 1753	✓	0.337	43	✓	0.146	147	To Do
Kamke 1754	✓	0.034	17	✓	0.044	15	To Do
Kamke 1755	✗	0	0	✓	0.357	418	To Do
Kamke 1756	✓	0.337	111	✓	0.152	75	To Do
Kamke 1757	✗	0	0	✗	0	0	To Do
Kamke 1758	✓	0.06	31	✓	0.066	42	To Do
Kamke 1759	✓	0.036	18	✓	0.034	31	To Do
Kamke 1760	✗	0	0	✓	0.084	114	To Do
Kamke 1761	✗	0	0	✗	0	0	To Do
Kamke 1762	✗	0	0	✓	0.944	108	To Do
Kamke 1763	✓	0.15	33	✓	0.06	148	To Do
Kamke 1764	✓	0.066	37	✓	0.197	18	To Do
Kamke 1765	✓	0.131	24	✓	0.036	27	To Do
Kamke 1766	✓	0.047	21	✓	0.042	64	To Do
Kamke 1767	✓	0.083	54	✓	0.373	50	To Do
Kamke 1768	✓	0.119	79	✓	0.063	43	To Do
Kamke 1769	✓	0.047	18	✓	0.043	21	To Do
Kamke 1770	✓	0.812	22	✓	0.067	26	To Do

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Table 3 – continued from previous page

#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 1771	✓	0.085	20	✓	0.201	22	To Do
Kamke 1772	✓	0.989	36	✓	0.164	37	To Do
Kamke 1773	✓	0.195	44	✓	0.045	30	To Do
Kamke 1774	✓	1.426	92	✓	0.303	136	To Do
Kamke 1775	✓	0.135	24	✓	0.11	31	To Do
Kamke 1776	✗	0	0	✓	0.35	49	To Do
Kamke 1777	✗	0	0	✓	0.714	79	To Do
Kamke 1778	✓	0.964	75	✓	0.562	245	To Do
Kamke 1779	✗	0	0	✓	0.585	112	To Do
Kamke 1780	✗	0	0	✓	0.639	160	To Do
Kamke 1781	✓	0.084	14	✓	0.062	11	To Do
Kamke 1782	✓	0.09	93	✓	0.056	33	To Do
Kamke 1783	✓	1.466	24	✓	0.189	23	To Do
Kamke 1784	✓	0.296	72	✓	0.643	82	To Do
Kamke 1785	✓	0.381	95	✓	0.421	83	To Do
Kamke 1786	✓	1.055	87	✓	0.218	42	To Do
Kamke 1787	✗	0	0	✓	0.315	80	To Do
Kamke 1788	✗	0	0	✗	0	0	To Do
Kamke 1789	✗	0	0	✗	0	0	To Do
Kamke 1790	✓	23.799	182	✓	0.287	119	To Do
Kamke 1791	✓	23.863	164	✓	0.41	90	To Do
Kamke 1792	✓	27.964	222	✓	1.03	194	To Do
Kamke 1793	✓	1.432	113	✓	0.073	40	To Do
Kamke 1794	✓	1.327	98	✓	0.099	46	To Do
Kamke 1795	✓	0.341	103	✓	1.237	529	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 1796	✓	0.341	65	✓	0.256	51	To Do
Kamke 1797	✗	0	0	✗	0	0	To Do
Kamke 1798	✗	0	0	✓	0.263	166	To Do
Kamke 1799	✓	1.911	58	✓	0.155	46	To Do
Kamke 1800	✓	0.511	78	✓	0.056	60	To Do
Kamke 1801	✗	0	0	✗	0	0	To Do
Kamke 1802	✗	0	0	✗	0	0	To Do
Kamke 1803	✓	21.168	9968	✓	2.592	115620	To Do
Kamke 1804	✓	3.131	415	✓	0.038	31	To Do
Kamke 1805	✓	2.647	436	✓	0.05	34	To Do
Kamke 1806	✗	0	0	✓	5.29	819	To Do
Kamke 1807	✗	0	0	✗	0	0	To Do
Kamke 1808	✓	104.67	155	✓	0.146	72	To Do
Kamke 1809	✗	0	0	✓	0.776	336	To Do
Kamke 1810	✓	0.111	1881	✓	0.139	91	To Do
Kamke 1811	✗	0	0	✗	0	0	To Do
Kamke 1812	✓	0.029	29	✓	0.042	19	To Do
Kamke 1813	✗	0	0	✓	0.424	138	To Do
Kamke 1814	✓	13.818	116	✓	0.207	87	To Do
Kamke 1815	✗	0	0	✓	0.882	71	To Do
Kamke 1816	✗	0	0	✓	1.231	46	To Do
Kamke 1817	✗	0	0	✓	0.295	40	To Do
Kamke 1818	✗	0	0	✓	0.443	66	To Do
Kamke 1819	✗	0	0	✓	0.072	42	To Do
Kamke 1820	✗	0	0	✓	1.211	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	✓	2.023	54	To Do
Kamke 1822	✓	1.124	369	✓	1.39	291	To Do
Kamke 1823	✗	0	0	✓	0.446	289	To Do
Kamke 1824	✓	0.378	347	✓	0.899	96	To Do
Kamke 1825	✗	0	0	✓	0.993	49	To Do
Kamke 1826	✓	0.828	119	✓	0.414	173	To Do
Kamke 1827	✗	0	0	✓	13.97	81	To Do
Kamke 1828	✓	0.011	32	✓	0.676	59	To Do
Kamke 1829	✓	0.007	24	✓	0.451	32	To Do
Kamke 1830	✓	0.028	24	✓	0.635	304	To Do
Kamke 1831	✗	0	0	✓	1.186	163	To Do
Kamke 1832	✗	0	0	✓	1.023	117	To Do
Kamke 1833	✗	0	0	✓	3.854	145	To Do
Kamke 1834	✗	0	0	✓	0.509	82	To Do
Kamke 1835	✓	0.129	131	✗	0	0	To Do
Kamke 1836	✗	0	0	✓	0.507	100	To Do
Kamke 1837	✗	0	0	✓	0.378	95	To Do
Kamke 1838	✗	0	0	✓	0.635	73	To Do
Kamke 1839	✗	0	0	✓	0.905	116	To Do
Kamke 1840	✗	0	0	✓	0.991	129	To Do
Kamke 1841	✗	0	0	✓	0.595	60	To Do
Kamke 1842	✓	0.181	282	✓	0.696	190	To Do
Kamke 1843	✓	3.106	409	✓	0.335	77	To Do
Kamke 1844	✗	0	0	✓	0.346	17	To Do
Kamke 1845	✗	0	0	✓	0.277	22	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 1846	✓	0.045	51	✓	0.014	28	To Do
Kamke 1847	✓	0.13	95	✓	0.331	49	To Do
Kamke 1848	✗	0	0	✓	1.273	789	To Do
Kamke 1849	✓	0.697	415	✓	0.233	197	To Do
Kamke 1850	✗	0	0	✓	1.667	164	To Do
Kamke 1851	✗	0	0	✗	0	0	To Do
Kamke 1852	✓	0.037	28	✓	0.257	28	To Do
Kamke 1853	✗	0	0	✓	0.875	110	To Do
Kamke 1854	✗	0	0	✗	0	0	To Do
Kamke 1855	✗	0	0	✗	0	0	To Do
Kamke 1856	✓	0.006	22	✓	0.067	19	To Do
Kamke 1857	✓	0.129	39	✓	0.05	35	To Do
Kamke 1858	✓	0.042	158	✓	0.059	65	To Do
Kamke 1859	✓	0.006	43	✓	0.041	37	To Do
Kamke 1860	✓	0.052	362	✓	0.083	177	To Do
Kamke 1861	✓	0.014	145	✓	0.116	152	To Do
Kamke 1862	✓	0.102	46	✓	0.042	39	To Do
Kamke 1863	✓	0.012	72	✓	0.04	35	To Do
Kamke 1864	✓	0.021	52	✓	0.043	44	To Do
Kamke 1865	✓	1.324	926	✓	0.142	224	To Do
Kamke 1866	✓	0.03	47	✓	0.039	39	To Do
Kamke 1867	✓	0.089	45	✓	0.039	42	To Do
Kamke 1868	✓	0.049	76	✓	0.077	64	To Do
Kamke 1869	✓	0.246	84	✓	0.064	51	To Do
Kamke 1870	✓	0.317	71	✓	0.113	47	To Do

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Table 3 – continued from previous page

#	Mathematica			Maple			note on solution
	solved	cpu	leaf	solved	cpu	leaf	
Kamke 1871	✓	0.176	79	✓	0.082	62	To Do
Kamke 1872	✓	0.063	76	✓	0.069	65	To Do
Kamke 1873	✓	0.048	104	✓	0.068	52	To Do
Kamke 1874	✓	0.141	105	✓	0.481	57	To Do
Kamke 1875	✗	0	0	✓	1.347	1447	To Do
Kamke 1876	✓	0.109	41	✓	0.142	18	To Do
Kamke 1877	✓	0.006	31	✓	0.038	31	To Do
Kamke 1878	✓	0.013	39	✓	0.063	39	To Do
Kamke 1879	✓	0.135	58	✓	0.057	54	To Do
Kamke 1880	✗	0	0	✓	0.084	23	To Do
Kamke 1881	✓	0.064	44	✓	0.03	48	To Do
Kamke 1882	✓	0.507	199	✓	0.086	99	To Do
Kamke 1883	✓	0.557	170	✓	0.116	80	To Do
Kamke 1884	✓	0.223	116	✓	0.11	69	To Do
Kamke 1885	✗	0	0	✓	0.113	47	To Do
Kamke 1886	✓	0.022	103	✓	0.08	49	To Do
Kamke 1887	✓	0.586	5647	✓	0.143	360	To Do
Kamke 1888	✓	25.969	1	✓	0.252	457	To Do
Kamke 1889	✓	0.115	151	✓	0.056	60	To Do
Kamke 1890	✗	0	0	✗	0	0	To Do
Kamke 1891	✓	0.499	200	✓	0.059	64	To Do
Kamke 1892	✓	0.431	3522	✓	0.155	463	To Do
Kamke 1893	✗	0	0	✓	1.248	1579	To Do
Kamke 1894	✗	0	0	✓	1.013	1056	To Do
Kamke 1895	✓	0.465	6816	✓	0.253	1008	To Do

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Table 3 – continued from previous page

#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 1896	✓	0.21	246	✓	0.068	67	To Do
Kamke 1897	✓	0.12	118	✓	0.174	86	To Do
Kamke 1898	✓	0.04	246	✓	0.077	71	To Do
Kamke 1899	✓	0.013	93	✓	0.089	52	To Do
Kamke 1900	✓	0.011	88	✓	0.087	50	To Do
Kamke 1901	✓	0.011	93	✓	0.076	43	To Do
Kamke 1902	✓	0.016	109	✓	0.07	51	To Do
Kamke 1903	✓	0.099	736	✓	0.163	299	To Do
Kamke 1904	✓	0.073	1084	✓	0.098	257	To Do
Kamke 1905	✗	0	0	✗	0	0	To Do
Kamke 1906	✓	0.056	177	✓	0.082	120	To Do
Kamke 1907	✓	0.014	157	✓	0.067	66	To Do
Kamke 1908	✓	0.047	551	✓	0.726	1213	To Do
Kamke 1909	✓	0.063	1630	✓	27.45	33085	To Do
Kamke 1910	✓	0.011	39	✓	0.098	37	To Do
Kamke 1911	✗	0	0	✓	0.155	309	To Do
Kamke 1912	✗	0	0	✓	2.662	2956	To Do
Kamke 1913	✓	0.052	52	✓	0.146	57	To Do
Kamke 1914	✓	0.701	198	✓	0.497	92	To Do
Kamke 1915	✗	0	0	✓	10.175	147	To Do
Kamke 1916	✗	0	0	✓	0.683	180	To Do
Kamke 1917	✗	0	0	✓	0.932	109	To Do
Kamke 1918	✗	0	0	✓	1.995	182	To Do
Kamke 1919	✗	0	0	✓	3.04	200	To Do
Kamke 1920	✗	0	0	✓	3.084	202	To Do

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Table 3 – continued from previous page

#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 1921	✗	0	0	✗	0	0	To Do
Kamke 1922	✗	0	0	✗	0	0	To Do
Kamke 1923	✓	0.014	39	✓	0.044	35	To Do
Kamke 1924	✓	0.077	179	✓	0.359	180	To Do
Kamke 1925	✗	0	0	✓	0.308	194	To Do
Kamke 1926	✗	0	0	✓	0.174	96	To Do
Kamke 1927	✗	0	0	✗	0	0	To Do
Kamke 1928	✗	0	0	✗	0	0	To Do
Kamke 1929	✗	0	0	✓	3.917	116	To Do
Kamke 1930	✓	0.053	127	✓	0.055	45	To Do
Kamke 1931	✓	5.638	1461	✓	0.861	1117	To Do
Kamke 1932	✗	0	0	✓	1.207	383	To Do
Kamke 1933	✗	0	0	✓	2.476	17738	To Do
Kamke 1934	✗	0	0	✓	1.379	377	To Do
Kamke 1935	✗	0	0	✓	2.278	741	To Do
Kamke 1936	✗	0	0	✓	0.791	704	To Do
Kamke 1937	✗	0	0	✓	0.799	240	To Do
Kamke 1938	✓	0.01	137	✓	0.132	101	To Do
Kamke 1939	✗	0	0	✓	1.619	899	To Do
Kamke 1940	✗	0	0	✗	0	0	To Do

2.1 ODE No. 1

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

✓ **Mathematica** : cpu = 1.19496 (sec), leaf count = 1117

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

✓ **Maple** : cpu = 0.45 (sec), leaf count = 1089

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

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 = 0.0323651 (sec), leaf count = 33

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

✓ **Maple** : cpu = 0.163 (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 = 0.0497953 (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 = 0.211 (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

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

Therefore (2) becomes

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

2.4 ODE No. 4

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

✓ **Mathematica** : cpu = 0.00998446 (sec), leaf count = 24

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

✓ **Maple** : cpu = 0.006 (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 $\mu = e^{\int 2xdx} = e^{x^2}$. 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 = 3.58577 (sec), leaf count = 31

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

✓ **Maple** : cpu = 1.103 (sec), leaf count = 21

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

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

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

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

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

Integrating both sides

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

2.6 ODE No. 6

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

✓ **Mathematica** : cpu = 0.0245693 (sec), leaf count = 18

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

✓ **Maple** : cpu = 0.05 (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 = 0.0258166 (sec), leaf count = 16

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

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

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

Hand solution

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

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

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

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

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

2.8 ODE No. 8

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

✓ **Mathematica** : cpu = 0.0259315 (sec), leaf count = 15

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

✓ **Maple** : cpu = 0.056 (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 = 0.0173847 (sec), leaf count = 17

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

✓ **Maple** : cpu = 0.028 (sec), leaf count = 14

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

Hand solution

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

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 $\int \sin\left(\log\left(x\right)\right) + \cos\left(\log\left(x\right)\right) dx$, let $r = \log\left(x\right)$, $\frac{dr}{dx} = \frac{1}{x}$, then $dx = x dr$, But $x = e^r$, hence the integral becomes

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

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

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

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

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

Hence the integration factor is

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

Therefore (1) becomes

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

Integrating

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

2.10 ODE No. 10

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

✓ **Mathematica** : cpu = 0.00920306 (sec), leaf count = 18

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

✓ **Maple** : cpu = 0.012 (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 = 0.495627 (sec), leaf count = 48

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

✓ **Maple** : cpu = 0.117 (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 = 0.0895491 (sec), leaf count = 34

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

✓ **Maple** : cpu = 0.203 (sec), leaf count = 8

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

Hand solution

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

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 = 0.0715606 (sec), leaf count = 69

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

✓ **Maple** : cpu = 1.201 (sec), leaf count = 79

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

Hand solution

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

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

Since $u' = yu$ then

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

So we have new second order ODE

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

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

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

Therefore the solution to (3) is

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

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

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

Therefore since $u' = yu$ then

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

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

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

Reference: Airy function

2.14 ODE No. 14

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

✓ **Mathematica** : cpu = 0.0189552 (sec), leaf count = 253

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

✓ **Maple** : cpu = 0.393 (sec), leaf count = 187

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

Hand solution

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

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

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

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

Since $u' = yu$ then

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

So we have new second order ODE

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

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

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

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

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

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

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

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

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

And

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

Therefore

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

Since $u' = yu$ then

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

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 = 0.0215375 (sec), leaf count = 25

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

✓ **Maple** : cpu = 0.887 (sec), leaf count = 33

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

Hand solution

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

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

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

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

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

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

Hence

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

This is separable

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

Integrating both sides

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

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

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

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

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

Since $u = y - x^2$ then

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

To obtain same solution as Maple, we divide by C_1

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

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

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

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

2.16 ODE No. 16

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

✗ **Mathematica** : cpu = 21.1718 (sec), leaf count = 0 , could not solve

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

✓ **Maple** : cpu = 0.345 (sec), leaf count = 49

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

Hand solution

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

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

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

Hence

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

Equating (1) and (2) gives

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

Hence

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

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

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

Integrating both sides

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

Hence

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

Hence

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

2.17 ODE No. 17

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

✓ **Mathematica** : cpu = 0.0247082 (sec), leaf count = 30

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

✓ **Maple** : cpu = 0.143 (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 $\frac{-b\pm\sqrt{b^2-4ac}}{2a} = \frac{3\pm\sqrt{9+16}}{2} = \frac{3\pm 5}{2} = \{4, -1\}$, hence

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

And

$$u'(x) = c_14e^{4x} - c_2e^{-x}$$

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 = 0.0250423 (sec), leaf count = 49

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

✓ **Maple** : cpu = 0.107 (sec), leaf count = 39

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

Hand solution

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

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 = 0.0107691 (sec), leaf count = 30

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

✓ **Maple** : cpu = 0.074 (sec), leaf count = 16

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

Hand solution

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

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

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

This is separable

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

Since $u = y + x$ then

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

2.20 ODE No. 20

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

✓ **Mathematica** : cpu = 0.716725 (sec), leaf count = 48

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

✓ **Maple** : cpu = 0.122 (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

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

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

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

Integrating

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

Therefore

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

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

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

2.21 ODE No. 21

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

✓ **Mathematica** : cpu = 7.28133 (sec), leaf count = 57

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

✓ **Maple** : cpu = 0.21 (sec), leaf count = 25

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

Hand solution

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

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

$$y_p = \sin(x)$$

Therefore

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

Equating this to (1) gives

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

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

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

Integrating both sides

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

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

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

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

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

2.22 ODE No. 22

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

✗ **Mathematica** : cpu = 300.736 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 1.644 (sec), leaf count = 128

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

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

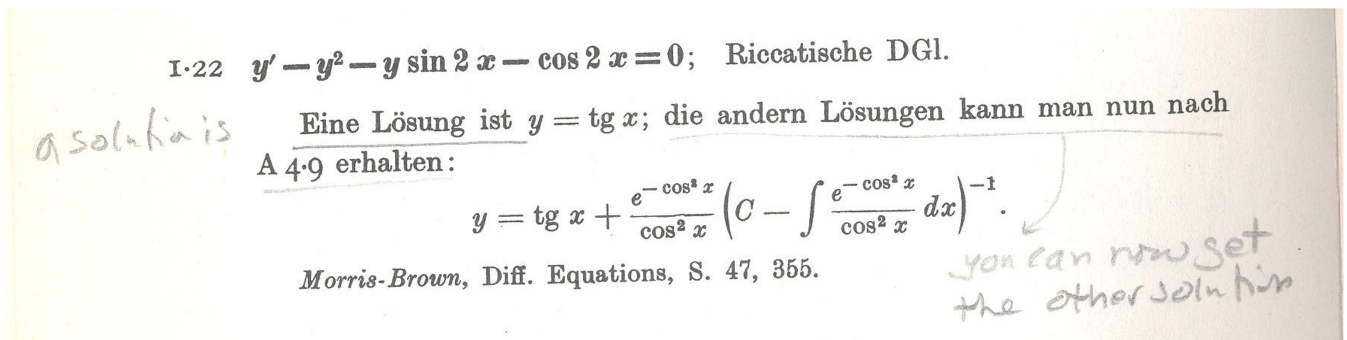
$$
\begin{aligned}
\frac{1}{\cos^2 x}e^{-\cos^2 x}u &= -\int \frac{e^{-\cos^2 x}}{\cos^2 x}dx + C \\
u &= \cos^2 x e^{\cos^2 x}\left(C - \int \frac{e^{-\cos^2 x}}{\cos^2 x}dx\right)
\end{aligned}
$$

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 $y = \mathrm{tg}\, x$; die andern Lösungen kann man nun nach A 4·9 erhalten:

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

Morris-Brown, Diff. Equations, S. 47, 355. you can now set the other soln

2.23 ODE No. 23

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

✓ **Mathematica** : cpu = 5.2031 (sec), leaf count = 32

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

✓ **Maple** : cpu = 0.052 (sec), leaf count = 23

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

Hand solution

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

Separable,

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

But

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

Hence

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

2.24 ODE No. 24

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

✓ **Mathematica** : cpu = 0.134876 (sec), leaf count = 276

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

✓ **Maple** : cpu = 0.111 (sec), leaf count = 201

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

Hand solution

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

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

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

Hence

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

Therefore (1) becomes

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

Hence

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

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

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

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

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

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

Using these, then

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

Hence for $ab < 0$

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

Using derivatives the above becomes

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

Similar result can be found for $ab > 0$

2.25 ODE No. 25

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

✓ **Mathematica** : cpu = 3.85522 (sec), leaf count = 516

$$
\left\{\left\{y(x) \to -\frac{x^\nu\left(\sqrt{b}c_1(\nu+1)\sqrt{(\nu+1)^2}U\left(\frac{1}{2}\left(\frac{\sqrt{a}c}{\sqrt{b}\sqrt{(\nu+1)^2}}+\frac{\nu}{\nu+1}\right),\frac{\nu}{\nu+1},\frac{2\sqrt{a}\sqrt{b}x^{\nu+1}}{\sqrt{(\nu+1)^2}}\right)+c_1\left(\sqrt{a}c(\nu+1)+\sqrt{b}\sqrt{(\nu\right.\right.}{\sqrt{a}(\nu+1)^2\left(c_1U\left(\frac{1}{2}\right.\right.}\right.\right.
$$

✓ **Maple** : cpu = 0.512 (sec), leaf count = 348

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

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 = 0.361935 (sec), leaf count = 56

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

✓ **Maple** : cpu = 0.115 (sec), leaf count = 45

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

Hand solution

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

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

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

Comparing to (1) results in

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

Hence

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

$$
u'' + u'(Ab + Ba) + u(ABab) = 0
$$

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 = 20.7062 (sec), leaf count = 88

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

✓ **Maple** : cpu = 0.342 (sec), leaf count = 72

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

Hand solution

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

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

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

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

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

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

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

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

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

But

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

Therefore

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

Hence

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

Since $u = y - x$ then

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

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 = 0.375703 (sec), leaf count = 63

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

✓ **Maple** : cpu = 0.291 (sec), leaf count = 51

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

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

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

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

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

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

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

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

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

Verification

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

2.29 ODE No. 29

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

✓ **Mathematica** : cpu = 0.0239502 (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 = 0.015 (sec), leaf count = 19

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

Hand solution

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

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

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

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

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

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

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

Integrating both sides gives

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

Hence from above

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

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

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

Verification

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

2.30 ODE No. 30

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

✓ **Mathematica** : cpu = 0.289385 (sec), leaf count = 197

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

✓ **Maple** : cpu = 0.097 (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 $n\geq 1$

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

For $r=0$, we obtain

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

For $r=-a$

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

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

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

For $n=2$

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

For $n=3$

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

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

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

Since

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

and

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

Then

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

And (5) can now be written as

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

But modified Bessel function of first kind is

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

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

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

Hence

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

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

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

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 = 1.10159 (sec), leaf count = 21

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

✓ **Maple** : cpu = 0.066 (sec), leaf count = 23

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

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

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

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 = 0.169157 (sec), leaf count = 26

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

✓ **Maple** : cpu = 0.396 (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

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

Hence

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

Or

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

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 = 42.8365 (sec), leaf count = 114

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

✓ **Maple** : cpu = 0.846 (sec), leaf count = 58

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

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 = 0.560091 (sec), leaf count = 51

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

✓ **Maple** : cpu = 0.031 (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

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

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

$$
\frac{y'}{y^2} = -g\frac{1}{y} - f \qquad (2)
$$

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

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

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

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

Hence

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

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 = 0.0624036 (sec), leaf count = 48

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

✓ **Maple** : cpu = 0.073 (sec), leaf count = 35

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

Hand solution

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

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

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

Hence

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

Equating this to RHS of (1) gives

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

Simplifying

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

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

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

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

Hence

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

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 = 0.606976 (sec), leaf count = 171

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

✓ **Maple** : cpu = 0.236 (sec), leaf count = 62

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

Hand solution

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

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

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

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

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

For $g(x) \neq 0$.

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

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

Equating the above to the RHS of (1) gives

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

Writing as

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

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

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

Hence

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

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

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

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

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

We now go back to (3) and find x

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

Since

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

Then

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

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

2.37 ODE No. 37

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

✓ **Mathematica** : cpu = 1.01565 (sec), leaf count = 73

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

✓ **Maple** : cpu = 0.101 (sec), leaf count = 50

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

2.38 ODE No. 38

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

✓ **Mathematica** : cpu = 0.117269 (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 = 0.085 (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 = 0.0579837 (sec), leaf count = 54

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

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

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

2.40 ODE No. 40

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

✓ **Mathematica** : cpu = 0.455891 (sec), leaf count = 161

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

✓ **Maple** : cpu = 0.08 (sec), leaf count = 48

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

2.41 ODE No. 41

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

✓ **Mathematica** : cpu = 0.160415 (sec), leaf count = 98

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

✓ **Maple** : cpu = 0.309 (sec), leaf count = 103

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

2.42 ODE No. 42

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

✓ **Mathematica** : cpu = 1.78985 (sec), leaf count = 136

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

✓ **Maple** : cpu = 0.044 (sec), leaf count = 40

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

2.43 ODE No. 43

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

✓ **Mathematica** : cpu = 10.3341 (sec), leaf count = 352

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

✓ **Maple** : cpu = 2.198 (sec), leaf count = 373

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

2.44 ODE No. 44

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

✓ **Mathematica** : cpu = 0.0186058 (sec), leaf count = 65

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

✓ **Maple** : cpu = 0.024 (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

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

Hence

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

Or

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

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 = 0.79557 (sec), leaf count = 120

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

✓ **Maple** : cpu = 0.186 (sec), leaf count = 123

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

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 = 0.3157 (sec), leaf count = 254

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

✓ **Maple** : cpu = 0.167 (sec), leaf count = 956

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

2.47 ODE No. 47

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

✗ **Mathematica** : cpu = 34.2032 (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

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

✗ **Mathematica** : cpu = 38.0406 (sec), leaf count = 0 , could not solve

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

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

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

2.49 ODE No. 49

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

✗ **Mathematica** : cpu = 29.4264 (sec), leaf count = 0 , could not solve

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

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

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

2.50 ODE No. 50

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

✗ **Mathematica** : cpu = 135.783 (sec), leaf count = 0 , could not solve

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

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

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

2.51 ODE No. 51

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

✓ **Mathematica** : cpu = 0.864297 (sec), leaf count = 322

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

✓ **Maple** : cpu = 0.235 (sec), leaf count = 237

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

2.52 ODE No. 52

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

✓ **Mathematica** : cpu = 175.47 (sec), leaf count = 109

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

✓ **Maple** : cpu = 0.271 (sec), leaf count = 61

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

2.53 ODE No. 53

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

✓ **Mathematica** : cpu = 105.501 (sec), leaf count = 95

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

✓ **Maple** : cpu = 0.07 (sec), leaf count = 281

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

2.54 ODE No. 54

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

✓ **Mathematica** : cpu = 0.16318 (sec), leaf count = 74

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

✓ **Maple** : cpu = 0.236 (sec), leaf count = 38

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

2.55 ODE No. 55

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

✗ **Mathematica** : cpu = 4.14723 (sec), leaf count = 0 , could not solve

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

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

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

2.56 ODE No. 56

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

✗ **Mathematica** : cpu = 2.48264 (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 = 168.671 (sec), leaf count = 263

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

✓ **Maple** : cpu = 0.138 (sec), leaf count = 31

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

2.58 ODE No. 58

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

✓ **Mathematica** : cpu = 0.240381 (sec), leaf count = 114

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

✓ **Maple** : cpu = 0.107 (sec), leaf count = 68

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

2.59 ODE No. 59

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

✓ **Mathematica** : cpu = 0.195319 (sec), leaf count = 96

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

✓ **Maple** : cpu = 0.076 (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 = 0.05088 (sec), leaf count = 44

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

✓ **Maple** : cpu = 0.018 (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 = 0.188285 (sec), leaf count = 75

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

✓ **Maple** : cpu = 0.015 (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 = 4.17572 (sec), leaf count = 36

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

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

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

Hand solution

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

Let $y = ux$ then $y' = u + xu'$ therefore

$$\begin{aligned}
u + xu' &= \frac{y - x^2\sqrt{x^2 - y^2}}{xy\sqrt{x^2 - y^2} + x} \\
&= \frac{ux - x^2\sqrt{x^2 - (ux)^2}}{x(ux)\sqrt{x^2 - (ux)^2} + x} \\
&= \frac{ux - x^3\sqrt{1 - u^2}}{x^3u\sqrt{1 - u^2} + x} \\
&= \frac{u - x^2\sqrt{1 - u^2}}{x^2u\sqrt{1 - u^2} + 1}
\end{aligned}$$

Hence

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

Hence

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

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

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

Therefore (2) is exact. Let

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

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

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

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

From (3)

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

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

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

Hence

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

2.63 ODE No. 63

$$y'(x)-\frac{y(x)^2+1}{(x+1)^{3/2}\left|y(x)+\sqrt{y(x)+1}\right|}=0$$

✗ **Mathematica** : cpu = 300.825 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 6.707 (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 = 0.193224 (sec), leaf count = 90

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

✓ **Maple** : cpu = 0.109 (sec), leaf count = 124

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

2.65 ODE No. 65

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

✓ **Mathematica** : cpu = 1.6787 (sec), leaf count = 312

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

✓ **Maple** : cpu = 0.054 (sec), leaf count = 47

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

2.66 ODE No. 66

$$y'(x)-\frac{\sqrt{|(1-y(x))y(x)(1-ay(x))|}}{\sqrt{|(1-x)x(1-ax)|}}=0$$

✗ **Mathematica** : cpu = 300.001 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.126 (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 = 0.0646598 (sec), leaf count = 14

$$\left\{\left\{y(x)\to \mathrm{sn}\left(c_1+F\left(\sin^{-1}(x)\middle|-1\right)\middle|-1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.015 (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 = 0.942037 (sec), leaf count = 373

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

✓ **Maple** : cpu = 0.072 (sec), leaf count = 77

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

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 = 99.1945 (sec), leaf count = 1

$Aborted

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

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

2.70 ODE No. 70

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

✗ **Mathematica** : cpu = 300.054 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.198 (sec), leaf count = 113

$$\left\{\int^{y(x)}\sqrt{\_a^4 b4+\_a^3 b3+\_a^2 b2+\_a\,b1+b0}\,d\_a+\int^{x}-\sqrt{\frac{\_a^4 a4+\_a^3 a3+\_a^2 a2+\_a\,a1+a0}{b4\ (y\,(x))^4+b3\ (y\,(x))^3+b2\ (y\,(x))^2+b1\,y\,(x}}\right.$$

2.71 ODE No. 71

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

✓ **Mathematica** : cpu = 4.81031 (sec), leaf count = 2237

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

✓ **Maple** : cpu = 0.157 (sec), leaf count = 113

$$\left\{\int^{y(x)}\frac{1}{\sqrt{\_a^4 b4+\_a^3 b3+\_a^2 b2+\_a\, b1+b0}}d\_a+\int^{x}-1\sqrt{\frac{b4\ (y(x))^4+b3\ (y(x))^3+b2\ (y(x))^2+b1\ y}{\_a^4 a4+\_a^3 a3+\_a^2 a2+\_a\, a1+a}}\right.$$

2.72 ODE No. 72

$$y'(x)-\mathrm{R1}\left(x,\sqrt{\mathrm{a0}+\mathrm{a1}x+\mathrm{a2}x^2+\mathrm{a3}x^3+\mathrm{a4}x^4}\right)\mathrm{R2}\left(y(x),\sqrt{\mathrm{b0}+\mathrm{b1}y(x)+\mathrm{b2}y(x)^2+\mathrm{b3}y(x)^3+\mathrm{b4}y(x)^4}\right)=0$$

✓ **Mathematica** : cpu = 0.927387 (sec), leaf count = 84

$$\left\{\left\{y(x)\to\mathrm{InverseFunction}\left[\int_1^{\#1}\frac{1}{\mathrm{R2}\left(K[1],\sqrt{\mathrm{b1}K[1]+\mathrm{b2}K[1]^2+\mathrm{b3}K[1]^3+\mathrm{b4}K[1]^4+\mathrm{b0}}\right)}dK[1]\&\right]\left[\int_1^x \mathrm{R1}\right.\right.\right.$$

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

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

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 = 1.8261 (sec), leaf count = 733

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

✓ **Maple** : cpu = 0.43 (sec), leaf count = 91

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

2.74 ODE No. 74

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

✗ **Mathematica** : cpu = 3.22816 (sec), leaf count = 0 , could not solve

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

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

```
dsolve(diff(y(x),x)-f(x)*(y(x)-g(x))*((y(x)-a)*(y(x)-b))^(1/2) = 0,y(x))
```

2.75 ODE No. 75

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

✓ **Mathematica** : cpu = 0.0202831 (sec), leaf count = 18

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

✓ **Maple** : cpu = 0.192 (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

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

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

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

Hence

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

Taking logs

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

Let $e^{C_1} = C_2$ then

$$
y = \ln\left(1 - C_2 e^{-e^{x}}\right)
$$

Verification

```
ode:=diff(y(x),x)=exp(x-y(x))-exp(x);
my_sol:=log(1-_C1*exp(-exp(x)));
odetest(y(x)=my_sol,ode);
0
```

2.76 ODE No. 76

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

✓ **Mathematica** : cpu = 0.106016 (sec), leaf count = 51

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

✓ **Maple** : cpu = 0.075 (sec), leaf count = 41

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

Hand solution

$$y' = a\cos y + b$$

This is separable.

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

Using standard Tangent half-angle substitution, let $t=\tan\frac{y}{2}, \cos y = \frac{1-t^2}{1+t^2}, dy = \frac{2}{1+t^2}dt$, then the integral becomes

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

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

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

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

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

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

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

Going back to (1)

$$\int \frac{dy}{a\cos y + b} = x + C$$

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

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

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

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

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

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

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

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 = 0.319637 (sec), leaf count = 58

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

✓ **Maple** : cpu = 0.086 (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 = 0.921878 (sec), leaf count = 86

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

✓ **Maple** : cpu = 2.266 (sec), leaf count = 89

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

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

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

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

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

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

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

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

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

Back to (1), therefore after integrating both sides

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

Let

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

Then

$$\begin{aligned}
\tanh^{-1}\left(\frac{\tan\left(\frac{\alpha y+\beta x}{2}\right)(b\alpha-\beta)+a\alpha}{A}\right)&=\frac{1}{2}A(x+C)\\
\frac{\tan\left(\frac{\alpha y+\beta x}{2}\right)(b\alpha-\beta)+a\alpha}{A}&=\tanh\left(\frac{1}{2}A(x+C)\right)\\
\tan\left(\frac{\alpha y+\beta x}{2}\right)(b\alpha-\beta)+a\alpha&=A\tanh\left(\frac{1}{2}A(x+C)\right)\\
\tan\left(\frac{\alpha y+\beta x}{2}\right)&=\frac{A}{(b\alpha-\beta)}\tanh\left(\frac{1}{2}A(x+C)\right)-\frac{a\alpha}{(b\alpha-\beta)}\\
\frac{\alpha y+\beta x}{2}&=\arctan\left(\frac{A}{(b\alpha-\beta)}\tanh\left(\frac{1}{2}A(x+C)\right)-\frac{a\alpha}{(b\alpha-\beta)}\right)\\
y&=\frac{2}{\alpha}\arctan\left(\frac{A}{(b\alpha-\beta)}\tanh\left(\frac{1}{2}A(x+C)\right)-\frac{a\alpha}{(b\alpha-\beta)}\right)-\frac{\beta x}{\alpha}
\end{aligned}$$

Verification

```
ode:=diff(y(x),x)=-a*sin(alpha*y(x)+beta*x)-b;
A0:=sqrt(alpha^2*a^2-(alpha^2*b^2+beta^2-2*alpha*b*beta));
B0:=(alpha*b-beta);
my_sol:=2/alpha*arctan(A0/B0*tanh((1/2)*A0*(x+_C1))-a*alpha/(B0))-beta*x/alpha;
odetest(y(x)=my_sol,ode);
0
```

2.79 ODE No. 79

$$f(x)\cos(ay(x)) + g(x)\sin(ay(x)) + h(x) + y'(x) = 0$$

✗ **Mathematica** : cpu = 25.3884 (sec), leaf count = 0 , could not solve

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

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

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

2.80 ODE No. 80

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

✗ **Mathematica** : cpu = 24.0714 (sec), leaf count = 0 , could not solve

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

✓ **Maple** : cpu = 1.477 (sec), leaf count = 41

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

2.81 ODE No. 81

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

✗ **Mathematica** : cpu = 43.5637 (sec), leaf count = 0 , could not solve

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

✓ **Maple** : cpu = 1.403 (sec), leaf count = 78

$$\left\{\_C1 + \tan(x)\frac{1}{\sqrt[4]{\frac{\left(1+(\tan(y(x)))^2\right)\left(1+(\tan(x))^2\right)}{(\tan(y(x))\tan(x)-1)^2}}} + \frac{\tan(y(x)) + \tan(x)}{2\tan(y(x))\tan(x) - 2}{}_2F_1\left(\frac{1}{2},\frac{5}{4};\frac{3}{2};-\frac{(\tan(y(x)) + \tan(x))^2}{(\tan(y(x))\tan(x) - 1)\right.$$

2.82 ODE No. 82

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

✗ **Mathematica** : cpu = 50.5929 (sec), leaf count = 0 , could not solve

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

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

```
dsolve(diff(y(x),x)-a*(1+tan(y(x))^2)+tan(y(x))*tan(x) = 0,y(x))
```

2.83 ODE No. 83

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

✗ **Mathematica** : cpu = 40.3984 (sec), leaf count = 0 , could not solve

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

✓ **Maple** : cpu = 0.445 (sec), leaf count = 44

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

2.84 ODE No. 84

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

✓ **Mathematica** : cpu = 11.0486 (sec), leaf count = 108

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

✓ **Maple** : cpu = 0.042 (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 = 201.532 (sec), leaf count = 160

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

✓ **Maple** : cpu = 0.557 (sec), leaf count = 153

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

2.86 ODE No. 86

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

✗ **Mathematica** : cpu = 299.998 (sec), leaf count = 0 , timed out

```
$Aborted
```

✓ **Maple** : cpu = 0.657 (sec), leaf count = 52

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

2.87 ODE No. 87

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

✗ **Mathematica** : cpu = 15.8005 (sec), leaf count = 0 , could not solve

```
DSolve[-((a*f[x^c*y[x]]*y[x] + c*x^a*y[x]^b)/(b*x*f[x^c*y[x]] - x^a*y[x]^b)) + Derivative[1]
```

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

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

2.88 ODE No. 88

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

✓ **Mathematica** : cpu = 0.303826 (sec), leaf count = 2479

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

✓ **Maple** : cpu = 0.26 (sec), leaf count = 256

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

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 $A = \frac{\sqrt{4a^2-3b}}{a}, B = \frac{\sqrt{3c}e^{-ax}}{a}$ then

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

But

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

Hence from $y = \frac{-2}{3}\frac{u'}{u}$ the solution is now found.

Verification

```
ode:=2*diff(y(x),x)-3*y(x)^2-4*a*y(x)=b+c*exp(-2*a*x);
uode:=diff(u(x),x$2)-2*a*diff(u(x),x)+3/4*(b+c*(exp(-2*a*x)))*u(x)=0;
uSol:=dsolve(uode,u(x));
my_sol:=(-2/3)*diff(rhs(uSol),x)/rhs(uSol);
odetest(y(x)=my_sol,ode);
0
```

2.89 ODE No. 89

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

✓ **Mathematica** : cpu = 0.0331721 (sec), leaf count = 46

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

✓ **Maple** : cpu = 0.019 (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 = 0.0143858 (sec), leaf count = 19

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

✓ **Maple** : cpu = 0.013 (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. $\int u dv = uv - \int v du$. Let $u = x, dv = \sin x$, hence $du = 1, v = -\cos x$, therefore

$$\begin{aligned} \int x\sin x dx &= -x\cos x + \int \cos x \\ &= -x\cos x + \sin x \end{aligned}$$

Hence

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

Verification

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

2.91 ODE No. 91

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

✓ **Mathematica** : cpu = 0.00668255 (sec), leaf count = 13

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

✓ **Maple** : cpu = 0.007 (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 = 0.0124823 (sec), leaf count = 14

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

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

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

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 = 0.0196627 (sec), leaf count = 14

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

✓ **Maple** : cpu = 0.018 (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 = 0.0165009 (sec), leaf count = 25

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

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

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

Hand solution

$$xy' + ay + bx^n = 0$$

Linear first order, exact, separable. $y' + \frac{ay}{x} = -bx^{n-1}$, integrating factor $\mu = e^{\int \frac{a}{x} dx} = e^{a \ln x} = x^a$, hence

$$\begin{aligned} d(\mu y) &= -\mu b x^{n-1} \\ x^a y &= -\int b x^{a+n-1} + C \end{aligned}$$

If $a = -n$ then

$$\begin{aligned} x^a y &= -\int b x^{-1} + C \\ y &= -x^{-a} b \ln(x) + x^{-a} C \\ &= x^{-a}(C - b \ln x) \end{aligned}$$

If $a \neq -n$ then

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

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 = 0.0146751 (sec), leaf count = 30

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

✓ **Maple** : cpu = 0.073 (sec), leaf count = 27

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

Hand solution

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

This is Riccati first order non-linear. Writing it in standard form and for $x \neq 0$

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

Where $f_0 = -x, f_1 = 0, f_2 = -\frac{1}{x}$. Using standard substitution $y = \frac{-u'}{uf_2}$ changes the ODE to second order linear ODE

$$y = \frac{xu'}{u} \tag{2}$$

Hence

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

Equating this to RHS of (1) gives

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

This is Lienard ODE. Since it is not constant coefficient ODE, the solution will be in Bessel functions, using Power series method. The solution is

$$u = C_1 \operatorname{BesselJ}(0, x) + C_2 \operatorname{BesselY}(0, x)$$

But $\frac{d}{dx} \operatorname{BesselJ}(0, x) = -\operatorname{BesselJ}(1, x)$ and $\frac{d}{dx} \operatorname{BesselY}(0, x) = -\operatorname{BesselY}(1, x)$, hence

$$u'(x) = -C_1 \operatorname{BesselJ}(1, x) - C_2 \operatorname{BesselY}(1, x)$$

And from (2) the solution is

$$
\begin{aligned}
y &= \frac{xu'}{u} \\
&= x\frac{[-C_1 \operatorname{BesselJ}(1,x) - C_2 \operatorname{BesselY}(1,x)]}{C_1 \operatorname{BesselJ}(0,x) + C_2 \operatorname{BesselY}(0,x)} \\
&= -x\frac{C_1 \operatorname{BesselJ}(1,x) + C_2 \operatorname{BesselY}(1,x)}{C_1 \operatorname{BesselJ}(0,x) + C_2 \operatorname{BesselY}(0,x)}
\end{aligned}
$$

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

$$
y = -x\frac{C \operatorname{BesselJ}(1,x) + \operatorname{BesselY}(1,x)}{C \operatorname{BesselJ}(0,x) + \operatorname{BesselY}(0,x)}
$$

Verification

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

2.96 ODE No. 96

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

✓ **Mathematica** : cpu = 0.0229333 (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 = 0.052 (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

$$\frac{dy}{dx} = \frac{y^2-1}{x}$$
$$\frac{dy}{y^2-1} = \frac{dx}{x}$$

Integrating

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

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 = 0.0274837 (sec), leaf count = 36

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

✓ **Maple** : cpu = 0.044 (sec), leaf count = 25

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

Hand solution

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

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

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

Which is separable, Hence

$$\frac{du}{au^2 + b} = -dx$$

Integrating

$$\begin{aligned}
\frac{1}{\sqrt{ab}} \arctan\left(\frac{au}{\sqrt{ab}}\right) &= -x + C \\
\frac{au}{\sqrt{ab}} &= \tan\left(\sqrt{ab}(-x + C)\right) \\
u &= \frac{\sqrt{ab}}{a} \tan\left(\sqrt{ab}(-x + C)\right)
\end{aligned}$$

Therefore

$$\begin{aligned}
y &= ux \\
&= x\frac{\sqrt{ab}}{a} \tan\left(\sqrt{ab}(-x + C)\right)
\end{aligned}$$

Verification

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

2.98 ODE No. 98

$$ay(x)^2 + cx^{2b} - by(x) + xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.0262253 (sec), leaf count = 123

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

✓ **Maple** : cpu = 0.06 (sec), leaf count = 38

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

2.99 ODE No. 99

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

✓ **Mathematica** : cpu = 0.0186474 (sec), leaf count = 243

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

✓ **Maple** : cpu = 0.129 (sec), leaf count = 171

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

2.100 ODE No. 100

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

✓ **Mathematica** : cpu = 0.00914194 (sec), leaf count = 133

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

✓ **Maple** : cpu = 0.085 (sec), leaf count = 59

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

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

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

Therefore,

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

Which is simplified to

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

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

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

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

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

Verification

```
restart;
ode:=x*diff(y(x),x)+x*y(x)^2+a=0;
num:=_C1*sqrt(a)*BesselJ(0,2*sqrt(a)*sqrt(x))+sqrt(a)*BesselY(0,2*sqrt(a)*sqrt(x));
den:=_C1*sqrt(x)*BesselJ(1,2*sqrt(a)*sqrt(x))+sqrt(x)*BesselY(1,2*sqrt(a)*sqrt(x));
my_solution:=num/den;
odetest(y(x)=my_solution,ode);
0
```

2.101 ODE No. 101

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

✓ **Mathematica** : cpu = 0.00955024 (sec), leaf count = 18

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

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

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

Hand solution

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

This is of the form $y' = f_0 + f_1 y + f_2 y^2$ with $f_0 = 0, f_1 = \frac{1}{x}, f_2 = -1$. Since $f_0 = 0$ this is Bernoulli differential equation. We always start by dividing by y^2

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

Then $u = \frac{1}{y}$ or $y = \frac{1}{u}$, therefore $y' = -\frac{u'}{u^2}$. Equating this to RHS of (1) gives

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

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 = 0.0207206 (sec), leaf count = 30

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

✓ **Maple** : cpu = 0.049 (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

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

Integrating

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

Therefore

$$
\begin{aligned}
y&=xv\\
&=x\sqrt{a}\tanh\left(\sqrt{a}\left(\frac{x^2}{2}+C\right)\right)
\end{aligned}
$$

Verification

```
restart;
ode:=x*diff(y(x),x)+x*y(x)^2-y(x)-a*x^3=0;
my_solution:=x*sqrt(a)*tanh(sqrt(a)*(x^2/2+_C1));
odetest(y(x)=my_solution,ode);
0
```

2.103 ODE No. 103

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

✓ **Mathematica** : cpu = 0.103325 (sec), leaf count = 72

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

✓ **Maple** : cpu = 0.06 (sec), leaf count = 29

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

Hand solution

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

This is Riccati non-linear first order. Converting it to standard form

$$\begin{aligned} y' &= x^2+\frac{\left(2x^2+1\right)}{x}y+y^2 \\ &= f_0+f_1y+f_2y^2 \end{aligned} \tag{1}$$

Using standard transformation $y=-\frac{u'}{uf_2}=-\frac{u'}{u}$, therefore

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

Equating the above to RHS of (1) gives

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

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

$$xu''-\left(2x^2+1\right)u'+ux^3=0 \tag{2}$$

This is second order linear ODE (Sturm-Liouville). Using the transformation $t=\frac{x^2}{2}$, then $\frac{dt}{dx}=x$ and

$$\frac{du}{dx}=\frac{du}{dt}\frac{dt}{dx}=x\frac{du}{dt}=\sqrt{2t}\frac{du}{dt}$$

And

$$\begin{aligned}
\frac{d^2u}{dx^2} &= \frac{d}{dx}\left(\frac{du}{dx}\right) \\
&= \frac{d}{dx}\left(x\frac{du}{dt}\right) \\
&= \frac{du}{dt} + x\frac{d^2u}{dt^2}\frac{dt}{dx} \\
&= \frac{du}{dt} + x\frac{d^2u}{dt^2}x \\
&= \frac{du}{dt} + x^2\frac{d^2u}{dt^2} \\
&= \frac{du}{dt} + 2t\frac{d^2u}{dt^2}
\end{aligned}$$

Hence (2) can be written as

$$\begin{aligned}
\sqrt{2t}\left(\frac{du}{dt} + 2t\frac{d^2u}{dt^2}\right) - (2(2t)+1)\sqrt{2t}\frac{du}{dt} + u(2t)^{\frac{3}{2}} &= 0 \\
\sqrt{2t}\frac{du}{dt} + \sqrt{2t}2t\frac{d^2u}{dt^2} - (4t+1)\sqrt{2t}\frac{du}{dt} + u\left(\sqrt{2t}\right)^3 &= 0 \\
\frac{du}{dt} + 2t\frac{d^2u}{dt^2} - (4t+1)\frac{du}{dt} + 2tu &= 0 \\
\frac{du}{dt} + 2t\frac{d^2u}{dt^2} - 4t\frac{du}{dt} - \frac{du}{dt} + 2tu &= 0 \\
2t\frac{d^2u}{dt^2} - 4t\frac{du}{dt} + 2tu &= 0 \\
2t\left(\frac{d^2u}{dt^2} - 2\frac{du}{dt} + u\right) &= 0
\end{aligned}$$

Hence

$$\frac{d^2u}{dt^2} - 2\frac{du}{dt} + u = 0$$

This is linear second order with constant coefficients. The indicial equation is $\lambda^2 - 2\lambda + 1 = 0$ with roots $\lambda = \frac{-b\pm\sqrt{b^2-4ac}}{2a} = \frac{2\pm\sqrt{4-4}}{2} = 1$ double root. Hence

$$u(t) = Ae^t + tBe^t$$

Since $t = \frac{x^2}{2}$ then

$$u(x) = Ae^{\frac{x^2}{2}} + \frac{x^2}{2}Be^{\frac{x^2}{2}}$$

But $y = -\frac{u'}{u}$ therefore

$$\begin{aligned}
u' &= Axe^{\frac{x^2}{2}} + \left(xBe^{\frac{x^2}{2}} + \frac{x^2}{2}xBe^{\frac{x^2}{2}}\right) \\
&= Axe^{\frac{x^2}{2}} + xBe^{\frac{x^2}{2}} + \frac{x^3}{2}Be^{\frac{x^2}{2}}
\end{aligned}$$

Hence

$$y=-\frac{Axe^{\frac{x^2}{2}}+xBe^{\frac{x^2}{2}}+\frac{x^3}{2}Be^{\frac{x^2}{2}}}{Ae^{\frac{x^2}{2}}+\frac{x^2}{2}Be^{\frac{x^2}{2}}}=-\frac{Axe^{\frac{x^2}{2}}+B\left(xe^{\frac{x^2}{2}}+\frac{x^3}{2}e^{\frac{x^2}{2}}\right)}{Ae^{\frac{x^2}{2}}+\frac{x^2}{2}Be^{\frac{x^2}{2}}}$$

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

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

Verification

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

2.104 ODE No. 104

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

✓ **Mathematica** : cpu = 0.0177441 (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 = 0.077 (sec), leaf count = 63

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

Hand solution

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

$$\begin{aligned}
y'&=-b-\frac{2}{x}y-ay^2 \qquad (1)\\
&=f_0+f_1y+f_2y^2
\end{aligned}$$

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 = 0.185737 (sec), leaf count = 301

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

✓ **Maple** : cpu = 0.336 (sec), leaf count = 844

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

2.106 ODE No. 106

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

✓ **Mathematica** : cpu = 0.0398361 (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 = 0.053 (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 = 0.271771 (sec), leaf count = 1286

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

✓ **Maple** : cpu = 0.294 (sec), leaf count = 174

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

2.108 ODE No. 108

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

✓ **Mathematica** : cpu = 0.0118983 (sec), leaf count = 15

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

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

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

Hand solution

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

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

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

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

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

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

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

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

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

Integrating

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

Therefore

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

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

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

Verification

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

2.109 ODE No. 109

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

✓ **Mathematica** : cpu = 0.0115921 (sec), leaf count = 17

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

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

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

Hand solution

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

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

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

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

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

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

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

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

Integrating

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

Therefore

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

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

$$
y = \frac{1}{2(\ln x + 1) + Cx}
$$

Verification

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

2.110 ODE No. 110

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

✗ **Mathematica** : cpu = 17.4449 (sec), leaf count = 0 , could not solve

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

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

```
dsolve(x*diff(y(x),x)+f(x)*(y(x)^2-x^2) = 0,y(x))
```

Hand solution

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

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

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

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

Hence

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

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

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

Integrating

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

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

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

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 = 0.420499 (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 = 0.144 (sec), leaf count = 54

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

2.112 ODE No. 112

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

✓ **Mathematica** : cpu = 0.0224581 (sec), leaf count = 13

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

✓ **Maple** : cpu = 0.043 (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

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

Separable.

$$\frac{dv}{\sqrt{1+v^2}} = \frac{1}{x}dx$$

Integrating

$$\begin{aligned}\operatorname{arcsinh}(v) &= \ln x + C\\ v &= \sinh(\ln x + C)\end{aligned}$$

Since $y = xv$ then

$$y = x\sinh(\ln x + C)$$

Verification

```
ode:=x*diff(y(x),x)=sqrt(x^2+y(x)^2)+y(x);
y0:=x*sinh(ln(x)+_C1);
odetest(y(x)=y0,ode) assuming x>= 0;
0
```

2.113 ODE No. 113

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

✓ **Mathematica** : cpu = 0.023683 (sec), leaf count = 16

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

✓ **Maple** : cpu = 0.032 (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 = 0.0208489 (sec), leaf count = 12

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

✓ **Maple** : cpu = 2.558 (sec), leaf count = 28

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

Hand solution

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

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

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

Separable.

$$
\frac{dv}{\sqrt{1+v^2}} = dx
$$

Integrating

$$
\begin{aligned}
\operatorname{arcsinh}(v) &= x + C \\
v &= \sinh(x+C)
\end{aligned}
$$

Since $y = xv$ then

$$
y = x\sinh(x+C)
$$

Verification

```
ode:=x*diff(y(x),x)=x*sqrt(x^2+y(x)^2)+y(x);
y0:=x*sinh(x+_C1);
odetest(y(x)=y0,ode) assuming x>0;
0
```

2.115 ODE No. 115

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

✓ **Mathematica** : cpu = 0.128875 (sec), leaf count = 81

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

✓ **Maple** : cpu = 0.247 (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.

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

But $y=xu$, hence

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

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

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

$$z^2\left(1-\left(\frac{x^2}{2}+C\right)^2\right) + 2z + 1 + \left(\frac{x^2}{2}+C\right)^2 = 0$$

Solving for z (quadratic formula, some conditions apply), one of the solutions is

$$z = \frac{4Cx^2 + 4C^2 + x^4 + 4}{4Cx^2 + 4C^2 + x^4 - 4}$$

Hence

$$y = x\frac{4Cx^2 + 4C^2 + x^4 + 4}{4Cx^2 + 4C^2 + x^4 - 4}$$

Need to work on verification. Kamke gives the final solution as

$$y = x\frac{-2Cx^2 + C^2 + x^4 + 4}{-2Cx^2 + C^2 + x^4 - 4}$$

I am not sure where my error now is. Need to look at this again.

2.116 ODE No. 116

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

✓ **Mathematica** : cpu = 0.615195 (sec), leaf count = 142

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

✓ **Maple** : cpu = 0.243 (sec), leaf count = 86

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

2.117 ODE No. 117

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

✓ **Mathematica** : cpu = 0.0264595 (sec), leaf count = 21

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

✓ **Maple** : cpu = 0.121 (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 = 0.0113233 (sec), leaf count = 13

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

✓ **Maple** : cpu = 0.059 (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 = 0.0306596 (sec), leaf count = 17

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

✓ **Maple** : cpu = 0.071 (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 = 0.054204 (sec), leaf count = 20

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

✓ **Maple** : cpu = 0.216 (sec), leaf count = 17

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

2.121 ODE No. 121

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

✗ **Mathematica** : cpu = 3.29359 (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 = 0.0798725 (sec), leaf count = 19

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

✓ **Maple** : cpu = 0.451 (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 = 0.060316 (sec), leaf count = 19

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

✓ **Maple** : cpu = 0.06 (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 = 0.0284619 (sec), leaf count = 16

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

✓ **Maple** : cpu = 0.033 (sec), leaf count = 12

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

2.125 ODE No. 125

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

✓ **Mathematica** : cpu = 0.0401807 (sec), leaf count = 16

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

✓ **Maple** : cpu = 0.069 (sec), leaf count = 14

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

2.126 ODE No. 126

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

✓ **Mathematica** : cpu = 19.954 (sec), leaf count = 84

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

✓ **Maple** : cpu = 0.026 (sec), leaf count = 29

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

2.127 ODE No. 127

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

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

`$Aborted`

✓ **Maple** : cpu = 0.137 (sec), leaf count = 39

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

2.128 ODE No. 128

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

✓ **Mathematica** : cpu = 4.38897 (sec), leaf count = 39

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

✓ **Maple** : cpu = 0.318 (sec), leaf count = 33

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

2.129 ODE No. 129

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

✓ **Mathematica** : cpu = 0.0315872 (sec), leaf count = 37

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

✓ **Maple** : cpu = 0.033 (sec), leaf count = 33

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

2.130 ODE No. 130

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

✓ **Mathematica** : cpu = 0.00712988 (sec), leaf count = 21

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

✓ **Maple** : cpu = 0.008 (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 = 0.0178772 (sec), leaf count = 20

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

✓ **Maple** : cpu = 0.218 (sec), leaf count = 31

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

2.132 ODE No. 132

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

✓ **Mathematica** : cpu = 0.0124957 (sec), leaf count = 115

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

✓ **Maple** : cpu = 0.031 (sec), leaf count = 153

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

2.133 ODE No. 133

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

✓ **Mathematica** : cpu = 0.00749435 (sec), leaf count = 22

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

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

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

2.134 ODE No. 134

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

✓ **Mathematica** : cpu = 0.0117684 (sec), leaf count = 21

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

✓ **Maple** : cpu = 0.012 (sec), leaf count = 17

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

2.135 ODE No. 135

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

✓ **Mathematica** : cpu = 0.00718364 (sec), leaf count = 14

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

✓ **Maple** : cpu = 0.005 (sec), leaf count = 11

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

2.136 ODE No. 136

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

✓ **Mathematica** : cpu = 0.013272 (sec), leaf count = 24

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

✓ **Maple** : cpu = 0.018 (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 = 0.00925938 (sec), leaf count = 16

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

✓ **Maple** : cpu = 0.014 (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 = 0.0144866 (sec), leaf count = 13

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

✓ **Maple** : cpu = 0.069 (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 = 0.138293 (sec), leaf count = 397

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

✓ **Maple** : cpu = 0.157 (sec), leaf count = 219

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

2.140 ODE No. 140

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

✓ **Mathematica** : cpu = 0.0103777 (sec), leaf count = 17

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

✓ **Maple** : cpu = 0.049 (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 = 0.0274719 (sec), leaf count = 61

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

✓ **Maple** : cpu = 0.076 (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 = 0.122143 (sec), leaf count = 71

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

✓ **Maple** : cpu = 0.114 (sec), leaf count = 52

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

2.143 ODE No. 143

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

✓ **Mathematica** : cpu = 0.0102027 (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 = 0.079 (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

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

✓ **Mathematica** : cpu = 0.181345 (sec), leaf count = 1588

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

✓ **Maple** : cpu = 0.126 (sec), leaf count = 219

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

2.145 ODE No. 145

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

✓ **Mathematica** : cpu = 0.674738 (sec), leaf count = 239

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

✓ **Maple** : cpu = 0.128 (sec), leaf count = 117

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

2.146 ODE No. 146

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

✓ **Mathematica** : cpu = 0.786534 (sec), leaf count = 73

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

✓ **Maple** : cpu = 0.189 (sec), leaf count = 84

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

2.147 ODE No. 147

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

✓ **Mathematica** : cpu = 0.943159 (sec), leaf count = 279

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

✓ **Maple** : cpu = 0.222 (sec), leaf count = 178

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

2.148 ODE No. 148

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

✓ **Mathematica** : cpu = 0.0132848 (sec), leaf count = 20

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

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

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

2.149 ODE No. 149

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

✓ **Mathematica** : cpu = 0.0122314 (sec), leaf count = 27

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

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

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

2.150 ODE No. 150

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

✓ **Mathematica** : cpu = 0.00838134 (sec), leaf count = 25

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

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

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

2.151 ODE No. 151

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

✓ **Mathematica** : cpu = 0.600347 (sec), leaf count = 161

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

✓ **Maple** : cpu = 0.062 (sec), leaf count = 85

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

2.152 ODE No. 152

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

✓ **Mathematica** : cpu = 0.25271 (sec), leaf count = 39

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

✓ **Maple** : cpu = 0.999 (sec), leaf count = 25

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

2.153 ODE No. 153

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

✓ **Mathematica** : cpu = 0.0171825 (sec), leaf count = 21

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

✓ **Maple** : cpu = 0.015 (sec), leaf count = 20

$$\left\{y(x)=\sqrt{x-1}\sqrt{1+x}\_C1+ax\right\}$$

2.154 ODE No. 154

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

✓ **Mathematica** : cpu = 0.0146847 (sec), leaf count = 18

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

✓ **Maple** : cpu = 0.011 (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 = 0.0184058 (sec), leaf count = 47

$$\left\{\left\{y(x)\to\frac{2c_1x+x\log(1-x)-x\log(x+1)+2}{2c_1+\log(1-x)-\log(x+1)}\right\}\right\}$$

✓ **Maple** : cpu = 0.111 (sec), leaf count = 14

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

2.156 ODE No. 156

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

✓ **Mathematica** : cpu = 0.0179594 (sec), leaf count = 21

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

✓ **Maple** : cpu = 0.033 (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 = 0.0917957 (sec), leaf count = 32

$$\left\{\left\{y(x)\to\frac{c_1P_a(x)+Q_a(x)}{c_1P_{a-1}(x)+Q_{a-1}(x)}\right\}\right\}$$

✓ **Maple** : cpu = 0.299 (sec), leaf count = 231

$$\left\{y(x)=\frac{1}{4\,a\,(1+x)}\left(8\,\_C1\,(1+x)\,((a-1/2)\,x-a/2+1/2)\,\mathit{HeunC}\left(0,-2\,a+1,0,0,a^2-a+1/2,2\,(1+x)^{-1}\right.\right.\right.$$

2.158 ODE No. 158

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

✓ **Mathematica** : cpu = 0.0379568 (sec), leaf count = 31

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

✓ **Maple** : cpu = 0.018 (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 = 0.0182218 (sec), leaf count = 17

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

✓ **Maple** : cpu = 0.137 (sec), leaf count = 13

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

2.160 ODE No. 160

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

✓ **Mathematica** : cpu = 0.0211657 (sec), leaf count = 27

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

✓ **Maple** : cpu = 0.029 (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 = 0.014837 (sec), leaf count = 34

$$\left\{\left\{y(x)\to \frac{-12c_1-3x^4+8x^3}{12(x-3)(x-2)^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.015 (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 = 0.286209 (sec), leaf count = 99

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

✓ **Maple** : cpu = 0.219 (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 = 0.0135459 (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 = 0.048 (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 = 0.0860549 (sec), leaf count = 76

$$\left\{\left\{y(x) \to \frac{4a^2c_1\sqrt{x} + 2ac_1x + 2a\sqrt{x}e^{\frac{4a}{\sqrt{x}}} - xe^{\frac{4a}{\sqrt{x}}}}{2e^{\frac{4a}{\sqrt{x}}} - 4ac_1}\right\}\right\}$$

✓ **Maple** : cpu = 0.249 (sec), leaf count = 102

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

2.165 ODE No. 165

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

✓ **Mathematica** : cpu = 0.0179297 (sec), leaf count = 22

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

✓ **Maple** : cpu = 0.025 (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 = 0.077096 (sec), leaf count = 63

$$\left\{\left\{y(x) \to -\frac{2\left(\pi G_{2,2}^{2,0}\left(x\,\middle|\,\begin{array}{c}\frac{1}{2},\frac{3}{2}\\ 0,1\end{array}\right) + c_1(K(x) - E(x))\right)}{\pi G_{2,2}^{2,0}\left(x\,\middle|\,\begin{array}{c}\frac{1}{2},\frac{3}{2}\\ 0,0\end{array}\right) + 2c_1E(x)}\right\}\right\}$$

✓ **Maple** : cpu = 0.199 (sec), leaf count = 97

$$\left\{y(x) = \frac{x}{2\,x-2}\left(LegendreQ\left(-\frac{1}{2},1,\frac{2-x}{x}\right)\_C1 - LegendreQ\left(\frac{1}{2},1,\frac{2-x}{x}\right)\_C1 + LegendreP\left(-\frac{1}{2},1,\frac{2-x}{x}\right.\right.$$

2.167 ODE No. 167

$$3x^2y'(x) - x^2 - 3xy(x) - 7y(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.0233912 (sec), leaf count = 29

$$\left\{\left\{y(x) \to \frac{x\tan\left(\frac{1}{3}\sqrt{7}(3c_1 + \log(x))\right)}{\sqrt{7}}\right\}\right\}$$

✓ **Maple** : cpu = 0.036 (sec), leaf count = 20

$$\left\{y(x) = \frac{x\sqrt{7}}{7}\tan\left(\frac{(\ln(x) + \_C1)\sqrt{7}}{3}\right)\right\}$$

2.168 ODE No. 168

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

✓ **Mathematica** : cpu = 0.0991429 (sec), leaf count = 99

$$\left\{\left\{y(x) \to \frac{-2c_1xP_{-\frac{1}{6}}^{\frac{1}{3}}\left(\frac{x}{2}\right) + 3c_1P_{\frac{5}{6}}^{\frac{1}{3}}\left(\frac{x}{2}\right) - 2xQ_{-\frac{1}{6}}^{\frac{1}{3}}\left(\frac{x}{2}\right) + 3Q_{\frac{5}{6}}^{\frac{1}{3}}\left(\frac{x}{2}\right)}{c_1P_{-\frac{1}{6}}^{\frac{1}{3}}\left(\frac{x}{2}\right) + Q_{-\frac{1}{6}}^{\frac{1}{3}}\left(\frac{x}{2}\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.19 (sec), leaf count = 140

$$\left\{y(x) = -3\,(x+2)\left(\mathit{HeunC}\left(0, 4/3, -1/3, 0, \frac{25}{36}, 4\,(x+2)^{-1}\right)\_C1 - 1/3\,(-x/4 - 1/2)^{4/3}\,\mathit{HeunC}\left(0, -4/3, -1\right.\right.\right.$$

2.169 ODE No. 169

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

✓ **Mathematica** : cpu = 2.90266 (sec), leaf count = 110

$$\text{Solve}\left[-\frac{c}{\sqrt{-a(ax+b)^2}} = \frac{2\exp\left(-\frac{(a(ax+b)+cy(x))^2}{2ay(x)^2(ax+b)^2}\right)}{2c_1 - \sqrt{2\pi}\,\text{erfi}\left(\frac{a(ax+b)+cy(x)}{\sqrt{2}y(x)\sqrt{-a(ax+b)^2}}\right)}, y(x)\right]$$

✓ **Maple** : cpu = 0.176 (sec), leaf count = 153

$$\left\{\frac{1}{2}\left(\left(\sqrt{2}\sqrt{\pi}\mathit{Erf}\left(\frac{\sqrt{2}(cy(x) + a(ax+b))}{2\,(ax+b)\,y\,(x)}\frac{1}{\sqrt{a}}\right)\mathrm{e}^{\frac{(cy(x)+a(ax+b))^2}{2\,(y(x))^2(ax+b)^2a}}ac + 2\,a^{3/2}(ax+b)\right)\mathrm{e}^{-\frac{((-ax-b+c)y(x)+a(ax+b))((ax+b+c}{2\,(y(x))^2(ax+b)^2a}}\right.\right.$$

2.170 ODE No. 170

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

✓ **Mathematica** : cpu = 0.0223909 (sec), leaf count = 22

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

✓ **Maple** : cpu = 0.018 (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 = 0.0102875 (sec), leaf count = 17

$$\left\{\left\{y(x)\to \frac{x^2}{c_1x+1}\right\}\right\}$$

✓ **Maple** : cpu = 0.011 (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 = 0.0424635 (sec), leaf count = 27

$$\left\{\left\{y(x)\to \frac{4-5c_1x^9}{c_1x^{11}+x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.285 (sec), leaf count = 26

$$\left\{y(x)=\frac{5\,x^9+4\,\_C1}{(-x^9+\_C1)\,x^2}\right\}$$

2.173 ODE No. 173

$$x^6\left(-y(x)^2\right)+x^3y'(x)-(2x-3)x^2y(x)+3=0$$

✓ **Mathematica** : cpu = 0.0174059 (sec), leaf count = 25

$$\left\{\left\{y(x)\to\frac{\frac{1}{c_1e^{4x}+\frac{1}{4}}-3}{x^3}\right\}\right\}$$

✓ **Maple** : cpu = 0.057 (sec), leaf count = 27

$$\left\{y(x)=\frac{-3\left(e^x\right)^4\_C1-3}{x^3\left(\left(e^x\right)^4\_C1-3\right)}\right\}$$

2.174 ODE No. 174

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

✓ **Mathematica** : cpu = 0.00814903 (sec), leaf count = 17

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

✓ **Maple** : cpu = 0.005 (sec), leaf count = 13

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

2.175 ODE No. 175

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

✓ **Mathematica** : cpu = 0.0218895 (sec), leaf count = 23

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

✓ **Maple** : cpu = 0.021 (sec), leaf count = 20

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

2.176 ODE No. 176

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

✓ **Mathematica** : cpu = 0.131262 (sec), leaf count = 73

$$\left\{\left\{y(x)\to -\frac{2\left(\pi G_{2,2}^{2,0}\left(x^2\middle|\begin{array}{c}\frac{1}{2},\frac{3}{2}\\ 0,1\end{array}\right)+c_1\left(K\left(x^2\right)-E\left(x^2\right)\right)\right)}{\pi G_{2,2}^{2,0}\left(x^2\middle|\begin{array}{c}\frac{1}{2},\frac{3}{2}\\ 0,0\end{array}\right)+2c_1E\left(x^2\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.131 (sec), leaf count = 30

$$\left\{y(x)=\frac{\_C1\ EllipticCE(x)+EllipticE(x)-EllipticK(x)}{\_C1\ EllipticCE\left(x\right)-\_C1\ EllipticCK\left(x\right)+EllipticE\left(x\right)}\right\}$$

2.177 ODE No. 177

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

✓ **Mathematica** : cpu = 0.0176343 (sec), leaf count = 20

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

✓ **Maple** : cpu = 0.029 (sec), leaf count = 17

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

2.178 ODE No. 178

$$2(x^2-1)\,xy'(x)+2(x^2-1)\,y(x)^2-(3x^2-5)\,y(x)+x^2-3=0$$

✓ **Mathematica** : cpu = 0.0786962 (sec), leaf count = 52

$$\left\{\left\{y(x)\to\frac{\sqrt{x}}{c_1\sqrt{1-x^2}-2\sqrt{1-\frac{1}{x^2}}xF\left(\sin^{-1}\left(\frac{1}{\sqrt{x}}\right)\middle|-1\right)}+1\right\}\right\}$$

✓ **Maple** : cpu = 0.178 (sec), leaf count = 63

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

2.179 ODE No. 179

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

✓ **Mathematica** : cpu = 1.71012 (sec), leaf count = 1619

$$\left\{\left\{y(x)\to \frac{e^{-2\int_1^x \text{Root}[125K[1]^8-164K[1]^6+70K[1]^4-20K[1]^2+(1296K[1]^{12}-5184K[1]^{10}+7776K[1]^8-5184K[1]^6+1296K[1]^4)\#1^4+(-3}}{\quad}\right.\right.$$

✓ **Maple** : cpu = 0.188 (sec), leaf count = 112

$$\left\{y(x)=35\frac{1}{\sqrt[3]{x}\left(8\,{}_2\mathrm{F}_1(5/6,7/6;\,4/3;\,x^2)x^{2/3}\_C1+8\,{}_2\mathrm{F}_1(1/2,5/6;\,2/3;\,x^2)\right)}\left(\_C1\left(\frac{8\,x^2}{7}-\frac{16}{35}\right){}_2\mathrm{F}_1(5/6,7/6;\right.\right.$$

2.180 ODE No. 180

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

✓ **Mathematica** : cpu = 0.135358 (sec), leaf count = 104

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

✓ **Maple** : cpu = 0.083 (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 = 0.0128941 (sec), leaf count = 100

$$\left\{\left\{y(x)\to \frac{\left(x+i\sqrt{-a}c_1\right)\cosh\left(\frac{\sqrt{-a}}{x}\right)-\left(\sqrt{-a}+ic_1x\right)\sinh\left(\frac{\sqrt{-a}}{x}\right)}{x^2\left(\cosh\left(\frac{\sqrt{-a}}{x}\right)-ic_1\sinh\left(\frac{\sqrt{-a}}{x}\right)\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.085 (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 = 0.186305 (sec), leaf count = 24

$$\left\{\left\{y(x)\to\frac{x(2c_1x+1)}{2c_1+x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.158 (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 = 0.0157509 (sec), leaf count = 22

$$\left\{\left\{y(x)\to\frac{c_1x^2}{\sqrt[3]{1-2x^3}}\right\}\right\}$$

✓ **Maple** : cpu = 0.012 (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 = 1.61932 (sec), leaf count = 612

$$\left\{\left\{y(x)\to\frac{b^2c_1\left(-\exp\left(\frac{2\sqrt{4ac-b^2}\sqrt{1-\frac{4A}{b^2-4ac}}\tan^{-1}\left(\frac{2ax+b}{\sqrt{4ac-b^2}}\right)}{\sqrt{b^2-4ac}}\right)\right)+bc_1\sqrt{b^2-4ac}\sqrt{1-\frac{4A}{b^2-4ac}}\exp\left(\frac{2\sqrt{4ac-b^2}\sqrt{1-\cdots}}{\cdots}\right.}{\cdots}\right.\right.$$

✓ **Maple** : cpu = 0.415 (sec), leaf count = 493

$$\left\{y(x)=2\frac{a}{\sqrt{-4\,ac+b^2}\left(2\,ax+b+i\sqrt{4\,ac-b^2}\right)\left(i\sqrt{4\,ac-b^2}-2\,ax-b\right)}\left(\_C1\left(i\sqrt{\frac{-4\,ac+b^2-4\,A}{a^2}}a\sqrt{4\,ac\cdots}\right.\right.\right.$$

2.185 ODE No. 185

$$x^7 y'(x) + 5x^3 y(x)^2 + 2\left(x^2+1\right) y(x)^3 = 0$$

✓ **Mathematica** : cpu = 0.4931 (sec), leaf count = 106

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

✓ **Maple** : cpu = 0.051 (sec), leaf count = 63

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

2.186 ODE No. 186

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

✓ **Mathematica** : cpu = 0.0311517 (sec), leaf count = 19

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

✓ **Maple** : cpu = 0.05 (sec), leaf count = 17

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

2.187 ODE No. 187

$$-ay(x)^2 - bx^{2n-2} + x^n y'(x) = 0$$

✓ **Mathematica** : cpu = 0.0738728 (sec), leaf count = 154

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

✓ **Maple** : cpu = 0.087 (sec), leaf count = 60

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

2.188 ODE No. 188

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

✗ **Mathematica** : cpu = 21.1318 (sec), leaf count = 0 , could not solve

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

✓ **Maple** : cpu = 0.032 (sec), leaf count = 32

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

2.189 ODE No. 189

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

✓ **Mathematica** : cpu = 108.645 (sec), leaf count = 90

$$\text{Solve}\left[bx^{m+1}\log(x)\left(\frac{ax^{-(m+1)n}}{b}\right)^{\frac{1}{n}} + c_1 = \int_1^{y(x)\left(\frac{ax^{-(m+1)n}}{b}\right)^{\frac{1}{n}}} \frac{1}{-K[1]\left(\frac{b^{1-n}(m+1)^n}{a}\right)^{\frac{1}{n}} + K[1]^n + 1} dK[1], y(x)\right]$$

✓ **Maple** : cpu = 0.277 (sec), leaf count = 60

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

2.190 ODE No. 190

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

✓ **Mathematica** : cpu = 0.0506717 (sec), leaf count = 44

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

✓ **Maple** : cpu = 0.007 (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 = 0.0315155 (sec), leaf count = 48

$$\left\{\left\{y(x) \to -\cot\left(c_1+\sin^{-1}(x)\right)\sqrt{\sec^2\left(c_1+\sin^{-1}(x)\right)}\right\},\left\{y(x) \to \cot\left(c_1+\sin^{-1}(x)\right)\sqrt{\sec^2\left(c_1+\sin^{-1}(x)\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.019 (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 = 0.029563 (sec), leaf count = 42

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

✓ **Maple** : cpu = 0.019 (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 = 0.00870357 (sec), leaf count = 16

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

✓ **Maple** : cpu = 0.008 (sec), leaf count = 14

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

2.194 ODE No. 194

$$x\log(x)y'(x) - y(x)\left(2\log^2(x)+1\right) - y(x)^2\log(x) - \log^3(x) = 0$$

✓ **Mathematica** : cpu = 0.0773305 (sec), leaf count = 30

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

✓ **Maple** : cpu = 0.023 (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 = 0.0591586 (sec), leaf count = 24

$$\left\{\left\{y(x)\to\left(\frac{1}{c_1e^{5x}+\frac{1}{5}}-4\right)\csc(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.124 (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 = 0.0605675 (sec), leaf count = 40

$$\left\{\left\{y(x)\to e^{-2\tanh^{-1}\left(\tan\left(\frac{x}{2}\right)\right)}\left(c_1+\sin(x)+4\log\left(\cos\left(\frac{x}{2}\right)-\sin\left(\frac{x}{2}\right)\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.166 (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 = 0.0518102 (sec), leaf count = 98

$$\left\{\left\{y(x) \to \frac{1}{\sqrt[3]{c_1 \cos^3(x) - \sin(x) - 2\sin(x)\cos^2(x)}}\right\}, \left\{y(x) \to -\frac{\sqrt[3]{-1}}{\sqrt[3]{c_1 \cos^3(x) - \sin(x) - 2\sin(x)\cos^2(x)}}\right\}, \left\{y\right.\right.$$

✓ **Maple** : cpu = 0.123 (sec), leaf count = 237

$$\left\{y(x) = \frac{1}{\_C1\ (\sin(x))^4 + 2\cos(x)(\sin(x))^3 - 2\_C1\ (\sin(x))^2 - 3\cos(x)\sin(x) + \_C1} \sqrt[3]{\cos(x)\left(\_C1\ (\sin\right.}\right.$$

2.198 ODE No. 198

$$\sin(x)\cos(x)y'(x) - y(x) - \sin^3(x) = 0$$

✓ **Mathematica** : cpu = 0.0256106 (sec), leaf count = 15

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

✓ **Maple** : cpu = 0.015 (sec), leaf count = 13

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

2.199 ODE No. 199

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

✓ **Mathematica** : cpu = 0.195311 (sec), leaf count = 15

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

✓ **Maple** : cpu = 0.191 (sec), leaf count = 102

$$\left\{y(x) = \frac{1}{2}\arctan\left(2\frac{\_C1\ (2\sin(2x) + \sin(4x))}{-\_C1^2\cos(4x) + \_C1^2 + 4\cos(2x) + \cos(4x) + 3}, \frac{\_C1^2\cos(4x) - \_C1^2 + 4\cos(2x}{\_C1^2\cos(4x) - \_C1^2 - 4\cos(2x}\right.\right.$$

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 = 0.0524883 (sec), leaf count = 59

$$\left\{\left\{y(x)\to\frac{2aAx^2-2aAx\sin(2x)-aA\cos(2x)+4Acx^2+4c_1}{4a\cos(2x)-4(a+2b)}\right\}\right\}$$

✓ **Maple** : cpu = 0.064 (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 = 0.0778275 (sec), leaf count = 38

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

✓ **Maple** : cpu = 0.049 (sec), leaf count = 23

$$\left\{y(x)=i\tan\left(-i\int\sqrt{f(x)}\,\mathrm{d}x+\_C1\right)\sqrt{f(x)}\right\}$$

2.202 ODE No. 202

$$f(x)y'(x)+g(x)\mathrm{tg}(y(x))+h(x)=0$$

✗ **Mathematica** : cpu = 20.5533 (sec), leaf count = 0 , could not solve

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

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

```
dsolve(f(x)*diff(y(x),x)+g(x)*tg(y(x))+h(x) = 0,y(x))
```

2.203 ODE No. 203

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

✗ **Mathematica** : cpu = 3.43876 (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 = 0.116998 (sec), leaf count = 67

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

✓ **Maple** : cpu = 0.335 (sec), leaf count = 92

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

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 = 26.8812 (sec), leaf count = 0 , could not solve

```
DSolve[((-1 + a^2)*x)/4 + b*x^n + a*y[x] + y[x]*Derivative[1][y][x] == 0, y[x], x]
```

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

```
dsolve(y(x)*diff(y(x),x)+a*y(x)+1/4*(a^2-1)*x+b*x^n = 0,y(x))
```

2.206 ODE No. 206

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

✗ **Mathematica** : cpu = 30.0755 (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 = 0.0126922 (sec), leaf count = 47

$$\left\{\left\{y(x)\to -\sqrt{c_1e^{-2x}-4x^2}\right\},\left\{y(x)\to \sqrt{c_1e^{-2x}-4x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.024 (sec), leaf count = 37

$$\left\{y(x)=\sqrt{e^{-2\,x}\_C1-4\,x^2},y(x)=-\sqrt{e^{-2\,x}\_C1-4\,x^2}\right\}$$

2.208 ODE No. 208

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

✓ **Mathematica** : cpu = 0.0831191 (sec), leaf count = 120

$$\left\{\left\{y(x)\to -\frac{\sqrt{e^{-2ax}\left(4a^2c_1+2be^{2ax}\sin(c+x)+c_1\right)+4ab\cos(c+x)}}{\sqrt{4a^2+1}}\right\},\left\{y(x)\to \frac{\sqrt{e^{-2ax}\left(4a^2c_1+2be^{2ax}\sin(c\right.}}{\sqrt{4a^2}}\right.\right.$$

✓ **Maple** : cpu = 0.08 (sec), leaf count = 106

$$\left\{y(x)=\frac{1}{4\,a^2+1}\sqrt{16\,\left(a^2+1/4\right)^2\_C1\,e^{-2\,ax}+16\,\left(a^2+1/4\right)\left(\cos\left(x+c\right)a+1/2\,\sin\left(x+c\right)\right)b},y(x)=-\frac{1}{4\,a^2+}\right.$$

2.209 ODE No. 209

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

✓ **Mathematica** : cpu = 0.0234811 (sec), leaf count = 58

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

✓ **Maple** : cpu = 0.012 (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 = 0.017322 (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 = 0.023 (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 = 53.8209 (sec), leaf count = 38

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

✓ **Maple** : cpu = 0.035 (sec), leaf count = 31

$$\left\{y(x) = RootOf\left(-\int^{\_Z} \frac{\_a}{-\_a^2 + \mathrm{e}^{\_a^{-1}}} d\_a + \ln(x) + \_C1\right) x\right\}$$

2.212 ODE No. 212

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

✓ **Mathematica** : cpu = 30.0019 (sec), leaf count = 92

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

✓ **Maple** : cpu = 0.137 (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 = 0.143753 (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 = 0.771 (sec), leaf count = 66

$$\left\{-\frac{1}{2}\ln\left(\frac{(y(x))^2+(-x+3)\,y(x)-x^2+x+1}{(x-1)^2}\right)-\frac{\sqrt{5}}{5}\mathit{Artanh}\left(\frac{(-2\,y(x)-3+x)\sqrt{5}}{5\,x-5}\right)-\ln(x-1)-\_C1=0\right.$$

2.214 ODE No. 214

$$(y(x)+x-1)y'(x)-y(x)+2x+3=0$$

✓ **Mathematica** : cpu = 0.154587 (sec), leaf count = 78

$$\text{Solve}\left[2\sqrt{2}\tan^{-1}\left(\frac{-y(x)+2x+3}{\sqrt{2}(y(x)+x-1)}\right)=3c_1+2\log\left(\frac{6x^2+3y(x)^2-10y(x)+8x+11}{(3x+2)^2}\right)+4\log(3x+2),y(x)\right]$$

✓ **Maple** : cpu = 0.184 (sec), leaf count = 48

$$\left\{y(x)=\frac{5}{3}+\frac{(-3\,x-2)\sqrt{2}\tan\left(\mathit{RootOf}\left(\sqrt{2}\ln\left(2\left((\tan(\_Z))^2+1\right)(3\,x+2)^2\right)+2\sqrt{2}\_C1-2\_Z\right)\right)}{3}\right\}$$

2.215 ODE No. 215

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

✓ **Mathematica** : cpu = 0.161552 (sec), leaf count = 80

$$\text{Solve}\left[6\sqrt{3}\tan^{-1}\left(\frac{4-3y(x)}{\sqrt{3}(y(x)+2x-2)}\right)=2c_1+3\log\left(\frac{3x^2+3y(x)^2+3(x-3)y(x)-6x+7}{(1-3x)^2}\right)+6\log(3x-1),\right.$$

✓ **Maple** : cpu = 0.218 (sec), leaf count = 51

$$\left\{y(x)=\frac{3}{2}-\frac{x}{2}+\frac{\sqrt{3}(3\,x-1)}{6}\tan\left(\mathit{RootOf}\left(\sqrt{3}\ln\left(\frac{\left(3\left(\tan\left(\_Z\right)\right)^2+3\right)(3\,x-1)^2}{4}\right)+2\sqrt{3}\_\mathit{C1}+6\_Z\right)\right)\right.$$

2.216 ODE No. 216

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

✓ **Mathematica** : cpu = 0.140369 (sec), leaf count = 82

$$\text{Solve}\left[6\sqrt{3}\tan^{-1}\left(\frac{3y(x)+1}{\sqrt{3}(-y(x)+2x-1)}\right)=2c_1+3\log\left(\frac{3x^2+3y(x)^2-3(x-1)y(x)-3x+1}{(1-3x)^2}\right)+6\log(3x-1\right.$$

✓ **Maple** : cpu = 0.204 (sec), leaf count = 51

$$\left\{y(x)=\frac{(-3\,x+1)\sqrt{3}}{6}\tan\left(\mathit{RootOf}\left(\sqrt{3}\ln\left(\frac{\left(3\left(\tan\left(\_Z\right)\right)^2+3\right)(3\,x-1)^2}{4}\right)+2\sqrt{3}\_\mathit{C1}+6\_Z\right)\right)+\frac{x}{2}-\right.$$

2.217 ODE No. 217

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

✓ **Mathematica** : cpu = 0.0201065 (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 = 0.035 (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 = 0.104628 (sec), leaf count = 232

$$\left\{\left\{y(x)\to x^2\left(1+\frac{2-2i}{\frac{i\sqrt{2}}{\sqrt{x^2\sinh\left(\frac{2c_1}{9}\right)+x^2\cosh\left(\frac{2c_1}{9}\right)-i}}-(1-i)}\right)\right\},\left\{y(x)\to x^2\left(1+\frac{2-2i}{(-1+i)-\frac{i\sqrt{2}}{\sqrt{x^2\sinh\left(\frac{2c_1}{9}\right)+x^2\cosh}}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.226 (sec), leaf count = 57

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

2.219 ODE No. 219

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

✗ **Mathematica** : cpu = 301.144 (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 = 0.0148508 (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 = 0.025 (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 = 0.0190394 (sec), leaf count = 30

$$\left\{\left\{y(x)\to\frac{1}{6}\left(4W\left(-e^{c_1+\frac{9x}{4}-1}\right)-3x+1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.069 (sec), leaf count = 21

$$\left\{y(x)=-\frac{x}{2}+\frac{2}{3}\mathit{lambertW}\left(\frac{\mathrm{e}^{-\frac{1}{4}}\_C1}{4}\mathrm{e}^{\frac{9x}{4}}\right)+\frac{1}{6}\right\}$$

2.222 ODE No. 222

$$(2y(x)+x+7)y'(x)-y(x)+2x+4=0$$

✓ **Mathematica** : cpu = 0.0786614 (sec), leaf count = 65

$$\text{Solve}\left[5c_1+2\log\left(\frac{4(x^2+y(x)^2+4y(x)+6x+13)}{5(x+3)^2}\right)+2\tan^{-1}\left(\frac{y(x)-2(x+2)}{2y(x)+x+7}\right)+4\log(x+3)=0,y(x)\right]$$

✓ **Maple** : cpu = 0.06 (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 = 0.0262915 (sec), leaf count = 55

$$\left\{\left\{y(x)\to\frac{1}{2}\left(x-\sqrt{5x^2-4e^{c_1}}\right)\right\},\left\{y(x)\to\frac{1}{2}\left(\sqrt{5x^2-4e^{c_1}}+x\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.194 (sec), leaf count = 51

$$\left\{y(x)=\frac{1}{2\_C1}\left(\_C1\,x-\sqrt{5\_C1^2x^2+4}\right),y(x)=\frac{1}{2\_C1}\left(\_C1\,x+\sqrt{5\_C1^2x^2+4}\right)\right\}$$

2.224 ODE No. 224

$$(2y(x) - 6x)y'(x) - y(x) + 3x + 2 = 0$$

✓ **Mathematica** : cpu = 0.0191462 (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 = 0.064 (sec), leaf count = 35

$$\left\{y(x) = \frac{1}{5}\mathrm{e}^{-\mathit{lambertW}\left(-\frac{\mathrm{e}^{-1}}{2}\mathrm{e}^{\frac{25\,x}{4}}\mathrm{e}^{-\frac{25\_C1}{4}}\right) + \frac{25\,x}{4} - 1 - \frac{25\_C1}{4}} + 3\,x - \frac{2}{5}\right\}$$

2.225 ODE No. 225

$$(4y(x) + 2x + 3)y'(x) - 2y(x) - x - 1 = 0$$

✓ **Mathematica** : cpu = 0.0172241 (sec), leaf count = 26

$$\left\{\left\{y(x) \to \frac{1}{8}\left(W\left(-e^{c_1 + 8x - 1}\right) - 4x - 5\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.053 (sec), leaf count = 20

$$\left\{y(x) = -\frac{x}{2} + \frac{\mathit{lambertW}\left(\mathrm{e}^{5}\left(\mathrm{e}^{x}\right)^{8}\_C1\right)}{8} - \frac{5}{8}\right\}$$

2.226 ODE No. 226

$$(4y(x) - 2x - 3)y'(x) + 2y(x) - x - 1 = 0$$

✓ **Mathematica** : cpu = 0.0171908 (sec), leaf count = 28

$$\left\{\left\{y(x) \to \frac{1}{8}\left(-W\left(-e^{c_1 + 8x - 1}\right) + 4x + 5\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.054 (sec), leaf count = 21

$$\left\{y(x) = \frac{x}{2} - \frac{\mathit{lambertW}\left(-\mathrm{e}^{5}\left(\mathrm{e}^{x}\right)^{8}\_C1\right)}{8} + \frac{5}{8}\right\}$$

2.227 ODE No. 227

$$(4y(x) - 3x - 5)y'(x) - 3y(x) + 7x + 2 = 0$$

✓ **Mathematica** : cpu = 0.012743 (sec), leaf count = 71

$$\left\{\left\{y(x) \to \frac{1}{4}\left(-i\sqrt{-16c_1 + 19x^2 - 14x - 25} + 3x + 5\right)\right\}, \left\{y(x) \to \frac{1}{4}\left(i\sqrt{-16c_1 + 19x^2 - 14x - 25} + 3x + 5\right)\right\}$$

✓ **Maple** : cpu = 0.21 (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 = 0.30765 (sec), leaf count = 1677

$$\left\{\left\{y(x) \to \frac{1}{4}\left(\frac{}{\sqrt[3]{-6561\cosh\left(\frac{3c_1}{4}\right)x^4 - 6561\sinh\left(\frac{3c_1}{4}\right)x^4 + 2916\cosh\left(\frac{3c_1}{4}\right)x^3 + 2916\sinh\left(\frac{3c_1}{4}\right)x^3 + 162\cosh\left(\frac{3c_1}{8}\right)x^2 - 486\cosh\left(\frac{3c_1}{4}\right)x^2 +}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.405 (sec), leaf count = 271

$$\left\{y(x) = 1\left((-76x + 28)\sqrt[3]{64 - 8748(9x - 1)^2\_C1 + 108\sqrt{43046721}\sqrt{(x - 1/9)^2\_C1\left(-\frac{32}{177147} + (x - 1/\right.}}\right.\right.$$

2.229 ODE No. 229

$$(12y(x)-5x-8)y'(x)-5y(x)+2x+3=0$$

✓ **Mathematica** : cpu = 0.0136908 (sec), leaf count = 77

$$\left\{\left\{y(x)\to\frac{1}{12}\left(-i\sqrt{-16\left(9c_1+4\right)-x^2-8x}+5x+8\right)\right\},\left\{y(x)\to\frac{1}{12}\left(i\sqrt{-16\left(9c_1+4\right)-x^2-8x}+5x+8\right)\right\}$$

✓ **Maple** : cpu = 0.206 (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 = 0.126968 (sec), leaf count = 96

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

✓ **Maple** : cpu = 0.065 (sec), leaf count = 100

$$\left\{y(x)=\frac{1}{a}\sqrt{e^{2\,\frac{bx}{a}}a\left(a\_C1-2\int\left(e^{\frac{bx}{a}}\right)^2f(x)\,dx\right)}\left(e^{2\,\frac{bx}{a}}\right)^{-1},y(x)=-\frac{1}{a}\sqrt{e^{2\,\frac{bx}{a}}a\left(a\_C1-2\int\left(e^{\frac{bx}{a}}\right)^2f(x)\,dx\right.}$$

2.231 ODE No. 231

$$y'(x)(ay(x)+bx+c)+\alpha y(x)+\beta x+\gamma=0$$

✓ **Mathematica** : cpu = 3.37099 (sec), leaf count = 252

$$\text{Solve}\left[\frac{(\alpha-b)^2\left(-\log\left(\frac{(ay(x)+bx+c)^2\left(-\frac{(\alpha(bx+c)-a(\beta x+\gamma))\left(a(\alpha-b)y(x)+a(\beta x+\gamma)+b^2(-x)-bc\right)}{(ay(x)+bx+c)^2}+a\beta-\alpha b\right)}{(\alpha(bx+c)-a(\beta x+\gamma))^2}\right)-\frac{2\tan^{-1}\left(\frac{\frac{2a(\beta x+\gamma)-2\alpha\ldots}{ay(x)+bx\ldots}}{(\alpha-b)\sqrt{\frac{4(\ldots}{(\ldots}}}\right.}{\sqrt{\frac{4(a\beta-\alpha b)\ldots}{(\alpha-b)^2}}}\right.}{2(a\beta-\alpha b)}\right.$$

✓ **Maple** : cpu = 0.258 (sec), leaf count = 178

$$\left\{y(x) = \frac{1}{-a\beta + b\alpha}\left(-b\gamma + \beta c + \frac{x(a\beta - b\alpha) + a\gamma - \alpha c}{2a}\left(\sqrt{4a\beta - \alpha^2 - 2b\alpha - b^2}\tan\left(RootOf\left(\sqrt{4a\beta - \alpha^2 -\right.\right.\right.\right.\right.$$

2.232 ODE No. 232

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

✓ **Mathematica** : cpu = 0.0100309 (sec), leaf count = 46

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

✓ **Maple** : cpu = 0.019 (sec), leaf count = 39

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

2.233 ODE No. 233

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

✓ **Mathematica** : cpu = 0.0249268 (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 = 0.028 (sec), leaf count = 30

$$\left\{y(x) = \sqrt{-2\sin(x)a + \_C1}x, y(x) = -\sqrt{-2\sin(x)a + \_C1}x\right\}$$

2.234 ODE No. 234

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

✗ **Mathematica** : cpu = 29.8171 (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 = 0.0739973 (sec), leaf count = 33

$$\text{Solve}\left[x = \frac{e^{-\frac{y(x)}{b}}\left(bc_1 - a\text{Ei}\left(\frac{y(x)}{b}\right)\right)}{b}, y(x)\right]$$

✓ **Maple** : cpu = 0.057 (sec), leaf count = 30

$$\left\{\_C1 + \left(\mathrm{e}^{\frac{y(x)}{b}}bx - aEi\left(1, -\frac{y(x)}{b}\right)\right)^{-1} = 0\right\}$$

2.236 ODE No. 236

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

✓ **Mathematica** : cpu = 0.0184004 (sec), leaf count = 84

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

✓ **Maple** : cpu = 0.071 (sec), leaf count = 141

$$\left\{y(x) = 1\left(-(x+4)^{\frac{3}{2}}\sqrt{\frac{\_C1\ (x+4) - 4}{x+4}}x - 16\sqrt{x} - 4x^{3/2}\right)\left(-(x+4)^{\frac{3}{2}}\sqrt{\frac{\_C1\ (x+4) - 4}{x+4}} + 4\sqrt{x} + x^{\frac{3}{2}}\right)^{-}\right.$$

2.237 ODE No. 237

$$x(a + y(x))y'(x) + by(x) + cx = 0$$

✗ **Mathematica** : cpu = 9.01219 (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 = 0.0487451 (sec), leaf count = 176

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

✓ **Maple** : cpu = 0.088 (sec), leaf count = 93

$$\left\{y(x) = \frac{1}{-a^2 + \_C1}\left(-abx - \_C1\, x + \sqrt{\_C1\ (a+b)\left(ax^2 + bx^2 + a^2 - \_C1\right)}\right), y(x) = \frac{1}{a^2 - \_C1}\left(abx + \_C\right.\right.$$

2.239 ODE No. 239

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

✓ **Mathematica** : cpu = 0.0307492 (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 = 0.203 (sec), leaf count = 59

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

2.240 ODE No. 240

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

✓ **Mathematica** : cpu = 0.0107556 (sec), leaf count = 39

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

✓ **Maple** : cpu = 0.024 (sec), leaf count = 34

$$\left\{y(x) = \sqrt{-ax\ln(x) + \_C1\,x}, y(x) = -\sqrt{-x\left(a\ln(x) - \_C1\right)}\right\}$$

2.241 ODE No. 241

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

✓ **Mathematica** : cpu = 0.0104785 (sec), leaf count = 37

$$\left\{\left\{y(x) \to -\sqrt{x\left(c_1 - ax\right)}\right\}, \left\{y(x) \to \sqrt{x\left(c_1 - ax\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.016 (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 = 0.0156767 (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 = 0.019 (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 = 15.0399 (sec), leaf count = 451

$$\left\{\left\{y(x)\to-\frac{\sqrt[3]{2}x}{\sqrt[3]{-27c_1^2x^2+\sqrt{108c_1^3x^3+\left(27c_1^2x-27c_1^2x^2\right)^2}+27c_1^2x}}+\frac{\sqrt[3]{-27c_1^2x^2+\sqrt{108c_1^3x^3+\left(27c_1^2x-27c_1^2\right.}}}{3\sqrt[3]{2}c_1}\right.\right.$$

✓ **Maple** : cpu = 0.155 (sec), leaf count = 391

$$\left\{y(x)=\frac{1}{80\_C1}\left(-3\left(x\left(\sqrt{5}\sqrt{\frac{80\ (x-1)^2\_C1-x}{\_C1}}+20\,x-20\right)\_C1^2\right)^{2/3}\left(1+i\sqrt{3}\right)\sqrt[3]{5}+3\left(x\left(i\sqrt{3}-1\right.\right.\right.\right.$$

2.244 ODE No. 244

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

✓ **Mathematica** : cpu = 15.0049 (sec), leaf count = 457

$$\left\{\left\{y(x)\to-\frac{\sqrt[3]{2}x}{\sqrt[3]{27c_1^2x^2+\sqrt{\left(27c_1^2x^2+27c_1^2x\right)^2-108c_1^3x^3}+27c_1^2x}}-\frac{\sqrt[3]{27c_1^2x^2+\sqrt{\left(27c_1^2x^2+27c_1^2x\right)^2-108c_1^3x}}}{3\sqrt[3]{2}c_1}\right.\right.$$

✓ **Maple** : cpu = 0.139 (sec), leaf count = 391

$$\left\{y(x)=\frac{3}{80\_C1}\left(\left(\left(x\left(\sqrt{5}\sqrt{\frac{80\ (1+x)^2\_C1-x}{\_C1}}-20\,x-20\right)\_C1^2\right)^{\frac{2}{3}}\left(i\sqrt{3}-1\right)\sqrt[3]{5}-\left(x\left(1+i\sqrt{3}\right)5^{\frac{2}{3}}+\right.\right.\right.\right.$$

2.245 ODE No. 245

$$(4x^3 + 2xy(x))\, y'(x) + 112x^2 y(x) + y(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.459141 (sec), leaf count = 1453

$$\left\{\left\{y(x) \to \text{Root}\left[-1521681143169024\#1x^{22} - 697437190619136\#1^2x^{20} - 145299414712320\#1^3x^{18} - 18162426\right.\right.\right.$$

✓ **Maple** : cpu = 0.367 (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 = 0.0322499 (sec), leaf count = 71

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

✓ **Maple** : cpu = 0.077 (sec), leaf count = 63

$$\left\{ y(x) = \frac{1}{6\_C1\,x}\left(-4\,x^2\_C1 - \sqrt{-2\,x^4\_C1^2 + 6}\right), y(x) = \frac{1}{6\_C1\,x}\left(-4\,x^2\_C1 + \sqrt{-2\,x^4\_C1^2 + 6}\right) \right\}$$

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 = 15.0016 (sec), leaf count = 590

$$\left\{\left\{y(x) \to \frac{x\left(\sqrt[3]{-2e^{2c_1}(3x+2) + 2\sqrt{e^{2c_1}(3x+2)^2\left(e^{2c_1} - (3x+2)^2\right)} + 27x^3 + 54x^2 + 36x + 8} + 12\right) + \left(-2e^2\right.}{2\sqrt[3]{-2e^{2c_1}(3x+2) + 2\sqrt{e^{2c_1}(3x+2)^2\left(e^{2c_1} - (\right.}}}\right.\right.$$

✓ **Maple** : cpu = 0.261 (sec), leaf count = 517

$$\left\{ y(x) = -\frac{1}{3} + \frac{3\,x+2}{6}\left(7\left(-1/4\sqrt[3]{2\,(3\,x+2)\_C1 - 27\,(3\,x+2)^3\_C1^3 + 2\sqrt{-27\,(3\,x+2)^4\_C1^4 + (3\,x+}}\right.\right.\right.$$

2.248 ODE No. 248

$$\left(x^2+6xy(x)+3\right)y'(x)+3y(x)^2+2xy(x)+2x=0$$

✓ **Mathematica** : cpu = 0.0154072 (sec), leaf count = 83

$$\left\{\left\{y(x)\to -\frac{\sqrt{36c_1x+x^4-12x^3+6x^2+9}+x^2+3}{6x}\right\},\left\{y(x)\to -\frac{-\sqrt{36c_1x+x^4-12x^3+6x^2+9}+x^2+3}{6x}\right\}$$

✓ **Maple** : cpu = 0.025 (sec), leaf count = 75

$$\left\{y(x)=\frac{1}{6\,x}\left(-x^2-3-\sqrt{x^4-12\,x^3-12\_C1\,x+6\,x^2+9}\right),y(x)=\frac{1}{6\,x}\left(-x^2-3+\sqrt{x^4-12\,x^3-12\_C1\,x\right.$$

2.249 ODE No. 249

$$y'(x)\left(axy(x)+bx^n\right)+\alpha y(x)^3+\beta y(x)^2=0$$

✓ **Mathematica** : cpu = 6.07988 (sec), leaf count = 103

$$\text{Solve}\left[\frac{\frac{(a(-n)+a+\alpha y(x))y(x)^{\frac{a-an}{\beta}-1}(\alpha y(x)+\beta)^{\frac{a(n-1)}{\beta}}}{a(n-1)+\beta}-\frac{ax^{1-n}\exp\left(-\frac{a(n-1)(\log(y(x))-\log(\alpha y(x)+\beta))}{\beta}\right)}{b}}{a^2(n-1)^2}=c_1,y(x)\right]$$

✓ **Maple** : cpu = 0.221 (sec), leaf count = 232

$$\left\{y(x)=\beta\left(eval\left(RootOf\left(-x^{1-n}\_Z^{\frac{a(n-1)}{\beta}}a^2\beta\,n+\_C1\,a^2bn^2+x^{1-n}\_Z^{\frac{a(n-1)}{\beta}}a^2\beta-x^{1-n}\_Z^{\frac{a(n-1)}{\beta}}a\beta^2-\_Z^{\frac{an}{}}\right.\right.\right.\right.$$

2.250 ODE No. 250

$$y'(x)\left(ax+Ax^2+by(x)+Bxy(x)+c\right)+Axy(x)+\alpha x-By(x)^2+\beta y(x)+\gamma=0$$

✗ **Mathematica** : cpu = 301.34 (sec), leaf count = 0 , timed out

`$Aborted`

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

```
dsolve((B*x*y(x)+A*x^2+a*x+b*y(x)+c)*diff(y(x),x)-B*g(x)^2+A*x*y(x)+alpha*x+beta*y(x)+gamma
```

2.251 ODE No. 251

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

✓ **Mathematica** : cpu = 0.0131408 (sec), leaf count = 57

$$\left\{\left\{y(x)\to\frac{1-\sqrt{c_1x^2+2x^3+1}}{x^2}\right\},\left\{y(x)\to\frac{\sqrt{c_1x^2+2x^3+1}+1}{x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.024 (sec), leaf count = 51

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

2.252 ODE No. 252

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

✓ **Mathematica** : cpu = 14.8064 (sec), leaf count = 501

$$\left\{\left\{y(x)\to\frac{\sqrt[3]{-\left(1-6c_1\right)^2x^3+\sqrt{\left(6c_1-1\right)^3\left(6c_1x^6+\left(2-12c_1\right)x^3+6c_1-1\right)}+36c_1^2-12c_1+1}}{6c_1-1}-\frac{}{\sqrt[3]{-(1-6c}}\right.\right.$$

✓ **Maple** : cpu = 0.942 (sec), leaf count = 1338

$$\left\{y(x)=1\left(\left(\left(-\_C1+80\right)x^7-160\,x^4+80\,x\right)\sqrt[3]{4}\sqrt[3]{\left(-80+\left(\_C1-80\right)x^6+160\,x^3\right)^2\_C1\left(-\frac{1}{4}+\sqrt{\frac{-}{-80+(}}\right.}\right.\right.$$

2.253 ODE No. 253

$$\left(x^2y(x)-1\right)y'(x)+8xy(x)^2-8=0$$

✗ **Mathematica** : cpu = 20.9999 (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 = 0.0179818 (sec), leaf count = 81

$$\left\{\left\{y(x) \to \frac{2}{\sqrt{-\frac{1}{x^3}}x^2\sqrt{-x\,(4c_1 - 4\log(x) + 1)} + x}\right\}, \left\{y(x) \to \frac{2}{\left(-\frac{1}{x^3}\right)^{3/2} x^5\sqrt{-x\,(4c_1 - 4\log(x) + 1)} + x}\right\}\right\}$$

✓ **Maple** : cpu = 0.034 (sec), leaf count = 59

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

2.255 ODE No. 255

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

✓ **Mathematica** : cpu = 5.21739 (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 = 0.266 (sec), leaf count = 74

$$\left\{y(x) = -3\,\frac{\mathit{lambertW}\left(2/3\,\sqrt[3]{-1/8\,x^2\_C1}\right)}{x}, y(x) = -3\,\frac{\mathit{lambertW}\left(-1/3\,\sqrt[3]{-1/8\,x^2\_C1}\,\left(1 + i\sqrt{3}\right)\right)}{x}, y(x) = -\right.$$

2.256 ODE No. 256

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

✓ **Mathematica** : cpu = 0.020925 (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 = 0.056 (sec), leaf count = 31

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

2.257 ODE No. 257

$$x\left(x^4+xy(x)-1\right)y'(x)-y(x)\left(-x^4+xy(x)-1\right)=0$$

✓ **Mathematica** : cpu = 0.424211 (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 = 0.122 (sec), leaf count = 98

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

2.258 ODE No. 258

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

✓ **Mathematica** : cpu = 0.0147055 (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 = 0.024 (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 = 0.0228497 (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 = 0.031 (sec), leaf count = 51

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

2.260 ODE No. 260

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

✓ **Mathematica** : cpu = 0.0159413 (sec), leaf count = 74

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

✓ **Maple** : cpu = 0.035 (sec), leaf count = 59

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

2.261 ODE No. 261

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

✓ **Mathematica** : cpu = 1.08445 (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 = 0.146 (sec), leaf count = 18

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

2.262 ODE No. 262

$$2x^3+\left(2x^2y(x)-x^3\right)y'(x)-4xy(x)^2+y(x)^3=0$$

✓ **Mathematica** : cpu = 0.0696845 (sec), leaf count = 101

$$\left\{\left\{y(x)\to \frac{2x^3-\sqrt{e^{2c_1}x^2\left(e^{2c_1}-3x^2\right)}}{e^{2c_1}+x^2}\right\},\left\{y(x)\to \frac{\sqrt{e^{2c_1}x^2\left(e^{2c_1}-3x^2\right)}+2x^3}{e^{2c_1}+x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.371 (sec), leaf count = 65

$$\left\{y(x)=\frac{x}{x^2\_C1-1}\left(2x^2\_C1-\sqrt{3x^2\_C1+1}\right),y(x)=\frac{x}{x^2\_C1-1}\left(2x^2\_C1+\sqrt{3x^2\_C1+1}\right)\right\}$$

2.263 ODE No. 263

$$2x^3 + 3x^2y(x)^2 + y(x)y'(x) + 7 = 0$$

✓ **Mathematica** : cpu = 0.0436029 (sec), leaf count = 120

$$\left\{\left\{y(x)\to -\frac{1}{3}\sqrt{9c_1e^{-2x^3}+\frac{20\ 2^{2/3}e^{-2x^3}x\Gamma\left(\frac{1}{3},-2x^3\right)}{\sqrt[3]{-x^3}}-6x}\right\},\left\{y(x)\to \sqrt{c_1e^{-2x^3}+\frac{20\ 2^{2/3}e^{-2x^3}x\Gamma\left(\frac{1}{3},-2x^3\right)}{9\sqrt[3]{-x^3}}\right.\right.$$

✓ **Maple** : cpu = 0.238 (sec), leaf count = 179

$$\left\{y(x) = -\frac{2^{\frac{2}{3}}\sqrt{3}}{18\,\Gamma(2/3)}\sqrt{-80\,\sqrt[3]{-x^3}\Gamma(2/3)\sqrt[3]{2}\left(\frac{9\,\Gamma(2/3)\sqrt[3]{2}\left(-3/2\,\mathrm{e}^{-2\,x^3}\_C1+x\right)\sqrt[3]{-x^3}}{40}+\mathrm{e}^{-2\,x^3}x\left(\pi\sqrt{3}-3/\right.\right.}\right.$$

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 = 0.402676 (sec), leaf count = 680

$$\left\{\left\{y(x)\to \mathrm{Root}\left[81\#1^7e^{\frac{21c_1}{2}}x^{12}+756\#1^6e^{\frac{21c_1}{2}}x^9+2646\#1^5e^{\frac{21c_1}{2}}x^6+4116\#1^4e^{\frac{21c_1}{2}}x^3+2401\#1^3e^{\frac{21c_1}{2}}-x^{3/2}\&\right.\right.\right.$$

✓ **Maple** : cpu = 0.681 (sec), leaf count = 574

$$\left\{y(x) = \frac{-40353607\left(RootOf\left(9\,x^7\_Z^{98}-49\_C1\_Z^{42}+14\_C1\_Z^{21}-\_C1\right)\right)^{91}\_C1+756315\left(RootOf\left(9\,x\right.\right.}{3\,x^3\left(RootOf\left(9\,x^7\_Z^{98}-49\_C1\_Z^{42}+14\_C1\_Z^{21}-\_C1\right)\right)^7\left(5764801\_C1\left(RootOf\left(9\,x^7\_\right.\right.\right.}\right.$$

2.265 ODE No. 265

$$2(n+1)^2x^{n-1}\left(x^{n^2}y(x)^2-1\right)+\left(x^{n(n+1)}y(x)-1\right)y'(x)=0$$

✗ **Mathematica** : cpu = 299.997 (sec), leaf count = 0 , timed out

```
$Aborted
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve((x^(n*(n+1))*y(x)-1)*diff(y(x),x)+2*(n+1)^2*x^(n-1)*(x^(n^2)*y(x)^2-1) = 0,y(x))
```

2.266 ODE No. 266

$$\sqrt{x^2+1}(y(x)-x)y'(x)-a\sqrt{\left(y(x)^2+1\right)^3}=0$$

✗ **Mathematica** : cpu = 300.043 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 1.788 (sec), leaf count = 57

$$\left\{y(x)=\tan\left(RootOf\left(-\arctan(x)+\int^{-\arctan(x)+\_Z}-\frac{1}{2a^2+\cos(2\_a)-1}\left(\cos(2\_a)-1-\sqrt{-2a^2(\cos(2\_\right.\right.\right.\right.$$

2.267 ODE No. 267

$$y(x)\sin^2(x)y'(x)+y(x)^2\sin(x)\cos(x)-1=0$$

✓ **Mathematica** : cpu = 0.039039 (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 = 0.028 (sec), leaf count = 32

$$\left\{y(x)=\frac{1}{\sin(x)}\sqrt{2x+\_C1},y(x)=-\frac{1}{\sin(x)}\sqrt{2x+\_C1}\right\}$$

2.268 ODE No. 268

$$f(x)y(x)y'(x)+g(x)y(x)^2+h(x)=0$$

✓ **Mathematica** : cpu = 1.06397 (sec), leaf count = 140

$$\left\{\left\{y(x)\to-e^{\int_1^x-\frac{g(K[1])}{f(K[1])}dK[1]}\sqrt{2\int_1^x-\frac{h(K[2])\exp\left(-2\int_1^{K[2]}-\frac{g(K[1])}{f(K[1])}dK[1]\right)}{f(K[2])}dK[2]+c_1}\right\},\left\{y(x)\to e^{\int_1^x-\frac{g(K[1}{f(K[1}}\right.\right.$$

✓ **Maple** : cpu = 0.09 (sec), leaf count = 118

$$\left\{y(x)=1\sqrt{e^{2\int\frac{g(x)}{f(x)}\,dx}\left(-2\int\frac{h(x)}{f(x)}\left(e^{\int\frac{g(x)}{f(x)}\,dx}\right)^2dx+\_C1\right)}\left(e^{2\int\frac{g(x)}{f(x)}\,dx}\right)^{-1},y(x)=-1\sqrt{e^{2\int\frac{g(x)}{f(x)}\,dx}\left(-2\int\frac{h}{f}\right.}\right.$$

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 = 493.844 (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 = 4.30963 (sec), leaf count = 326

$$\left\{\left\{y(x)\to -\frac{\sqrt[3]{2}\left(\sqrt{(6c_1-4)\,x^3+9c_1^2+x^6}+3c_1+x^3\right)^{2/3}+2x}{2^{2/3}\sqrt[3]{\sqrt{(6c_1-4)\,x^3+9c_1^2+x^6}+3c_1+x^3}}\right\},\left\{y(x)\to \frac{2^{2/3}(1-i\sqrt{3})\left(\sqrt{(6c_1-4)\,x^3+\right.}{4\sqrt[3]{\sqrt{(6c_1-4)}}}\right.$$

✓ **Maple** : cpu = 0.028 (sec), leaf count = 319

$$\left\{y(x)=\frac{1}{2}\left(\left(-4\,x^3-12\,\_C1+4\,\sqrt{x^6+(6\,\_C1-4)\,x^3+9\,\_C1^2}\right)^{\frac{2}{3}}+4\,x\right)\frac{1}{\sqrt[3]{-4\,x^3-12\,\_C1+4\,\sqrt{x^6+(6}}}\right.$$

2.271 ODE No. 271

$$\left(x^2+y(x)^2\right)y'(x)+2x(y(x)+2x)=0$$

✓ **Mathematica** : cpu = 1.8182 (sec), leaf count = 372

$$\left\{\left\{y(x)\to \frac{\sqrt[3]{\sqrt{-8e^{3c_1}x^3+e^{6c_1}+20x^6}+e^{3c_1}-4x^3}}{\sqrt[3]{2}}-\frac{\sqrt[3]{2}x^2}{\sqrt[3]{\sqrt{-8e^{3c_1}x^3+e^{6c_1}+20x^6}+e^{3c_1}-4x^3}}\right\},\left\{y(x)\to -\frac{i2}{}\right.\right.$$

✓ **Maple** : cpu = 0.222 (sec), leaf count = 352

$$\left\{y(x)=1\left(\frac{1}{2}\sqrt[3]{4-16\,x^3\_C1^{3/2}+4\,\sqrt{20\,\_C1^3x^6-8\,x^3\_C1^{3/2}+1}}-2\,\frac{x^2\_C1}{\sqrt[3]{4-16\,x^3\_C1^{3/2}+4\,\sqrt{20\,\_C1^3x^6}}}\right.\right.$$

2.272 ODE No. 272

$$\left(x^2+y(x)^2\right)y'(x)-y(x)^2=0$$

✓ **Mathematica** : cpu = 1.78659 (sec), leaf count = 39

$$\text{Solve}\left[\log\left(\frac{y(x)}{x}\right)+\frac{2\tan^{-1}\left(\frac{\frac{2y(x)}{x}-1}{\sqrt{3}}\right)}{\sqrt{3}}+\log(x)=c_1,y(x)\right]$$

✓ **Maple** : cpu = 0.172 (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 = 0.0205615 (sec), leaf count = 294

$$\left\{\left\{y(x)\to\frac{\sqrt[3]{2}\left(\sqrt{4\left(a+x^2\right)^3+9c_1^2}+3c_1\right)^{2/3}-2a-2x^2}{2^{2/3}\sqrt[3]{\sqrt{4\left(a+x^2\right)^3+9c_1^2}+3c_1}}\right\},\left\{y(x)\to\frac{\left(1+i\sqrt{3}\right)\left(a+x^2\right)}{2^{2/3}\sqrt[3]{\sqrt{4\left(a+x^2\right)^3+9c_1^2}+3c_1}}+\frac{i(\sqrt{3}}{}\right.\right.$$

✓ **Maple** : cpu = 0.026 (sec), leaf count = 401

$$\left\{y(x)=\frac{1}{2}\left(\left(-12\_C1+4\sqrt{4x^6+12ax^4+12a^2x^2+4a^3+9\_C1^2}\right)^{\frac{2}{3}}-4x^2-4a\right)\frac{}{\sqrt[3]{-12\_C1+4\sqrt{4x^6+}}}\right.$$

2.274 ODE No. 274

$$\left(a+x^2+y(x)^2\right)y'(x)+b+x^2+2xy(x)=0$$

✓ **Mathematica** : cpu = 0.140542 (sec), leaf count = 396

$$\left\{\left\{y(x)\to\frac{\sqrt[3]{2}\left(\sqrt{4\left(a+x^2\right)^3+\left(3bx-3c_1+x^3\right)^2}-3bx+3c_1-x^3\right)^{2/3}-2a-2x^2}{2^{2/3}\sqrt[3]{\sqrt{4\left(a+x^2\right)^3+\left(3bx-3c_1+x^3\right)^2}-3bx+3c_1-x^3}}\right\},\left\{y(x)\to\frac{}{2^{2/3}\sqrt[3]{\sqrt{4(a}}}\right.\right.$$

✓ **Maple** : cpu = 0.039 (sec), leaf count = 657

$$\left\{y(x) = \frac{1}{2}\left(\left(-4\,x^3 - 12\,bx - 12\_C1 + 4\sqrt{5\,x^6 + (12\,a + 6\,b)\,x^4 + 6\,x^3\_C1 + (12\,a^2 + 9\,b^2)\,x^2 + 18\,bx\_C1 +}\right.\right.\right.$$

2.275 ODE No. 275

$$\left(x^2 + y(x)^2 + x\right) y'(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 0.218677 (sec), leaf count = 16

$$\text{Solve}\left[c_1 + \tan^{-1}\left(\frac{x}{y(x)}\right) = y(x), y(x)\right]$$

✓ **Maple** : cpu = 0.091 (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 = 0.137059 (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 = 0.069 (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

$$(x^4 + y(x)^2)\, y'(x) - 4x^3 y(x) = 0$$

✓ **Mathematica** : cpu = 0.023994 (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 = 0.397 (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 = 0.267154 (sec), leaf count = 32

$$\text{Solve}\left[-\frac{1}{32}e^{-4y(x)}\left(8y(x)^2 + 4y(x) + 32\sin(x) + 1\right) = c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.061 (sec), leaf count = 28

$$\left\{\frac{\left(-8\,(y(x))^2 - 4\,y(x) - 32\,\sin(x) - 1\right)e^{-4\,y(x)}}{32} + \_C1 = 0\right\}$$

2.279 ODE No. 279

$$\left(y(x)^2 + 2y(x) + x\right)y'(x) + y(x)^2(y(x) + x)^2 + y(x)(y(x) + 1) = 0$$

✓ **Mathematica** : cpu = 1.85216 (sec), leaf count = 106

$$\left\{\left\{y(x) \to -\frac{\sqrt{(c_1x - x^2 + 1)^2 + 4\,(x - c_1)} - c_1x + x^2 - 1}{2\,(x - c_1)}\right\}, \left\{y(x) \to \frac{\sqrt{(c_1x - x^2 + 1)^2 + 4\,(x - c_1)} + c_1x -}{2\,(x - c_1)}\right.\right.$$

✓ **Maple** : cpu = 0.186 (sec), leaf count = 116

$$\left\{y(x) = \frac{1}{-2\,\_C1 + 4\,x}\left(-2\,x^2 + \_C1\,x + \sqrt{4\,x^4 - 4\,x^3\_C1 + \left(\_C1^2 - 8\right)x^2 + (4\,\_C1 + 16)\,x - 8\,\_C1 + 4 +}\right.\right.$$

2.280 ODE No. 280

$$(y(x)+x)^2y'(x)-a^2=0$$

✓ **Mathematica** : cpu = 0.0537573 (sec), leaf count = 20

$$\text{Solve}\left[a\tan^{-1}\left(\frac{y(x)+x}{a}\right)+c_1=y(x),y(x)\right]$$

✓ **Maple** : cpu = 0.061 (sec), leaf count = 24

$$\{y(x)=aRootOf(\tan(\_Z)\,a-\_Z\,a+\_C1-x)-\_C1\}$$

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 = 0.0924693 (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 = 0.092 (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 = 0.208113 (sec), leaf count = 1089

$$\left\{\left\{y(x)\to\frac{1}{6}\left(12x+4e^{c_1}-\sqrt{36x^2-12x+16e^{2c_1}+16e^{c_1}(6x-1)+3\,2^{2/3}\sqrt[3]{-e^{c_1}(6x-1)^4\left(6x+e^{c_1}-1\right)}+1}\right.\right.\right.$$

✓ **Maple** : cpu = 0.303 (sec), leaf count = 71

$$\left\{3\ln\left(\frac{-6\,y(x)+3}{6\,x-1}\right)-\ln\left(\frac{-6\,y(x)+4-6\,x}{6\,x-1}\right)-3\ln\left(\frac{-6\,y(x)+18\,x}{6\,x-1}\right)-\ln(6\,x-1)-\_C1=0\right\}$$

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 = 0.0647782 (sec), leaf count = 497

$$\left\{\left\{y(x)\to -\frac{e^{-2x}\sqrt[3]{\sqrt{e^{8x}\left(-2c_1e^{3x}+c_1^2-4e^{4x}x^6+e^{6x}\right)}+c_1e^{4x}-e^{7x}}}{\sqrt[3]{2}}-\frac{\sqrt[3]{2}e^{2x}x^2}{\sqrt[3]{\sqrt{e^{8x}\left(-2c_1e^{3x}+c_1^2-4e^{4x}x^6+e^{6x}\right.}}}\right.\right.$$

✓ **Maple** : cpu = 0.072 (sec), leaf count = 407

$$\left\{y(x)=\frac{1}{2\,\mathrm{e}^{2\,x}}\left(4\,x^2\left(\mathrm{e}^{2\,x}\right)^2+\left(\left(4\,\mathrm{e}^{3\,x}-4\_C1+4\sqrt{-4\,x^6\left(\mathrm{e}^{2\,x}\right)^2+\left(\mathrm{e}^{3\,x}\right)^2-2\,\mathrm{e}^{3\,x}\_C1+\_C1^2}\right)\left(\mathrm{e}^{2\,x}\right)^2\right)^{\frac{2}{3}}\right)\right.$$

2.284 ODE No. 284

$$\left(x^2+4y(x)^2\right)y'(x)-xy(x)=0$$

✓ **Mathematica** : cpu = 0.114122 (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 = 0.142 (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 = 0.0491527 (sec), leaf count = 382

$$\left\{\left\{y(x)\to\frac{1}{4}\left(\sqrt[3]{2\sqrt{4e^{3c_1}x^3+16e^{6c_1}+333x^6}+8e^{3c_1}+x^3}-\frac{11x^2}{\sqrt[3]{2\sqrt{4e^{3c_1}x^3+16e^{6c_1}+333x^6}+8e^{3c_1}+x^3}}-x\right)\right.\right.$$

✓ **Maple** : cpu = 0.086 (sec), leaf count = 432

$$\left\{y(x)=\frac{1}{\_C1}\left(\frac{1}{4}\sqrt[3]{x^3\_C1^3+8+2\sqrt{333\_C1^6x^6+4x^3\_C1^3+16}}-\frac{11\_C1^2x^2}{4}\frac{1}{\sqrt[3]{x^3\_C1^3+8+2\sqrt{333\_}}}\right.\right.$$

2.286 ODE No. 286

$$(2y(x)-3x+1)^2y'(x)-(3y(x)-2x-4)^2=0$$

✓ **Mathematica** : cpu = 0.366634 (sec), leaf count = 3501

✓ **Maple** : cpu = 1.233 (sec), leaf count = 1337

$$\left\{y(x)=\frac{(5x+3)\left(RootOf\left((115330078125\_C1\,x^9-2283535546875\_C1\,x^8+20095112812500\_C1\,x^7-1031\right.\right.}{5\left(RootOf\left((115330078125\_C1\,x^9-2283535546875\_C1\,x^8+20095112812500\_C1\,x^7-1\right.\right.}\right.$$

2.287 ODE No. 287

$$(2y(x)-4x+1)^2y'(x)-(y(x)-2x)^2=0$$

✓ **Mathematica** : cpu = 1.91263 (sec), leaf count = 69

$$\text{Solve}\left[\frac{1}{196}\left(112y(x)+\left(9\sqrt{2}-8\right)\log\left(-7y(x)+14x+\sqrt{2}-4\right)-\left(8+9\sqrt{2}\right)\log\left(7y(x)-14x+\sqrt{2}+4\right)-28x\right.\right.$$

✓ **Maple** : cpu = 0.081 (sec), leaf count = 56

$$\left\{-\frac{x}{7}-\frac{9\sqrt{2}}{98}Artanh\left(\frac{(7y(x)-14x+4)\sqrt{2}}{2}\right)-\frac{2\ln\left(7(y(x)-2x)^2+8y(x)-16x+2\right)}{49}+\frac{4y(x)}{7}-\_C1=0\right.$$

2.288 ODE No. 288

$$\left(-3x^2y(x)+6y(x)^2+1\right)y'(x)-3xy(x)^2+x=0$$

✓ **Mathematica** : cpu = 0.0227355 (sec), leaf count = 518

$$\left\{\left\{y(x)\to\frac{1}{36}\left(-3\sqrt[3]{3}\sqrt[3]{4\sqrt{3}\sqrt{-54c_1x^6+648c_1x^2+432c_1^2-27x^8+207x^4+32}+144c_1-9x^6+108x^2-\frac{}{\sqrt[3]{4\sqrt{}}}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.034 (sec), leaf count = 579

$$\left\{y(x)=-\frac{1}{24}\left(-6\,x^2\sqrt[3]{-324\,x^2-432\,\_C1+27\,x^6+12\,\sqrt{-81\,x^8-162\,\_C1\,x^6+621\,x^4+1944\,x^2\_C1+1296}}\right.\right.$$

2.289 ODE No. 289

$$a+(6y(x)-x)^2y'(x)-6y(x)^2+2xy(x)=0$$

✓ **Mathematica** : cpu = 0.0404703 (sec), leaf count = 115

$$\left\{\left\{y(x)\to\frac{1}{6}\left(\sqrt[3]{-18ax+18c_1-x^3}+x\right)\right\},\left\{y(x)\to\frac{x}{6}+\frac{1}{12}i\left(\sqrt{3}+i\right)\sqrt[3]{-18ax+18c_1-x^3}\right\},\left\{y(x)\to\frac{x}{6}-\right.\right.$$

✓ **Maple** : cpu = 0.04 (sec), leaf count = 115

$$\left\{y(x)=\frac{1}{6}\sqrt[3]{-x^3-18\,ax-18\,\_C1}+\frac{x}{6},y(x)=-\frac{1}{12}\sqrt[3]{-x^3-18\,ax-18\,\_C1}-\frac{i}{12}\sqrt{3}\sqrt[3]{-x^3-18\,ax-18\,\_C}\right.$$

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 = 0.314985 (sec), leaf count = 744

$$\left\{\left\{\left\{y(x)\to\frac{2^{2/3}\sqrt[3]{\sqrt{\left(a^2\left(e^{3c_1}-dx^3\right)+3abcx^3-2b^3x^3\right)^2-4x^6\left(b^2-ac\right)^3}+a^2e^{3c_1}-a^2dx^3+3abcx^3-2b^3x^3+}}{2a}\right.\right.\right.$$

✓ **Maple** : cpu = 0.109 (sec), leaf count = 1388

$$\left\{y(x) = \frac{1}{\_C1}\left(\frac{1}{2\,a}\sqrt[3]{-4\,\_C1^3a^2dx^3 + 12\,cx^3\_C1^3ba - 8\,b^3x^3\_C1^3 + 4\sqrt{\_C1^6a^2d^2x^6 - 6\,\_C1^6abcdx^6 + 4\,\_}}\right.\right.$$

2.291 ODE No. 291

$$y'(x)\left(b(\alpha x + \beta y(x))^2 - \beta(ax + by(x))\right) - \alpha(ax + by(x)) + a(\alpha x + \beta y(x))^2 = 0$$

✓ **Mathematica** : cpu = 1.04395 (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 = 0.189 (sec), leaf count = 50

$$\left\{y(x) = \frac{-ax + e^{RootOf(\_C1\,a\beta\,x - \_C1\,\alpha\,bx - \_Z\,a\beta\,x + \_Z\,\alpha\,bx - \_C1\,\beta\,e^{-\_Z} + e^{-\_Z}\_Z\,\beta + b)}}{b}\right\}$$

2.292 ODE No. 292

$$y'(x)(ay(x) + bx + c)^2 + (\alpha y(x) + \beta x + \gamma)^2 = 0$$

✓ **Mathematica** : cpu = 63.2654 (sec), leaf count = 760

$$\text{Solve}\left[(\alpha b - a\beta)\text{RootSum}\left[\#1^3a\beta^3 - \#1^3\alpha b\beta^2 + 2\#1^2a\alpha\beta^2y(x) + \#1^2ab^2\beta y(x) + 3\gamma\#1^2a\beta^2 - 2\#1^2\alpha^2b\beta y(x) +\right.\right.$$

✓ **Maple** : cpu = 0.055 (sec), leaf count = 115

$$\left\{y(x) = \frac{1}{a\beta - b\alpha}\left(((bx+c)\,\alpha - a(\beta\,x+\gamma))\,RootOf\left(\int^{\_Z}\frac{(\_a\,a - b)^2}{\_a^3a^2 - 2\,\_a^2ab - \_a^2\alpha^2 + 2\,\_a\,\alpha\,\beta + \_a\,b^2 - \beta^2}d\right.\right.\right.$$

2.293 ODE No. 293

$$x\left(y(x)^2-3x\right)y'(x)+2y(x)^3-5xy(x)=0$$

✓ **Mathematica** : cpu = 0.11029 (sec), leaf count = 661

$$\left\{\left\{y(x)\to \text{Root}\left[-\#1^{15}-\frac{25\#1^2 e^{\frac{65c_1}{2}}}{x^{26}}+\frac{65e^{\frac{65c_1}{2}}}{x^{25}}\&,1\right]\right\},\left\{y(x)\to \text{Root}\left[-\#1^{15}-\frac{25\#1^2 e^{\frac{65c_1}{2}}}{x^{26}}+\frac{65e^{\frac{65c_1}{2}}}{x^{25}}\&,2\right]\right.$$

✓ **Maple** : cpu = 0.419 (sec), leaf count = 35

$$\left\{\ln(x)-\_C1+\frac{6}{13}\ln\left(y(x)\frac{1}{\sqrt{x}}\right)-\frac{2}{65}\ln\left(\frac{5\,(y(x))^2-13\,x}{x}\right)=0\right\}$$

2.294 ODE No. 294

$$x\left(-a+x^2+y(x)^2\right)y'(x)-y(x)\left(a+x^2+y(x)^2\right)=0$$

✓ **Mathematica** : cpu = 0.0417931 (sec), leaf count = 65

$$\left\{\left\{y(x)\to\frac{1}{2}\left(c_1x-\sqrt{\left(c_1^2+4\right)x^2-4a}\right)\right\},\left\{y(x)\to\frac{1}{2}\left(\sqrt{\left(c_1^2+4\right)x^2-4a}+c_1x\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.106 (sec), leaf count = 112

$$\left\{\left((y(x))^{-2}-\left(-x^2+a\right)^{-1}\right)^{-1}=-x\sqrt{x^2-a}\frac{1}{\sqrt{\_C1+4\,\frac{a}{x^2-a}}}+\frac{x^2}{2}-\frac{a}{2},\left((y(x))^{-2}-\left(-x^2+a\right)^{-1}\right)^{-1}=x\sqrt{x\right.$$

2.295 ODE No. 295

$$x\left(-x^2+xy(x)+y(x)^2\right)y'(x)+x^2y(x)-y(x)^3+xy(x)^2=0$$

✓ **Mathematica** : cpu = 0.0631933 (sec), leaf count = 30

$$\text{Solve}\left[c_1=\frac{x}{y(x)}+\frac{y(x)}{x}+\log\left(\frac{y(x)}{x}\right)+2\log(x),y(x)\right]$$

✓ **Maple** : cpu = 0.22 (sec), leaf count = 29

$$\left\{y(x)=\mathrm{e}^{RootOf\left(\left(\mathrm{e}^{\_Z}\right)^2+2\,\mathrm{e}^{\_Z}\ln(x)+2\,\mathrm{e}^{\_Z}\_C1+\_Z\,\mathrm{e}^{\_Z}+1\right)}x\right\}$$

2.296 ODE No. 296

$$x^4 + x\left(x^2 y(x) + x^2 + y(x)^2\right) y'(x) - 2x^2 y(x)^2 - 2y(x)^3 = 0$$

✓ **Mathematica** : cpu = 0.612574 (sec), leaf count = 88

$$\left\{\left\{y(x) \to -e^{-c_1}\left(\sqrt{x^2\left(-e^{c_1}x^2 + e^{2c_1} + x^2\right)} + x^2\right)\right\}, \left\{y(x) \to e^{-c_1}\left(\sqrt{x^2\left(-e^{c_1}x^2 + e^{2c_1} + x^2\right)} - x^2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.821 (sec), leaf count = 135

$$\left\{y(x) = -x\left(-x^3 + \_C1\,x + x^2 + \sqrt{-\_C1\,x^4 + \_C1^2x^2 + x^4}\right)\left(\_C1\,x - x^2 + \sqrt{-\_C1\,x^4 + \_C1^2x^2 + x^4}\right)^-$$

2.297 ODE No. 297

$$2x\left(5x^2 + y(x)^2\right) y'(x) - x^2 y(x) + y(x)^3 = 0$$

✓ **Mathematica** : cpu = 0.0615089 (sec), leaf count = 216

$$\left\{\left\{y(x) \to \text{Root}\left[-\#1^5 + \frac{\#1^2 e^{3c_1}}{x^{3/2}} + 3e^{3c_1}\sqrt{x}\&, 1\right]\right\}, \left\{y(x) \to \text{Root}\left[-\#1^5 + \frac{\#1^2 e^{3c_1}}{x^{3/2}} + 3e^{3c_1}\sqrt{x}\&, 2\right]\right\}, \left\{y(x\right.$$

✓ **Maple** : cpu = 0.379 (sec), leaf count = 29

$$\left\{y(x) = \left(\mathit{RootOf}\left(x^9\_C1\,\_Z^{45} - \_Z^{18} - 6\_Z^9 - 9\right)\right)^{\frac{9}{2}} x\right\}$$

2.298 ODE No. 298

$$3xy(x)^2 y'(x) + y(x)^3 - 2x = 0$$

✓ **Mathematica** : cpu = 0.0108164 (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 = 0.02 (sec), leaf count = 73

$$\left\{y(x) = \frac{1}{x}\sqrt[3]{\left(x^2 + \_C1\right)x^2}, y(x) = -\frac{1 + i\sqrt{3}}{2\,x}\sqrt[3]{\left(x^2 + \_C1\right)x^2}, y(x) = \frac{i\sqrt{3} - 1}{2\,x}\sqrt[3]{\left(x^2 + \_C1\right)x^2}\right\}$$

2.299 ODE No. 299

$$\left(3xy(x)^2-x^2\right)y'(x)+y(x)^3-2xy(x)=0$$

✓ **Mathematica** : cpu = 0.0224674 (sec), leaf count = 328

$$\left\{\left\{y(x)\to-\frac{\sqrt[3]{2}\left(9c_1x^2+\sqrt{81c_1^2x^4-12x^9}\right)^{2/3}+2\sqrt[3]{3}x^3}{6^{2/3}x\sqrt[3]{9c_1x^2+\sqrt{81c_1^2x^4-12x^9}}}\right\},\left\{y(x)\to\frac{\sqrt[3]{3}(1-i\sqrt{3})\left(18c_1x^2+2\sqrt{81c_1^2x^4-12x^9}\right.}{12x\sqrt[3]{9c_1x^2+\sqrt{81c_1^2}}}\right.$$

✓ **Maple** : cpu = 0.238 (sec), leaf count = 276

$$\left\{y(x)=-\frac{12^{\frac{2}{3}}}{144\,x}\left(\left(-12\,ix^3+i\left(\left(12\,\sqrt{-12\,x^5+81\,\_C1^2}+108\,\_C1\right)x^2\right)^{\frac{2}{3}}\right)\sqrt{3}+12\,x^3+\left(\left(12\,\sqrt{-12\,x^5+81}\right.\right.\right.\right.$$

2.300 ODE No. 300

$$6xy(x)^2y'(x)+2y(x)^3+x=0$$

✓ **Mathematica** : cpu = 0.0103019 (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 = 0.022 (sec), leaf count = 83

$$\left\{y(x)=\frac{1}{2\,x}\sqrt[3]{-2\,\left(x^2-4\_C1\right)x^2},y(x)=-\frac{1+i\sqrt{3}}{4\,x}\sqrt[3]{-2\,\left(x^2-4\_C1\right)x^2},y(x)=\frac{i\sqrt{3}-1}{4\,x}\sqrt[3]{-2\,\left(x^2-4\_C1\right.}\right.$$

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 = 0.0438941 (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 = 0.249 (sec), leaf count = 25

$$\left\{y(x)=\frac{1}{x}e^{-\frac{1}{2}lambertW\left(6\,\frac{e^{3\_C1}}{x^3}\right)+\frac{3\_C1}{2}}\right\}$$

2.302 ODE No. 302

$$\left(x^2y(x)^2 + x\right)y'(x) + y(x) = 0$$

✓ **Mathematica** : cpu = 0.0214664 (sec), leaf count = 60

$$\left\{\left\{y(x) \to \frac{1}{2}\left(c_1 - \frac{\sqrt{c_1^2x+4}}{\sqrt{x}}\right)\right\}, \left\{y(x) \to \frac{1}{2}\left(\frac{\sqrt{c_1^2x+4}}{\sqrt{x}} + c_1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.192 (sec), leaf count = 133

$$\left\{y(x) = -\frac{1}{2\_C1\,x}\sqrt{-2\,x\_C1\,\left(-2\_C1 - x + \sqrt{x\,(4\_C1 + x)}\right)}, y(x) = \frac{1}{2\_C1\,x}\sqrt{-2\,x\_C1\,\left(-2\_C1 - x -\right.}\right.$$

2.303 ODE No. 303

$$y(x)\left(x^2y(x)^2 + 1\right) + x(xy(x) - 1)^2y'(x) = 0$$

✓ **Mathematica** : cpu = 0.0719538 (sec), leaf count = 24

$$\text{Solve}\left[c_1 + \frac{1}{xy(x)} + 2\log(y(x)) = xy(x), y(x)\right]$$

✓ **Maple** : cpu = 0.191 (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 = 45.2452 (sec), leaf count = 45

$$\text{Solve}\left[c_1 + \frac{1}{2}\log\left(5x^2y(x)^2 + 2\right) + \log(y(x)) + \frac{\tan^{-1}\left(\sqrt{\frac{5}{2}}xy(x)\right)}{\sqrt{10}} = 0, y(x)\right]$$

✓ **Maple** : cpu = 0.283 (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 = 0.108445 (sec), leaf count = 1211

$$\left\{\left\{y(x) \to -\frac{\sqrt{\frac{4x^3+12c_1+\left(243x^2-\frac{1}{432}\sqrt{11019960576x^4-4(144x^3+432c_1)^3}\right)^{2/3}}{\sqrt[3]{243x^2-\frac{1}{432}\sqrt{11019960576x^4-4(144x^3+432c_1)^3}}}}}{\sqrt{6}} - \frac{1}{2}\sqrt{-\frac{12\sqrt{6}x}{\sqrt{\frac{4x^3+12c_1+\left(243x^2-\frac{1}{432}\sqrt{11019960576x\right.}}{\sqrt[3]{243x^2-\frac{1}{432}\sqrt{11019960576x^4-}}}}}}\right.\right.$$

✓ **Maple** : cpu = 0.026 (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 = 0.054628 (sec), leaf count = 201

$$\left\{\left\{y(x) \to \sqrt[3]{x^3 - \sqrt{x^6 - e^{6c_1}}}\right\}, \left\{y(x) \to -\sqrt[3]{-1}\sqrt[3]{x^3 - \sqrt{x^6 - e^{6c_1}}}\right\}, \left\{y(x) \to (-1)^{2/3}\sqrt[3]{x^3 - \sqrt{x^6 - e^{6c_1}}}\right\},\right.$$

✓ **Maple** : cpu = 0.42 (sec), leaf count = 231

$$\left\{y(x) = x\frac{1}{\sqrt[3]{-\left(x^3\_C1 - \sqrt{\_C1^2x^6+1}\right)x^3\_C1}}, y(x) = x\frac{1}{\sqrt[3]{-\left(x^3\_C1 + \sqrt{\_C1^2x^6+1}\right)x^3\_C1}}, y(x) = 4\right.$$

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 = 0.0232456 (sec), leaf count = 149

$$\left\{\left\{y(x) \to -\sqrt{-\sqrt{a^2 + 4ax^2 + 4c_1} - a - x^2}\right\}, \left\{y(x) \to \sqrt{-\sqrt{a^2 + 4ax^2 + 4c_1} - a - x^2}\right\}, \left\{y(x) \to -\sqrt{\sqrt{a^2}\right.\right.$$

✓ **Maple** : cpu = 0.056 (sec), leaf count = 125

$$\left\{y(x) = \sqrt{-x^2 - a - \sqrt{4\,ax^2 + a^2 - 4\_C1}}, y(x) = \sqrt{-x^2 - a + \sqrt{4\,ax^2 + a^2 - 4\_C1}}, y(x) = -\sqrt{-x^2 - a -}\right.$$

2.308 ODE No. 308

$$2y(x)^3y'(x) + xy(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.00749147 (sec), leaf count = 48

$$\left\{\{y(x) \to 0\}, \left\{y(x) \to -\sqrt{2c_1 - \frac{x^2}{2}}\right\}, \left\{y(x) \to \sqrt{2c_1 - \frac{x^2}{2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.025 (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 = 0.013694 (sec), leaf count = 151

$$\left\{\left\{y(x) \to -\frac{\sqrt{-\sqrt{8c_1 + 4x^4 + 4x^2 + 1} - 1}}{\sqrt{2}}\right\}, \left\{y(x) \to \frac{\sqrt{-\sqrt{8c_1 + 4x^4 + 4x^2 + 1} - 1}}{\sqrt{2}}\right\}, \left\{y(x) \to -\frac{\sqrt{\sqrt{8c_1 +}}}{}\right.\right.$$

✓ **Maple** : cpu = 0.045 (sec), leaf count = 113

$$\left\{y(x) = -\frac{1}{2}\sqrt{-2 - 2\sqrt{4\,x^4 + 4\,x^2 + 8\_C1 + 1}}, y(x) = \frac{1}{2}\sqrt{-2 - 2\sqrt{4\,x^4 + 4\,x^2 + 8\_C1 + 1}}, y(x) = -\frac{1}{2}\sqrt{-2}\right.$$

2.310 ODE No. 310

$$x^3 + \left(5x^2y(x) + 2y(x)^3\right)y'(x) + 5xy(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.065358 (sec), leaf count = 159

$$\left\{\left\{y(x) \to -\frac{\sqrt{-\sqrt{2e^{4c_1} + 23x^4} - 5x^2}}{\sqrt{2}}\right\}, \left\{y(x) \to \frac{\sqrt{-\sqrt{2e^{4c_1} + 23x^4} - 5x^2}}{\sqrt{2}}\right\}, \left\{y(x) \to -\frac{\sqrt{\sqrt{2e^{4c_1} + 23x^4} -}}{\sqrt{2}}\right.\right.$$

✓ **Maple** : cpu = 0.168 (sec), leaf count = 125

$$\left\{y(x) = -\frac{1}{2}\sqrt{-10\,x^2\_C1 - 2\sqrt{23\,x^4\_C1^2 + 2}}\frac{1}{\sqrt{\_C1}}, y(x) = \frac{1}{2}\sqrt{-10\,x^2\_C1 - 2\sqrt{23\,x^4\_C1^2 + 2}}\frac{1}{\sqrt{\_C1}}, y(\right.$$

2.311 ODE No. 311

$$4x^3 + 9x^2y(x) + \left(3x^3 + 6x^2y(x) - 3xy(x)^2 + 20y(x)^3\right) y'(x) + 6xy(x)^2 - y(x)^3 = 0$$

✓ **Mathematica** : cpu = 0.192479 (sec), leaf count = 2201

$$\left\{\left\{y(x) \to \frac{x}{20} + \frac{1}{2}\sqrt{-\frac{39x^2}{100} + \frac{\sqrt[3]{99x^6 + 351e^{c_1}x^2 + \sqrt{3}\sqrt{-67037x^{12} + 185406e^{c_1}x^8 - 83733e^{2c_1}x^4 + 32000e^{3c_1}}}}{5\sqrt[3]{2}3^{2/3}}}\right.\right.$$

✓ **Maple** : cpu = 0.104 (sec), leaf count = 50

$$\left\{y(x) = \frac{\mathit{RootOf}\left(x^4\_C1^4 + 3\,x^3\_C1^3\_Z + 3\_C1^2\_Z^2x^2 - \_C1\,\_Z^3x + 5\_Z^4 - 1\right)}{\_C1}\right\}$$

2.312 ODE No. 312

$$\left(y(x)y'(x) + x\right)\left(\frac{x^2}{a} + \frac{y(x)^2}{b}\right) + \frac{(a-b)\left(y(x)y'(x) - x\right)}{a+b} = 0$$

✓ **Mathematica** : cpu = 0.286901 (sec), leaf count = 190

$$\left\{\left\{y(x) \to -\frac{\sqrt{b}\sqrt{2a^2W\left(\frac{c_1(a+b)e^{-\frac{a^2\left(b+x^2\right)+ab^2-b^2x^2}{2a^2b}}}{2a^3b^2}\right) + (a+b)\left(a-x^2\right)}}{\sqrt{a}\sqrt{a+b}}\right\}, \left\{y(x) \to \frac{\sqrt{b}\sqrt{2a^2W\left(\frac{c_1(a+b)e^{-\frac{a^2(}{}}}{2}\right.}}{}\right.\right.$$

✓ **Maple** : cpu = 1.678 (sec), leaf count = 240

$$\left\{y(x) = \frac{1}{a}\sqrt{a\left(e^{\frac{1}{2a^2b}\left(-2\,\mathit{lambertW}\left(1/2\,\frac{(a+b)e^{-1/2}}{a^2b}e^{-1/2\,\frac{x^2}{b}}e^{1/2\,\frac{bx^2}{a^2}}e^{-1/2\,\frac{b}{a}}\left(e^{\frac{\_C1}{ab}}\right)^{-1}\right)a^2b+(-x^2-b)a^2+(-b^2-2\_C1)a+b^2x^2\right)}\right.}\right.$$

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 = 0.093987 (sec), leaf count = 520

$$\left\{\left\{y(x)\to\frac{-\sqrt[3]{2}\left(\sqrt{3}\sqrt{a^3\left(27ax^2\left(bx^2+c_1\right)^2+4\left(cx+c_1\right)^3\right)}+9a^2bx^3+9a^2c_1x\right)^{2/3}+2\sqrt[3]{3}acx+2\sqrt[3]{3}ac_1}{6^{2/3}a\sqrt[3]{\sqrt{3}\sqrt{a^3\left(27ax^2\left(bx^2+c_1\right)^2+4\left(cx+c_1\right)^3\right)}+9a^2bx^3+9a^2c_1x}}\right\},\left\{\right.$$

✓ **Maple** : cpu = 0.248 (sec), leaf count = 748

$$\left\{y(x)=\frac{1}{6\,a}\left(\left(-12\,cx+12\_C1\right)a+\left(\left(-108\,bx^3+108\_C1\,x+12\sqrt{81\,ab^2x^6-162\_C1\,abx^4+12\,c^3x^3+8\right.}\right.\right.\right.$$

2.314 ODE No. 314

$$xy(x)^3y'(x)+y(x)^4-x\sin(x)=0$$

✓ **Mathematica** : cpu = 0.0524185 (sec), leaf count = 164

$$\left\{\left\{y(x)\to-\frac{\sqrt[4]{c_1+16x\left(x^2-6\right)\sin(x)-4\left(x^4-12x^2+24\right)\cos(x)}}{x}\right\},\left\{y(x)\to-\frac{i\sqrt[4]{c_1+16x\left(x^2-6\right)\sin(x)-}}{x}\right.\right.$$

✓ **Maple** : cpu = 0.056 (sec), leaf count = 158

$$\left\{y(x)=\frac{1}{x}\sqrt[4]{\left(-4\,x^4+48\,x^2-96\right)\cos(x)+\left(16\,x^3-96\,x\right)\sin(x)+\_C1},y(x)=\frac{-i}{x}\sqrt[4]{\left(-4\,x^4+48\,x^2-96\right)\cos(\right.}\right.$$

2.315 ODE No. 315

$$\left(2xy(x)^3-x^4\right)y'(x)+2x^3y(x)-y(x)^4=0$$

✓ **Mathematica** : cpu = 0.133741 (sec), leaf count = 331

$$\left\{\left\{y(x)\to\frac{\sqrt[3]{2}\left(\sqrt{81x^6-12e^{3c_1}x^3}-9x^3\right)^{2/3}+2\sqrt[3]{3}e^{c_1}x}{6^{2/3}\sqrt[3]{\sqrt{81x^6-12e^{3c_1}x^3}-9x^3}}\right\},\left\{y(x)\to\frac{i\sqrt[3]{2}\sqrt[6]{3}\left(\sqrt{3}+i\right)\left(\sqrt{81x^6-12e^{3c_1}x^3}-9x\right.}{2\,2^{2/3}3^{5/6}\sqrt[3]{\sqrt{81x^6-12e^{3c}}}}\right.\right.$$

✓ **Maple** : cpu = 0.104 (sec), leaf count = 376

$$\left\{y(x) = \frac{\sqrt[3]{12}}{6\_C1}\left(x\sqrt[3]{12}\_C1 + \left(x\left(-9\,x^2\_C1 + \sqrt{3}\sqrt{\frac{27\_C1^3x^4 - 4\,x}{\_C1}}\right)\_C1^2\right)^{\frac{2}{3}}\right)\frac{1}{\sqrt[3]{x\left(-9\,x^2\_C1 + \sqrt{3}\sqrt{\right.}}}\right.$$

2.316 ODE No. 316

$$\left(2xy(x)^3 + y(x)\right)y'(x) + 2y(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.0675627 (sec), leaf count = 41

$$\left\{\{y(x) \to 0\}, \text{Solve}\left[x = \frac{1}{4}e^{-\frac{1}{2}y(x)^2}\left(4c_1 - \text{Ei}\left(\frac{y(x)^2}{2}\right)\right), y(x)\right]\right\}$$

✓ **Maple** : cpu = 0.057 (sec), leaf count = 53

$$\left\{y(x) = 0, y(x) = \sqrt{-2\,RootOf\left(\mathrm{e}^{\_Z}Ei\,(1, \_Z) + 4\,\mathrm{e}^{\_Z}\_C1 - 4\,x\right)}, y(x) = -\sqrt{-2\,RootOf\left(\mathrm{e}^{\_Z}Ei\,(1, \_Z) + 4\,\mathrm{e}\right.}\right.$$

2.317 ODE No. 317

$$\left(x^2 + 2xy(x)^3 + xy(x)\right)y'(x) + y(x)^2 - xy(x) = 0$$

✓ **Mathematica** : cpu = 0.363775 (sec), leaf count = 23

$$\text{Solve}\left[c_1 + \frac{x}{y(x)} = y(x)^2 + \log(y(x)) + \log(x), y(x)\right]$$

✓ **Maple** : cpu = 0.133 (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 = 0.160507 (sec), leaf count = 2353

$$\left\{ \{y(x) \to 0\}, \left\{ y(x) \to -\frac{\sqrt{\frac{8\sqrt[3]{2}x^4+8\sqrt[3]{2}x^3+2\left(2\sqrt[3]{16x^6+24x^5-3(9c_1^2-4)x^4+2x^3+3\sqrt{3}\sqrt{-x^7c_1^2(32x^3+48x^2-27c_1^2x+24x+4)}}+\sqrt[3]{2}\right)}{x^2\sqrt[3]{16x^6}}}}{} \right. \right.$$

✓ **Maple** : cpu = 0.022 (sec), leaf count = 28

$$\left\{ x + (y(x))^{-2} - \frac{\_C1}{(y(x))^2} \frac{1}{\sqrt{(y(x))^2 - 2}} = 0, y(x) = 0 \right\}$$

2.319 ODE No. 319

$$\left(7xy(x)^3 + y(x) - 5x\right) y'(x) + y(x)^4 - 5y(x) = 0$$

✓ **Mathematica** : cpu = 0.0255008 (sec), leaf count = 302

$$\left\{\left\{y(x) \to \text{Root}\left[10\#1^7x + 2\#1^5 - 100\#1^4x - 25\#1^2 + 250\#1x - 10c_1\&, 1\right]\right\}, \left\{y(x) \to \text{Root}\left[10\#1^7x + 2\#1^5 -\right.\right.\right.$$

✓ **Maple** : cpu = 0.039 (sec), leaf count = 35

$$\left\{ x + \frac{2(y(x))^5 - 25(y(x))^2 - 10\_C1}{10y(x)\left((y(x))^3 - 5\right)^2} = 0 \right\}$$

2.320 ODE No. 320

$$\left(x^2 y(x)^3 + x y(x)\right) y'(x) - 1 = 0$$

✓ **Mathematica** : cpu = 0.0612689 (sec), leaf count = 76

$$\left\{\left\{y(x)\to -\frac{\sqrt{2xW\left(c_1 e^{\frac{1}{2x}-1}\right)+2x-1}}{\sqrt{x}}\right\},\left\{y(x)\to \frac{\sqrt{2xW\left(c_1 e^{\frac{1}{2x}-1}\right)+2x-1}}{\sqrt{x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.1 (sec), leaf count = 78

$$\left\{y(x)=\frac{1}{x}\sqrt{2\,x^2 \mathit{lambertW}\left(1/2\_C1\,e^{-1/2\,\frac{2\,x-1}{x}}\right)+2\,x^2-x}, y(x)=-\frac{1}{x}\sqrt{2\,x^2 \mathit{lambertW}\left(1/2\_C1\,e^{-1/2\,\frac{2\,x-1}{x}}\right)\right.$$

2.321 ODE No. 321

$$\left(2x^2 y(x)^3 + x^2 y(x)^2 - 2x\right) y'(x) - 2y(x) - 1 = 0$$

✓ **Mathematica** : cpu = 0.32538 (sec), leaf count = 42

$$\text{Solve}\left[\frac{1}{64}\left(-4y(x)^2+4y(x)-\frac{16}{2xy(x)+x}-2\log(8y(x)+4)+3\right)=c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.18 (sec), leaf count = 42

$$\left\{y(x)=\frac{e^{\mathit{RootOf}\left(x\left(e^{\_Z}\right)^3-4\,x\left(e^{\_Z}\right)^2+8\_C1\,x e^{\_Z}+2\_Z\,x e^{\_Z}+3\,x e^{\_Z}+16\right)}}{2}-\frac{1}{2}\right\}$$

2.322 ODE No. 322

$$\left(10x^2 y(x)^3 - 3y(x)^2 - 2\right) y'(x) + 5xy(x)^4 + x = 0$$

✓ **Mathematica** : cpu = 0.215863 (sec), leaf count = 2097

$$\left\{\left\{y(x)\to -\frac{\sqrt{3}\sqrt{\frac{5\sqrt[3]{6}\sqrt[3]{189x^2-18c_1+\sqrt{3}\sqrt{27(21x^2-2c_1)^2-16(5x^4-10c_1x^2-2)^3}}x^2+\frac{10\ 6^{2/3}\left(5x^4-10c_1x^2-2\right)x^2}{\sqrt[3]{189x^2-18c_1+\sqrt{3}\sqrt{27\left(21x^2-2c_1\right)^2-16\left(5x^4-10c_1x^2\right.}}}}{x^4}}}{}\right.\right.$$

✓ **Maple** : cpu = 0.033 (sec), leaf count = 29

$$\left\{\frac{5\,x^2(y(x))^4}{2}-(y(x))^3+\frac{x^2}{2}-2\,y(x)+\_C1=0\right\}$$

2.323 ODE No. 323

$$xy'(x)\left(axy(x)^3+c\right)+y(x)\left(bx^3y(x)+c\right)=0$$

✓ **Mathematica** : cpu = 0.050313 (sec), leaf count = 484

$$\left\{\left\{y(x)\to\frac{x\left(2c_1-bx^2\right)}{\sqrt[3]{3}\sqrt[3]{\sqrt{3}\sqrt{a^3x^4\left(27ac^2+x^2\left(bx^2-2c_1\right)^3\right)}+9a^2cx^2}}+\frac{\sqrt[3]{\sqrt{3}\sqrt{a^3x^4\left(27ac^2+x^2\left(bx^2-2c_1\right)^3\right)}+9a^2c}}{3^{2/3}ax}\right.\right.$$

✓ **Maple** : cpu = 0.143 (sec), leaf count = 630

$$\left\{y(x)=-\frac{3^{\frac{2}{3}}}{18\,ax}\left(\left(\left(3\,i\left(bx^2-2\_C1\right)x^2a+i\left(\left(\left(27\,c+3\,\sqrt{\frac{3\,b^3x^8-18\_C1\,b^2x^6+36\_C1^2bx^4-24\_C1^3x^2+}{a}}\right.\right.\right.\right.\right.\right.\right.$$

2.324 ODE No. 324

$$\left(2x^3y(x)^3-x\right)y'(x)+2x^3y(x)^3-y(x)=0$$

✓ **Mathematica** : cpu = 0.0563137 (sec), leaf count = 672

$$\left\{\left\{y(x)\to\frac{c_1x^2+\frac{x^4(c_1-2x)^2}{\sqrt[3]{12c_1x^8-6c_1^2x^7+c_1^3x^6+3\sqrt{3}\sqrt{x^8\left(-24c_1x^4+12c_1^2x^3-2c_1^3x^2+16x^5+27\right)}-8x^9-27x^4}}+\sqrt[3]{12c_1x^8-6c_1^2x^7+c_1^3x}}{6x^2}\right.\right.$$

✓ **Maple** : cpu = 0.143 (sec), leaf count = 815

$$\left\{y(x)=-\frac{1}{12\,x}\left(\left(-2\_C1\,x+4\,x^2\right)\sqrt[3]{\left(\_C1^3x^2-6\_C1^2x^3+12\_C1\,x^4-8\,x^5+3\,\sqrt{-6\_C1^3x^2+36\_C1^2x}\right.}\right.\right.$$

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 = 0.0628881 (sec), leaf count = 133

$$\text{Solve}\left[7c_1+\log\left(1-\frac{y(x)}{x}\right)=\text{RootSum}\left[\#1^4+\#1^3+3\#1^2+\#1+1\&,\frac{8\#1^3\log\left(\frac{y(x)}{x}-\#1\right)+9\#1^2\log\left(\frac{y(}{x}\right.}{4\#1^}\right.\right.$$

✓ **Maple** : cpu = 0.665 (sec), leaf count = 124

$$\left\{\frac{1}{7}\ln\left(\frac{y(x)-x}{x}\right)-\frac{2}{7}\ln\left(\frac{4\,x^4+4\,x^3y(x)+12\,x^2(y(x))^2+4\,x(y(x))^3+4\,(y(x))^4}{x^4}\right)-\frac{2\sqrt{3}}{7}\arctan\left(\frac{(x+2\,y(x}{3\,x}\right.\right.$$

2.326 ODE No. 326

$$y(x)y'(x)\left((ay(x)+bx)^3+bx^3\right)+x\left((ay(x)+bx)^3+ay(x)^3\right)=0$$

✓ **Mathematica** : cpu = 5.32627 (sec), leaf count = 1

$Aborted

✓ **Maple** : cpu = 0.519 (sec), leaf count = 160

$$\left\{y(x)=\frac{x(\_C1\,x-bRootOf\left(b^2\_Z^4-2\,bx\_C1\,\_Z^3+\left(a^2x^2\_C1^2+b^2x^2\_C1^2+\_C1^2x^2-a^2\right)\_Z^2-2\,bx^3\_\right.}{aRootOf\left(b^2\_Z^4-2\,bx\_C1\,\_Z^3+\left(a^2x^2\_C1^2+b^2x^2\_C1^2+\_C1^2x^2-a^2\right)\_Z^2-2\,bx^3\_C1^3\right.}\right.$$

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 = 0.430521 (sec), leaf count = 575

$$\left\{\left\{y(x)\to\frac{\frac{2c_1\left(c_1+3x^2\right)}{\sqrt[3]{\frac{9}{2}\left(c_1^2+3\right)x^2+\frac{3}{2}\sqrt{3}\sqrt{-4c_1^3x^6+\left(-c_1^4+18c_1^2+27\right)x^4+4c_1^3x^2+c_1^3}}}+2^{2/3}\sqrt[3]{9\left(c_1^2+3\right)x^2+3\sqrt{3}\sqrt{-4c_1^3x^6+\left(-c_1^4+1\right.}}}{6x}\right.\right.$$

✓ **Maple** : cpu = 0.196 (sec), leaf count = 583

$$\left\{y(x)=\frac{1}{12\_C1\,x}\left(\left(-12\,ix^2\_C1-i\left(108\_C1^3x^2+12\sqrt{3}\sqrt{27\_C1^4x^2+18\_C1^2x^2+(4\,x^4-4)\_C1-x^2\right.\right.\right.\right.$$

2.328 ODE No. 328

$$ax^2y(x)^ny'(x)-2xy'(x)+y(x)=0$$

✓ **Mathematica** : cpu = 0.129895 (sec), leaf count = 35

$$\mathrm{Solve}\left[\frac{n(-\log\left(-axy(x)^n+n+2\right)-2\log(y(x))+\log(x))}{n+2}=c_1,y(x)\right]$$

✓ **Maple** : cpu = 0.214 (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

$$x^ny(x)^m\left(axy'(x)+by(x)\right)+\alpha xy'(x)+\beta y(x)=0$$

✓ **Mathematica** : cpu = 0.430246 (sec), leaf count = 97

$$\mathrm{Solve}\left[\frac{m((a\beta-\alpha b)\log\left(x^ny(x)^m(bm-an)-\alpha n+\beta m\right)+\alpha(bm-an)\log(y(x)(\beta m-\alpha n))+\beta\log(x)(bm-an)}{(bm-an)(\beta m-\alpha n)}\right.$$

✓ **Maple** : cpu = 0.385 (sec), leaf count = 71

$$\left\{\left((y(x))^m\right)^{\alpha\,(an-bm)}x^{\beta\,m(an-bm)}\left(x^n(an-bm)\,(y(x))^m-\beta\,m+\alpha\,n\right)^{-a\beta\,m+\alpha\,bm}-\_C1=0\right\}$$

2.330 ODE No. 330

$$(f(y(x)+x)+1)y'(x)+f(y(x)+x)=0$$

✓ **Mathematica** : cpu = 46.9464 (sec), leaf count = 49

$$\text{Solve}\left[c_1=\int_1^{y(x)}\left(-\int_1^x f'(K[1]+K[2])\,dK[1]+f(K[2]+x)+1\right)dK[2]+\int_1^x f(K[1]+y(x))\,dK[1],y(x)\right]$$

✓ **Maple** : cpu = 0.033 (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 = 57.294 (sec), leaf count = 0 , could not solve

```
DSolve[-Sum[y[x]^nu*g[nu][x], {nu, 1, q}] + Sum[y[x]^nu*f[nu][x], {nu, 1, p}]*Derivative[1][
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , exception

```
time expired
```

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 = 0.13296 (sec), leaf count = 23

$$\text{Solve}\left[c_1+\log(x)=\frac{2}{\sqrt{xy(x)}}+\log(y(x)),y(x)\right]$$

✓ **Maple** : cpu = 0.063 (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 = 0.277622 (sec), leaf count = 53

$$\text{Solve}\left[\frac{\sqrt{xy(x)}\left(-3x^{3/2}y(x)^{3/2}(\log(x)-2\log(y(x)))-6xy(x)+2\right)}{3x^2y(x)^2}=c_1,y(x)\right]$$

✓ **Maple** : cpu = 0.185 (sec), leaf count = 32

$$\left\{\ln(y(x))+\frac{1}{3}x^{-\frac{3}{2}}(y(x))^{-\frac{3}{2}}-1\frac{1}{\sqrt{x}}\frac{1}{\sqrt{y(x)}}-\frac{\ln(x)}{2}-\_C1=0\right\}$$

2.334 ODE No. 334

$$\left(\sqrt{y(x)+x}+1\right)y'(x)+1=0$$

✓ **Mathematica** : cpu = 0.0375194 (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 = 0.1 (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 = 0.190207 (sec), leaf count = 75

$$\left\{\left\{y(x)\to\text{InverseFunction}\left[\frac{1}{2}\#1\sqrt{\#1^2-1}-\frac{1}{2}\log\left(\sqrt{\#1^2-1}+\#1\right)\&\right]\left[c_1+\frac{1}{2}\sqrt{x^2-1}x-\frac{1}{2}\log\left(\sqrt{x^2-1}\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.06 (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 = 0.0813991 (sec), leaf count = 43

$$\text{Solve}\left[y(x)\left(2ax+\sqrt{y(x)^2+1}\right)+\sqrt{x^2+1}x+\sinh^{-1}(y(x))+\sinh^{-1}(x)=2c_1,y(x)\right]$$

✓ **Maple** : cpu = 0.085 (sec), leaf count = 41

$$\left\{\frac{x}{2}\sqrt{x^2+1}+\frac{\mathit{Arcsinh}(x)}{2}+axy(x)+\frac{y(x)}{2}\sqrt{(y(x))^2+1}+\frac{\mathit{Arcsinh}(y(x))}{2}+\_C1=0\right\}$$

2.337 ODE No. 337

$$\left(\sqrt{x^2+y(x)^2}+x\right)y'(x)-y(x)=0$$

✓ **Mathematica** : cpu = 0.0621214 (sec), leaf count = 52

$$\left\{\left\{y(x)\to -e^{\frac{c_1}{2}}\sqrt{e^{c_1}+2x}\right\},\left\{y(x)\to e^{\frac{c_1}{2}}\sqrt{e^{c_1}+2x}\right\}\right\}$$

✓ **Maple** : cpu = 0.302 (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

$$y'(x)\left(\sin(\alpha)\left(y(x)^2-x^2\right)-2x\cos(\alpha)y(x)+\sqrt{x^2+y(x)^2}y(x)\right)+\cos(\alpha)\left(y(x)^2-x^2\right)+2x\sin(\alpha)y(x)+x\sqrt{x^2+y$$

✓ **Mathematica** : cpu = 102.095 (sec), leaf count = 1

$Aborted

✓ **Maple** : cpu = 1.892 (sec), leaf count = 129

$$\left\{y(x)=\mathit{RootOf}\left(-\ln(x)+\int^{\_Z}\frac{1}{(\_a^2+1)(\cos(2\alpha)\_a^2+2\_a\sin(2\alpha)+\_a^2-\cos(2\alpha)+1)}\left(-\cos(2\alpha)\_\right.\right.\right.$$

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 = 0.130642 (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 = 0.466 (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

$$y'(x)\left(\frac{\text{e1}(a+x)}{\left((a+x)^2+y(x)^2\right)^{3/2}}+\frac{\text{e2}(x-a)}{\left((x-a)^2+y(x)^2\right)^{3/2}}\right)-y(x)\left(\frac{\text{e1}}{\left((a+x)^2+y(x)^2\right)^{3/2}}+\frac{\text{e2}}{\left((x-a)^2+y(x)^2\right)^{3/2}}\right)$$

✗ **Mathematica** : cpu = 299.997 (sec), leaf count = 0 , timed out

`$Aborted`

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , exception

`time expired`

2.341 ODE No. 341

$$\left(xe^{y(x)}+e^x\right)y'(x)+e^xy(x)+e^{y(x)}=0$$

✓ **Mathematica** : cpu = 0.0540571 (sec), leaf count = 33

$$\left\{\left\{y(x)\to c_1e^{-x}-W\left(xe^{c_1e^{-x}-x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.318 (sec), leaf count = 33

$$\left\{y(x)=\frac{1}{\mathrm{e}^x}\left(-\mathit{lambertW}\left(\frac{x}{\mathrm{e}^x}\left(\mathrm{e}^{\frac{\_C1}{\mathrm{e}^x}}\right)^{-1}\right)\mathrm{e}^x-\_C1\right)\right\}$$

2.342 ODE No. 342

$$x\left(2e^{-xy(x)}+3e^{xy(x)}\right)\left(xy'(x)+y(x)\right)+1=0$$

✓ **Mathematica** : cpu = 0.279231 (sec), leaf count = 163

$$\left\{\left\{y(x)\to-\frac{\cosh^{-1}\left(\frac{1}{24}\left(-5\sqrt{\log^2\left(\frac{c_1}{x}\right)+24}-\log\left(\frac{c_1}{x}\right)\right)\right)}{x}\right\},\left\{y(x)\to\frac{\cosh^{-1}\left(\frac{1}{24}\left(-5\sqrt{\log^2\left(\frac{c_1}{x}\right)+24}-\log\left(\right.\right.\right.}{x}\right.$$

✓ **Maple** : cpu = 0.156 (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 = 0.0666255 (sec), leaf count = 22

$$\text{Solve}\left[\log(y(x))+x=e^{y(x)}(c_1+\text{Ei}(-y(x))),y(x)\right]$$

✓ **Maple** : cpu = 0.151 (sec), leaf count = 27

$$\left\{y(x)=\mathrm{e}^{RootOf\left(-x-\_Z-\mathrm{e}^{\mathrm{e}^{-Z}}Ei(1,\mathrm{e}^{-Z})+\_C1\,\mathrm{e}^{\mathrm{e}^{-Z}}\right)}\right\}$$

2.344 ODE No. 344

$$y'(x)(\log(y(x))+2x-1)-2y(x)=0$$

✓ **Mathematica** : cpu = 0.0207743 (sec), leaf count = 23

$$\left\{\left\{y(x)\to-\frac{W\left(-2c_1e^{-2x}\right)}{2c_1}\right\}\right\}$$

✓ **Maple** : cpu = 0.119 (sec), leaf count = 19

$$\left\{y(x)=\mathrm{e}^{-lambertW\left(-2\,\mathrm{e}^{-2\,x}\_C1\right)-2\,x}\right\}$$

2.345 ODE No. 345

$$xy'(x)\left(2x^2y(x)\log(y(x))+1\right)-2y(x)=0$$

✓ **Mathematica** : cpu = 0.0751847 (sec), leaf count = 23

$$\text{Solve}\left[y(x)\left(\frac{1}{x^2}+y(x)\left(\log(y(x))-\frac{1}{2}\right)\right)=c_1,y(x)\right]$$

✓ **Maple** : cpu = 0.293 (sec), leaf count = 36

$$\left\{y(x)=\mathrm{e}^{RootOf\left(2\_Z\,x^2\left(\mathrm{e}^{\_Z}\right)^2-x^2\left(\mathrm{e}^{\_Z}\right)^2+2\,x^2\_C1+2\,\mathrm{e}^{\_Z}\right)}\right\}$$

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 = 0.0892592 (sec), leaf count = 20

$$\text{Solve}[(ax-y(x))\log(xy(x))=c_1,y(x)]$$

✓ **Maple** : cpu = 0.678 (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 = 0.132849 (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 = 1.312 (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 = 0.055346 (sec), leaf count = 17

$$\text{Solve}[c_1=x\sin(y(x))+y(x)\sin(x),y(x)]$$

✓ **Maple** : cpu = 0.223 (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 = 0.0413887 (sec), leaf count = 15

$$\left\{\left\{y(x)\to x\csc^{-1}\left(2(c_1+\log(x))\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.175 (sec), leaf count = 17

$$\left\{y(x)=\arcsin\left(\left(2\ln(x)+2\_C1\right)^{-1}\right)x\right\}$$

2.350 ODE No. 350

$$y'(x)\cos(y(x))-\sin(y(x))-\cos(x)\sin^2(y(x))=0$$

✓ **Mathematica** : cpu = 0.621073 (sec), leaf count = 53

$$\left\{\left\{y(x)\to\csc^{-1}\left(\frac{1}{2}\left(-2c_1e^{-x}-\sin(x)-\cos(x)\right)\right)\right\},\left\{y(x)\to-\csc^{-1}\left(\frac{1}{2}\left(2c_1e^{-x}+\sin(x)+\cos(x)\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 1.27 (sec), leaf count = 226

$$\left\{y(x)=\arctan\left(-2\frac{e^x}{e^x(\cos(x)+\sin(x))+2\_C1},\frac{\sqrt{16}}{4\_C1^2+4e^x(\cos(x)+\sin(x))\_C1+(e^x)^2(2\cos(x)\sin(\right.\right.$$

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 = 0.395081 (sec), leaf count = 61

$$\left\{\left\{y(x) \to -\cot^{-1}\left(\sqrt{e^{x^2}\left(4c_1 - \sqrt{\pi}\text{erf}(x)\right)}\right)\right\}, \left\{y(x) \to \cot^{-1}\left(\sqrt{e^{x^2}\left(4c_1 - \sqrt{\pi}\text{erf}(x)\right)}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.677 (sec), leaf count = 55

$$\left\{y(x) = -\arcsin\left(\frac{1}{\sqrt{1 - \sqrt{\pi}\,\mathit{Erf}\,(x)\,\mathrm{e}^{x^2} - 2\_\mathit{C1}\,\mathrm{e}^{x^2}}}\right), y(x) = \arcsin\left(\frac{1}{\sqrt{1 - \sqrt{\pi}\,\mathit{Erf}\,(x)\,\mathrm{e}^{x^2} - 2\_\mathit{C1}\,\mathrm{e}^{x^2}}}\right)\right\}$$

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 = 0.154338 (sec), leaf count = 32

$$\text{Solve}[c_1 + 2y(x) + \sin(2y(x)) + 2x + \sin(2x) = 4\sin(\alpha)\sin(x)\sin(y(x)), y(x)]$$

✓ **Maple** : cpu = 0.543 (sec), leaf count = 33

$$\left\{\frac{(-2\sin(\alpha)\sin(x) + \cos(y(x)))\sin(y(x))}{2} + \frac{\cos(x)\sin(x)}{2} + \frac{x}{2} + \_\mathit{C1} + \frac{y(x)}{2} = 0\right\}$$

2.353 ODE No. 353

$$xy'(x)\cos(y(x)) + \sin(y(x)) = 0$$

✓ **Mathematica** : cpu = 0.0212585 (sec), leaf count = 14

$$\left\{\left\{y(x) \to \sin^{-1}\left(\frac{e^{c_1}}{x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.642 (sec), leaf count = 12

$$\left\{y(x) = \arcsin\left(\frac{1}{\_\mathit{C1}\,x}\right)\right\}$$

2.354 ODE No. 354

$$y'(x)(x\sin(y(x))-1)+\cos(y(x))=0$$

✓ **Mathematica** : cpu = 0.0674968 (sec), leaf count = 145

$$\left\{\left\{y(x)\to -\cos^{-1}\left(\frac{c_1x-\sqrt{c_1^2-x^2+1}}{c_1^2+1}\right)\right\},\left\{y(x)\to \cos^{-1}\left(\frac{c_1x-\sqrt{c_1^2-x^2+1}}{c_1^2+1}\right)\right\},\left\{y(x)\to -\cos^{-1}\left(\frac{\sqrt{}}{}\right.\right.$$

✓ **Maple** : cpu = 0.137 (sec), leaf count = 108

$$\left\{y(x)=\arctan\left(\frac{1}{\_C1^2+1}\left(-\_C1\sqrt{\_C1^2-x^2+1}+x\right),\frac{1}{\_C1^2+1}\left(\_C1\,x+\sqrt{\_C1^2-x^2+1}\right)\right),y(x)=a$$

2.355 ODE No. 355

$$y'(x)(x\cos(y(x))+\cos(x))+\sin(y(x))-y(x)\sin(x)=0$$

✓ **Mathematica** : cpu = 0.0547077 (sec), leaf count = 17

$$\text{Solve}[c_1=x\sin(y(x))+y(x)\cos(x),y(x)]$$

✓ **Maple** : cpu = 0.222 (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 = 0.072886 (sec), leaf count = 21

$$\text{Solve}\left[c_1=x^2\sin(y(x))+y(x)^2\sin(x),y(x)\right]$$

✓ **Maple** : cpu = 0.216 (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 = 0.335928 (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 = 0.72 (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 = 0.0503972 (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 = 0.68 (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 = 0.0609896 (sec), leaf count = 42

$$\left\{\left\{y(x) \to \text{SinIntegral}^{(-1)}\left(c_1 - \frac{5}{36}\left(15\cos(x) + \cos(3x) + 12\left(\log\left(\sin\left(\frac{x}{2}\right)\right) - \log\left(\cos\left(\frac{x}{2}\right)\right)\right)\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.15 (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 = 55.3013 (sec), leaf count = 6218

$$\left\{\left\{y(x)\to \text{InverseFunction}\left[\frac{\sqrt{2}(\cos(a\#1)+1)\sqrt{\frac{2c\cos(a\#1)+\cos(2a\#1)-1}{(\cos(a\#1)+1)^2}}\left(-\frac{\left(\sqrt{-\frac{\sqrt{c^2+4}}{c}-\frac{2}{c}}+\sqrt{\frac{\sqrt{c^2+4}}{c}-\frac{2}{c}}\right)\left(\left(\frac{\sqrt{c-1}}{\sqrt{c+1}}+\sqrt{\right.\right.}{}\right.}{}\right.\right.\right.$$

✓ **Maple** : cpu = 0.686 (sec), leaf count = 48

$$\left\{x+\int^{y(x)}2\,\frac{\cos(\_a\,a)}{b\,(c\cos(\_a\,a)-1)\,\sqrt{2\,\cos(2\,\_a\,a)-2+4\,c\cos(\_a\,a)}}d\_a+\_C1=0\right\}$$

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 = 0.353858 (sec), leaf count = 23

$$\text{Solve}[c_1+\cos(xy(x))=\sin(y(x)+x)+\cos(y(x))+\sin(x),y(x)]$$

✓ **Maple** : cpu = 0.358 (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 = 0.0926821 (sec), leaf count = 20

$$\text{Solve}[c_1+4\log(y(x))+\cos(xy(x))+\log(x)=0,y(x)]$$

✓ **Maple** : cpu = 2.012 (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

$$\left(xy'(x)-y(x)\right)\cos^2\left(\frac{y(x)}{x}\right)+x=0$$

✓ **Mathematica** : cpu = 0.0460438 (sec), leaf count = 28

$$\text{Solve}\left[4c_1=\frac{2y(x)}{x}+\sin\left(\frac{2y(x)}{x}\right)+4\log(x),y(x)\right]$$

✓ **Maple** : cpu = 0.189 (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 = 0.0789493 (sec), leaf count = 27

$$\text{Solve}\left[c_1+\log\left(\frac{y(x)}{x}\right)+\log\left(\cos\left(\frac{y(x)}{x}\right)\right)+2\log(x)=0,y(x)\right]$$

✓ **Maple** : cpu = 0.337 (sec), leaf count = 23

$$\left\{y(x)=\frac{\_C1}{\cos\left(\mathit{RootOf}\left(-\_Z\,\cos(\_Z)\,x^2+\_C1\right)\right)x}\right\}$$

2.365 ODE No. 365

$$\left(y(x)f\left(x^2+y(x)^2\right)-x\right)y'(x)+xf\left(x^2+y(x)^2\right)+y(x)=0$$

✗ **Mathematica** : cpu = 299.998 (sec), leaf count = 0 , timed out

```
$Aborted
```

✓ **Maple** : cpu = 1.713 (sec), leaf count = 42

$$\left\{y(x)=x\left(\tan\left(RootOf\left(-2\_Z-\int^{\frac{x^2\left((\tan(\_Z))^2+1\right)}{(\tan(\_Z))^2}}\frac{f(\_a)}{\_a}d\_a+2\_C1\right)\right)\right)^{-1}\right\}$$

2.366 ODE No. 366

$$f\left(ay(x)^2+x^2\right)\left(ay(x)y'(x)+x\right)-xy'(x)-y(x)=0$$

✗ **Mathematica** : cpu = 299.999 (sec), leaf count = 0 , timed out

```
$Aborted
```

✓ **Maple** : cpu = 0.377 (sec), leaf count = 45

$$\left\{-ax(y(x))^2\frac{1}{\sqrt{a^2\left(y\left(x\right)\right)^2}}-\int^{-\frac{a(y(x))^2}{2}-\frac{x^2}{2}}f(-2\_a)\,d\_a+\_C1=0\right\}$$

2.367 ODE No. 367

$$f(x^cy(x))\left(bxy'(x)-a\right)-x^ay(x)^b\left(cy(x)+xy'(x)\right)=0$$

✗ **Mathematica** : cpu = 14.1671 (sec), leaf count = 0 , could not solve

```
DSolve[-(x^a*y[x]^b*(c*y[x] + x*Derivative[1][y][x])) + f[x^c*y[x]]*(-a + b*x*Derivative[1][
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(f(x^c*y(x))*(b*x*diff(y(x),x)-a)-x^a*y(x)^b*(x*diff(y(x),x)+c*y(x)) = 0,y(x))
```

2.368 ODE No. 368

$$ay(x) + bx^2 + y'(x)^2 = 0$$

✗ **Mathematica** : cpu = 299.998 (sec), leaf count = 0 , timed out

```
$Aborted
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , exception

```
time expired
```

2.369 ODE No. 369

$$-a^2 + y'(x)^2 + y(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.0522396 (sec), leaf count = 99

$$\left\{\left\{y(x) \to -\frac{a\tan(x-c_1)}{\sqrt{\sec^2(x-c_1)}}\right\}, \left\{y(x) \to \frac{a\tan(x-c_1)}{\sqrt{\sec^2(x-c_1)}}\right\}, \left\{y(x) \to -\frac{a\tan(c_1+x)}{\sqrt{\sec^2(c_1+x)}}\right\}, \left\{y(x) \to \frac{a\tan(c_1+}{\sqrt{\sec^2(c_1+}}\right.\right.$$

✓ **Maple** : cpu = 0.463 (sec), leaf count = 68

$$\left\{y(x) = a, y(x) = \tan(-x+\_C1)\sqrt{\frac{a^2}{(\tan(-x+\_C1))^2+1}}, y(x) = -a, y(x) = -\tan(-x+\_C1)\sqrt{\frac{}{(\tan(-x}}\right.$$

2.370 ODE No. 370

$$-f(x)^2 + y'(x)^2 + y(x)^2 = 0$$

✗ **Mathematica** : cpu = 18.1209 (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 = 0.0258425 (sec), leaf count = 35

$$\left\{\left\{y(x) \to \sec^2\left(\frac{1}{2}(x - c_1)\right)\right\}, \left\{y(x) \to \tan^2\left(\frac{1}{2}(c_1 + x)\right) + 1\right\}\right\}$$

✓ **Maple** : cpu = 0.229 (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 = 0.00469513 (sec), leaf count = 27

$$\{\{y(x) \to \wp(x - c_1; a, b)\}, \{y(x) \to \wp(x + c_1; a, b)\}\}$$

✓ **Maple** : cpu = 0.108 (sec), leaf count = 232

$$\left\{y(x) = \frac{1}{6}\left(\left(27\,b + 3\sqrt{-3\,a^3 + 81\,b^2}\right)^{\frac{2}{3}} + 3\,a\right)\frac{1}{\sqrt[3]{27\,b + 3\sqrt{-3\,a^3 + 81\,b^2}}}, y(x) = -\frac{1}{12}\left(\left(i\left(27\,b + 3\sqrt{-3\,a^3 +\right.\right.\right.\right.$$

2.373 ODE No. 373

$$a^2y(x)^2\left(\log^2(y(x)) - 1\right) + y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.101219 (sec), leaf count = 71

$$\left\{\left\{y(x) \to e^{\frac{1}{2}\left(e^{-c_1 + iax} + e^{c_1 - iax}\right)}\right\}, \left\{y(x) \to \exp\left(\frac{1}{2}\left(e^{-c_1 - iax} + e^{c_1 + iax}\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 5.012 (sec), leaf count = 49

$$\left\{y(x) = \left(\mathrm{e}^{-\sin(a(x - \_C1))}\right)^{-1}, y(x) = \mathrm{e}^{-\sin(a(x - \_C1))}, y(x) = \mathrm{e}^{RootOf\left(a^2\left(\mathrm{e}^{-\_Z}\right)^2\left(\_Z^2 - 1\right)\right)}\right\}$$

2.374 ODE No. 374

$$y'(x)^2 - 2y'(x) - y(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.0673387 (sec), leaf count = 73

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[-\frac{\sqrt{\#1^2+1}}{\#1} - \frac{1}{\#1} + \sinh^{-1}(\#1)\&\right][c_1 - x]\right\}, \left\{y(x) \to \text{InverseFunction}\left[-\frac{\sqrt{\#1^2}}{\#}\right.\right.\right.$$

✓ **Maple** : cpu = 0.089 (sec), leaf count = 85

$$\left\{x - (y(x))^{-1} - \frac{1}{y(x)}\left((y(x))^2+1\right)^{\frac{3}{2}} + y(x)\sqrt{(y(x))^2+1} + \mathit{Arcsinh}(y(x)) - \_C1 = 0, x + \frac{1}{y(x)}\left((y(x))^2+1\right)\right.$$

2.375 ODE No. 375

$$ay'(x) + bx + y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.0470034 (sec), leaf count = 68

$$\left\{\left\{y(x) \to c_1 - \frac{(a^2-4bx)^{3/2} + 6abx}{12b}\right\}, \left\{y(x) \to \frac{1}{2}\left(\frac{(a^2-4bx)^{3/2}}{6b} - ax\right) + c_1\right\}\right\}$$

✓ **Maple** : cpu = 0.068 (sec), leaf count = 49

$$\left\{y(x) = -\frac{ax}{2} - \frac{1}{12\,b}(a^2 - 4\,bx)^{\frac{3}{2}} + \_C1, y(x) = -\frac{ax}{2} + \frac{1}{12\,b}(a^2 - 4\,bx)^{\frac{3}{2}} + \_C1\right\}$$

2.376 ODE No. 376

$$ay'(x) + by(x) + y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.339406 (sec), leaf count = 110

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[-\frac{\sqrt{a^2-4\#1b} + a\log\left(\sqrt{a^2-4\#1b} - a\right)}{2b}\&\right]\left[c_1 + \frac{x}{2}\right]\right\}, \left\{y(x) \to \text{InverseFuncti}\right.\right.$$

✓ **Maple** : cpu = 6.309 (sec), leaf count = 219

$$\left\{y(x) = -\frac{1}{4\,b}\mathrm{e}^{\frac{1}{2\,a}\left(-2\,\mathit{alambertW}\left(2\,\frac{\mathrm{e}^{-1}}{a}\mathrm{e}^{\frac{b\_C1}{a}}\frac{1}{\sqrt{-b^{-1}}}\left(\mathrm{e}^{\frac{bx}{a}}\right)^{-1}\right) - a\ln\left(-\frac{1}{4\,b}\right) - 2\,a + (-2\,x + 2\_C1)b\right)}\left(\mathrm{e}^{\frac{1}{2\,a}\left(-2\,\mathit{alambertW}\left(2\,\frac{\mathrm{e}^{-1}}{a}\mathrm{e}^{\frac{b\_C}{a}}\right.\right.}\right.\right.$$

2.377 ODE No. 377

$$y'(x)^2 + (x-2)y'(x) - y(x) + 1 = 0$$

✓ **Mathematica** : cpu = 0.00495591 (sec), leaf count = 17

$$\{\{y(x) \to c_1(x-2) + c_1^2 + 1\}\}$$

✓ **Maple** : cpu = 0.042 (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 = 0.00463305 (sec), leaf count = 13

$$\{\{y(x) \to c_1(a + c_1 + x)\}\}$$

✓ **Maple** : cpu = 0.023 (sec), leaf count = 20

$$\left\{ y(x) = \_C1\,(\_C1 + a + x)\,, y(x) = -\frac{(x+a)^2}{4} \right\}$$

2.379 ODE No. 379

$$y'(x)^2 - (x+1)y'(x) + y(x) = 0$$

✓ **Mathematica** : cpu = 0.00460425 (sec), leaf count = 15

$$\{\{y(x) \to c_1(-c_1 + x + 1)\}\}$$

✓ **Maple** : cpu = 0.02 (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 = 0.449554 (sec), leaf count = 1445

$$\left\{\left\{y(x) \to \frac{1}{36}\left(-9x^2 - \frac{9\left(x^3 + 8\cosh\left(3c_1\right) + 8\sinh\left(3c\right.\right.}{\sqrt[3]{x^6 - 20\cosh\left(3c_1\right)x^3 - 20\sinh\left(3c_1\right)x^3 - 8\cosh\left(6c_1\right) - 8\sinh\left(6c_1\right) + 8\sqrt{-\left(\left(x^3 - 1\right)\right.}}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.096 (sec), leaf count = 619

$$\left\{y(x) = \frac{1}{16}\left(i\left(6\_C1 - x^3 + 2\sqrt{-3x^3\_C1 + 9\_C1^2}\right)^{\frac{2}{3}}\sqrt{3} - i\sqrt{3}x^2 - \left(6\_C1 - x^3 + 2\sqrt{-3x^3\_C1 + 9\_C\right.\right.\right.$$

2.381 ODE No. 381

$$y'(x)^2 - 2xy'(x) + y(x) = 0$$

✓ **Mathematica** : cpu = 0.462415 (sec), leaf count = 1445

$$\left\{\left\{y(x) \to \frac{1}{36}\left(9x^2 + \frac{9\left(x^3 + 8\cosh\left(3c_1\right) + 8\sinh\left(3c_1\right)\right.}{\sqrt[3]{x^6 - 20\cosh\left(3c_1\right)x^3 - 20\sinh\left(3c_1\right)x^3 - 8\cosh\left(6c_1\right) - 8\sinh\left(6c_1\right) + 8\sqrt{-\left(\left(x^3 - 1\right)c\right.}}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.09 (sec), leaf count = 579

$$\left\{y(x) = -\frac{1}{16}\left(i\left(-6\_C1 + x^3 + 2\sqrt{-3x^3\_C1 + 9\_C1^2}\right)^{\frac{2}{3}}\sqrt{3} - i\sqrt{3}x^2 - \left(-6\_C1 + x^3 + 2\sqrt{-3x^3\_C1 +\right.\right.\right.$$

2.382 ODE No. 382

$$axy'(x) - bx^2 - c + y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.313353 (sec), leaf count = 186

$$\left\{\left\{y(x)\to \frac{1}{4}x\sqrt{x^2\left(a^2+4b\right)+4c}+\frac{c\log\left(\sqrt{a^2+4b}\sqrt{x^2\left(a^2+4b\right)+4c}+a^2x+4bx\right)}{\sqrt{a^2+4b}}-\frac{ax^2}{4}+c_1\right\},\left\{y(x)\to \right.\right.$$

✓ **Maple** : cpu = 0.098 (sec), leaf count = 146

$$\left\{y(x)=-\frac{x}{4}\sqrt{\left(a^2+4\,b\right)x^2+4\,c}-c\ln\left(\sqrt{a^2+4\,b}x+\sqrt{\left(a^2+4\,b\right)x^2+4\,c}\right)\frac{1}{\sqrt{a^2+4\,b}}-\frac{ax^2}{4}+\_C1,y(x)=\frac{x}{4}\right.$$

2.383 ODE No. 383

$$axy'(x) + by(x) + cx^2 + y'(x)^2 = 0$$

✗ **Mathematica** : cpu = 300. (sec), leaf count = 0 , timed out

`$Aborted`

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , exception

`time expired`

2.384 ODE No. 384

$$(ax+b)y'(x) - ay(x) + c + y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 2.19588 (sec), leaf count = 133

$$\left\{\left\{y(x)\to -\frac{2\sqrt{-a^4e^{2c_1}(x+1)^2}+a^3(-(2x+1))+2a^2bx+a\left(b^2+e^{2c_1}-4c\right)}{4a^2}\right\},\left\{y(x)\to \frac{2\sqrt{-a^4e^{2c_1}(x+1)^2}}{}\right.\right.$$

✓ **Maple** : cpu = 0.099 (sec), leaf count = 50

$$\left\{y(x)=\frac{\_C1^2+(ax+b)\_C1+c}{a},y(x)=\frac{-a^2x^2-2\,abx-b^2+4\,c}{4\,a}\right\}$$

2.385 ODE No. 385

$$-2x^2y'(x) + y'(x)^2 + 2xy(x) = 0$$

✗ **Mathematica** : cpu = 300.008 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.711 (sec), leaf count = 169

$$\left\{y(x) = \frac{x^4 - \left(RootOf\left(x^{16} - 12\_Z^2x^{12} - 16\_Z^3x^{10} + 30\_Z^4x^8 + 96\_Z^5x^6 + 100\_Z^6x^4 + 48\_Z^7x^2 + 9\_Z\right.\right.}{2\,x}\right.$$

2.386 ODE No. 386

$$ax^3y'(x) - 2ax^2y(x) + y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.216305 (sec), leaf count = 56

$$\left\{\left\{y(x) \to 2ae^{2c_1}\left(4e^{2c_1} + x^2\right)\right\}, \left\{y(x) \to \frac{e^{4c_1} - 2ae^{2c_1}x^2}{8a}\right\}\right\}$$

✓ **Maple** : cpu = 0.892 (sec), leaf count = 27

$$\left\{y(x) = -\frac{ax^4}{8}, y(x) = x^2\_C1 + 2\frac{\_C1^2}{a}\right\}$$

2.387 ODE No. 387

$$y'(x)^2 + e^x\left(y'(x) - y(x)\right) = 0$$

✓ **Mathematica** : cpu = 0.909673 (sec), leaf count = 133

$$\left\{\text{Solve}\left[\frac{e^{x/2}\sqrt{4y(x) + e^x} + 4y(x)\log\left(\sqrt{4y(x) + e^x} + e^{x/2}\right) - e^x}{2y(x)} = c_1, y(x)\right], \text{Solve}\left[2\log(y(x)) = c_1 + \frac{e^{x/2}\sqrt{4}}{}\right.\right.$$

✓ **Maple** : cpu = 1.761 (sec), leaf count = 115

$$\left\{\ln\left(y(x)\right) - \frac{1}{2\,y(x)}\sqrt{e^{2\,x} + 4\,y(x)\,e^x} - 2\,Artanh\left(\sqrt{e^{2\,x} + 4\,y(x)\,e^x}e^{-x}\right) - \frac{e^x}{2\,y(x)} - \_C1 = 0, \ln\left(y(x)\right) + \frac{1}{2\,y(x}\right.$$

2.388 ODE No. 388

$$y'(x)^2 - 2y(x)y'(x) - 2x = 0$$

✓ **Mathematica** : cpu = 0.801893 (sec), leaf count = 41

$$\text{Solve}\left[\left\{x = \frac{\text{K\$1888232}(2c_1 + \sinh^{-1}(\text{K\$1888232}))}{2\sqrt{\text{K\$1888232}^2 + 1}}, \text{K\$1888232} = 2\left(\frac{x}{\text{K\$1888232}} + y(x)\right)\right\}, \{y(x), \text{K\$1888232}\}$$

✓ **Maple** : cpu = 0.21 (sec), leaf count = 223

$$\left\{1\left(\left(-\frac{y(x)}{2} - \frac{1}{2}\sqrt{(y(x))^2 + 2x}\right) Arcsinh\left(y(x) + \sqrt{(y(x))^2 + 2x}\right) + x\sqrt{2(y(x))^2 + 2x + 2y(x)\sqrt{(y(x))^2 -}}\right.\right.$$

2.389 ODE No. 389

$$y'(x)^2 - (4y(x) + 1)y'(x) + y(x)(4y(x) + 1) = 0$$

✓ **Mathematica** : cpu = 0.0461427 (sec), leaf count = 55

$$\left\{\left\{y(x) \to \frac{1}{4}e^{x-4c_1}\left(e^x - 2e^{2c_1}\right)\right\}, \left\{y(x) \to \frac{1}{4}e^{2c_1+x}\left(e^{2c_1+x} - 2\right)\right\}\right\}$$

✓ **Maple** : cpu = 3.801 (sec), leaf count = 71

$$\left\{y(x) = -\frac{1}{4}, y(x) = \frac{1}{\_C1}\left(-(\mathrm{e}^x)^2\sqrt{-\frac{\_C1}{(\mathrm{e}^x)^2}} + \_C1\right)\frac{1}{\sqrt{-\frac{\_C1}{(\mathrm{e}^x)^2}}}, y(x) = -\frac{1}{\_C1}\left((\mathrm{e}^x)^2\sqrt{-\frac{\_C1}{(\mathrm{e}^x)^2}} + \_C1\right)\frac{1}{\sqrt{-}}\right.$$

2.390 ODE No. 390

$$ay(x)y'(x) - bx - c + y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 2.39455 (sec), leaf count = 82

$$\text{Solve}\left[\left\{\frac{c}{b} + x = \frac{\text{K\$1888645}\left(\tan^{-1}\left(\frac{\sqrt{a}\text{K\$1888645}}{\sqrt{b-a\text{K\$1888645}^2}}\right) + \sqrt{a}c_1\right)}{\sqrt{a}\sqrt{b - a\text{K\$1888645}^2}}, y(x) = \frac{bx + c - \text{K\$1888645}^2}{a\text{K\$1888645}}\right\}, \{y(x), \text{K\$1888}$$

✓ **Maple** : cpu = 1.667 (sec), leaf count = 281

$$\left\{y(x) = 2\,\frac{\left(-1/4\left(\mathrm{e}^{2\,RootOf\left(\sqrt{a}\_C1\,b\mathrm{e}^{2\_Z}-a\mathrm{e}^{2\_Z}bx+\sqrt{a}\_C1\,b^2-\mathrm{e}^{2\_Z}\_Z\,b-a\mathrm{e}^{2\_Z}c+ab^2x-\_Z\,b^2+abc\right)}+b\right)^2\mathrm{e}^{-2\,RootOf\left(\sqrt{a}\_\cdots\right.}\right.}{a^{3/2}\left(\mathrm{e}^{2\,RootOf\left(\sqrt{a}\_C1\cdots\right.}\right.}\right.$$

2.391 ODE No. 391

$$y'(x)(ay(x)+bx)+abxy(x)+y'(x)^2=0$$

✓ **Mathematica** : cpu = 0.00601346 (sec), leaf count = 29

$$\left\{\left\{y(x)\to c_1e^{-ax}\right\},\left\{y(x)\to c_1-\frac{bx^2}{2}\right\}\right\}$$

✓ **Maple** : cpu = 0.059 (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 = 0.270158 (sec), leaf count = 25

$$\left\{\left\{y(x)\to\frac{e^{\frac{1}{4}c_1(2x-c_1)}}{a}\right\}\right\}$$

✓ **Maple** : cpu = 3.054 (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 = 0.0345932 (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 = 0.284 (sec), leaf count = 77

$$\left\{y(x)=\frac{\_C1}{\tan(x)}\left(1+\sqrt{(\tan(x))^2+1}\right)\frac{1}{\sqrt{\frac{(\tan(x))^2}{(\tan(x))^2+1}}},y(x)=\frac{\_C1\left((\tan(x))^2+1\right)}{\tan(x)}\sqrt{\frac{(\tan(x))^2}{(\tan(x))^2+1}}\left(1+\sqrt{(\mathrm{ta}\right.\right.$$

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 = 56.0079 (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[x]*De
```

✓ **Maple** : cpu = 9.915 (sec), leaf count = 164

$$\left\{y(x)=-\tan\left(\frac{1}{2\cos(2)+2}\left(\int\left(\mathrm{e}^{\int_a^x f(xp)\,\mathrm{d}xp}\right)^2\sqrt{-\frac{\left((f(x))^2-g(x)\right)(4\cos(2)+\cos(4)+3)}{\left(\mathrm{e}^{\int_a^x f(xp)\,\mathrm{d}xp}\right)^4}}\,\mathrm{d}x\sqrt{2}-2\_C1\right.\right.\right.$$

2.395 ODE No. 395

$$2f(x)y(x)y'(x)+g(x)y(x)^2+h(x)+y'(x)^2=0$$

✗ **Mathematica** : cpu = 32.7996 (sec), leaf count = 0 , could not solve

```
DSolve[h[x] + g[x]*y[x]^2 + 2*f[x]*y[x]*Derivative[1][y][x] + Derivative[1][y][x]^2 == 0, y[
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(y(x),x)^2+2*f(x)*y(x)*diff(y(x),x)+g(x)*y(x)^2+h(x) = 0,y(x))
```

2.396 ODE No. 396

$$(y(x)-x)y(x)y'(x)+y'(x)^2-xy(x)^3=0$$

✓ **Mathematica** : cpu = 0.00896819 (sec), leaf count = 29

$$\left\{\left\{y(x)\to\frac{1}{x-c_1}\right\},\left\{y(x)\to c_1e^{\frac{x^2}{2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.065 (sec), leaf count = 20

$$\left\{y(x)=(x+\_C1)^{-1},y(x)=e^{\frac{x^2}{2}}\_C1\right\}$$

2.397 ODE No. 397

$$-2x^3y(x)^2y'(x)-4x^2y(x)^3+y'(x)^2=0$$

✓ **Mathematica** : cpu = 0.669461 (sec), leaf count = 136

$$\left\{\text{Solve}\left[4c_1+\frac{2x\sqrt{x^4y(x)+4}y(x)^{3/2}\sinh^{-1}\left(\frac{1}{2}x^2\sqrt{y(x)}\right)}{\sqrt{x^2y(x)^3\left(x^4y(x)+4\right)}}+\log(y(x))=0,y(x)\right],\text{Solve}\left[4c_1+\log(y(x))=\frac{2xy}{}\right.\right.$$

✓ **Maple** : cpu = 0.977 (sec), leaf count = 128

$$\left\{y(x)=\frac{-2\sqrt{2}x^2-2\_C1}{2\_C1\,x^4-\_C1^3},y(x)=\frac{2\sqrt{2}x^2-2\_C1}{2\_C1\,x^4-\_C1^3},y(x)=\frac{\left(\sqrt{2}x^2\_C1-2\right)\_C1^2}{2\_C1^2x^4-4},y(x)=-4\,x^{-4},y(x)=-\right.$$

2.398 ODE No. 398

$$y'(x)^2-3xy(x)^{2/3}y'(x)+9y(x)^{5/3}=0$$

✓ **Mathematica** : cpu = 1.08648 (sec), leaf count = 169

$$\left\{\text{Solve}\left[\frac{1}{6}\left(\frac{\left(x^2-4\sqrt[3]{y(x)}\right)^{3/2}y(x)^2\left(6\log\left(\sqrt{x^2-4\sqrt[3]{y(x)}}+x\right)-\log(y(x))\right)}{\left(\left(x^2-4\sqrt[3]{y(x)}\right)y(x)^{4/3}\right)^{3/2}}+\log(y(x))\right)=c_1,y(x)\right],\text{Sol}\right.$$

✓ **Maple** : cpu = 2.724 (sec), leaf count = 137

$$\left\{\ln(x)+\frac{1}{6}\ln\left(64\frac{y(x)}{x^6}-1\right)-\frac{1}{6}\ln\left(4\sqrt[3]{\frac{y(x)}{x^6}}-1\right)-\frac{1}{6}\ln\left(16\left(\frac{y(x)}{x^6}\right)^{2/3}+4\sqrt[3]{\frac{y(x)}{x^6}}+1\right)+\frac{1}{6}\ln\left(\frac{y(x)}{x^6}\right)+\right.$$

2.399 ODE No. 399

$$2y'(x)^2 + (x-1)y'(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 0.00469513 (sec), leaf count = 15

$$\{\{y(x) \to c_1(2c_1 + x - 1)\}\}$$

✓ **Maple** : cpu = 0.021 (sec), leaf count = 22

$$\left\{ y(x) = \_C1\ (2\_C1 + x - 1)\,, y(x) = -\frac{(x-1)^2}{8} \right\}$$

2.400 ODE No. 400

$$-2x^2y'(x) + 2y'(x)^2 + 3xy(x) = 0$$

✗ **Mathematica** : cpu = 299.997 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.398 (sec), leaf count = 74

$$\left\{ y(x) = \frac{x^3}{6}, y(x) = \frac{1}{3\_C1}\left(-\sqrt{-6\_C1\,x}x + 3\right), y(x) = \frac{1}{3\_C1}\left(\sqrt{-6\_C1\,x}x + 3\right), y(x) = -\frac{x}{3}\sqrt{-6\_C1\,x} +$$

2.401 ODE No. 401

$$3y'(x)^2 - 2xy'(x) + y(x) = 0$$

✓ **Mathematica** : cpu = 0.352838 (sec), leaf count = 1093

$$\{\{y(x) \to \mathrm{Root}\left[-16e^{6c_1}x^6 + 3\#1^4x^4 + 144e^{6c_1}\#1x^4 - 24\#1^5x^2 - 378e^{6c_1}\#1^2x^2 + 243e^{12c_1} + 48\#1^6 + 216e^{6c_1}\right.$$

✓ **Maple** : cpu = 0.089 (sec), leaf count = 580

$$\left\{ y(x) = -\frac{1}{48}\left(i\left(-54\_C1 + x^3 + 6\sqrt{-3\,x^3\_C1 + 81\_C1^2}\right)^{\frac{2}{3}}\sqrt{3} - i\sqrt{3}x^2 - \left(-54\_C1 + x^3 + 6\sqrt{-3\,x^3\_C\right.\right.\right.$$

2.402 ODE No. 402

$$x^2 + 4xy'(x) + 3y'(x)^2 - y(x) = 0$$

✗ **Mathematica** : cpu = 300.006 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.256 (sec), leaf count = 101

$$\left\{ y(x) = -\frac{x^2}{3}, y(x) = \frac{-3\_C1^2 x^2 - 2\sqrt{3}\_C1\,x + 3}{12\_C1^2}, y(x) = \frac{-3\_C1^2 x^2 + 2\sqrt{3}\_C1\,x + 3}{12\_C1^2}, y(x) = -\frac{\sqrt{3}\_C1\,x}{6}\right.$$

2.403 ODE No. 403

$$ay'(x)^2 + by'(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 0.324624 (sec), leaf count = 116

$$\left\{ \left\{ y(x) \to \text{InverseFunction}\left[\frac{\sqrt{4\#1a + b^2} + b\log\left(\sqrt{4\#1a + b^2} - b\right)}{2a} \& \right] \left[\frac{x}{2a} + c_1 \right] \right\}, \left\{ y(x) \to \text{InverseFunction} \right.\right.$$

✓ **Maple** : cpu = 5.659 (sec), leaf count = 197

$$\left\{ y(x) = \frac{1}{4\,a} \mathrm{e}^{-\frac{1}{2\,b}\left(2\,b\,\mathrm{lambertW}\left(2\,\frac{\mathrm{e}^{-1}}{b\sqrt{a^{-1}}}\mathrm{e}^{\frac{x}{b}}\left(\mathrm{e}^{\frac{\_C1}{b}}\right)^{-1}\right) + b\ln\left(\frac{1}{4\,a}\right) + 2\_C1 + 2\,b - 2\,x\right)} \left(\mathrm{e}^{-\frac{1}{2\,b}\left(2\,b\,\mathrm{lambertW}\left(2\,\frac{\mathrm{e}^{-1}}{b\sqrt{a^{-1}}}\mathrm{e}^{\frac{x}{b}}\left(\mathrm{e}^{\frac{\_C1}{b}}\right)^{-1}\right.\right.}\right.\right.$$

2.404 ODE No. 404

$$ay'(x)^2 + bx^2 y'(x) + cxy(x) = 0$$

✗ **Mathematica** : cpu = 299.997 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.62 (sec), leaf count = 389

$$\left\{ \int_{\_b}^{x} 1\left(-b\_a^2 - \sqrt{\_a^4 b^2 - 4\_a\,acy\,(x)}\right)\left(b\_a^3 + \sqrt{\_a^4 b^2 - 4\_a\,acy\,(x)}\_a + 6\,ay(x)\right)^{-1} \mathrm{d}\_a + \int^{y(x)} -2\,\frac{}{bx^3} \right.$$

2.405 ODE No. 405

$$ay'(x)^2 + y(x)y'(x) - x = 0$$

✓ **Mathematica** : cpu = 1.35655 (sec), leaf count = 40

$$\text{Solve}\left[\left\{x = \frac{\text{K\$1944536}\left(a\sin^{-1}(\text{K\$1944536}) + c_1\right)}{\sqrt{1 - \text{K\$1944536}^2}}, a\text{K\$1944536} + y(x) = \frac{x}{\text{K\$1944536}}\right\}, \{y(x), \text{K\$1944536}\}\right]$$

✓ **Maple** : cpu = 0.545 (sec), leaf count = 378

$$\left\{\_C1\left(y(x) - \sqrt{4\,ax + (y(x))^2}\right)\frac{1}{\sqrt{\frac{1}{a}\left(-y(x) + \sqrt{4\,ax + (y(x))^2} - 2\,a\right)}}\frac{1}{\sqrt{\frac{1}{a}\left(-y(x) + \sqrt{4\,ax + (y(x))^2} + 2\,a\right.}}\right.$$

2.406 ODE No. 406

$$ay'(x)^2 - y(x)y'(x) - x = 0$$

✓ **Mathematica** : cpu = 1.03773 (sec), leaf count = 38

$$\text{Solve}\left[\left\{x = \frac{\text{K\$1944721}\left(a\sinh^{-1}(\text{K\$1944721}) + c_1\right)}{\sqrt{\text{K\$1944721}^2 + 1}}, a\text{K\$1944721} = \frac{x}{\text{K\$1944721}} + y(x)\right\}, \{y(x), \text{K\$1944721}\}\right]$$

✓ **Maple** : cpu = 0.175 (sec), leaf count = 262

$$\left\{1\left(\left(y(x) - \sqrt{4\,ax + (y(x))^2}\right) Arcsinh\left(\frac{1}{2\,a}\left(-y(x) + \sqrt{4\,ax + (y(x))^2}\right)\right) + x\sqrt{-2\,\frac{y(x)\sqrt{4\,ax + (y(x))^2} -}{a^2}}\right.\right.$$

2.407 ODE No. 407

$$xy'(x)^2 - y(x) = 0$$

✓ **Mathematica** : cpu = 0.0176772 (sec), leaf count = 41

$$\left\{\left\{y(x) \to \frac{1}{4}\left(c_1 - 2\sqrt{x}\right)^2\right\}, \left\{y(x) \to \frac{1}{4}\left(c_1 + 2\sqrt{x}\right)^2\right\}\right\}$$

✓ **Maple** : cpu = 0.083 (sec), leaf count = 39

$$\left\{y(x) = 0, y(x) = \frac{1}{x}\left(-x + \sqrt{\_C1\,x}\right)^2, y(x) = \frac{1}{x}\left(x + \sqrt{\_C1\,x}\right)^2\right\}$$

2.408 ODE No. 408

$$xy'(x)^2 - 2y(x) + x = 0$$

✓ **Mathematica** : cpu = 1.06607 (sec), leaf count = 163

$$\left\{\text{Solve}\left[\frac{\left(\sqrt{\frac{2y(x)}{x} - 1} - 1\right)\left(\left(\sqrt{\frac{2y(x)}{x} - 1} - 1\right)\log\left(\sqrt{\frac{2y(x)}{x} - 1} - 1\right) - 1\right)}{\sqrt{\frac{2y(x)}{x} - 1} - \frac{y(x)}{x}} = c_1 + \log(x), y(x)\right], \text{Solve}\left[\frac{x\left(\sqrt{\right.}\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.136 (sec), leaf count = 73

$$\left\{y(x) = \left(\frac{1}{2}\left(\mathit{lambertW}\left(\frac{1}{\_C1}\sqrt{\_C1\,x}\right) + 1\right)^2\left(\mathit{lambertW}\left(\frac{1}{\_C1}\sqrt{\_C1\,x}\right)\right)^{-2} + \frac{1}{2}\right)x, y(x) = \left(\frac{1}{2}\left(\mathit{lamber}\right.\right.\right.$$

2.409 ODE No. 409

$$xy'(x)^2 - 2y'(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 30.8379 (sec), leaf count = 39

$$\text{Solve}\left[\left\{\text{K\$1945333}x = \frac{y(\text{K\$1945333})}{\text{K\$1945333}} + 2, y(x) = \frac{\text{K\$1945333}(c_1\text{K\$1945333} - 2\text{K\$1945333}\log(\text{K\$1945333}) - 2}{(\text{K\$1945333} - 1)^2}\right.\right.$$

✓ **Maple** : cpu = 0.189 (sec), leaf count = 63

$$\left\{y(x) = x\mathrm{e}^{2\,\mathit{RootOf}\left(-x\mathrm{e}^{2\_Z} + 2x\mathrm{e}^{\_Z} + 2\mathrm{e}^{\_Z} + \_C1 - 2\_Z - x\right)} - 2\,\mathrm{e}^{\mathit{RootOf}\left(-x\mathrm{e}^{2\_Z} + 2x\mathrm{e}^{\_Z} + 2\mathrm{e}^{\_Z} + \_C1 - 2\_Z - x\right)}\right\}$$

2.410 ODE No. 410

$$xy'(x)^2 + 4y'(x) - 2y(x) = 0$$

✓ **Mathematica** : cpu = 31.4654 (sec), leaf count = 40

$$\text{Solve}\left[\left\{\text{K\$1945647}x + 4 = \frac{2y(\text{K\$1945647})}{\text{K\$1945647}}, y(x) = \frac{\text{K\$1945647}(c_1\text{K\$1945647} + 4\text{K\$1945647}\log(\text{K\$1945647}) + \right.$$

✓ **Maple** : cpu = 0.193 (sec), leaf count = 64

$$\left\{y(x) = \frac{x e^{2\,RootOf\left(-x e^{2\_Z} + 4\,x e^{\_Z} - 4\,e^{\_Z} + \_C1 + 8\_Z - 4\,x\right)}}{2} + 2\,e^{RootOf\left(-x e^{2\_Z} + 4\,x e^{\_Z} - 4\,e^{\_Z} + \_C1 + 8\_Z - 4\,x\right)}\right\}$$

2.411 ODE No. 411

$$xy'(x)^2 + xy'(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 1.13209 (sec), leaf count = 180

$$\left\{\text{Solve}\left[\frac{x\left(\sqrt{\frac{4y(x)}{x}+1}-1\right)\left(\left(\sqrt{\frac{4y(x)}{x}+1}-1\right)\log\left(\sqrt{\frac{4y(x)}{x}+1}-1\right)-1\right)}{2x\left(\sqrt{\frac{4y(x)}{x}+1}-1\right)-4y(x)} = c_1 + \frac{\log(x)}{2}, y(x)\right], \text{Solve}\left[\frac{x\left(\sqrt{\right.}\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.125 (sec), leaf count = 65

$$\left\{y(x) = \frac{x}{4}\left(1 + 2\,lambertW\left(-1/2\,\frac{1}{\sqrt{\frac{\_C1}{x}}}\right)\right)\left(lambertW\left(-\frac{1}{2}\frac{1}{\sqrt{\frac{\_C1}{x}}}\right)\right)^{-2}, y(x) = \frac{x}{4}\left(1 + 2\,lambertW\left(1/\right.\right.\right.$$

2.412 ODE No. 412

$$a + xy'(x)^2 + y(x)y'(x) = 0$$

✓ **Mathematica** : cpu = 29.0085 (sec), leaf count = 1

$$\$\text{Aborted}$$

✓ **Maple** : cpu = 0.125 (sec), leaf count = 146

$$\left\{-x^2\_C1\left(\frac{1}{x}\left(-y(x) + \sqrt{(y(x))^2 - 4\,ax}\right)\right)^{\frac{3}{2}}\left(-y(x) + \sqrt{(y(x))^2 - 4\,ax}\right)^{-2} + x + \frac{4\,ax^2}{3}\left(-y(x) + \sqrt{(y(x))^2\right.\right.\right.$$

2.413 ODE No. 413

$$-x^2 + xy'(x)^2 + y(x)y'(x) = 0$$

✗ **Mathematica** : cpu = 300.001 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.338 (sec), leaf count = 269

$$\left\{\int_{\_b}^{x} \frac{1}{\_a}\left(-y(x)-\sqrt{4\_a^3+(y(x))^2}\right)\left(\sqrt{4\_a^3+(y(x))^2}+4\,y(x)\right)^{-1} \mathrm{d}\_a + \int^{y(x)} 1\Bigg(-2+\Bigg(-48\_f-12\sqrt{}\right.$$

2.414 ODE No. 414

$$x^3 + xy'(x)^2 + y(x)y'(x) = 0$$

✗ **Mathematica** : cpu = 300.005 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.341 (sec), leaf count = 269

$$\left\{\int_{\_b}^{x} \frac{1}{\_a}\left(-y(x)-\sqrt{-4\_a^4+(y(x))^2}\right)\left(\sqrt{-4\_a^4+(y(x))^2}+5\,y(x)\right)^{-1} \mathrm{d}\_a + \int^{y(x)} 1\Bigg(-2+\Bigg(80\_f+16\right.$$

2.415 ODE No. 415

$$y(x)y'(x) + xy'(x)^2 - y(x)^4 = 0$$

✓ **Mathematica** : cpu = 0.234596 (sec), leaf count = 133

$$\left\{\left\{y(x)\to-\frac{\sqrt{\tanh^2\left(\frac{1}{2}\left(c_1-\log(x)\right)\right)-1}}{2\sqrt{x}}\right\},\left\{y(x)\to\frac{\sqrt{\tanh^2\left(\frac{1}{2}\left(c_1-\log(x)\right)\right)-1}}{2\sqrt{x}}\right\},\left\{y(x)\to-\frac{\sqrt{\tanh^2\left(\right.}}{}\right.\right.$$

✓ **Maple** : cpu = 0.582 (sec), leaf count = 95

$$\left\{y(x)=-\frac{1}{2}\frac{1}{\sqrt{-x}}, y(x)=\frac{1}{2}\frac{1}{\sqrt{-x}}, y(x)=-\frac{1}{2\,x}\sqrt{-\left(\tanh\left(-\frac{\ln(x)}{2}+\frac{\_C1}{2}\right)\right)^2 x+x\left(\tanh\left(-\frac{\ln(x)}{2}+\frac{\_C1}{2}\right.\right.}\right.$$

2.416 ODE No. 416

$$xy'(x)^2 + (y(x) - 3x)y'(x) + y(x) = 0$$

✗ **Mathematica** : cpu = 301.06 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.118 (sec), leaf count = 136

$$\left\{ -\frac{\_C1}{x} \left(-y(x) + 5\,x + \sqrt{9\,x^2 - 10\,xy\,(x) + (y\,(x))^2} \right) \left(\frac{1}{x} \left(-y(x) + 3\,x + \sqrt{9\,x^2 - 10\,xy\,(x) + (y\,(x))^2} \right) \right)^{-\frac{3}{2}} +$$

2.417 ODE No. 417

$$a + xy'(x)^2 - y(x)y'(x) = 0$$

✓ **Mathematica** : cpu = 0.438948 (sec), leaf count = 183

$$\left\{ \left\{ y(x) \to -\frac{-8a^2 - \sqrt{a\,(\sinh\,(2c_1) + \cosh\,(2c_1))\,\left((-4a + x - 1)\sinh\left(\frac{c_1}{2}\right) + (4a - x - 1)\cosh\left(\frac{c_1}{2}\right)\right)^2} + 2a\sinh}{-4a + \sinh\,(c_1) + \cosh\,(c_1)} \right.\right.$$

✓ **Maple** : cpu = 0.063 (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 = 0.902108 (sec), leaf count = 158

$$\left\{ \text{Solve}\left[\frac{y(x)}{ax} + \frac{\sqrt{\frac{y(x)}{x}}\sqrt{\frac{y(x)}{x} - 4a}}{a} + 4c_1 + 2\log(x) = 4\log\left(\sqrt{\frac{y(x)}{x} - 4a} + \sqrt{\frac{y(x)}{x}} \right), y(x) \right], \text{Solve}\left[\frac{\sqrt{\frac{y(x)}{x}}\sqrt{\frac{y(}{x}}}{a} \right.\right.$$

✓ **Maple** : cpu = 0.097 (sec), leaf count = 42

$$\left\{ y(x) = 0, y(x) = -ax\left(lambertW\left(-\frac{xe}{a\_C1} \right) - 1 \right)^2 \left(lambertW\left(-\frac{xe}{a\_C1} \right) \right)^{-1} \right\}$$

2.419 ODE No. 419

$$xy'(x)^2 + 2y(x)y'(x) - x = 0$$

✓ **Mathematica** : cpu = 1.5878 (sec), leaf count = 6977

$$\left\{\left\{y(x) \to \frac{-\sqrt{\frac{36x^6 + \frac{36\ 2^{2/3}\left(2x^6 - \cosh(6c_1) - \sinh(6c_1)\right)x^4}{\sqrt[3]{32x^{12} + 40\cosh(6c_1)x^6 + 40\sinh(6c_1)x^6 - \cosh(12c_1) - \sinh(12c_1) + \sqrt{\left(\left(16x^6+1\right)\cosh(3c_1) + \left(1-16x^6\right)\sinh(3c_1)\right)^3(\cosh(15c_1) + \mathrm{si}}}}}{}}{}\right.\right.$$

✓ **Maple** : cpu = 0.093 (sec), leaf count = 109

$$\left\{x + \frac{\_C1}{x}\left(y(x) - \sqrt{(y(x))^2 + x^2}\right)\left(\frac{1}{x^2}\left(2x^2 + 6(y(x))^2 - 6y(x)\sqrt{(y(x))^2 + x^2}\right)\right)^{-\frac{2}{3}} = 0, \frac{\_C1}{x}\left(\sqrt{(y(x))^2}\right.\right.$$

2.420 ODE No. 420

$$a + xy'(x)^2 - 2y(x)y'(x) = 0$$

✓ **Mathematica** : cpu = 1.85 (sec), leaf count = 9391

✓ **Maple** : cpu = 0.147 (sec), leaf count = 689

$$\left\{y(x) = \frac{x}{12\_C1}\left(4\frac{x^2}{\sqrt[3]{-36a\_C1^2 + 8x^3 + 12\sqrt{a\left(9a\_C1^2 - 4x^3\right)}\_C1}} + 2x + \sqrt[3]{-36a\_C1^2 + 8x^3 + 12\sqrt{\cdot}}\right.\right.$$

2.421 ODE No. 421

$$xy'(x)^2 - 2y(x)y'(x) - x = 0$$

✓ **Mathematica** : cpu = 0.0342652 (sec), leaf count = 27

$$\{\{y(x) \to x \sinh(c_1 - \log(x))\}, \{y(x) \to x \sinh(c_1 + \log(x))\}\}$$

✓ **Maple** : cpu = 0.065 (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 = 0.0509955 (sec), leaf count = 29

$$\{\{y(x) \to 2x \cosh(c_1 - \log(x))\}, \{y(x) \to 2x \cosh(c_1 + \log(x))\}\}$$

✓ **Maple** : cpu = 0.066 (sec), leaf count = 30

$$\left\{ y(x) = -2x, y(x) = 2x, y(x) = \frac{4\_C1^2 + x^2}{2\_C1} \right\}$$

2.423 ODE No. 423

$$xy'(x)^2 - 2y(x)y'(x) + 2y(x) + x = 0$$

✓ **Mathematica** : cpu = 0.0832509 (sec), leaf count = 51

$$\left\{ \left\{ y(x) \to -e^{-c_1}x^2 - \frac{e^{c_1}}{2} + x \right\}, \left\{ y(x) \to -\frac{1}{2}e^{c_1}x^2 - e^{-c_1} + x \right\} \right\}$$

✓ **Maple** : cpu = 0.074 (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 = 0.664982 (sec), leaf count = 223

$$\left\{ \text{Solve}\left[\frac{-2a\tan^{-1}\left(\frac{ay(x)}{x\sqrt{4b-\frac{a^2y(x)^2}{x^2}}}\right) + (a+2)\left(2\tan^{-1}\left(\frac{(a+2)y(x)}{x\sqrt{4b-\frac{a^2y(x)^2}{x^2}}}\right) - i\log\left(\frac{(a+1)y(x)^2}{x^2}+b\right)\right)}{8(a+1)} = c_1 + \frac{1}{2}i\log\right.\right.$$

✓ **Maple** : cpu = 0.308 (sec), leaf count = 193

$$\left\{ \frac{1}{x}\left(-\_C1\left(ay(x) - \sqrt{a^2\left(y\left(x\right)\right)^2 - 4\,bx^2}\right)\left(\frac{a}{2\,x^2}\left(-y(x)\left(a+1\right)\sqrt{a^2\left(y\left(x\right)\right)^2 - 4\,bx^2} + \left(a^2+a\right)\left(y(x)\right)^2 - 2\,bx\right.\right.\right.\right.$$

2.425 ODE No. 425

$$(x+1)y'(x)^2 - (y(x)+x)y'(x) + y(x) = 0$$

✓ **Mathematica** : cpu = 0.286707 (sec), leaf count = 57

$$\left\{\left\{y(x) \to -\frac{e^{c_1}\left(e^{c_1}-2x\right)}{2\left(e^{c_1}+2\right)}\right\}, \left\{y(x) \to \frac{2e^{c_1}\left(x-2e^{c_1}\right)}{2e^{c_1}+1}\right\}\right\}$$

✓ **Maple** : cpu = 0.069 (sec), leaf count = 45

$$\left\{y(x) = \frac{\_C1\left(\_C1\,x + \_C1 - x\right)}{\_C1 - 1}, y(x) = x + 2 - 2\sqrt{1+x}, y(x) = x + 2 + 2\sqrt{1+x}\right\}$$

2.426 ODE No. 426

$$(3x+1)y'(x)^2 - 3(y(x)+2)y'(x) + 9 = 0$$

✓ **Mathematica** : cpu = 0.486341 (sec), leaf count = 150

$$\left\{\left\{y(x) \to -\frac{\sqrt{(\sinh(2c_1) + \cosh(2c_1))\left((3x-34)\cosh\left(\frac{c_1}{2}\right) - 3(x-12)\sinh\left(\frac{c_1}{2}\right)\right)^2} + 8\sinh(c_1) + 8\cosh(c_1) -}{\sinh(c_1) + \cosh(c_1) - 36}\right.\right.$$

✓ **Maple** : cpu = 0.084 (sec), leaf count = 51

$$\left\{y(x) = \frac{9 + (3\,x+1)\_C1^2 - 6\_C1}{3\_C1}, y(x) = -2 - 2\sqrt{3\,x+1}, y(x) = -2 + 2\sqrt{3\,x+1}\right\}$$

2.427 ODE No. 427

$$(3x+5)y'(x)^2-(3y(x)+x)y'(x)+y(x)=0$$

✓ **Mathematica** : cpu = 0.714467 (sec), leaf count = 300

$$\left\{\left\{y(x)\to -\frac{-3e^{\frac{4c_1}{3}}(2x+5)+\sqrt{5}\sqrt{-e^{\frac{4c_1}{3}}\left(e^{\frac{4c_1}{3}}-12x-15\right)^2+30x+25}}{18\left(e^{\frac{4c_1}{3}}+5\right)}\right\},\left\{y(x)\to \frac{3e^{\frac{4c_1}{3}}(2x+5)+\sqrt{5}\sqrt{-}}{}\right.\right.$$

✓ **Maple** : cpu = 0.07 (sec), leaf count = 60

$$\left\{y(x)=\frac{(3x+5)\_C1^2-\_C1\,x}{3\_C1-1},y(x)=\frac{x}{3}+\frac{10}{9}-\frac{2}{9}\sqrt{15x+25},y(x)=\frac{x}{3}+\frac{10}{9}+\frac{2}{9}\sqrt{15x+25}\right\}$$

2.428 ODE No. 428

$$y'(x)(-ay(x)+bx+c)+axy'(x)^2-by(x)=0$$

✗ **Mathematica** : cpu = 300.022 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.144 (sec), leaf count = 66

$$\left\{y(x)=\frac{1}{a}\left(-bx+c-2\sqrt{-bcx}\right),y(x)=\frac{1}{a}\left(-bx+c+2\sqrt{-bcx}\right),y(x)=\frac{\_C1\,(\_C1\,ax+bx+c)}{a\_C1+b}\right\}$$

2.429 ODE No. 429

$$-y'(x)(ay(x)-a+bx-b)+axy'(x)^2+by(x)=0$$

✗ **Mathematica** : cpu = 300.074 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.144 (sec), leaf count = 72

$$\left\{y(x)=\frac{1}{a}\left(bx+a+b-2\sqrt{bx\,(a+b)}\right),y(x)=\frac{1}{a}\left(bx+a+b+2\sqrt{bx\,(a+b)}\right),y(x)=\frac{\_C1\,(\_C1\,ax-bx+a}{a\_C1-b}\right.$$

2.430 ODE No. 430

$$\mathrm{a0}x + y'(x)(\mathrm{a1}x + \mathrm{b1}y(x) + \mathrm{c1}) + (\mathrm{a2}x + \mathrm{c2})y'(x)^2 + \mathrm{b0}y(x) + \mathrm{c0} = 0$$

✓ **Mathematica** : cpu = 274.077 (sec), leaf count = 296

$$\text{Solve}\left[\left\{x = (\mathrm{b0} + \mathrm{b1K\$2924020})(\mathrm{a0} + \mathrm{K\$2924020}(\mathrm{a1} + \mathrm{K\$2924020}(\mathrm{a2} + \mathrm{b1}) + \mathrm{b0}))^{-\frac{2\mathrm{a2}+\mathrm{b1}}{2(\mathrm{a2}+\mathrm{b1})}} \exp\left(\frac{(\mathrm{b1}(\mathrm{b0} - \mathrm{a1}}{(\mathrm{a2} +}\right.\right.\right.$$

✓ **Maple** : cpu = 2.235 (sec), leaf count = 1602

$$\left\{\frac{1}{2\,a2\,x + 2\,c2}\left(-2\left(\_C1 - 1/2\int \frac{-a1\,x - b1\,y(x) - c1 + \sqrt{b1^2 (y(x))^2 + ((2\,b1\,a1 - 4\,a2\,b0)x - 4\,b0\,c2 + 2\,b1\,c1)y(x) + \left(-4\,a0\,a2 + a1^2\right)x^2 + (-4\,a0\,c}}{2\,a2\,x + 2\,c2}\right.\right.\right.$$

2.431 ODE No. 431

$$x^2 y'(x)^2 - y(x)^4 + y(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.043586 (sec), leaf count = 103

$$\left\{\left\{y(x) \to \sqrt{\sec^2(c_1 - \log(x))}(-\cot(c_1 - \log(x)))\right\}, \left\{y(x) \to \sqrt{\sec^2(c_1 - \log(x))}\cot(c_1 - \log(x))\right\}, \left\{y(x) \to\right.\right.$$

✓ **Maple** : cpu = 0.452 (sec), leaf count = 62

$$\left\{y(x) = -1, y(x) = 1, y(x) = \frac{1}{\tan(-\ln(x) + \_C1)}\sqrt{(\tan(-\ln(x) + \_C1))^2 + 1}, y(x) = -\frac{1}{\tan(-\ln(x) + \_C1}\right.$$

2.432 ODE No. 432

$$(a + xy'(x))^2 - 2ay(x) + x^2 = 0$$

✓ **Mathematica** : cpu = 2.01636 (sec), leaf count = 49

$$\text{Solve}\left[\left\{\frac{(\text{K\$2927000}^2+1)\,x^2}{a} + a + 2\text{K\$2927000}x = 2y(x), x = \frac{c_1 - a\sinh^{-1}(\text{K\$2927000})}{\sqrt{\text{K\$2927000}^2+1}}\right\}, \{y(x), \text{K\$292700}\right.$$

✓ **Maple** : cpu = 10.625 (sec), leaf count = 242

$$\left\{y(x) = \frac{1}{2\,a\left(\left(\mathit{RootOf}\left((\mathit{Arcsinh}(\_Z))^2 a^2 - \_Z^2x^2 - 2\,\mathit{Arcsinh}(\_Z)\_\mathit{C1}\,a + \_\mathit{C1}^2 - x^2\right)\right)^2 + 1\right)}\left(-2\,a\mathit{Roo}\right.\right.$$

2.433 ODE No. 433

$$-4a - 4x^2 + (xy'(x) + y(x) + 2x)^2 - 4xy(x) = 0$$

✓ **Mathematica** : cpu = 0.60544 (sec), leaf count = 22

$$\left\{\left\{y(x) \to \frac{c_1(c_1 - 2x) - a}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.405 (sec), leaf count = 34

$$\left\{y(x) = \frac{-x^2 - a}{x}, y(x) = \_\mathit{C1} + \frac{\_\mathit{C1}^2 - 4\,a}{4\,x}\right\}$$

2.434 ODE No. 434

$$x^2y'(x)^2 - x^2 - 2xy(x)y'(x) = 0$$

✓ **Mathematica** : cpu = 0.0354507 (sec), leaf count = 27

$$\{\{y(x) \to x\sinh(c_1 - \log(x))\}, \{y(x) \to x\sinh(c_1 + \log(x))\}\}$$

✓ **Maple** : cpu = 0.03 (sec), leaf count = 7

$$\{y(x) = x + \_\mathit{C1}\}$$

2.435 ODE No. 435

$$x^2y'(x)^2 - 2xy(x)y'(x) + y(x)(y(x)+1) - x = 0$$

✓ **Mathematica** : cpu = 0.0412472 (sec), leaf count = 55

$$\left\{\left\{y(x)\to \frac{c_1^2 x}{4} - ic_1\sqrt{x} + x - 1\right\}, \left\{y(x)\to \frac{c_1^2 x}{4} + ic_1\sqrt{x} + x - 1\right\}\right\}$$

✓ **Maple** : cpu = 0.6 (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 = 0.0379962 (sec), leaf count = 26

$$\{\{y(x)\to -x\sinh(x-c_1)\}, \{y(x)\to x\sinh(c_1+x)\}\}$$

✓ **Maple** : cpu = 5.81 (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 = 0.34443 (sec), leaf count = 47

$$\left\{\left\{y(x)\to \frac{x - 2\sqrt{a}c_1}{4c_1^2}\right\}, \left\{y(x)\to \frac{2\sqrt{a}c_1 + x}{4c_1^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.128 (sec), leaf count = 36

$$\left\{y(x) = -\frac{a}{4x}, y(x) = \_C1\,x - \sqrt{a\_C1}, y(x) = \_C1\,x + \sqrt{a\_C1}\right\}$$

2.438 ODE No. 438

$$x^2y'(x)^2 + 3xy(x)y'(x) + 2y(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.00769434 (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 = 0.037 (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 = 0.0156898 (sec), leaf count = 49

$$\left\{\left\{y(x)\to c_1x^{-\frac{3}{2}-\frac{i\sqrt{3}}{2}}\right\},\left\{y(x)\to c_1x^{\frac{1}{2}i\left(\sqrt{3}+3i\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.132 (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 = 0.00705053 (sec), leaf count = 19

$$\left\{\left\{y(x)\to \frac{c_1}{x^5}\right\},\{y(x)\to c_1x\}\right\}$$

✓ **Maple** : cpu = 0.037 (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 = 0.079724 (sec), leaf count = 59

$$\left\{\left\{y(x)\to e^{-c_1}x\left(x-2\sqrt{2}e^{\frac{c_1}{2}}\right)\right\},\left\{y(x)\to e^{c_1}x^2-2\sqrt{2}e^{\frac{c_1}{2}}x\right\}\right\}$$

✓ **Maple** : cpu = 7.494 (sec), leaf count = 83

$$\left\{y(x)=-2,y(x)=\frac{1}{\_C1}\left(x^2-2\sqrt{2}\sqrt{x^2\_C1}\right),y(x)=\frac{1}{\_C1}\left(2\sqrt{2}\sqrt{x^2\_C1}+x^2\right),y(x)=\frac{x(-2\sqrt{2}\_C1+x)}{\_C1^2}\right.$$

2.442 ODE No. 442

$$x^2y'(x)^2+(1-x)\left(y(x)^2-x^2y(x)\right)+\left(x^3+x^2y(x)-2xy(x)\right)y'(x)=0$$

✓ **Mathematica** : cpu = 0.0103131 (sec), leaf count = 26

$$\left\{\left\{y(x)\to c_1e^{-x}x\right\},\left\{y(x)\to x(c_1-x)\right\}\right\}$$

✓ **Maple** : cpu = 0.04 (sec), leaf count = 21

$$\left\{y(x)=(-x+\_C1)\,x,y(x)=\_C1\,\mathrm{e}^{-x}x\right\}$$

2.443 ODE No. 443

$$x\left(xy'(x)-y(x)\right)^2-y'(x)=0$$

✓ **Mathematica** : cpu = 0.61713 (sec), leaf count = 1921

$$\left\{\left\{y(x)\to \mathrm{Root}\left[1024x^{12}-576e^{12c_1}\#1^4x^8-2176e^{12c_1}\#1^3x^6+81e^{24c_1}\#1^8x^4-1536e^{12c_1}\#1^2x^4+36e^{24c_1}\#1^7x^2\right.\right.\right.$$

✓ **Maple** : cpu = 10.76 (sec), leaf count = 221

$$\left\{y(x)=-\frac{2}{9\,x^2},y(x)=\frac{\left(RootOf\left(-729\_C1\,x^{12}+\_Z^8-12\_Z^7+60\_Z^6-160\_Z^5+240\_Z^4-192\_Z^3+\right.\right.}{}\right.$$

2.444 ODE No. 444

$$x^2y'(x)^2 - (y(x) - 2x)y(x)y'(x) + y(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.166751 (sec), leaf count = 73

$$\left\{\left\{y(x) \to \frac{\sinh(2c_1) - \cosh(2c_1)}{x\sinh(2c_1) + x\cosh(2c_1) - 1}\right\}, \left\{y(x) \to \frac{\sinh(2c_1) - \cosh(2c_1)}{x\sinh(2c_1) + x\cosh(2c_1) + 1}\right\}\right\}$$

✓ **Maple** : cpu = 7.15 (sec), leaf count = 120

$$\left\{y(x) = \frac{\_C1^3\sqrt{2} - 2x\_C1^2}{-2\_C1^2 + 4x^2}, y(x) = \frac{\_C1^2(\sqrt{2}\_C1 + 2x)}{2\_C1^2 - 4x^2}, y(x) = 4x, y(x) = -2\frac{\_C1^2(-\sqrt{2}\_C1 + x)}{-2\_C1^2 + x^2}, y(x\right.$$

2.445 ODE No. 445

$$y'(x)\left(ax^2y(x)^3 + b\right) + aby(x)^3 + x^2y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.0112036 (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 = 0.074 (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 = 0.568138 (sec), leaf count = 167

$$\left\{\left\{y(x) \to -\frac{-e^{2c_1}x + 2e^{c_1} + x}{e^{2c_1} + 1}\right\}, \left\{y(x) \to \frac{e^{2c_1}x + 2e^{c_1} - x}{e^{2c_1} + 1}\right\}, \left\{y(x) \to \frac{\left(e^{4c_1} - 1\right)x + 2\sqrt{-e^{2c_1}\left(e^{2c_1} - 1\right)^2}}{\left(e^{2c_1} - 1\right)^2}\right\}\right.$$

✓ **Maple** : cpu = 0.134 (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 = 0.0190349 (sec), leaf count = 41

$$\left\{\left\{y(x)\to c_1-\log\left(\sqrt{x^2-1}+x\right)\right\},\left\{y(x)\to c_1+\log\left(\sqrt{x^2-1}+x\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.057 (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 = 0.0960042 (sec), leaf count = 88

$$\left\{\left\{y(x)\to\frac{1}{2}e^{-c_1}\left(\left(e^{2c_1}+1\right)x-\left(e^{2c_1}-1\right)\sqrt{x^2-1}\right)\right\},\left\{y(x)\to\frac{1}{2}e^{-c_1}\left(\left(e^{2c_1}-1\right)\sqrt{x^2-1}+\left(e^{2c_1}+1\right)x\right)\right\}\right\}$$

✓ **Maple** : cpu = 301.962 (sec), leaf count = 166

$$\left\{1\sqrt{(-1+y(x))(1+y(x))}\ln\left(y(x)+\sqrt{(y(x))^2-1}\right)\frac{1}{\sqrt{-1+y(x)}}\frac{1}{\sqrt{1+y(x)}}+\int^x\frac{1}{\_a^2-1}\sqrt{\left(\_a^2-1\right)\left((y\right.}\right.$$

2.449 ODE No. 449

$$\left(x^2-a^2\right) y'(x)^2+2xy(x)y'(x)+y(x)^2=0$$

✓ **Mathematica** : cpu = 0.0110394 (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 = 0.045 (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 = 0.50786 (sec), leaf count = 26

$$\left\{\left\{y(x)\to \frac{a^2+c_1^2-x^2}{2c_1}\right\}\right\}$$

✓ **Maple** : cpu = 1.02 (sec), leaf count = 51

$$\left\{y(x)=\sqrt{a^2-x^2}, y(x)=-\sqrt{a^2-x^2}, y(x)=x^2\_C1-\_C1\,a^2-\frac{1}{4\_C1}\right\}$$

2.451 ODE No. 451

$$\left(a+x^2\right) y'(x)^2+b-2xy(x)y'(x)+y(x)^2=0$$

✗ **Mathematica** : cpu = 300.398 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.241 (sec), leaf count = 78

$$\left\{y(x)=\frac{1}{a}\sqrt{-ab\left(x^2+a\right)}, y(x)=-\frac{1}{a}\sqrt{-ab\left(x^2+a\right)}, y(x)=\_C1\,x-\sqrt{-a\_C1^2-b}, y(x)=\_C1\,x+\sqrt{-a\_C$$

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 = 300.893 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 2.113 (sec), leaf count = 37

$$\left\{y(x)=-3\,x-2\,\sqrt{2\,x^2+1}, y(x)=-3\,x+2\,\sqrt{2\,x^2+1}\right\}$$

2.453 ODE No. 453

$$\left(a^2-1\right)x^2y'(x)^2+a^2x^2+2xy(x)y'(x)-y(x)^2=0$$

✓ **Mathematica** : cpu = 0.875403 (sec), leaf count = 369

$$\left\{\text{Solve}\left[\frac{a\left(2\log\left(x-a^2x\right)-\log\left(\frac{\left(a^2-1\right)\left(y(x)+ix\left(a\sqrt{a^2-\frac{y(x)^2}{x^2}-1}+a^2-1\right)\right)}{a^3(x+iy(x))}\right)+\log\left(\frac{i\left(a^2-1\right)\left(x\left(a\sqrt{a^2-\frac{y(x)^2}{x^2}-1}+a^2-1\right.\right.}{a^3(x-iy(x))}\right.\right.}{2\left(a^2-1\right)}\right.\right.$$

✓ **Maple** : cpu = 4.434 (sec), leaf count = 229

$$\left\{\frac{1}{2a}\left(-2a\_C1+2a\ln(x)+\ln\left(\frac{(y(x))^2+x^2}{x^2}\right)a-2\sqrt{-a^2}\arctan\left(\frac{a^2y(x)}{\sqrt{-a^2}x}\frac{1}{\sqrt{\frac{(y(x))^2+(-a^2+1)x^2}{x^2}}}\right)+2\ln\left(\frac{1}{x}\right.\right.\right.$$

2.454 ODE No. 454

$$ax^2y'(x)^2-(a-1)ax^2-2axy(x)y'(x)+y(x)^2=0$$

✓ **Mathematica** : cpu = 0.180444 (sec), leaf count = 113

$$\left\{\left\{y(x)\to\frac{1}{2}e^{-c_1}x^{1-\sqrt{\frac{a-1}{a}}}\left(e^{2c_1}-ax^{2\sqrt{\frac{a-1}{a}}}\right)\right\},\left\{y(x)\to\frac{1}{2}e^{c_1}x^{\sqrt{\frac{a-1}{a}}+1}-\frac{1}{2}ae^{-c_1}x^{1-\sqrt{\frac{a-1}{a}}}\right\}\right\}$$

✓ **Maple** : cpu = 0.318 (sec), leaf count = 106

$$\left\{y(x)=\sqrt{-a}x,y(x)=RootOf\left(-\ln(x)-\int^{\_Z}\frac{1}{(a-1)\left(\_a^2+a\right)}\sqrt{(a-1)\left(\_a^2+a\right)a}d\_a+\_C1\right)x,y(x)=\right.$$

2.455 ODE No. 455

$$a + x^3 y'(x)^2 + x^2 y(x) y'(x) = 0$$

✓ **Mathematica** : cpu = 0.460386 (sec), leaf count = 123

$$\left\{\left\{y(x) \to -\frac{e^{-\frac{c_1}{2}}(2ae^{c_1}+x)}{\sqrt{2}x}\right\}, \left\{y(x) \to \frac{e^{-\frac{c_1}{2}}(2ae^{c_1}+x)}{\sqrt{2}x}\right\}, \left\{y(x) \to -\frac{e^{-\frac{c_1}{2}}(2ax+e^{c_1})}{\sqrt{2}x}\right\}, \left\{y(x) \to \frac{e^{-\frac{c_1}{2}}(2a}{\sqrt{}}\right.\right.$$

✓ **Maple** : cpu = 1.044 (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

$$2(1-x^2)\,y(x)y'(x) + x(x^2-1)\,y'(x)^2 + xy(x)^2 - x = 0$$

✓ **Mathematica** : cpu = 0.140958 (sec), leaf count = 61

$$\left\{\left\{y(x) \to x\cos\left(2\tan^{-1}\left(\sqrt{\frac{x-1}{x+1}}\right) + ic_1\right)\right\}, \left\{y(x) \to x\cos\left(2\tan^{-1}\left(\sqrt{\frac{x-1}{x+1}}\right) - ic_1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.998 (sec), leaf count = 33

$$\left\{y(x) = x, y(x) = -x, y(x) = \sqrt{-\_C1^2 + 1} + \sqrt{x^2-1}\_C1\right\}$$

2.457 ODE No. 457

$$x^4 y'(x)^2 - xy'(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 1.37086 (sec), leaf count = 406

$$\left\{\text{Solve}\left[\frac{2x\sqrt{4x^2y(x)+1}\log(x) + x\sqrt{4x^2y(x)+1}\log(y(x)) - x\sqrt{4x^2y(x)+1}\log\left(4x^2y(x)+1\right) - 2x\sqrt{4x^2y(x)}}{}\right.\right.$$

✓ **Maple** : cpu = 6.479 (sec), leaf count = 45

$$\left\{y(x) = \frac{i\_C1 - x}{x\_C1^2}, y(x) = \frac{-i\_C1 - x}{x\_C1^2}, y(x) = -\frac{1}{4\,x^2}\right\}$$

2.458 ODE No. 458

$$x^2(x^2 - a^2)\, y'(x)^2 - 1 = 0$$

✓ **Mathematica** : cpu = 0.0755073 (sec), leaf count = 139

$$\left\{\left\{y(x) \to c_1 - \frac{ix\sqrt{x^2-a^2}\log\left(\frac{2\left(\sqrt{x^2-a^2}-ia\right)}{x}\right)}{a\sqrt{x^4-a^2x^2}}\right\}, \left\{y(x) \to c_1 + \frac{ix\sqrt{x^2-a^2}\log\left(\frac{2\left(\sqrt{x^2-a^2}-ia\right)}{x}\right)}{a\sqrt{x^4-a^2x^2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.08 (sec), leaf count = 90

$$\left\{y(x) = -1\ln\left(\frac{1}{x}\left(-2\,a^2 + 2\,\sqrt{-a^2}\sqrt{-a^2+x^2}\right)\right)\frac{1}{\sqrt{-a^2}} + \_C1, y(x) = 1\ln\left(\frac{1}{x}\left(-2\,a^2 + 2\,\sqrt{-a^2}\sqrt{-a^2+x^2}\right)\right.$$

2.459 ODE No. 459

$$-\left(y'(x) - 1\right)^2 + e^{-2x}y'(x)^2 + e^{-2y(x)} = 0$$

✓ **Mathematica** : cpu = 3.36697 (sec), leaf count = 241

$$\left\{\left\{y(x) \to \log\left(-\frac{ie^{-c_1}(e^x+1)\left(e^{2c_1+x} - e^{2c_1} + e^x + 1\right)}{2\sqrt{(e^x+1)^2}}\right)\right\}, \left\{y(x) \to \log\left(\frac{ie^{-c_1}(e^x+1)\left(e^{2c_1+x} - e^{2c_1} + e^x\right.}{2\sqrt{(e^x+1)^2}}\right.\right.$$

✓ **Maple** : cpu = 1.371 (sec), leaf count = 65

$$\left\{y(x) = x + \ln\left(\frac{1}{e^x}\left(-1 - \sqrt{(e^x)^2 - \frac{(e^x)^2}{(e^{\_C1})^2}}\right)\right) + \_C1, y(x) = x + \ln\left(\frac{1}{e^x}\left(-1 + \sqrt{(e^x)^2 - \frac{(e^x)^2}{(e^{\_C1})^2}}\right)\right) + \_$$

2.460 ODE No. 460

$$\cos^4(x)\left(y'(x)^2 + y(x)^2\right) - a^2 = 0$$

✗ **Mathematica** : cpu = 59.4839 (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 = 300.028 (sec), leaf count = 0 , timed out

```
$Aborted
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(d0(x)*diff(y(x),x)^2+2*b0(x)*y(x)*diff(y(x),x)+c0(x)*y(x)^2+2*d0(x)*diff(y(x),x)+2*e0
```

2.462 ODE No. 462

$$y(x)y'(x)^2 - 1 = 0$$

✓ **Mathematica** : cpu = 0.0204271 (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 = 0.117 (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 = 0.0230932 (sec), leaf count = 47

$$\left\{\left\{y(x)\to \left(\frac{3}{2}\right)^{2/3}(c_1-e^x)^{2/3}\right\},\left\{y(x)\to \left(\frac{3}{2}\right)^{2/3}(c_1+e^x)^{2/3}\right\}\right\}$$

✓ **Maple** : cpu = 0.29 (sec), leaf count = 50

$$\left\{-1\sqrt{y(x)(e^x)^2}\frac{1}{\sqrt{y(x)}}+\frac{2}{3}(y(x))^{\frac{3}{2}}+\_C1=0, 1\sqrt{y(x)(e^x)^2}\frac{1}{\sqrt{y(x)}}+\frac{2}{3}(y(x))^{\frac{3}{2}}+\_C1=0\right\}$$

2.464 ODE No. 464

$$y(x)y'(x)^2 + 2xy'(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 0.0739048 (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 = 2.278 (sec), leaf count = 70

$$\left\{y(x) = \sqrt{\_C1^2 - 2\_C1\,x}, y(x) = \sqrt{\_C1^2 + 2\_C1\,x}, y(x) = -ix, y(x) = ix, y(x) = -\sqrt{\_C1\,(2\,x + \_C1)}, y$$

2.465 ODE No. 465

$$y(x)y'(x)^2 + 2xy'(x) - 9y(x) = 0$$

✗ **Mathematica** : cpu = 300.58 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.164 (sec), leaf count = 210

$$\left\{\_C1\,x\left(x + \sqrt{x^2 + 9\,(y(x))^2}\right)\left(\frac{1}{y(x)}\left(-x - \sqrt{x^2 + 9\,(y(x))^2}\right)\right)^{\frac{2}{7}}\left(x\sqrt{x^2 + 9\,(y(x))^2} + x^2 + (y(x))^2\right)^{-1} -\right.$$

2.466 ODE No. 466

$$y(x)y'(x)^2 - 2xy'(x) + y(x) = 0$$

✓ **Mathematica** : cpu = 0.281553 (sec), leaf count = 119

$$\left\{\left\{y(x) \to -\sqrt{-(\sinh(c_1) + \cosh(c_1))(\sinh(c_1) + \cosh(c_1) + 2x)}\right\}, \left\{y(x) \to \sqrt{-(\sinh(c_1) + \cosh(c_1))(\sinh(\right.\right.$$

✓ **Maple** : cpu = 1.99 (sec), leaf count = 71

$$\left\{y(x) = x, y(x) = \sqrt{\_C1^2 - 2\,ix\_C1}, y(x) = \sqrt{\_C1^2 + 2\,ix\_C1}, y(x) = -x, y(x) = -\sqrt{\_C1^2 - 2\,ix\_C1}, y(x$$

2.467 ODE No. 467

$$y(x)y'(x)^2 - 4xy'(x) + y(x) = 0$$

✗ **Mathematica** : cpu = 300.081 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.132 (sec), leaf count = 148

$$\left\{ -\frac{\_C1\, x}{y(x)} \frac{1}{\sqrt[3]{\frac{1}{y(x)}\left(2\,x - \sqrt{-(y(x))^2 + 4\,x^2}\right)}} \frac{1}{\sqrt[3]{\frac{1}{(y(x))^2}\left(8\,x^2 - 4\,(y(x))^2 - 4\,x\sqrt{-(y(x))^2 + 4\,x^2}\right)}} + x = 0, -\right.$$

2.468 ODE No. 468

$$-4a^2xy'(x) + a^2y(x) + y(x)y'(x)^2 = 0$$

✗ **Mathematica** : cpu = 300.13 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.145 (sec), leaf count = 181

$$\left\{ -\frac{\_C1\, x}{ay(x)} \frac{1}{\sqrt[3]{\frac{a}{y(x)}\left(2\,ax + \sqrt{4\,a^2x^2 - (y(x))^2}\right)}} \frac{1}{\sqrt[3]{\frac{a^2}{(y(x))^2}\left(2\,a^2x^2 + \sqrt{4\,a^2x^2 - (y(x))^2}ax - (y(x))^2\right)}} + x = 0, -\right.$$

2.469 ODE No. 469

$$axy'(x) + by(x) + y(x)y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.592245 (sec), leaf count = 245

$$\left\{ \text{Solve}\left[\frac{1}{8}\left(\frac{2a\tanh^{-1}\left(\frac{\sqrt{a^2-\frac{4by(x)^2}{x^2}}}{a}\right) - 2(a+2b)\tanh^{-1}\left(\frac{\sqrt{a^2-\frac{4by(x)^2}{x^2}}}{a+2b}\right) + a\log\left(a+b+\frac{y(x)^2}{x^2}\right) + 2b\log\left(a+b\right.}{a+b}\right.\right.\right.$$

✓ **Maple** : cpu = 0.303 (sec), leaf count = 264

$$\left\{ \frac{x}{(y(x))^2}\left(\_C1\left(-\frac{1}{2\,y(x)}\left(ax+\sqrt{a^2x^2-4\,b\,(y(x))^2}\right)\right)^{-\frac{a}{a+b}}\left(ax+\sqrt{a^2x^2-4\,b\,(y(x))^2}\right)\left(\frac{a}{2\,(y(x))^2}\left(ax^2+\right.\right.\right.\right.$$

2.470 ODE No. 470

$$x^3y'(x) - x^2y(x) + y(x)y'(x)^2 = 0$$

✗ **Mathematica** : cpu = 299.999 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.925 (sec), leaf count = 87

$$\left\{y(x) = -\frac{i}{2}x^2, y(x) = \frac{i}{2}x^2, y(x) = -\frac{1}{4}\sqrt{-4\,x^2\_C1 + \_C1^2}, y(x) = \frac{1}{4}\sqrt{-4\,x^2\_C1 + \_C1^2}, y(x) = -2\,\frac{\sqrt{x^2\_C}}{\_C}\right.$$

2.471 ODE No. 471

$$y(x)y'(x)^2 - (y(x) - x)y'(x) - x = 0$$

✓ **Mathematica** : cpu = 0.0113914 (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 = 0.078 (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 = 0.208809 (sec), leaf count = 121

$$\left\{\left\{y(x) \to -\frac{2}{3}\sqrt{e^{c_1}\left(e^{c_1} - 3x\right)} - \frac{e^{c_1}}{3}\right\}, \left\{y(x) \to \frac{2}{3}\sqrt{e^{c_1}\left(e^{c_1} - 3x\right)} - \frac{e^{c_1}}{3}\right\}, \left\{y(x) \to e^{c_1} - 2\sqrt{e^{c_1}\left(e^{c_1} + x\right)}\right\}, \left\{y\right.\right.$$

✓ **Maple** : cpu = 2.295 (sec), leaf count = 121

$$\left\{\ln(x) - Artanh\left(\frac{y(x) + 2\,x}{2\,x}\frac{1}{\sqrt{\frac{(y(x))^2 + xy(x) + x^2}{x^2}}}\right) + \ln\left(\frac{y(x)}{x}\right) - \_C1 = 0, \ln(x) + Artanh\left(\frac{y(x) + 2\,x}{2\,x}\frac{1}{\sqrt{\frac{(y(x)}{}}}\right.\right.$$

2.473 ODE No. 473

$$(y(x) - 2x)y'(x)^2 - 2(x-1)y'(x) + y(x) - 2 = 0$$

✓ **Mathematica** : cpu = 0.422507 (sec), leaf count = 137

$$\left\{\left\{y(x) \to -\frac{1}{2}\sqrt{-e^{c_1}\left(e^{c_1}+4x-4\right)} - \frac{e^{c_1}}{2} + 2\right\}, \left\{y(x) \to \frac{1}{2}\left(\sqrt{-e^{c_1}\left(e^{c_1}+4x-4\right)} - e^{c_1} + 4\right)\right\}, \left\{y(x) \to -\sqrt{\right.\right.$$

✓ **Maple** : cpu = 3.27 (sec), leaf count = 71

$$\left\{y(x) = 2 + \_C1 - \sqrt{\_C1\ (-\_C1 + 2\,x - 2)}, y(x) = 2 + \frac{\_C1}{2} - \frac{1}{2}\sqrt{\_C1\ (-\_C1 + 4\,x - 4)}, y(x) = (x-1)\right.$$

2.474 ODE No. 474

$$2y(x)y'(x)^2 - (4x-5)y'(x) + 2y(x) = 0$$

✓ **Mathematica** : cpu = 0.26319 (sec), leaf count = 135

$$\left\{\left\{y(x) \to -i\sqrt{2}e^{\frac{c_1}{2}}\sqrt{8e^{c_1}+4x-5}\right\}, \left\{y(x) \to i\sqrt{2}e^{\frac{c_1}{2}}\sqrt{8e^{c_1}+4x-5}\right\}, \left\{y(x) \to -\frac{1}{4}ie^{\frac{c_1}{2}}\sqrt{e^{c_1}+8x-10}\right\}, \left\{y\right.\right.$$

✓ **Maple** : cpu = 1.901 (sec), leaf count = 152

$$\left\{\ln\left(x - \frac{5}{4}\right) + \ln\left(\frac{y(x)}{4\,x-5}\right) - \frac{1}{2}\ln\left(4\,\frac{y(x)}{4\,x-5} + 1\right) - \frac{1}{2}\ln\left(4\,\frac{y(x)}{4\,x-5} - 1\right) + \sqrt{-16\,\frac{(y(x))^2}{(4\,x-5)^2} + 1} - \mathit{Artanh}\left(\right.\right.$$

2.475 ODE No. 475

$$4y(x)y'(x)^2 + 2xy'(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 0.0801218 (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 = 2.297 (sec), leaf count = 67

$$\left\{y(x) = \sqrt{\_C1^2 - \_C1\,x}, y(x) = \sqrt{\_C1^2 + \_C1\,x}, y(x) = -\frac{i}{2}x, y(x) = \frac{i}{2}x, y(x) = -\sqrt{\_C1\ (x + \_C1)}, y(x\right.$$

2.476 ODE No. 476

$$4x^3y'(x) - 4x^2y(x) + 9y(x)y'(x)^2 = 0$$

✗ **Mathematica** : cpu = 299.998 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.89 (sec), leaf count = 87

$$\left\{y(x) = -\frac{i}{3}x^2, y(x) = \frac{i}{3}x^2, y(x) = -\frac{1}{6}\sqrt{-4\,x^2\_C1 + \_C1^2}, y(x) = \frac{1}{6}\sqrt{-4\,x^2\_C1 + \_C1^2}, y(x) = -2\,\frac{\sqrt{x^2\_C}}{\_C}\right.$$

2.477 ODE No. 477

$$ay(x)y'(x)^2 + (2x-b)y'(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 0.35314 (sec), leaf count = 136

$$\left\{\left\{y(x) \to -\frac{e^{\frac{c_1}{2}}\sqrt{2b + e^{c_1} - 4x}}{2\sqrt{a}}\right\}, \left\{y(x) \to \frac{e^{\frac{c_1}{2}}\sqrt{2b + e^{c_1} - 4x}}{2\sqrt{a}}\right\}, \left\{y(x) \to -e^{\frac{c_1}{2}}\sqrt{4\left(ae^{c_1} + x\right) - 2b}\right\}, \left\{y(x) -\right.\right.$$

✓ **Maple** : cpu = 0.979 (sec), leaf count = 622

$$\left\{\int_{\_b}^{x} 1\left(-4\,\_a + 2\,b - 2\,\sqrt{4\,a\,(y(x))^2 + (b - 2\,\_a)^2}\right)\left((-b + 2\,\_a)\,\sqrt{4\,a\,(y(x))^2 + (b - 2\,\_a)^2} + 4\,a(y(x))^2 + (b\right.\right.$$

2.478 ODE No. 478

$$\left(y'(x)^2 + 1\right)(ay(x) + b) - c = 0$$

✓ **Mathematica** : cpu = 0.197176 (sec), leaf count = 141

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[\frac{c\tan^{-1}\left(\frac{\sqrt{\#1a+b}}{\sqrt{-\#1a-b+c}}\right) - \sqrt{\#1a+b}\sqrt{-\#1a-b+c}}{a}\&\right][c_1 - x]\right\}, \left\{y(x) \to \text{Inverse}\right.\right.$$

✓ **Maple** : cpu = 0.36 (sec), leaf count = 88

$$\left\{x - \int^{y(x)} (\_a\,a + b)\frac{1}{\sqrt{-(\_a\,a + b)(\_a\,a + b - c)}}d\_a - \_C1 = 0, x - \int^{y(x)} -(\_a\,a + b)\frac{1}{\sqrt{-(\_a\,a + b)(\_a\,a\right.\right.$$

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 = 300.041 (sec), leaf count = 0 , timed out

```
$Aborted
```

✓ **Maple** : cpu = 0.444 (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 = 32.8543 (sec), leaf count = 0 , could not solve

```
DSolve[-y[x]^2 + 2*x*y[x]*Derivative[1][y][x]^2 + (-x^2 + a*y[x])*Derivative[1][y][x]^2 == 0
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve((a*y(x)-x^2)*diff(y(x),x)^2+2*x*y(x)*diff(y(x),x)^2-y(x)^2 = 0,y(x))
```

2.481 ODE No. 481

$$\left(x^2 + y(x)^2\right)y'(x) + xy(x)y'(x)^2 + xy(x) = 0$$

✓ **Mathematica** : cpu = 0.0128486 (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 = 0.083 (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 = 67.9889 (sec), leaf count = 0 , could not solve

```
DSolve[-(x*y[x]) + (a + x^22 - y[x]^2)*Derivative[1][y][x] + x*y[x]*Derivative[1][y][x]^2 ==
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(x*y(x)*diff(y(x),x)^2+(x^22-y(x)^2+a)*diff(y(x),x)-x*y(x) = 0,y(x))
```

2.483 ODE No. 483

$$\left(2xy(x)-x^2\right)y'(x)^2+2xy(x)y'(x)-y(x)^2+2xy(x)=0$$

✓ **Mathematica** : cpu = 0.186972 (sec), leaf count = 69

$$\left\{\left\{y(x)\to e^{\frac{c_1}{2}}-\sqrt{x\left(2e^{\frac{c_1}{2}}-x\right)}\right\},\left\{y(x)\to \sqrt{x\left(2e^{\frac{c_1}{2}}-x\right)}+e^{\frac{c_1}{2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.148 (sec), leaf count = 103

$$\left\{y(x)=0,y(x)=\mathit{RootOf}\left(-2\ln(x)+\int^{\_Z}\frac{1}{\_a\left(\_a^2+1\right)}\left(-2\_a^2+\sqrt{2}\sqrt{\_a\left(\_a-1\right)^2}\right)d\_a+2\_C1\right)x,y($$

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 = 0.179086 (sec), leaf count = 79

$$\left\{\left\{y(x)\to -\sqrt{x\left(3x-2e^{\frac{c_1}{2}}\right)}-e^{\frac{c_1}{2}}+2x\right\},\left\{y(x)\to \sqrt{x\left(3x-2e^{\frac{c_1}{2}}\right)}-e^{\frac{c_1}{2}}+2x\right\}\right\}$$

✓ **Maple** : cpu = 0.148 (sec), leaf count = 115

$$\left\{y(x)=0,y(x)=\mathit{RootOf}\left(-2\ln(x)+\int^{\_Z}\frac{1}{\_a\left(\_a^2-4\_a+1\right)}\left(-2\_a^2+\sqrt{2}\sqrt{\_a\left(\_a+1\right)^2}+4\_a\right)d\_a$$

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 = 300.002 (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 = 0.0321392 (sec), leaf count = 89

$$\left\{\left\{y(x)\to -\sqrt{a^2-(c_1+x)^2}\right\},\left\{y(x)\to \sqrt{a^2-(c_1+x)^2}\right\},\left\{y(x)\to -\sqrt{a^2-(x-c_1)^2}\right\},\left\{y(x)\to \sqrt{a^2-(x\right.\right.$$

✓ **Maple** : cpu = 0.311 (sec), leaf count = 54

$$\left\{y(x)=a,y(x)=\sqrt{-\_C1^2+2\_C1\,x+a^2-x^2},y(x)=-a,y(x)=-\sqrt{(a-\_C1+x)(a+\_C1-x)}\right\}$$

2.487 ODE No. 487

$$-6x^3y'(x)+4x^2y(x)+y(x)^2y'(x)^2=0$$

✗ **Mathematica** : cpu = 299.998 (sec), leaf count = 0 , timed out

```
$Aborted
```

✓ **Maple** : cpu = 0.81 (sec), leaf count = 100

$$\left\{y(x)=RootOf\left(-\ln(x)+\int^{\_Z}-\frac{3}{4\_a\,(4\_a^3-9)}\left(4\_a^3+3\sqrt{-4\_a^3+9}-9\right)d\_a+\_C1\right)x^{\frac{4}{3}},y(x)=\frac{\sqrt[3]{1}}{2}\right.$$

2.488 ODE No. 488

$$4a^2 - 4ay(x)y'(x) - 4ax + y(x)^2y'(x)^2 + y(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.419195 (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 = 1.032 (sec), leaf count = 111

$$\left\{y(x) = -2\sqrt{ax}, y(x) = 2\sqrt{ax}, y(x) = -\frac{1}{4a}\sqrt{-16a^4 + 32a^3x + (-16x^2 + 8\_C1)a^2 + 8\_C1\,ax - \_C1^2}, y(x$$

2.489 ODE No. 489

$$ay(x)^2 + bx + c + y(x)^2y'(x)^2 + 2xy(x)y'(x) = 0$$

✗ **Mathematica** : cpu = 308.499 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 4.255 (sec), leaf count = 551

$$\left\{y(x) = -\frac{\sqrt{16}}{2a(a+1)}\sqrt{a\left(\left(ax - \frac{b}{2} + x\right)^2 a(a+1)^2 \, RootOf\left(2\int^{\_Z} -1/4\,\frac{b}{(a+1)\_a\,(4\_a\,a^2 + 8\_a\,a + 4\_a\right.\right.}}$$

2.490 ODE No. 490

$$a - x^2 - 2xy(x)y'(x) + y(x)^2y'(x)^2 + 2y(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.677098 (sec), leaf count = 63

$$\left\{\left\{y(x) \to -\sqrt{-\frac{a}{2} + 4c_1x - 2c_1^2 - x^2}\right\}, \left\{y(x) \to \sqrt{-\frac{a}{2} + 4c_1x - 2c_1^2 - x^2}\right\}\right\}$$

✓ **Maple** : cpu = 1.035 (sec), leaf count = 145

$$\left\{y(x) = \sqrt{-2\sqrt{a + 2\_C1}\,x - \_C1 - x^2 - a}, y(x) = \sqrt{2\sqrt{a + 2\_C1}\,x - \_C1 - x^2 - a}, y(x) = -\sqrt{-2\sqrt{a +}}\right.$$

2.491 ODE No. 491

$$(a-1)b+ax^2+2axy(x)y'(x)+(1-a)y(x)^2+y(x)^2y'(x)^2=0$$

✓ **Mathematica** : cpu = 1.18064 (sec), leaf count = 65

$$\left\{\left\{y(x)\to -\sqrt{-2(a-1)c_1x+(a-1)c_1^2+b-x^2}\right\},\left\{y(x)\to \sqrt{-2(a-1)c_1x+(a-1)c_1^2+b-x^2}\right\}\right\}$$

✓ **Maple** : cpu = 1.466 (sec), leaf count = 195

$$\left\{y(x)=\sqrt{-ax^2+b},y(x)=\frac{1}{a}\sqrt{a\left(2\,x\sqrt{-a\,(b-\_C1)\,(a-1)}+(-x^2+b)\,a-b+\_C1\right)},y(x)=\frac{1}{a}\sqrt{\left(-2\,x\sqrt{-\right.}}$$

2.492 ODE No. 492

$$\left(y(x)^2-a^2\right)y'(x)^2+y(x)^2=0$$

✓ **Mathematica** : cpu = 0.30867 (sec), leaf count = 111

$$\left\{\left\{y(x)\to \text{InverseFunction}\left[\sqrt{a^2-\#1^2}-a\log\left(a\sqrt{a^2-\#1^2}+a^2\right)+a\log(\#1)\&\right][c_1-x]\right\},\left\{y(x)\to \text{Inverse}\right.\right.$$

✓ **Maple** : cpu = 3.062 (sec), leaf count = 122

$$\left\{x-\sqrt{a^2-(y\,(x))^2}+a^2\ln\left(\frac{1}{y\,(x)}\left(2\,a^2+2\,\sqrt{a^2}\sqrt{a^2-(y\,(x))^2}\right)\right)\frac{1}{\sqrt{a^2}}-\_C1=0,x+\sqrt{a^2-(y\,(x))^2}-a^2\,\text{l}\right.$$

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 = 10.5889 (sec), leaf count = 393

$$\left\{\text{Solve}\left[\left[\left\{y(x)=-\frac{\sqrt{-a\text{K\$2962283}^2\left(a\text{K\$2962283}^2-2\left(\text{K\$2962283}^2+1\right)x\right)}+a\text{K\$2962283}}{\text{K\$2962283}^2+1},x=\frac{a\left(c_1^2\text{K\$296}\right.}{}\right.\right.\right.\right.$$

✓ **Maple** : cpu = 1.814 (sec), leaf count = 111

$$\left\{\left[x(\_T)=\frac{1}{2\,a}\left(\left(\mathit{Artanh}\left(\frac{1}{\sqrt{\_T^2+1}}\right)\right)^2\sqrt{\_T^2+1}a^2+\left(-2\,a\_C1\,\sqrt{\_T^2+1}-2\,a^2\right)\mathit{Artanh}\left(\frac{1}{\sqrt{\_T^2+1}}\right.\right.\right.\right.$$

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 = 300.611 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.338 (sec), leaf count = 161

$$\left\{y(x)=\sqrt{a^2-1}x, y(x)=RootOf\left(-\ln(x)+\int^{\_Z}\frac{1}{(\_a^2+1)(\_a^2-a^2+1)}\left(-\_a^3+\_a\,a^2+\sqrt{\_a^2a^2-a^4+\right.\right.\right.$$

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 = 0.177029 (sec), leaf count = 79

$$\left\{\text{Solve}\left[\sqrt{a-1}\tan^{-1}\left(\frac{y(x)}{x}\right)=c_1+\frac{1}{2}\log\left(\frac{y(x)^2}{x^2}+1\right)+\log(x),y(x)\right],\text{Solve}\left[\sqrt{a-1}\tan^{-1}\left(\frac{y(x)}{x}\right)+\frac{1}{2}\log\left(\right.\right.\right.$$

✓ **Maple** : cpu = 4.303 (sec), leaf count = 61

$$\left\{y(x)=\tan\left(RootOf\left(-2\_Z\sqrt{a-1}-\ln\left(\frac{x^2}{(\cos(\_Z))^2}\right)+2\_C1\right)\right)x, y(x)=\tan\left(RootOf\left(2\_Z\sqrt{a-1}-\right.\right.\right.$$

2.496 ODE No. 496

$$(y(x)-x)^2\left(y'(x)^2+1\right)-a^2\left(y'(x)+1\right)^2=0$$

✓ **Mathematica** : cpu = 96.0964 (sec), leaf count = 53

$$\left\{\left\{y(x)\to c_1-\sqrt{a^2-(x-c_1)^2}\right\},\left\{y(x)\to\sqrt{a^2-(x-c_1)^2}+c_1\right\}\right\}$$

✓ **Maple** : cpu = 0.603 (sec), leaf count = 130

$$\left\{y(x)=x-\sqrt{2}a, y(x)=x+\sqrt{2}a, y(x)=x+RootOf\left(-x+\int^{\_Z}-\frac{1}{2\_a^2-4a^2}\left(\_a^2-2a^2+\sqrt{-\_a^4+2\_\right.\right.\right.$$

2.497 ODE No. 497

$$-x^2-2xy(x)y'(x)+3y(x)^2y'(x)^2+4y(x)^2=0$$

✓ **Mathematica** : cpu = 0.200198 (sec), leaf count = 203

$$\left\{\left\{y(x)\to-\frac{\sqrt{-4ix\sinh(3c_1)-4ix\cosh(3c_1)+\sinh(6c_1)+\cosh(6c_1)-3x^2}}{\sqrt{3}}\right\},\left\{y(x)\to\frac{\sqrt{-4ix\sinh(3c_1)-$$

✓ **Maple** : cpu = 1.111 (sec), leaf count = 203

$$\left\{\ln(x)-\frac{\sqrt{3}}{6}\sqrt{\frac{(\sqrt{3}x+3\,y(x))(\sqrt{3}x-3\,y(x))}{x^2}}+\frac{1}{2}\sqrt{\frac{x^2-3\,(y(x))^2}{x^2}}-Artanh\left(\frac{1}{2}\sqrt{\frac{x^2-3\,(y(x))^2}{x^2}}\right)+\frac{1}{2}\ln\Big($$

2.498 ODE No. 498

$$(3y(x)-2)y'(x)^2+4y(x)-4=0$$

✓ **Mathematica** : cpu = 0.120795 (sec), leaf count = 107

$$\left\{\left\{y(x)\to\text{InverseFunction}\left[-\sqrt{1-\#1}\sqrt{3\#1-2}-\frac{\sin^{-1}(\sqrt{3-3\#1})}{\sqrt{3}}\&\right][c_1-2x]\right\},\left\{y(x)\to\text{InverseFunctic}$$

✓ **Maple** : cpu = 1.844 (sec), leaf count = 99

$$\left\{y(x)=1,y(x)=\frac{\sin\Big(RootOf\Big(-8\sqrt{3}\_C1\,\_Z+8\sqrt{3}x\_Z-(\cos(\_Z))^2+48\,\_C1^2-96\,\_C1\,x+48\,x^2+\_Z}{6}$$

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 = 0.339396 (sec), leaf count = 126

$$\left\{\left\{y(x)\to-\frac{\sqrt{2(a^2-1)\,xe^{(a^2-1)c_1}+e^{2(a^2-1)c_1}+(a^2-1)^3(-x^2)}}{\sqrt{(a^2-1)^3}}\right\},\left\{y(x)\to\frac{\sqrt{2(a^2-1)\,xe^{(a^2-1)c_1}+e^{2(a^2-1}}}{\sqrt{(a^2-1)^3}}$$

✓ **Maple** : cpu = 0.361 (sec), leaf count = 189

$$\left\{y(x)=RootOf\left(-\ln(x)+\int^{\_Z}\frac{\_a}{(\_a^2+1)(\_a^2a^2-\_a^2+a^2)}\left(-\_a^2a^2+\_a^2-a^2+\sqrt{\_a^2a^2-\_a^2+a^2}\right)d$$

2.500 ODE No. 500

$$(a-b)y(x)^2y'(x)^2-ab+ay(x)^2-bx^2-2bxy(x)y'(x)=0$$

✓ **Mathematica** : cpu = 1.52827 (sec), leaf count = 86

$$\left\{\left\{y(x)\to -\frac{\sqrt{a\left((x-c_1)^2-b\right)+b\left(b-x^2\right)}}{\sqrt{b-a}}\right\},\left\{y(x)\to \frac{\sqrt{a\left((x-c_1)^2-b\right)+b\left(b-x^2\right)}}{\sqrt{b-a}}\right\}\right\}$$

✓ **Maple** : cpu = 1.695 (sec), leaf count = 220

$$\left\{y(x)=\frac{1}{b}\sqrt{b\left(2x\sqrt{-ab\left(b-\_C1\right)}+\left(-x^2+\_C1+a\right)b-a\_C1\right)},y(x)=\frac{1}{b}\sqrt{\left(-2x\sqrt{-ab\left(b-\_C1\right)}+\left(-x^2\right.\right.}$$

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 = 37.1349 (sec), leaf count = 613

$$\left\{\text{Solve}\left[\left\{y(x)=\frac{b\text{K\$3061667}-\sqrt{\text{K\$3061667}^2\left(-4bx\left(a\text{K\$3061667}^2+d\right)-4c\left(a\text{K\$3061667}^2+d\right)+b^2\right)}}{2\left(a\text{K\$3061667}^2+d\right)},x=\right.\right.\right.$$

✓ **Maple** : cpu = 8.695 (sec), leaf count = 215

$$\left\{[x(\_T)=-\frac{1}{4\,bd}\left(\sqrt{\_T^2a+d}\left(\ln\left(\frac{1}{\_T}\left(\sqrt{d}\sqrt{\_T^2a+d}+d\right)\right)\right)^2b^2+\left(\left(2\ln(2)\,b^2+4\sqrt{d}b\_C1\right)\sqrt{\_T^2a+\right.\right.\right.$$

2.502 ODE No. 502

$$(ay(x)-bx)^2\left(a^2y'(x)^2+b^2\right)-c^2\left(ay'(x)+b\right)^2=0$$

✓ **Mathematica** : cpu = 2.00562 (sec), leaf count = 71

$$\left\{\left\{y(x)\to \frac{bc_1-\sqrt{c^2-b^2(x-c_1)^2}}{a}\right\},\left\{y(x)\to \frac{\sqrt{c^2-b^2(x-c_1)^2}+bc_1}{a}\right\}\right\}$$

✓ **Maple** : cpu = 1.055 (sec), leaf count = 195

$$\left\{y(x)=\frac{bx-\sqrt{2}c}{a},y(x)=\frac{bx+\sqrt{2}c}{a},y(x)=\frac{1}{a}\left(RootOf\left(-x+\int^{\_Z}\frac{a}{\left(2\_a^2a^2-4c^2\right)b}\left(-\_a^2a^2+2c^2+\sqrt{-a^2}\right.\right.\right.\right.$$

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 = 300.038 (sec), leaf count = 0 , timed out

```
$Aborted
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve((b2*y(x)+a2*x+c2)^2*diff(y(x),x)^2+(a1*x+b1*y(x)+c1)*diff(y(x),x)+b0*y(x)+a0+c0=0,y(x
```

2.504 ODE No. 504

$$-\left(-a+x^3+y(x)^3\right)y'(x)+x^2y(x)+xy(x)^2y'(x)^2=0$$

✗ **Mathematica** : cpu = 300.002 (sec), leaf count = 0 , timed out

```
$Aborted
```

✓ **Maple** : cpu = 1.739 (sec), leaf count = 247

$$\left\{\int_{\_b}^{y(x)}\_a^2\frac{1}{\sqrt{x^6+(-2\_a^3-2\,a)\,x^3+(-\_a^3+a)^2}}\mathrm{d}\_a-\frac{\ln(x)}{2}-\_C1=0,\int_{\_b}^{y(x)}\_a^2\frac{1}{\sqrt{x^6+(-2\_a^3-2\,a)}}\right.$$

2.505 ODE No. 505

$$-x^3+xy(x)^2y'(x)^2-2y(x)^3y'(x)+2xy(x)^2=0$$

✓ **Mathematica** : cpu = 0.0198093 (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 = 0.096 (sec), leaf count = 52

$$\left\{y(x)=\sqrt{x^2+\_C1},y(x)=\sqrt{x^2\_C1+1}x,y(x)=-\sqrt{x^2+\_C1},y(x)=-\sqrt{x^2\_C1+1}x\right\}$$

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 = 66.1921 (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 = 32.6985 (sec), leaf count = 408

$$\left\{\text{Solve}\left[\left[\left\{x=\frac{\text{K\$3073764}y(\text{K\$3073764})-\frac{\sqrt{a^2\left(\text{K\$3073764}^4+\text{K\$3073764}^2\right)y(\text{K\$3073764})^4}}{a^2}}{\text{K\$3073764}^2},ac_1\sqrt{\text{K\$3073764}}+\frac{2a\sqrt[4]{\overline{\text{K\$30}}}}{}\right.\right.\right.\right.$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , exception

```
time expired
```

2.508 ODE No. 508

$$\left(x^2y(x)^2-x^2+y(x)^4\right)y'(x)^2+2xy(x)y'(x)-y(x)^2=0$$

✗ **Mathematica** : cpu = 56.2747 (sec), leaf count = 0 , could not solve

```
DSolve[-y[x]^2 + 2*x*y[x]*Derivative[1][y][x] + (-x^2 + x^2*y[x]^2 + y[x]^4)*Derivative[1][y
```

✓ **Maple** : cpu = 2.657 (sec), leaf count = 60

$$\left\{y(x)=-ix,y(x)=ix,y(x)=-Artanh\left(RootOf\left((Artanh(\_Z))^2\_Z^2-2\,Artanh(\_Z)\_C1\_Z^2+\_C1^2\_Z^2\right.\right.\right.$$

2.509 ODE No. 509

$$9(x^2-1)\,y(x)^4y'(x)^2-4x^2-6xy(x)^5y'(x)=0$$

✗ **Mathematica** : cpu = 300. (sec), leaf count = 0 , timed out

```
$Aborted
```

✓ **Maple** : cpu = 2.011 (sec), leaf count = 212

$$\left\{y(x)=\sqrt[6]{-4\,x^2+4},y(x)=-\sqrt[6]{-4\,x^2+4},y(x)=-\frac{1+i\sqrt{3}}{2}\sqrt[6]{-4\,x^2+4},y(x)=\frac{1+i\sqrt{3}}{2}\sqrt[6]{-4\,x^2+4},y(x)=\right.$$

2.510 ODE No. 510

$$-(x^4y(x)^2-1)\,y(x)^2+x^2\,(x^2y(x)^4-1)\,y'(x)^2+2x^3\,(y(x)^2-x^2)\,y(x)^3y'(x)=0$$

✗ **Mathematica** : cpu = 64.3978 (sec), leaf count = 0 , could not solve

```
DSolve[-(y[x]^2*(-1 + x^4*y[x]^2)) + 2*x^3*y[x]^3*(-x^2 + y[x]^2)*Derivative[1][y][x] + x^2*
1 + x^2*y[x]^4)*Derivative[1][y][x]^2 == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(x^2*(x^2*y(x)^4-1)*diff(y(x),x)^2+2*x^3*y(x)^3*(y(x)^2-x^2)*diff(y(x),x)-
y(x)^2*(x^4*y(x)^2-1)=0,y(x))
```

2.511 ODE No. 511

$$\left(a^2\sqrt{x^2+y(x)^2}-x^2\right)y'(x)^2+a^2\sqrt{x^2+y(x)^2}+2xy(x)y'(x)-y(x)^2=0$$

✓ **Mathematica** : cpu = 2.0153 (sec), leaf count = 225

$$\left\{\text{Solve}\left[\tan^{-1}\left(\frac{x}{y(x)}\right)=\frac{2a\sqrt{x^2+y(x)^2}\sqrt{\sqrt{x^2+y(x)^2}-a^2}\tan^{-1}\left(\frac{\sqrt{\sqrt{x^2+y(x)^2}-a^2}}{a}\right)}{\sqrt{a^2\,(x^2+y(x)^2)\left(\sqrt{x^2+y(x)^2}-a^2\right)}}+c_1,y(x)\right],\text{Solve}\left[\frac{2a\sqrt{}}{}\right.\right.$$

✓ **Maple** : cpu = 9.744 (sec), leaf count = 199

$$\left\{\arctan\left(\frac{x}{y\,(x)}\right)-2\frac{\sqrt{a^2\left((y\,(x))^2+x^2\right)\left(-a^2+\sqrt{(y\,(x))^2+x^2}\right)}}{a\sqrt{(y\,(x))^2+x^2}\sqrt{-a^2+\sqrt{(y\,(x))^2+x^2}}}\arctan\left(\frac{\sqrt{-a^2+\sqrt{(y\,(x))^2+x^2}}}{a}\right)-\_C1\right.$$

2.512 ODE No. 512

$$\left(a\left(x^2+y(x)^2\right)^{3/2}-x^2\right)y'(x)^2+a\left(x^2+y(x)^2\right)^{3/2}+2xy(x)y'(x)-y(x)^2=0$$

✓ **Mathematica** : cpu = 6.25473 (sec), leaf count = 713

$$\left\{\text{Solve}\left[\tan^{-1}\left(\frac{x}{y(x)}\right)-\frac{i\sqrt{a\left(\left(x^2+y(x)^2\right)^{5/2}-a\left(x^2+y(x)^2\right)^3\right)}\left(\sqrt{2}\left(\log\left(\frac{a^{3/2}\left(3i\sqrt{2}a\sqrt{x^2+y(x)^2}+4\sqrt{a}\sqrt{\sqrt{x^2+y(}}\right.}{4a\sqrt{x^2+y(x)^2}+}\right.\right.\right.}{}\right.\right.$$

✓ **Maple** : cpu = 10.134 (sec), leaf count = 135

$$\left\{y(x)=x\left(\tan\left(RootOf\left(-\_Z+\int^{\frac{x^2\left((\tan(\_Z))^2+1\right)}{(\tan(\_Z))^2}}-\frac{1}{2\_a^2\left(\_a\,a^2-1\right)}\left(\sqrt{\_a}a+1\right)\sqrt{-\_a^{\frac{5}{2}}a\left(\sqrt{\_a}a-1\right)}d\_a\right.\right.\right.\right.$$

2.513 ODE No. 513

$$y'(x)^2\sin(y(x))+2xy'(x)\cos^3(y(x))-\sin(y(x))\cos^4(y(x))=0$$

✗ **Mathematica** : cpu = 300.026 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 5.087 (sec), leaf count = 1134

$$\left\{\left[x(\_T)=\frac{1}{2\_T}\left(\left(\cos\left(\frac{1}{2}\arctan\left(1\left(\_C1^2\_T^2-2\_C1\_T\sqrt[3]{\_C1^3\_T^3+54\_C1\_T+6\sqrt{3}\sqrt{\_C1^2\_}}\right.\right.\right.\right.\right.\right.\right.$$

2.514 ODE No. 514

$$y'(x)^2(a\cos(y(x))+b)-c\cos(y(x))+d=0$$

✓ **Mathematica** : cpu = 17.7542 (sec), leaf count = 605

$$\left\{\left\{y(x)\to \text{InverseFunction}\left[\frac{4\sin^2\left(\frac{\#1}{2}\right)\csc(\#1)\sqrt{a\cos(\#1)+b}\sqrt{\frac{\cot^2\left(\frac{\#1}{2}\right)(c-d)}{c+d}}\sqrt{\frac{\csc^2\left(\frac{\#1}{2}\right)(a+b)(d-c\cos(\#1))}{ad+bc}}\left(c(a\right.}{c(a}\right.\right.\right.$$

✓ **Maple** : cpu = 1.559 (sec), leaf count = 87

$$\left\{x-\int^{y(x)}(a\cos(\_a)+b)\frac{1}{\sqrt{(a\cos(\_a)+b)(c\cos(\_a)-d)}}d\_a-\_C1=0, x-\int^{y(x)}-(a\cos(\_a)+b)\frac{}{\sqrt{(a}}\right.$$

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 = 300.002 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 5.88 (sec), leaf count = 113

$$\left\{y(x)=x\left(\tan\left(RootOf\left(-\_Z+\int^{\frac{x^2\left((\tan(\_Z))^2+1\right)}{(\tan(\_Z))^2}}-\frac{1}{2\_a\left(f(\_a)-\_a\right)}\sqrt{-\left(f(\_a)-\_a\right)f(\_a)}d\_a+\_C1\right.\right.\right.\right.$$

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 = 4.26237 (sec), leaf count = 229

$$\left\{\text{Solve}\left[c_1=\log(x)+\int_1^{\frac{y(x)}{x}}\frac{\left(K[1]^2+1\right)f\left(\frac{1}{\sqrt{K[1]^2+1}}\right)-1}{(K[1]-i)(K[1]+i)\sqrt{f\left(\frac{1}{\sqrt{K[1]^2+1}}\right)}\left(K[1]\sqrt{f\left(\frac{1}{\sqrt{K[1]^2+1}}\right)}+i\sqrt{f\left(\frac{1}{\sqrt{K[1]^2+1}}\right)}-1\right.}\right.\right.$$

✓ **Maple** : cpu = 3.192 (sec), leaf count = 139

$$\left\{y(x) = RootOf\left(-\ln(x) + \int^{\_Z} \frac{1}{\_a^2+1}\left(-\_a\, f\left(\frac{1}{\sqrt{\_a^2+1}}\right) + \sqrt{-\left(f\left(\frac{1}{\sqrt{\_a^2+1}}\right)\right)^2 + f\left(\frac{1}{\sqrt{\_a^2+1}}\right)\right.\right.\right.$$

2.517 ODE No. 517

$$(x^2+y(x)^2)\, f\left(\frac{y(x)}{\sqrt{x^2+y(x)^2}}\right)(y'(x)^2+1) - (xy'(x)-y(x))^2 = 0$$

✓ **Mathematica** : cpu = 4.47165 (sec), leaf count = 253

$$\left\{\text{Solve}\left[c_1 = \log(x) + \int_1^{\frac{y(x)}{x}} \frac{(K[1]^2+1)\, f\left(\frac{K[1]}{\sqrt{K[1]^2+1}}\right) - 1}{(K[1]-i)(K[1]+i)\sqrt{f\left(\frac{K[1]}{\sqrt{K[1]^2+1}}\right)}\left(K[1]\sqrt{f\left(\frac{K[1]}{\sqrt{K[1]^2+1}}\right)} + i\sqrt{f\left(\frac{K[1]}{\sqrt{K[1]^2+1}}\right) - 1}\right.}\right.\right.$$

✓ **Maple** : cpu = 3.203 (sec), leaf count = 157

$$\left\{y(x) = RootOf\left(-\ln(x) + \int^{\_Z} -\frac{1}{\_a^2+1}\left(\_a\, f\left(\_a\frac{1}{\sqrt{\_a^2+1}}\right) - \sqrt{-\left(f\left(\_a\frac{1}{\sqrt{\_a^2+1}}\right)\right)^2 + f\left(\_a\frac{}{\sqrt{\_}}\right.}\right.\right.\right.$$

2.518 ODE No. 518

$$y'(x)^3 - (y(x)-a)^2(y(x)-b)^2 = 0$$

✓ **Mathematica** : cpu = 0.918716 (sec), leaf count = 236

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[-\frac{3\sqrt[3]{a-\#1}\left(\frac{\#1-b}{a-b}\right)^{2/3} {}_2F_1\left(\frac{1}{3},\frac{2}{3};\frac{4}{3};\frac{a-\#1}{a-b}\right)}{(b-\#1)^{2/3}}\&\right][c_1+x]\right\}, \left\{y(x) \to \text{InverseFunctio}\right.\right.$$

✓ **Maple** : cpu = 0.363 (sec), leaf count = 126

$$\left\{x - \int^{y(x)} \frac{1}{\sqrt[3]{(\_a-a)^2(-b+\_a)^2}} d\_a - \_C1 = 0, x - \int^{y(x)} -2\frac{1}{(1+i\sqrt{3})\sqrt[3]{(-\_a+a)^2(-\_a+b)^2}} d\_a - \_\right.$$

2.519 ODE No. 519

$$y'(x)^3 - f(x)\left(ay(x)^2 + by(x) + c\right)^2 = 0$$

✓ **Mathematica** : cpu = 2.26509 (sec), leaf count = 473

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[\frac{3\left(2\#1a - \sqrt{b^2-4ac} + b\right)\left(\frac{2\#1a+\sqrt{b^2-4ac}+b}{\sqrt{b^2-4ac}}\right)^{2/3} {}_2F_1\left(\frac{1}{3},\frac{2}{3};\frac{4}{3};\frac{-b-2a\#1+\sqrt{b^2-4ac}}{2\sqrt{b^2-4ac}}\right)}{2\,2^{2/3}a(\#1(\#1a+b)+c)^{2/3}}\&\right]\right.\right.$$

✓ **Maple** : cpu = 2.371 (sec), leaf count = 197

$$\left\{\int^{y(x)} \left(\_a^2a + \_a\,b + c\right)^{-\frac{2}{3}} d\_a + \int^{x} -1\sqrt[3]{f(\_a)\left(a\left(y(x)\right)^2 + by(x) + c\right)^2}\left(a(y(x))^2 + by(x) + c\right)^{-\frac{2}{3}} d\_a + \_\right.$$

2.520 ODE No. 520

$$y'(x)^3 + y'(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 237.16 (sec), leaf count = 3323

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[\frac{\left(243\#1^2 - 27\sqrt{81\#1^2+12}\#1 - 24\sqrt[3]{2}\sqrt[6]{3}\tan^{-1}\left(\frac{1}{\sqrt{3}} - \left(\frac{2}{3}\right)^{2/3}\sqrt[3]{\sqrt{81\#1^2+12} -}\right.\right.}{}\right.\right.\right.$$

✓ **Maple** : cpu = 0.276 (sec), leaf count = 245

$$\left\{x - \int^{y(x)} 6\frac{\sqrt[3]{108\_a + 12\sqrt{81\_a^2+12}}}{\left(108\_a + 12\sqrt{81\_a^2+12}\right)^{2/3} - 12} d\_a - \_C1 = 0, x - \int^{y(x)} -12\frac{}{\left(1+i\sqrt{3}\right)\left(\sqrt[3]{108\_a + 12\sqrt{8}}\right.}\right.$$

2.521 ODE No. 521

$$y'(x)^3 + xy'(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 0.00712892 (sec), leaf count = 14

$$\{\{y(x) \to c_1(c_1^2 + x)\}\}$$

✓ **Maple** : cpu = 0.066 (sec), leaf count = 33

$$\left\{y(x) = \_C1\,(\_C1^2 + x)\,, y(x) = -\frac{2\,x}{9}\sqrt{-3\,x}, y(x) = \frac{2\,x}{9}\sqrt{-3\,x}\right\}$$

2.522 ODE No. 522

$$y'(x)^3 - (x+5)y'(x) + y(x) = 0$$

✓ **Mathematica** : cpu = 0.00709629 (sec), leaf count = 17

$$\{\{y(x) \to c_1(-c_1^2 + x + 5)\}\}$$

✓ **Maple** : cpu = 0.079 (sec), leaf count = 44

$$\left\{y(x) = \_C1\,(-\_C1^2 + x + 5)\,, y(x) = -\frac{2\,x+10}{9}\sqrt{3\,x+15}, y(x) = \frac{2\,x+10}{9}\sqrt{3\,x+15}\right\}$$

2.523 ODE No. 523

$$-axy'(x) + x^3 + y'(x)^3 = 0$$

✗ **Mathematica** : cpu = 299.999 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.092 (sec), leaf count = 231

$$\left\{y(x) = \int i\left(\left(\frac{i}{12} - \frac{\sqrt{3}}{12}\right)\left(-108\,x^3 + 12\,\sqrt{-12\,a^3x^3 + 81\,x^6}\right)^{\frac{2}{3}} + a\left(\sqrt{3} + i\right)x\right)\frac{1}{\sqrt[3]{-108\,x^3 + 12\,\sqrt{-12\,a^3x^3 +}}}\right.$$

2.524 ODE No. 524

$$y'(x)^3 - 2y(x)y'(x) + y(x)^2 = 0$$

✗ **Mathematica** : cpu = 640.562 (sec), leaf count = 0 , timed out

```
$Aborted
```

✓ **Maple** : cpu = 0.218 (sec), leaf count = 270

$$\left\{ x - \int^{y(x)} 12^{\frac{2}{3}} \sqrt[3]{-9\_a^2 + \sqrt{3}\sqrt{27\_a^4 - 32\_a^3}} \left(4\sqrt[3]{12}\_a + 2\left(-9\_a^2 + \sqrt{3}\sqrt{27\_a^4 - 32\_a^3}\right)^{2/3} \right)^{-1} d\_a \right.$$

2.525 ODE No. 525

$$-axy(x)y'(x) + 2ay(x)^2 + y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 8.3823 (sec), leaf count = 121

$$\left\{ \left\{ y(x) \to \frac{c_1 e^{\frac{1}{4}\left(ax^2 + \sqrt{a}x\sqrt{ax^2-8}\right)}}{\left(\sqrt{a}\sqrt{ax^2-8} + ax\right)^2} \right\}, \left\{ y(x) \to ac_1 e^{\frac{1}{4}\left(ax^2 - \sqrt{a}x\sqrt{ax^2-8}\right)} \left(\sqrt{ax^2-8} + \sqrt{a}x\right)^2 \right\} \right\}$$

✓ **Maple** : cpu = 0.19 (sec), leaf count = 122

$$\left\{ y(x) = \_C1 \left(a^2 x \frac{1}{\sqrt{a^2}} + \sqrt{a^2x^2 - 8\,a} \right)^{-2\,\frac{a}{\sqrt{a^2}}} e^{\frac{x}{4}\left(ax + \sqrt{a^2x^2 - 8\,a}\right)}, y(x) = \_C1 \left(a^2 x \frac{1}{\sqrt{a^2}} + \sqrt{a^2x^2 - 8\,a} \right)^{2\,\frac{a}{\sqrt{a^2}}} e \right.$$

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 = 0.948807 (sec), leaf count = 43

$$\left\{ \left\{ y(x) \to -\frac{1}{c_1 + x} \right\}, \left\{ y(x) \to c_1 e^{\frac{x^2}{2}} \right\}, \left\{ y(x) \to c_1 + \frac{x^3}{3} \right\} \right\}$$

✓ **Maple** : cpu = 0.077 (sec), leaf count = 32

$$\left\{ y(x) = (-x + \_C1)^{-1}, y(x) = e^{\frac{x^2}{2}}\_C1, y(x) = \frac{x^3}{3} + \_C1 \right\}$$

2.527 ODE No. 527

$$-xy(x)^4y'(x)+y'(x)^3-y(x)^5=0$$

✗ **Mathematica** : cpu = 300.001 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 1.056 (sec), leaf count = 43

$$\left\{y(x)=\sqrt{\frac{\_C1^{10}}{(\_C1^4x-1)^2}}\_C1, y(x)=-\frac{3\sqrt{3}}{2}x^{-\frac{3}{2}}, y(x)=\frac{3\sqrt{3}}{2}x^{-\frac{3}{2}}\right\}$$

2.528 ODE No. 528

$$abx+ay'(x)^2+by(x)+y'(x)^3=0$$

✗ **Mathematica** : cpu = 300.002 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.219 (sec), leaf count = 86

$$\left\{y(x)=-ax-\frac{\left(e^{RootOf(-2a^2\_Z-3e^{2\_Z}+8ae^{\_Z}+2b\_C1-5a^2-2bx)}-a\right)^2e^{RootOf(-2a^2\_Z-3e^{2\_Z}+8ae^{\_Z}+2b\_C1-5a^2-}}{b}\right.$$

2.529 ODE No. 529

$$y'(x)^3+xy'(x)^2-y(x)=0$$

✓ **Mathematica** : cpu = 64.6431 (sec), leaf count = 1484

$$\left\{\left\{y(x)\to\frac{-16x^4+8\left(\sqrt[3]{-8x^3-36x^2-54x+108c_1+6\sqrt{6}\sqrt{(2c_1+1)(-4x^3-18x^2-27x+27c_1)}+27-12}\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.129 (sec), leaf count = 1251

$$\left\{y(x)=0, y(x)=1\left((-8x-6)\sqrt[3]{-36x^2-54x+108\_C1-8x^3+27+6\sqrt{-6(1+2\_C1)(4x^3+18x^2-2}}\right.\right.$$

2.530 ODE No. 530

$$y'(x)^3 - y(x)y'(x)^2 + y(x)^2 = 0$$

✗ **Mathematica** : cpu = 315.379 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.165 (sec), leaf count = 370

$$\left\{x - \int^{y(x)} 6 \frac{\sqrt[3]{-108\_a^2 + 8\_a^3 + 12\sqrt{-12\_a^5 + 81\_a^4}}}{\left(-108\_a^2 + 8\_a^3 + 12\sqrt{-12\_a^5 + 81\_a^4}\right)^{2/3} + 2\_a\sqrt[3]{-108\_a^2 + 8\_a^3 + 12\sqrt{-12\_a^5 + 81}}}\right.$$

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 = 81.7303 (sec), leaf count = 0 , could not solve

```
DSolve[-(x^3*y[x]^6) + (x^3*y[x]^2 + x^2*y[x]^4 + x*y[x]^6)*Derivative[1][y][x] + Derivative
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(y(x),x)^2-(y(x)^4+x*y(x)^2+x^2)*diff(y(x),x)^2+(x*y(x)^6+x^2*y(x)^4+x^3*y(x)^2)*
x^3*y(x)^6=0,y(x))
```

2.532 ODE No. 532

$$ay'(x)^3 + by'(x)^2 + cy'(x) - d - y(x) = 0$$

✗ **Mathematica** : cpu = 300.009 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.37 (sec), leaf count = 944

$$\left\{x - \int^{y(x)} -3\sqrt[3]{6}a\sqrt[3]{27}\sqrt[3]{\sqrt{3}\left(1/3\sqrt{27\left(d+\_a\right)^2a^2 + 18c\left(\left(d+\_a\right)b + 2/9c^2\right)a + \left(-4d - 4\_a\right)b^3 - b^2c^2a +}\right.}\right.$$

2.533 ODE No. 533

$$a + xy'(x)^3 - y(x)y'(x)^2 = 0$$

✗ **Mathematica** : cpu = 300.349 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.04 (sec), leaf count = 76

$$\left\{y(x) = \frac{\_C1^3 x + a}{\_C1^2}, y(x) = \frac{3\sqrt[3]{2}}{2}\sqrt[3]{ax^2}, y(x) = -\frac{3\sqrt[3]{2}\left(1 + i\sqrt{3}\right)}{4}\sqrt[3]{ax^2}, y(x) = \frac{3\sqrt[3]{2}\left(i\sqrt{3} - 1\right)}{4}\sqrt[3]{ax^2}\right\}$$

2.534 ODE No. 534

$$4xy'(x)^3 - 6y(x)y'(x)^2 + 3y(x) - x = 0$$

✗ **Mathematica** : cpu = 300.002 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.163 (sec), leaf count = 84

$$\left\{y(x) = x, y(x) = -\frac{\left(1 + \sqrt{3}\right)x}{2}, y(x) = \frac{\left(\sqrt{3} - 1\right)x}{2}, y(x) = \frac{1}{3\_C1}\left(-\sqrt{2}(x + \_C1)\sqrt{\_C1\ (x + \_C1)} - \_C1\right.$$

2.535 ODE No. 535

$$8xy'(x)^3 - 12y(x)y'(x)^2 + 9y(x) = 0$$

✗ **Mathematica** : cpu = 300.013 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.139 (sec), leaf count = 51

$$\left\{y(x) = 0, y(x) = -\frac{3x}{2}, y(x) = \frac{3x}{2}, y(x) = -\frac{1}{3\_C1^2}(\_C1\ (3\_C1 + x))^{\frac{3}{2}}, y(x) = \frac{1}{3\_C1^2}(\_C1\ (3\_C1 + x))^{\frac{3}{2}}\right.$$

2.536 ODE No. 536

$$bx\left(x^2-a^2\right)y'(x)^2+\left(x^2-a^2\right)y'(x)^3+bx+y'(x)=0$$

✓ **Mathematica** : cpu = 0.0282632 (sec), leaf count = 64

$$\left\{\left\{y(x)\to c_1-\frac{bx^2}{2}\right\},\left\{y(x)\to \tan^{-1}\left(\frac{x}{\sqrt{a^2-x^2}}\right)+c_1\right\},\left\{y(x)\to c_1-\tan^{-1}\left(\frac{x}{\sqrt{a^2-x^2}}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.094 (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 = 300.009 (sec), leaf count = 0 , timed out

`$Aborted`

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(x^3*diff(y(x),x)^3-3*x^2*y(x)*diff(y(x),x)^2+(3*x*y(x)^2+x^6)*diff(y(x),x)-
y(x)^3-2*x^5*y(x)=0,y(x))
```

2.538 ODE No. 538

$$2\left(xy'(x)+y(x)\right)^3-y(x)y'(x)=0$$

✗ **Mathematica** : cpu = 300.008 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 5.689 (sec), leaf count = 1532

$$\left\{\int_{\_b}^{x}1\left(-6^{\frac{2}{3}}\left(-9\left(-1/9\sqrt{3}\sqrt{\frac{27\_a\,(y(x))^2-2\,y(x)}{\_a}}+y(x)\right)y(x)\_a^2\right)^{\frac{2}{3}}+6\,y(x)\_a\left(\sqrt[3]{6}\sqrt[3]{-9\left(-1/9\sqrt{3}\right.}\right.\right.\right.$$

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 = 0.0414267 (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 = 0.451 (sec), leaf count = 32

$$\{y(x) = \_C1\,\mathrm{e}^x, y(x) = -\cos(x) + \_C1, y(x) = -\ln(\csc(x) - \cot(x)) + \_C1\}$$

2.540 ODE No. 540

$$2y(x)y'(x)^3 - y(x)y'(x)^2 + 2xy'(x) - x = 0$$

✓ **Mathematica** : cpu = 0.0218549 (sec), leaf count = 61

$$\left\{\left\{y(x)\to c_1 + \frac{x}{2}\right\}, \left\{y(x)\to\left(\frac{3c_1}{2} - ix^{3/2}\right)^{2/3}\right\}, \left\{y(x)\to\left(\frac{3c_1}{2} + ix^{3/2}\right)^{2/3}\right\}\right\}$$

✓ **Maple** : cpu = 0.147 (sec), leaf count = 109

$$\left\{x + \frac{x\_C1}{y(x)}\left(\frac{1}{y(x)}\left(-x - \sqrt{-xy(x)} + y(x)\right)\right)^{-\frac{2}{3}}\left(\frac{1}{y(x)}\left(\sqrt{-xy(x)} + y(x)\right)\right)^{-\frac{2}{3}} = 0, x + \frac{x\_C1}{y(x)}\left(\frac{1}{y(x)}\left(-x + \right.\right.\right.$$

2.541 ODE No. 541

$$y(x)^2y'(x)^3 + 2xy'(x) - y(x) = 0$$

✗ **Mathematica** : cpu = 300. (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 1.383 (sec), leaf count = 103

$$\left\{y(x) = \sqrt{\_C1^3 + 2\_C1\,x}, y(x) = -\frac{2\,i}{3}\sqrt[4]{2}\sqrt[4]{3}\sqrt[4]{-x^3}, y(x) = \frac{2\,i}{3}\sqrt[4]{2}\sqrt[4]{3}\sqrt[4]{-x^3}, y(x) = -\sqrt{\_C1^3 + 2\_C1\,x}, y(\right.$$

2.542 ODE No. 542

$$16y(x)^2y'(x)^3+2xy'(x)-y(x)=0$$

✗ **Mathematica** : cpu = 300. (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.59 (sec), leaf count = 107

$$\left\{y(x)=\sqrt{16\_C1^3+2\_C1\,x},y(x)=-\frac{i}{3}\sqrt[4]{2}\sqrt[4]{3}\sqrt[4]{-x^3},y(x)=\frac{i}{3}\sqrt[4]{2}\sqrt[4]{3}\sqrt[4]{-x^3},y(x)=-\sqrt{16\_C1^3+2\_C1\,x}\right.$$

2.543 ODE No. 543

$$x\left(x^2+1\right)y'(x)-x^2y(x)+y(x)^3\left(-y'(x)^2\right)+xy(x)^2y'(x)^3=0$$

✗ **Mathematica** : cpu = 300.02 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 1.73 (sec), leaf count = 277

$$\left\{y(x)=-\frac{i}{2}\sqrt[4]{-16\,x^4+40\,x^2+2-2\sqrt{-\left(8\,x^2-1\right)^3}},y(x)=-\frac{i}{2}\sqrt[4]{-16\,x^4+40\,x^2+2+2\sqrt{-\left(8\,x^2-1\right)^3}},y(x)\right.$$

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 = 300. (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 1.227 (sec), leaf count = 4201

$$\left\{\int_{\_b}^{x}\frac{1}{\_a}\left(\left(-i\sqrt{3}-1\right)\left(-108\,(y(x))^6\,\_a^{12}+12\,\sqrt{3}\sqrt{\frac{27\,\_a^6\,(y\,(x))^3-4}{y\,(x)}}(y(x))^5\,\_a^9+72\,\_a^6(y(x))^3-8\right)^{\frac{2}{3}}+\right.\right.$$

2.545 ODE No. 545

$$y'(x)^4 - (y(x) - a)^3(y(x) - b)^2 = 0$$

✓ **Mathematica** : cpu = 0.783178 (sec), leaf count = 383

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[-\frac{\sqrt[4]{a-\#1}\sqrt{\frac{\#1-b}{a-b}}B_{\frac{a-\#1}{a-b}}\left(\frac{1}{4},\frac{1}{2}\right)}{\sqrt{b-\#1}\sqrt[4]{\frac{a-\#1}{a-b}}}\&\right]\left[c_1 - \sqrt[4]{-1}x\right]\right\}, \left\{y(x) \to \text{InverseFunction}\left[-\right.\right.\right.$$

✓ **Maple** : cpu = 0.365 (sec), leaf count = 144

$$\left\{x - \int^{y(x)} \frac{1}{\sqrt[4]{(\_a - a)^3 (\_a - b)^2}} d\_a - \_C1 = 0, x - \int^{y(x)} -i\frac{1}{\sqrt[4]{-(-\_a + a)^3 (-\_a + b)^2}} d\_a - \_C1 = 0, x\right.$$

2.546 ODE No. 546

$$y'(x)^4 + 3(x-1)y'(x)^2 - 3(2y(x) - 1)y'(x) + 3x = 0$$

✗ **Mathematica** : cpu = 300.011 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.211 (sec), leaf count = 171

$$\left\{y(x) = 1\left(\left(-6 + \_C1^3 + (6x - 6)\_C1\right)\sqrt{\_C1^2 + 4x} - 2\_C1^4 + (-14x + 6)\_C1^2 + \left(\left(\_C1^2 + 4x\right)^{\frac{3}{2}} + 6\right.\right.\right.$$

2.547 ODE No. 547

$$y'(x)^4 - 4y(x)\left(xy'(x) - 2y(x)\right)^2 = 0$$

✓ **Mathematica** : cpu = 1.94601 (sec), leaf count = 321

$$\left\{\text{Solve}\left[\frac{\sqrt{x^2 - 4\sqrt{y(x)}}\sqrt{y(x)}\left(4\log\left(\sqrt{x^2 - 4\sqrt{y(x)}} + x\right) - \log(y(x))\right)}{\sqrt{\left(x^2 - 4\sqrt{y(x)}\right)y(x)}} + \log(y(x)) = 4c_1, y(x)\right], \text{Solve}\left[\frac{\sqrt{x}}{}\right.\right.$$

✓ **Maple** : cpu = 0.46 (sec), leaf count = 118

$$\left\{1\left(\sqrt{x^2 - 4\sqrt{y(x)}} - x\right)^{1\sqrt{x^2y(x) - 4(y(x))^{3/2}}\frac{1}{\sqrt{x^2 - 4\sqrt{y(x)}}}\frac{1}{\sqrt{y(x)}}}\frac{1}{\sqrt{y(x)}}\left(\left(\sqrt{x^2 - 4\sqrt{y(x)}} + x\right)^{1\sqrt{x^2y(x) - 4(y(x))^{3/2}}}\right.\right.$$

2.548 ODE No. 548

$$y'(x)^6 - (y(x) - a)^4 (y(x) - b)^3 = 0$$

✓ **Mathematica** : cpu = 1.13967 (sec), leaf count = 569

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[-\frac{\sqrt[3]{a - \#1}\sqrt{\frac{\#1-b}{a-b}}B_{\frac{a-\#1}{a-b}}\left(\frac{1}{3},\frac{1}{2}\right)}{\sqrt{b - \#1}\sqrt[3]{\frac{a-\#1}{a-b}}}\&\right][c_1 - ix]\right\}, \left\{y(x) \to \text{InverseFunction}\left[-\frac{\sqrt[3]{a -}}{}\right.\right.\right.$$

✓ **Maple** : cpu = 0.592 (sec), leaf count = 250

$$\left\{x - \int^{y(x)} \frac{1}{\sqrt[6]{(\_a - a)^4 (\_a - b)^3}} d\_a - \_C1 = 0, x - \int^{y(x)} \frac{-2\,i}{-\sqrt{3} + i} \frac{1}{\sqrt[6]{-(-\_a + a)^4 (-\_a + b)^3}} d\_a - \_C1\right.$$

2.549 ODE No. 549

$$x^2 \left(y'(x)^2 + 1\right)^3 - a^2 = 0$$

✓ **Mathematica** : cpu = 0.467915 (sec), leaf count = 360

$$\left\{\left\{y(x) \to c_1 - \frac{1}{4}\sqrt[3]{x}\sqrt{-4 + \frac{2i\left(\sqrt{3} + i\right)a^{2/3}}{x^{2/3}}}\left(2x^{2/3} + \left(1 - i\sqrt{3}\right)a^{2/3}\right)\right\}, \left\{y(x) \to c_1 + \frac{1}{4}\sqrt[3]{x}\sqrt{-4 + \frac{2i\left(\sqrt{3} -\right.}{x^2}}\right.\right.$$

✓ **Maple** : cpu = 0.285 (sec), leaf count = 553

$$\left\{y(x) = 1\sqrt{-\frac{1}{a^4}\left(a^2x\right)^{\frac{4}{3}}\left(\left(a^2x\right)^{\frac{2}{3}} - a^2\right)}\left(a^2 - \left(a^2x\right)^{\frac{2}{3}}\right)\left(a^2x\right)^{-\frac{2}{3}} + \_C1, y(x) = 1\sqrt{-\frac{1}{a^4}\left(a^2x\right)^{\frac{4}{3}}\left(\left(a^2x\right)^{\frac{2}{3}} - a^2\right)}\left(\left(\right.\right.\right.$$

2.550 ODE No. 550

$$-ay(x)^s - bx^{\frac{rs}{r-s}} + y'(x)^r = 0$$

✗ **Mathematica** : cpu = 300.096 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.569 (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 = 0.409113 (sec), leaf count = 79

$$\left\{\left\{y(x)\to \frac{a(a-b)^n\left(\int_1^x(-1)^{\frac{1}{n}+1}f(K[1])\,dK[1]+c_1\right)^n+bn^n}{(a-b)^n\left(\int_1^x(-1)^{\frac{1}{n}+1}f(K[1])\,dK[1]+c_1\right)^n+n^n}\right\}\right\}$$

✓ **Maple** : cpu = 0.893 (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 = 0.198112 (sec), leaf count = 39

$$\left\{\left\{y(x)\to \text{InverseFunction}\left[\int_1^{\#1} g(K[1])^{-1/n}\,dK[1]\&\right]\left[\int_1^x f(K[2])^{\frac{1}{n}}\,dK[2]+c_1\right]\right\}\right\}$$

✓ **Maple** : cpu = 0.106 (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 = 0.20069 (sec), leaf count = 51

$$\text{Solve}\left[\left\{x=\frac{am\text{K\$5137179}^{m-1}}{m-1}+\frac{bn\text{K\$5137179}^{n-1}}{n-1}+c_1, a\text{K\$5137179}^m+b\text{K\$5137179}^n=y(x)\right\},\{y(x),\text{K\$513}$$

✓ **Maple** : cpu = 0.056 (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 = 0.130237 (sec), leaf count = 44

$$\text{Solve}\left[\left\{\text{K\$5137364}nx = \text{K\$5137364}^n x^{n-1} + y(x), x = c_1(\text{K\$5137364} - \text{K\$5137364}n)^{\frac{n}{1-n}}\right\}, \{y(x), \text{K\$5137364}\}\right]$$

✓ **Maple** : cpu = 0.418 (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 = 304.739 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.025 (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 = 7.63185 (sec), leaf count = 50

$$\text{Solve}\left[\left\{ x = -\frac{-c_1 + \sqrt{\text{K\$5137597}^2+1} + \sinh^{-1}(\text{K\$5137597})}{(\text{K\$5137597}+1)^2}, \text{K\$5137597}^2 x + \sqrt{\text{K\$5137597}^2+1} + y(x) = 0 \right\}\right.$$

✓ **Maple** : cpu = 0.485 (sec), leaf count = 581

$$\left\{ x^2\_C1\left(\sqrt{-4\,xy\,(x)+2+2\,\sqrt{4\,x^2-4\,xy\,(x)+1}} - 2\,x\right)^{-2} + x + 2\,\frac{x^2}{\left(\sqrt{-4\,xy\,(x)+2+2\,\sqrt{4\,x^2-4\,xy\,(x)+}}\right.}\right.$$

2.557 ODE No. 557

$$x\left(y'(x)+\sqrt{y'(x)^2+1}\right)-y(x)=0$$

✓ **Mathematica** : cpu = 0.0194125 (sec), leaf count = 37

$$\left\{\left\{y(x)\to -\sqrt{-x\left(x-c_1\right)}\right\},\left\{y(x)\to \sqrt{-x\left(x-c_1\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.227 (sec), leaf count = 74

$$\left\{2\,xy(x)\,\_C1\,{\frac{1}{\sqrt{{\frac{\left((y(x))^2+x^2\right)^2}{x^2(y(x))^2}}}}}\left(\sqrt{{\frac{x^4+2\,x^2\,(y\,(x))^2+(y\,(x))^4}{x^2\,(y\,(x))^2}}}y(x)\,x+(y(x))^2-x^2\right)^{-1}+x=0\right\}$$

2.558 ODE No. 558

$$ax\sqrt{y'(x)^2+1}+xy'(x)-y(x)=0$$

✓ **Mathematica** : cpu = 0.868922 (sec), leaf count = 369

$$\left\{\text{Solve}\left[\frac{a\left(2\log\left(x-a^2x\right)-\log\left(\frac{(a^2-1)\left(y(x)+ix\left(a\sqrt{a^2-\frac{y(x)^2}{x^2}-1}+a^2-1\right)\right)}{a^3(x+iy(x))}\right)\right)+\log\left(\frac{i(a^2-1)\left(x\left(a\sqrt{a^2-\frac{y(x)^2}{x^2}-1}+a^2-1\right)\right.}{a^3(x-iy(x))}\right.}{2\left(a^2-1\right)}\right.\right.$$

✓ **Maple** : cpu = 0.246 (sec), leaf count = 223

$$\left\{x-\_C1\,e^{\frac{1}{a}Arcsinh\left(\frac{1}{\left(a^2-1\right)x}\left(\sqrt{-a^2x^2+x^2+(y(x))^2}a+y(x)\right)\right)}\frac{1}{\sqrt{\frac{1}{\left(a^2-1\right)^2x^2}\left(-a^2x^2+a^2\left(y\left(x\right)\right)^2+2\sqrt{-a^2x^2+x^2+(y\right.\right.}}\right.$$

2.559 ODE No. 559

$$-ay(x)y'(x) - ax + y(x)\sqrt{y'(x)^2 + 1} = 0$$

✓ **Mathematica** : cpu = 0.35417 (sec), leaf count = 126

$$\left\{\left\{y(x) \to -\frac{\sqrt{2\left(a^2-1\right)xe^{\left(a^2-1\right)c_1} + e^{2\left(a^2-1\right)c_1} + \left(a^2-1\right)^3\left(-x^2\right)}}{\sqrt{\left(a^2-1\right)^3}}\right\}, \left\{y(x) \to \frac{\sqrt{2\left(a^2-1\right)xe^{\left(a^2-1\right)c_1} + e^{2\left(a^2-1\right.}}}{\sqrt{\left(a^2-1\right)^3}}\right.\right.$$

✓ **Maple** : cpu = 0.394 (sec), leaf count = 215

$$\left\{ -\mathrm{e}^{\int \frac{1}{\left(a^2-1\right)y(x)}\left(-a^2x-\sqrt{\left(a^2-1\right)(y(x))^2+a^2x^2}\right)} a\left(a\sqrt{\_a^2+1}-\_a\right)\frac{1}{\sqrt{\_a^2+1}}\left(a\_a-\sqrt{\_a^2+1}\right)^{-1}\left(\_a^2a-\sqrt{\_a^2+1}\_a+a\right)^{-1}d\_a \_C1 + x \right.$$

2.560 ODE No. 560

$$ay(x)\sqrt{y'(x)^2 + 1} - x^2 - 2xy(x)y'(x) + y(x)^2 = 0$$

✓ **Mathematica** : cpu = 24.6562 (sec), leaf count = 86

$$\left\{\left\{y(x) \to -\frac{\sqrt{4x^2 - a^2\left(c_1x+2\right)^2}}{\sqrt{a^2c_1^2-4}}\right\}, \left\{y(x) \to \frac{\sqrt{4x^2 - a^2\left(c_1x+2\right)^2}}{\sqrt{a^2c_1^2-4}}\right\}\right\}$$

✓ **Maple** : cpu = 1.208 (sec), leaf count = 1120

$$\left\{ \int_{\_b}^{x} 1\left(2\_a^3 - 2\_a\,(y(x))^2 + \sqrt{a^2\left(\_a^4 + 2\_a^2\,(y(x))^2 - a^2\,(y(x))^2 + (y(x))^4\right)}\right)\left(-2\,a^2\_a\,(y(x))^2 + 2\_a^5\right.\right.$$

2.561 ODE No. 561

$$f\left(x^2 + y(x)^2\right)\sqrt{y'(x)^2 + 1} - xy'(x) + y(x) = 0$$

✗ **Mathematica** : cpu = 300.001 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 2.638 (sec), leaf count = 50

$$\left\{ y(x) = x\left(\tan\left(\mathit{RootOf}\left(-2\_Z + \int^{\frac{x^2\left((\tan(\_Z))^2+1\right)}{(\tan(\_Z))^2}} \frac{f(\_a)}{\_a}\frac{1}{\sqrt{-\left(f\left(\_a\right)\right)^2 + \_a}}d\_a + 2\_C1\right)\right)\right)^{-1} \right\}$$

2.562 ODE No. 562

$$a\sqrt[3]{y'(x)^3+1}+bxy'(x)-y(x)=0$$

✗ **Mathematica** : cpu = 300.005 (sec), leaf count = 0 , timed out

```
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```

✓ **Maple** : cpu = 0.171 (sec), leaf count = 3306

$$\Bigg\{\Bigg(\Bigg(-\int^{\frac{1}{2\,b^3x^3+2\,a^3}}\Bigg(2\,b^2x^2y(x)\sqrt[3]{-4\,b^6x^6-8\,a^3b^3x^3-4\,b^3x^3(y(x))^3+4\,\sqrt{b^6x^6+2\,a^3b^3x^3+2\,b^3x^3(y(x))^3+a^6-2\,(y(x))^3a^3+(y(x))^6}b^3x^3-4\,a^6-$$

2.563 ODE No. 563

$$ay(x)+b+xy'(x)+\log\left(y'(x)\right)=0$$

✓ **Mathematica** : cpu = 0.171482 (sec), leaf count = 52

$$\text{Solve}\left[W\left(xe^{-ay(x)-b}\right)+\frac{(a+1)\log\left(1-aW\left(xe^{-ay(x)-b}\right)\right)}{a}+ay(x)=c_1,y(x)\right]$$

✓ **Maple** : cpu = 0.157 (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

$$a\left(xy'(x)-y(x)\right)+\log\left(y'(x)\right)=0$$

✓ **Mathematica** : cpu = 0.0565757 (sec), leaf count = 21

$$\left\{\left\{y(x)\to e^{-c_1}x-\frac{c_1}{a}\right\}\right\}$$

✓ **Maple** : cpu = 0.024 (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

$$y'(x) + y(x)\log\left(y'(x)\right) - xy(x) - y(x)\log(y(x)) = 0$$

✓ **Mathematica** : cpu = 0.0137817 (sec), leaf count = 24

$$\left\{\left\{y(x) \to c_1 e^{\frac{1}{2}W(e^x)(W(e^x)+2)}\right\}\right\}$$

✓ **Maple** : cpu = 0.18 (sec), leaf count = 17

$$\left\{y(x) = \_C1\,\mathrm{e}^{\frac{\mathit{lambertW}(\mathrm{e}^x)(\mathit{lambertW}(\mathrm{e}^x)+2)}{2}}\right\}$$

2.566 ODE No. 566

$$y'(x) + \sin\left(y'(x)\right) - x = 0$$

✗ **Mathematica** : cpu = 0.0112657 (sec), leaf count = 0 , could not solve

```
DSolve[-x + Sin[Derivative[1][y][x]] + Derivative[1][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 0.077 (sec), leaf count = 16

$$\left\{y(x) = \int \mathit{RootOf}(\sin(\_Z) + \_Z - x)\, \mathrm{d}x + \_C1\right\}$$

2.567 ODE No. 567

$$a\cos\left(y'(x)\right) + by'(x) + x = 0$$

✗ **Mathematica** : cpu = 0.0131267 (sec), leaf count = 0 , could not solve

```
DSolve[x + a*Cos[Derivative[1][y][x]] + b*Derivative[1][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 0.03 (sec), leaf count = 18

$$\left\{y(x) = \int \mathit{RootOf}(a\cos(\_Z) + \_Z\, b + x)\, \mathrm{d}x + \_C1\right\}$$

2.568 ODE No. 568

$$y'(x)^2\sin\left(y'(x)\right)-y(x)=0$$

✓ **Mathematica** : cpu = 0.0563533 (sec), leaf count = 27

$$\text{Solve}\left[\left\{\cos(\text{K\$5174591})+x=c_1+\text{K\$5174591}\sin(\text{K\$5174591}),\text{K\$5174591}^2\sin(\text{K\$5174591})=y(x)\right\},\{y(x),\text{K\$}$$

✓ **Maple** : cpu = 0.165 (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 = 0.0443811 (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 = 1.012 (sec), leaf count = 147

$$\left\{y(x)=x\_C1-\arcsin\left(\frac{1}{\sqrt{\_C1^2+1}}\right),y(x)=x\_C1+\arcsin\left(\frac{1}{\sqrt{\_C1^2+1}}\right),y(x)=-x\sqrt{x^{-1}}\sqrt{1-x}-\text{ar}$$

2.570 ODE No. 570

$$\left(y'(x)^2+1\right)\left(ax+\tan^{-1}\left(y'(x)\right)\right)+y'(x)=0$$

✗ **Mathematica** : cpu = 0.119767 (sec), leaf count = 0 , could not solve

```
DSolve[Derivative[1][y][x] + (a*x + ArcTan[Derivative[1][y][x]])*(1 + Derivative[1][y][x]^2)
```

✓ **Maple** : cpu = 0.065 (sec), leaf count = 30

$$\left\{y(x)=\int\tan\left(\mathit{RootOf}\left(ax(\tan\left(\_Z\right))^2+(\tan\left(\_Z\right))^2\_Z+ax+\tan\left(\_Z\right)+\_Z\right)\right)\,\mathrm{d}x+\_C1\right\}$$

2.571 ODE No. 571

$$ax^n f(y'(x)) + xy'(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 0.124745 (sec), leaf count = 67

$$\text{Solve}\left[\left\{af(\text{K\$5174949})x^n + \text{K\$5174949}x = y(x), \left(f(\text{K\$5174949})^{\frac{1}{n}-1}\left((n-1)\int_1^{\text{K\$5174949}} -\frac{f(K[1])^{-1/n}}{an}\,dK[1\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.421 (sec), leaf count = 169

$$\left\{\left[y(\_T) = a\left(\left(\frac{1}{af(\_T)\,n}\left((1-n)\int (f(\_T))^{-n^{-1}}\,\mathrm{d}\_T + \_C1\,an\right)\right)^{(n-1)^{-1}} (f(\_T))^{\frac{1}{n(n-1)}}\right)^n f(\_T) + \left(\frac{}{af}\right.\right.\right.$$

2.572 ODE No. 572

$$f(y'(x))\,(xy'(x) - y(x))^n + y(x)g(y'(x)) + xh(y'(x)) = 0$$

✗ **Mathematica** : cpu = 0.0336098 (sec), leaf count = 0 , could not solve

```
DSolve[x*h[Derivative[1][y][x]] + g[Derivative[1][y][x]]*y[x] + f[Derivative[1][y][x]]*(-
y[x] + x*Derivative[1][y][x])^n == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve((x*diff(y(x),x)-y(x))^n*f(diff(y(x),x))+y(x)*g(diff(y(x),x))+x*h(diff(y(x),x))=0,y(x)
```

2.573 ODE No. 573

$$f(xy'(x)^2) + 2xy'(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 0.0147871 (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 = 0.2 (sec), leaf count = 16

$$\left\{y(x) = f\left(\frac{\_C1^2}{4}\right) + \_C1\sqrt{x}\right\}$$

2.574 ODE No. 574

$$f\left(x-\frac{3}{2}y'(x)^2\right)+y'(x)^3-y(x)=0$$

✓ **Mathematica** : cpu = 0.0163845 (sec), leaf count = 62

$$\left\{\left\{y(x)\to \frac{1}{9}\left(9f(c_1)+2\sqrt{6}(x-c_1)^{3/2}\right),y(x)\to \frac{1}{9}\left(9f(c_1)-2\sqrt{6}(x-c_1)^{3/2}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.15 (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

$$y'(x)f\left(xy(x)y'(x)-y(x)^2\right)+x^2\left(-y'(x)\right)+xy(x)=0$$

✗ **Mathematica** : cpu = 0.0181169 (sec), leaf count = 0 , could not solve

```
DSolve[x*y[x] - x^2*Derivative[1][y][x] + f[-y[x]^2 + x*y[x]*Derivative[1][y][x]]*Derivative
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(y(x),x)*f(x*y(x)*diff(y(x),x)-y(x)^2)-x^2*diff(y(x),x)+x*y(x)=0,y(x))
```

2.576 ODE No. 576

$$\phi\left(f\left(x,y(x),y'(x)\right),g\left(x,y(x),y'(x)\right)\right)=0$$

✗ **Mathematica** : cpu = 0.00822647 (sec), leaf count = 0 , could not solve

```
DSolve[phi[f[x, y[x], Derivative[1][y][x]], g[x, y[x], Derivative[1][y][x]]] == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(phi(f(x,y(x),diff(y(x),x)),g(x,y(x),diff(y(x),x)))=0,y(x))
```

2.577 ODE No. 577

$$y'(x) = F\left(\frac{y(x)}{a+x}\right)$$

✓ **Mathematica** : cpu = 17.2448 (sec), leaf count = 141

$$\text{Solve}\left[c_1 = \int_1^{y(x)} \left(\frac{1}{K[2]-(a+x)F\left(\frac{K[2]}{a+x}\right)} - \int_1^x \frac{(K[1]+a)F\left(\frac{K[2]}{K[1]+a}\right) - K[2]F'\left(\frac{K[2]}{K[1]+a}\right)}{(K[1]+a)\left(K[2]-(K[1]+a)F\left(\frac{K[2]}{K[1]+a}\right)\right)^2} dK[1]\right) dK[2] +$$

✓ **Maple** : cpu = 0.053 (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 = 22.4081 (sec), leaf count = 88

$$\text{Solve}\left[c_1 = \int_1^{y(x)} \left(-\int_1^x -\frac{2K[1]F'\left(K[2]-K[1]^2\right)}{F\left(K[2]-K[1]^2\right)^2} dK[1] - \frac{1}{F\left(K[2]-x^2\right)}\right) dK[2] + \int_1^x \left(\frac{2K[1]}{F\left(y(x)-K[1]^2\right)} +\right.\right.$$

✓ **Maple** : cpu = 0.137 (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 = 17.8942 (sec), leaf count = 162

$$\text{Solve}\left[c_1 = \int_1^{y(x)} \left(-\int_1^x \frac{2(aK[1]+b)F'\left(\frac{1}{4}aK[1]^2 + \frac{1}{2}bK[1] + K[2]\right)}{\left(2F\left(\frac{1}{4}aK[1]^2 + \frac{1}{2}bK[1] + K[2]\right)+b\right)^2} dK[1] - \frac{2}{2F\left(K[2]+\frac{ax^2}{4}+\frac{bx}{2}\right)+b}\right) dK[\right.$$

✓ **Maple** : cpu = 0.135 (sec), leaf count = 35

$$\left\{y(x) = -\frac{ax^2}{4} - \frac{bx}{2} + RootOf\left(-x + 2\int^{\_Z} (2F(\_a)+b)^{-1}\, d\_a + \_C1\right)\right\}$$

2.580 ODE No. 580

$$y'(x) = e^{bx} F\left(e^{-bx} y(x)\right)$$

✓ **Mathematica** : cpu = 34.7797 (sec), leaf count = 161

$$\text{Solve}\left[c_1 = \int_1^{y(x)} \left(\frac{1}{bK[2] - e^{bx} F\left(e^{-bx} K[2]\right)} - \int_1^x \frac{b\left(e^{bK[1]} F\left(K[2]e^{-bK[1]}\right) - K[2]F'\left(K[2]e^{-bK[1]}\right)\right)}{\left(e^{bK[1]} F\left(K[2]e^{-bK[1]}\right) - bK[2]\right)^2} \, dK[1]\right) dK$$

✓ **Maple** : cpu = 0.215 (sec), leaf count = 31

$$\left\{y(x) = \frac{\mathit{RootOf}\left(-x + \int^{\_Z} (F(\_a) - \_a\, b)^{-1} \, d\_a + \_C1\right)}{\mathrm{e}^{-bx}}\right\}$$

2.581 ODE No. 581

$$y'(x) = \frac{xF\left(\frac{x^2 y(x) + \frac{1}{4}}{x^2}\right) + \frac{1}{2}}{x^3}$$

✓ **Mathematica** : cpu = 52.4266 (sec), leaf count = 107

$$\text{Solve}\left[c_1 = \int_1^{y(x)} \left(-\int_1^x -\frac{F'\left(K[2] + \frac{1}{4K[1]^2}\right)}{2K[1]^3 F\left(K[2] + \frac{1}{4K[1]^2}\right)^2} \, dK[1] - \frac{1}{F\left(K[2] + \frac{1}{4x^2}\right)}\right) dK[2] + \int_1^x \frac{\frac{1}{F\left(\frac{1}{4K[1]^2} + y(x)\right)} + }{2K[1]^3}$$

✓ **Maple** : cpu = 0.102 (sec), leaf count = 32

$$\left\{y(x) = \frac{4\,\mathit{RootOf}\left(\int^{\_Z} (F(\_a))^{-1} \, d\_ax + x\_C1 + 1\right) x^2 - 1}{4\,x^2}\right\}$$

2.582 ODE No. 582

$$y'(x) = \frac{ax^2 F\left(\frac{axy(x)+1}{ax}\right) + 1}{ax^2}$$

✓ **Mathematica** : cpu = 23.8168 (sec), leaf count = 103

$$\text{Solve}\left[c_1 = \int_1^{y(x)} \left(\frac{1}{F\left(K[2] + \frac{1}{ax}\right)} - \int_1^x \frac{F'\left(\frac{1}{aK[1]} + K[2]\right)}{aK[1]^2 F\left(\frac{1}{aK[1]} + K[2]\right)^2} \, dK[1]\right) dK[2] + \int_1^x \left(-\frac{1}{aK[1]^2 F\left(\frac{1}{aK[1]} + y\right.}\right.$$

✓ **Maple** : cpu = 0.234 (sec), leaf count = 30

$$\left\{y(x)=\frac{RootOf\left(-x+\int^{-Z}(F(\_a))^{-1}\,d\_a+\_C1\right)ax-1}{ax}\right\}$$

2.583 ODE No. 583

$$y'(x)=-\frac{1}{2}x\left(ax^2-2F\left(\frac{ax^4}{8}+y(x)\right)\right)$$

✓ **Mathematica** : cpu = 56.5657 (sec), leaf count = 111

$$\text{Solve}\left[c_1=\int_1^{y(x)}\left(-\int_1^x\frac{aK[1]^3F'\left(\frac{1}{8}aK[1]^4+K[2]\right)}{2F\left(\frac{1}{8}aK[1]^4+K[2]\right)^2}\,dK[1]-\frac{1}{F\left(K[2]+\frac{ax^4}{8}\right)}\right)dK[2]+\int_1^x\left(K[1]-\frac{a}{2F\left(\frac{1}{8}aK\right.}\right.\right.$$

✓ **Maple** : cpu = 0.154 (sec), leaf count = 31

$$\left\{y(x)=-\frac{ax^4}{8}+RootOf\left(-x^2+2\int^{-Z}(F(\_a))^{-1}\,d\_a+2\_C1\right)\right\}$$

2.584 ODE No. 584

$$y'(x)=\frac{2a}{2aF\left(y(x)^2-4ax\right)+y(x)}$$

✓ **Mathematica** : cpu = 26.6545 (sec), leaf count = 107

$$\text{Solve}\left[c_1=\int_1^{y(x)}\left(\frac{\frac{K[2]}{F(K[2]^2-4ax)}+2a}{4a^2}-\int_1^x\frac{K[2]F'\left(K[2]^2-4aK[1]\right)}{aF\left(K[2]^2-4aK[1]\right)^2}\,dK[1]\right)dK[2]+\int_1^x-\frac{1}{2aF\left(y(x)^2-4aK\right.}\right.$$

✓ **Maple** : cpu = 0.072 (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 = 166.81 (sec), leaf count = 141

$$\text{Solve}\left[c_1 = \int_1^{y(x)} \left(\frac{1}{xK[2]F(\log(\log(K[2])) - \log(x)) - K[2]\log(K[2])} - \int_1^x \frac{F'(\log(\log(K[2])) - \log(K[1])) - F}{K[2](\log(K[2]) - K[1]F(\log(\text{lo}\right.\right.$$

✓ **Maple** : cpu = 0.679 (sec), leaf count = 122

$$\left\{\int_{\_b}^{x} \frac{F(\ln(\ln(y(x))) - \ln(\_a))}{\_a\,F(\ln(\ln(y(x))) - \ln(\_a)) - \ln(y(x))}\,\mathrm{d}\_a + \int^{y(x)} -\frac{1}{\_f\ (xF(\ln(\ln(\_f)) - \ln(x)) - \ln(\_f))} - \int_{\_b}^{x} \frac{F}{\ }\right.$$

2.586 ODE No. 586

$$y'(x) = \frac{xF\left(\frac{y(x)}{\sqrt{x^2+1}}\right)}{\sqrt{x^2+1}}$$

✓ **Mathematica** : cpu = 181.076 (sec), leaf count = 395

$$\text{Solve}\left[c_1 = \int_1^{y(x)} \frac{-\left(\left(x^2+1\right)F\left(\frac{K[2]}{\sqrt{x^2+1}}\right)^2 - K[2]^2\right)\left(\int_1^x \frac{K[1]\left(\left(K[1]^2+1\right)^{3/2}K[2]F\left(\frac{K[2]}{\sqrt{K[1]^2+1}}\right)^2\left(F'\left(\frac{K[2]}{\sqrt{K[1]^2+1}}\right)-2\right)+(F\right.}{(}\right.}{\ }\right.$$

✓ **Maple** : cpu = 0.278 (sec), leaf count = 39

$$\left\{y(x) = \mathit{RootOf}\left(-\ln\left(x^2+1\right) + 2\int^{\_Z} (F(\_a) - \_a)^{-1}\,d\_a + 2\_C1\right)\sqrt{x^2+1}\right\}$$

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 = 264.88 (sec), leaf count = 109

$$\text{Solve}\left[c_1 = \int_1^{y(x)} \left(-\int_1^x -\frac{K[1]^2 F'\left(K[2] - \frac{K[1]^3}{6}\right)}{2F\left(K[2] - \frac{K[1]^3}{6}\right)^2} dK[1] - \frac{1}{F\left(K[2] - \frac{x^3}{6}\right)}\right) dK[2] + \int_1^x \left(\frac{K[1]^2}{2F\left(y(x) - \frac{K[1]^3}{6}\right)}\right.\right.$$

✓ **Maple** : cpu = 0.158 (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 = 41.6098 (sec), leaf count = 99

$$\text{Solve}\left[c_1 = \int_1^{y(x)} \left(-\int_1^x -\frac{2K[1]K[2]F'(K[2]^2 - K[1]^2)}{F(K[2]^2 - K[1]^2)^2} dK[1] - \frac{K[2]}{F(K[2]^2 - x^2)}\right) dK[2] + \int_1^x \left(\frac{K[1]}{F(y(x)^2 - K\right.\right.$$

✓ **Maple** : cpu = 0.133 (sec), leaf count = 53

$$\left\{y(x) = \sqrt{x^2 + RootOf\left(-2x + \int^{\_Z} (F(\_a))^{-1} d\_a + 2\_C1\right)}, y(x) = -\sqrt{x^2 + RootOf\left(-2x + \int^{\_Z} (F(\_\right.}\right.$$

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 = 26.718 (sec), leaf count = 118

$$\text{Solve}\left[c_1 = \int_1^{y(x)} \left(-\int_1^x -\frac{F'\left(\frac{1}{K[2]} - \log(K[1])\right)}{K[1]K[2]^2\left(F\left(\frac{1}{K[2]} - \log(K[1])\right) + 1\right)^2} dK[1] - \frac{1}{K[2]^2\left(F\left(\frac{1}{K[2]} - \log(x)\right) + 1\right)}\right) d\right.$$

✓ **Maple** : cpu = 0.161 (sec), leaf count = 38

$$\left\{\int_{\_b}^{y(x)} \frac{1}{\_a^2}\left(F\left(\frac{1-\_a\ln(x)}{\_a}\right)+1\right)^{-1} \mathrm{d}\_a-\ln(x)-\_C1=0\right\}$$

2.590 ODE No. 590

$$y'(x)=\frac{x}{F(x^2+y(x)^2)-y(x)}$$

✓ **Mathematica** : cpu = 41.4378 (sec), leaf count = 91

$$\text{Solve}\left[c_1=\int_1^{y(x)}\left(-\int_1^x \frac{2K[1]K[2]F'(K[1]^2+K[2]^2)}{F(K[1]^2+K[2]^2)^2}dK[1]-\frac{K[2]}{F(K[2]^2+x^2)}+1\right)dK[2]+\int_1^x-\frac{K[1]}{F(K[1]^2+\right.$$

✓ **Maple** : cpu = 0.155 (sec), leaf count = 28

$$\left\{-y(x)+\frac{\int^{(y(x))^2+x^2}(F(\_a))^{-1}\,d\_a}{2}-\_C1=0\right\}$$

2.591 ODE No. 591

$$y'(x)=\frac{xF\left(\frac{ay(x)^2+bx^2}{a}\right)}{\sqrt{a}y(x)}$$

✓ **Mathematica** : cpu = 26.7633 (sec), leaf count = 160

$$\text{Solve}\left[c_1=\int_1^{y(x)}\left(-\int_1^x \frac{2b^2K[1]K[2]F'\left(\frac{bK[1]^2}{a}+K[2]^2\right)}{\sqrt{a}\left(\sqrt{a}F\left(\frac{bK[1]^2}{a}+K[2]^2\right)+b\right)^2}dK[1]-\frac{bK[2]}{\sqrt{a}F\left(K[2]^2+\frac{bx^2}{a}\right)+b}\right)dK[2]+\int_1^x \frac{b\cdots}{aF\cdots}\right.$$

✓ **Maple** : cpu = 0.219 (sec), leaf count = 108

$$\left\{y(x)=\frac{1}{a}\sqrt{a\left(-bx^2+RootOf\left(\left(\int^{\_Z}(F(\_a)\,a+b\sqrt{a})^{-1}\,d\_aba^{\frac{3}{2}}-bx^2+2\_C1\,a\right)a\right)},y(x)=-\frac{1}{a}\sqrt{a\left(-bx\cdots\right.}\right.$$

2.592 ODE No. 592

$$y'(x) = \frac{F\left(-\frac{2x^3}{5} + y(x) - 2\sqrt{x}\right) + \frac{6x^3}{5} + \sqrt{x}}{x}$$

✗ **Mathematica** : cpu = 300. (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.204 (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 = 38.1308 (sec), leaf count = 149

$$\text{Solve}\left[c_1 = \int_1^{y(x)} \left(\frac{\sqrt{K[2]}}{F\left(K[2]^{3/2} - \frac{3e^x}{2}\right) - 1} - \int_1^x \frac{3e^{K[1]}\sqrt{K[2]}F'\left(K[2]^{3/2} - \frac{3e^{K[1]}}{2}\right)}{2\left(F\left(K[2]^{3/2} - \frac{3e^{K[1]}}{2}\right) - 1\right)^2} dK[1]\right) dK[2] + \int_1^x -\frac{e^{K[1]}}{F\left(y\right.}\right.$$

✓ **Maple** : cpu = 0.375 (sec), leaf count = 35

$$\left\{\int_{\_b}^{y(x)} 1\sqrt{\_a}\left(F\left(\_a^{\frac{3}{2}} - \frac{3\,e^x}{2}\right) - 1\right)^{-1} d\_a - e^x - \_C1 = 0\right\}$$

2.594 ODE No. 594

$$y'(x) = \frac{xF\left(\frac{y(x)^2 - b}{x^2}\right)}{y(x)}$$

✓ **Mathematica** : cpu = 24.7283 (sec), leaf count = 188

$$\text{Solve}\left[c_1 = \int_1^{y(x)} \left(\frac{K[2]}{x^2 F\left(\frac{K[2]^2 - b}{x^2}\right) - K[2]^2 + b} - \int_1^x -\frac{2K[2]\left(\left(b - K[2]^2\right)F'\left(\frac{K[2]^2 - b}{K[1]^2}\right) + K[1]^2 F\left(\frac{K[2]^2 - b}{K[1]^2}\right)\right)}{K[1]\left(K[1]^2 F\left(\frac{K[2]^2 - b}{K[1]^2}\right) - K[2]^2 + b\right)^2} dK\right.\right.$$

✓ **Maple** : cpu = 0.227 (sec), leaf count = 67

$$\left\{y(x)=\sqrt{RootOf\left(-2\ln(x)+\int^{\_Z}(F(\_a)-\_a)^{-1}d\_a+2\_C1\right)x^2+b}, y(x)=-\sqrt{RootOf\left(-2\ln(x)+\right.}\right.$$

2.595 ODE No. 595

$$y'(x)=\frac{F\left(\frac{xy(x)^2+1}{x}\right)}{x^2y(x)}$$

✓ **Mathematica** : cpu = 25.7453 (sec), leaf count = 127

$$\text{Solve}\left[c_1=\int_1^{y(x)}\frac{\left(1-2F\left(K[2]^2+\frac{1}{x}\right)\right)\int_1^x\frac{2K[2]F'\left(K[2]^2+\frac{1}{K[1]}\right)}{K[1]^2\left(1-2F\left(K[2]^2+\frac{1}{K[1]}\right)\right)^2}dK[1]+K[2]}{2F\left(K[2]^2+\frac{1}{x}\right)-1}dK[2]+\int_1^x-\frac{F\left(\frac{1}{K[1]}+\right.}{K[1]^2\left(2F\left(\frac{1}{K[1]}\right.\right.}\right.$$

✓ **Maple** : cpu = 0.165 (sec), leaf count = 72

$$\left\{y(x)=\frac{1}{x}\sqrt{x\left(RootOf\left(\int^{\_Z}(-1+2F(\_a))^{-1}d\_ax+x\_C1+1\right)x-1\right)}, y(x)=-\frac{1}{x}\sqrt{x\left(RootOf\left(\int^{\_Z}(\right.\right.}\right.$$

2.596 ODE No. 596

$$y'(x)=\frac{F(x^2+y(x)-x)-2x^2+x}{x}$$

✓ **Mathematica** : cpu = 252.776 (sec), leaf count = 103

$$\text{Solve}\left[c_1=\int_1^{y(x)}\left(-\int_1^x\frac{(2K[1]-1)F'(K[1]^2-K[1]+K[2])}{F(K[1]^2-K[1]+K[2])^2}dK[1]-\frac{1}{F(K[2]+x^2-x)}\right)dK[2]+\int_1^x\left(\frac{}{F((}\right.\right.$$

✓ **Maple** : cpu = 0.098 (sec), leaf count = 26

$$\left\{y(x)=-x^2+RootOf\left(-\ln(x)+\int^{\_Z}(F(\_a))^{-1}d\_a+\_C1\right)+x\right\}$$

2.597 ODE No. 597

$$y'(x) = \frac{2a}{x^2\left(2aF\left(\frac{xy(x)^2-4a}{x}\right)-y(x)\right)}$$

✓ **Mathematica** : cpu = 36.2004 (sec), leaf count = 112

$$\text{Solve}\left[c_1 = \int_1^{y(x)}\left(-\int_1^x \frac{2K[2]F'\left(K[2]^2-\frac{4a}{K[1]}\right)}{K[1]^2F\left(K[2]^2-\frac{4a}{K[1]}\right)^2}\,dK[1] - \frac{K[2]}{2aF\left(K[2]^2-\frac{4a}{x}\right)}+1\right)dK[2] + \int_1^x -\frac{1}{K[1]^2F\left(y(x\right.}\right.$$

✓ **Maple** : cpu = 0.453 (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 = 0.109819 (sec), leaf count = 35

$$\text{Solve}\left[c_1+\log(1-x) = \int_1^{\frac{y(x)}{x}}\frac{1}{F(K[1])+K[1]}\,dK[1]+\log(x), y(x)\right]$$

✓ **Maple** : cpu = 0.024 (sec), leaf count = 29

$$\left\{y(x) = \mathit{RootOf}\left(-\int^{\_Z}(F(\_a)+\_a)^{-1}\,d\_a - \ln(x)+\ln(x-1)+\_C1\right)x\right\}$$

2.599 ODE No. 599

$$y'(x) = \frac{F\left(x^2+y(x)^2\right)-x}{y(x)}$$

✓ **Mathematica** : cpu = 30.9373 (sec), leaf count = 92

$$\text{Solve}\left[c_1 = \int_1^{y(x)}\left(-\int_1^x \frac{2K[1]K[2]F'\left(K[1]^2+K[2]^2\right)}{F\left(K[1]^2+K[2]^2\right)^2}\,dK[1] - \frac{K[2]}{F\left(K[2]^2+x^2\right)}\right)dK[2] + \int_1^x\left(1-\frac{K[1]}{F\left(K[1]^2+\right.}\right.\right.$$

✓ **Maple** : cpu = 0.11 (sec), leaf count = 57

$$\left\{y(x) = \sqrt{-x^2 + RootOf\left(-2\,x + \int^{\_Z} (F(\_a))^{-1} d\_a + 2\_C1\right)}, y(x) = -\sqrt{-x^2 + RootOf\left(-2\,x + \int^{\_Z} (F\right.}\right.$$

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 = 28.7524 (sec), leaf count = 119

$$\text{Solve}\left[c_1 = \int_1^{y(x)} \left(-\int_1^x -\frac{4F'\left(\frac{1}{K[2]} - 2\log(K[1])\right)}{K[1]K[2]^2\left(F\left(\frac{1}{K[2]} - 2\log(K[1])\right) + 2\right)^2} dK[1] - \frac{2}{K[2]^2\left(F\left(\frac{1}{K[2]} - 2\log(x)\right) + 2\right)}\right.\right.$$

✓ **Maple** : cpu = 0.238 (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 = 43.9713 (sec), leaf count = 116

$$\text{Solve}\left[c_1 = \int_1^{y(x)} \left(\frac{K[2]}{F(K[2]^2 - x^2) - 1} - \int_1^x \frac{2K[1]K[2]F'(K[2]^2 - K[1]^2)}{(F(K[2]^2 - K[1]^2) - 1)^2} dK[1]\right) dK[2] + \int_1^x \frac{K[1]F(y(x)^2 -}{1 - F(y(x)^2 -}\right.$$

✓ **Maple** : cpu = 0.143 (sec), leaf count = 61

$$\left\{y(x) = \sqrt{x^2 + RootOf\left(-x^2 + \int^{\_Z} (F(\_a) - 1)^{-1} d\_a + 2\_C1\right)}, y(x) = -\sqrt{x^2 + RootOf\left(-x^2 + \int^{\_Z} (F\right.}\right.$$

2.602 ODE No. 602

$$y'(x)=\frac{y(x)^2\left(x^2F\left(\frac{x^2-y(x)}{x^2y(x)}\right)+2\right)}{x^3}$$

✓ **Mathematica** : cpu = 249.048 (sec), leaf count = 111

$$\text{Solve}\left[c_1=\int_1^{y(x)}\left(-\int_1^x\frac{2F'\left(\frac{1}{K[2]}-\frac{1}{K[1]^2}\right)}{K[1]^3K[2]^2F\left(\frac{1}{K[2]}-\frac{1}{K[1]^2}\right)^2}dK[1]-\frac{1}{K[2]^2F\left(\frac{1}{K[2]}-\frac{1}{x^2}\right)}\right)dK[2]+\int_1^x\left(\frac{}{K[1]^3F\left(\right.}\right.\right.$$

✓ **Maple** : cpu = 0.144 (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 = 22.7695 (sec), leaf count = 102

$$\text{Solve}\left[c_1=\int_1^{y(x)}\left(\frac{1}{F(K[2]+\log(2x+1))}-\int_1^x-\frac{2F'(K[2]+\log(2K[1]+1))}{(2K[1]+1)F(K[2]+\log(2K[1]+1))^2}dK[1]\right)dK[2]+\int_1^x\left(\right.\right.$$

✓ **Maple** : cpu = 0.149 (sec), leaf count = 27

$$\left\{y(x)=-\ln(2x+1)+RootOf\left(-x+\int^{\_Z}(F(\_a))^{-1}d\_a+\_C1\right)\right\}$$

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 = 31.6804 (sec), leaf count = 97

$$\text{Solve}\left[c_1=\int_1^{y(x)}\left(\frac{\frac{1}{F\left(\frac{1}{K[2]^2}+4x\right)}+2K[2]}{2K[2]^3}-\int_1^x-\frac{2F'\left(4K[1]+\frac{1}{K[2]^2}\right)}{K[2]^3F\left(4K[1]+\frac{1}{K[2]^2}\right)^2}dK[1]\right)dK[2]+\int_1^x-\frac{1}{F\left(4K[1]+\right.}\right.$$

✓ **Maple** : cpu = 0.163 (sec), leaf count = 30

$$\left\{-\_C1 - (y(x))^{-1} - \frac{\int^{4\,x+(y(x))^{-2}} (F(\_a))^{-1}\,d\_a}{4} = 0\right\}$$

2.605 ODE No. 605

$$y'(x) = -\frac{y(x)^2\left(2x - F\left(\frac{1-\frac{1}{2}xy(x)}{y(x)}\right)\right)}{4x}$$

✓ **Mathematica** : cpu = 223.991 (sec), leaf count = 103

$$\text{Solve}\left[c_1 = \int_1^{y(x)}\left(-\int_1^x -\frac{2F'\left(\frac{1}{K[2]} - \frac{K[1]}{2}\right)}{K[2]^2 F\left(\frac{1}{K[2]} - \frac{K[1]}{2}\right)^2}dK[1] - \frac{4}{K[2]^2 F\left(\frac{1}{K[2]} - \frac{x}{2}\right)}\right)dK[2] + \int_1^x\left(\frac{1}{K[1]} - \frac{}{F\left(\frac{1}{y(x)}\right.}\right.\right.$$

✓ **Maple** : cpu = 0.138 (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 = 84.6118 (sec), leaf count = 180

$$\text{Solve}\left[c_1 = \int_1^{y(x)}\left(-\int_1^x \frac{e^{-K[1]^2}K[1]\left(K[1]^2-1\right)F'\left(K[2] - \frac{1}{2}e^{-K[1]^2}K[1]^2\right)}{F\left(K[2] - \frac{1}{2}e^{-K[1]^2}K[1]^2\right)^2}dK[1] - \frac{1}{F\left(K[2] - \frac{1}{2}e^{-x^2}x^2\right)}\right)dK\right.$$

✓ **Maple** : cpu = 0.944 (sec), leaf count = 34

$$\left\{y(x) = \frac{x^2 e^{-x^2}}{2} + RootOf\left(x^2 - 2\int^{\_Z}(F(\_a))^{-1}\,d\_a + 2\_C1\right)\right\}$$

2.607 ODE No. 607

$$y'(x) = \frac{x^3 F\left(\frac{y(x)}{x^2}\right) + 2y(x)}{x}$$

✗ **Mathematica** : cpu = 300.006 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.102 (sec), leaf count = 22

$$\left\{y(x) = RootOf\left(-x + \int^{\_Z} (F(\_a))^{-1} d\_a + \_C1\right) x^2\right\}$$

2.608 ODE No. 608

$$y'(x) = \frac{\sqrt{y(x)}}{F\left(\frac{x-y(x)}{\sqrt{y(x)}}\right) + \sqrt{y(x)}}$$

✗ **Mathematica** : cpu = 300.008 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.213 (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

$$y'(x) = \frac{F(x^3 y(x)) - 3x^2 y(x)}{x^3}$$

✓ **Mathematica** : cpu = 65.8806 (sec), leaf count = 107

$$\text{Solve}\left[c_1 = \int_1^{y(x)} \left(-\int_1^x \frac{3K[1]^5 K[2] F'(K[1]^3 K[2]) - 3K[1]^2 F(K[1]^3 K[2])}{F(K[1]^3 K[2])^2} dK[1] - \frac{x^3}{F(x^3 K[2])}\right) dK[2] + \int_1^x\right.$$

✓ **Maple** : cpu = 0.182 (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

$$y'(x) = \frac{x^2 F\left(\frac{y(x)}{x}\right) + y(x)}{x}$$

✓ **Mathematica** : cpu = 0.0821495 (sec), leaf count = 24

$$\text{Solve}\left[c_1 + x = \int_1^{\frac{y(x)}{x}} \frac{1}{F(K[1])} \, dK[1], y(x)\right]$$

✓ **Maple** : cpu = 0.014 (sec), leaf count = 20

$$\left\{y(x) = \mathit{RootOf}\left(x - \int^{\_Z} (F(\_a))^{-1} \, d\_a + \_C1\right) x\right\}$$

2.611 ODE No. 611

$$y'(x) = \frac{F(x(y(x)+x)) - y(x) - 2x}{x}$$

✓ **Mathematica** : cpu = 50.1182 (sec), leaf count = 116

$$\text{Solve}\left[c_1 = \int_1^{y(x)} \left(-\int_1^x \frac{K[1](2K[1]+K[2])F'(K[1](K[1]+K[2])) - F(K[1](K[1]+K[2]))}{F(K[1](K[1]+K[2]))^2} dK[1] - \frac{x}{F(x(K[2]\right.\right.$$

✓ **Maple** : cpu = 0.09 (sec), leaf count = 28

$$\left\{y(x) = \frac{-x^2 + \mathit{RootOf}\left(-x + \int^{\_Z} (F(\_a))^{-1} \, d\_a + \_C1\right)}{x}\right\}$$

2.612 ODE No. 612

$$y'(x) = \frac{1}{2} e^{\frac{x^2}{4}} \left(2F\left(e^{-\frac{x^2}{4}} y(x)\right) + e^{-\frac{x^2}{4}} x y(x)\right)$$

✓ **Mathematica** : cpu = 60.5566 (sec), leaf count = 169

$$\text{Solve}\left[c_1 = \int_1^{y(x)} \left(-\int_1^x \frac{e^{-\frac{1}{2}K[1]^2} K[1] \left(e^{\frac{K[1]^2}{4}} F\left(e^{-\frac{1}{4}K[1]^2} K[2]\right) - K[2] F'\left(e^{-\frac{1}{4}K[1]^2} K[2]\right)\right)}{2F\left(e^{-\frac{1}{4}K[1]^2} K[2]\right)^2} dK[1] - \frac{e^{-\frac{x^2}{4}}}{F\left(e^{-\frac{x^2}{4}} K\right.}\right.\right.$$

✓ **Maple** : cpu = 0.16 (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 = 299.999 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.112 (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 = 91.371 (sec), leaf count = 144

$$\text{Solve}\left[c_1 = \int_1^{y(x)} \left(-\int_1^x \frac{K[1]K[2]F'\left(\frac{1}{2}\left(K[2]^2 - \left(a^2-1\right)K[1]^2\right)\right)}{F\left(\frac{1}{2}\left(K[2]^2 - \left(a^2-1\right)K[1]^2\right)\right)^2} dK[1] + \frac{K[2]}{(a-1)(a+1)F\left(\frac{1}{2}\left(K[2]^2 - a^2x^2 + \right.\right.}\right.\right.$$

✓ **Maple** : cpu = 0.464 (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 = 20.792 (sec), leaf count = 74

$$\text{Solve}\left[c_1 = \int_1^{y(x)} \left(-\int_1^x \frac{F'(K[1]K[2])}{F(K[1]K[2])^2}\, dK[1] - \frac{1}{K[2]F(xK[2])} + 1\right) dK[2] + \int_1^x -\frac{1}{K[1]F(y(x)K[1])}\, dK[1], y(x\right.$$

✓ **Maple** : cpu = 0.135 (sec), leaf count = 26

$$\left\{-y(x) + \int^{xy(x)} \frac{1}{F(\_a)\_a} d\_a - \_C1 = 0\right\}$$

2.616 ODE No. 616

$$y'(x) = \frac{F(x(xy(x) - 1)) - 2x^3y(x) + x^2}{x^4}$$

✓ **Mathematica** : cpu = 60.8278 (sec), leaf count = 126

$$\text{Solve}\left[c_1 = \int_1^{y(x)} \left(-\int_1^x \frac{K[1](K[1](2K[1]K[2] - 1)F'(K[1](K[1]K[2] - 1)) - 2F(K[1](K[1]K[2] - 1)))}{F(K[1](K[1]K[2] - 1))^2}\, dK[1]\right.\right.$$

✓ **Maple** : cpu = 0.094 (sec), leaf count = 26

$$\left\{y(x) = \frac{\mathit{RootOf}\left(\int^{\_Z} (F(\_a))^{-1}\, d\_ax + x\_C1 + 1\right) + x}{x^2}\right\}$$

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 = 285.052 (sec), leaf count = 302

$$\text{Solve}\left[c_1 = \int_1^{y(x)} \left(-\int_1^x \frac{27e^{\frac{3K[1]^2}{2}}K[1]K[2]F\left(\frac{e^{\frac{3K[1]^2}{2}}(K[2]+3)}{3K[2]}\right) - 9e^{3K[1]^2}K[1](K[2] + 3)F'\left(\frac{e^{\frac{3K[1]^2}{2}}(K[2]+3)}{3K[2]}\right)}{K[2]\left(K[2]F\left(\frac{e^{\frac{3K[1]^2}{2}}(K[2]+3)}{3K[2]}\right) - 9e^{\frac{3K[1]^2}{2}}(K[2] + 3)\right)^2}\, dK\right.\right.$$

✓ **Maple** : cpu = 0.304 (sec), leaf count = 47

$$\left\{y(x) = -3\,\frac{e^{3/2\,x^2}}{e^{3/2\,x^2} - 3\,RootOf\left(-x^2 - 18\int^{\_Z} \left(F\left(\_a\right) - 27\,\_a\right)^{-1} d\_a + 2\_C1\right)}\right\}$$

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 = 0.10222 (sec), leaf count = 25

$$\left\{\left\{y(x) \to -W\left(-\frac{e^{c_1 e^x - 1}}{x}\right) - 1\right\}\right\}$$

✓ **Maple** : cpu = 0.481 (sec), leaf count = 34

$$\left\{y(x) = \frac{1}{x}\left(e^{-lambertW\left(-\frac{e^{e^x\_C1-1}}{x}\right) + e^x\_C1 - 1} - x\right)\right\}$$

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 = 270.489 (sec), leaf count = 195

$$\text{Solve}\left[c_1 = \int_1^{y(x)} \left(-\int_1^x \frac{(8K[2]^3 + 9K[2]^2 + 12K[2] + 6)\, F'\left(K[1] - \frac{1}{6}K[2]\left(2K[2]^3 + 3K[2]^2 + 6K[2] + 6\right)\right)}{F\left(K[1] - \frac{1}{6}K[2]\left(2K[2]^3 + 3K[2]^2 + 6K[2] + 6\right)\right)^2} dK\right.\right.$$

✓ **Maple** : cpu = 0.535 (sec), leaf count = 81

$$\left\{\int_{\_b}^{y(x)} \frac{1}{\_a}\left(-8\_a^4 - 9\_a^3 - 12\_a^2 + F\left(-\frac{\_a^4}{3} - \frac{\_a^3}{2} - \_a^2 - \_a + x\right) - 6\_a\right)\left(F\left(-\frac{\_a^4}{3} - \frac{\_a^3}{2} - \_a^2\right.\right.\right.$$

2.620 ODE No. 620

$$y'(x) = \frac{e^{2F(-(x-y(x))(y(x)+x))} + x^2 + 2xy(x) + y(x)^2}{-e^{2F(-(x-y(x))(y(x)+x))} + x^2 + 2xy(x) + y(x)^2}$$

✗ **Mathematica** : cpu = 299.998 (sec), leaf count = 0 , timed out

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✓ **Maple** : cpu = 0.307 (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 = 0.104125 (sec), leaf count = 445

$$\left\{\left\{y(x) \to \frac{1}{\text{Root}\left[\#1^6\left(16e^{12c_1}+16x^3\right)-24\#1^4x^2+8\#1^3x^{3/2}+9\#1^2x-6\#1\sqrt{x}+1\&,1\right]} - \sqrt{x}\right\}, \left\{y(x) \to \right.\right.$$

✓ **Maple** : cpu = 0.324 (sec), leaf count = 59

$$\left\{y(x) = 1\left(\sqrt{x}\left(RootOf\left(\_Z^{18}\_C1 - 9\,x\_Z^6 - 6\,\sqrt{x}\_Z^3 - 1\right)\right)^3 + 1\right)\left(RootOf\left(\_Z^{18}\_C1 - 9\,x\_Z^6 - 6\,\sqrt{x}\_Z^3\right.\right.$$

2.622 ODE No. 622

$$y'(x) = \frac{1}{y(x)+\sqrt{3x+1}+2}$$

✓ **Mathematica** : cpu = 0.479187 (sec), leaf count = 140

$$\text{Solve}\left[44c_1 + 6\sqrt{33}\tanh^{-1}\left(\frac{3y(x)+7\sqrt{3x+1}+6}{\sqrt{33}\left(y(x)+\sqrt{3x+1}+2\right)}\right) = 33\left(\log\left(\frac{-3\sqrt{3x+1}y(x)^2-3(3x+4\sqrt{3x+1}+1)}{2(3x}\right.\right.\right.$$

✓ **Maple** : cpu = 0.325 (sec), leaf count = 77

$$\left\{\ln\left((3\,y(x)+6)\sqrt{3\,x+1}+3\,(y(x))^2-6\,x+12\,y(x)+10\right) - 6\,\frac{\sqrt{3\,x+1}}{\sqrt{99\,x+33}}Artanh\left(\frac{3\sqrt{3\,x+1}+6\,y(x)+12}{\sqrt{99\,x+33}}\right)\right.$$

2.623 ODE No. 623

$$y'(x) = \frac{x^2}{x^{3/2} + y(x)}$$

✓ **Mathematica** : cpu = 0.220177 (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 = 0.408 (sec), leaf count = 49

$$\left\{\ln\left(3\,x^{3/2}y(x) - 2\,x^3 + 3\,(y(x))^2\right) - \frac{2\sqrt{33}}{11}\mathit{Artanh}\left(\frac{\sqrt{33}}{11}\left(x^{\frac{3}{2}} + 2\,y(x)\right)x^{-\frac{3}{2}}\right) - \_C1 = 0\right\}$$

2.624 ODE No. 624

$$y'(x) = \frac{x^{5/3}}{x^{4/3} + y(x)}$$

✓ **Mathematica** : cpu = 55.3633 (sec), leaf count = 1

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✓ **Maple** : cpu = 2.204 (sec), leaf count = 46

$$\left\{y(x) = \frac{1}{2}\left(\mathit{RootOf}\left(\_Z^{192} + 12\,x^{4/3}\_Z^{176} + 48\,x^{8/3}\_Z^{160} + 64\,x^4\_Z^{144} - \_C1\right)\right)^{16} + \frac{1}{2}x^{\frac{4}{3}}\right\}$$

2.625 ODE No. 625

$$y'(x) = \frac{1}{2}ix^2\left(-2\sqrt{6y(x) - x^3} + i\right)$$

✓ **Mathematica** : cpu = 0.322259 (sec), leaf count = 67

$$\text{Solve}\left[12ic_1 + 2\sqrt{6y(x) - x^3} + i\log\left(-x^3 + 6y(x) + 1\right) + 2ix^3 = 2\tan^{-1}\left(\sqrt{6y(x) - x^3}\right), y(x)\right]$$

✓ **Maple** : cpu = 0.354 (sec), leaf count = 53

$$\left\{\ln\left(x^3 - 6\,y(x) - 1\right) - 2\,i\sqrt{-x^3 + 6\,y\left(x\right)} + 2\,i\arctan\left(\sqrt{-x^3 + 6\,y\left(x\right)}\right) + 2\,x^3 - \_C1 = 0\right\}$$

2.626 ODE No. 626

$$y'(x) = \frac{x}{\sqrt{x^2+1}+y(x)}$$

✓ **Mathematica** : cpu = 0.253224 (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 = 0.621 (sec), leaf count = 115

$$\left\{-\frac{4}{3}\ln\left(36\frac{\sqrt{x^2+1}}{y(x)+\sqrt{x^2+1}}\right)+\frac{2}{3}\ln\left(-\frac{1296}{11}\left(\sqrt{x^2+1}y(x)-x^2+(y(x))^2-1\right)\left(y(x)+\sqrt{x^2+1}\right)^{-2}\right)-\frac{4\sqrt{5}}{15}\right.$$

2.627 ODE No. 627

$$y'(x) = \frac{(y(x)\log(x)-1)^2}{x}$$

✓ **Mathematica** : cpu = 1.07999 (sec), leaf count = 25

$$\left\{\left\{y(x)\to\frac{\tan\left(c_1+\log(x)\right)}{\log(x)\tan\left(c_1+\log(x)\right)+1}\right\}\right\}$$

✓ **Maple** : cpu = 0.822 (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 = 0.0862226 (sec), leaf count = 32

$$\left\{\left\{y(x)\to\frac{1}{48}\left(-2(27c_1+8)x^2+81c_1^2+9x^4\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.493 (sec), leaf count = 23

$$\left\{\_C1+\frac{3x^2}{4}+\frac{2}{3}-\sqrt{x^2+3y(x)}=0\right\}$$

2.629 ODE No. 629

$$y'(x) = \frac{(2y(x)\log(x) - 1)^2}{x}$$

✓ **Mathematica** : cpu = 0.806323 (sec), leaf count = 38

$$\left\{\left\{y(x)\to \frac{1}{\sqrt{2}\left(\sqrt{2}\log(x) - \tan\left(\frac{c_1+2\log(x)}{\sqrt{2}}\right)\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.226 (sec), leaf count = 62

$$\left\{y(x) = \frac{\sin\left(\ln(x)\sqrt{2}\right)\_C1 + \cos\left(\ln(x)\sqrt{2}\right)}{\sin\left(\ln(x)\sqrt{2}\right)\left(2\_C1\ \ln(x) - \sqrt{2}\right) + \left(\sqrt{2}\_C1 + 2\ \ln(x)\right)\cos\left(\ln(x)\sqrt{2}\right)}\right\}$$

2.630 ODE No. 630

$$y'(x) = \frac{e^{bx}}{e^{-bx}y(x) + 1}$$

✓ **Mathematica** : cpu = 0.625101 (sec), leaf count = 101

$$\text{Solve}\left[\frac{1}{2}b\left(\log\left(-be^{-2bx}y(x)^2 - be^{-bx}y(x) + 1\right) + 2bx\right) = \frac{b\tan^{-1}\left(\frac{(b+2)(-e^{bx}) - by(x)}{b\sqrt{-\frac{b+4}{b}}(e^{bx}+y(x))}\right)}{\sqrt{-\frac{b+4}{b}}} + c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.329 (sec), leaf count = 98

$$\left\{y(x) = \frac{1}{e^{-bx}} RootOf\left(-e^{RootOf\left(\left(\tanh\left(\frac{2\_C1\ b-2\ bx-\_Z}{2\ b}\sqrt{b^2+4\ b}\right)\right)^2 b+4\left(\tanh\left(1/2\ \frac{\sqrt{b^2+4\ b}(2\_C1\ b-2\ bx-\_Z)}{b}\right)\right)^2 - 4\ e^{\_Z} - b - 4\right)} -\right.\right.$$

2.631 ODE No. 631

$$y'(x) = \frac{1}{2}x^2\left(2\sqrt{x^3-6y(x)}+1\right)$$

✓ **Mathematica** : cpu = 0.0944318 (sec), leaf count = 31

$$\left\{\left\{y(x)\to\frac{1}{6}\left((1-12c_1)\,x^3-36c_1^2-x^6\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.218 (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 = 0.21456 (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 = 0.266 (sec), leaf count = 54

$$\left\{x-\frac{\sqrt{5}}{5}\mathit{Artanh}\left(\frac{2\,y(x)\,\sqrt{5}\mathrm{e}^{-x}}{5}+\frac{\sqrt{5}}{5}\right)+\frac{\ln\left((y(x))^2\left(\mathrm{e}^{-x}\right)^2+y(x)\,\mathrm{e}^{-x}-1\right)}{2}-\_C1=0\right\}$$

2.633 ODE No. 633

$$y'(x) = \frac{e^{2x/3}}{e^{-2x/3}y(x)+1}$$

✓ **Mathematica** : cpu = 0.243904 (sec), leaf count = 85

$$\text{Solve}\left[7\left(-9c_1+3\log\left(-\frac{2}{3}e^{-4x/3}y(x)^2-\frac{2}{3}e^{-2x/3}y(x)+1\right)+4x\right)=6\sqrt{7}\tanh^{-1}\left(\frac{y(x)+4e^{2x/3}}{\sqrt{7}\left(y(x)+e^{2x/3}\right)}\right),y(x)\right]$$

✓ **Maple** : cpu = 0.941 (sec), leaf count = 52

$$\left\{y(x)=1\mathit{RootOf}\left(-\mathrm{e}^{\mathit{RootOf}\left(343-343\left(\tanh\left(1/6\,(4\_C1-4\,x-3\_Z)\sqrt{7}\right)\right)^2+98\,\mathrm{e}^{-\_Z}\right)}-3+2\_Z+2\_Z^2\right)\left(\mathrm{e}^{-\frac{2\,x}{3}}\right)^{-1}\right\}$$

2.634 ODE No. 634

$$y'(x) = \frac{x^5\sqrt{4x^2y(x)+1}+\frac{1}{2}}{x^3}$$

✓ **Mathematica** : cpu = 0.190646 (sec), leaf count = 31

$$\left\{\left\{y(x)\to \frac{1}{16}\left(-8c_1x^4+16c_1^2+x^8-\frac{4}{x^2}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.248 (sec), leaf count = 26

$$\left\{\_C1-\frac{1}{x}\sqrt{4\,x^2y\,(x)+1}+\frac{x^4}{2}=0\right\}$$

2.635 ODE No. 635

$$y'(x) = \frac{1}{2}x\left(2\sqrt{x^3-6y(x)}+x\right)$$

✓ **Mathematica** : cpu = 0.12802 (sec), leaf count = 33

$$\left\{\left\{y(x)\to \frac{1}{24}(36c_1x^2-36c_1^2-9x^4+4x^3)\right\}\right\}$$

✓ **Maple** : cpu = 0.178 (sec), leaf count = 22

$$\left\{\_C1-\frac{3\,x^2}{2}-\sqrt{x^3-6\,y\,(x)}=0\right\}$$

2.636 ODE No. 636

$$y'(x) = y(x)\left(x^2-\log(y(x))\right)$$

✓ **Mathematica** : cpu = 0.0539391 (sec), leaf count = 24

$$\left\{\left\{y(x)\to e^{-2c_1e^{-x}+x^2-2x+2}\right\}\right\}$$

✓ **Maple** : cpu = 0.168 (sec), leaf count = 19

$$\left\{y(x)=\mathrm{e}^{\frac{\_C1}{\mathrm{e}^x}+x^2-2\,x+2}\right\}$$

2.637 ODE No. 637

$$y'(x) = \frac{e^{-x^2}x}{e^{x^2}y(x)+1}$$

✓ **Mathematica** : cpu = 16.1553 (sec), leaf count = 53

$$\text{Solve}\left[2x^2 = 4c_1 + \log\left(2e^{2x^2}y(x)^2 + 2e^{x^2}y(x)+1\right) + 2\tan^{-1}\left(2e^{x^2}y(x)+1\right), y(x)\right]$$

✓ **Maple** : cpu = 3.133 (sec), leaf count = 84

$$\left\{y(x) = -\frac{1}{e^{x^2}}\tan\left(RootOf\left(2\,x^2 - \ln\left(\frac{81\,(\tan(\_Z))^2}{10} + \frac{81}{10}\right) + 2\,\ln(9/2\,\tan(\_Z) - 9/2) + 6\_C1 - 2\_Z\right)\right)\right.$$

2.638 ODE No. 638

$$y'(x) = y(x)(-(\log(x) - \log(\log(y(x)))))$$

✗ **Mathematica** : cpu = 2.731 (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 = 0.171 (sec), leaf count = 35

$$\left\{\int_{\_b}^{y(x)} \frac{1}{\_a\,(-\ln(\ln(\_a))\,x + x\ln(x) + \ln(\_a))}\,d\_a + \ln(x) - \_C1 = 0\right\}$$

2.639 ODE No. 639

$$y'(x) = y(x)(\log(x) - \log(\log(y(x))))^2$$

✗ **Mathematica** : cpu = 0.33979 (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 = 0.201 (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 = 3.71103 (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 = 0.332 (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 = 0.184946 (sec), leaf count = 33

$$\left\{\left\{y(x) \to -\frac{2c_1x^3}{3} + c_1^2 + \frac{x^6}{9} - \frac{1}{4x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.209 (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

$$y'(x) = \frac{(4ax - y(x)^2)^2}{y(x)}$$

✓ **Mathematica** : cpu = 0.141108 (sec), leaf count = 95

$$\left\{\left\{y(x) \to -\sqrt{4ax - \sqrt{2}\sqrt{a}\tanh\left(\frac{\sqrt{2}\,(2ax - c_1)}{\sqrt{a}}\right)}\right\}, \left\{y(x) \to \sqrt{4ax - \sqrt{2}\sqrt{a}\tanh\left(\frac{\sqrt{2}\,(2ax - c_1)}{\sqrt{a}}\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.275 (sec), leaf count = 286

$$\left\{y(x) = \sqrt{4}\sqrt{\left(\_C1\left(ax - \frac{\sqrt{2}}{4}\sqrt{a}\right)e^{2\,x\left(\sqrt{2}\sqrt{a} - 2\,ax\right)} + e^{-2\,x\left(\sqrt{2}\sqrt{a} + 2\,ax\right)}\left(ax + \frac{\sqrt{2}}{4}\sqrt{a}\right)\right)\left(\_C1\,e^{2\,x\left(\sqrt{2}\sqrt{a} - 2\,ax\right)}\right.}$$

2.643 ODE No. 643

$$y'(x) = \frac{1}{3}x\left(3x\sqrt{x^2+3y(x)}-2\right)$$

✓ **Mathematica** : cpu = 0.123498 (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 = 0.183 (sec), leaf count = 22

$$\left\{\_C1+\frac{x^3}{2}-\sqrt{x^2+3\,y\,(x)}=0\right\}$$

2.644 ODE No. 644

$$y'(x) = -\frac{1}{2}x^2\left(ax-2\sqrt{a\,(ax^4+8y(x))}\right)$$

✓ **Mathematica** : cpu = 0.286329 (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 = 0.365 (sec), leaf count = 27

$$\left\{\_C1+\frac{4\,ax^3}{3}-\sqrt{a\,(ax^4+8\,y\,(x))}=0\right\}$$

2.645 ODE No. 645

$$y'(x) = y(x)(x-\log(y(x)))$$

✓ **Mathematica** : cpu = 0.0533983 (sec), leaf count = 20

$$\left\{\left\{y(x)\to e^{-e^{c_1-x}+x-1}\right\}\right\}$$

✓ **Maple** : cpu = 0.1 (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 = 0.191302 (sec), leaf count = 35

$$\left\{\left\{y(x) \to \frac{1}{6}\left(18c_1 \log(x+1) - 9c_1^2 + x^3 - 9\log^2(x+1)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.258 (sec), leaf count = 23

$$\left\{\_C1 - 3\ln(1+x) - \sqrt{x^3 - 6\,y(x)} = 0\right\}$$

2.647 ODE No. 647

$$y'(x) = \frac{x\left(ay(x)^2 + bx^2\right)^2}{a^{5/2}y(x)}$$

✓ **Mathematica** : cpu = 0.41652 (sec), leaf count = 117

$$\left\{\left\{y(x) \to -\sqrt{\frac{a^{3/4}\sqrt{b}\tan\left(\frac{a^{3/2}bx^2+2c_1}{a^{9/4}\sqrt{b}}\right) - bx^2}{a}}\right\}, \left\{y(x) \to \sqrt{\frac{a^{3/4}\sqrt{b}\tan\left(\frac{a^{3/2}bx^2+2c_1}{a^{9/4}\sqrt{b}}\right) - bx^2}{a}}\right\}\right\}$$

✓ **Maple** : cpu = 0.355 (sec), leaf count = 460

$$\left\{y(x) = \frac{1}{a}\sqrt{-a\left(\_C1\,e^{\frac{x^2}{2}\left(2\,a^{3/2}\sqrt{-\frac{b}{a^{3/2}}}+bx^2\right)a^{-\frac{3}{2}}} + e^{\frac{x^2}{2}\left(-2\,a^{3/2}\sqrt{-\frac{b}{a^{3/2}}}+bx^2\right)a^{-\frac{3}{2}}}\right)\left(\left(bx^2 - a^{\frac{3}{2}}\sqrt{-ba^{-\frac{3}{2}}}\right)e^{\frac{x^2}{2}\left(-2\,a^{3/2}\right.}\right.\right.}$$

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 = 0.361839 (sec), leaf count = 96

$$\left\{\left\{y(x) \to \frac{1}{72}a\left(-96c_1x^3 + 72(2c_1 - 1)\,x^2 - 48\left(-6c_1 + 2x^3 - 3x^2 + 6x + 9\right)\log(x+1) - 144(2c_1 - 3)\,x + 36(3\right.\right.\right.$$

✓ **Maple** : cpu = 0.669 (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 = 0.181798 (sec), leaf count = 36

$$\left\{\left\{y(x) \to \frac{1}{8}\left(-(16c_1 + 1)\,x^2 + 16c_1^2 + 4x^4 + 2x - 1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.21 (sec), leaf count = 27

$$\left\{\_C1 + 2\,x^2 + \frac{1}{4} - \sqrt{x^2 - 2\,x + 1 + 8\,y\,(x)} = 0\right\}$$

2.650 ODE No. 650

$$y'(x) = x\sqrt{a^2 + 2ax + x^2 + 4y(x)} - \frac{a}{2} - \frac{x}{2}$$

✓ **Mathematica** : cpu = 0.247795 (sec), leaf count = 39

$$\left\{\left\{y(x) \to \frac{1}{4}\left(-a^2 - 2ax - (4c_1 + 1)\,x^2 + 4c_1^2 + x^4\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.234 (sec), leaf count = 28

$$\left\{\_C1 + x^2 + \frac{1}{2} - \sqrt{x^2 + 2\,ax + a^2 + 4\,y\,(x)} = 0\right\}$$

2.651 ODE No. 651

$$y'(x) = \frac{y(x)\left(x^2 + \log(y(x))\right)}{x}$$

✓ **Mathematica** : cpu = 0.0341823 (sec), leaf count = 15

$$\left\{\left\{y(x) \to e^{x(2c_1 + x)}\right\}\right\}$$

✓ **Maple** : cpu = 0.077 (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 = 2.0019 (sec), leaf count = 103

$$\left\{\left\{y(x) \to -\frac{\sqrt{256a^4x\left(16a - x^3\right) + 32a^2e^{c_1}x^2 - e^{2c_1}}}{32a^2}\right\}, \left\{y(x) \to \frac{\sqrt{256a^4x\left(16a - x^3\right) + 32a^2e^{c_1}x^2 - e^{2c_1}}}{32a^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.197 (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 = 0.18738 (sec), leaf count = 31

$$\left\{\left\{y(x) \to -\frac{1}{4}(4c_1 + 1)\,x^2 + c_1^2 + \frac{x^4}{4} + x\right\}\right\}$$

✓ **Maple** : cpu = 0.173 (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 = 0.180201 (sec), leaf count = 37

$$\left\{\left\{y(x) \to \frac{1}{12}\left(-18c_1\log(x+1) + 9c_1^2 - 4x^2 + 9\log^2(x+1)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.25 (sec), leaf count = 23

$$\left\{\_C1 + \frac{3\,\ln\left(1+x\right)}{2} - \sqrt{x^{2} + 3\,y\left(x\right)} = 0\right\}$$

2.655 ODE No. 655

$$y'(x) = \frac{e^{-4x/3}y(x)^3}{e^{-2x/3}y(x)+1}$$

✓ **Mathematica** : cpu = 20.3018 (sec), leaf count = 79

$$\text{Solve}\left[\frac{3}{2}\log(y(x)) - \frac{3}{4}\log\left(-3y(x)^2 + 2e^{2x/3}y(x) + 2e^{4x/3}\right) + \frac{3\tanh^{-1}\left(\frac{y(x)+2e^{2x/3}}{\sqrt{7}y(x)}\right)}{2\sqrt{7}} + x = c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.659 (sec), leaf count = 66

$$\left\{x + \frac{3\sqrt{7}}{14}Artanh\left(\frac{3\,y(x)\,\sqrt{7}}{7}e^{-\frac{2x}{3}} - \frac{\sqrt{7}}{7}\right) - \frac{3}{4}\ln\left(3\,(y(x))^2\left(e^{-2/3\,x}\right)^2 - 2\,y(x)\,e^{-2/3\,x} - 2\right) + \frac{3}{2}\ln\left(y(x)\,e^{-\frac{2x}{3}}\right.$$

2.656 ODE No. 656

$$y'(x) = \frac{y(x)\left(x^3 + \log(y(x))\right)}{x}$$

✓ **Mathematica** : cpu = 0.0416786 (sec), leaf count = 20

$$\left\{\left\{y(x) \to e^{3c_1x+\frac{x^3}{2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.076 (sec), leaf count = 15

$$\left\{y(x) = e^{\frac{x^3}{2}}e^{x\_C1}\right\}$$

2.657 ODE No. 657

$$y'(x) = x^2\sqrt{x^2 + 8y(x) - 2x + 1} - \frac{x}{4} + \frac{1}{4}$$

✓ **Mathematica** : cpu = 0.194603 (sec), leaf count = 37

$$\left\{\left\{y(x) \to \frac{1}{72}\left(-96c_1x^3 + 144c_1^2 + 16x^6 - 9x^2 + 18x - 9\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.213 (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 = 0.256699 (sec), leaf count = 46

$$\left\{\left\{y(x) \to \frac{1}{8}\left(16c_1^2 - x^2 + 2x - 1\right) - 4c_1 \log(4(x+1)) + 2\log^2(4(x+1))\right\}\right\}$$

✓ **Maple** : cpu = 0.306 (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 = 0.450101 (sec), leaf count = 51

$$\left\{\left\{y(x) \to \frac{a^2\left(-(4c_1+1)x^2 + 4c_1^2 + x^4\right) - 2abx - b^2 + 4c}{4a}\right\}\right\}$$

✓ **Maple** : cpu = 0.271 (sec), leaf count = 41

$$\left\{\_C1 + ax^2 + \frac{a}{2} - \sqrt{a^2x^2 + 2abx + b^2 + 4ay(x) - 4c} = 0\right\}$$

2.660 ODE No. 660

$$y'(x) = x^2\sqrt{a^2 + 2ax + x^2 + 4y(x)} - \frac{a}{2} - \frac{x}{2}$$

✓ **Mathematica** : cpu = 0.273464 (sec), leaf count = 42

$$\left\{\left\{y(x) \to \frac{1}{36}\left(-9a^2 - 18ax - 24c_1x^3 + 36c_1^2 + 4x^6 - 9x^2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.231 (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 = 0.46469 (sec), leaf count = 54

$$\left\{\left\{y(x) \to \frac{a^2\left(-24c_1x^3 + 36c_1^2 + 4x^6 - 9x^2\right) - 18abx - 9b^2 + 36c}{36a}\right\}\right\}$$

✓ **Maple** : cpu = 0.221 (sec), leaf count = 39

$$\left\{\_C1 + \frac{2\,ax^3}{3} - \sqrt{a^2x^2 + 2\,abx + b^2 + 4\,ay\,(x) - 4\,c} = 0\right\}$$

2.662 ODE No. 662

$$y'(x) = x^2\sqrt{x^2 - 4y(x) + 2x + 1} + \frac{x}{2} + \frac{1}{2}$$

✓ **Mathematica** : cpu = 0.205784 (sec), leaf count = 37

$$\left\{\left\{y(x) \to \frac{1}{36}\left(24c_1x^3 - 36c_1^2 - 4x^6 + 9x^2 + 18x + 9\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.214 (sec), leaf count = 26

$$\left\{\_C1 - \frac{2\,x^3}{3} - \sqrt{x^2 + 2\,x + 1 - 4\,y\,(x)} = 0\right\}$$

2.663 ODE No. 663

$$y'(x) = \frac{x^2\sqrt{4ax - y(x)^2} + 2a}{y(x)}$$

✓ **Mathematica** : cpu = 2.32392 (sec), leaf count = 103

$$\left\{\left\{y(x) \to -\frac{\sqrt{4096a^6x\,(36a - x^5) + 128a^3e^{c_1}x^3 - e^{2c_1}}}{192a^3}\right\}, \left\{y(x) \to \frac{\sqrt{4096a^6x\,(36a - x^5) + 128a^3e^{c_1}x^3 - e^{2c_1}}}{192a^3}\right\}\right\}$$

✓ **Maple** : cpu = 0.183 (sec), leaf count = 27

$$\left\{-\sqrt{-\left(y\,(x)\right)^2 + 4\,ax} - \frac{x^3}{3} - \_C1 = 0\right\}$$

2.664 ODE No. 664

$$y'(x) = x^2\sqrt{x^2 + 4y(x) - 4x} - \frac{x}{2} + 1$$

✓ **Mathematica** : cpu = 0.197601 (sec), leaf count = 34

$$\left\{\left\{y(x) \to -\frac{2c_1x^3}{3} + c_1^2 + \frac{x^6}{9} - \frac{x^2}{4} + x\right\}\right\}$$

✓ **Maple** : cpu = 0.194 (sec), leaf count = 25

$$\left\{\_C1 + \frac{2\,x^3}{3} - \sqrt{x^2 - 4\,x + 4\,y\,(x)} = 0\right\}$$

2.665 ODE No. 665

$$y'(x) = -\frac{\sqrt{a}\left(-2\sqrt{ax^4 + 8y(x)} + \sqrt{a}x^4 + \sqrt{a}x^3\right)}{2(x+1)}$$

✓ **Mathematica** : cpu = 0.31716 (sec), leaf count = 39

$$\left\{\left\{y(x) \to -4ac_1\log(x+1) + 2ac_1^2 - \frac{ax^4}{8} + 2a\log^2(x+1)\right\}\right\}$$

✓ **Maple** : cpu = 0.532 (sec), leaf count = 28

$$\left\{-\frac{1}{4}\sqrt{ax^4 + 8\,y\,(x)}\frac{1}{\sqrt{a}} + \ln(1+x) - \_C1 = 0\right\}$$

2.666 ODE No. 666

$$y'(x) = y(x)\left(x^3 + x^2 - \log(y(x)) + 1\right)$$

✓ **Mathematica** : cpu = 0.0729871 (sec), leaf count = 29

$$\left\{\left\{y(x) \to e^{-c_1e^{-x}+x^3-2x^2+4x-3}\right\}\right\}$$

✓ **Maple** : cpu = 0.165 (sec), leaf count = 24

$$\left\{y(x) = \mathrm{e}^{\frac{\_C1}{\mathrm{e}^{x}}+x^3-2\,x^2+4\,x-3}\right\}$$

2.667 ODE No. 667

$$y'(x) = \frac{e^{-2bx}y(x)^3}{e^{-bx}y(x)+1}$$

✓ **Mathematica** : cpu = 1.13558 (sec), leaf count = 84

$$\text{Solve}\left[\frac{\log(y(x))}{b} - \frac{\log\left(y(x)^2 - be^{bx}\left(e^{bx}+y(x)\right)\right)}{2b} + \frac{\tanh^{-1}\left(\frac{\sqrt{\frac{b}{b+4}}\left(2e^{bx}+y(x)\right)}{y(x)}\right)}{\sqrt{b}\sqrt{b+4}} + x = c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.236 (sec), leaf count = 82

$$\left\{bx - bArtanh\left((-2\,y(x)\,\mathrm{e}^{-bx}+b)\frac{1}{\sqrt{b^2+4\,b}}\right)\frac{1}{\sqrt{b^2+4\,b}} - \frac{\ln\left(-by(x)\,\mathrm{e}^{-bx}+(y(x))^2\left(\mathrm{e}^{-bx}\right)^2-b\right)}{2} + \ln\left(y(x)\,\mathrm{e}^{-}\right.\right.$$

2.668 ODE No. 668

$$y'(x) = \frac{e^{-2x}y(x)^3}{e^{-x}y(x)+1}$$

✓ **Mathematica** : cpu = 0.644337 (sec), leaf count = 59

$$\text{Solve}\left[\log(y(x)) - \frac{1}{2}\log\left(-y(x)^2+e^xy(x)+e^{2x}\right) + \frac{\tanh^{-1}\left(\frac{y(x)+2e^x}{\sqrt{5}y(x)}\right)}{\sqrt{5}} + x = c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.754 (sec), leaf count = 58

$$\left\{y(x) = \mathrm{e}^{RootOf\left(2\sqrt{5}Artanh\left(1/5\,\frac{\left(-2\,\mathrm{e}^{\_Z}+\mathrm{e}^x\right)\sqrt{5}}{\mathrm{e}^x}\right)+5\,\ln\left(\left(\mathrm{e}^{\_Z}\right)^2-\mathrm{e}^{\_Z+x}-\left(\mathrm{e}^x\right)^2\right)+10\_C1-10\_Z-10\,x\right)}\right\}$$

2.669 ODE No. 669

$$y'(x) = \frac{e^x \left(3e^x - 2y(x)^{3/2}\right)^2}{4\sqrt{y(x)}}$$

✓ **Mathematica** : cpu = 0.857219 (sec), leaf count = 222

$$\left\{\left\{y(x) \to \frac{\left(\frac{3}{2}e^{3c_1+x} + e^{3c_1} - e^{3e^x} + \frac{3}{2}e^{x+3e^x}\right)^{2/3}}{\sqrt[3]{\left(e^{3c_1} + e^{3e^x}\right)^2}}\right\}, \left\{y(x) \to -\frac{\sqrt[3]{-1}\left(\frac{3}{2}e^{3c_1+x} + e^{3c_1} - e^{3e^x} + \frac{3}{2}e^{x+3e^x}\right)^{2/3}}{\sqrt[3]{\left(e^{3c_1} + e^{3e^x}\right)^2}}\right\}, \left\{\right.\right.$$

✓ **Maple** : cpu = 0.22 (sec), leaf count = 72

$$\left\{\_C1 + 1e^{-\frac{3e^x}{2} - \frac{9e^{2x}}{8}}\left(2(y(x))^{3/2}e^x - 2e^x - 3e^{2x}\right)\left(e^{\frac{3e^x}{2} - \frac{9e^{2x}}{8}}\right)^{-1}\left(2(y(x))^{3/2}e^x - 3e^{2x} + 2e^x\right)^{-1} = 0\right\}$$

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 = 0.503356 (sec), leaf count = 83

$$\text{Solve}\left[2i\sqrt{4\log(a) - x^2 + 4\log(y(x))} - 2i\tan^{-1}\left(\sqrt{4\log(a) - x^2 + 4\log(y(x))}\right) + 8\log(a) = \log\left(4\log(a) - x^2 +\right.\right.$$

✓ **Maple** : cpu = 0.365 (sec), leaf count = 70

$$\left\{-\frac{1}{2}\sqrt{-x^2 + 4\ln(a) + 4\ln(y(x))} + \frac{1}{2}\arctan\left(\sqrt{-x^2 + 4\ln(a) + 4\ln(y(x))}\right) - \frac{i}{4}\ln\left(x^2 - 4\ln(a) - 4\ln(y(x\right.\right.$$

2.671 ODE No. 671

$$y'(x) = \frac{\left(xy(x)^2 + 1\right)^2}{x^4 y(x)}$$

✓ **Mathematica** : cpu = 0.403141 (sec), leaf count = 162

$$\left\{\left\{y(x) \to -\frac{\sqrt{\frac{\left(\sqrt{2}x-2\right)e^{\frac{2\sqrt{2}(c_1x+1)}{x}} - \sqrt{2}x - 2}{x}}}{\sqrt{2}\sqrt{e^{\frac{2\sqrt{2}(c_1x+1)}{x}} + 1}}\right\}, \left\{y(x) \to \frac{\sqrt{\frac{\left(\sqrt{2}x-2\right)e^{\frac{2\sqrt{2}(c_1x+1)}{x}} - \sqrt{2}x - 2}{x}}}{\sqrt{2}\sqrt{e^{\frac{2\sqrt{2}(c_1x+1)}{x}} + 1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.233 (sec), leaf count = 237

$$\left\{y(x)=-\frac{\sqrt{2}}{2\,x}\sqrt{-x\left(\_C1\,\mathrm{e}^{\frac{-1-\sqrt{2}x}{x^2}}+\mathrm{e}^{\frac{-1+\sqrt{2}x}{x^2}}\right)\left(\_C1\,\left(\sqrt{2}x+2\right)\mathrm{e}^{\frac{-1-\sqrt{2}x}{x^2}}+\left(2-\sqrt{2}x\right)\mathrm{e}^{\frac{-1+\sqrt{2}x}{x^2}}\right)\left(\_C1\,\mathrm{e}^{\frac{-1-\sqrt{2}x}{x^2}}\right.}\right.$$

2.672 ODE No. 672

$$y'(x)=\frac{x^2\left(\sqrt{4y(x)^3-9x^4}+3x\right)}{y(x)^2}$$

✗ **Mathematica** : cpu = 300.112 (sec), leaf count = 0 , timed out

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✓ **Maple** : cpu = 0.317 (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 = 0.101231 (sec), leaf count = 23

$$\left\{\left\{y(x)\to\tan^{-1}\left(\frac{3c_1+2x^3}{6x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.485 (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 = 0.241733 (sec), leaf count = 32

$$\left\{\left\{y(x) \to -2c_1 \log(x+1) + c_1^2 - \frac{x^2}{4} + x + \log^2(x+1)\right\}\right\}$$

✓ **Maple** : cpu = 0.296 (sec), leaf count = 27

$$\left\{\_C1 + 2\ln(1+x) - 1 - \sqrt{x^2 - 4x + 4y(x)} = 0\right\}$$

2.675 ODE No. 675

$$y'(x) = \frac{ax^4 + ae^x x^3 + ax^3 - x^2 y(x)^2 - e^x x y(x)^2 - x y(x)^2 + y(x)}{x}$$

✓ **Mathematica** : cpu = 0.0547435 (sec), leaf count = 45

$$\left\{\left\{y(x) \to \sqrt{a} x \tanh\left(\frac{1}{6}\sqrt{a}(6c_1 + 2x^3 + 3x^2 + 6e^x(x-1))\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.074 (sec), leaf count = 37

$$\left\{y(x) = \tanh\left(\frac{(6x-6)e^x + 2x^3 + 3x^2 + 6\_C1}{6}\sqrt{a}\right) x\sqrt{a}\right\}$$

2.676 ODE No. 676

$$y'(x) = \frac{x^6\sqrt{4x^2 y(x) + 1} + \frac{x}{2} + \frac{1}{2}}{x^3(x+1)}$$

✓ **Mathematica** : cpu = 0.333993 (sec), leaf count = 120

$$\left\{\left\{y(x) \to -\frac{1}{12}(6c_1 - 11)x^4 + \left(\frac{2c_1}{3} - 1\right)x^3 - (c_1 - 1)x^2 + \left(-2c_1 + \frac{x^4}{2} - \frac{2x^3}{3} + x^2 - 2x\right)\log(x+1) + 2c_1 x$$

✓ **Maple** : cpu = 0.543 (sec), leaf count = 43

$$\left\{\_C1 + 2\ln(1+x) - \frac{1}{x}\sqrt{4x^2 y(x) + 1} - 2x + x^2 - \frac{2x^3}{3} + \frac{x^4}{2} = 0\right\}$$

2.677 ODE No. 677

$$y'(x) = \frac{ax^4 + ax^3 + ax^3\log(x+1) - x^2y(x)^2 - xy(x)^2 + y(x) - xy(x)^2\log(x+1)}{x}$$

✓ **Mathematica** : cpu = 0.0364465 (sec), leaf count = 51

$$\left\{\left\{y(x) \to \sqrt{a}x\tanh\left(\frac{1}{12}\sqrt{a}(12c_1 + 4x^3 + 3x^2 + 6(x^2-1)\log(x+1) + 6x)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.053 (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 = 0.285286 (sec), leaf count = 90

$$\left\{\left\{y(x) \to \left(-3c_1 + x^3 - \frac{3x^2}{2} + 3x\right)\log(x+1) + \frac{1}{24}(8(3c_1+5)x^3 - 36(c_1+1)x^2 + 72c_1x - 36c_1^2 - 4x^6 + 12x^5$$

✓ **Maple** : cpu = 0.314 (sec), leaf count = 37

$$\left\{\_C1 - x^3 + \frac{3x^2}{2} - 3x + 3\ln(1+x) - \frac{1}{2} - \sqrt{x^3 - 6y(x)} = 0\right\}$$

2.679 ODE No. 679

$$y'(x) = \frac{x^4 + x^3 + x^3\log(x) + 7x^2y(x)^2 + 7xy(x)^2 + y(x) + 7xy(x)^2\log(x)}{x}$$

✓ **Mathematica** : cpu = 0.041037 (sec), leaf count = 44

$$\left\{\left\{y(x) \to \frac{x\tan\left(\frac{1}{12}\sqrt{7}(12c_1 + 4x^3 + 3x^2 + 6x^2\log(x))\right)}{\sqrt{7}}\right\}\right\}$$

✓ **Maple** : cpu = 0.056 (sec), leaf count = 37

$$\left\{y(x) = \frac{x\sqrt{7}}{7}\tan\left(\frac{(6x^2\ln(x) + 4x^3 + 3x^2 + 12\_C1)\sqrt{7}}{12}\right)\right\}$$

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 = 0.242934 (sec), leaf count = 39

$$\left\{\left\{y(x) \to \frac{1}{4}\left(8c_1 \log(x+1) - 4c_1^2 + x^2 + 2x - 4\log^2(x+1) + 1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.295 (sec), leaf count = 28

$$\left\{\_C1 - 2\ln(1+x) - \frac{1}{2} - \sqrt{x^2 + 2x + 1 - 4y(x)} = 0\right\}$$

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 = 0.0454777 (sec), leaf count = 54

$$\left\{\left\{y(x) \to \frac{\sqrt{b}x\tan\left(\frac{1}{12}\sqrt{a}\sqrt{b}\left(12c_1 + 4x^3 + 9x^2 - 6x^2\log(x)\right)\right)}{\sqrt{a}}\right\}\right\}$$

✓ **Maple** : cpu = 0.067 (sec), leaf count = 45

$$\left\{y(x) = \frac{x}{a}\tan\left(\frac{4x^3 + 6x^2\ln\left(x^{-1}\right) + 9x^2 + 12\_C1}{12}\sqrt{ab}\right)\sqrt{ab}\right\}$$

2.682 ODE No. 682

$$y'(x) = \frac{2a}{x\left(-8a^2 + 2axy(x)^2 - xy(x)\right)}$$

✓ **Mathematica** : cpu = 0.127696 (sec), leaf count = 33

$$\text{Solve}\left[\frac{e^{-4ay(x)}\left(xy(x)^2 - 4a\right)}{8ax} = c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.331 (sec), leaf count = 28

$$\left\{\_C1 + \frac{-x(y(x))^2 + 4a}{e^{4ay(x)}x} = 0\right\}$$

2.683 ODE No. 683

$$y'(x) = \frac{y(x)\left(x^4 y(x)\log(x(x+1)) - x^3\log(x(x+1)) - 1\right)}{x}$$

✓ **Mathematica** : cpu = 0.654509 (sec), leaf count = 72

$$\left\{\left\{y(x) \to \frac{e^{\frac{1}{9}x(2x^2+3)}}{x\left(c_1 e^{\frac{x^2}{6}}\sqrt[3]{x+1}(x(x+1))^{\frac{x^3}{3}} + e^{\frac{1}{9}x(2x^2+3)}\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.197 (sec), leaf count = 152

$$\left\{y(x) = \frac{1}{x}(x(1+x))^{-\frac{x^3}{3}}\,\mathrm{e}^{\frac{2x^3}{9}}\mathrm{e}^{-\frac{x^2}{6}}\mathrm{e}^{\frac{x}{3}}\left(x^{-\frac{x^3}{3}}(1+x)^{-\frac{x^3}{3}}\,\mathrm{e}^{\frac{x}{6}\left(ix^2(csgn(ix(1+x)))^3\pi - ix^2(csgn(ix)+csgn(i+ix))\pi\,(csgn(ix(1+x)))\right.}\right.$$

2.684 ODE No. 684

$$y'(x) = \frac{x^2\sqrt{x^2+y(x)^2} + y(x)}{x}$$

✓ **Mathematica** : cpu = 0.0259123 (sec), leaf count = 18

$$\left\{\left\{y(x) \to x\sinh\left(c_1 + \frac{x^2}{2}\right)\right\}\right\}$$

✓ **Maple** : cpu = 3.446 (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 = 0.0400697 (sec), leaf count = 62

$$\left\{\left\{y(x) \to \frac{x\tan\left(\frac{1}{2}\sqrt{7}(2c_1 - x^2 + x^2\log(x-1) + x^2\log(x+1) - \log(1-x) - \log(x+1))\right)}{\sqrt{7}}\right\}\right\}$$

✓ **Maple** : cpu = 0.187 (sec), leaf count = 48

$$\left\{y(x) = \frac{x\sqrt{7}}{7}\tan\left(\frac{\left(x^2\ln((x-1)(1+x)) - x^2 - \ln((x-1)(1+x)) + 2\_C1 + 1\right)\sqrt{7}}{2}\right)\right\}$$

2.686 ODE No. 686

$$y'(x) = \frac{e^{2x^2}xy(x)^3}{e^{x^2}y(x)+1}$$

✓ **Mathematica** : cpu = 15.8769 (sec), leaf count = 49

$$\text{Solve}\left[-\frac{1}{2}\log\left(e^{2x^2}y(x)^2+2e^{x^2}y(x)+2\right)+\tan^{-1}\left(e^{x^2}y(x)+1\right)+\log(y(x))=c_1,y(x)\right]$$

✓ **Maple** : cpu = 2.537 (sec), leaf count = 85

$$\left\{y(x) = \frac{1}{e^{x^2}}\left(1-\tan\left(RootOf\left(-2\,x^2-\ln\left(\frac{81\,(\tan(\_Z))^2}{10}+\frac{81}{10}\right)+2\,\ln(9/2\,\tan(\_Z)-9/2)+6\_C1-2\_\right.\right.\right.\right.$$

2.687 ODE No. 687

$$y'(x) = \frac{x^3\left(-\log\left(\frac{x+1}{x-1}\right)\right)+y(x)+xy(x)^2\log\left(\frac{x+1}{x-1}\right)}{x}$$

✓ **Mathematica** : cpu = 0.0691604 (sec), leaf count = 111

$$\left\{\left\{y(x)\to\frac{x\left(-(x+1)^{x^2}e^{2(c_1+x)}+x\left((x+1)^{x^2}e^{2(c_1+x)}+(x-1)^{x^2}\right)+(x-1)^{x^2}\right)}{(x+1)^{x^2}e^{2(c_1+x)}+x\left((x-1)^{x^2}-(x+1)^{x^2}e^{2(c_1+x)}\right)+(x-1)^{x^2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.174 (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 = 0.121045 (sec), leaf count = 45

$$\left\{\left\{y(x)\to x\tan\left(c_1-4e\text{Ei}\left(\frac{2}{x-1}\right)+\frac{1}{2}e^{\frac{x+1}{x-1}}\left(x^2+2x-3\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.098 (sec), leaf count = 42

$$\left\{y(x) = \tan\left(\frac{x^2+2\,x-3}{2}e^{\frac{1+x}{x-1}}+4\,e\,Ei\left(1,-2\,(x-1)^{-1}\right)+\_C1\right)x\right\}$$

2.689 ODE No. 689

$$y'(x) = \frac{-e^{x+1}x^3 + e^{x+1}xy(x)^2 + xy(x) - y(x)}{(x-1)x}$$

✓ **Mathematica** : cpu = 0.0787733 (sec), leaf count = 55

$$\left\{\left\{y(x) \to \frac{x - xe^{2(c_1+e^2\text{Ei}(x-1)+e^{x+1})}}{e^{2(c_1+e^2\text{Ei}(x-1)+e^{x+1})}+1}\right\}\right\}$$

✓ **Maple** : cpu = 0.062 (sec), leaf count = 25

$$\left\{y(x) = -\tanh\left(e^{1+x} - e^2 Ei(1, 1-x) + \_C1\right) x\right\}$$

2.690 ODE No. 690

$$y'(x) = \frac{-\frac{x^2}{4} + x^3\sqrt{x^2 + 8y(x) - 2x + 1} + \frac{1}{4}}{x+1}$$

✓ **Mathematica** : cpu = 0.418562 (sec), leaf count = 106

$$\left\{\left\{y(x) \to -\frac{2}{3}\left(-6c_1 + 2x^3 - 3x^2 + 6x + 11\right)\log(4(x+1)) + \frac{1}{72}\left((32 - 96c_1)\,x^3 + 3(48c_1 - 43)\,x^2 - 6(48c_1 - 91\right.\right.$$

✓ **Maple** : cpu = 0.342 (sec), leaf count = 40

$$\left\{\_C1 + \frac{4\,x^3}{3} - 2\,x^2 + 4\,x - 4\,\ln(1+x) - \sqrt{x^2 - 2\,x + 1 + 8\,y\,(x)} = 0\right\}$$

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 = 0.0897213 (sec), leaf count = 21

$$\left\{\left\{y(x) \to \tan^{-1}\left(\frac{2c_1 + x^4}{4x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.719 (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 = 0.0287637 (sec), leaf count = 18

$$\left\{\left\{y(x) \to x \sinh\left(c_1 + \frac{x^3}{3}\right)\right\}\right\}$$

✓ **Maple** : cpu = 2.707 (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 = 0.22139 (sec), leaf count = 143

$$\text{Solve}\left[3(9b+29)^{2/3}\text{RootSum}\left[\#1^3(9b+29)^{2/3} - 9\#1b - 3\#1 + (9b+29)^{2/3}\&, \frac{\log\left(\frac{e^{-2bx}\left(e^{bx}+3y(x)\right)}{\sqrt[3]{(9b+29)e^{-3bx}}} - \#1\right)}{\#1^2\left(-(9b+29)^{2/3}\right) + 3b + 1}\&\right.\right.$$

✓ **Maple** : cpu = 0.134 (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 = 0.304336 (sec), leaf count = 43

$$\left\{\left\{y(x) \to -2c_1x - 2(x - c_1)\log(x+1) + c_1^2 + x^2 - \frac{1}{4x^2} + \log^2(x+1)\right\}\right\}$$

✓ **Maple** : cpu = 0.309 (sec), leaf count = 30

$$\left\{-2\ln(1+x) - \frac{1}{x}\sqrt{4x^2y(x) + 1} + 2x + \_C1 = 0\right\}$$

2.695 ODE No. 695

$$y'(x) = \frac{x^4 + x^3 + x^2 y(x)^2 + x y(x)^2 + y(x) \log(x-1)}{x \log(x-1)}$$

✓ **Mathematica** : cpu = 0.0802485 (sec), leaf count = 34

$$\{\{y(x) \to x \tan\left(c_1 + 2\text{Ei}(\log(x-1)) + 3\text{Ei}(2\log(x-1)) + \text{Ei}(3\log(x-1))\right)\}\}$$

✓ **Maple** : cpu = 0.061 (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

$$y'(x) = \frac{e^{x+1} x^3 + 7 e^{x+1} x y(x)^2 + y(x) \log(x-1)}{x \log(x-1)}$$

✗ **Mathematica** : cpu = 299.998 (sec), leaf count = 0 , timed out

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✓ **Maple** : cpu = 0.073 (sec), leaf count = 32

$$\left\{ y(x) = \frac{x\sqrt{7}}{7} \tan\left(\left(\mathrm{e} \int \frac{x \mathrm{e}^x}{\ln(x-1)}\, dx + \_C1\right)\sqrt{7}\right)\right\}$$

2.697 ODE No. 697

$$y'(x) = e^{2x/3}\left(e^{-2x} y(x)^3 + e^{-4x/3} y(x)^2 + 1\right)$$

✓ **Mathematica** : cpu = 0.159941 (sec), leaf count = 112

$$\text{Solve}\left[105\text{RootSum}\left[-35\#1^3 + 9\sqrt[3]{35}\#1 - 35\&, \frac{\log\left(\frac{e^{-4x/3}\left(3y(x)+e^{2x/3}\right)}{\sqrt[3]{35}\sqrt[3]{e^{-2x}}} - \#1\right)}{3\sqrt[3]{35} - 35\#1^2}\&\right] + 9c_1 + 35^{2/3} e^{4x/3} \left(e^{-2x}\right)^{2/3} x$$

✓ **Maple** : cpu = 0.118 (sec), leaf count = 40

$$\left\{ y(x) = RootOf\left(-x + 3\int^{\_Z} \left(3\_a^3 + 3\_a^2 - 2\_a + 3\right)^{-1} d\_a + \_C1\right)\left(\mathrm{e}^{-\frac{2x}{3}}\right)^{-1}\right\}$$

2.698 ODE No. 698

$$y'(x) = e^x \left(e^{-3x} y(x)^3 + e^{-2x} y(x)^2 + 1\right)$$

✓ **Mathematica** : cpu = 0.172063 (sec), leaf count = 104

$$\text{Solve}\left[57\text{RootSum}\left[-19\#1^3 + 6\sqrt[3]{38}\#1 - 19\&, \frac{\log\left(\frac{e^{-2x}(3y(x)+e^x)}{\sqrt[3]{38}\sqrt[3]{e^{-3x}}} - \#1\right)}{2\sqrt[3]{38} - 19\#1^2}\&\right] + 9c_1 + 38^{2/3} e^{2x} \left(e^{-3x}\right)^{2/3} x = 0, y$$

✓ **Maple** : cpu = 0.093 (sec), leaf count = 34

$$\left\{ y(x) = \frac{RootOf\left(-x + \int^{\_Z} \left(\_a^3 + \_a^2 - \_a + 1\right)^{-1} d\_a + \_C1\right)}{\mathrm{e}^{-x}} \right\}$$

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 = 0.270006 (sec), leaf count = 90

$$\left\{\left\{y(x) \to \frac{1}{48}\left(-12(2c_1+3)x^3 + 4(9c_1+5)x^2 - 12\left(-6c_1 + 2x^3 - 3x^2 + 6x\right)\log(x+1) - 72c_1 x + 36c_1^2 + 4x^6 - \right.\right.$$

✓ **Maple** : cpu = 0.302 (sec), leaf count = 36

$$\left\{\_C1 + \frac{x^3}{2} - \frac{3\,x^2}{4} - \frac{3\,\ln(1+x)}{2} + \frac{3\,x}{2} - \sqrt{x^2 + 3\,y(x)} = 0\right\}$$

2.700 ODE No. 700

$$y'(x) = \frac{1}{xy(x)\left(xy(x)^2 + x + 1\right)}$$

✓ **Mathematica** : cpu = 0.0692612 (sec), leaf count = 72

$$\left\{\left\{y(x) \to -\frac{\sqrt{2xW\left(c_1 e^{\frac{1}{2}\left(\frac{1}{x}-1\right)}\right) + x - 1}}{\sqrt{x}}\right\}, \left\{y(x) \to \frac{\sqrt{2xW\left(c_1 e^{\frac{1}{2}\left(\frac{1}{x}-1\right)}\right) + x - 1}}{\sqrt{x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.122 (sec), leaf count = 62

$$\left\{y(x) = \frac{1}{x}\sqrt{x\left(2\, lambertW\left(1/2\_C1\, e^{-1/2\,\frac{x-1}{x}}\right)x + x - 1\right)}, y(x) = -\frac{1}{x}\sqrt{x\left(2\, lambertW\left(1/2\_C1\, e^{-1/2\,\frac{x-1}{x}}\right)\right.}\right.$$

2.701 ODE No. 701

$$y'(x) = \frac{x^4 + x^4\log(x) - 2x^2y(x) - 2x^2y(x)\log(x) + y(x)^2 + y(x)^2\log(x) + 2e^x x - 2x - \log(x) - 1}{e^x - 1}$$

✗ **Mathematica** : cpu = 300.051 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 6.424 (sec), leaf count = 71

$$\left\{y(x) = 1\left(-x^2\left(e^{\int \frac{\ln(x)+1}{e^x-1}\,dx}\right)^2 + \_C1\,x^2 + \left(e^{\int \frac{\ln(x)+1}{e^x-1}\,dx}\right)^2 + \_C1\right)\left(-\left(e^{\int \frac{\ln(x)+1}{e^x-1}\,dx}\right)^2 + \_C1\right)^{-1}\right\}$$

2.702 ODE No. 702

$$y'(x) = \frac{-x^3 + x^3(-\log(x)) - xy(x)^2 + xy(x) - e^x y(x) - xy(x)^2\log(x)}{x\,(x - e^x)}$$

✗ **Mathematica** : cpu = 300.04 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.1 (sec), leaf count = 35

$$\left\{y(x) = \tan\left(\left(\int \frac{x\ln(x)}{e^x - x}\,dx + \int \frac{x}{e^x - x}\,dx + \_C1\right)x\right)\right\}$$

2.703 ODE No. 703

$$y'(x) = \frac{y(x)\left(x^3y(x) + x^2y(x)\log(x) - x^2 - x - x\log(x) + 1\right)}{(x-1)x}$$

✗ **Mathematica** : cpu = 302.719 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.531 (sec), leaf count = 44

$$\left\{y(x) = \frac{e^{dilog(x)}}{xe^x\,(x-1)}\left(\int -\frac{e^{dilog(x)}(x + \ln(x))}{(x-1)^2\,e^x}\,dx + \_C1\right)^{-1}\right\}$$

2.704 ODE No. 704

$$y'(x) = \frac{2ax^3y(x)^2 + 2bx^5 - y(x) + xy(x)\log(x)}{x(x\log(x) - 1)}$$

✗ **Mathematica** : cpu = 300.033 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.067 (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 = 0.062705 (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 = 0.21 (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 = 300.146 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.517 (sec), leaf count = 65

$$\left\{\int_{\_b}^{y(x)} -\frac{1}{2\_a+2}\left(-\frac{x^2(\_a+1)\ln(\_a-1)}{2} + \frac{x^2(\_a+1)\ln(\_a+1)}{2} + x^2(\_a+1)\ln(x) + 4\_a - 4\right)^{-1}\mathrm{d}\_a$$

2.707 ODE No. 707

$$y'(x) = \frac{1}{16}x(y(x)+1)^2(-\log(y(x)-1)+\log(y(x)+1)+2\log(x))^2$$

✗ **Mathematica** : cpu = 300.001 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.555 (sec), leaf count = 105

$$\left\{\int_{\_b}^{y(x)} \frac{1}{4\_a+4}\left(\frac{x^2(\_a+1)(\ln(\_a+1))^2}{4}+x^2\left(-\frac{\ln(\_a-1)}{2}+\ln(x)\right)(\_a+1)\ln(\_a+1)+\frac{x^2(\_a+1)(\mathrm{l}}{4}\right.\right.$$

2.708 ODE No. 708

$$y'(x) = \frac{(4ax-y(x)^2)^3}{y(x)(4ax-y(x)^2-1)}$$

✓ **Mathematica** : cpu = 0.341426 (sec), leaf count = 82

$$\text{Solve}\left[2ax = \text{RootSum}\left[-\#1^3+2\#1a-2a\&, \frac{\#1a\log(-\#1+4ax-y(x)^2)-a\log(-\#1+4ax-y(x)^2)}{2a-3\#1^2}\&\right]+\right.$$

✓ **Maple** : cpu = 37.689 (sec), leaf count = 229

$$\left\{\int_{\_b}^{x} -\frac{\left(4a\_a-(y(x))^2\right)^3}{-(y(x))^6+12\_a\,a(y(x))^4+(-48\_a^2a^2+2a)(y(x))^2+64\_a^3a^3-8\_a\,a^2+2a}\,\mathrm{d}\_a+\int^{y(x)}\frac{}{-\_f^6}\right.$$

2.709 ODE No. 709

$$y'(x) = \frac{x^3\sqrt{4ax-y(x)^2}+2ax+2a}{(x+1)y(x)}$$

✓ **Mathematica** : cpu = 6.04769 (sec), leaf count = 143

$$\left\{\left\{y(x)\to -\frac{1}{6}\sqrt{144ax-(6c_1+2x^3-3x^2+6x)^2+12(6c_1+2x^3-3x^2+6x)\log(x+1)-36\log^2(x+1)}\right\},\left\{y\right.\right.$$

✓ **Maple** : cpu = 0.301 (sec), leaf count = 39

$$\left\{-\sqrt{-(y(x))^2+4ax}-\frac{x^3}{3}+\frac{x^2}{2}-x+\ln(1+x)-\_C1=0\right\}$$

2.710 ODE No. 710

$$y'(x) = \frac{2x^3 + 4x^2y(x) + 2xy(x)^2 + 2x + e^{\frac{1}{x}} - \log(x)}{\log(x) - e^{\frac{1}{x}}}$$

✗ **Mathematica** : cpu = 300.1 (sec), leaf count = 0 , timed out

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✓ **Maple** : cpu = 2.651 (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 = 0.080739 (sec), leaf count = 24

$$\left\{\left\{y(x) \to e^{e^{-x-1}(ec_1 + \text{Ei}(x+1))}\right\}\right\}$$

✓ **Maple** : cpu = 0.148 (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 = 0.316665 (sec), leaf count = 102

$$\left\{\left\{y(x) \to \frac{1}{36}\left(8(3c_1 - 1)x^3 + (39 - 36c_1)x^2 + 12\left(-6c_1 + 2x^3 - 3x^2 + 6x + 11\right)\log(x+1) + 6(12c_1 - 19)x - 4\right.\right.\right.$$

✓ **Maple** : cpu = 0.399 (sec), leaf count = 38

$$\left\{\_C1 - \frac{2x^3}{3} + x^2 - 2x + 2\ln(1+x) - \sqrt{x^2 + 2x + 1 - 4y(x)} = 0\right\}$$

2.713 ODE No. 713

$$y'(x) = \frac{-a^2 - aby(x) - ab\sqrt{x} + ab + b^2x + b^2}{a\left(a(-y(x)) - a\sqrt{x} + a + bx + b\right)}$$

✓ **Mathematica** : cpu = 0.13699 (sec), leaf count = 607

$$\left\{\left\{y(x) \to \frac{\frac{1}{\text{Root}\left[\#1^6\left(16e^{12c_1}+16x^3\right)-\frac{24\#1^4x^2}{a^4}+\frac{8\#1^3x^{3/2}}{a^6}+\frac{9\#1^2x}{a^8}-\frac{6\#1\sqrt{x}}{a^{10}}+\frac{1}{a^{12}}\&,1\right]} + a\left(a(-\sqrt{x}) + a + bx + b\right)}{a^2}\right\}, \left\{y(x) -\right.\right.$$

✓ **Maple** : cpu = 0.453 (sec), leaf count = 86

$$\left\{y(x) = \frac{1}{2a}\left(3\tanh\left(\mathit{RootOf}\left(729\,x^3(\tanh(\_Z))^6\,a^6 - 2187\,x^3(\tanh(\_Z))^4\,a^6 + 2187\,x^3(\tanh(\_Z))^2\,a^6 - 729\right.\right.\right.\right.$$

2.714 ODE No. 714

$$y'(x) = -\frac{y(x)\left(x^3y(x) + x^2y(x)\log(x) - x^2 + e^x - x\log(x) - \log\left(\frac{1}{x}\right)\right)}{x\left(e^x - \log\left(\frac{1}{x}\right)\right)}$$

✗ **Mathematica** : cpu = 300.056 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 2.726 (sec), leaf count = 96

$$\left\{y(x) = 1\mathrm{e}^{\int\frac{x\ln(x)+x^2+\ln(x^{-1})-\mathrm{e}^x}{\left(-\ln(x^{-1})+\mathrm{e}^x\right)x}\,\mathrm{d}x}\left(\int\frac{x(x+\ln(x))}{-\ln(x^{-1})+\mathrm{e}^x}\mathrm{e}^{\int\frac{x\ln(x)+x^2+\ln(x^{-1})-\mathrm{e}^x}{\left(-\ln(x^{-1})+\mathrm{e}^x\right)x}\,\mathrm{d}x}\,\mathrm{d}x + \_C1\right)^{-1}\right\}$$

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 = 0.305255 (sec), leaf count = 89

$$\left\{\left\{y(x) \to -\frac{1}{3}(2c_1+3)\,x^3 + \left(c_1 + \frac{3}{4}\right)x^2 + \left(2c_1 - \frac{2x^3}{3} + x^2 - 2x\right)\log(x+1) - 2c_1x + c_1^2 + \frac{x^6}{9} - \frac{x^5}{3} + \frac{11x^4}{12} -\right.\right.$$

✓ **Maple** : cpu = 0.298 (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 = 6.28473 (sec), leaf count = 133

$$\left\{\left\{y(x) \to \left(-\frac{3}{2}\right)^{2/3} \sqrt[3]{8c_1 \log(x+1) - 4c_1^2 + x^4 - 4\log^2(x+1)}\right\}, \left\{y(x) \to \left(\frac{3}{2}\right)^{2/3} \sqrt[3]{8c_1 \log(x+1) - 4c_1^2 + x\right.$$

✓ **Maple** : cpu = 0.354 (sec), leaf count = 37

$$\left\{\int_{\_b}^{y(x)} \_a^2 \frac{1}{\sqrt{9\,x^4 - 4\,\_a^3}}\, d\_a - \ln(1+x) - \_C1 = 0\right\}$$

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 = 0.367589 (sec), leaf count = 44

$$\left\{\left\{y(x) \to -\frac{a^2}{4} - \frac{ax}{2} - 2c_1 \log(x+1) + c_1^2 - \frac{x^2}{4} + \log^2(x+1)\right\}\right\}$$

✓ **Maple** : cpu = 0.42 (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 = 0.174021 (sec), leaf count = 123

$$\text{Solve}\left[\frac{11}{3}\text{RootSum}\left[11\#1^3 + 15\sqrt[3]{11}\#1 + 11\&, \frac{\log\left(\frac{e^{x^2} x \left(3e^{x^2} y(x)+1\right)}{\sqrt[3]{11}\sqrt[3]{e^{3x^2} x^3}} - \#1\right)}{11\#1^2 + 5\sqrt[3]{11}}\&\right] = c_1 + \frac{1}{18} 11^{2/3} e^{-2x^2} \left(e^{3x^2} x^3\right)^{2/\cdots}\right.$$

✓ **Maple** : cpu = 0.082 (sec), leaf count = 44

$$\left\{y(x)=\frac{-11\,RootOf\left(-5\,x^2+20250\int^{\_Z}(121\,\_a^3+3375\,\_a-3375)^{-1}d\_a+6\,\_C1\right)-15}{45\,\mathrm{e}^{x^2}}\right\}$$

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 = 0.132237 (sec), leaf count = 44

$$\left\{\left\{y(x)\to\frac{2^{e^{-x}}}{x\left(c_1x^{-e^{-x}}e^{\mathrm{Ei}(-x)}+2^{e^{-x}}\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.265 (sec), leaf count = 57

$$\left\{y(x)=-\frac{x^{\mathrm{e}^{-x}}2^{\mathrm{e}^{-x}}\mathrm{e}^{Ei(1,x)}}{x\left(\int x^{\mathrm{e}^{-x}}2^{\mathrm{e}^{-x}}\mathrm{e}^{Ei(1,x)}\mathrm{e}^{-x}\left(\ln(2)+\ln(x)\right)\,\mathrm{d}x+\_C1\right)}\right\}$$

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 = 6.49408 (sec), leaf count = 272

$$\left\{\left\{y(x)\to\sqrt[3]{(6c_1+9)\,x^3-9\,(c_1+1)\,x^2+3\,(-6c_1+2x^3-3x^2+6x)\log(x+1)+18c_1x-9c_1^2-x^6+3x^5-6x^4}\right.\right.$$

✓ **Maple** : cpu = 0.26 (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 = 0.023044 (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 = 0.092 (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 = 92.8942 (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 = 0.355 (sec), leaf count = 70

$$\left\{y(x) = 1\mathrm{e}^{RootOf\left(-\mathrm{e}^{\_Z}\ln\left(\frac{\mathrm{e}^{\_Z}+2}{2x^4}\right)+3\_C1\,\mathrm{e}^{\_Z}+\_Z\,\mathrm{e}^{\_Z}+2\right)}\left(1 + (2\ln(x) - 1)\,\mathrm{e}^{RootOf\left(-\mathrm{e}^{\_Z}\ln\left(\frac{\mathrm{e}^{\_Z}+2}{2x^4}\right)+3\_C1\,\mathrm{e}^{\_Z}+\_Z\,\mathrm{e}^{\right.}}\right.\right.$$

2.723 ODE No. 723

$$y'(x) = \frac{2a}{32a^3x^2 - 16a^2xy(x)^2 + 2ay(x)^4 + y(x)}$$

✓ **Mathematica** : cpu = 0.0814907 (sec), leaf count = 672

$$\left\{\left\{y(x) \to -\frac{\sqrt[3]{-1024a^6c_1^3 + 9216a^5c_1x - 432a^2 + 16\sqrt{a^4\left(\left(64a^4c_1^3 - 576a^3c_1x + 27\right)^2 - 4096a^5\left(ac_1^2 + 3x\right)^3\right)}}}{12\sqrt[3]{2}a}\right.\right.$$

✓ **Maple** : cpu = 0.083 (sec), leaf count = 856

$$\left\{y(x) = -\frac{1}{12\,a}\left(-8\_C1\,a^2\sqrt[3]{\left(64\_C1^3a^4 - 576\_C1\,a^3x + 3\sqrt{-12288\_C1^4a^7x + 24576\_C1^2a^6x^2 - 12288\right.}}\right.\right.$$

2.724 ODE No. 724

$$y'(x) = -\frac{y(x)^3}{x(-y(x) + y(x)\log(x) - 1)}$$

✓ **Mathematica** : cpu = 78.0176 (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 = 0.056 (sec), leaf count = 18

$$\left\{y(x) = \left(-\mathit{lambertW}\left(\_C1\,e^{-2}x\right) + \ln(x) - 2\right)^{-1}\right\}$$

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 = 0.349819 (sec), leaf count = 19

$$\{\{y(x)\to\tan\left(c_1+\log(2)\mathrm{li}(x)+x\right)-x\}\}$$

✓ **Maple** : cpu = 0.964 (sec), leaf count = 25

$$\{y(x)=-x-\tan\left(\ln(2)\,\mathit{Ei}(1,-\ln(x))+\_C1-x\right)\}$$

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 = 0.0949559 (sec), leaf count = 607

$$\left\{\left\{y(x)\to\frac{\frac{1}{\mathrm{Root}\left[\#1^6\left(16e^{12c_1}+16x^3\right)-\frac{24\#1^4x^2}{a^4}+\frac{8\#1^3x^{3/2}}{a^6}+\frac{9\#1^2x}{a^8}-\frac{6\#1\sqrt{x}}{a^{10}}+\frac{1}{a^{12}}\&,1\right]}+a\left(a(-\sqrt{x})-bx+c\right)}{a^2}\right\},\left\{y(x)\to\right.\right.$$

✓ **Maple** : cpu = 0.315 (sec), leaf count = 83

$$\left\{y(x)=\frac{1}{2\,a}\left(3\tanh\left(\mathit{RootOf}\left(-729\,x^3(\tanh(\_Z))^6\,a^6+2187\,x^3(\tanh(\_Z))^4\,a^6-2187\,x^3(\tanh(\_Z))^2\,a^6+7\right.\right.\right.\right.$$

2.727 ODE No. 727

$$y'(x)=\frac{y(x)(y(x)+2x+2)}{(x+1)(\log(y(x))+2x-1)}$$

✓ **Mathematica** : cpu = 0.576258 (sec), leaf count = 29

$$\left\{\left\{y(x)\to\frac{W\left(e^{-2x}(c_1+\log(x+1))\right)}{c_1+\log(x+1)}\right\}\right\}$$

✓ **Maple** : cpu = 0.515 (sec), leaf count = 25

$$\left\{y(x)=\mathrm{e}^{-\mathit{lambertW}\left((\ln(1+x)-\_C1)\mathrm{e}^{-2\,x}\right)-2\,x}\right\}$$

2.728 ODE No. 728

$$y'(x) = \frac{y(x)\left(x^3 + 3y(x)^2\right)}{x\left(6y(x)^2 + x\right)}$$

✓ **Mathematica** : cpu = 0.485355 (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 = 0.351 (sec), leaf count = 50

$$\left\{\left((y(x))^{-2} + 6\,x^{-1}\right)^{-1} = \frac{x}{54}\left(e^{RootOf\left(x^2 e^{\_Z} - e^{\_Z}\ln\left(\frac{\left(e^{\_Z}+9\right)x}{2}\right) + 3\_C1\,e^{\_Z} + \_Z\,e^{\_Z} + 9\right)} + 9\right)\right\}$$

2.729 ODE No. 729

$$y'(x) = \frac{(x - y(x))y(x)}{x\left(x - y(x)^3\right)}$$

✓ **Mathematica** : cpu = 0.410327 (sec), leaf count = 315

$$\left\{\left\{y(x) \to \frac{2\sqrt[3]{2}(c_1 - \log(x))}{\sqrt[3]{2\sqrt{(6c_1 - 6\log(x))^3 + 729x^2} + 54x}} - \frac{\sqrt[3]{2\sqrt{(6c_1 - 6\log(x))^3 + 729x^2} + 54x}}{3\sqrt[3]{2}}\right\},\left\{y(x) \to \frac{}{\sqrt[3]{2\sqrt{(}}}\right.\right.$$

✓ **Maple** : cpu = 0.11 (sec), leaf count = 404

$$\left\{y(x) = \frac{1}{6}\left(\left(i\left(-27\,x + 3\sqrt{24\_C1^3 - 72\_C1^2\ln(x) + 72\_C1\,(\ln(x))^2 - 24\,(\ln(x))^3 + 81\,x^2}\right)^{\frac{2}{3}} + 6\,i\_C1\right.\right.\right.$$

2.730 ODE No. 730

$$y'(x) = \frac{e^x \left(2y(x)^{3/2} - 3e^x\right)^3}{4\sqrt{y(x)} \left(2y(x)^{3/2} - 3e^x + 2\right)}$$

✗ **Mathematica** : cpu = 50.9107 (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 + 2*y
```

✓ **Maple** : cpu = 2.064 (sec), leaf count = 41

$$\left\{ e^x - \int^{(y(x))^{\frac{3}{2}} - \frac{3e^x}{2}} \frac{2 + 2\_a}{3\_a^3 - 3\_a - 3} d\_a - \_C1 = 0 \right\}$$

2.731 ODE No. 731

$$y'(x) = \frac{2y(x) + 1}{x \left(2xy(x)^3 + xy(x)^2 - 2\right)}$$

✓ **Mathematica** : cpu = 0.346847 (sec), leaf count = 42

$$\text{Solve}\left[\frac{1}{64}\left(-4y(x)^2 + 4y(x) - \frac{16}{2xy(x) + x} - 2\log(8y(x) + 4) + 3\right) = c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.182 (sec), leaf count = 42

$$\left\{ y(x) = \frac{e^{RootOf\left(x\left(e^{\_Z}\right)^3 - 4x\left(e^{\_Z}\right)^2 + 8x\_C1\, e^{\_Z} + 2\_Z\, e^{\_Z} x + 3e^{\_Z} x + 16\right)}}{2} - \frac{1}{2} \right\}$$

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 = 0.549042 (sec), leaf count = 105

$$\left\{\left\{y(x) \to -\frac{a^2}{4} - \frac{ax}{2} - \frac{2c_1x^3}{3} + c_1x^2 + \left(2c_1 - \frac{2x^3}{3} + x^2 - 2x\right)\log(x+1) - 2c_1x + c_1^2 + \frac{x^6}{9} - \frac{x^5}{3} + \frac{11x^4}{12} - x^3\right.\right.$$

✓ **Maple** : cpu = 0.396 (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 = 300.012 (sec), leaf count = 0 , timed out

```
$Aborted
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(y(x),x) = (2*x*sin(x)-ln(2*x)+ln(2*x)*x^4-2*ln(2*x)*x^2*y(x)+ln(2*x)*y(x)^2)/sin
```

2.734 ODE No. 734

$$y'(x) = \frac{y(x)\left(x^3 - x\log(y(x)) - \log(y(x))\right)}{x+1}$$

✓ **Mathematica** : cpu = 0.13281 (sec), leaf count = 37

$$\left\{\left\{y(x) \to \exp\left(-c_1e^{-x} - e^{-x-1}\text{Ei}(x+1) + x^2 - 3x + 4\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.154 (sec), leaf count = 39

$$\left\{y(x) = \frac{\mathrm{e}^{x^2}\mathrm{e}^4}{\left(\mathrm{e}^x\right)^3}\mathrm{e}^{\frac{\_C1}{\mathrm{e}^x}}\mathrm{e}^{\frac{Ei(1,-1-x)}{\mathrm{e}^x\mathrm{e}}}\right\}$$

2.735 ODE No. 735

$$y'(x) = \frac{(2y(x)\log(x) - 1)^3}{x(-y(x) + 2y(x)\log(x) - 1)}$$

✗ **Mathematica** : cpu = 299.999 (sec), leaf count = 0 , timed out

```
$Aborted
```

✓ **Maple** : cpu = 0.076 (sec), leaf count = 78

$$\left\{y(x) = \frac{71\,RootOf\left(-82944\int^{\_Z}\left(5041\,\_a^3 - 27648\,\_a + 27648\right)^{-1}d\_a - 16\,\ln(x) + 3\,\_C1\right) - 1}{(142\,\ln(x) - 71)\,RootOf\left(-82944\int^{\_Z}\left(5041\,\_a^3 - 27648\,\_a + 27648\right)^{-1}d\_a - 16\,\ln(x) + 3\,\_C1\right) -}\right.$$

2.736 ODE No. 736

$$y'(x) = \frac{x^4 - 2x^2y(x) + 2x^2 + y(x)^2 + 2x - 1}{x + 1}$$

✓ **Mathematica** : cpu = 0.119052 (sec), leaf count = 30

$$\left\{\left\{y(x) \to -\frac{2(x+1)^2}{-2c_1 + x^2 + 2x} + x^2 + 1\right\}\right\}$$

✓ **Maple** : cpu = 0.2 (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 = 0.0374013 (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 = 0.091 (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 = 0.600704 (sec), leaf count = 1200

$$\left\{\left\{y(x) \to \frac{-2(4a + e^{c_1}) + \frac{2\sqrt[3]{2304x^2a^4 - 64x^3a^3 + 576e^{c_1}x^2a^3 - 48e^{c_1}x^3a^2 - 216x^3a^2 - 12e^{2c_1}x^3a - e^{3c_1}x^3 + \sqrt{x^3\left(x\left(-2304a^4 - 64(9e^{c_1} -\right.\right.}}}{x}}{}\right.\right.$$

✓ **Maple** : cpu = 0.868 (sec), leaf count = 1054

$$\left\{y(x) = \frac{1}{24\_C1\,ax}\left(-2\,x\sqrt[3]{-216\_C1^3a^2x^3 + 576\_C1^2a^3x^2 + 12\,a\_C1\,x^2\sqrt{\frac{(324\_C1^4a^2 + 3\_C1)\,x^3 + (-}{}}}\right.\right.$$

2.739 ODE No. 739

$$y'(x) = \frac{2y(x) + 1}{x\,(2xy(x)^2 + xy(x) - 2)}$$

✓ **Mathematica** : cpu = 0.371524 (sec), leaf count = 34

$$\text{Solve}\left[\frac{1}{8}\left(-2y(x) - \frac{4}{2xy(x) + x} + \log(4y(x) + 2) - 1\right) = c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.181 (sec), leaf count = 35

$$\left\{y(x) = \frac{e^{RootOf\left(x(e^{-Z})^2 + 2\,x\_C1\,e^{-Z} - \_Z\,e^{-Z}x - e^{-Z}x + 4\right)}}{2} - \frac{1}{2}\right\}$$

2.740 ODE No. 740

$$y'(x) = \frac{x^4 - 2x^2y(x)^2 + y(x)^4 + x}{y(x)}$$

✓ **Mathematica** : cpu = 0.0746008 (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 = 0.107 (sec), leaf count = 72

$$\left\{y(x) = \frac{\sqrt{2}}{2\_C1 + 2\,x}\sqrt{(\_C1 + x)\,(2\_C1\,x^2 + 2\,x^3 - 1)}, y(x) = -\frac{\sqrt{2}}{2\_C1 + 2\,x}\sqrt{(\_C1 + x)\,(2\_C1\,x^2 + 2\,x^3 -}\right.$$

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 = 3.97087 (sec), leaf count = 172

$$\text{Solve}\left[x^2 = a^{3/2}\text{RootSum}\left[\#1^3b^3 + 3\#1^2ab^2y(x)^2 + \#1a^{3/2}b^2 + 3\#1a^2by(x)^4 + a^{5/2}by(x)^2 + a^{5/2}b + a^3y(x)^6\&,\right.\right.$$

✓ **Maple** : cpu = 1.056 (sec), leaf count = 246

$$\left\{\int_{\_b}^{x}\frac{\left(\_a^2b + a(y(x))^2\right)^3\_a}{a^3}\left(b\left((y(x))^2 + 1\right)a^{\frac{5}{2}} + a^{\frac{3}{2}}b^2\_a^2 + \left(\_a^2b + a(y(x))^2\right)^3\right)^{-1}\mathrm{d}\_a + \int^{y(x)}1\left(\left((-\_f^2\right.\right.\right.$$

2.742 ODE No. 742

$$y'(x) = -\frac{(-\cos(y(x)) + x + 1)\cos(y(x))}{(x+1)(x\sin(y(x)) - 1)}$$

✓ **Mathematica** : cpu = 5.9824 (sec), leaf count = 221

$$\left\{\left\{y(x) \to -\sec^{-1}\left(\frac{-\sqrt{2c_1\log(x+1) + c_1^2 - x^2 + \log^2(x+1) + 1} + c_1x + x\log(x+1)}{x^2 - 1}\right)\right\}, \left\{y(x) \to \sec^{-1}\left(\right.\right.\right.$$

✓ **Maple** : cpu = 1.905 (sec), leaf count = 239

$$\left\{y(x) = \arctan\left(\frac{1}{\_C1^2 - 2\_C1\ \ln(1+x) + (\ln(1+x))^2 + 1}\left(\left(-\ln(1+x) + \_C1\right)\sqrt{(\ln(1+x))^2 - 2\_C1\ \ln}\right.\right.\right.$$

2.743 ODE No. 743

$$y'(x) = -\frac{i\left(x^4 + 8x^2y(x)^2 + 16y(x)^4 + 8ix\right)}{32y(x)}$$

✗ **Mathematica** : cpu = 47.7017 (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], y[x
```

✓ **Maple** : cpu = 0.509 (sec), leaf count = 264

$$\left\{y(x) = \sqrt{2}\sqrt{\left(\left(i\sqrt{3} + 1\right)\_C1\ \mathrm{Ai}^{(1)}\left(-\frac{\left(\sqrt{3} - i\right)x}{2}\right) + \left(i\sqrt{3} + 1\right)\mathrm{Bi}^{(1)}\left(-\frac{\left(\sqrt{3} - i\right)x}{2}\right) - \frac{x^2}{2}\left(\mathrm{Ai}\left(-\frac{\left(\sqrt{3} - \right.}{2}\right.\right.\right.}\right.$$

2.744 ODE No. 744

$$y'(x) = \frac{x}{x^4 + 2x^2y(x)^2 + y(x)^4 - y(x)}$$

✓ **Mathematica** : cpu = 0.0577546 (sec), leaf count = 534

$$\left\{\left\{y(x) \to \frac{\sqrt[3]{144c_1x^2 + 2\sqrt{(12x^2 - 4c_1^2)^3 + 4(36c_1x^2 + 4c_1^3 - 27)^2} + 16c_1^3 - 108}}{6\sqrt[3]{2}} + \frac{}{3\sqrt[3]{36c_1x^2 + 3\sqrt{3}\sqrt{32c_1^2x^4}}}\right.\right.$$

✓ **Maple** : cpu = 0.224 (sec), leaf count = 621

$$\left\{y(x) = \frac{1}{12}\left(-2\_C1\sqrt[3]{-36\_C1\,x^2 - 54 - \_C1^3 + 6\sqrt{48\,x^6 + 24\,x^4\_C1^2 + (3\_C1^4 + 108\_C1)\,x^2 + 3\_C}}\right.\right.$$

2.745 ODE No. 745

$$y'(x) = \frac{(y(x)\log(x) - 1)^3}{x(-y(x) + y(x)\log(x) - 1)}$$

✗ **Mathematica** : cpu = 299.999 (sec), leaf count = 0 , timed out

```
$Aborted
```

✓ **Maple** : cpu = 0.074 (sec), leaf count = 78

$$\left\{y(x) = \frac{47\,RootOf\left(-27783\int^{\_Z}(2209\_a^3 - 9261\_a + 9261)^{-1}d\_a - 7\ln(x) + 3\_C1\right) - 84}{(47\ln(x) - 47)\,RootOf\left(-27783\int^{\_Z}(2209\_a^3 - 9261\_a + 9261)^{-1}d\_a - 7\ln(x) + 3\_C1\right) - 84\ln}\right.$$

2.746 ODE No. 746

$$y'(x) = -\frac{i(x^4 + 2x^2y(x)^2 + y(x)^4 + ix)}{y(x)}$$

✗ **Mathematica** : cpu = 46.2312 (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 = 0.485 (sec), leaf count = 232

$$\left\{y(x) = \frac{\sqrt{2}}{2\,\mathrm{Ai}\left(-\sqrt[3]{-8}\,ix\right)\_C1 + 2\,\mathrm{Bi}\left(-\sqrt[3]{-8}\,ix\right)}\sqrt{\left(\left(i\sqrt{3} + 1\right)\_C1\,\mathrm{Ai}^{(1)}\left(-\sqrt[3]{-8}\,ix\right) + \left(i\sqrt{3} + 1\right)\mathrm{Bi}^{(1)}\left(-\sqrt[3]{-}\right.\right.}\right.$$

2.747 ODE No. 747

$$y'(x) = -\frac{y(x)\cot(x)\left(x^2 y(x)(-\log(2x)) + x\log(2x) + \tan(x)\right)}{x}$$

✗ **Mathematica** : cpu = 300.002 (sec), leaf count = 0 , timed out

```
$Aborted
```

✓ **Maple** : cpu = 0.564 (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 = 0.41323 (sec), leaf count = 286

$$\left\{\left\{y(x) \to \frac{2\sqrt[3]{2}(c_1+\log(x))}{\sqrt[3]{\sqrt{2916x^2-864\left(c_1+\log(x)\right)^3}+54x}} + \frac{\sqrt[3]{\frac{1}{6}\sqrt{2916x^2-864\left(c_1+\log(x)\right)^3}+9x}}{3^{2/3}}\right\}, \left\{y(x) \to \frac{(-1}{}\right.\right.$$

✓ **Maple** : cpu = 0.106 (sec), leaf count = 404

$$\left\{y(x) = \frac{1}{6}\left(\left(i\left(27\,x+3\sqrt{-24\_C1^3-72\_C1^2\ln(x)-72\_C1\,(\ln(x))^2-24\,(\ln(x))^3+81\,x^2}\right)^{\frac{2}{3}} - 6\,i\_C1\right.\right.\right.$$

2.749 ODE No. 749

$$y'(x) = \frac{x(x-y(x))^2(y(x)+x)^2}{y(x)}$$

✓ **Mathematica** : cpu = 0.116923 (sec), leaf count = 102

$$\left\{\left\{y(x) \to -\frac{\sqrt{(x^2-1)\,e^{4c_1+2x^2}+x^2+1}}{\sqrt{e^{4c_1+2x^2}+1}}\right\}, \left\{y(x) \to \frac{\sqrt{(x^2-1)\,e^{4c_1+2x^2}+x^2+1}}{\sqrt{e^{4c_1+2x^2}+1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.155 (sec), leaf count = 192

$$\left\{y(x) = 1\sqrt{\left((x^2+1)\,\mathrm{e}^{-\frac{x^2(x^2+2)}{2}} + \_C1\,(x^2-1)\,\mathrm{e}^{-\frac{x^2(x^2-2)}{2}}\right)\left(\_C1\,\mathrm{e}^{-\frac{x^2(x^2-2)}{2}} + \mathrm{e}^{-\frac{x^2(x^2+2)}{2}}\right)\left(\_C1\,\mathrm{e}^{-\frac{x^2(x^2-2}{2}}\right.}\right.$$

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 = 0.417148 (sec), leaf count = 68

$$\left\{\left\{y(x) \to -\frac{\sqrt{x}\sqrt{W\left(\frac{6e^{2(c_1+x)}}{x}\right)}}{\sqrt{6}}\right\}, \left\{y(x) \to \frac{\sqrt{x}\sqrt{W\left(\frac{6e^{2(c_1+x)}}{x}\right)}}{\sqrt{6}}\right\}\right\}$$

✓ **Maple** : cpu = 0.325 (sec), leaf count = 49

$$\left\{\left((y(x))^{-2} + 6\,x^{-1}\right)^{-1} = \frac{x}{54}\left(\mathrm{e}^{\mathit{RootOf}\left(-\mathrm{e}^{\_Z}\ln\left(\frac{\left(\mathrm{e}^{\_Z}+9\right)x}{2}\right)+3\_C1\,\mathrm{e}^{\_Z}+\_Z\,\mathrm{e}^{\_Z}+2\,\mathrm{e}^{\_Z}x+9\right)} + 9\right)\right\}$$

2.751 ODE No. 751

$$y'(x) = \frac{y(x)\left(x^4 + x\log(y(x)) + \log(y(x))\right)}{x(x+1)}$$

✓ **Mathematica** : cpu = 0.0901133 (sec), leaf count = 29

$$\left\{\left\{y(x) \to (x+1)^x e^{\frac{1}{2}x\left(2c_1+x^2-2x\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.118 (sec), leaf count = 26

$$\left\{y(x) = \frac{(1+x)^x\,\mathrm{e}^{x\_C1}}{\mathrm{e}^{x^2}}\mathrm{e}^{\frac{x^3}{2}}\right\}$$

2.752 ODE No. 752

$$y'(x) = \frac{\cos(y(x))\left(x^3\cos(y(x)) - x - 1\right)}{(x+1)(x\sin(y(x)) - 1)}$$

✗ **Mathematica** : cpu = 33.9311 (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 = 1.526 (sec), leaf count = 723

$$\left\{y(x) = \arctan\left(\frac{1}{36\,(\ln(1+x))^2 + \left(-24\,x^3 + 36\,x^2 - 72\_C1 - 72\,x\right)\ln(1+x) + 4\,x^6 - 12\,x^5 + 33\,x^4 + (24\_C\right.\right.$$

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 = 0.145782 (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 = 0.186 (sec), leaf count = 38

$$\left\{y(x) = e^{-12\,\frac{x}{3\,x^4-4\,x^3+6\,x^2+12\,\ln(1+x)-12\_C1-12\,x}}\right\}$$

2.754 ODE No. 754

$$y'(x) = \frac{x^3 + xy(x)^2 + xy(x) + y(x)^3}{x^2}$$

✓ **Mathematica** : cpu = 0.0339183 (sec), leaf count = 47

$$\text{Solve}\left[c_1 + x = \text{RootSum}\left[\#1^3 + \#1^2 + 1\&, \frac{\log\left(\frac{y(x)}{x} - \#1\right)}{3\#1^2 + 2\#1}\&\right], y(x)\right]$$

✓ **Maple** : cpu = 0.02 (sec), leaf count = 26

$$\left\{y(x) = RootOf\left(-\int^{\_Z}\left(\_a^3 + \_a^2 + 1\right)^{-1} d\_a + x + \_C1\right)x\right\}$$

2.755 ODE No. 755

$$y'(x) = \frac{y(x)^{3/2}}{x^2 - 2xy(x) + y(x)^2 + y(x)^{3/2}}$$

✓ **Mathematica** : cpu = 0.222135 (sec), leaf count = 2213

$$\left\{\left\{y(x) \to \frac{1}{3}\left(2\left(x + e^{c_1} + 2e^{2c_1}\right) - \sqrt[3]{x^3 + 3e^{c_1}x^2 - 3e^{2c_1}(4x-1)x - 96e^{5c_1} - 64e^{6c_1} + 6e^{4c_1}(8x-5) + e^{3c_1}(12\right.\right.\right.$$

✓ **Maple** : cpu = 0.11 (sec), leaf count = 44

$$\left\{2\,\frac{\sqrt{y(x)}}{y(x) - x} + (y(x) - x)^{-1} - 2\,\frac{x}{\sqrt{y(x)}\,(y(x) - x)} - \_C1 = 0\right\}$$

2.756 ODE No. 756

$$y'(x) = \frac{x^6 + 2x^3y(x) + x^2y(x)^2 + y(x)^3}{x^4}$$

✓ **Mathematica** : cpu = 0.10973 (sec), leaf count = 93

$$\text{Solve}\left[87\text{RootSum}\left[-29\#1^3 + 3\sqrt[3]{29}\#1 - 29\&, \frac{\log\left(\frac{x^2+3y(x)}{\sqrt[3]{29}\sqrt[3]{\frac{1}{x^6}}x^4} - \#1\right)}{\sqrt[3]{29} - 29\#1^2}\&\right] + 9c_1 + 29^{2/3}\left(\frac{1}{x^6}\right)^{2/3}x^5 = 0, y(x)\right]$$

✓ **Maple** : cpu = 0.036 (sec), leaf count = 37

$$\left\{y(x) = \frac{\left(-3 + 29\,\mathit{RootOf}\left(-81\int^{\_Z}\left(841\_a^3 - 27\_a + 27\right)^{-1}d\_a + x + 3\_C1\right)\right)x^2}{9}\right\}$$

2.757 ODE No. 757

$$y'(x) = \frac{x^3 + 2x^2 - 4xy(x) - 4x - 8}{2x^2 - 8y(x) + 4x - 8}$$

✓ **Mathematica** : cpu = 0.0362727 (sec), leaf count = 33

$$\left\{\left\{y(x) \to \frac{1}{4}\left(8W\left(-e^{c_1 - \frac{x}{4} - 1}\right) + x^2 + 2x + 4\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.068 (sec), leaf count = 26

$$\left\{y(x) = \frac{x^2}{4} + 2\,\mathit{lambertW}\left(1/2\_C1\,e^{-x/4}e^{-1/2}\right) + \frac{x}{2} + 1\right\}$$

2.758 ODE No. 758

$$y'(x) = \frac{y(x)\left(x^3y(x) + 2x + 2\right)}{(x+1)(\log(y(x)) + 2x - 1)}$$

✓ **Mathematica** : cpu = 1.16998 (sec), leaf count = 459

$$\left\{\left\{y(x) \to \frac{6W\left(-\frac{1}{6}\sqrt[6]{e^{-12x}\left(6c_1 + 2x^3 - 3x^2 + 6x - 6\log(x+1)\right)^6}\right)}{6c_1 + 2x^3 - 3x^2 + 6x - 6\log(x+1)}\right\}, \left\{y(x) \to \frac{6W\left(\frac{1}{6}\sqrt[6]{e^{-12x}\left(6c_1 + 2x^3 - 3\right.}\right.}{6c_1 + 2x^3 - 3x^2 + 6}\right.$$

✓ **Maple** : cpu = 0.238 (sec), leaf count = 41

$$\left\{y(x) = \mathrm{e}^{-\mathit{lambertW}\left(-\frac{\left(-2\,x^3+3\,x^2+6\,\ln(1+x)+6\_\mathit{C1}-6\,x\right)\mathrm{e}^{-2\,x}}{6}\right)-2\,x}\right\}$$

2.759 ODE No. 759

$$y'(x) = -\frac{ix\left(x^8+18x^4y(x)^2+54ix^2+81y(x)^4\right)}{243y(x)}$$

✗ **Mathematica** : cpu = 41.0183 (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]^4))/y[
```

✓ **Maple** : cpu = 0.655 (sec), leaf count = 305

$$\left\{y(x) = -\frac{\sqrt{3}}{3\,x}\sqrt{\left(J_{\frac{1}{3}}\left(\left(\frac{2}{27}-\frac{2\,i}{27}\right)\sqrt{6}x^3\right)\_\mathit{C1}+Y_{\frac{1}{3}}\left(\left(\frac{2}{27}-\frac{2\,i}{27}\right)\sqrt{6}x^3\right)\right)\left(-9\,\left(1/27\,x^6+i\right)\_\mathit{C1}\,J_{1/3}\left(\left(\frac{2}{27}\right.\right.\right.}\right.$$

2.760 ODE No. 760

$$y'(x) = \frac{\left(xy(x)^2+1\right)^3}{x^4y(x)\left(xy(x)^2+x+1\right)}$$

✓ **Mathematica** : cpu = 2.38317 (sec), leaf count = 85

$$\text{Solve}\left[5\left(c_1+\frac{1}{x}\right)+2\log\left(xy(x)^2-x+1\right)+\tan^{-1}\left(2xy(x)^4+2(x+1)y(x)^2+x+1\right)=\log\left(2x^2y(x)^4+x^2+2\right.\right.$$

✓ **Maple** : cpu = 1.388 (sec), leaf count = 137

$$\left\{\frac{\left(2\left(y(x)\right)^4+2\left(y(x)\right)^2+1\right)\left(-1+y(x)\right)\left(1+y(x)\right)\left(2\,\ln\left(x(y(x))^2-x+1\right)x-\ln\left(2\,x^2(y(x))^4+\left(2\,x^2+4\,x\right)\right.\right.}{5\,x\left(2\,\left(y\left(\right.\right.\right.}\right.$$

2.761 ODE No. 761

$$y'(x) = \frac{-x^3 + 4x^2 - 4xy(x) - 4x + 8}{2x^2 + 8y(x) - 8x + 8}$$

✓ **Mathematica** : cpu = 0.030058 (sec), leaf count = 26

$$\left\{\left\{y(x) \to W\left(-e^{c_1-x-1}\right) - \frac{x^2}{4} + x\right\}\right\}$$

✓ **Maple** : cpu = 0.066 (sec), leaf count = 18

$$\left\{y(x) = -\frac{x^2}{4} + \mathit{lambertW}\left(\frac{\_C1}{\mathrm{e}^x}\right) + x\right\}$$

2.762 ODE No. 762

$$y'(x) = -\frac{y(x)(x\log(y(x)) + \log(y(x)) - x)}{x(x+1)}$$

✓ **Mathematica** : cpu = 0.0720348 (sec), leaf count = 26

$$\left\{\left\{y(x) \to (x+1)^{-1/x} e^{1-\frac{c_1}{x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.114 (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 = 0.071312 (sec), leaf count = 21

$$\left\{\left\{y(x) \to \left(\frac{x}{x+1}\right)^x e^{c_1 x}\right\}\right\}$$

✓ **Maple** : cpu = 0.106 (sec), leaf count = 14

$$\left\{y(x) = \left(\frac{x\_C1}{1+x}\right)^x\right\}$$

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 = 0.110148 (sec), leaf count = 46

$$\left\{\left\{y(x) \to (x+1)^{\frac{1}{x}} \exp\left(-\frac{12c_1 - 3x^4 + 4x^3 - 6x^2 + 12x + 25}{12x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.125 (sec), leaf count = 36

$$\left\{y(x) = e^{\frac{x^3}{4}} e^{-\frac{x^2}{3}} e^{\frac{x}{2}} \sqrt[x]{1+x} e^{-\frac{\_C1}{x}} e^{-1}\right\}$$

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 = 299.998 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.236 (sec), leaf count = 106

$$\left\{y(x) = \frac{e^{dilog(1+x)} x^{\ln(1+x)}}{x e^{dilog(x)}} e^{-\frac{(\ln(x))^2}{2}} \left(\int -\frac{e^{dilog(1+x)} x^{\ln(1+x)}}{x e^{dilog(x)}} e^{-\frac{(\ln(x))^2}{2}} \ln\left(\frac{(x-1)(1+x)}{x}\right) \left(x^{\ln\left(\frac{(x-1)(1+x)}{x}\right)}\right)^{-1} dx\right.$$

2.766 ODE No. 766

$$y'(x) = \frac{y(x)\left(x^2y(x)\log\left(\frac{(x-1)(x+1)}{x}\right) - x\log\left(\frac{(x-1)(x+1)}{x}\right) - \log(x)\right)}{x\log(x)}$$

✗ **Mathematica** : cpu = 299.998 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.258 (sec), leaf count = 89

$$\left\{y(x) = 1e^{\int \frac{1}{x\ln(x)}\left(-x\ln\left(\frac{(x-1)(1+x)}{x}\right) - \ln(x)\right) dx} \left(\int -\frac{x}{\ln(x)} e^{\int \frac{1}{x\ln(x)}\left(-x\ln\left(\frac{(x-1)(1+x)}{x}\right) - \ln(x)\right) dx} \ln\left(\frac{(x-1)(1+x)}{x}\right) dx\right.$$

2.767 ODE No. 767

$$y'(x) = \frac{-x^3 + 2x^2 - 8xy(x) - 8x + 32}{4x^2 + 32y(x) - 8x + 32}$$

✓ **Mathematica** : cpu = 0.0276981 (sec), leaf count = 35

$$\left\{\left\{y(x) \to 4W\left(-e^{c_1 - \frac{x}{16} - 1}\right) - \frac{x^2}{8} + \frac{x}{4} + 3\right\}\right\}$$

✓ **Maple** : cpu = 0.069 (sec), leaf count = 26

$$\left\{y(x) = -\frac{x^2}{8} + 4\, lambertW\left(1/4\_C1\, \mathrm{e}^{-x/16}\mathrm{e}^{-3/4}\right) + \frac{x}{4} + 3\right\}$$

2.768 ODE No. 768

$$y'(x) = \frac{y(x)(y(x) + 1)}{x(xy(x) - y(x) - 1)}$$

✓ **Mathematica** : cpu = 1.11725 (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 = 0.127 (sec), leaf count = 26

$$\left\{y(x) = -\left(x lambertW\left(\frac{1}{x\mathrm{e}^{x^{-1}}\_C1}\right) + 1\right)^{-1}\right\}$$

2.769 ODE No. 769

$$y'(x) = -\frac{ix(x^8 + 8x^4y(x)^2 + 16ix^2 + 16y(x)^4)}{32y(x)}$$

✗ **Mathematica** : cpu = 42.8073 (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))/y[x]
```

✓ **Maple** : cpu = 0.49 (sec), leaf count = 251

$$\left\{y(x) = -\frac{\sqrt{4}}{2\,x}\sqrt{\left(-2\_C1\ (1/8\,x^6 + i)\,J_{1/3}\left((1/3 - i/3)\,x^3\right) + \left(-\frac{x^6}{4} - 2\,i\right)Y_{\frac{1}{3}}\left(\left(\frac{1}{3} - \frac{i}{3}\right)x^3\right) + (1 + i)\,x^3\left(J_{\frac{4}{3}}\right.\right.}\right.$$

2.770 ODE No. 770

$$y'(x)=\frac{2y(x)^6}{32x^2y(x)^4+y(x)^3+16xy(x)^2+2}$$

✓ **Mathematica** : cpu = 0.151102 (sec), leaf count = 687

$$\left\{\left\{y(x)\to\frac{2\sqrt[3]{2}\sqrt[3]{4608c_1^2x^2+3\sqrt{3}\sqrt{(1-16c_1x)^2\left(2048c_1^2x^2+64c_1\left(4c_1^3-9\right)x-16c_1^3+4096x^3+27\right)}-720c_1x}}{6(1-}\right.\right.$$

✓ **Maple** : cpu = 0.141 (sec), leaf count = 1105

$$\left\{y(x)=\frac{1}{96\,x+6\_C1}\left(32\,x\_C1\,\sqrt[3]{96\,\sqrt{3}\,(\_C1/16+x)\,\sqrt{(4096\,x^3+27)\_C1^4+576\,x\_C1^3+2048\_C1^2x^2}}\right.\right.$$

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 = 0.0348667 (sec), leaf count = 48

$$\left\{\left\{y(x)\to-\frac{abx^2+8W\left(-e^{-\frac{b^2x}{4}+c_1-1}\right)+2b^2x+4b+8}{4b}\right\}\right\}$$

✓ **Maple** : cpu = 0.148 (sec), leaf count = 84

$$\left\{y(x)=\frac{1}{4\,b}\left(-ax^2b-2\,b^2x-4\,b+4\,\mathrm{e}^{1/4\,\frac{1}{a}\left(-4\,lambertW\left(-1/2\,\mathrm{e}^{-1/4\,b^2x}\mathrm{e}^{-1/2\,\frac{\_C1\,b^2}{a}}\mathrm{e}^{-b/2}\mathrm{e}^{-1}\right)a+(-b^2x-2\,b-4)a-2\_C1\,b^2\right)}\right.\right.$$

2.772 ODE No. 772

$$y'(x) = \frac{y(x)\log(y(x))(x\log(y(x)) + x + 1)}{x(x+1)}$$

✓ **Mathematica** : cpu = 0.0694948 (sec), leaf count = 21

$$\left\{\left\{y(x) \to e^{\frac{x}{c_1 - x + \log(x+1)}}\right\}\right\}$$

✓ **Maple** : cpu = 0.125 (sec), leaf count = 18

$$\left\{y(x) = \mathrm{e}^{\frac{x}{\ln(1+x) + \_C1 - x}}\right\}$$

2.773 ODE No. 773

$$y'(x) = \frac{y(x)^2 + xy(x) + x}{(x-1)(y(x)+x)}$$

✓ **Mathematica** : cpu = 0.0794805 (sec), leaf count = 59

$$\text{Solve}\left[\frac{1}{2}\log\left(\frac{x^2 + xy(x) + y(x)^2}{x^2}\right) + \frac{\tan^{-1}\left(\frac{2y(x)+x}{\sqrt{3}x}\right)}{\sqrt{3}} + \log(x) = c_1 + \log(1-x), y(x)\right]$$

✓ **Maple** : cpu = 0.305 (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 = 0.0316045 (sec), leaf count = 46

$$\left\{\left\{y(x) \to -\frac{8W\left(-e^{-\frac{a^2x}{4} + c_1 - 1}\right) + 2a^2x + a(x^2+4) + 8}{4a}\right\}\right\}$$

✓ **Maple** : cpu = 0.105 (sec), leaf count = 51

$$\left\{y(x) = \frac{1}{4\,a}\left(-2\,a^2x - ax^2 - 8\,\mathit{lambertW}\left(-1/2\,\mathrm{e}^{-1/4\,a^2x}\mathrm{e}^{-a/2}\mathrm{e}^{-1}\mathrm{e}^{1/4\_C1\,a^2}\right) - 4\,a - 8\right)\right\}$$

2.775 ODE No. 775

$$y'(x) = \frac{-y(x) + \sqrt{y(x)} + x}{-y(x) + \sqrt{y(x)} + x + 1}$$

✓ **Mathematica** : cpu = 0.107182 (sec), leaf count = 943

$$\{\{y(x) \to \text{Root}[x^6 - 2e^{3c_1}x^3 + e^{6c_1} + \#1^6 + (-6x-6)\#1^5 + (15x^2+24x+9)\#1^4 + (-20x^3 - 36x^2 - 18x + 2$$

✓ **Maple** : cpu = 0.096 (sec), leaf count = 44

$$\left\{-2(y(x))^{3/2} + (y(x))^3 + (-3x-3)(y(x))^2 + (3x^2+3x)y(x) - x^3 - \_C1 = 0\right\}$$

2.776 ODE No. 776

$$y'(x) = \frac{y(x)\left(x^2 y(x)\log\left(\frac{x^2+1}{x}\right) - x\log\left(\frac{x^2+1}{x}\right) - \log\left(\frac{1}{x}\right)\right)}{x\log\left(\frac{1}{x}\right)}$$

✗ **Mathematica** : cpu = 300.04 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 1.05 (sec), leaf count = 96

$$\left\{y(x) = 1\mathrm{e}^{\int \frac{1}{x\ln(x^{-1})}\left(-\ln\left(\frac{x^2+1}{x}\right)x - \ln(x^{-1})\right)\mathrm{d}x}\left(\int -\frac{x}{\ln(x^{-1})}\mathrm{e}^{\int \frac{1}{x\ln(x^{-1})}\left(-\ln\left(\frac{x^2+1}{x}\right)x - \ln(x^{-1})\right)\mathrm{d}x}\ln\left(\frac{x^2+1}{x}\right)\mathrm{d}x + \_C\right.\right.$$

2.777 ODE No. 777

$$y'(x) = \frac{y(x)(y(x)+1)}{x(xy(x)^4 - y(x) - 1)}$$

✓ **Mathematica** : cpu = 0.142795 (sec), leaf count = 34

$$\text{Solve}\left[y(x) + \frac{3}{2} = c_1 + \frac{y(x)^2}{2} + \frac{1}{xy(x)} + \log(y(x)+1), y(x)\right]$$

✓ **Maple** : cpu = 0.145 (sec), leaf count = 51

$$\left\{y(x) = \mathrm{e}^{RootOf\left(x(\mathrm{e}^{\_Z})^3 - 5x(\mathrm{e}^{\_Z})^2 + 2x\_C1\,\mathrm{e}^{\_Z} + 2\_Z\,\mathrm{e}^{\_Z}x + 7\,\mathrm{e}^{\_Z}x - 2x\_C1 - 2x\_Z - 3x + 2\right)} - 1\right\}$$

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 = 0.0917695 (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 = 0.029 (sec), leaf count = 37

$$\left\{y(x) = \frac{-3 + 29\,\mathit{RootOf}\left(-81\int^{\_Z}\left(841\_a^3 - 27\_a + 27\right)^{-1} d\_a + x + 3\_C1\right)}{9\,x^3}\right\}$$

2.779 ODE No. 779

$$y'(x) = \frac{x^3 y(x) + x^3 + x y(x)^2 + y(x)^3}{(x-1)x^3}$$

✓ **Mathematica** : cpu = 0.0484155 (sec), leaf count = 51

$$\text{Solve}\left[4c_1 + \log\left(\frac{y(x)^2}{x^2} + 1\right) + 4\log(1-x) = 2\left(\log\left(\frac{y(x)+x}{x}\right) + \tan^{-1}\left(\frac{y(x)}{x}\right) + 2\log(x)\right), y(x)\right]$$

✓ **Maple** : cpu = 0.105 (sec), leaf count = 50

$$\left\{\frac{1}{2}\ln\left(\frac{y(x)+x}{x}\right) - \frac{1}{4}\ln\left(\frac{(y(x))^2 + x^2}{x^2}\right) + \frac{1}{2}\arctan\left(\frac{y(x)}{x}\right) + \ln(x) - \ln(x-1) - \_C1 = 0\right\}$$

2.780 ODE No. 780

$$y'(x) = \frac{x\sqrt{x^2 + y(x)^2} + x y(x) + y(x)}{x(x+1)}$$

✓ **Mathematica** : cpu = 0.0273206 (sec), leaf count = 15

$$\{\{y(x) \to x\sinh(c_1 + \log(x+1))\}\}$$

✓ **Maple** : cpu = 0.451 (sec), leaf count = 27

$$\left\{\_C1 + \frac{1}{x(1+x)}\left(\sqrt{(y(x))^2 + x^2} + y(x)\right) = 0\right\}$$

2.781 ODE No. 781

$$y'(x) = \frac{y(x)\left(x^4 + x^3 + 3y(x)^2 + x\right)}{x\left(6y(x)^2 + x\right)}$$

✓ **Mathematica** : cpu = 0.558621 (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 = 0.345 (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

$$y'(x) = \frac{y(x)\coth\left(\frac{1}{x}\right)\left(x^2y(x)\log\left(\frac{x^2+1}{x}\right) - x\log\left(\frac{x^2+1}{x}\right) - \tanh\left(\frac{1}{x}\right)\right)}{x}$$

✗ **Mathematica** : cpu = 300. (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 2.376 (sec), leaf count = 96

$$\left\{y(x) = 1e^{\int \frac{1}{x\tanh\left(x^{-1}\right)}\left(-\ln\left(\frac{x^2+1}{x}\right)x-\tanh\left(x^{-1}\right)\right)dx}\left(\int -\frac{x}{\tanh\left(x^{-1}\right)}e^{\int \frac{1}{x\tanh\left(x^{-1}\right)}\left(-\ln\left(\frac{x^2+1}{x}\right)x-\tanh\left(x^{-1}\right)\right)dx}\ln\left(\frac{x^2+1}{x}\right.\right.\right.$$

2.783 ODE No. 783

$$y'(x) = -\frac{y(x)\coth(x)\left(x^2y(x)(-\log(2x)) + x\log(2x) + \tanh(x)\right)}{x}$$

✗ **Mathematica** : cpu = 300.058 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.311 (sec), leaf count = 75

$$\left\{y(x) = 1e^{\int \frac{-x\ln(x)-x\ln(2)-\tanh(x)}{x\tanh(x)}dx}\left(\int -\frac{x(\ln(2)+\ln(x))}{\tanh(x)}e^{\int \frac{-x\ln(x)-x\ln(2)-\tanh(x)}{x\tanh(x)}dx}dx + \_C1\right)^{-1}\right\}$$

2.784 ODE No. 784

$$y'(x) = \operatorname{csch}(x) \left(x^2 \log(x) + 2xy(x) \log(x) + y(x)^2 \log(x) + \log(x) - \sinh(x)\right)$$

✗ **Mathematica** : cpu = 300.058 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 30.444 (sec), leaf count = 24

$$\left\{y(x) = -x - \tan\left(\_C1 - \int \frac{\ln(x)}{\sinh(x)}\,dx\right)\right\}$$

2.785 ODE No. 785

$$y'(x) = \frac{x^2 \sinh(x) + 2xy(x) \sinh(x) + y(x)^2 \sinh(x) - \log(x) + \sinh(x)}{\log(x)}$$

✗ **Mathematica** : cpu = 300.046 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 88.591 (sec), leaf count = 24

$$\left\{y(x) = -x - \tan\left(\_C1 - \int \frac{\sinh(x)}{\ln(x)}\,dx\right)\right\}$$

2.786 ODE No. 786

$$y'(x) = \frac{axy(x)^2 \cosh(x) + bx^3 \cosh(x) + y(x) \log(x)}{x \log(x)}$$

✗ **Mathematica** : cpu = 300.041 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.078 (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 = 36.8266 (sec), leaf count = 488

$$\text{Solve}\left[\frac{\left(2-\frac{x(x^2-x-1)(2x^2-2y(x)+3)}{\sqrt[3]{x^3(x^2-x-1)^3(x^2-y(x))}}\right)\left(\frac{x(x^2-x-1)(2x^2-2y(x)+3)}{\sqrt[3]{x^3(x^2-x-1)^3(x^2-y(x))}}+4\right)\left(\left(\left(1-\frac{x(x^2-x-1)(2x^2-2y(x)+3)}{2\sqrt[3]{x^3(x^2-x-1)^3(x^2-y(x))}}\right)\log\left(\frac{2-\frac{x(x^2}{\sqrt[3]{x^3}}}{}\right.\right.\right.}{18\sqrt[3]{2}\left(-\frac{(2x^2-2y(x)+3)^3}{8(x^2-y(x))^3}+\frac{3x(x^2-x-1}{2\sqrt[3]{x^3(x^2-}}\right.}\right.$$

✓ **Maple** : cpu = 0.485 (sec), leaf count = 191

$$\left\{y(x)=1\left(4x^2\mathrm{e}^{RootOf\left(8x^3\mathrm{e}^{\_Z}-24x^2\mathrm{e}^{\_Z}-36x^3+6\ln\left(\frac{2\mathrm{e}^{\_Z}-9}{(1+x)^4}\right)\mathrm{e}^{\_Z}+18\_C1\,\mathrm{e}^{\_Z}-6\_Z\,\mathrm{e}^{\_Z}+24\mathrm{e}^{\_Z}x+108x^2-27\ln\left(\frac{2\mathrm{e}^{\_Z}-9}{(1+x)^4}\right)-81\right.}\right.\right.$$

2.788 ODE No. 788

$$y'(x)=-\frac{y(x)\left(x^2y(x)(-\coth(x+1))+\log(x-1)+x\coth(x+1)\right)}{x\log(x-1)}$$

✗ **Mathematica** : cpu = 300.006 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.713 (sec), leaf count = 108

$$\left\{y(x)=1\left(\mathrm{e}^{-\int\frac{-\ln(x-1)\sinh(1+x)-x\cosh(1+x)}{\sinh(1+x)x\ln(x-1)}\,\mathrm{d}x}\right)^{-1}\left(\_C1+\int-\frac{x\cosh(1+x)}{\ln(x-1)\sinh(1+x)}\mathrm{e}^{\int\frac{-\ln(x-1)\sinh(1+x)-x\cosh(1+x)}{\sinh(1+x)x\ln(x-1)}\,\mathrm{d}x}\right.\right.$$

2.789 ODE No. 789

$$y'(x) = \frac{x^2 \coth(x+1) + 2xy(x)\coth(x+1) + y(x)^2 \coth(x+1) - \log(x-1) + \coth(x+1)}{\log(x-1)}$$

✗ **Mathematica** : cpu = 300.005 (sec), leaf count = 0 , timed out

```
$Aborted
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(y(x),x) = -(ln(x-1)-coth(1+x)*x^2-2*coth(1+x)*x*y(x)-coth(1+x)-coth(1+x)*y(x)^2)
1),y(x))
```

2.790 ODE No. 790

$$y'(x) = \frac{x^4 \coth\left(\frac{x+1}{x-1}\right) - 2x^2 y(x) \coth\left(\frac{x+1}{x-1}\right) + y(x)^2 \coth\left(\frac{x+1}{x-1}\right) + 2x \log\left(\frac{1}{x-1}\right) - \coth\left(\frac{x+1}{x-1}\right)}{\log\left(\frac{1}{x-1}\right)}$$

✗ **Mathematica** : cpu = 300.007 (sec), leaf count = 0 , timed out

```
$Aborted
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(y(x),x) = (2*x*ln(1/(x-1))-coth((1+x)/(x-1))+coth((1+x)/(x-1))*y(x)^2-
2*coth((1+x)/(x-1))*x^2*y(x)+coth((1+x)/(x-1))*x^4)/ln(1/(x-1)),y(x))
```

2.791 ODE No. 791

$$y'(x) = \frac{\operatorname{sech}\left(\frac{1}{x-1}\right)\left(x^5 + x^4 - 2x^3 y(x) - 2x^2 y(x) + 2x^2 \cosh\left(\frac{1}{x-1}\right) + xy(x)^2 + y(x)^2 - x - 2x \cosh\left(\frac{1}{x-1}\right) - 1\right)}{x-1}$$

✗ **Mathematica** : cpu = 300.156 (sec), leaf count = 0 , timed out

```
$Aborted
```

✓ **Maple** : cpu = 22.337 (sec), leaf count = 306

$$\left\{ y(x) = 1 \left(\left(-x^2+1\right) \left(e^{\frac{1}{\left(e^{(x-1)^{-1}}\right)^2+1}} \int \frac{e^{(x-1)^{-1}}(1+x)}{\left(\left(e^{(x-1)^{-1}}\right)^2+1\right)(x-1)} \, dx \right)^4 \left(e^{\frac{1}{\left(e^{(x-1)^{-1}}\right)^2+1}} \int \frac{e^{(x-1)^{-1}}(1+x)}{\left(\left(e^{(x-1)^{-1}}\right)^2+1\right)(x-1)} \, dx e^{2(x-1)^{-1}} \right.\right.\right.$$

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 = 300. (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.711 (sec), leaf count = 112

$$\left\{y(x) = 1\mathrm{e}^{\int \frac{(1-x)\cosh\left((1+x)^{-1}\right)-x^2-x}{x(x-1)\cosh\left((1+x)^{-1}\right)}\,\mathrm{d}x}\left(\int -\frac{x(1+x)}{(x-1)\cosh\left((1+x)^{-1}\right)}\mathrm{e}^{\int \frac{(1-x)\cosh\left((1+x)^{-1}\right)-x^2-x}{x(x-1)\cosh\left((1+x)^{-1}\right)}\,\mathrm{d}x}\,\mathrm{d}x + \_C1\right)^{-1}\right\}$$

2.793 ODE No. 793

$$y'(x) = -\frac{y(x)(xy(x)+1)}{x(xy(x)-y(x)+1)}$$

✓ **Mathematica** : cpu = 20.8316 (sec), leaf count = 399

$$\text{Solve}\left[-\frac{\sqrt[3]{-2}\left(\frac{2^{2/3}((x-1)y(x)-2)}{\sqrt[3]{-\frac{1}{(x-1)^3}}(x-1)((x-1)y(x)+1)}+(-2)^{2/3}\right)\left(\frac{-xy(x)+y(x)+2}{\sqrt[3]{2}\sqrt[3]{-\frac{1}{(x-1)^3}}(x-1)((x-1)y(x)+1)}+(-2)^{2/3}\right)\left(\left(\frac{\sqrt[3]{-1}(-x}{\sqrt[3]{-\frac{1}{(x-1)^3}}(x}\right.\right.}{}\right.$$

✓ **Maple** : cpu = 0.182 (sec), leaf count = 32

$$\left\{y(x) = -2\,\frac{1}{x}\mathrm{e}^{-\mathit{lambertW}\left(-2\,\frac{(x-1)\left(\mathrm{e}^{\_C1}\right)^3\mathrm{e}^{-1}}{x}\right)+3\_C1-1}\right\}$$

2.794 ODE No. 794

$$y'(x) = \frac{y(x)}{x\left(x^3y(x)^4+x^2y(x)^3+y(x)-1\right)}$$

✓ **Mathematica** : cpu = 0.112203 (sec), leaf count = 66

$$\text{Solve}\left[c_1+\log(x) = \text{RootSum}\left[\#1^3y(x)^3+\#1^2y(x)^2+1\&, \frac{\#1y(x)\log(x-\#1)+\log(x-\#1)}{3\#1y(x)+2}\&\right]+y(x), y(x)\right]$$

✓ **Maple** : cpu = 3.16 (sec), leaf count = 32

$$\left\{-y(x)+\int^{xy(x)}\frac{1}{\_a\left(\_a^3+\_a^2+1\right)}d\_a-\_C1=0\right\}$$

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 = 0.266889 (sec), leaf count = 106

$$\text{Solve}\left[57\text{RootSum}\left[-19\#1^3+6\sqrt[3]{38}\#1-19\&,\frac{\log\left(\frac{a+3y(x)+x}{\sqrt[3]{38}\sqrt[3]{\frac{1}{(a+x)^6}}(a+x)^3}-\#1\right)}{2\sqrt[3]{38}-19\#1^2}\&\right]+38^{2/3}\left(\frac{1}{(a+x)^6}\right)^{2/3}(a+x$$

✓ **Maple** : cpu = 0.028 (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 = 17.1287 (sec), leaf count = 103

$$\text{Solve}\left[-\frac{1}{2}\log\left(9e^{\frac{3x^2}{2}}(y(x)+3)y(x)+3e^{3x^2}(y(x)+3)^2-y(x)^2\right)+3\sqrt{\frac{3}{31}}\tanh^{-1}\left(\frac{\sqrt{\frac{3}{31}}\left(2e^{\frac{3x^2}{2}}(y(x)+3)+3y(\right.}{y(x)}\right.\right.$$

✓ **Maple** : cpu = 1.164 (sec), leaf count = 143

$$\left\{y(x)=RootOf\left(\left(\left(7\,e^{3\,x^2+RootOf\left(\left(e^{3/2\,x^2}\right)^2\left(42\sqrt{93}\tanh\left(\frac{(\_C1-5\_Z)\sqrt{93}}{90}\right)e^{3\,x^2+\_Z}+217\left(\tanh\left(\frac{(\_C1-5\_Z)\sqrt{93}}{90}\right)\right)^2e^{3\,x^2+\_Z}+189\right.\right.\right.}\right.\right.\right.$$

2.797 ODE No. 797

$$y'(x)=\frac{y(x)\left(x^3y(x)\cosh\left(\frac{x+1}{x-1}\right)+x^2y(x)\cosh\left(\frac{x+1}{x-1}\right)-x^2\cosh\left(\frac{x+1}{x-1}\right)-x\cosh\left(\frac{x+1}{x-1}\right)-1\right)}{x}$$

✓ **Mathematica** : cpu = 2.64051 (sec), leaf count = 146

$$\Bigg\{\Bigg\{y(x)\to\frac{\exp\left(\frac{(3e^2-1)\operatorname{Chi}\left(\frac{2}{x-1}\right)+(1+3e^2)\operatorname{Shi}\left(\frac{2}{x-1}\right)}{e}\right)}{x\Big(c_1\exp\left(\frac{(x-1)\left((-x+e^2(x+5)-1)\sinh\left(\frac{2}{x-1}\right)+(x+e^2(x+5)+1)\cosh\left(\frac{2}{x-1}\right)\right)}{4e}\right)+\exp\Big(\frac{(3e^2-1)\operatorname{Chi}\left(\frac{2}{x-1}\right)+(1+3e^2)\operatorname{S}}{e}}$$

✓ **Maple** : cpu = 0.446 (sec), leaf count = 252

$$\Big\{y(x)=\frac{1}{x}\mathrm{e}^{-\frac{\mathrm{e}x^2}{4}\mathrm{e}^{2\,(x-1)^{-1}}}\mathrm{e}^{\frac{5\,\mathrm{e}}{4}\mathrm{e}^{2\,(x-1)^{-1}}}\mathrm{e}^{-\frac{\mathrm{e}^{-1}x^2}{4}\mathrm{e}^{-2\,(x-1)^{-1}}}\mathrm{e}^{\frac{\mathrm{e}^{-1}}{4}\mathrm{e}^{-2\,(x-1)^{-1}}}\mathrm{e}^{\mathrm{e}^{-1}\mathit{Ei}\left(1,2\,(x-1)^{-1}\right)}\left(\mathrm{e}^{\mathrm{e}\mathrm{e}^{2\,(x-1)^{-1}}x}\right)^{-1}\Big(\mathrm{e}^{\mathrm{e}\mathit{Ei}(1,-}$$

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 = 0.712421 (sec), leaf count = 25

$$\operatorname{Solve}\left[c_1+\frac{x}{y(x)}+\log(x+1)=y(x)^2+\log(y(x)),y(x)\right]$$

✓ **Maple** : cpu = 0.148 (sec), leaf count = 30

$$\left\{y(x)=\mathrm{e}^{\mathit{RootOf}\left(-\left(\mathrm{e}^{\_Z}\right)^3+\ln(1+x)\mathrm{e}^{\_Z}+\mathrm{e}^{\_Z}\_C1-\_Z\,\mathrm{e}^{\_Z}+x\right)}\right\}$$

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 = 0.496763 (sec), leaf count = 50

$$\left\{\left\{y(x)\to\frac{1}{c_1x\exp\left(\frac{1}{2}e^{\frac{x+1}{x-1}}\left(x^2+4x-5\right)-6e\operatorname{Ei}\left(\frac{2}{x-1}\right)\right)+x}\right\}\right\}$$

✓ **Maple** : cpu = 0.398 (sec), leaf count = 147

$$\left\{y(x) = \frac{1}{x}\mathrm{e}^{\frac{5}{2}\mathrm{e}^{\frac{1+x}{x-1}}}\mathrm{e}^{-\frac{x^2}{2}\mathrm{e}^{\frac{1+x}{x-1}}}\left(\mathrm{e}^{\mathrm{e}Ei\left(1,-2\,(x-1)^{-1}\right)}\right)^{-6}\left(\mathrm{e}^{x\mathrm{e}^{\frac{1+x}{x-1}}}\right)^{-2}\left(\int -(1+x)\mathrm{e}^{\frac{1+x}{x-1}}\mathrm{e}^{\frac{5}{2}\mathrm{e}^{\frac{1+x}{x-1}}}\mathrm{e}^{-\frac{x^2}{2}\mathrm{e}^{\frac{1+x}{x-1}}}\left(\mathrm{e}^{\mathrm{e}Ei\left(1,-2\,(x-1)\right.}\right.\right.\right.$$

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 = 0.267353 (sec), leaf count = 118

$$\text{Solve}\left[57\text{RootSum}\left[-19\#1^3 + 6\sqrt[3]{38}\#1 - 19\&, \frac{\log\left(\frac{b-6y(x)-2x}{\sqrt[3]{38}\sqrt[3]{\frac{1}{(b-2x)^6}}(b-2x)^3} - \#1\right)}{2\sqrt[3]{38} - 19\#1^2}\&\right] + 38^{2/3}\left(\frac{1}{(b-2x)^6}\right)^{2/3}(b -$$

✓ **Maple** : cpu = 0.027 (sec), leaf count = 41

$$\left\{y(x) = \frac{RootOf\left(-\int^{\_Z}\left(\_a^3 - \_a^2 - \_a - 1\right)^{-1}d\_a + \ln\left(-2\,x + b\right) + \_C1\right)(-2\,x + b)}{2}\right\}$$

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 = 0.146002 (sec), leaf count = 124

$$\text{Solve}\left[87\text{RootSum}\left[-29\#1^3 + 3\sqrt[3]{29}\#1 - 29\&, \frac{\log\left(\frac{e^{-\frac{x^2}{2}}\left(e^{\frac{x^2}{4}}+3y(x)\right)}{\sqrt[3]{29}\sqrt[3]{e^{-\frac{3x^2}{4}}}} - \#1\right)}{\sqrt[3]{29} - 29\#1^2}\&\right] + 9c_1 + 29^{2/3}e^{\frac{x^2}{2}}\left(e^{-\frac{3x^2}{4}}\right)^{2/3}$$

✓ **Maple** : cpu = 0.069 (sec), leaf count = 63

$$\left\{y(x) = \frac{1}{9}\left(-3\,\mathrm{e}^{-1/4\,x^2}\mathrm{e}^{1/4\,x^2} + 29\,RootOf\left(-81\int^{\_Z}\left(841\,\_a^3 - 27\,\_a + 27\right)^{-1}d\_a + x + 3\,\_C1\right)\right)\left(\mathrm{e}^{\frac{x^2}{4}}\right)^{-1}\right.$$

2.802 ODE No. 802

$$y'(x) = \frac{\_\mathrm{F1}\left(y(x) + \frac{1}{x}\right) + \frac{1}{x}}{x}$$

✓ **Mathematica** : cpu = 0.0871691 (sec), leaf count = 88

$$\mathrm{Solve}\left[c_1 = \int_1^{y(x)} \left(-\int_1^x -\frac{\_\mathrm{F1}'\left(K[2] + \frac{1}{K[1]}\right)}{K[1]^2 \left(\_\mathrm{F1}\left(K[2] + \frac{1}{K[1]}\right)\right)^2} dK[1] - \frac{1}{\_\mathrm{F1}\left(K[2] + \frac{1}{x}\right)}\right) dK[2] + \int_1^x \frac{\frac{1}{\_\mathrm{F1}\left(\frac{1}{K[1]} + y(x)\right)}}{K[1]^2}\right.$$

✓ **Maple** : cpu = 0.119 (sec), leaf count = 27

$$\left\{y(x) = \frac{\mathit{RootOf}\left(-\ln(x) + \int^{\_Z} (\_\mathit{F1}(\_a))^{-1} d\_a + \_\mathit{C1}\right) x - 1}{x}\right\}$$

2.803 ODE No. 803

$$y'(x) = \frac{\_\mathrm{F1}\left(y(x)^2 - 2\log(x)\right)}{x\sqrt{y(x)^2}}$$

✓ **Mathematica** : cpu = 0.101361 (sec), leaf count = 234

$$\mathrm{Solve}\left[c_1 = \int_1^{y(x)} \frac{-\left(\left(\_\mathrm{F1}\left(K[2]^2 - 2\log(x)\right)\right)^2 - 1\right)\left(\int_1^x \frac{2\left(\sqrt{K[2]^2}\left(\_\mathrm{F1}\left(K[2]^2 - 2\log(K[1])\right)\right)^2 + 2K[2]\_\mathrm{F1}\left(K[2]^2 - 2\log(K[1]\right.\right.}{K[1]\left(\left(\_\mathrm{F1}\left(K[2]^2 - 2\log(K[1])\right)\right)^2 - \right.}\right.}{\left(\_\mathrm{F1}\left(K[2]^2 - 2\log(x\right.\right.}\right.$$

✓ **Maple** : cpu = 0.488 (sec), leaf count = 65

$$\left\{y(x) = \sqrt{2\ln(x) + 2\,\mathit{RootOf}\left(\ln(x) - \int^{\_Z} (\_\mathit{F1}(2\_a) - 1)^{-1} d\_a + \_\mathit{C1}\right)}, y(x) = -\sqrt{2\ln(x) + 2\,\mathit{RootOf}\right.$$

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 = 0.656342 (sec), leaf count = 43

$$\left\{\left\{y(x) \to \tan^{-1}\left(\frac{-12c_1 + 3x^4 - 4x^3 + 6x^2 - 12x + 12\log(x+1) - 25}{12x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 1.263 (sec), leaf count = 38

$$\left\{y(x) = \arctan\left(\frac{3\,x^4 - 4\,x^3 + 6\,x^2 + 12\,\ln(1+x) - 12\_C1 - 12\,x}{12\,x}\right)\right\}$$

2.805 ODE No. 805

$$y'(x) = \frac{x^4\sqrt{x^2 + y(x)^2} + xy(x) + y(x)}{x(x+1)}$$

✓ **Mathematica** : cpu = 0.559105 (sec), leaf count = 35

$$\left\{\left\{y(x) \to x\sinh\left(c_1 + \frac{x^3}{3} - \frac{x^2}{2} + x - \log(x+1) + \frac{11}{6}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.671 (sec), leaf count = 42

$$\left\{\ln\left(y(x) + \sqrt{(y(x))^2 + x^2}\right) - \frac{x^3}{3} + \frac{x^2}{2} - x - \ln(x) + \ln(1+x) - \_C1 = 0\right\}$$

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 = 0.251396 (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 = 0.699 (sec), leaf count = 22

$$\left\{y(x) = -\arctan\left(\frac{\ln(1+x) - x - \_C1}{x}\right)\right\}$$

2.807 ODE No. 807

$$y'(x) = -\frac{1}{-e^{y(x)}y(x)\_F1(y(x) - \log(x)) - x}$$

✗ **Mathematica** : cpu = 2.06171 (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 = 0.719 (sec), leaf count = 43

$$\left\{ \frac{(\ln(x))^2}{2} - y(x)\ln(x) - \int^{y(x)-\ln(x)} \frac{\_F1(\_a)\_a + e^{-\_a}}{\_F1(\_a)} d\_a + \_C1 = 0 \right\}$$

2.808 ODE No. 808

$$y'(x) = \frac{(y(x)+1)(2y(x)+1)}{x(2xy(x) - 2y(x) + x - 2)}$$

✓ **Mathematica** : cpu = 1.80055 (sec), leaf count = 149

$$\text{Solve}\left[\frac{2^{2/3}\left(x\log\left(-\frac{6\ 2^{2/3}(y(x)+1)}{2(x-1)y(x)+x-2}\right) - x\log\left(\frac{3\ 2^{2/3}(2xy(x)+x)}{2(x-1)y(x)+x-2}\right) + 2xy(x)\left(\log\left(-\frac{6\ 2^{2/3}(y(x)+1)}{2(x-1)y(x)+x-2}\right) - \log\left(\frac{3\ 2^{2/3}(2xy}{2(x-1)y(x}\right.\right.\right.}{9(2xy(x)+x)}\right.$$

✓ **Maple** : cpu = 0.106 (sec), leaf count = 45

$$\left\{ y(x) = 1\left(-x\,lambertW\left(\frac{1}{xe^{x^{-1}}\_C1}\right) - 2\right)\left(2\,x\,lambertW\left(\frac{1}{xe^{x^{-1}}\_C1}\right) + 2\right)^{-1} \right\}$$

2.809 ODE No. 809

$$y'(x) = \frac{64x^3 - 240x^2 + 64xy(x)^2 + 64y(x)^3 - 80y(x)^2 + 300x - 125}{(4x-5)^3}$$

✓ **Mathematica** : cpu = 0.238837 (sec), leaf count = 118

$$\text{Solve}\left[57\text{RootSum}\left[-19\#1^3 + 6\sqrt[3]{38}\#1 - 19\&, \frac{\log\left(\frac{12y(x)+4x-5}{\sqrt[3]{38}\sqrt[3]{\frac{1}{(5-4x)^6}}(4x-5)^3} - \#1\right)}{2\sqrt[3]{38} - 19\#1^2}\&\right] + 9c_1 + 38^{2/3}\left(\frac{1}{(5-4x)^6}\right)^{2}\right.$$

✓ **Maple** : cpu = 0.024 (sec), leaf count = 41

$$\left\{y(x) = -\frac{RootOf\left(-\int^{\_Z} \left(\_a^3 - \_a^2 - \_a - 1\right)^{-1} d\_a + \ln(4x-5) + \_C1\right)(4x-5)}{4}\right\}$$

2.810 ODE No. 810

$$y'(x) = \frac{x^2 \log^2(x) + y(x)^2 + y(x) - 2xy(x)\log(x) + x}{x}$$

✓ **Mathematica** : cpu = 0.0185194 (sec), leaf count = 18

$$\left\{\left\{y(x) \to x\left(\frac{1}{c_1 - x} + \log(x)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.047 (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 = 2.52662 (sec), leaf count = 29

$$\left\{\left\{y(x) \to -\log\left(\frac{e^{-\frac{1}{2}x(2c_1+x^2)} - 1}{x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 2.411 (sec), leaf count = 32

$$\left\{y(x) = \frac{x^3}{2} + x\_C1 + \ln\left(-x\left(-1 + e^{\frac{x^3}{2}} e^{x\_C1}\right)^{-1}\right)\right\}$$

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 = 0.382649 (sec), leaf count = 76

$$\left\{\left\{y(x) \to \left(\frac{3c_1}{4} - 1\right)x^4 + \left(c_1 + \frac{1}{6}\right)x^3 + 3c_1x - \frac{3c_1^2}{2} - \frac{3x^8}{32} - \frac{x^7}{4} - \frac{x^6}{6} - \frac{3x^5}{4} - \frac{3x^2}{2}\right\}\right\}$$

✓ **Maple** : cpu = 0.272 (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 = 0.566299 (sec), leaf count = 64

$$\left\{\left\{y(x) \to \frac{1}{72}a\left((87 - 72c_1)\,x^4 - 96c_1x^3 - 288c_1x + 144c_1^2 + 9x^8 + 24x^7 + 16x^6 + 72x^5 + 144x^2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.592 (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 = 0.0180305 (sec), leaf count = 70

$$\left\{\left\{y(x) \to \frac{x}{\frac{\sqrt{x(c_1 - 2x + 1)}}{\sqrt{\frac{1}{x^7}}} - x^4}\right\}, \left\{y(x) \to -\frac{x}{\frac{\sqrt{x(c_1 - 2x + 1)}}{\sqrt{\frac{1}{x^7}}} + x^4}\right\}\right\}$$

✓ **Maple** : cpu = 0.042 (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 = 18.1846 (sec), leaf count = 100

$$\text{Solve}\left[\frac{1}{6}\left(\log\left(-81e^{\frac{3x^2}{2}}(y(x)+3)y(x) + e^{3x^2}(y(x)+3)^2 - 243y(x)^2\right) - 2\log(y(x)+3)\right) = c_1 + \sqrt{\frac{3}{31}}\tanh^{-1}\left(\right.\right.$$

✓ **Maple** : cpu = 0.829 (sec), leaf count = 168

$$\left\{5\,\ln\left(\frac{100\,(3+y(x))^2\left(e^{3/2\,x^2}\right)^2 + \left(-8100\,(y(x))^2 - 24300\,y(x)\right)e^{3/2\,x^2} - 24300\,(y(x))^2}{189\,\left(e^{3/2\,x^2}\,(3+y\,(x)) + 3\,y\,(x)\right)^2}\right) - \frac{30\,\sqrt{93}}{31}\mathit{Artanh}\left(\right.\right.$$

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 = 0.17209 (sec), leaf count = 72

$$\text{Solve}\left[\text{RootSum}\left[\#1^3 - \#1 + 1\&, \frac{\#1\log\left(-\#1 + x^2 - y(x)^2\right) - \log\left(-\#1 + x^2 - y(x)^2\right)}{3\#1^2 - 1}\&\right] + x^2 = 2c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.925 (sec), leaf count = 190

$$\left\{\int_{\_b}^{x}\frac{(\_a - y(x))^3\,(y(x)+\_a)^3\,\_a}{\_a^6 - 3\,\_a^4\,(y\,(x))^2 + 3\,\_a^2\,(y\,(x))^4 - (y\,(x))^6 - \_a^2 + (y\,(x))^2 + 1}\,d\_a + \int^{y(x)} - \frac{(-\_f^2 +}{-\_f^6 + 3\,\_f^4 x^2 - 3\,\_}\right.$$

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 = 0.42822 (sec), leaf count = 59

$$\left\{\left\{y(x) \to -\sec^{-1}\left(-\frac{9c_1 + x^3 - 3x^3\log(x)}{9\log(x)}\right)\right\}, \left\{y(x) \to \sec^{-1}\left(-\frac{9c_1 + x^3 - 3x^3\log(x)}{9\log(x)}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.77 (sec), leaf count = 27

$$\left\{y(x) = \arccos\left(9\,\frac{\ln(x)}{3\,x^3\ln(x) - x^3 + 9\_C1}\right)\right\}$$

2.818 ODE No. 818

$$y'(x) = \frac{y(x)}{x\left(xy(x)^4 + xy(x)^3 + xy(x) - 1\right)}$$

✓ **Mathematica** : cpu = 0.0834378 (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 = 0.148 (sec), leaf count = 34

$$\left\{y(x) = \mathrm{e}^{RootOf\left(-2\,x\left(\mathrm{e}^{\_Z}\right)^4 - 3\,x\left(\mathrm{e}^{\_Z}\right)^3 + 6\_C1\,x\mathrm{e}^{\_Z} - 6\_Z\,x\mathrm{e}^{\_Z} - 6\right)}\right\}$$

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 = 0.266226 (sec), leaf count = 63

$$\left\{\left\{y(x) \to \frac{1}{192}\left((96 - 72c_1)\,x^4 - 96c_1x^3 - 288c_1x + 144c_1^2 + 9x^8 + 24x^7 + 16x^6 + 72x^5 + 80x^2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.25 (sec), leaf count = 30

$$\left\{\_C1 + \frac{3\,x^4}{8} + \frac{x^3}{2} + \frac{3\,x}{2} - \sqrt{x^2 + 3\,y(x)} = 0\right\}$$

2.820 ODE No. 820

$$y'(x) = \frac{\csc(y(x)) \left(\frac{1}{2}x^2 \log(x) \cos(2y(x)) + \frac{1}{2}x^2 \log(x) - \cos(y(x))\right)}{x \log(x)}$$

✓ **Mathematica** : cpu = 0.377645 (sec), leaf count = 59

$$\left\{\left\{y(x) \to -\sec^{-1}\left(-\frac{4c_1 + x^2 - 2x^2 \log(x)}{4\log(x)}\right)\right\}, \left\{y(x) \to \sec^{-1}\left(-\frac{4c_1 + x^2 - 2x^2 \log(x)}{4\log(x)}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.738 (sec), leaf count = 27

$$\left\{y(x) = \arccos\left(4 \frac{\ln(x)}{2x^2 \ln(x) - x^2 + 4\_C1}\right)\right\}$$

2.821 ODE No. 821

$$y'(x) = \frac{y(x)(xy(x) + 1)}{x\left(x^3 y(x)^4 - xy(x) - 1\right)}$$

✓ **Mathematica** : cpu = 0.180017 (sec), leaf count = 1993

$$\left\{\left\{y(x) \to \frac{c_1}{4} - \frac{1}{2}\sqrt{\frac{c_1^2}{4} + \frac{\sqrt[3]{36c_1^2x^6 + 27x^5 + \sqrt{x^9\left(216x^3(6c_1 - 1)c_1^3 + 216x^2c_1^2 - 9x(512c_1 - 81) - 4096\right)}}}{6x^3} + \cdots}\right.\right.$$

✓ **Maple** : cpu = 0.159 (sec), leaf count = 27

$$\left\{-\frac{1}{3x^3(y(x))^3} - \frac{1}{2x^2(y(x))^2} - y(x) + \_C1 = 0\right\}$$

2.822 ODE No. 822

$$y'(x) = \frac{1}{4}x\left(-4e^{-x^2}x^2y(x) - 4e^{-x^2}x^2 + 4e^{-x^2} + e^{-2x^2}x^4 + 4y(x)^2\right)$$

✓ **Mathematica** : cpu = 0.0475723 (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 = 0.127 (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 = 0.477113 (sec), leaf count = 35

$$\text{Solve}\left[\frac{y(x)^3}{3} + \frac{y(x)^2}{2} + \log(y(x)) = c_1 + \frac{x}{y(x)} + \log(x), y(x)\right]$$

✓ **Maple** : cpu = 0.139 (sec), leaf count = 38

$$\left\{y(x) = \mathrm{e}^{RootOf\left(-2\left(\mathrm{e}^{\_Z}\right)^4 - 3\left(\mathrm{e}^{\_Z}\right)^3 + 6\ln(x)\mathrm{e}^{\_Z} + 6\,\mathrm{e}^{\_Z}\_C1 - 6\_Z\,\mathrm{e}^{\_Z} + 6\,x\right)}\right\}$$

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 = 0.0941342 (sec), leaf count = 66

$$\text{Solve}\left[\log\left(\frac{y(x)}{x}\right) + \frac{\tan^{-1}\left(\frac{2y(x)+x}{\sqrt{3}x}\right)}{\sqrt{3}} + \log(x) = c_1 + \frac{1}{2}\log\left(\frac{x^2 + xy(x) + y(x)^2}{x^2}\right) + \log(1-x), y(x)\right]$$

✓ **Maple** : cpu = 0.424 (sec), leaf count = 61

$$\left\{\ln\left(\frac{y(x)}{x}\right) - \frac{1}{2}\ln\left(\frac{(y(x))^2 + xy(x) + x^2}{x^2}\right) + \frac{\sqrt{3}}{3}\arctan\left(\frac{(x+2\,y(x))\sqrt{3}}{3\,x}\right) + \ln(x) - \ln(x-1) - \_C1 = 0\right\}$$

2.825 ODE No. 825

$$y'(x) = \frac{x\left(x^2 y(x)^3 + (x^2+1)^{3/2} y(x)^2 + x^2 (x^2+1)^{3/2} + (x^2+1)^{3/2} + y(x)^3\right)}{(x^2+1)^3}$$

✓ **Mathematica** : cpu = 0.305798 (sec), leaf count = 144

$$\text{Solve}\left[-\frac{19}{3}\text{RootSum}\left[-19\#1^3 + 6\sqrt[3]{38}\#1 - 19\&, \frac{\log\left(\frac{x\left(\frac{3y(x)}{(x^2+1)^2} + \frac{1}{(x^2+1)^{3/2}}\right)}{\sqrt[3]{38}\sqrt[3]{\frac{x^3}{(x^2+1)^{9/2}}}} - \#1\right)}{2\sqrt[3]{38} - 19\#1^2}\&\right] = \frac{1}{18}\left(18c_1 + \frac{38^{2/3}\left(\cdots\right.}{\cdots}\right.\right.$$

✓ **Maple** : cpu = 0.111 (sec), leaf count = 48

$$\left\{ y(x) = \frac{19\, \mathit{RootOf}\left(-1296 \int^{\_Z} (361\_a^3 - 432\_a + 432)^{-1}\, d\_a + 2\ln(x^2+1) + 3\_C1\right) - 6}{18}\sqrt{x^2+1} \right\}$$

2.826 ODE No. 826

$$y'(x) = \frac{y(x)\left(3xy(x)^2 + 3y(x)^2 + x\right)}{x(x+1)\left(6y(x)^2 + x\right)}$$

✓ **Mathematica** : cpu = 0.69356 (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 = 0.343 (sec), leaf count = 51

$$\left\{ \left((y(x))^{-2} + 6x^{-1}\right)^{-1} = \frac{x}{54}\left(e^{\mathit{RootOf}\left(-e^{\_Z}\ln\left(\frac{(1+x)^2(e^{\_Z}+9)}{2x}\right) + 3e^{\_Z}\_C1 + \_Z e^{\_Z} + 9\right)} + 9\right) \right\}$$

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 = 0.134587 (sec), leaf count = 93

$$\left\{\left\{y(x)\to\frac{x\left(-2e^{\frac{1}{3}\sqrt{2}(3c_1+x^3)}+e^{\frac{2}{3}\sqrt{2}(3c_1+x^3)}-1\right)}{2e^{\frac{1}{3}\sqrt{2}(3c_1+x^3)}+e^{\frac{2}{3}\sqrt{2}(3c_1+x^3)}-1}\right\}\right\}$$

✓ **Maple** : cpu = 0.243 (sec), leaf count = 49

$$\left\{\ln\left(2\,\frac{x\left(\sqrt{2\,(y(x))^2+2\,x^2}+y(x)+x\right)}{y(x)-x}\right)+\frac{\sqrt{2}x^3}{3}-\ln(x)-\_C1=0\right\}$$

2.828 ODE No. 828

$$y'(x)=\frac{(y(x)+1)(2y(x)+1)}{x\,(2xy(x)^4+xy(x)^3-2y(x)-2)}$$

✓ **Mathematica** : cpu = 0.40808 (sec), leaf count = 46

$$\text{Solve}\left[\frac{1}{16}\left(-2y(x)^2+6y(x)-\frac{8}{2xy(x)+x}-8\log(y(x)+1)+\log(2y(x)+1)\right)=c_1,y(x)\right]$$

✓ **Maple** : cpu = 0.297 (sec), leaf count = 54

$$\left\{y(x)=\frac{1}{2}\mathrm{e}^{RootOf\left(x(\mathrm{e}^{\_Z})^3-8\,x(\mathrm{e}^{\_Z})^2+16\,\ln(1/2\,\mathrm{e}^{\_Z}+1/2)x\mathrm{e}^{\_Z}+8\_C1\,x\mathrm{e}^{\_Z}-2\_Z\,x\mathrm{e}^{\_Z}+7\,\mathrm{e}^{\_Z}x+16\right)}-\frac{1}{2}\right\}$$

2.829 ODE No. 829

$$y'(x)=\frac{x^6\sqrt{4x^2y(x)+1}+x^5\sqrt{4x^2y(x)+1}+x^3\sqrt{4x^2y(x)+1}+\frac{1}{2}}{x^3}$$

✓ **Mathematica** : cpu = 0.451552 (sec), leaf count = 81

$$\left\{\left\{y(x)\to-\frac{2c_1x^5}{5}-\frac{1}{4}(2c_1-1)\,x^4-c_1x^2+c_1^2+\frac{x^{10}}{25}+\frac{x^9}{10}+\frac{x^8}{16}+\frac{x^7}{5}+\frac{x^6}{4}-\frac{1}{4x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.312 (sec), leaf count = 34

$$\left\{\_C1-\frac{1}{x}\sqrt{4\,x^2y(x)+1}+x^2+\frac{x^4}{2}+\frac{2\,x^5}{5}=0\right\}$$

2.830 ODE No. 830

$$y'(x) = \frac{(x - y(x))y(x)}{x\left(-y(x)^4 - y(x)^3 - y(x) + x\right)}$$

✓ **Mathematica** : cpu = 0.546546 (sec), leaf count = 34

$$\text{Solve}\left[\log(x) = c_1 + \frac{y(x)^3}{3} + \frac{y(x)^2}{2} + \frac{x}{y(x)} + \log(y(x)), y(x)\right]$$

✓ **Maple** : cpu = 0.141 (sec), leaf count = 38

$$\left\{y(x) = e^{RootOf\left(2\left(e^{\_Z}\right)^4+3\left(e^{\_Z}\right)^3-6\ln(x)e^{\_Z}+6e^{\_Z}\_C1+6\_Z e^{\_Z}+6x\right)}\right\}$$

2.831 ODE No. 831

$$y'(x) = \frac{x^3\sqrt{4ax - y(x)^2} + x^2\sqrt{4ax - y(x)^2} + \sqrt{4ax - y(x)^2} + 2a}{y(x)}$$

✓ **Mathematica** : cpu = 5.10107 (sec), leaf count = 79

$$\left\{\left\{y(x) \to -\frac{1}{12}\sqrt{576ax - \left(12c_1 + 3x^4 + 4x^3 + 12x\right)^2}\right\}, \left\{y(x) \to \frac{1}{12}\sqrt{576ax - \left(12c_1 + 3x^4 + 4x^3 + 12x\right)^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.369 (sec), leaf count = 35

$$\left\{-\sqrt{-\left(y(x)\right)^2 + 4ax} - \frac{x^4}{4} - \frac{x^3}{3} - x - \_C1 = 0\right\}$$

2.832 ODE No. 832

$$y'(x) = \frac{y(x)(y(x) + x + 1)}{(x+1)\left(y(x)^4 + y(x)^3 + y(x)^2 + x\right)}$$

✓ **Mathematica** : cpu = 3.63062 (sec), leaf count = 2405

$$\left\{\left\{y(x) \to \frac{1}{8}\left(-4\sqrt{\frac{-8x + 3c_1 + 3\log(x+1) +}{\sqrt[3]{36\left(c_1 + \log(x+1)\right)^2 + 18\left(c_1 + \log(x+1)\right) + 69x + \sqrt{\left(36\left(c_1 + \log(x+1)\right)^2 + 18\left(c_1 + \right.\right.}}}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.203 (sec), leaf count = 31

$$\left\{\ln(1+x) + \frac{x}{y(x)} - \frac{\left(y(x)\right)^3}{3} - \frac{\left(y(x)\right)^2}{2} - y(x) + \_C1 = 0\right\}$$

2.833 ODE No. 833

$$y'(x) = \frac{x^4\left(-\sqrt{x^2+y(x)^2}\right)+x^3y(x)\sqrt{x^2+y(x)^2}+y(x)}{x}$$

✓ **Mathematica** : cpu = 0.140372 (sec), leaf count = 87

$$\left\{\left\{y(x)\to \frac{x\left(-2e^{\frac{4c_1+x^4}{2\sqrt{2}}}+e^{\frac{4c_1+x^4}{\sqrt{2}}}-1\right)}{2e^{\frac{4c_1+x^4}{2\sqrt{2}}}+e^{\frac{4c_1+x^4}{\sqrt{2}}}-1}\right\}\right\}$$

✓ **Maple** : cpu = 0.183 (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 = 0.846903 (sec), leaf count = 90

$$\left\{\left\{y(x)\to -\frac{\sqrt{x}\sqrt{W\left(\frac{6(x+1)^2e^{2c_1+x^2-2x-3}}{x}\right)}}{\sqrt{6}}\right\},\left\{y(x)\to \frac{\sqrt{x}\sqrt{W\left(\frac{6(x+1)^2e^{2c_1+x^2-2x-3}}{x}\right)}}{\sqrt{6}}\right\}\right\}$$

✓ **Maple** : cpu = 0.347 (sec), leaf count = 60

$$\left\{\left((y(x))^{-2}+6\,x^{-1}\right)^{-1}=\frac{x}{54}\left(e^{RootOf\left(x^2e^{\_Z}-e^{\_Z}\ln\left(\frac{x\left(e^{\_Z}+9\right)}{2\,(1+x)^2}\right)+3\,e^{\_Z}\_C1+\_Z\,e^{\_Z}-2\,e^{\_Z}x+9\right)}+9\right)\right\}$$

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 = 2.8972 (sec), leaf count = 0 , could not solve

```
DSolve[Derivative[1][y][x] == -(-(x*(y[x]^3)^(2/3)) - x*(y[x]^3)^(1/3)*_F1[-3*Log[x] + y[x]^
1), y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(y(x),x) = -1/(-(y(x)^3)^(2/3)*x-_F1(y(x)^3-3*ln(x))*(y(x)^3)^(1/3)*x),y(x))
```

2.836 ODE No. 836

$$y'(x) = \frac{(x - y(x))y(x)(y(x)+1)}{x(xy(x) - y(x) + x)}$$

✓ **Mathematica** : cpu = 17.2952 (sec), leaf count = 379

$$\mathrm{Solve}\left[\frac{1}{9}2^{2/3}\left(\frac{\left(1-\frac{(x-1)^2\left(\frac{x^6}{(x-1)^3}\right)^{2/3}((x+2)y(x)+x)}{x^4((x-1)y(x)+x)}\right)\left(\frac{\left(\frac{x^6}{(x-1)^3}\right)^{2/3}(x-1)^2((x+2)y(x)+x)}{x^4((x-1)y(x)+x)}+2\right)\left(\left(1-\frac{(x-1)^2\left(\frac{x^6}{(x-1)^3}\right)^{2/3}(}{x^4((x-1)y(x}\right.\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.229 (sec), leaf count = 73

$$\left\{y(x) = -x\mathrm{e}^{RootOf\left(-\ln\left(\frac{\mathrm{e}^{\_Z}}{2}+\frac{9}{2}\right)\mathrm{e}^{\_Z}+3\,\mathrm{e}^{\_Z}\_C1+\_Z\,\mathrm{e}^{\_Z}-\mathrm{e}^{\_Z}x+9\right)}\left(-9+(x-1)\,\mathrm{e}^{RootOf\left(-\ln\left(\frac{\mathrm{e}^{\_Z}}{2}+\frac{9}{2}\right)\mathrm{e}^{\_Z}+3\,\mathrm{e}^{\_Z}\_C1+\_Z\right.}\right.\right.$$

2.837 ODE No. 837

$$y'(x) = -\frac{1}{-\sqrt[3]{y(x)^3}\log(x)\_\mathrm{F1}\left(3\mathrm{Ei}(-\log(x)) + y(x)^3\right) - \left(y(x)^3\right)^{2/3}\log(x)}$$

✗ **Mathematica** : cpu = 3.48292 (sec), leaf count = 0 , could not solve

```
DSolve[Derivative[1][y][x] == -(-(Log[x]*(y[x]^3)^(2/3)) - Log[x]*(y[x]^3)^(1/3)*_F1[3*ExpIn
Log[x]] + y[x]^3])^(-1), y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(y(x),x) = -1/(-ln(x)*(y(x)^3)^(2/3)-_F1(y(x)^3+3*Ei(1,-ln(x)))*ln(x)*(y(x)^3)^(1
```

2.838 ODE No. 838

$$y'(x) = \frac{\frac{8x^{7/2}}{5} + \frac{4x^6}{25} - \frac{4}{5}x^3y(x) + \frac{6x^3}{5} - 4\sqrt{x}y(x) + y(x)^2 + 4x + \sqrt{x}}{x}$$

✓ **Mathematica** : cpu = 0.0326822 (sec), leaf count = 29

$$\left\{\left\{y(x) \to \frac{1}{c_1 - \log(x)} + \frac{2x^3}{5} + 2\sqrt{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.11 (sec), leaf count = 25

$$\left\{y(x) = \frac{2\,x}{5}\left(x^2 + 5\,\frac{1}{\sqrt{x}}\right) + (\_C1 - \ln(x))^{-1}\right\}$$

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 = 0.0841068 (sec), leaf count = 28

$$\left\{\left\{y(x) \to -x\log\left(\frac{e^{2c_1} - x^2}{2x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.079 (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 = 0.0989701 (sec), leaf count = 28

$$\left\{\left\{y(x) \to -x\log\left(\frac{e^{3c_1} - x^3}{3x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.07 (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 = 1.47443 (sec), leaf count = 208

$$\left\{\left\{y(x)\to -\frac{\sqrt{-2a^{5/2}\left(c-bx^2\right)+4a^3bx\left(bx^2-c\right)+a^2x+4\sqrt{a}bc_1\left(bx^2-c\right)+2bc_1x}}{\sqrt{2}\sqrt{2a^{3/2}bc_1+a^{7/2}+2a^4bx}}\right\},\left\{y(x)\to \frac{\sqrt{-2a^{5/2}\left(c-\right.}}{}\right.$$

✓ **Maple** : cpu = 0.338 (sec), leaf count = 97

$$\left\{y(x)=\frac{1}{x\_C1+1}\sqrt{(x\_C1+1)\,a^{\frac{3}{2}}\left((x\_C1+1)\left(bx^2-c\right)\sqrt{a}+\frac{x}{2}\right)}a^{-\frac{3}{2}},y(x)=-2\frac{\sqrt{(x\_C1+1)\,a^{3/2}\left((x\_C\right.}}{a^{3/2}\left(2x\right.}\right.$$

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 = 0.15245 (sec), leaf count = 44

$$\left\{\left\{y(x)\to \frac{\log(x)\left(-4(c_1+1)+x^2-2x^2\log(x)\right)}{4c_1-x^2+2x^2\log(x)}\right\}\right\}$$

✓ **Maple** : cpu = 0.027 (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 = 0.138919 (sec), leaf count = 44

$$\left\{\left\{y(x)\to \frac{\log(x)\left(-9(c_1+1)+x^3-3x^3\log(x)\right)}{9c_1-x^3+3x^3\log(x)}\right\}\right\}$$

✓ **Maple** : cpu = 0.027 (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 = 19.83 (sec), leaf count = 386

$$\text{Solve}\left[\frac{2^{2/3}\left(1-\frac{\left(\frac{x^6}{(x+1)^3}\right)^{2/3}(x+1)^2((x-2)y(x)+x)}{x^4((x+1)y(x)+x)}\right)\left(\frac{\left(\frac{x^6}{(x+1)^3}\right)^{2/3}(x+1)^2((x-2)y(x)+x)}{x^4((x+1)y(x)+x)}+2\right)\left(\left(1-\frac{\left(\frac{x^6}{(x+1)^3}\right)^{2/3}(x+1)^2((x-2}{x^4((x+1)y(x)+x)}\right.\right.}{9\left(\frac{3(}{}\right.}\right.$$

✓ **Maple** : cpu = 0.205 (sec), leaf count = 97

$$\left\{y(x) = -x\mathrm{e}^{RootOf\left(-\ln\left(\frac{\mathrm{e}^{\_Z}}{2}+\frac{9}{2}\right)\mathrm{e}^{\_Z}+3\,\mathrm{e}^{\_Z}\_C1+\_Z\,\mathrm{e}^{\_Z}+\mathrm{e}^{\_Z}x+9\right)}\left(\mathrm{e}^{RootOf\left(-\ln\left(\frac{\mathrm{e}^{\_Z}}{2}+\frac{9}{2}\right)\mathrm{e}^{\_Z}+3\,\mathrm{e}^{\_Z}\_C1+\_Z\,\mathrm{e}^{\_Z}+\mathrm{e}^{\_Z}x+9\right)}x\right.\right.$$

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 = 5.83257 (sec), leaf count = 218

$$\left\{\left\{y(x) \to -\frac{1}{2}\sqrt[3]{-\frac{1}{2}}\sqrt[3]{12\left(6c_1+11\right)x^4+96c_1x^3+288c_1x+144c_1^2+9x^8+24x^7+16x^6+72x^5+144x^2}\right\},\left\{y(\right.\right.$$

✓ **Maple** : cpu = 0.261 (sec), leaf count = 44

$$\left\{\int_{\_b}^{y(x)}\_a^2\frac{1}{\sqrt{-9\,x^4+4\,\_a^3}}\,\mathrm{d}\_a-\frac{x^4}{4}-\frac{x^3}{3}-x-\_C1=0\right\}$$

2.846 ODE No. 846

$$y'(x) = \frac{1}{x^2\left(-\left(\frac{1}{y(x)}+1\right)\right)\_\mathrm{F1}\left(x\left(\frac{1}{y(x)}+1\right)\right)+x^2\_\mathrm{F1}\left(x\left(\frac{1}{y(x)}+1\right)\right)+x\left(\frac{1}{y(x)}+1\right)-x}$$

✓ **Mathematica** : cpu = 1.56016 (sec), leaf count = 174

$$\text{Solve}\left[c_1 = \int_1^{y(x)}\left(\frac{x\_\mathrm{F1}\left(x\left(\frac{1}{K[2]}+1\right)\right)-1}{x(K[2]+1)\_\mathrm{F1}\left(x\left(\frac{1}{K[2]}+1\right)\right)-K[2]} - \int_1^x \frac{K[1](K[2]+1)\_\mathrm{F1}'\left(K[1]\left(\frac{1}{K[2]}+1\right)\right)+K[2}{K[2]\left(K[2]-K[1](K[2]+1)\_\mathrm{F1}\left(K[\right.\right.}\right.\right.$$

✓ **Maple** : cpu = 0.201 (sec), leaf count = 40

$$\left\{y(x) = \mathrm{e}^{RootOf\left(-\_Z-\int^{\frac{\mathrm{e}^{\_Z}x}{\mathrm{e}^{\_Z}-1}}\frac{1}{(\_F1(\_a)\_a-1)\_a}d\_a+\_C1\right)} - 1\right\}$$

2.847 ODE No. 847

$$y'(x) = x^2\sqrt{x^2-4y(x)+2x+1}+\sqrt{x^2-4y(x)+2x+1}+x^3\sqrt{x^2-4y(x)+2x+1}+\frac{x}{2}+\frac{1}{2}$$

✓ **Mathematica** : cpu = 0.421693 (sec), leaf count = 69

$$\left\{\left\{y(x)\to\frac{1}{144}\left(24(3c_1-4)\,x^4+96c_1x^3+72(4c_1+1)\,x-144c_1^2-9x^8-24x^7-16x^6-72x^5-108x^2+36\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.295 (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

$$y'(x) = \_\mathrm{F1}(y(x)-\log(\sinh(x)))+\coth(x)$$

✓ **Mathematica** : cpu = 0.126402 (sec), leaf count = 91

$$\text{Solve}\left[c_1 = \int_1^{y(x)}\left(\frac{1}{\_\mathrm{F1}(K[2]-\log(\sinh(x)))} - \int_1^x \frac{\coth(K[1])\_\mathrm{F1}'(K[2]-\log(\sinh(K[1])))}{(\_\mathrm{F1}(K[2]-\log(\sinh(K[1]))))^2}\,dK[1]\right)dK[2]+\int\right.$$

✓ **Maple** : cpu = 0.643 (sec), leaf count = 27

$$\left\{\int_{\_b}^{y(x)}\left(\_F1\left(\_a-\ln\left(\sinh\left(x\right)\right)\right)\right)^{-1}\,\mathrm{d}\_a-x-\_C1=0\right\}$$

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 = 0.381354 (sec), leaf count = 73

$$\left\{\left\{y(x) \to -\frac{1}{6}(3c_1-4)\,x^4 - \frac{2c_1x^3}{3} - 2c_1x + c_1^2 + \frac{x^8}{16} + \frac{x^7}{6} + \frac{x^6}{9} + \frac{x^5}{2} + \frac{3x^2}{4} + x\right\}\right\}$$

✓ **Maple** : cpu = 0.286 (sec), leaf count = 33

$$\left\{\_C1 + \frac{x^4}{2} + \frac{2\,x^3}{3} + 2\,x - \sqrt{x^2-4\,x+4\,y\,(x)} = 0\right\}$$

2.850 ODE No. 850

$$y'(x) = \_\mathrm{F1}(y(x) - \log(\sin(x)) + \log(\cos(x)+1)) + \csc(x)$$

✓ **Mathematica** : cpu = 0.236226 (sec), leaf count = 114

$$\mathrm{Solve}\left[c_1 = \int_1^{y(x)} \left(\frac{1}{\_\mathrm{F1}(K[2] - \log(\sin(x)) + \log(\cos(x)+1))} - \int_1^x \frac{\csc(K[1])\_\mathrm{F1}'(K[2] - \log(\sin(K[1])) + \log}{(\_\mathrm{F1}(K[2] - \log(\sin(K[1])) + \log(\cos(}\right.\right.$$

✓ **Maple** : cpu = 1.313 (sec), leaf count = 32

$$\left\{\int_{\_b}^{y(x)} (\_F1\,(\_a - \ln(\sin(x)) + \ln(\cos(x)+1)))^{-1}\,\mathrm{d}\_a - x - \_C1 = 0\right\}$$

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 = 0.227437 (sec), leaf count = 136

$$\mathrm{Solve}\left[3(27a+29b)^{2/3}\mathrm{RootSum}\left[\#1^3(27a+29b)^{2/3} - 3\#1b^{2/3} + (27a+29b)^{2/3}\&, \frac{\log\left(\frac{3ax+3by(x)+b}{b\sqrt[3]{\frac{27a}{b}+29}} - \#1\right)}{b^{2/3} - \#1^2(27a+29b)^{2/3}}\&\right]\right]$$

✓ **Maple** : cpu = 0.073 (sec), leaf count = 42

$$\left\{y(x) = \frac{\mathit{RootOf}\left(\int^{\_Z} (\_a^3b + \_a^2b + a + b)^{-1}\,d\_ab - x + \_C1\right)b - ax}{b}\right\}$$

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 = 0.216126 (sec), leaf count = 136

$$\text{Solve}\left[3(29\alpha+27\beta)^{2/3}\text{RootSum}\left[\#1^3(29\alpha+27\beta)^{2/3}-3\#1\alpha^{2/3}+(29\alpha+27\beta)^{2/3}\&,\frac{\log\left(\frac{3\alpha y(x)+\alpha+3\beta x}{\alpha\sqrt[3]{\frac{27\beta}{\alpha}+29}}-\#1\right)}{\alpha^{2/3}-\#1^2(29\alpha+27\beta)^{2/3}}\right.\right.$$

✓ **Maple** : cpu = 0.075 (sec), leaf count = 42

$$\left\{y(x)=\frac{RootOf\left(\int^{-Z}\left(\_a^3\alpha+\_a^2\alpha+\alpha+\beta\right)^{-1}d\_a\alpha-x+\_C1\right)\alpha-\beta\,x}{\alpha}\right\}$$

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 = 0.021134 (sec), leaf count = 75

$$\left\{\left\{y(x)\to\frac{-2\sqrt{c_1-2x}+x+2}{x\left(\sqrt{c_1-2x}-1\right)}\right\},\left\{y(x)\to-\frac{2\sqrt{c_1-2x}+x+2}{x\sqrt{c_1-2x}+x}\right\}\right\}$$

✓ **Maple** : cpu = 0.044 (sec), leaf count = 63

$$\left\{y(x)=\frac{1}{x}\left(-2\sqrt{\_C1-2\,x}-x-2\right)\left(\sqrt{\_C1-2\,x}+1\right)^{-1},y(x)=\frac{1}{x}\left(-2\sqrt{\_C1-2\,x}+x+2\right)\left(\sqrt{\_C1-2\right.\right.$$

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 = 0.740546 (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]*Log[y[
```

✓ **Maple** : cpu = 0.229 (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 = 0.962118 (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]*Log[y[
```

✓ **Maple** : cpu = 0.214 (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

$$y'(x) = -\frac{x\left(-\_F1\left(y(x)^2 - 2x\right) - \frac{1}{x}\right)}{\sqrt{y(x)^2}}$$

✓ **Mathematica** : cpu = 1.07342 (sec), leaf count = 100

$$\text{Solve}\left[c_1 = \int_1^{y(x)}\left(\frac{\sqrt{K[2]^2}}{\_F1\left(K[2]^2 - 2x\right)} - \int_1^x \frac{2K[2]\_F1'\left(K[2]^2 - 2K[1]\right)}{\left(\_F1\left(K[2]^2 - 2K[1]\right)\right)^2}\, dK[1]\right) dK[2] + \int_1^x \left(-\frac{1}{\_F1\left(y(x)^2 - 2\right.}\right.\right.$$

✓ **Maple** : cpu = 0.307 (sec), leaf count = 65

$$\left\{y(x) = \sqrt{2\,RootOf\left(x^2 - 2\int^{\_Z}(\_F1\,(2\_a))^{-1}\,d\_a + 4\_C1\right) + 2\,x}, y(x) = -\sqrt{2\,RootOf\left(x^2 - 2\int^{\_Z}(\_F\right.}\right.$$

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 = 0.400379 (sec), leaf count = 77

$$\left\{\left\{y(x) \to \left(\frac{4}{3} - c_1\right)x^4 - \frac{4c_1x^3}{3} + \left(\frac{1}{4} - 4c_1\right)x + 2c_1^2 + \frac{x^8}{8} + \frac{x^7}{3} + \frac{2x^6}{9} + x^5 + \frac{15x^2}{8} - \frac{1}{8}\right\}\right\}$$

✓ **Maple** : cpu = 0.29 (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 = 0.222386 (sec), leaf count = 136

$$\text{Solve}\left[3(29a+27b)^{2/3}\text{RootSum}\left[\#1^3(29a+27b)^{2/3} - 3\#1a^{2/3} + (29a+27b)^{2/3}\&, \frac{\log\left(\frac{3ay(x)+a+3bx}{a\sqrt[3]{\frac{27b}{a}+29}} - \#1\right)}{a^{2/3} - \#1^2(29a+27b)^{2/3}}\&\right]\right.$$

✓ **Maple** : cpu = 0.073 (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

$$y'(x) = \frac{\_F1\left(y(x)^2 - 2x\right) + x}{x\sqrt{y(x)^2}}$$

✓ **Mathematica** : cpu = 1.52778 (sec), leaf count = 102

$$\text{Solve}\left[c_1 = \int_1^{y(x)}\left(\frac{\sqrt{K[2]^2}}{\_F1\left(K[2]^2 - 2x\right)} - \int_1^x \frac{2K[2]\_F1'\left(K[2]^2 - 2K[1]\right)}{\left(\_F1\left(K[2]^2 - 2K[1]\right)\right)^2}\,dK[1]\right)dK[2] + \int_1^x\left(-\frac{1}{\_F1\left(y(x)^2 - 2\right.}\right.\right.$$

✓ **Maple** : cpu = 0.29 (sec), leaf count = 63

$$\left\{y(x) = \sqrt{2\,RootOf\left(\ln(x) - \int^{\_Z}(\_F1\,(2\_a))^{-1}\,d\_a + 2\_C1\right) + 2\,x}, y(x) = -\sqrt{2\,RootOf\left(\ln(x) - \int^{\_Z}(\right.}\right.$$

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 = 0.175487 (sec), leaf count = 35

$$\left\{\left\{y(x)\to\tan^{-1}\left(\frac{c_1}{2x}+\frac{x^4}{5}+\frac{x^3}{4}+\frac{x}{2}\right)\right\}\right\}$$

✓ **Maple** : cpu = 2.414 (sec), leaf count = 29

$$\left\{y(x)=\arctan\left(\frac{4\,x^5+5\,x^4+10\,x^2+40\_C1}{20\,x}\right)\right\}$$

2.861 ODE No. 861

$$y'(x)=-\frac{e^{-1/x}\left(-\_\mathrm{F1}\left(e^{\frac{1}{x}}y(x)\right)-\frac{e^{\frac{1}{x}}y(x)}{x}\right)}{x}$$

✓ **Mathematica** : cpu = 2.04654 (sec), leaf count = 137

$$\text{Solve}\left[c_1=\int_1^{y(x)}\left(-\int_1^x\frac{e^{\frac{1}{K[1]}}\left(\_\mathrm{F1}\left(e^{\frac{1}{K[1]}}K[2]\right)-e^{\frac{1}{K[1]}}K[2]\_\mathrm{F1}'\left(e^{\frac{1}{K[1]}}K[2]\right)\right)}{K[1]^2\left(\_\mathrm{F1}\left(e^{\frac{1}{K[1]}}K[2]\right)\right)^2}dK[1]-\frac{e^{\frac{1}{x}}}{\_\mathrm{F1}\left(e^{\frac{1}{x}}K[2]\right)}\right)dK[2$$

✓ **Maple** : cpu = 0.187 (sec), leaf count = 26

$$\left\{y(x)=\frac{\mathit{RootOf}\left(-\ln(x)+\int^{\_Z}(\_F1(\_a))^{-1}d\_a+\_C1\right)}{\mathrm{e}^{x^{-1}}}\right\}$$

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 = 1.24039 (sec), leaf count = 0 , could not solve

```
DSolve[Derivative[1][y][x] == -(Log[-1 + y[x]]*(ExpIntegralEi[-Log[-1 + y[x]]]/x - _F1[x])),
```

✓ **Maple** : cpu = 0.231 (sec), leaf count = 27

$$\left\{y(x) = \mathrm{e}^{RootOf\left(\int \frac{-F1(x)}{x}\,\mathrm{d}x + x\_C1 + Ei(1,-\_Z)\right)} + 1\right\}$$

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 = 0.0396985 (sec), leaf count = 26

$$\left\{\left\{y(x) \to x\sinh\left(c_1 + \frac{x^4}{4} + \frac{x^3}{3} + x\right)\right\}\right\}$$

✓ **Maple** : cpu = 5.871 (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 = 0.0472511 (sec), leaf count = 98

$$\left\{\left\{y(x) \to \frac{e^{\frac{x^2}{2}}}{\sqrt{e^{\frac{x^2}{2}}(c_1 - 2x + 1)} - e^{\frac{x^2}{4}}}\right\}, \left\{y(x) \to -\frac{e^{\frac{x^2}{2}}}{\sqrt{e^{\frac{x^2}{2}}(c_1 - 2x + 1)} + e^{\frac{x^2}{4}}}\right\}\right\}$$

✓ **Maple** : cpu = 0.097 (sec), leaf count = 162

$$\left\{y(x) = 1\left(\mathrm{e}^{\frac{x^2}{2}}\left(\sqrt{\_C1 - 2x} - 1\right)\mathrm{e}^{-\frac{x^2}{4}} - \mathrm{e}^{\frac{x^2}{4}}\sqrt{\_C1 - 2x}\right)\left(\mathrm{e}^{-\frac{x^2}{4}}\right)^{-1}\left(\mathrm{e}^{\frac{x^2}{4}}\sqrt{\_C1 - 2x} + \mathrm{e}^{-\frac{x^2}{4}}\mathrm{e}^{\frac{x^2}{2}}\right)^{-1}, y(x)\right.$$

2.865 ODE No. 865

$$y'(x) = (1 - y(x))\left(-f(x) + \frac{y(x)\log(y(x)-1)}{x(1-y(x))\log(x)} - \frac{\log(y(x)-1)}{x(1-y(x))\log(x)}\right)$$

✗ **Mathematica** : cpu = 299.999 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.229 (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 = 0.565376 (sec), leaf count = 85

$$\left\{\left\{y(x) \to -\frac{a^2}{4} - \frac{ax}{2} - \frac{1}{6}(3c_1-4)x^4 - \frac{2c_1x^3}{3} - 2c_1x + c_1^2 + \frac{x^8}{16} + \frac{x^7}{6} + \frac{x^6}{9} + \frac{x^5}{2} + \frac{3x^2}{4}\right\}\right\}$$

✓ **Maple** : cpu = 0.362 (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 = 0.0818474 (sec), leaf count = 75

$$\text{Solve}\left[87\text{RootSum}\left[-29\#1^3 + 3\sqrt[3]{29}\#1 - 29\&, \frac{\log\left(\frac{x^2+3y(x)+1}{\sqrt[3]{29}} - \#1\right)}{\sqrt[3]{29} - 29\#1^2}\&\right] + 9c_1 + 29^{2/3}x = 0, y(x)\right]$$

✓ **Maple** : cpu = 0.07 (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 = 0.0620318 (sec), leaf count = 77

$$\text{Solve}\left[87\text{RootSum}\left[-29\#1^3 + 3\sqrt[3]{29}\#1 - 29\&, \frac{\log\left(\frac{-3x^2+3y(x)+1}{\sqrt[3]{29}} - \#1\right)}{\sqrt[3]{29} - 29\#1^2}\&\right] + 9c_1 + 29^{2/3}x = 0, y(x)\right]$$

✓ **Maple** : cpu = 0.066 (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 = 0.041397 (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 = 0.1 (sec), leaf count = 37

$$\left\{y(x) = x^2 + \frac{1}{2}\mathit{lambertW}\left(-2\,\frac{e^{x^4}e^{4/3\,x^3}\_C1\,(e^x)^4\,e^{-1}}{\left(e^{x^2}\right)^2}\right) + \frac{1}{2}\right\}$$

2.870 ODE No. 870

$$y'(x) = \frac{e^{\frac{y(x)}{x}}\left(x^4 + x^3 + xe^{-\frac{y(x)}{x}} + e^{-\frac{y(x)}{x}}y(x) + x\right)}{x}$$

✓ **Mathematica** : cpu = 1.88733 (sec), leaf count = 32

$$\left\{\left\{y(x) \to -x\log\left(-\frac{c_1}{x} - \frac{x^3}{4} - \frac{x^2}{3} - 1\right)\right\}\right\}$$

✓ **Maple** : cpu = 1.105 (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 = 0.0301006 (sec), leaf count = 22

$$\left\{\left\{y(x) \to \frac{1}{c_1 - x} - \log(2x+1)\right\}\right\}$$

✓ **Maple** : cpu = 0.08 (sec), leaf count = 26

$$\left\{y(x) = \frac{-1 + (\_C1 - x)\ln(2x+1)}{-\_C1 + x}\right\}$$

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 = 0.0511312 (sec), leaf count = 92

$$\left\{\left\{y(x) \to \sqrt{-\frac{1}{x}}\sqrt{-x\left(c_1 + 2\log(x) + 1\right)} + \frac{2x^3}{5} + 2\sqrt{x} - 1\right\}, \left\{y(x) \to \left(-\frac{1}{x}\right)^{3/2} x\sqrt{-x\left(c_1 + 2\log(x) + 1\right)} + \right.$$

✓ **Maple** : cpu = 0.07 (sec), leaf count = 49

$$\left\{y(x) = \frac{2x^3}{5} + 2\sqrt{x} - \sqrt{\_C1 + 2\ln(x)} - 1, y(x) = \frac{2x^3}{5} + 2\sqrt{x} + \sqrt{\_C1 + 2\ln(x)} - 1\right\}$$

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 = 0.7187 (sec), leaf count = 48

$$\text{Solve}\left[\frac{1}{192}\left(-16y(x)^3 - 12y(x)^2 + 12y(x) - \frac{96}{2xy(x) + x} - 54\log(4y(x)+2) + 7\right) = c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.264 (sec), leaf count = 50

$$\left\{y(x) = \frac{e^{RootOf\left(2x\left(e^{\_Z}\right)^4 - 3x\left(e^{\_Z}\right)^3 - 6x\left(e^{\_Z}\right)^2 + 48\_C1\,xe^{\_Z} + 54\_Z\,xe^{\_Z} + 7e^{\_Z}x + 96\right)}}{2} - \frac{1}{2}\right\}$$

2.874 ODE No. 874

$$y'(x) = \frac{1}{512}x(a^3x^{12} + 24a^2x^8y(x) + 8a^2x^8 + 192ax^4y(x)^2 + 128ax^4y(x) - 256ax^2 + 512y(x)^3 + 512y(x)^2 + 512$$

✓ **Mathematica** : cpu = 0.0997009 (sec), leaf count = 95

$$\text{Solve}\left[174\text{RootSum}\left[-29\#1^3 + 3\sqrt[3]{29}\#1 - 29\&, \frac{\log\left(\frac{x(3ax^4+24y(x)+8)}{8\sqrt[3]{29}\sqrt[3]{x^3}} - \#1\right)}{\sqrt[3]{29} - 29\#1^2}\&\right] + 18c_1 + 29^{2/3}\left(x^3\right)^{2/3} = 0, y(x$$

✓ **Maple** : cpu = 0.05 (sec), leaf count = 40

$$\left\{y(x) = -\frac{ax^4}{8} - \frac{1}{3} + \frac{29\,RootOf\left(x^2 - 162\int^{\_Z}(841\_a^3 - 27\_a + 27)^{-1}d\_a + 6\_C1\right)}{9}\right\}$$

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 = 0.329905 (sec), leaf count = 213

$$\left\{\left\{y(x) \to \frac{x\left(2(x+1)^{\sqrt{2}}\exp\left(\frac{12c_1+3x^4+6x^2+4(x^2+3)x+25}{6\sqrt{2}}\right) + (x+1)^{2\sqrt{2}}\left(-e^{\frac{4c_1+x^4+2x^2}{\sqrt{2}}}\right) + e^{\frac{4x^3+12x+25}{3\sqrt{2}}}\right)}{-2(x+1)^{\sqrt{2}}\exp\left(\frac{12c_1+3x^4+6x^2+4(x^2+3)x+25}{6\sqrt{2}}\right) + (x+1)^{2\sqrt{2}}\left(-e^{\frac{4c_1+x^4+2x^2}{\sqrt{2}}}\right) + e^{\frac{4x^3+12x+25}{3\sqrt{2}}}}\right\}\right\}$$

✓ **Maple** : cpu = 0.279 (sec), leaf count = 73

$$\left\{\ln\left(2\,\frac{x\left(\sqrt{2\,(y(x))^2 + 2\,x^2} + y(x) + x\right)}{y(x) - x}\right) + \sqrt{2}\ln(1+x) + \frac{(3\,x^4 - 4\,x^3 + 6\,x^2 - 12\,x)\sqrt{2}}{12} - \_C1 - \ln(x) =$$

2.876 ODE No. 876

$$y'(x) = -\frac{y(x)^2 \left(x^2 y(x) - 2xy(x) + y(x) - 2x\right)}{2x(xy(x) - 2y(x) - 2)}$$

✓ **Mathematica** : cpu = 0.0211941 (sec), leaf count = 89

$$\left\{\left\{y(x) \to \frac{2}{\sqrt{2}\sqrt{-\frac{1}{x}}\sqrt{-x\left(2c_1 - \log(x) + 2\right)} + x - 2}\right\}, \left\{y(x) \to -\frac{2}{\sqrt{2}\sqrt{-\frac{1}{x}}\sqrt{-x\left(2c_1 - \log(x) + 2\right)} - x + 2}\right\}$$

✓ **Maple** : cpu = 0.053 (sec), leaf count = 41

$$\left\{y(x) = -4\left(\sqrt{\_C1 - 8\ln(x)} - 2x + 4\right)^{-1}, y(x) = 4\left(\sqrt{\_C1 - 8\ln(x)} + 2x - 4\right)^{-1}\right\}$$

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 = 0.0191437 (sec), leaf count = 47

$$\left\{\left\{y(x) \to \frac{1}{\sqrt{c_1 - 2x} - 1} + x^2\right\}, \left\{y(x) \to x^2 - \frac{1}{\sqrt{c_1 - 2x} + 1}\right\}\right\}$$

✓ **Maple** : cpu = 0.051 (sec), leaf count = 73

$$\left\{y(x) = \frac{1}{-2\_C1 + 2x}\left(-2\_C1\, x^2 + 2x^3 + \sqrt{2\_C1 - 2x + 1} - 1\right), y(x) = \frac{1}{-2x + 2\_C1}\left(2\_C1\, x^2 - 2x^3 +\right.$$

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 = 0.33751 (sec), leaf count = 128

$$\text{Solve}\left[2ax = a\text{RootSum}\left[64\#1^3a^3 - 48\#1^2a^2y(x)^2 - 16\#1^2a^2 + 12\#1ay(x)^4 + 8\#1ay(x)^2 + 2a - y(x)^6 - y(x)^4\right.\right.$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(y(x),x) = (1+y(x)^4-8*a*x*y(x)^2+16*a^2*x^2+y(x)^6-12*y(x)^4*a*x+48*y(x)^2*a^2*x
64*a^3*x^3)/y(x),y(x))
```

2.879 ODE No. 879

$$y'(x) = \frac{x^2\left(-\sqrt{x^2+y(x)^2}\right)+xy(x)\sqrt{x^2+y(x)^2}+xy(x)+y(x)}{x(x+1)}$$

✓ **Mathematica** : cpu = 0.173511 (sec), leaf count = 109

$$\left\{\left\{y(x)\to \frac{x\left(-2(x+1)^{\sqrt{2}}e^{\sqrt{2}(c_1+x)}+e^{2\sqrt{2}(c_1+x)}-(x+1)^{2\sqrt{2}}\right)}{2(x+1)^{\sqrt{2}}e^{\sqrt{2}(c_1+x)}+e^{2\sqrt{2}(c_1+x)}-(x+1)^{2\sqrt{2}}}\right\}\right\}$$

✓ **Maple** : cpu = 0.24 (sec), leaf count = 55

$$\left\{\ln\left(2\,\frac{x\left(\sqrt{2\,(y(x))^2+2\,x^2}+y(x)+x\right)}{y(x)-x}\right)+\sqrt{2}x-\ln(x)-\sqrt{2}\ln(1+x)-\_C1=0\right\}$$

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 = 0.171469 (sec), leaf count = 126

$$\text{Solve}\left[8ac_1 = \frac{\text{RootSum}\left[-64\#1^3a^3+48\#1^2a^2y(x)^2+16\#1^2a^2-12\#1ay(x)^4-8\#1ay(x)^2+y(x)^6+y(x)^4+\right.}{a}\right.$$

✓ **Maple** : cpu = 0.085 (sec), leaf count = 41

$$\left\{\frac{y(x)}{2\,a}+\frac{\int^{(y(x))^2-4\,ax}\left(\_a^3+\_a^2+1\right)^{-1}d\_a}{8\,a^2}-\_C1=0\right\}$$

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 = 0.0205884 (sec), leaf count = 57

$$\left\{\left\{y(x) \to \frac{27}{\sqrt{c_1 - 1458x} - 27} - \frac{x^2}{3}\right\}, \left\{y(x) \to -\frac{27}{\sqrt{c_1 - 1458x} + 27} - \frac{x^2}{3}\right\}\right\}$$

✓ **Maple** : cpu = 0.055 (sec), leaf count = 77

$$\left\{y(x) = \frac{1}{-6\,x + 6\_C1}\left(-2\_C1\,x^2 + 2\,x^3 - 3\,\sqrt{2\_C1 - 2\,x + 1} + 3\right), y(x) = \frac{1}{-6\,x + 6\_C1}\left(-2\_C1\,x^2 + 2\,x\right.$$

2.882 ODE No. 882

$$y'(x) = -\frac{1}{216}\sqrt{x}\left(-108x^{3/2} + x^9 - 18x^6y(x) - 6x^6 + 108x^3y(x)^2 + 72x^3y(x) - 216y(x)^3 - 216y(x)^2 - 216\right)$$

✓ **Mathematica** : cpu = 0.102746 (sec), leaf count = 106

$$\text{Solve}\left[261\text{RootSum}\left[-29\#1^3 + 3\sqrt[3]{29}\#1 - 29\&, \frac{\log\left(-\#1 - \frac{\sqrt{x}(x^3 - 6y(x) - 2)}{2\sqrt[3]{29}\sqrt[3]{x^{3/2}}}\right)}{\sqrt[3]{29} - 29\#1^2}\&\right] + 27c_1 + 2\ 29^{2/3}\sqrt{x}\left(x^{3/2}\right)^{2/3}\right.$$

✓ **Maple** : cpu = 0.062 (sec), leaf count = 41

$$\left\{y(x) = \frac{x^3}{6} - \frac{1}{3} + \frac{29}{9} RootOf\left(2\,x^{3/2} - 243\int^{\_Z}\left(841\_a^3 - 27\_a + 27\right)^{-1} d\_a + 9\_C1\right)\right\}$$

2.883 ODE No. 883

$$y'(x) = \frac{x\left(a^3y(x)^6 + a^3y(x)^4 + a^3 + 3a^2bx^2y(x)^4 + 2a^2bx^2y(x)^2 + 3ab^2x^4y(x)^2 + ab^2x^4 + b^3x^6\right)}{a^{7/2}y(x)}$$

✓ **Mathematica** : cpu = 1.63846 (sec), leaf count = 159

$$\text{Solve}\left[x^2 = a^{5/2}\text{RootSum}\left[\#1^3b^3 + 3\#1^2ab^2y(x)^2 + \#1^2ab^2 + 3\#1a^2by(x)^4 + 2\#1a^2by(x)^2 + a^{5/2}b + a^3y(x)^6 +\right.\right.$$

✓ **Maple** : cpu = 0.753 (sec), leaf count = 352

$$\left\{\int_{\_b}^{x}\left(b^3\_a^6 + 3\,(y(x))^2\,ab^2\_a^4 + 3\,(y(x))^4\,a^2b\_a^2 + (y(x))^6\,a^3 + a\_a^4b^2 + 2\,a^2(y(x))^2\,b\_a^2 + (y(x))^4\,a^3 + a^3\right)\right.$$

2.884 ODE No. 884

$$y'(x) = -\frac{x(x^6 - 3x^4y(x)^2 - x^4 + 3x^2y(x)^4 + 2x^2y(x)^2 - y(x)^6 - y(x)^4 - 1)}{y(x)}$$

✓ **Mathematica** : cpu = 0.624051 (sec), leaf count = 71

$$\text{Solve}\left[\frac{1}{4}\left(2\log\left(-x^2+y(x)^2+1\right)-2x^2-\frac{1}{y(x)(y(x)+x)}+\frac{1}{xy(x)-y(x)^2}-2\log(x-y(x))-2\log(y(x)+x)\right)\right.$$

✓ **Maple** : cpu = 0.379 (sec), leaf count = 107

$$\left\{y(x) = e^{RootOf\left(3\,x^2\left(e^{\_Z}\right)^2-6\,x^3e^{\_Z}-3\left(e^{\_Z}\right)^2\ln\left(\frac{\left(e^{\_Z}\right)^2-2\,e^{\_Z}x+1}{e^{\_Z}-2\,x}\right)-2\_C1\left(e^{\_Z}\right)^2+3\_Z\left(e^{\_Z}\right)^2+6\,e^{\_Z}\ln\left(\frac{\left(e^{\_Z}\right)^2-2\,e^{\_Z}x+1}{e^{\_Z}-2\,x}\right)x+\right.}\right.$$

2.885 ODE No. 885

$$y'(x) = -\frac{i(x^6 + 12x^4y(x)^2 + 4x^4 + 48x^2y(x)^4 + 32x^2y(x)^2 + 64y(x)^6 + 64y(x)^4 + 32ix + 64)}{128y(x)}$$

✗ **Mathematica** : cpu = 40.8481 (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 + 12*x^
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(y(x),x) = -1/128*I*(32*I*x+64+64*y(x)^4+32*x^2*y(x)^2+4*x^4+64*y(x)^6+48*x^2*y(x
```

2.886 ODE No. 886

$$y'(x) = \frac{x^6y(x)^3 - 3x^5y(x)^2 + x^4y(x)^2 + 3x^4y(x) - 4x^3y(x) - x^3 + 2x^2 + 1}{x^4}$$

✓ **Mathematica** : cpu = 0.0771885 (sec), leaf count = 79

$$\text{Solve}\left[87\text{RootSum}\left[-29\#1^3+3\sqrt[3]{29}\#1-29\&,\frac{\log\left(\frac{3x^2y(x)-3x+1}{\sqrt[3]{29}}-\#1\right)}{\sqrt[3]{29}-29\#1^2}\&\right]+9c_1=\frac{29^{2/3}}{x},y(x)\right]$$

✓ **Maple** : cpu = 0.035 (sec), leaf count = 42

$$\left\{y(x) = \frac{9\,x-3+29\,RootOf\left(-81\int^{\_Z}\left(841\_a^3-27\_a+27\right)^{-1}d\_a x+3\,x\_C1-1\right)}{9\,x^2}\right\}$$

2.887 ODE No. 887

$$y'(x) = \frac{a^3x^3y(x)^3 + 3a^2x^2y(x)^2 + a^2xy(x) + a^2x + 3axy(x) + a + 1}{a^2x^2(axy(x) + ax + 1)}$$

✓ **Mathematica** : cpu = 0.0286994 (sec), leaf count = 91

$$\left\{\left\{y(x) \to \frac{a^3}{\sqrt{c_1 - 2a^6x} - a^3} - \frac{1}{ax}\right\}, \left\{y(x) \to -\frac{\sqrt{c_1 - 2a^6x} + a^4x + a^3}{ax\sqrt{c_1 - 2a^6x} + a^4x}\right\}\right\}$$

✓ **Maple** : cpu = 0.059 (sec), leaf count = 72

$$\left\{y(x) = \frac{1}{ax}\left(-ax - \sqrt{\_C1 - 2\,x} - 1\right)\left(\sqrt{\_C1 - 2\,x} + 1\right)^{-1}, y(x) = \frac{1}{ax}\left(ax - \sqrt{\_C1 - 2\,x} + 1\right)\left(\sqrt{\_C1 - 2\right.$$

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 = 0.020941 (sec), leaf count = 67

$$\left\{\left\{y(x) \to \frac{1}{x^4\left(\frac{1}{x^2} - \frac{1}{x^2\sqrt{c_1 + \frac{2}{x}}}\right)} + \frac{x-1}{x^2}\right\}, \left\{y(x) \to \frac{\frac{1}{\frac{1}{\sqrt{c_1 + \frac{2}{x}}} + 1} + x - 1}{x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.063 (sec), leaf count = 79

$$\left\{y(x) = \frac{1}{x^2}\left(\sqrt{\frac{x\_C1 + 2}{x}}x - x + 1\right)\left(\sqrt{\frac{x\_C1 + 2}{x}} - 1\right)^{-1}, y(x) = \frac{1}{x^2}\left(\sqrt{\frac{x\_C1 + 2}{x}}x + x - 1\right)\left(\sqrt{\frac{x\_C1}{x}}\right.\right.$$

2.889 ODE No. 889

$$y'(x) = -\frac{e^x\left(-8y(x)^{9/2} + 36e^xy(x)^3 - 8y(x)^3 + 24e^xy(x)^{3/2} - 54e^{2x}y(x)^{3/2} - 18e^{2x} + 27e^{3x} - 8\right)}{8\sqrt{y(x)}}$$

✗ **Mathematica** : cpu = 300.692 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 1.322 (sec), leaf count = 49

$$\left\{e^x - 4\left(-6\,(y(x))^{3/2} + 9\,e^x\right)^{-1} + \frac{2}{3}\ln\left((y(x))^{\frac{3}{2}} - \frac{3\,e^x}{2}\right) - \frac{2}{3}\ln\left((y(x))^{\frac{3}{2}} - \frac{3\,e^x}{2} + 1\right) - \_C1 = 0\right\}$$

2.890 ODE No. 890

$$y'(x) = \frac{x}{x^6 + 3x^4y(x)^2 + x^4 + 3x^2y(x)^4 + 2x^2y(x)^2 + y(x)^6 + y(x)^4 - y(x) + 1}$$

✓ **Mathematica** : cpu = 0.167243 (sec), leaf count = 103

$$\text{Solve}\left[\text{RootSum}\left[\#1^3 + 3\#1^2y(x)^2 + \#1^2 + 3\#1y(x)^4 + 2\#1y(x)^2 + y(x)^6 + y(x)^4 + 1\&, \frac{\log(x^2}{3\#1^2 + 6\#1y(x)^2 + 2}\right.\right.$$

✓ **Maple** : cpu = 1.057 (sec), leaf count = 34

$$\left\{-y(x) + \frac{\int^{(y(x))^2+x^2}(\_a^3 + \_a^2 + 1)^{-1}d\_a}{2} - \_C1 = 0\right\}$$

2.891 ODE No. 891

$$y'(x) = \frac{y(x)^2(x^4y(x) + 2x^2y(x) + 2x^2 - 2y(x))}{x^3(x^2y(x) + x^2 - y(x))}$$

✓ **Mathematica** : cpu = 0.0269971 (sec), leaf count = 86

$$\left\{\left\{y(x) \to \frac{x^2}{x^2\left(\sqrt{\frac{1}{x^5}}\sqrt{x^5(c_1 - 2\log(x) + 1)} - 1\right) + 1}\right\}, \left\{y(x) \to -\frac{x^2}{x^2\left(\sqrt{\frac{1}{x^5}}\sqrt{x^5(c_1 - 2\log(x) + 1)} + 1\right) - 1}\right.\right.$$

✓ **Maple** : cpu = 0.065 (sec), leaf count = 56

$$\left\{y(x) = x^2\left(\sqrt{\_C1 - 2\ln(x)}x^2 - x^2 + 1\right)^{-1}, y(x) = -x^2\left(\sqrt{\_C1 - 2\ln(x)}x^2 + x^2 - 1\right)^{-1}\right\}$$

2.892 ODE No. 892

$$y'(x) = \frac{e^{-\frac{2}{x^2 - y(x)^2 - 1}} + x^2 + 2xy(x) + y(x)^2}{-e^{-\frac{2}{x^2 - y(x)^2 - 1}} + x^2 + 2xy(x) + y(x)^2}$$

✗ **Mathematica** : cpu = 300.02 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.653 (sec), leaf count = 40

$$\left\{y(x) = \mathrm{e}^{RootOf\left(-\_Z + \int^{\left(\mathrm{e}^{\_Z}\right)^2 - 2\,\mathrm{e}^{\_Z}x}\left(\mathrm{e}^{2(\_a+1)^{-1}} + \_a\right)^{-1}d\_a + \_C1\right)} - x\right\}$$

2.893 ODE No. 893

$$y'(x) = \frac{x^3y(x)^3 + x^3y(x)^2 + x^3 + 6x^2y(x)^2 + 4x^2y(x) + 12xy(x) + 6x + 8}{x^3}$$

✓ **Mathematica** : cpu = 0.0835149 (sec), leaf count = 77

$$\text{Solve}\left[87\text{RootSum}\left[-29\#1^3 + 3\sqrt[3]{29}\#1 - 29\&, \frac{\log\left(\frac{3xy(x)+x+6}{\sqrt[3]{29}x} - \#1\right)}{\sqrt[3]{29} - 29\#1^2}\&\right] + 9c_1 + 29^{2/3}x = 0, y(x)\right]$$

✓ **Maple** : cpu = 0.034 (sec), leaf count = 41

$$\left\{y(x) = \frac{29\, RootOf\left(-81\int^{\_Z}\left(841\_a^3 - 27\_a + 27\right)^{-1} d\_a + x + 3\_C1\right)x - 3x - 18}{9x}\right\}$$

2.894 ODE No. 894

$$y'(x) = -\frac{i\left(x^6 + 3x^4y(x)^2 + x^4 + 3x^2y(x)^4 + 2x^2y(x)^2 + y(x)^6 + y(x)^4 + ix + 1\right)}{y(x)}$$

✗ **Mathematica** : cpu = 40.7994 (sec), leaf count = 0 , could not solve

```
DSolve[Derivative[1][y][x] == ((-I)*(1 + I*x + x^4 + x^6 + 2*x^2*y[x]^2 + 3*x^4*y[x]^2 + y[x
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(y(x),x) = -I*(I*x+1+x^4+2*x^2*y(x)^2+y(x)^4+x^6+3*x^4*y(x)^2+3*x^2*y(x)^4+y(x)^6
```

2.895 ODE No. 895

$$y'(x) = \frac{x\left(a^3x^{12} + 24a^2x^8y(x) - 32a^2x^6 + 192ax^4y(x)^2 - 256ax^2y(x) - 256ax^2 + 512y(x)^3\right)}{64ax^4 + 512y(x) + 512}$$

✓ **Mathematica** : cpu = 0.0279842 (sec), leaf count = 63

$$\left\{\left\{y(x) \to \frac{512}{\sqrt{c_1 - 262144x^2} - 512} - \frac{ax^4}{8}\right\}, \left\{y(x) \to -\frac{ax^4}{8} - \frac{512}{\sqrt{c_1 - 262144x^2} + 512}\right\}\right\}$$

✓ **Maple** : cpu = 0.068 (sec), leaf count = 79

$$\left\{y(x) = 1\left(-8 + \left(-\sqrt{-x^2 + \_C1} - 1\right)ax^4\right)\left(8 + 8\sqrt{-x^2 + \_C1}\right)^{-1}, y(x) = 1\left(8 + \left(-\sqrt{-x^2 + \_C1} + 1\right)ax\right.$$

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 = 0.258716 (sec), leaf count = 102

$$\text{Solve}\left[2(c_1 + x) = \text{RootSum}\left[-\#1^3 + 3\#1^2y(x)^2 + \#1^2 - 3\#1y(x)^4 - 2\#1y(x)^2 + y(x)^6 + y(x)^4 + 1\&, \frac{}{3\#1^2 -}\right.\right.$$

✓ **Maple** : cpu = 0.832 (sec), leaf count = 63

$$\left\{\int_{\_b}^{y(x)} \frac{\_a}{-\_a^6 + 3\_a^4x^2 - 3\_a^2x^4 + x^6 - \_a^4 + 2\_a^2x^2 - x^4 - 1} d\_a + x - \_C1 = 0\right\}$$

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 = 0.0289774 (sec), leaf count = 65

$$\left\{\left\{y(x) \to \frac{x^3}{6} - \frac{216}{\sqrt{c_1 - 62208x^{3/2}} + 216}\right\}, \left\{y(x) \to \frac{216}{\sqrt{c_1 - 62208x^{3/2}} - 216} + \frac{x^3}{6}\right\}\right\}$$

✓ **Maple** : cpu = 0.086 (sec), leaf count = 87

$$\left\{y(x) = 1\left(\sqrt{9\_C1 - 12\,x^{3/2}}x^3 - 3\,x^3 + 18\right)\left(6\sqrt{9\_C1 - 12\,x^{3/2}} - 18\right)^{-1}, y(x) = 1\left(\sqrt{9\_C1 - 12\,x^{3/2}}x^3 + 3\right.\right.$$

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 = 0.0262112 (sec), leaf count = 95

$$\left\{\left\{y(x) \to \frac{-\sqrt{c_1 + \frac{8192}{x}} + 256x^2 + 64}{4x^2\left(\sqrt{c_1 + \frac{8192}{x}} - 64\right)}\right\}, \left\{y(x) \to -\frac{\sqrt{c_1 + \frac{8192}{x}} + 256x^2 + 64}{4x^2\left(\sqrt{c_1 + \frac{8192}{x}} + 64\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.05 (sec), leaf count = 87

$$\left\{y(x) = \frac{1}{4\,x^2}\left(-4\,x^2 - \sqrt{\frac{x\_C1+2}{x}} - 1\right)\left(\sqrt{\frac{x\_C1+2}{x}}+1\right)^{-1}, y(x) = \frac{1}{4\,x^2}\left(4\,x^2 - \sqrt{\frac{x\_C1+2}{x}}+1\right)\left(\sqrt{\right.\right.$$

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 = 0.106033 (sec), leaf count = 101

$$\text{Solve}\left[29^{2/3}\left(\frac{1}{x^6}\right)^{2/3}x^3 = 87\text{RootSum}\left[-29\#1^3 + 3\sqrt[3]{29}\#1 - 29\&, \frac{\log\left(\frac{12x^2y(x)+4x^2+3}{4\sqrt[3]{29}\sqrt[3]{\frac{1}{x^6}}x^4} - \#1\right)}{\sqrt[3]{29} - 29\#1^2}\&\right] + 9c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.041 (sec), leaf count = 47

$$\left\{y(x) = \frac{116\,RootOf\left(-81\int^{\_Z}\left(841\_a^3 - 27\_a + 27\right)^{-1}d\_ax + 3\,x\_C1 - 1\right)x^2 - 12\,x^2 - 9}{36\,x^2}\right\}$$

2.900 ODE No. 900

$$y'(x) = \frac{2a\left(4ax - y(x)^2 - 1\right)}{128a^4x^3 - 96a^3x^2y(x)^2 + 24a^2xy(x)^4 - 2ay(x)^6 + 4axy(x) - y(x)^3 - y(x)}$$

✓ **Mathematica** : cpu = 0.104571 (sec), leaf count = 381

$$\{\{y(x) \to \text{Root}\left[8\#1^5a - 16\#1^4a^2c_1 - 64\#1^3a^2x + \#1^2\left(128a^3c_1x - 2\right) + 128\#1a^3x^2 - 256a^4c_1x^2 + 8ax - 1\&,\right.$$

✓ **Maple** : cpu = 0.079 (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 = 0.163903 (sec), leaf count = 29

$$\text{Solve}\left[2c_1 + x^2 + 2y(x)(\log(y(x)) + \log(x)) = 2ax\log(y(x)), y(x)\right]$$

✓ **Maple** : cpu = 0.546 (sec), leaf count = 30

$$\left\{y(x) = \mathrm{e}^{\mathit{RootOf}\left(-2\_Z\,ax+2\,\ln(x)\mathrm{e}^{-\_Z}+2\_Z\,\mathrm{e}^{-\_Z}+2\_C1\,a+x^2\right)}\right\}$$

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 = 0.117898 (sec), leaf count = 195

$$\left\{\left\{y(x) \to -\frac{1}{2}\sqrt{-\frac{4c_1x^2 + \sqrt{4c_1 - 4x + 1} - 4x^3 + 1}{x - c_1}}\right\}, \left\{y(x) \to \frac{1}{2}\sqrt{-\frac{4c_1x^2 + \sqrt{4c_1 - 4x + 1} - 4x^3 + 1}{x - c_1}}\right\}, \left\{\right.\right.$$

✓ **Maple** : cpu = 0.271 (sec), leaf count = 183

$$\left\{y(x) = \frac{1}{2\_C1 + 6\,x}\sqrt{(\_C1 + 3\,x)\left(4\_C1\,x^2 + 12\,x^3 - \sqrt{-12\_C1 - 36\,x + 9} - 3\right)}, y(x) = \frac{1}{2\_C1 + 6\,x}\sqrt{(\_\right.$$

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 = 0.0563284 (sec), leaf count = 19

$$\left\{\left\{y(x) \to 2x\cot^{-1}\left(e^{-c_1-x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.083 (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 = 0.0652822 (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 = 0.052 (sec), leaf count = 64

$$\left\{y(x)=\arctan\left(2\frac{e^{1/2\,x^2}\_C1}{\left(e^{1/2\,x^2}\right)^2\_C1^2+1},1\left(-\left(e^{\frac{x^2}{2}}\right)^2\_C1^2+1\right)\left(\left(\left(e^{\frac{x^2}{2}}\right)^2\_C1^2+1\right)^{-1}\right)\right)x\right\}$$

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 = 0.0885537 (sec), leaf count = 83

$$\text{Solve}\left[87\text{RootSum}\left[-29\#1^3+3\sqrt[3]{29}\#1-29\&,\frac{\log\left(\frac{\frac{ax+3}{ax}+3y(x)}{\sqrt[3]{29}}-\#1\right)}{\sqrt[3]{29}-29\#1^2}\&\right]+9c_1+29^{2/3}x=0,y(x)\right]$$

✓ **Maple** : cpu = 0.053 (sec), leaf count = 46

$$\left\{y(x)=\frac{29\,RootOf\left(-81\int^{\_Z}\left(841\_a^3-27\_a+27\right)^{-1}d\_a+x+3\_C1\right)ax-3\,ax-9}{9\,ax}\right\}$$

2.906 ODE No. 906

$$y'(x)=\frac{x\left(x^2+y(x)^2+1\right)}{x^6+3x^4y(x)^2+3x^2y(x)^4-x^2y(x)+y(x)^6-y(x)^3-y(x)}$$

✓ **Mathematica** : cpu = 0.0623962 (sec), leaf count = 326

$$\{\{y(x)\to\text{Root}\left[4\#1^5-4\#1^4c_1+8\#1^3x^2+\#1^2\left(2-8c_1x^2\right)+4\#1x^4-4c_1x^4+2x^2+1\&,1\right]\},\{y(x)\to\text{Root}[$$

✓ **Maple** : cpu = 0.368 (sec), leaf count = 37

$$\left\{-\left(2\,(y(x))^2+2\,x^2\right)^{-1}-\frac{1}{4\,\left((y\,(x))^2+x^2\right)^2}-y(x)+\_C1=0\right\}$$

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 = 0.0573107 (sec), leaf count = 21

$$\left\{\left\{y(x)\to\frac{1}{c_1-\log(x)}+x+x(-\cos(x))\right\}\right\}$$

✓ **Maple** : cpu = 0.164 (sec), leaf count = 20

$$\left\{y(x)=-(-1+\cos\left(x\right))\,x+(\_C1-\ln\left(x\right))^{-1}\right\}$$

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 = 1.71555 (sec), leaf count = 1003

$$\left\{\left\{y(x)\to\frac{c_1+\sqrt[3]{-9x^2c_1a^6+27x^2c_1a^4+27a^4-27x^2c_1a^2-54a^2+c_1^3+9x^2c_1+\frac{1}{2}\sqrt{4\left(-9x^2c_1a^6+27\left(c_1x^2+\right.\right.}}}{}\right.\right.$$

✓ **Maple** : cpu = 0.458 (sec), leaf count = 1742

$$\left\{y(x)=\frac{9^{\frac{2}{3}}}{27\,a^2-27}\left(\left(-\_C1\,a^2+\_C1\right)\sqrt[3]{9}\sqrt[3]{(a+1)^2\left(\frac{1}{3}\sqrt{-3\,(a-1)^5\,(a+1)^5\,x^6+6\,\_C1^2\,(a-1)^4\,(a+1)^4}\right.}\right.\right.$$

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 = 40.7839 (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 + x^3*
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(y(x),x) = (x^3+y(x)^4*x^3+2*x^2*y(x)^2+x+x^3*y(x)^6+3*x^2*y(x)^4+3*x*y(x)^2+1)/x
```

2.910 ODE No. 910

$$y'(x) = \frac{x^6 + 3x^5y(x) + 3x^4y(x)^2 + x^4 + x^3y(x)^3 + 2x^3y(x) + x^2y(x)^2 - y(x) - 2x + 1}{x}$$

✓ **Mathematica** : cpu = 0.100349 (sec), leaf count = 95

$$\text{Solve}\left[87\text{RootSum}\left[-29\#1^3 + 3\sqrt[3]{29}\#1 - 29\&, \frac{\log\left(\frac{x(3x^2+3xy(x)+1)}{\sqrt[3]{29}\sqrt[3]{x^3}} - \#1\right)}{\sqrt[3]{29} - 29\#1^2}\&\right] + 9c_1 + \frac{29^{2/3}\left(x^3\right)^{2/3}}{x} = 0, y(x)\right]$$

✓ **Maple** : cpu = 0.036 (sec), leaf count = 42

$$\left\{y(x) = \frac{-9\,x^2 + 29\,RootOf\left(-81\int^{\_Z}\left(841\_a^3 - 27\_a + 27\right)^{-1}d\_a + x + 3\_C1\right) - 3}{9\,x}\right\}$$

2.911 ODE No. 911

$$y'(x) = -y(x)\left(-\_\text{F1}(x) - \frac{\log(y(x))}{x} + \cot(x)\log(y(x))\right)$$

✓ **Mathematica** : cpu = 4.02532 (sec), leaf count = 53

$$\text{Solve}\left[c_1 + 2\sin(1)\log(y(x)) = \int_1^x \frac{2K[1]\sin(K[1])\_\text{F1}(K[1]) + 2\log(y(x))(\sin(K[1]) - K[1]\cos(K[1]))}{K[1]^2}\,dK[1], y\right.$$

✓ **Maple** : cpu = 0.587 (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

$$y'(x) = \frac{2ax}{-128a^4 + 96a^3xy(x)^2 + 32a^3x - 24a^2x^2y(x)^4 - 16a^2x^2y(x)^2 + 2ax^3y(x)^6 + 2ax^3y(x)^4 + 2ax^3 - x^3y(x)}$$

✓ **Mathematica** : cpu = 1.76681 (sec), leaf count = 199

$$\text{Solve}\left[y(x) = \text{RootSum}\left[-\#1^3y(x)^6 - \#1^3y(x)^4 - \#1^3 + 12\#1^2ay(x)^4 + 8\#1^2ay(x)^2 - 48\#1a^2y(x)^2 - 16\#1a^2\right.\right.$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , exception

`time expired`

2.913 ODE No. 913

$$y'(x) = \frac{y(x)^3 + y(x) + y(x)^3\left(-\log^3(x)\right) + y(x)^3\log^2(x) + 3y(x)^2\log^2(x) - 2y(x)^2\log(x) - 3y(x)\log(x) + 1}{xy(x)}$$

✗ **Mathematica** : cpu = 299.998 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.075 (sec), leaf count = 43

$$\left\{y(x) = 9\left(9\ln(x) + 56\, RootOf\left(-81\int^{\_Z}\left(3136\_a^3 - 27\_a + 27\right)^{-1}d\_a - \ln(x) + 3\_C1\right) - 3\right)^{-1}\right\}$$

2.914 ODE No. 914

$$y'(x) = \frac{2a\left(-4a + xy(x)^2 + x\right)}{-128a^4 + 96a^3xy(x)^2 - 24a^2x^2y(x)^4 + 2ax^3y(x)^6 + 4ax^2y(x) - x^3y(x)^3 - x^3y(x)}$$

✓ **Mathematica** : cpu = 1.8453 (sec), leaf count = 401

$$\{\{y(x) \to \text{Root}\left[8\#1^5ax^2 - 8\#1^4ac_1x^2 - 64\#1^3a^2x + \#1^2\left(64a^2c_1x + 2x^2\right) + 128\#1a^3 - 128a^3c_1 - 8ax + x^2\&,\right.$$

✓ **Maple** : cpu = 3.481 (sec), leaf count = 71

$$\left\{\frac{x(y(x))^4 + (-4\,a + x)\,(y(x))^2 - 2\,a}{2\,a\,(y\,(x))^4\left(-x\,(y\,(x))^2 + 4\,a\right)^2} + \frac{8\,a(y(x))^5 + 2\,(y(x))^2 + 1}{16\,a^2\,(y\,(x))^4} + \_C1 = 0\right\}$$

2.915 ODE No. 915

$$y'(x) = \frac{y(x)^3 + y(x) - 8y(x)^3\log^3(x) + 4y(x)^3\log^2(x) + 12y(x)^2\log^2(x) - 4y(x)^2\log(x) - 6y(x)\log(x) + 1}{xy(x)}$$

✗ **Mathematica** : cpu = 299.998 (sec), leaf count = 0 , timed out

```
$Aborted
```

✓ **Maple** : cpu = 0.075 (sec), leaf count = 43

$$\left\{y(x) = 9\left(18\ln(x) + 83\,\mathit{RootOf}\left(-81\int^{\_Z}\left(6889\_a^3 - 27\_a + 27\right)^{-1} d\_a - \ln(x) + 3\_C1\right) - 3\right)^{-1}\right\}$$

2.916 ODE No. 916

$$y'(x) = \frac{y(x)\left(x^4\log^2(y(x)) + 2x^4\log(x)\log(y(x)) + x^4\log^2(x) + x\log(y(x)) + \log(y(x)) - x + x\log(x) + \log(x)}{x(x+1)}$$

✗ **Mathematica** : cpu = 2.30285 (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]] + x*Lo
```

✓ **Maple** : cpu = 0.352 (sec), leaf count = 73

$$\left\{y(x) = e^{\frac{-12\ln(1+x)\ln(x) + \left(-3x^4 + 4x^3 - 6x^2 + 12\_C1 + 12x\right)\ln(x) - 12x}{3x^4 - 4x^3 + 6x^2 + 12\ln(1+x) - 12\_C1 - 12x}}\right\}$$

2.917 ODE No. 917

$$y'(x) = \frac{y(x)\left(x\log^2(y(x)) + 2x\log(x)\log(y(x)) + x\log(y(x)) + \log(y(x)) - x + x\log^2(x) + x\log(x) + \log(x) -\right.}{x(x+1)}$$

✗ **Mathematica** : cpu = 1.37297 (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]] + x*Log[
```

✓ **Maple** : cpu = 0.24 (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 = 300.019 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 1.508 (sec), leaf count = 41

$$\left\{x - RootOf\left(\int^{\_Z}\left(64\_a^3 + 16\_a^2 + 1\right)^{-1} d\_ay(x) + y(x)\_C1 + 1\right) + \frac{1}{4\,(y\,(x))^2} = 0\right\}$$

2.919 ODE No. 919

$$y'(x) = \frac{\left(-y(x) + \sqrt{y(x)} + x\right)y(x)^{3/2}}{x^3 - 3x^2y(x) + 3xy(x)^2 + xy(x)^{3/2} - y(x)^3 - y(x)^{5/2} + y(x)^2}$$

✗ **Mathematica** : cpu = 300.661 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.232 (sec), leaf count = 61

$$\left\{-1\left(\left(x - y(x) - \sqrt{y\,(x)}\right)\sqrt{2\,y\,(x) - \sqrt{y\,(x)} - 2\,x} + \_C1\,(y(x))^{\frac{3}{4}}\,(y(x) - x)^{\frac{3}{2}}\right)(y(x))^{-\frac{3}{4}}\,(y(x) - x)^{-\frac{3}{2}} = 0\right\}$$

2.920 ODE No. 920

$$y'(x) = \frac{2y(x)^6\left(4xy(x)^2 + y(x)^2 + 1\right)}{128x^3y(x)^6 + 96x^2y(x)^4 + 4xy(x)^5 + y(x)^5 + y(x)^3 + 24xy(x)^2 + 2}$$

✓ **Mathematica** : cpu = 0.260806 (sec), leaf count = 301

$$\{\{y(x) \to \text{Root}[\#1^5(128c_1x^2 - 8x - 1) + 128\#1^4x^2 + \#1^3(64c_1x - 2) + 64\#1^2x + 8\#1c_1 + 8\&, 1]\}, \{y(x) \to$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(y(x),x) = 2*y(x)^6*(1+4*x*y(x)^2+y(x)^2)/(y(x)^3+4*y(x)^5*x+y(x)^5+2+24*x*y(x)^2
```

2.921 ODE No. 921

$$y'(x) = -y(x)\left(-\_\mathrm{F1}(x) - \frac{\log(y(x))}{x} + \frac{\log(y(x))}{x\log(x)}\right)$$

✓ **Mathematica** : cpu = 3.07641 (sec), leaf count = 47

$$\mathrm{Solve}\left[\mathrm{ConditionalExpression}\left[c_1 = \int_1^x -\frac{K[1]\log(K[1])\_\mathrm{F1}(K[1]) + \log(y(x))(\log(K[1])-1)}{K[1]^2}\,dK[1], \Re(x) > 0 \vee\right.\right.$$

✓ **Maple** : cpu = 0.277 (sec), leaf count = 30

$$\left\{y(x) = \mathrm{e}^{\frac{\_C1\,x}{\ln(x)}}\,\mathrm{e}^{\frac{x}{\ln(x)}\int\frac{\_F1(x)\ln(x)}{x}\,\mathrm{d}x}\right\}$$

2.922 ODE No. 922

$$y'(x) = \frac{y(x)^2}{x^3 - 3x^2y(x) + x^2\sqrt{y(x)} + 3xy(x)^2 - 2xy(x)^{3/2} - y(x)^3 + y(x)^{5/2} + y(x)^2 + y(x)^{3/2}}$$

✗ **Mathematica** : cpu = 300.019 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.257 (sec), leaf count = 47

$$\left\{\frac{\ln(y(x))}{2} - \int^{x\frac{1}{\sqrt{y(x)}} - \sqrt{y(x)}} \left(2\_a^3 + 2\_a^2 - \_a + 2\right)^{-1} d\_a - \_C1 = 0\right\}$$

2.923 ODE No. 923

$$y'(x) = \frac{x^2 + 2xy(x) + e^{-2(x-y(x))(y(x)+x)} + y(x)^2}{x^2 + 2xy(x) - e^{-2(x-y(x))(y(x)+x)} + y(x)^2}$$

✗ **Mathematica** : cpu = 299.999 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.296 (sec), leaf count = 36

$$\left\{y(x) = \mathrm{e}^{RootOf\left(-\_Z + \int^{\left(\mathrm{e}^{\_Z}\right)^2 - 2\,\mathrm{e}^{\_Z}x} \left(\mathrm{e}^{2\_a} + \_a\right)^{-1} d\_a + \_C1\right)} - x\right\}$$

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 = 1.05789 (sec), leaf count = 53

$$\text{Solve}\left[\text{ConditionalExpression}\left[2c_1 = 2\int_1^x -\frac{2K[1]\_F1(K[1]) + \log^2(y(x))}{2K[1]^2}\,dK[1] + \log^2(y(x)), \Re(x) > 0 \lor x \notin \mathbb{R}\right.\right.$$

✓ **Maple** : cpu = 0.154 (sec), leaf count = 46

$$\left\{y(x) = e^{\sqrt{2\int \frac{\_F1(x)}{x}\,dx + 2\_C1\,x}}, y(x) = e^{-\sqrt{2}\sqrt{x\left(\int \frac{\_F1(x)}{x}\,dx + \_C1\right)}}\right\}$$

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 = 300. (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.299 (sec), leaf count = 38

$$\left\{y(x) = e^{RootOf\left(-\_Z + \int \left(e^{\_Z}\right)^2 - 2e^{\_Z}x\left(e^{2\_a^2} + \_a\right)^{-1} d\_a + \_C1\right)} - x\right\}$$

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 = 0.0301499 (sec), leaf count = 77

$$\left\{\left\{y(x) \to \frac{2\left(\sqrt{c_1 + 2048\log(x)} - 64\right)}{x\left(\sqrt{c_1 + 2048\log(x)} - 64\right) + 128}\right\}, \left\{y(x) \to \frac{2\left(\sqrt{c_1 + 2048\log(x)} + 64\right)}{x\left(\sqrt{c_1 + 2048\log(x)} + 64\right) - 128}\right\}\right\}$$

✓ **Maple** : cpu = 0.077 (sec), leaf count = 67

$$\left\{y(x) = 1\left(2\sqrt{\_C1 + 8\ln(x)} - 8\right)\left(x\sqrt{\_C1 + 8\ln(x)} - 4x + 8\right)^{-1}, y(x) = 1\left(2\sqrt{\_C1 + 8\ln(x)} + 8\right)\left(x\sqrt{\_\right.\right.$$

2.927 ODE No. 927

$$y'(x) = -\frac{1}{8}x\Big(12e^{-x^2}x^2y(x)^2 + 8e^{-x^2}x^2y(x) + 8e^{-x^2}x^2 - 8e^{-x^2} + e^{-3x^2}x^6 - 6e^{-2x^2}x^4y(x) - 2e^{-2x^2}x^4 - 8y(x)^3$$

✓ **Mathematica** : cpu = 0.153623 (sec), leaf count = 100

$$\text{Solve}\left[174\text{RootSum}\left[-29\#1^3 + 3\sqrt[3]{29}\#1 - 29\&, \frac{\log\left(\frac{-\frac{3}{2}e^{-x^2}x^3+3xy(x)+x}{\sqrt[3]{29}\sqrt[3]{x^3}} - \#1\right)}{\sqrt[3]{29} - 29\#1^2}\&\right] + 18c_1 + 29^{2/3}\left(x^3\right)^{2/3} = 0,$$

✓ **Maple** : cpu = 0.134 (sec), leaf count = 68

$$\left\{y(x) = \frac{58\,\mathit{RootOf}\left(x^2 - 162\int^{\_Z}\left(841\_a^3 - 27\_a + 27\right)^{-1}d\_a + 6\_C1\right) + \left(9\,x^2 - 6\,\mathrm{e}^{x^2}\right)\mathrm{e}^{-x^2}}{18\,\mathrm{e}^{-x^2}\mathrm{e}^{x^2}}\right\}$$

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 = 1.52686 (sec), leaf count = 22

$$\left\{\left\{y(x) \to -x\log\left(\frac{c_1 - \log(x+1)}{x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.441 (sec), leaf count = 20

$$\left\{y(x) = -\ln\left(\frac{-\ln(1+x) + \_C1}{x}\right)x\right\}$$

2.929 ODE No. 929

$$y'(x) = \frac{-\frac{1}{32}x^3y(x)^3 + \frac{1}{16}x^2y(x)^3 + \frac{3}{16}x^2y(x)^2 - \frac{1}{2}xy(x)^3 + \frac{y(x)^3}{4} - \frac{1}{4}xy(x)^2 - \frac{3}{8}xy(x) + \frac{y(x)}{4} + \frac{1}{4}}{xy(x)}$$

✗ **Mathematica** : cpu = 299.998 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.052 (sec), leaf count = 42

$$\left\{y(x) = 18\left(58\,\mathit{RootOf}\left(-324\int^{\_Z}\left(841\_a^3 - 27\_a + 27\right)^{-1}d\_a - \ln(x) + 12\_C1\right) + 9\,x - 6\right)^{-1}\right\}$$

2.930 ODE No. 930

$$y'(x) = \frac{e^{\frac{y(x)}{x}}\left(x^4 + x^2 e^{-\frac{y(x)}{x}} + x e^{-\frac{y(x)}{x}} + x e^{-\frac{y(x)}{x}} y(x) + e^{-\frac{y(x)}{x}} y(x)\right)}{x(x+1)}$$

✓ **Mathematica** : cpu = 1.7709 (sec), leaf count = 38

$$\left\{\left\{y(x) \to -x \log\left(-\frac{c_1 + \frac{x^3}{3} - \frac{x^2}{2} + x - \log(x+1)}{x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.664 (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

$$y'(x) = \frac{x^6 + 3x^5 y(x) + 3x^4 y(x)^2 + x^3 y(x)^3 - 2x^3 - 3x^2 y(x) - x y(x)^2 - y(x) - 2x}{x\left(x^2 + x y(x) + 1\right)}$$

✓ **Mathematica** : cpu = 0.026391 (sec), leaf count = 53

$$\left\{\left\{y(x) \to \frac{1}{x\left(\sqrt{c_1 - 2x} - 1\right)} - x\right\}, \left\{y(x) \to -\frac{1}{x\sqrt{c_1 - 2x} + x} - x\right\}\right\}$$

✓ **Maple** : cpu = 0.052 (sec), leaf count = 73

$$\left\{y(x) = \frac{1}{x}\left(-\sqrt{\_C1 - 2\,x}x^2 - x^2 - 1\right)\left(\sqrt{\_C1 - 2\,x} + 1\right)^{-1}, y(x) = \frac{1}{x}\left(-\sqrt{\_C1 - 2\,x}x^2 + x^2 + 1\right)\left(\sqrt{\_C1\right.$$

2.932 ODE No. 932

$$y'(x) = \frac{e^{-\frac{3x^2}{2}} x\left(3e^{3x^2} y(x)^3 + e^{\frac{9x^2}{2}} y(x)^3 + 18e^{3x^2} y(x)^2 + 9e^{\frac{9x^2}{2}} y(x)^2 + 27e^{3x^2} y(x) + 27e^{\frac{9x^2}{2}} y(x) + 27e^{\frac{9x^2}{2}} + 27y(\right.}{243y(x)}$$

✗ **Mathematica** : cpu = 300. (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.171 (sec), leaf count = 54

$$\left\{y(x) = -369\,\frac{e^{3/2\,x^2}}{123 + 123\,e^{3/2\,x^2} - 136\,RootOf\left(-41\,x^2 - 50243409\,\int^{\_Z}(9248\,\_a^3 - 1860867\,\_a + 1860867)^{-1}\,d\right.}\right.$$

2.933 ODE No. 933

$$y'(x) = \frac{x^3 + x^3(-\log^3(x)) + x^3\log^2(x) + 3x^2y(x)\log^2(x) - 2x^2y(x)\log(x) + x^2 + xy(x)^2 + xy(x) + y(x)^3 - 3x}{x^2}$$

✓ **Mathematica** : cpu = 0.103224 (sec), leaf count = 93

$$\text{Solve}\left[87\text{RootSum}\left[-29\#1^3 + 3\sqrt[3]{29}\#1 - 29\&, \frac{\log\left(\frac{3y(x)+x-3x\log(x)}{\sqrt[3]{29}\sqrt[3]{\frac{1}{x^3}}x^2} - \#1\right)}{\sqrt[3]{29} - 29\#1^2}\&\right] + 9c_1 + \frac{29^{2/3}}{\sqrt[3]{\frac{1}{x^3}}} = 0, y(x)\right]$$

✓ **Maple** : cpu = 0.05 (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

$$y'(x) = -\frac{x^6}{64} - \frac{3x^5}{32} + \frac{3}{16}x^4y(x) - \frac{x^4}{8} + \frac{3}{4}x^3y(x) + \frac{x^3}{8} - \frac{3}{4}x^2y(x)^2 + \frac{1}{4}x^2y(x) + \frac{x^2}{4} - \frac{3}{2}xy(x)^2 - xy(x) + y(x)^3 + y(x)^2 + \frac{x}{2} +$$

✓ **Mathematica** : cpu = 0.134952 (sec), leaf count = 101

$$\text{Solve}\left[-\frac{31}{3}\text{RootSum}\left[-31\#1^3 + 3\ 2^{2/3}\sqrt[3]{31}\#1 - 31\&, \frac{\log\left(\sqrt[3]{\frac{2}{31}}\left(-\frac{3x^2}{4} + 3y(x) - \frac{3x}{2} + 1\right) - \#1\right)}{2^{2/3}\sqrt[3]{31} - 31\#1^2}\&\right] = c_1 + \frac{1}{9}($$

✓ **Maple** : cpu = 0.086 (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

$$y'(x) = \frac{x^6}{64} - \frac{3x^5}{16} + \frac{3}{16}x^4y(x) + \frac{13x^4}{16} - \frac{3}{2}x^3y(x) - \frac{3x^3}{2} + \frac{3}{4}x^2y(x)^2 + \frac{7}{2}x^2y(x) + x^2 - 3xy(x)^2 - 2xy(x) + y(x)^3 + y(x)^2 - \frac{x}{2}$$

✓ **Mathematica** : cpu = 21.9096 (sec), leaf count = 117

$$\text{Solve}\left[-\frac{2^{2/3}\left(x^2\left(-\log\left(4y(x)+(x-2)^2\right)\right)+(x-4)x\log(-4y(x)-(x-4)x)+4x\log\left(4y(x)+(x-2)^2\right)+4y(x\right.}{9(4y(x)+(x-4)x)}\right.$$

✓ **Maple** : cpu = 0.232 (sec), leaf count = 55

$$\left\{y(x) = \frac{e^{RootOf\left(\ln\left(e^{-\_Z}-4\right)e^{-\_Z}+\_C1\,e^{-\_Z}-\_Z\,e^{-\_Z}+e^{-\_Z}x-4\ln\left(e^{-\_Z}-4\right)-4\_C1+4\_Z-4x+4\right)}}{4} - 1 - \frac{x^2}{4} + x\right\}$$

2.936 ODE No. 936

$$y'(x) = \frac{x^6}{512} - \frac{3x^5}{256} + \frac{3}{64}x^4y(x) + \frac{5x^4}{128} - \frac{3}{16}x^3y(x) - \frac{5x^3}{64} + \frac{3}{8}x^2y(x)^2 + \frac{7}{16}x^2y(x) + \frac{x^2}{16} - \frac{3}{4}xy(x)^2 - \frac{1}{2}xy(x) + y(x)^3 + y(x)$$

✓ **Mathematica** : cpu = 0.125879 (sec), leaf count = 85

$$\text{Solve}\left[1068\text{RootSum}\left[-89\#1^3+6\sqrt[3]{178}\#1-89\&,\frac{\log\left(\frac{3x^2+24y(x)-6x+8}{4\sqrt[3]{178}}-\#1\right)}{2\sqrt[3]{178}-89\#1^2}\&\right]+36c_1+178^{2/3}x=0,y(x)\right]$$

✓ **Maple** : cpu = 0.086 (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

$$y'(x) = \frac{2xy(x)^3 + y(x)^3 - 2y(x) + 6xy(x)\log^2(2x+1) + 3y(x)\log^2(2x+1) + 6xy(x)^2\log(2x+1) + 3y(x)^2\log(}{(2x+1)(y(x)+\log(2x+1)+1)}$$

✓ **Mathematica** : cpu = 0.0287291 (sec), leaf count = 57

$$\left\{\left\{y(x)\to\frac{1}{\sqrt{c_1-2x}-1}-\log(2x+1)\right\},\left\{y(x)\to-\frac{1}{\sqrt{c_1-2x}+1}-\log(2x+1)\right\}\right\}$$

✓ **Maple** : cpu = 0.07 (sec), leaf count = 79

$$\left\{y(x) = 1\left(-\sqrt{\_C1-2x}\ln(2x+1)-\ln(2x+1)-1\right)\left(\sqrt{\_C1-2x}+1\right)^{-1}, y(x) = 1\left(-\sqrt{\_C1-2x}\ln(2x\right.\right.$$

2.938 ODE No. 938

$$y'(x) = \frac{x^6 - 3x^5 + 3x^4 y(x) + 4x^4 - 6x^3 y(x) - 3x^3 + 3x^2 y(x)^2 + 5x^2 y(x) - x^2 - 3xy(x)^2 - 2xy(x) + y(x)^3 + y(}{x}$$

✓ **Mathematica** : cpu = 0.0992046 (sec), leaf count = 101

$$\text{Solve}\left[87\text{RootSum}\left[-29\#1^3 + 3\sqrt[3]{29}\#1 - 29\&, \frac{\log\left(\frac{3x^2+3y(x)-3x+1}{\sqrt[3]{29}\sqrt[3]{\frac{1}{x^3}}x} - \#1\right)}{\sqrt[3]{29} - 29\#1^2}\&\right] + 9c_1 + 29^{2/3}\left(\frac{1}{x^3}\right)^{2/3} x^2 \log(x)$$

✓ **Maple** : cpu = 0.041 (sec), leaf count = 39

$$\left\{ y(x) = -x^2 + x - \frac{1}{3} + \frac{29\, RootOf\left(-81 \int^{\_Z} \left(841\_a^3 - 27\_a + 27\right)^{-1} d\_a + \ln(x) + 3\_C1\right)}{9} \right\}$$

2.939 ODE No. 939

$$y'(x) = \frac{x^6 + 6x^5 - 12x^4 y(x) + 12x^4 - 48x^3 y(x) + 16x^3 + 48x^2 y(x)^2 - 48x^2 y(x) + 16x^2 + 96xy(x)^2 - 32xy(x) -}{16x^2 - 64y(x) + 32x - 64}$$

✓ **Mathematica** : cpu = 0.45183 (sec), leaf count = 137

$$\text{Solve}\left[2\text{RootSum}\left[\#1^4 + 4\#1^3 - 8\#1^2 y(x) - 16\#1 y(x) - 8\#1 + 16y(x)^2 + 16y(x) + 8\&, \frac{\#1^2(-\log(x - \#1)) +}{}\right.\right.$$

✓ **Maple** : cpu = 0.146 (sec), leaf count = 70

$$\left\{ x + \frac{2}{5}\ln\left(2\left(y(x) - 1/4\,x^2 - x/2\right)^2 + 2\,y(x) - \frac{x^2}{2} - x + 1\right) - \frac{2}{5}\arctan\left(-2\,y(x) + \frac{x^2}{2} + x - 1\right) - \frac{4}{5}\ln\left(y(x) +\right.\right.$$

2.940 ODE No. 940

$$y'(x) = \frac{x^3 \log^3(x) - 3x^2 y(x) \log^2(x) - x^2 + x^2 \log(x) - y(x)^3 - y(x)^2 - 2xy(x) + 3xy(x)^2 \log(x) + xy(x)\log(x)}{x(-y(x) - x + x\log(x))}$$

✓ **Mathematica** : cpu = 0.0227422 (sec), leaf count = 49

$$\left\{\left\{y(x) \to x\left(\log(x) - \frac{1}{\sqrt{c_1 - 2x} + 1}\right)\right\}, \left\{y(x) \to x\left(\frac{1}{\sqrt{c_1 - 2x} - 1} + \log(x)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.058 (sec), leaf count = 63

$$\left\{y(x) = x\left(\ln(x)\sqrt{\_C1 - 2x} - \ln(x) + 1\right)\left(\sqrt{\_C1 - 2x} - 1\right)^{-1}, y(x) = x\left(\ln(x)\sqrt{\_C1 - 2x} + \ln(x) - 1\right)\left(\right.$$

2.941 ODE No. 941

$$y'(x) = \frac{x^6 - 12x^5 + 12x^4y(x) + 48x^4 - 96x^3y(x) - 72x^3 + 48x^2y(x)^2 + 192x^2y(x) + 32x^2 - 192xy(x)^2 - 32xy(}{16x^2 + 64y(x) - 64x + 64}$$

✓ **Mathematica** : cpu = 0.404728 (sec), leaf count = 53

$$\text{Solve}\left[x = 8\text{RootSum}\left[11776\#1^3 - 40\#1 - 1\&, \#1\log\left(17664\#1^2 - 1472\#1 + 11x^2 + 44y(x) - 44x - 40\right)\&\right] + c\right.$$

✓ **Maple** : cpu = 0.061 (sec), leaf count = 35

$$\left\{y(x) = -\frac{x^2}{4} + x + \mathit{RootOf}\left(-x + \int^{\_Z} \frac{\_a + 1}{\_a^3 - \_a - 1} d\_a + \_C1\right)\right\}$$

2.942 ODE No. 942

$$y'(x) = \frac{-\exp\left(\frac{2(x-y(x))^3(y(x)+x)^3}{x^2-y(x)^2-1}\right) - x^2 - 2xy(x) - y(x)^2}{\exp\left(\frac{2(x-y(x))^3(y(x)+x)^3}{x^2-y(x)^2-1}\right) - x^2 - 2xy(x) - y(x)^2}$$

✗ **Mathematica** : cpu = 300.004 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.663 (sec), leaf count = 43

$$\left\{y(x) = e^{\mathit{RootOf}\left(-\_Z + \int \left(e^{\_Z}\right)^2 - 2e^{\_Z}x\left(e^{2\frac{\_a^3}{\_a+1}} + \_a\right)^{-1} d\_a + \_C1\right)} - x\right\}$$

2.943 ODE No. 943

$$y'(x) = \frac{x^6 - 6x^5 + 24x^4y(x) + 12x^4 - 96x^3y(x) - 24x^3 + 192x^2y(x)^2 + 96x^2y(x) + 32x^2 - 384xy(x)^2 - 128xy(}{64x^2 + 512y(x) - 128x + 512}$$

✓ **Mathematica** : cpu = 0.450671 (sec), leaf count = 53

$$\text{Solve}\left[x = 16\text{RootSum}\left[6656\#1^3 - 23\#1 - 1\&, \#1 \log\left(79872\#1^2 - 18304\#1 + 181x^2 + 1448y(x) - 362x - 184\right)\right.\right.$$

✓ **Maple** : cpu = 0.065 (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

$$y'(x) = \frac{a^3x^6 + 6a^2bx^5 + 12a^2x^4y(x) - 8a^2x^3 + 12ab^2x^4 + 48abx^3y(x) - 16abx^2 + 48ax^2y(x)^2 - 32axy(x) - 32a}{16ax^2 + 32bx + 64y(x) + 64}$$

✓ **Mathematica** : cpu = 1.80841 (sec), leaf count = 233

$$\text{Solve}\left[x = 4\text{RootSum}\left[\#1^6a^3 + 6\#1^5a^2b + 12\#1^4a^2y(x) + 12\#1^4ab^2 + 48\#1^3aby(x) + 8\#1^3b^3 + 8\#1^2ab + 48\#\right.\right.$$

✓ **Maple** : cpu = 0.097 (sec), leaf count = 47

$$\left\{y(x) = -\frac{ax^2}{4} - \frac{bx}{2} + RootOf\left(bx + 2\int^{\_Z} -\frac{b(\_a + 1)}{2\_a^3 + \_a b + b}d\_a + 2\_C1\right)\right\}$$

2.945 ODE No. 945

$$y'(x) = \frac{8a^3x^3 + 12a^2x^4 + 48a^2x^2y(x) + 6ax^5 + 48ax^3y(x) - 16ax^2 + 96axy(x)^2 + x^6 + 12x^4y(x) - 8x^3 + 48x^2y}{32ax + 16x^2 + 64y(x) + 64}$$

✓ **Mathematica** : cpu = 1.38518 (sec), leaf count = 213

$$\text{Solve}\left[x = 4\text{RootSum}\left[\#1^6 + 6\#1^5a + 12\#1^4a^2 + 12\#1^4y(x) + 8\#1^3a^3 + 48\#1^3ay(x) + 48\#1^2a^2y(x) + 8\#1^2a\right.\right.$$

✓ **Maple** : cpu = 0.079 (sec), leaf count = 41

$$\left\{y(x) = -\frac{x^2}{4} - \frac{ax}{2} + RootOf\left(-x + \int^{\_Z} 2\frac{\_a + 1}{2\_a^3 + \_a a + a}d\_a + \_C1\right)\right\}$$

2.946 ODE No. 946

$$y'(x) = \frac{x\left(12e^{-x^2}x^2y(x)^2 + 8e^{-x^2}x^2y(x) - 8e^{-x^2}y(x) + 4e^{-2x^2}x^2 + 8e^{-x^2}x^2 - 8e^{-x^2} + e^{-3x^2}x^6 - 6e^{-2x^2}x^4y(x)\right.}{4e^{-x^2}x^2 - 8y(x) - 8}$$

✓ **Mathematica** : cpu = 0.0883988 (sec), leaf count = 75

$$\left\{\left\{y(x) \to \frac{8}{\sqrt{c_1 - 64x^2} - 8} + \frac{1}{2}e^{-x^2}x^2\right\}, \left\{y(x) \to \frac{1}{2}e^{-x^2}x^2 - \frac{8}{\sqrt{c_1 - 64x^2} + 8}\right\}\right\}$$

✓ **Maple** : cpu = 0.187 (sec), leaf count = 85

$$\left\{y(x) = 1\left(-2 + x^2\left(\sqrt{-x^2 + \_C1} + 1\right)e^{-x^2}\right)\left(2\sqrt{-x^2 + \_C1} + 2\right)^{-1}, y(x) = 1\left(2 + x^2\left(\sqrt{-x^2 + \_C1} - 1\right)e\right.\right.$$

2.947 ODE No. 947

$$y'(x) = \frac{x^3\sin(x) + x^2y(x)^2 + 2x^2y(x)\cos(x) + \frac{x^2}{2} + x^2\cos(x) + \frac{1}{2}x^2\cos(2x) + 2xy(x) - 2xy(x)\sin(x) + x - x\sin}{x^3}$$

✓ **Mathematica** : cpu = 0.116501 (sec), leaf count = 28

$$\left\{\left\{y(x) \to \frac{1}{c_1 - \log(x)} + \frac{\sin(x) - x\cos(x) - 1}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.288 (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

$$y'(x) = -\frac{216y(x)}{36x^2 + 4y(x)^8 + 12y(x)^7 + 33y(x)^6 + 60y(x)^5 - 24xy(x)^4 - 216y(x)^4 - 36xy(x)^3 - 252y(x)^3 - 72xy(x}$$

✓ **Mathematica** : cpu = 0.380536 (sec), leaf count = 39

$$\text{Solve}\left[\frac{36}{y(x)\left(2y(x)^3 + 3y(x)^2 + 6y(x) + 6\right) - 6x} + \log(y(x)) = c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.209 (sec), leaf count = 68

$$\left\{y(x) = e^{RootOf\left(-12\_C1\left(e^{\_Z}\right)^4 - 2\left(e^{\_Z}\right)^4\_Z - 18\_C1\left(e^{\_Z}\right)^3 - 3\left(e^{\_Z}\right)^3\_Z - 36\_C1\left(e^{\_Z}\right)^2 - 6\left(e^{\_Z}\right)^2\_Z - 36\_C1\,e^{\_Z} - 6\_Z\,e^{\_Z} + 36\right.}\right.$$

2.949 ODE No. 949

$$y'(x) = \frac{x^6 - 3x^5 + 3x^4y(x) + x^4 - 6x^3y(x) + 2x^3 + 3x^2y(x)^2 + x^2y(x) - 3x^2 - 3xy(x)^2 + xy(x) + y(x)^3 + x}{x\left(x^2 + y(x) - x + 1\right)}$$

✓ **Mathematica** : cpu = 0.02337 (sec), leaf count = 55

$$\left\{\left\{y(x) \to \frac{1}{\sqrt{c_1 - 2\log(x)} - 1} - x^2 + x\right\}, \left\{y(x) \to -\frac{1}{\sqrt{c_1 - 2\log(x)} + 1} - x^2 + x\right\}\right\}$$

✓ **Maple** : cpu = 0.058 (sec), leaf count = 81

$$\left\{y(x) = 1\left(\left(-x^2 + x\right)\sqrt{\_C1 - 2\ln(x)} - x^2 + x - 1\right)\left(1 + \sqrt{\_C1 - 2\ln(x)}\right)^{-1}, y(x) = 1\left(\left(-x^2 + x\right)\sqrt{\_C1\right.\right.$$

2.950 ODE No. 950

$$y'(x) = \frac{a^3x^6}{64} + \frac{3}{32}a^2bx^5 + \frac{3}{16}a^2x^4y(x) + \frac{a^2x^4}{16} + \frac{3}{16}ab^2x^4 + \frac{3}{4}abx^3y(x) + \frac{1}{4}abx^3 + \frac{3}{4}ax^2y(x)^2 + \frac{1}{2}ax^2y(x) - \frac{ax}{2} + \frac{b^3x^3}{8} +$$

✓ **Mathematica** : cpu = 0.214743 (sec), leaf count = 138

$$\text{Solve}\left[-\frac{1}{3}(27b + 58)^{2/3}\text{RootSum}\left[\#1^3(27b + 58)^{2/3} - 3\ 2^{2/3}\#1 + (27b + 58)^{2/3}\&, \frac{\log\left(\frac{\sqrt[3]{2}\left(\frac{1}{4}\left(3ax^2 + 6bx + 4\right) + 3y(x)\right)}{\sqrt[3]{27b + 58}}\right.}{2^{2/3} - \#1^2(27b + 58)^{2/}}\right.\right.$$

✓ **Maple** : cpu = 0.109 (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

$$y'(x) = \frac{a^3x^3}{8} + \frac{3a^2x^4}{16} + \frac{3}{4}a^2x^2y(x) + \frac{a^2x^2}{4} + \frac{3ax^5}{32} + \frac{3}{4}ax^3y(x) + \frac{ax^3}{4} + \frac{3}{2}axy(x)^2 + axy(x) + \frac{x^6}{64} + \frac{3}{16}x^4y(x) + \frac{x^4}{16} + \frac{3}{4}x^2$$

✓ **Mathematica** : cpu = 0.192639 (sec), leaf count = 137

$$\text{Solve}\left[-\frac{1}{3}(27a + 58)^{2/3}\text{RootSum}\left[\#1^3(27a + 58)^{2/3} - 3\ 2^{2/3}\#1 + (27a + 58)^{2/3}\&, \frac{\log\left(\frac{\sqrt[3]{2}\left(\frac{1}{4}\left(6ax + 3x^2 + 4\right) + 3y(x)\right)}{\sqrt[3]{27a + 58}}\right.}{2^{2/3} - \#1^2(27a + 58)^{2/}}\right.\right.$$

✓ **Maple** : cpu = 0.095 (sec), leaf count = 41

$$\left\{y(x)=-\frac{x^{2}}{4}-\frac{ax}{2}+\mathit{RootOf}\left(-x+2\int^{\_Z}\left(2\_a^{3}+2\_a^{2}+a+2\right)^{-1}d\_a+\_C1\right)\right\}$$

2.952 ODE No. 952

$$y'(x)=\frac{-x^{2}\sqrt{x^{2}+y(x)^{2}}+xy(x)\sqrt{x^{2}+y(x)^{2}}+x^{5}\left(-\sqrt{x^{2}+y(x)^{2}}\right)+x^{4}y(x)\sqrt{x^{2}+y(x)^{2}}-x^{4}\sqrt{x^{2}+y(x)^{2}}+}{x}$$

✓ **Mathematica** : cpu = 0.150059 (sec), leaf count = 141

$$\left\{\left\{y(x)\to\frac{x\left(-2e^{\frac{20c_1+4x^5+5x^4+10x^2}{10\sqrt{2}}}+e^{\frac{20c_1+4x^5+5x^4+10x^2}{5\sqrt{2}}}-1\right)}{2e^{\frac{20c_1+4x^5+5x^4+10x^2}{10\sqrt{2}}}+e^{\frac{20c_1+4x^5+5x^4+10x^2}{5\sqrt{2}}}-1}\right\}\right\}$$

✓ **Maple** : cpu = 0.382 (sec), leaf count = 62

$$\left\{\ln\left(2\,\frac{x\left(\sqrt{2\,\left(y\left(x\right)\right)^{2}+2\,x^{2}}+y(x)+x\right)}{y\left(x\right)-x}\right)+\frac{\left(4\,x^{5}+5\,x^{4}+10\,x^{2}\right)\sqrt{2}}{20}-\_C1-\ln\left(x\right)=0\right\}$$

2.953 ODE No. 953

$$y'(x)=\frac{y(x)\left(x^{4}\log^{2}(y(x))+2x^{4}\log(x)\log(y(x))+x^{4}\log^{2}(x)+x^{3}\log^{2}(y(x))+2x^{3}\log(x)\log(y(x))+x^{3}\log^{2}(x\right.}{x}$$

✗ **Mathematica** : cpu = 1.6889 (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 + Log
```

✓ **Maple** : cpu = 0.416 (sec), leaf count = 145

$$\left\{y(x)=1\left(x^{\frac{x^{5}}{4\,x^{5}+5\,x^{4}+10\,x^{2}+20\_C1}}\right)^{-4}\left(x^{\frac{x^{4}}{4\,x^{5}+5\,x^{4}+10\,x^{2}+20\_C1}}\right)^{-5}\left(x^{\frac{x^{2}}{4\,x^{5}+5\,x^{4}+10\,x^{2}+20\_C1}}\right)^{-10}\left(x^{\frac{\_C1}{4\,x^{5}+5\,x^{4}+10\,x^{2}+20\_C1}}\right.$$

2.954 ODE No. 954

$$y'(x)=\frac{\frac{24}{5}x^{7/2}y(x)-\frac{24x^{13/2}}{25}+\frac{8x^{7/2}}{5}-8x^{3/2}-\frac{8x^{9}}{125}+\frac{12}{25}x^{6}y(x)+\frac{4x^{6}}{25}-\frac{24x^{4}}{5}-\frac{6}{5}x^{3}y(x)^{2}-\frac{4}{5}x^{3}y(x)+\frac{6x^{3}}{5}+12xy}{x}$$

✓ **Mathematica** : cpu = 0.11824 (sec), leaf count = 108

$$\text{Solve}\left[87\text{RootSum}\left[-29\#1^3+3\sqrt[3]{29}\#1-29\&,\frac{\log\left(\frac{-6x^3+15y(x)-30\sqrt{x}+5}{5\sqrt[3]{29}\sqrt[3]{\frac{1}{x^3}}x}-\#1\right)}{\sqrt[3]{29}-29\#1^2}\&\right]+9c_1+29^{2/3}\left(\frac{1}{x^3}\right)^{2/3}x^2\text{lo}$$

✓ **Maple** : cpu = 0.095 (sec), leaf count = 53

$$\left\{y(x)=\frac{1}{45}\left(18\,x^{7/2}+145\,RootOf\left(-81\int^{\_Z}\left(841\,\_a^{3}-27\,\_a+27\right)^{-1}d\_a+\ln(x)+3\,\_C1\right)\sqrt{x}-15\sqrt{x}+\right.$$

2.955 ODE No. 955

$$y'(x)=\frac{-24x^{7/2}y(x)+\frac{24x^{13/2}}{5}+14x^{7/2}+40x^{3/2}+\frac{8x^{9}}{25}-\frac{12}{5}x^{6}y(x)+\frac{12x^{6}}{5}+24x^{4}+6x^{3}y(x)^{2}-6x^{3}y(x)-6x^{3}-}{x\left(2x^{3}-5y(x)+10\sqrt{x}-5\right)}$$

✓ **Mathematica** : cpu = 0.143888 (sec), leaf count = 73

$$\left\{\left\{y(x)\to-\frac{125}{\sqrt{c_1-31250\log(x)}+125}+\frac{2x^3}{5}+2\sqrt{x}\right\},\left\{y(x)\to\frac{125}{\sqrt{c_1-31250\log(x)}-125}+\frac{2x^3}{5}+2\sqrt{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.113 (sec), leaf count = 101

$$\left\{y(x)=1\left(\left(2\,x^{3}+10\sqrt{x}\right)\sqrt{\_C1-2\,\ln(x)}-2\,x^{3}-10\sqrt{x}+5\right)\left(5\sqrt{\_C1-2\,\ln(x)}-5\right)^{-1},y(x)=1\left(\left(2\,x^{3}+\right.\right.\right.$$

2.956 ODE No. 956

$$y'(x)=\frac{y(x)\left(y(x)e^{\frac{2\log^2(x)}{\log(x)+1}}x^{\frac{2}{\log(x)+1}+2}+y(x)e^{\frac{2\log^2(x)}{\log(x)+1}}\log^2(x)x^{\frac{2}{\log(x)+1}+2}+2y(x)e^{\frac{2\log^2(x)}{\log(x)+1}}\log(x)x^{\frac{2}{\log(x)+1}+2}-e^{\frac{2\log^2(}{\log(x)+}}\right.}{x(\log(x)+1)}$$

✓ **Mathematica** : cpu = 0.231861 (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 = 0.096 (sec), leaf count = 79

$$\left\{y(x)=\frac{1}{\ln(x)+1}\mathrm{e}^{-\frac{x^4}{4}}\left(x^{-2\,\frac{\ln(x)}{\ln(x)+1}}(\ln(x)+1)\,\mathrm{e}^{\frac{(-4\,\ln(x)-4)\ln(\ln(x)+1)-x^4\ln(x)-x^4+8\,(\ln(x))^2}{4\,\ln(x)+4}}+\_C1\right)^{-1}\right\}$$

2.957 ODE No. 957

$$y'(x)=\frac{y(x)\left(y(x)e^{\frac{2\log^2(x)}{\log(x)+1}}x^{\frac{2}{\log(x)+1}+3}+y(x)e^{\frac{2\log^2(x)}{\log(x)+1}}\log^2(x)x^{\frac{2}{\log(x)+1}+3}+2y(x)e^{\frac{2\log^2(x)}{\log(x)+1}}\log(x)x^{\frac{2}{\log(x)+1}+3}-e^{\frac{2\log^2(}{\log(x)+}}\right.}{x(\log(x)+1)}$$

✓ **Mathematica** : cpu = 0.222278 (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 = 0.061 (sec), leaf count = 79

$$\left\{y(x)=\frac{1}{\ln(x)+1}\mathrm{e}^{-\frac{x^5}{5}}\left(x^{-2\,\frac{\ln(x)}{\ln(x)+1}}(\ln(x)+1)\,\mathrm{e}^{\frac{(-5\,\ln(x)-5)\ln(\ln(x)+1)-x^5\ln(x)-x^5+10\,(\ln(x))^2}{5\,\ln(x)+5}}+\_C1\right)^{-1}\right\}$$

2.958 ODE No. 958

$$y'(x)=\frac{2xy(x)^3+y(x)^3+2xy(x)^2+y(x)^2+6xy(x)\log^2(2x+1)+3y(x)\log^2(2x+1)+6xy(x)^2\log(2x+1)+}{}$$

✓ **Mathematica** : cpu = 0.089082 (sec), leaf count = 80

$$\text{Solve}\left[87\text{RootSum}\left[-29\#1^3+3\sqrt[3]{29}\#1-29\&,\frac{\log\left(\frac{3y(x)+3\log(2x+1)+1}{\sqrt[3]{29}}-\#1\right)}{\sqrt[3]{29}-29\#1^2}\&\right]+9c_1+29^{2/3}x=0,y(x)\right]$$

✓ **Maple** : cpu = 0.051 (sec), leaf count = 40

$$\left\{y(x)=-\ln(2\,x+1)-\frac{1}{3}+\frac{29\,RootOf\left(-81\,\int^{\_Z}\left(841\,\_a^3-27\,\_a+27\right)^{-1}d\_a+x+3\,\_C1\right)}{9}\right\}$$

2.959 ODE No. 959

$$y'(x) = \frac{\csc\left(\frac{y(x)}{2x}\right)\sec\left(\frac{y(x)}{2x}\right)\sec\left(\frac{y(x)}{x}\right)\left(x^3\sin\left(\frac{y(x)}{2x}\right)\sin\left(\frac{y(x)}{x}\right)\cos\left(\frac{y(x)}{2x}\right) - \frac{1}{2}y(x)\sin\left(\frac{y(x)}{x}\right) + \frac{1}{2}y(x)\sin\left(\frac{y(x)}{2x}\right)\right.}{x}$$

✓ **Mathematica** : cpu = 0.0479333 (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 = 0.085 (sec), leaf count = 15

$$\left\{y(x) = \arcsin\left(\mathrm{e}^{\frac{x^2}{2}}\_C1\right)x\right\}$$

2.960 ODE No. 960

$$y'(x) = \frac{\csc\left(\frac{y(x)}{2x}\right)\sec\left(\frac{y(x)}{2x}\right)\sec\left(\frac{y(x)}{x}\right)\left(x^2\sin\left(\frac{y(x)}{2x}\right)\sin\left(\frac{y(x)}{x}\right)\cos\left(\frac{y(x)}{2x}\right) - \frac{1}{2}y(x)\sin\left(\frac{y(x)}{x}\right) + \frac{1}{2}y(x)\sin\left(\frac{y(x)}{2x}\right)\right.}{x}$$

✓ **Mathematica** : cpu = 0.0409653 (sec), leaf count = 14

$$\left\{\left\{y(x)\to x\sin^{-1}\left(e^{c_1+x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.057 (sec), leaf count = 11

$$\{y(x) = \arcsin(\mathrm{e}^x\_C1)\,x\}$$

2.961 ODE No. 961

$$y'(x) = \frac{\exp\left(-2x^6+6x^4y(x)^2+2x^4-6x^2y(x)^4-4x^2y(x)^2+2y(x)^6+2y(x)^4+2\right)+x^2+2xy(x)+y(x)^2}{-\exp\left(-2x^6+6x^4y(x)^2+2x^4-6x^2y(x)^4-4x^2y(x)^2+2y(x)^6+2y(x)^4+2\right)+x^2+2xy(x)+y(x)^2}$$

✗ **Mathematica** : cpu = 300.002 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.453 (sec), leaf count = 45

$$\left\{y(x) = \mathrm{e}^{RootOf\left(-\_Z+\int^{\left(\mathrm{e}^{\_Z}\right)^2-2\,\mathrm{e}^{\_Z}x}\left(\mathrm{e}^{2\_a^3+2\_a^2+2}+\_a\right)^{-1}d\_a+\_C1\right)}-x\right\}$$

2.962 ODE No. 962

$$y'(x) = \frac{4(a-1)(a+1)x(a^2x^2 - x^2 -}{a^8x^6 - 4a^6x^6 - 3a^6x^4y(x)^2 + 6a^4x^6 + 9a^4x^4y(x)^2 + 3a^4x^2y(x)^4 - 4a^2x^6 - 9a^2x^4y(x)^2 - 6a^2x^2y(x)^4 + 4}$$

✓ **Mathematica** : cpu = 7.26423 (sec), leaf count = 1191

$$\{\{y(x) \to \text{Root}\left[2x^4a^8 - 8x^4a^6 + e^{c_1}x^4a^4 + 11x^4a^4 - 2e^{c_1}x^4a^2 - 6x^4a^2 + 4x^2a^2 + \left(2a^2-2\right)\#1^5 + e^{c_1}x^4 + x^4 +\right.$$

✓ **Maple** : cpu = 2.286 (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

$$y'(x) = \frac{-\frac{5x^3}{2} + \frac{15}{4}x^3\cos(x) - \frac{3}{2}x^3\cos(2x) + \frac{1}{4}x^3\cos(3x) + \frac{9}{2}x^2y(x) - 6x^2y(x)\cos(x) + \frac{3}{2}x^2y(x)\cos(2x) + \frac{3x^2}{2} +}{}$$

✓ **Mathematica** : cpu = 0.15248 (sec), leaf count = 101

$$\text{Solve}\left[87\text{RootSum}\left[-29\#1^3 + 3\sqrt[3]{29}\#1 - 29\&, \frac{\log\left(\frac{3y(x)-3x+3x\cos(x)+1}{\sqrt[3]{29}\sqrt[3]{\frac{1}{x^3}}x} - \#1\right)}{\sqrt[3]{29} - 29\#1^2}\&\right] + 9c_1 + 29^{2/3}\left(\frac{1}{x^3}\right)^{2/3}x^2\log\right.$$

✓ **Maple** : cpu = 0.251 (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

$$y'(x) = -\frac{}{a^8x^6 - 4a^6x^6 - 3a^6x^4y(x)^2 - 2a^6x^4 + 6a^4x^6 + 9a^4x^4y(x)^2 + 6a^4x^4 + 3a^4x^2y(x)^4 + 4a^4x^2y(x)^2 - 4a^2x}$$

✓ **Mathematica** : cpu = 6.27519 (sec), leaf count = 247

$$\text{Solve}\left[\left(a^2-1\right)c_1 = \frac{4\text{RootSum}\left[-\#1^3a^6 + 3\#1^3a^4 - 3\#1^3a^2 + \#1^3 + 3\#1^2a^4y(x)^2 + 2\#1^2a^4 - 6\#1^2a^2y(x)^2 -\right.}{}\right.$$

✓ **Maple** : cpu = 3.786 (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

$$y'(x) = \frac{\csc\left(\frac{y(x)}{2x}\right)\sec\left(\frac{y(x)}{2x}\right)\sec\left(\frac{y(x)}{x}\right)\left(x^4\sin\left(\frac{y(x)}{2x}\right)\sin\left(\frac{y(x)}{x}\right)\cos\left(\frac{y(x)}{2x}\right) + x^3\sin\left(\frac{y(x)}{2x}\right)\sin\left(\frac{y(x)}{x}\right)\cos\left(\frac{y(x)}{2x}\right) -\right.}{}$$

✓ **Mathematica** : cpu = 0.0636064 (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 = 0.075 (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

$$y'(x) = -\frac{}{216x^3 - 216x^2y(x)^4 - 324x^2y(x)^3 - 648x^2y(x)^2 - 648x^2y(x) + 216x^2 - 8y(x)^{12} - 36y(x)^{11} - 126y(x)}$$

✓ **Mathematica** : cpu = 0.5573 (sec), leaf count = 292

$$\text{Solve}\left[c_1 = 72\text{RootSum}\left[-216\#1^3 + 216\#1^2y(x)^4 + 324\#1^2y(x)^3 + 648\#1^2y(x)^2 + 648\#1^2y(x) - 216\#1^2 - 72\right.\right.$$

✓ **Maple** : cpu = 0.749 (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

$$y'(x) = -\frac{x\left(64x^9 - 288x^8y(x) - 96x^8 + 432x^7y(x)^2 + 288x^7y(x) - 144x^7 - 216x^6y(x)^3 - 216x^6y(x)^2 - 288x^6y(}{}$$

✓ **Mathematica** : cpu = 0.18452 (sec), leaf count = 143

$$\text{Solve}\left[174\text{RootSum}\left[-29\#1^3 + 3\sqrt[3]{29}\#1 - 29\&, \frac{\log\left(\frac{\left(\frac{x^3}{\left(x^2+1\right)^3}\right)^{2/3}\left(x^2+1\right)\left(-4x^3+6x^2y(x)+2x^2+6y(x)+5\right)}{2\sqrt[3]{29}x^2} - \#1\right)}{\sqrt[3]{29} - 29\#1^2}\&\right] -\right.$$

✓ **Maple** : cpu = 0.1 (sec), leaf count = 91

$$\left\{y(x) = \frac{58\,RootOf\left(-162\int^{\_Z}\left(841\_a^3 - 27\_a + 27\right)^{-1}d\_a + \ln\left(x^2+1\right) + 6\_C1\right)x^2 + 12\,x^3 - 6\,x^2 + 58\,Ro}{18\,x^2 + 18}\right.$$

2.968 ODE No. 968

$$y'(x) = \frac{\csc\left(\frac{y(x)}{2x}\right)\sec\left(\frac{y(x)}{2x}\right)\sec\left(\frac{y(x)}{x}\right)\left(x^4\sin\left(\frac{y(x)}{2x}\right)\sin\left(\frac{y(x)}{x}\right)\cos\left(\frac{y(x)}{2x}\right) - \frac{1}{2}xy(x)\sin\left(\frac{y(x)}{x}\right) - \frac{1}{2}y(x)\sin\left(\frac{y(x)}{x}\right.\right.}{}$$

✓ **Mathematica** : cpu = 0.091662 (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 = 0.088 (sec), leaf count = 22

$$\left\{y(x) = \arcsin\left(\frac{\_C1\,(1+x)}{e^x}e^{\frac{x^2}{2}}\right)x\right\}$$

2.969 ODE No. 969

$$y'(x) = \frac{\csc\left(\frac{y(x)}{2x}\right)\sec\left(\frac{y(x)}{2x}\right)\sec\left(\frac{y(x)}{x}\right)\left(-\frac{1}{2}xy(x)\sin\left(\frac{y(x)}{x}\right) - \frac{1}{2}y(x)\sin\left(\frac{y(x)}{x}\right) + x\sin\left(\frac{y(x)}{2x}\right)\sin\left(\frac{y(x)}{x}\right)\cos\left(\frac{y(x}{2x}\right.\right.}{}$$

✓ **Mathematica** : cpu = 0.0634151 (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 = 0.093 (sec), leaf count = 15

$$\left\{y(x) = \arcsin\left(\frac{\_C1\ x}{1+x}\right)x\right\}$$

2.970 ODE No. 970

$$y'(x) = -\frac{}{216x^3 - 216x^2y(x)^4 - 324x^2y(x)^3 - 648x^2y(x)^2 - 648x^2y(x) - 8y(x)^{12} - 36y(x)^{11} - 126y(x)^{10} - 315y}$$

✓ **Mathematica** : cpu = 0.567483 (sec), leaf count = 66

$$\text{Solve}\left[\frac{36\left(2y(x)^4+3y(x)^3+6y(x)^2+6y(x)-6x-3\right)}{\left(y(x)\left(2y(x)^3+3y(x)^2+6y(x)+6\right)-6x\right)^2}+\log(y(x))=c_1,y(x)\right]$$

✓ **Maple** : cpu = 0.879 (sec), leaf count = 181

$$\left\{\frac{1}{6\_C1 - 6\ln(y(x))}\left(-6\sqrt{3\ln(y(x)) - 3\_C1 + 9} + \left(2(y(x))^4 + 3(y(x))^3 + 6(y(x))^2 - 6x + 6y(x)\right)\ln(y(x\right.\right.$$

2.971 ODE No. 971

$$y'(x) = \frac{(xy(x)+1)^3}{x^5}$$

✓ **Mathematica** : cpu = 0.187811 (sec), leaf count = 124

$$\text{Solve}\left[6\left(c_1+\left(-\frac{1}{x^6}\right)^{5/3}x^9\right)+\log\left(-\sqrt[3]{-\frac{1}{x^6}}(xy(x)+1)^2+\left(-\frac{1}{x^6}\right)^{2/3}x^3(xy(x)+1)+1\right)=2\left(\sqrt{3}\tan^{-1}\left(\right.\right.\right.$$

✓ **Maple** : cpu = 0.332 (sec), leaf count = 86

$$\left\{y(x) = \frac{\sqrt{3}}{6x}\left(3\tan\left(RootOf\left(-18x^3\left(-x^{-6}\right)^{2/3} - 6\_Z\sqrt{3} - \ln\left(\frac{\left(\sqrt{3}+\tan(\_Z)\right)^6}{\left((\tan(\_Z))^2+1\right)^3}\right) + 18\_C1\right)\right)x^3\sqrt[3]{-\right.\right.$$

2.972 ODE No. 972

$$y'(x) = \frac{x(-2x^4 + 2x^2y(x) - x^2 + 1)}{y(x) - x^2}$$

✓ **Mathematica** : cpu = 0.0279992 (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 = 0.11 (sec), leaf count = 27

$$\left\{y(x) = x^2 + \frac{1}{2}\mathit{lambertW}\left(-2\,\frac{\mathrm{e}^{x^4}\_C1\,\mathrm{e}^{-1}}{\left(\mathrm{e}^{x^2}\right)^2}\right)+\frac{1}{2}\right\}$$

2.973 ODE No. 973

$$y'(x) = e^{-2bx}y(x)\left(e^{bx}y(x) + e^{2bx} + y(x)^2\right)$$

✓ **Mathematica** : cpu = 0.230114 (sec), leaf count = 143

$$\text{Solve}\left[3(9b-7)^{2/3}\text{RootSum}\left[\#1^3(9b-7)^{2/3} - 9\#1b + 6\#1 + (9b-7)^{2/3}\&, \frac{\log\left(\frac{e^{-2bx}\left(e^{bx}+3y(x)\right)}{\sqrt[3]{(9b-7)e^{-3bx}}} - \#1\right)}{\#1^2\left(-(9b-7)^{2/3}\right)+3b-2}\&\right] + x$$

✓ **Maple** : cpu = 0.39 (sec), leaf count = 136

$$\left\{y(x) = -\frac{\mathrm{e}^{bx}}{2} + \frac{1}{2}\tan\left(\mathit{RootOf}\left(-2\_Z\,\mathrm{e}^{bx} - \ln\left(-(4\,(\tan(\_Z))^2\,b - 3\,(\tan(\_Z))^2 + 4\,b - 3)\left(-\tan(\_Z)\sqrt{\right.\right.\right.\right.$$

2.974 ODE No. 974

$$y'(x) = -x^6 + 3x^4y(x) - 3x^2y(x)^2 + y(x)^3 + 2x$$

✓ **Mathematica** : cpu = 0.011769 (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 = 0.045 (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 = 0.0126234 (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 = 0.048 (sec), leaf count = 59

$$\left\{y(x) = -\frac{1}{3}\left(x^2\sqrt{-54\_C1 - 2\,x} - 3\right)\frac{1}{\sqrt{-54\_C1 - 2\,x}}, y(x) = -\frac{1}{3}\left(x^2\sqrt{-54\_C1 - 2\,x} + 3\right)\frac{1}{\sqrt{-54\_C1 - 2}}\right.$$

2.976 ODE No. 976

$$y'(x) = \frac{y(x)\left(x^7y(x)^2 + x^4y(x) + x - 3\right)}{x}$$

✓ **Mathematica** : cpu = 0.106753 (sec), leaf count = 101

$$\text{Solve}\left[-\frac{7}{3}\text{RootSum}\left[-7\#1^3 + 6\sqrt[3]{-7}\#1 - 7\&, \frac{\log\left(\frac{3x^6y(x)+x^3}{\sqrt[3]{7}\sqrt[3]{-x^9}} - \#1\right)}{2\sqrt[3]{-7} - 7\#1^2}\&\right] = c_1 + \frac{7^{2/3}\left(-x^9\right)^{2/3}}{9x^5}, y(x)\right]$$

✓ **Maple** : cpu = 0.283 (sec), leaf count = 57

$$\left\{y(x) = \frac{1}{2\,x^3}\left(\sqrt{3}\tan\left(RootOf\left(-\sqrt{3}\ln\left(\frac{9\left(\tan\left(\_Z\right)\right)^2 + 9}{7\left(\sqrt{3} - 3\tan\left(\_Z\right)\right)^2}\right) + 3\sqrt{3}\_C1 - 2\sqrt{3}x - 2\_Z\right)\right) - 1\right)\right\}$$

2.977 ODE No. 977

$$y'(x) = e^{2x^2}xy(x)\left(e^{-x^2}y(x) + e^{-2x^2} + y(x)^2\right)$$

✓ **Mathematica** : cpu = 0.254979 (sec), leaf count = 135

$$\text{Solve}\left[-\frac{25}{3}\text{RootSum}\left[-25\#1^3 + 24\sqrt[3]{-1}5^{2/3}\#1 - 25\&, \frac{\log\left(\frac{e^{x^2}x\left(3e^{x^2}y(x)+1\right)}{5^{2/3}\sqrt[3]{-e^{3x^2}x^3}} - \#1\right)}{8\sqrt[3]{-1}5^{2/3} - 25\#1^2}\&\right] = c_1 + \frac{5}{18}\sqrt[3]{5}e^{-2x^2}\left(-e\right.\right.$$

✓ **Maple** : cpu = 0.233 (sec), leaf count = 122

$$\left\{y(x)=\frac{1}{2\,\mathrm{e}^{x^2}}\left(\sqrt{11}\tan\left(RootOf\left(-4\sqrt{11}x^2+4\sqrt{11}\ln(11)+8\sqrt{11}\ln\left(-\frac{36\sqrt{11}}{11}+36\tan(\_Z)\right)-4\sqrt{11}\ln\right.\right.\right.\right.$$

2.978 ODE No. 978

$$y'(x)=\frac{y(x)\left(x^2+xy(x)+y(x)^2+x\right)}{x^2}$$

✓ **Mathematica** : cpu = 0.0872456 (sec), leaf count = 58

$$\text{Solve}\left[\log\left(\frac{y(x)}{x}\right)=c_1+\frac{1}{2}\log\left(\frac{x^2+xy(x)+y(x)^2}{x^2}\right)+\frac{\tan^{-1}\left(\frac{2y(x)+x}{\sqrt{3}x}\right)}{\sqrt{3}}+x,y(x)\right]$$

✓ **Maple** : cpu = 0.183 (sec), leaf count = 71

$$\left\{y(x)=-\frac{x}{2}+\frac{\sqrt{3}x}{2}\tan\left(RootOf\left(-\sqrt{3}\ln\left(\frac{4}{3+3\,(\tan(\_Z))^2}\right)-2\sqrt{3}\ln\left(-1/6\sqrt{3}+1/2\tan(\_Z)\right)-\sqrt{3}\ln\right.\right.\right.$$

2.979 ODE No. 979

$$y'(x)=\frac{-x^3+3x^2y(x)-3xy(x)^2+y(x)^3+x}{x}$$

✓ **Mathematica** : cpu = 0.0138963 (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 = 0.053 (sec), leaf count = 57

$$\left\{y(x)=1\left(x\sqrt{2\_C1-2\ln(x)}-1\right)\frac{1}{\sqrt{2\_C1-2\ln(x)}},y(x)=1\left(x\sqrt{2\_C1-2\ln(x)}+1\right)\frac{1}{\sqrt{2\_C1-2\ln(\right.}}$$

2.980 ODE No. 980

$$y'(x) = \frac{x^3 y(x)^3 + 6x^2 y(x)^2 + 12xy(x) + 2x + 8}{x^3}$$

✓ **Mathematica** : cpu = 0.0157103 (sec), leaf count = 44

$$\left\{\left\{y(x) \to -\frac{\frac{x}{\sqrt{c_1 - 2x}} + 2}{x}\right\}, \left\{y(x) \to \frac{1}{\sqrt{c_1 - 2x}} - \frac{2}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.02 (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

$$y'(x) = \frac{a^3 x^3 y(x)^3 + 3a^2 x^2 y(x)^2 + a^2 x + 3axy(x) + 1}{a^3 x^3}$$

✓ **Mathematica** : cpu = 0.0195827 (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 = 0.028 (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 = 0.159381 (sec), leaf count = 130

$$\text{Solve}\left[21\text{RootSum}\left[-7\#1^3 + 6\sqrt[3]{-7}\#1 - 7\&, \frac{\log\left(\frac{e^{-\frac{x^2}{2}}\left(e^{\frac{x^2}{4}} + 3y(x)\right)}{\sqrt[3]{7}\sqrt[3]{-e^{-\frac{3x^2}{4}}}} - \#1\right)}{2\sqrt[3]{-7} - 7\#1^2}\&\right] + 9c_1 + 7^{2/3} e^{\frac{x^2}{2}} \left(-e^{-\frac{3x^2}{4}}\right)^{2/3} x\right.$$

✓ **Maple** : cpu = 0.468 (sec), leaf count = 145

$$\left\{\frac{1}{3}\ln\left(36+\frac{324}{7}\left(y(x)\,\mathrm{e}^{-\frac{x^2}{2}}+\frac{1}{3}\mathrm{e}^{-\frac{x^2}{4}}\right)^2\left(\mathrm{e}^{\frac{x^2}{4}}\right)^2+\frac{1}{7}\left(108\,y(x)\,\mathrm{e}^{-1/2\,x^2}+36\,\mathrm{e}^{-1/4\,x^2}\right)\mathrm{e}^{\frac{x^2}{4}}\right)+\frac{2\sqrt{3}}{9}\arctan\left(\frac{\sqrt{3}}{9}\right.\right.$$

2.983 ODE No. 983

$$y'(x)=\frac{-x^3+3x^2y(x)+x^2-3xy(x)^2+y(x)^3}{(x-1)(x+1)}$$

✓ **Mathematica** : cpu = 0.522445 (sec), leaf count = 176

$$\text{Solve}\left[\frac{1}{6}\left(-\log\left(\left(\frac{1}{(x^2-1)^3}\right)^{2/3}(x^2-1)^2(x-y(x))+\frac{(x-y(x))^2}{\left(\frac{1}{(x^2-1)^3}\right)^{2/3}(x^2-1)^2}+1\right)+2\log\left(\frac{y(x)-x}{\sqrt[3]{\frac{1}{(x^2-1)^3}}\,(x^2-\right.\right.\right.$$

✓ **Maple** : cpu = 0.317 (sec), leaf count = 233

$$\left\{y(x)=\frac{\sqrt{3}}{2}\left(\frac{x^2-1}{3}\left(3\,\tan\left(\mathit{RootOf}\left(18\left(\frac{1}{(1+x)^3\,(x-1)^3}\right)^{2/3}\ln(x-1)\,x^4-18\left(\frac{1}{(1+x)^3\,(x-1)^3}\right)^{2/3}\ln(\right.\right.\right.\right.\right.$$

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 = 6.39626 (sec), leaf count = 341

$$\text{Solve}\left[\frac{2^{2/3}\left(1-\frac{e^x\left(e^{-3x}(x-1)^3\right)^{2/3}(3xy(x)+e^x)}{(x-1)^2}\right)\left(\frac{e^x\left(e^{-3x}(x-1)^3\right)^{2/3}(3xy(x)+e^x)}{(x-1)^2}+2\right)\left(\left(1-\frac{e^x\left(e^{-3x}(x-1)^3\right)^{2/3}(3xy(x)+e^x)}{(x-1)^2}\right.\right.}{9\left(-e^{-3x}\left(3xy(x\right.\right.}\right.$$

✓ **Maple** : cpu = 0.308 (sec), leaf count = 40

$$\left\{y(x)=\frac{1}{9\,x}\mathrm{e}^{\mathit{RootOf}\left(-\mathrm{e}^{\_Z}\ln\left(\frac{x\left(\mathrm{e}^{\_Z}+9\right)}{2}\right)+3\_\mathit{C1}\,\mathrm{e}^{\_Z}+\_Z\,\mathrm{e}^{\_Z}+\mathrm{e}^{\_Z}x+9\right)+x}\right\}$$

2.985 ODE No. 985

$$y'(x) = \frac{(xy(x)+1)\left(x^2y(x)^2+x^2y(x)+x^2+2xy(x)+x+1\right)}{x^5}$$

✓ **Mathematica** : cpu = 0.266137 (sec), leaf count = 96

$$\text{Solve}\left[34^{2/3}\left(-\frac{1}{x^6}\right)^{2/3}x^3 = 51\text{RootSum}\left[-17\#1^3+3\sqrt[3]{-34}\#1-17\&, \frac{\log\left(\frac{3xy(x)+x+3}{\sqrt[3]{34}\sqrt[3]{-\frac{1}{x^6}}x^3}-\#1\right)}{\sqrt[3]{-34}-17\#1^2}\&\right]+9c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.045 (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 = 0.0159931 (sec), leaf count = 41

$$\left\{\left\{y(x)\to x\left(\log(x)-\frac{1}{\sqrt{c_1-2x}}\right)\right\},\left\{y(x)\to x\left(\frac{1}{\sqrt{c_1-2x}}+\log(x)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.029 (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 = 0.101303 (sec), leaf count = 34

$$\left\{\left\{y(x)\to\sqrt{a}x\tanh\left(\sqrt{a}\left(\int_1^x K[1]F(K[1])\,dK[1]+c_1\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.056 (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 = 0.286434 (sec), leaf count = 77

$$\left\{\left\{y(x) \to \frac{x\left(-(\sqrt{2}-1)\exp\left(2\sqrt{2}\left(\int_1^x K[1](-F(K[1]))\,dK[1]+c_1\right)\right)+1+\sqrt{2}\right)}{\exp\left(2\sqrt{2}\left(\int_1^x K[1](-F(K[1]))\,dK[1]+c_1\right)\right)+1}\right\}\right\}$$

✓ **Maple** : cpu = 0.047 (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 = 0.109828 (sec), leaf count = 44

$$\left\{\left\{y(x) \to \frac{\sqrt{b}x\tan\left(\sqrt{a}\sqrt{b}\left(\int_1^x K[1]F(K[1])\,dK[1]+c_1\right)\right)}{\sqrt{a}}\right\}\right\}$$

✓ **Maple** : cpu = 0.047 (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 = 0.477474 (sec), leaf count = 48

$$\left\{\left\{y(x) \to -\frac{2e^{\int_1^x 2F(K[5])\,dK[5]}}{e^{\text{Integrate}[2F(K[5]),\{K[5],1,x\},\text{Assumptions}\to\text{True}]} - 2c_1} + x^2 + 1\right\}\right\}$$

✓ **Maple** : cpu = 0.515 (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 = 0.260237 (sec), leaf count = 75

$$\left\{\left\{y(x) \to \frac{x\left(-(\sqrt{2}-1)\exp\left(2\sqrt{2}\left(\int_1^x K[1]F(K[1])\,dK[1]+c_1\right)\right)+1+\sqrt{2}\right)}{\exp\left(2\sqrt{2}\left(\int_1^x K[1]F(K[1])\,dK[1]+c_1\right)\right)+1}\right\}\right\}$$

✓ **Maple** : cpu = 0.039 (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 = 0.109738 (sec), leaf count = 36

$$\left\{\left\{y(x) \to \frac{x\tan\left(\sqrt{7}\left(\int_1^x K[1]^2F(K[1])\,dK[1]+c_1\right)\right)}{\sqrt{7}}\right\}\right\}$$

✓ **Maple** : cpu = 0.043 (sec), leaf count = 25

$$\left\{y(x) = \frac{\tan\left(\left(\int x^2F(x)\,\mathrm{d}x + \_C1\right)\sqrt{7}\right)x\sqrt{7}}{7}\right\}$$

2.993 ODE No. 993

$$y'(x) = \frac{y(x)}{x\log(x)} - F(x)\left(-y(x)^2 - 2y(x)\log(x) - \log^2(x)\right)$$

✗ **Mathematica** : cpu = 299.998 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.027 (sec), leaf count = 35

$$\left\{y(x) = -\frac{\ln(x)\left(\int -2\ln(x)F(x)\,\mathrm{d}x - \_C1 - 2\right)}{\int -2\ln(x)F(x)\,\mathrm{d}x - \_C1}\right\}$$

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 = 0.136685 (sec), leaf count = 44

$$\left\{\left\{y(x)\to \frac{\log(x)\left(-16(c_1+1)+x^4-4x^4\log(x)\right)}{16c_1-x^4+4x^4\log(x)}\right\}\right\}$$

✓ **Maple** : cpu = 0.027 (sec), leaf count = 43

$$\left\{y(x) = -\frac{\ln(x)\left(4\,x^4\ln(x)-x^4+8\_C1+16\right)}{4\,x^4\ln(x)-x^4+8\_C1}\right\}$$

2.995 ODE No. 995

$$y'(x) = (y(x)-e^x)^2 + e^x$$

✓ **Mathematica** : cpu = 0.0181044 (sec), leaf count = 17

$$\left\{\left\{y(x)\to \frac{1}{c_1-x}+e^x\right\}\right\}$$

✓ **Maple** : cpu = 0.132 (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 = 70.8036 (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 = 0.074 (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 = 0.0333756 (sec), leaf count = 18

$$\left\{\left\{y(x) \to \frac{1}{c_1 - x} - \cos(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.067 (sec), leaf count = 16

$$\left\{y(x) = -\cos(x) + (\_C1 - x)^{-1}\right\}$$

2.998 ODE No. 998

$$y'(x) = \frac{(-\text{Ci}(x) + y(x) - \log(x))^2 + \cos(x)}{x}$$

✓ **Mathematica** : cpu = 0.465623 (sec), leaf count = 26

$$\left\{\left\{y(x) \to -\frac{2x^2}{x^2 - 2c_1} + \text{Ci}(x) + \log(x) + 1\right\}\right\}$$

✓ **Maple** : cpu = 0.575 (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 = 0.0259619 (sec), leaf count = 24

$$\left\{\left\{y(x) \to \frac{1}{c_1 - \log(x+1)} + x - \log(x+1)\right\}\right\}$$

✓ **Maple** : cpu = 0.064 (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

$$y'(x) = \frac{x^3 + 2x^2 y(x) - x y(x) - y(x)^2 + x y(x) \log(x)}{x^2 (x + \log(x))}$$

✗ **Mathematica** : cpu = 300.064 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.163 (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 = 0.00459433 (sec), leaf count = 12

$$\{\{y(x) \to c_2 x + c_1\}\}$$

✓ **Maple** : cpu = 0.004 (sec), leaf count = 9

$$\{y(x) = \_C1\, x + \_C2\}$$

Hand solution

$$y'' = 0$$

Integration twice gives

$$y(x) = c_1 x + c_2$$

2.1002 ODE No. 1002

$$y''(x) + y(x) = 0$$

✓ **Mathematica** : cpu = 0.00547013 (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 = 0.144766 (sec), leaf count = 29

$$\left\{\left\{y(x) \to c_2 \sin(x) + c_1 \cos(x) - \frac{\sin(nx)}{n^2 - 1}\right\}\right\}$$

✓ **Maple** : cpu = 0.082 (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

$$
\begin{aligned}
y_p &= \left(\frac{n \cos(nx) \sin x - \cos x \sin(nx)}{n^2 - 1}\right) \cos x + \left(\frac{-n \cos x \cos(nx) - \sin x \sin(nx)}{n^2 - 1}\right) \sin x \\
&= \frac{n \cos(nx) \cos x \sin x - \cos^2 x \sin(nx) - n \cos x \sin x \cos(nx) - \sin^2 x \sin(nx)}{n^2 - 1} \\
&= \frac{-\sin(nx) \left(\cos^2 x + \sin^2 x\right)}{n^2 - 1} \\
&= \frac{\sin(nx)}{1 - n^2}
\end{aligned}
$$

Therefore, the full solution is (for $n^2 \neq 1$)

$$
\begin{aligned}
y &= y_h + y_p \\
&= c_1 \cos x + c_2 \sin x + \frac{\sin(nx)}{1 - n^2}
\end{aligned}
$$

Solution using undetermined coefficients: Since RHS is $\sin nx$ we guess $y_p = A \cos(nx) + B \sin(nx)$, therefore

$$
\begin{aligned}
y_p' &= -An \sin(nx) + Bn \cos(nx) \\
y_p'' &= -An^2 \cos(nx) - Bn^2 \sin(nx)
\end{aligned}
$$

Plug into the ODE gives

$$
\begin{aligned}
y_p'' + y_p &= \sin nx \\
-An^2 \cos(nx) - Bn^2 \sin(nx) + A\cos(nx) + B\sin(nx) &= \sin nx \\
\cos(nx)\left(-An^2 + A\right) + \sin(nx)\left(-Bn^2 + B\right) &= \sin(nx)
\end{aligned}
$$

Hence $-Bn^2 - B = 1$ and $-An^2 + A = 0$. Therefore $A = 0$ and from the first equation

$$
\begin{aligned}
B\left(n^2 + 1\right) &= -1 \\
B &= \frac{-1}{n^2 + 1}
\end{aligned}
$$

Hence

$$
\begin{aligned}
y_p &= A\cos(nx) + B\sin(nx) \\
&= \frac{\sin(nx)}{1 - n^2}
\end{aligned}
$$

Which is the same as variation of parameters method.

Note: Full solution should also really consider the case for $n = 1$. Will update later.

```
restart;
ode:=diff(diff(y(x),x),x)+y(x)-sin(n*x)=0;
y0:=_C1*cos(x)+_C2*sin(x)+sin(n*x)/(1-n^2);
odetest(y(x)=y0,ode);
0
```

2.1004 ODE No. 1004

$$
-a\cos(bx) + y''(x) + y(x) = 0
$$

✓ **Mathematica** : cpu = 0.106947 (sec), leaf count = 30

$$
\left\{\left\{y(x) \to -\frac{a\cos(bx)}{b^2 - 1} + c_2 \sin(x) + c_1 \cos(x)\right\}\right\}
$$

✓ **Maple** : cpu = 0.051 (sec), leaf count = 27

$$
\left\{y(x) = \sin(x)\_C2 + \cos(x)\_C1 - \frac{a\cos(bx)}{b^2 - 1}\right\}
$$

Hand solution

$$y'' + y = a \cos bx \tag{1}$$

We start by solving the homogeneous equation

$$y'' + y = 0$$

Let $y = e^{\lambda x}$, substitution in above gives

$$\begin{aligned} \lambda^2 e^{\lambda x} + e^{\lambda x} &= 0 \\ \lambda^2 + 1 &= 0 \end{aligned}$$

Hence $\lambda = \pm i$, therefore the solution is

$$\begin{aligned} y_h &= Ae^{ix} + Be^{-ix} \\ &= A(\cos x + i \sin x) + B(\cos x - i \sin x) \\ &= \cos x(A + B) + \sin x(Ai - iB) \\ &= \cos x(A + B) + \sin x(i(A - B)) \end{aligned}$$

Let $A + B = c_1, i(A - B) = c_2$ hence

$$y_h = c_1 \cos x + c_2 \sin x$$

Now we solve for the particular solution using variation of parameters. Let

$$\begin{aligned} y_p &= u_1(x) \cos x + u_2(x) \sin x \\ y'_p &= u'_1 \cos x - u_1 \sin x + u'_2 \sin x + u_2 \cos x \\ &= u_2 \cos x - u_1 \sin x + u'_1 \cos x + u'_2 \sin x \end{aligned}$$

Let first condition be

$$u'_1 \cos x + u'_2 \sin x = 0 \tag{2}$$

Hence

$$\begin{aligned} y'_p &= u_2 \cos x - u_1 \sin x \\ y''_p &= u'_2 \cos x - u_2 \sin x - u'_1 \sin x - u_1 \cos x \end{aligned}$$

Substituting in (1) gives

$$\begin{aligned} y''_p + y_p &= a \cos bx \\ u'_2 \cos x - u_2 \sin x - u'_1 \sin x - u_1 \cos x + u_1 \cos x + u_2 \sin x &= a \cos bx \\ u'_2 \cos x - u'_1 \sin x &= a \cos bx \qquad (3) \end{aligned}$$

So we have two equations (1)(2) to solve for u_1, u_2

$$
\begin{aligned}
u_1' \cos x + u_2' \sin x &= 0 \\
u_2' \cos x - u_1' \sin x &= a \cos bx
\end{aligned}
$$

From the first equation

$$
u_1' = -u_2' \frac{\sin x}{\cos x} \tag{4}
$$

Substituting in the second equation

$$
\begin{aligned}
u_2' \cos x - \left(-u_2' \frac{\sin x}{\cos x}\right) \sin x &= a \cos bx \\
u_2' \left(\cos x + \frac{\sin x}{\cos x} \sin x\right) &= a \cos bx \\
u_2' \left(\frac{\cos^2 x + \sin^2 x}{\cos x}\right) &= a \cos bx \\
u_2' &= a \cos x \cos bx
\end{aligned}
$$

Hence

$$
\begin{aligned}
u_2 &= a \int \cos x \cos (bx) \, dx \\
&= a \frac{-\cos (bx) \sin x + b \cos x \sin (bx)}{b^2 - 1}
\end{aligned}
$$

From (4)

$$
\begin{aligned}
u_1' &= -a \cos (bx) \sin x \\
u_1 &= -a \int \cos (bx) \sin x dx \\
&= -a \frac{\cos (bx) \cos x + b \sin x \sin (bx)}{b^2 - 1}
\end{aligned}
$$

Since $y_p = u_1(x) \cos x + u_2(x) \sin x$ then

$$
\begin{aligned}
y_p &= \left(-a \frac{\cos (bx) \cos x + b \sin x \sin (bx)}{b^2 - 1}\right) \cos x + \left(a \frac{-\cos (bx) \sin x + b \cos x \sin (bx)}{b^2 - 1}\right) \sin x \\
&= \frac{-a \cos (bx) \cos^2 x - ab \cos x \sin x \sin (bx) - a \cos (bx) \sin^2 x + ab \sin x \cos x \sin (bx)}{b^2 - 1} \\
&= \frac{-a \cos (bx) \cos^2 x - a \cos (bx) \sin^2 x}{b^2 - 1} \\
&= \frac{-a \cos (bx) \left(\cos^2 x + \sin^2 x\right)}{b^2 - 1} \\
&= \frac{-a \cos (bx)}{b^2 - 1} \\
&= \frac{a \cos (bx)}{1 - b^2}
\end{aligned}
$$

Therefore, the full solution is (for $b^2 \neq 1$)

$$
\begin{aligned}
y &= y_h + y_p \\
&= c_1 \cos x + c_2 \sin x + \frac{a \cos(bx)}{1 - b^2}
\end{aligned}
$$

```
restart;
ode:=diff(diff(y(x),x),x)+y(x)-a*cos(b*x)=0;
y0:=_C1*cos(x)+_C2*sin(x)+a*cos(b*x)/(1-b^2);
odetest(y(x)=y0,ode);
0
```

2.1005 ODE No. 1005

$$
-\sin(ax)\sin(bx) + y''(x) + y(x) = 0
$$

✓ **Mathematica** : cpu = 0.590877 (sec), leaf count = 159

$$
\left\{\left\{y(x) \to \frac{a^4 c_2 \sin(x) - 2a^2 b^2 c_2 \sin(x) - a^2 \sin(ax)\sin(bx) - 2a^2 c_2 \sin(x) + c_1\left(a^4 - 2a^2(b^2+1) + (b^2-1)^2\right) c}{(a-b-1)(a-b+}\right.\right.
$$

✓ **Maple** : cpu = 0.115 (sec), leaf count = 82

$$
\left\{y(x) = \sin(x)\_C2 + \cos(x)\_C1 + \frac{-(a+b+1)(a+b-1)\cos(x(a-b)) + \cos((a+b)x)(a-b+1)(a-b}{2a^4 + (-4b^2-4)a^2 + 2b^4 - 4b^2 + 2}\right.
$$

Hand solution

$$
y'' + y = \sin ax \sin bx \tag{1}
$$

We start by solving the homogeneous equation

$$
y'' + y = 0
$$

Let $y = e^{\lambda x}$, substitution in above gives

$$
\begin{aligned}
\lambda^2 e^{\lambda x} + e^{\lambda x} &= 0 \\
\lambda^2 + 1 &= 0
\end{aligned}
$$

Hence $\lambda = \pm i$, therefore the solution is

$$
\begin{aligned}
y_h &= Ae^{ix} + Be^{-ix} \\
&= A(\cos x + i \sin x) + B(\cos x - i \sin x) \\
&= \cos x(A + B) + \sin x(Ai - iB) \\
&= \cos x(A + B) + \sin x(i(A - B))
\end{aligned}
$$

Let $A + B = c_1, i(A - B) = c_2$ hence

$$
\begin{aligned}
y_h &= c_1 \cos x + c_2 \sin x \\
&= y_h = c_1 y_1 + c_2 y_2
\end{aligned}
$$

Now we solve for the particular solution using variation of parameters.

$$
y_p = u_1 y_1 + u_2 y_2
$$

Wonskian is

$$
W = \begin{vmatrix} y_1 & y_2 \\ y_1' & y_2' \end{vmatrix} = \begin{vmatrix} \cos x & \sin x \\ -\sin x & \cos x \end{vmatrix} = \cos^2 x + \sin^2 x = 1
$$

Hence, using $f = \sin ax \sin bx$, which is the RHS of the ODE, and noting that a_0 is the coefficient of y'' which is one here, then

$$
\begin{aligned}
u_1 &= \int \frac{-y_2}{W} \frac{f}{a_0} dx = -\int \sin x \sin (ax) \sin (bx)\, dx \\
&= -\frac{1}{4} \left(\frac{\cos ((a - b - 1)\, x)}{a - b - 1} - \frac{\cos ((a - b + 1)\, x)}{a - b + 1} - \frac{\cos ((a + b - 1)\, x)}{a + b - 1} + \frac{\cos ((a + b + 1)\, x)}{a + b + 1} \right)
\end{aligned}
$$

And

$$
\begin{aligned}
u_2 &= \int \frac{y_1}{W} \frac{f}{a_0} dx = -\int \cos x \sin (ax) \sin (bx)\, dx \\
&= \frac{1}{4} \left(\frac{\sin ((a - b - 1)\, x)}{a - b - 1} + \frac{\sin ((a - b + 1)\, x)}{a - b + 1} - \frac{\sin ((a + b - 1)\, x)}{a + b - 1} - \frac{\sin ((a + b + 1)\, x)}{a + b + 1} \right)
\end{aligned}
$$

Since $y_p = u_1(x)\cos x + u_2(x)\sin x$ then

$$
\begin{aligned}
y_p &= -\frac{1}{4}\left(\frac{\cos((a-b-1)x)}{a-b-1} - \frac{\cos((a-b+1)x)}{a-b+1} - \frac{\cos((a+b-1)x)}{a+b-1} + \frac{\cos((a+b+1)x)}{a+b+1}\right)\cos x \\
&\quad + \frac{1}{4}\left(\frac{\sin((a-b-1)x)}{a-b-1} + \frac{\sin((a-b+1)x)}{a-b+1} - \frac{\sin((a+b-1)x)}{a+b-1} - \frac{\sin((a+b+1)x)}{a+b+1}\right)\sin x
\end{aligned}
$$

$$
\begin{aligned}
&= \frac{1}{4}\left(-\frac{\cos^2((a-b-1)x)}{a-b-1} + \frac{\sin^2((a-b-1)x)}{a-b-1}\right) + \frac{1}{4}\left(\frac{\cos^2((a-b+1)x)}{a-b+1} + \frac{\sin^2((a-b+1)x)}{a-b+1}\right) \\
&\quad + \frac{1}{4}\left(\frac{\cos^2((a+b-1)x)}{a+b-1} - \frac{\sin^2((a+b-1)x)}{a+b-1}\right) + \frac{1}{4}\left(-\frac{\cos^2((a+b+1)x)}{a+b+1} - \frac{\sin^2((a+b+1)x)}{a+b+1}\right)
\end{aligned}
$$

$$
\begin{aligned}
&= \frac{1}{4}\left(-\frac{\cos^2((a-b-1)x)}{a-b-1} + \frac{\sin^2((a-b-1)x)}{a-b-1}\right) + \frac{1}{4}\left(\frac{1}{a-b+1}\right) \\
&\quad + \frac{1}{4}\left(\frac{\cos^2((a+b-1)x)}{a+b-1} - \frac{\sin^2((a+b-1)x)}{a+b-1}\right) - \frac{1}{4}\left(\frac{1}{a+b+1}\right)
\end{aligned}
$$

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))+(1/4)*(1/(al
y0:=yp+_C1*sin(x)+_C2*cos(x);
not zero
```

2.1006 ODE No. 1006

$$y''(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 0.00522438 (sec), leaf count = 20

$$\{\{y(x) \to c_1 e^x + c_2 e^{-x}\}\}$$

✓ **Maple** : cpu = 0.008 (sec), leaf count = 15

$$\{y(x) = \mathrm{e}^x \_C1 + \_C2\, \mathrm{e}^{-x}\}$$

Hand solution

$$y'' - y = 0 \tag{1}$$

Let $y = e^{\lambda x}$, substitution in above gives

$$\begin{aligned} \lambda^2 e^{\lambda x} - e^{\lambda x} &= 0 \\ \lambda^2 - 1 &= 0 \end{aligned}$$

Hence $\lambda = \pm 1$, therefore the solution is

$$y_h = Ae^x + Be^{-x}$$

2.1007 ODE No. 1007

$$-4e^{x^2} x^2 + y''(x) - 2y(x) = 0$$

✓ **Mathematica** : cpu = 0.0736958 (sec), leaf count = 36

$$\left\{\left\{y(x) \to c_1 e^{\sqrt{2}x} + c_2 e^{-\sqrt{2}x} + e^{x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.054 (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

$$
a^2 y(x) - \cot(ax) + y''(x) = 0
$$

✓ **Mathematica** : cpu = 0.0454589 (sec), leaf count = 46

$$
\left\{\left\{y(x) \to \frac{\sin(ax)\left(a^2 c_2 + \log\left(\sin\left(\frac{ax}{2}\right)\right) - \log\left(\cos\left(\frac{ax}{2}\right)\right)\right)}{a^2} + c_1 \cos(ax)\right\}\right\}
$$

✓ **Maple** : cpu = 0.088 (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 = 0.00559236 (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 = 0.017 (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 = 0.0202943 (sec), leaf count = 42

$$\left\{\left\{y(x) \to c_1 \mathrm{Ai}\left(-\frac{b + ax}{(-a)^{2/3}}\right) + c_2 \mathrm{Bi}\left(-\frac{b + ax}{(-a)^{2/3}}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.039 (sec), leaf count = 31

$$\left\{y(x) = \_C1 \mathrm{Ai}\left(-(ax + b)a^{-\frac{2}{3}}\right) + \_C2 \mathrm{Bi}\left(-(ax + b)a^{-\frac{2}{3}}\right)\right\}$$

Hand solution

$$y'' + (ax + b)\, y = 0 \tag{1}$$

For $a \neq 0$. Let $y = \eta(\xi)\,, \xi = ax + b$, hence

$$\begin{aligned} \frac{dy}{dx} &= \frac{d\eta}{d\xi}\frac{d\xi}{dx} \\ &= \frac{d\eta}{d\xi}a \end{aligned}$$

And

$$
\begin{aligned}
\frac{d^2y}{dx^2} &= \frac{d}{dx}\left(\frac{d\eta}{d\xi}a\right) \\
&= a\frac{d}{dx}\left(\frac{d\eta}{d\xi}\right) \\
&= a\left(\frac{d^2\eta}{d\xi^2}\frac{d\xi}{dx}\right) \\
&= a^2\frac{d^2\eta}{d\xi^2}
\end{aligned}
$$

Therefore (1) becomes

$$
\begin{aligned}
a^2\frac{d^2\eta}{d\xi^2} + \xi\eta(\xi) &= 0 \\
a^2\eta'' + \xi\eta &= 0 \qquad (2)
\end{aligned}
$$

This is Airy ODE but with plus sign instead of the normal Airy $\eta'' - \xi\eta = 0$. Let

$$
\begin{aligned}
\eta &= \sum_{n=0}^{\infty} c_n\xi^n \\
\eta' &= \sum_{n=0}^{\infty} nc_n\xi^{n-1} = \sum_{n=1}^{\infty} nc_n\xi^{n-1} = \sum_{n=0}^{\infty} (n+1)\,c_{n+1}\xi^n \\
\eta'' &= \sum_{n=0}^{\infty} n(n+1)\,c_{n+1}\xi^{n-1} = \sum_{n=1}^{\infty} n(n+1)\,c_{n+1}\xi^{n-1} = \sum_{n=0}^{\infty} (n+1)\,(n+2)\,c_{n+2}\xi^n
\end{aligned}
$$

Hence (2) becomes

$$
\begin{aligned}
a^2\sum_{n=0}^{\infty} (n+1)\,(n+2)\,c_{n+2}\xi^n + \xi\sum_{n=0}^{\infty} c_n\xi^n &= 0 \\
\sum_{n=0}^{\infty} a^2(n+1)\,(n+2)\,c_{n+2}\xi^n + \sum_{n=0}^{\infty} c_n\xi^{n+1} &= 0 \\
\sum_{n=0}^{\infty} a^2(n+1)\,(n+2)\,c_{n+2}\xi^n + \sum_{n=1}^{\infty} c_{n-1}\xi^n &= 0 \\
2a^2c_2 + \sum_{n=1}^{\infty} \left(a^2(n+1)\,(n+2)\,c_{n+2} + c_{n-1}\right)\xi^n &= 0
\end{aligned}
$$

Hence

$$2a^2c_2 = 0 \tag{3}$$
$$a^2(n+1)(n+2)\,c_{n+2} + c_{n-1} = 0 \qquad n \geq 1 \tag{4}$$

From (3) and since $a \neq 0$

$$c_2 = 0$$

From (4)

$$c_{n+2} = \frac{-c_{n-1}}{a^2\,(n+1)\,(n+2)}$$

Hence for $n = 3$, we see from the above recurrence equation and because $c_2 = 0$ that

$$c_5 = \frac{-c_2}{a^2\,(4)\,(6)} = 0$$

Similarly, for $n = 6$

$$c_8 = \frac{-c_5}{a^2\,(7)\,(8)} = 0$$

Similarly, for $n = 9$

$$c_{11} = \frac{-c_8}{a^2\,(10)\,(11)} = 0$$

And so on. Hence we found so far that for $n = 3, 6, 9, 12, \cdots$ all terms generated which are $c_5, c_8, c_{11}, \cdots$ are zero.

Now, for $n = 1$, the recurrence equation gives

$$c_3 = \frac{-c_0}{a^2}\frac{1}{2 \cdot 3}$$

For $n = 2$

$$c_4 = \frac{-c_1}{a^2}\frac{1}{3 \cdot 4}$$

For $n = 4$

$$c_6 = \frac{-c_3}{a^2\,(5)\,(6)} = c_0\left(\frac{1}{a^2}\frac{1}{5 \cdot 6}\right)\left(\frac{1}{a^2}\frac{1}{2 \cdot 3}\right)$$

For $n=5$

$$c_7 = \frac{-c_4}{a^2(6)(7)} = c_1\left(\frac{1}{a^2}\frac{1}{6\cdot 7}\right)\left(\frac{1}{a^2}\frac{1}{3\cdot 4}\right)$$

For $n=7$

$$c_9 = \frac{-c_6}{a^2(8)(9)} = -c_0\left(\frac{1}{a^2}\frac{1}{8\cdot 9}\right)\left(\frac{1}{a^2}\frac{1}{5\cdot 6}\right)\left(\frac{1}{a^2}\frac{1}{2\cdot 3}\right)$$

For $n=8$

$$c_{10} = \frac{-c_7}{a^2(9)(10)} = -c_1\left(\frac{1}{a^2}\frac{1}{9\cdot 10}\right)\left(\frac{1}{a^2}\frac{1}{6\cdot 7}\right)\left(\frac{1}{a^2}\frac{1}{3\cdot 4}\right)$$

Therefore, in summary, this is what we have so far. For $n=3,6,9,12,\cdots$ all terms are zero. For $n=1,4,7,\cdots$ all terms are expressed using c_0 and for $n=2,5,8,\cdots$ all terms are expressed using c_1. So there are two arbitrary constants c_0, c_1.

In other words, $c_2, c_5, c_8, c_{11}, \cdots = 0$ and $c_3, c_6, c_9, c_{12}, \cdots = f(c_0)$ and $c_4, c_7, c_{10}, c_{13}, \cdots = f(c_1)$.

$$\begin{aligned}
\eta &= \sum_{n=0}^{\infty} c_n \xi^n \\
&= c_0 + c_1\xi^1 + c_2\xi^2 + c_3\xi^3 + \cdots \\
&= c_0 + \left(c_1\xi^1\right) + 0 - \left(c_0\frac{\xi^3}{a^2}\frac{1}{2\cdot 3}\right) - \left(c_1\frac{\xi^4}{a^2}\frac{1}{3\cdot 4}\right) + 0 + c_0\frac{\xi^6}{a^4}\frac{1}{2\cdot 3\cdot 5\cdot 6} + c_1\frac{\xi^7}{a^4}\frac{1}{3\cdot 4\cdot 6\cdot 7} + 0 \\
&= c_0\left(1 - \frac{\xi^3}{a^2}\frac{1}{2\cdot 3} + \frac{\xi^6}{a^4}\frac{1}{2\cdot 3\cdot 5\cdot 6} - \cdots\right) + c_1\left(\xi - \frac{\xi^4}{a^2}\frac{1}{3\cdot 4} + \frac{\xi^7}{a^4}\frac{1}{3\cdot 4\cdot 6\cdot 7} - \cdots\right) \\
&= c_0\left(1 - \frac{1}{a^2}\frac{\xi^3}{3!} + \frac{1\cdot 4}{a^4}\frac{\xi^6}{6!} - \frac{1\cdot 4\cdot 7}{a^6}\frac{\xi^9}{9!} + \cdots\right) + c_1\left(\xi - \frac{\xi^4}{a^2}\frac{2}{4!} + \frac{\xi^7}{a^4}\frac{2\cdot 5}{7!} - \frac{\xi^{10}}{a^6}\frac{2\cdot 5\cdot 8}{10!} + \cdots\right)
\end{aligned}$$

Hence

$$\eta = c_0\left(\sum_{n=0}^{\infty} 3^n\left(\frac{1}{3}\right)_n \frac{(-1)^n}{a^{2n}}\frac{\xi^{3n}}{(3n)!}\right) + c_1\left(\sum_{n=0}^{\infty} 3^n\left(\frac{2}{3}\right)_n \frac{(-1)^n}{a^{2n}}\frac{\xi^{3n+1}}{(3n+1)!}\right) \tag{5}$$

Where

$$\begin{aligned}
3^n\left(\frac{1}{3}\right)_n &= (1)\cdot(4)\cdot(7)\ldots(3n-2) \\
3^n\left(\frac{2}{3}\right)_n &= (2)\cdot(5)\cdot(8)\ldots(3n-1)
\end{aligned}$$

And

$$\left(\frac{1}{3}\right)_0 = \left(\frac{2}{3}\right)_0 = 1$$

Equation (5) can be simplified more by moving $\frac{(-1)^n}{a^{2n}}$ into ξ as follows

$$\eta = c_0\left(\sum_{n=0}^{\infty} 3^n \left(\frac{1}{3}\right)_n \frac{1}{(3n)!}\left(\frac{-\xi}{a^{\frac{2}{3}}}\right)^{3n}\right) + ac_1\left(\sum_{n=0}^{\infty} 3^n \left(\frac{2}{3}\right)_n \frac{1}{(3n+1)!}\left(\frac{-\xi}{a^{\frac{2}{3}}}\right)^{3n+1}\right)$$

Let $\left(\frac{-\xi}{a^{\frac{2}{3}}}\right) = z$ then the above is

$$\eta = c_0\left(\sum_{n=0}^{\infty} 3^n \left(\frac{1}{3}\right)_n \frac{z^{3n}}{(3n)!}\right) + ac_1\left(\sum_{n=0}^{\infty} 3^n \left(\frac{2}{3}\right)_n \frac{z^{3n+1}}{(3n+1)!}\right)$$

Let

$$f(\xi) = \sum_{n=0}^{\infty} 3^n \left(\frac{1}{3}\right)_n \frac{\xi^{3n}}{(3n)!}$$
$$g(\xi) = \sum_{n=0}^{\infty} 3^n \left(\frac{2}{3}\right)_n \frac{\xi^{3n+1}}{(3n+1)!}$$

Now looking at definition of $\operatorname{AiryAI}(z)$ we see

$$\operatorname{AiryAI}(z) = r_1 f(z) - r_2 g(z)$$
$$\operatorname{AiryBI}(z) = \sqrt{3}(r_1 f(z) + r_2 g(z))$$

These are Airy functions AiryAI and AiryBI with appropriate choice of c_0, c_1. See definition of these special functions. Converting back to x using $\xi = ax + b$ should result in solution given by CAS. Need to write these final details to make sure. Will finish later.

2.1011 ODE No. 1011

$$y''(x) - (x^2 + 1)\, y(x) = 0$$

✓ **Mathematica** : cpu = 0.30652 (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 = 0.032 (sec), leaf count = 17

$$\left\{y(x) = e^{\frac{x^2}{2}}\left(\mathit{Erf}(x)\_\mathit{C2} + \_\mathit{C1}\right)\right\}$$

Hand solution

$$y'' - (x^2 + 1)\, y = 0 \tag{1}$$

Second order with varying coefficient. Using power series, let $y = \sum_{n=0}^{\infty} c_n x^n$, hence

$$
\begin{aligned}
y' &= \sum_{n=0}^{\infty} n c_n x^{n-1} = \sum_{n=1}^{\infty} n c_n x^{n-1} = \sum_{n=0}^{\infty} (n+1)\, c_{n+1} x^n \\
y'' &= \sum_{n=0}^{\infty} n(n+1)\, c_{n+1} x^{n-1} = \sum_{n=1}^{\infty} n(n+1)\, c_{n+1} x^{n-1} = \sum_{n=0}^{\infty} (n+1)\,(n+2)\, c_{n+2} x^n
\end{aligned}
$$

Substituting back in the original ODE gives

$$
\begin{aligned}
\sum_{n=0}^{\infty} (n+1)\,(n+2)\, c_{n+2} x^n - (x^2+1) \sum_{n=0}^{\infty} c_n x^n &= 0 \\
\sum_{n=0}^{\infty} (n+1)\,(n+2)\, c_{n+2} x^n - x^2 \sum_{n=0}^{\infty} c_n x^n - \sum_{n=0}^{\infty} c_n x^n &= 0 \\
\sum_{n=0}^{\infty} (n+1)\,(n+2)\, c_{n+2} x^n - \sum_{n=0}^{\infty} c_n x^{n+2} - \sum_{n=0}^{\infty} c_n x^n &= 0 \\
\sum_{n=0}^{\infty} (n+1)\,(n+2)\, c_{n+2} x^n - \sum_{n=2}^{\infty} c_{n-2} x^n - \sum_{n=0}^{\infty} c_n x^n &= 0
\end{aligned}
$$

For $n = 0$

$$
\begin{aligned}
(n+1)\,(n+2)\, c_{n+2} - c_n &= 0 \\
2c_2 - c_0 &= 0 \\
c_2 &= \frac{c_0}{2}
\end{aligned}
$$

For $n = 1$

$$
\begin{aligned}
(n+1)\,(n+2)\, c_{n+2} - c_n &= 0 \\
(2)\,(3)\, c_3 - c_1 &= 0 \\
c_3 &= \frac{c_1}{6}
\end{aligned}
$$

For $n \geq 2$

$$
\begin{aligned}
(n+1)\,(n+2)\, c_{n+2} - c_{n-2} - c_n &= 0 \\
c_{n+2} &= \frac{c_{n-2} + c_n}{(n+1)\,(n+2)}
\end{aligned}
$$

Hence for $n = 2$

$$c_4 = \frac{c_0 + c_2}{(3)\,(4)} = \frac{c_0 + \frac{c_0}{2}}{(3)\,(4)} = \frac{2c_0 + c_0}{(2)\,(3)\,(4)} = c_0 \frac{3}{(2)\,(3)\,(4)}$$

For $n=3$

$$c_5=\frac{c_1+c_3}{(4)(5)}=\frac{c_1+\frac{c_1}{6}}{(4)(5)}=\frac{6c_1+c_1}{(4)(5)(6)}=c_1\frac{7}{(4)(5)(6)}$$

For $n=4$

$$c_6=\frac{c_2+c_4}{(5)(6)}=\frac{\frac{c_0}{2}+c_0\frac{3}{(2)(3)(4)}}{(5)(6)}=\frac{c_0(3)(4)+3c_0}{(2)(3)(4)(5)(6)}=c_0\frac{15}{(2)(3)(4)(5)(6)}$$

For $n=5$

$$\begin{aligned}c_7&=\frac{c_3+c_5}{(6)(7)}\\&=\frac{\frac{c_1}{6}+c_1\frac{7}{(4)(5)(6)}}{(6)(7)}=\frac{3}{560}c_1\end{aligned}$$

And so on. Hence the series is

$$\begin{aligned}y&=\sum_{n=0}^{\infty}c_nx^n\\&=c_0+c_1x+c_2x^2+c_3x^3+\cdots\\&=c_0+c_1x+\frac{c_0}{2}x^2+\frac{c_1}{6}x^3+c_0\frac{3}{(2)(3)(4)}x^4+c_1\frac{7}{(4)(5)(6)}x^5+c_0\frac{15}{(2)(3)(4)(5)(6)}x^6+c_1\frac{3}{560}x^7+\cdots\\&=c_0+c_1x+\frac{c_0}{2}x^2+\frac{c_1}{6}x^3+c_0\frac{1}{8}x^4+c_1\frac{7}{120}x^5+c_0\frac{1}{48}x^6+c_1\frac{3}{560}x^7+\cdots\\&=c_0\left(1+\frac{x^2}{2}+\frac{1}{8}x^4+\frac{1}{48}x^6+\cdots\right)+c_1\left(x+\frac{1}{6}x^3+\frac{7}{120}x^5+\frac{3}{560}x^7+\cdots\right)\end{aligned}$$

Now the power series for $e^{\frac{x^2}{2}}=1+\frac{x^2}{2}+\frac{x^4}{8}+\frac{x^6}{48}+\cdots$, so we can convert the first term above (the expression for c_0 to be $e^{\frac{x^2}{2}}$. Hence

$$c_0\left(1+\frac{x^2}{2}+\frac{1}{8}x^4+\frac{1}{48}x^6+\cdots\right)=c_0e^{\frac{x^2}{2}}$$

So now we have to work on the second term (the expression for c_1)

$$c_1\left(x+\frac{1}{6}x^3+\frac{7}{120}x^5+\frac{3}{560}x^7+\cdots\right)=?$$

Recall that series for error function is

$$\operatorname{erf}(x)=\frac{2}{\sqrt{\pi}}\left(x-\frac{x^3}{3}+\frac{x^5}{10}-\frac{x^7}{48}+\cdots\right)$$

Multiplying $e^{\frac{x^2}{2}}$ by $\operatorname{erf}(x)$ gives

$$\begin{aligned}e^{\frac{x^2}{2}}\operatorname{erf}(x)&=\frac{2}{\sqrt{\pi}}\left(1+\frac{x^2}{2}+\frac{x^4}{(2)(4)}+\frac{x^6}{(2)(4)(6)}+\cdots\right)\left(x-\frac{x^3}{3}+\frac{x^5}{10}-\frac{x^7}{48}+\cdots\right)\\&=\frac{2}{\sqrt{\pi}}\left(x-\frac{x^3}{3}+\frac{x^5}{10}-\frac{x^7}{48}+\cdots+\frac{x^3}{2}-\frac{x^5}{6}+\frac{x^7}{20}-\frac{x^{15}}{96}+\cdots\right)\\&=\frac{2}{\sqrt{\pi}}\left(x+\frac{x^3}{6}+\frac{7x^5}{120}+\frac{3}{560}x^7+\cdots\right)\end{aligned}$$

Comparing the above to the term next to c_1 above, we see they are the same with a multiplier $\frac{2}{\sqrt{\pi}}$, which can be absorbed into the constant c_1, Hence

$$\begin{aligned} y &= c_0\left(1+\frac{x^2}{2}+\frac{1}{8}x^4+\frac{1}{48}x^6+\cdots\right)+c_1\left(x+\frac{1}{6}x^3+\frac{7}{120}x^5+\frac{3}{560}x^7+\cdots\right) \\ &= c_0 e^{\frac{x^2}{2}}+c_1\left(e^{\frac{x^2}{2}}\operatorname{erf}(x)\right) \end{aligned}$$

Hence final solution is

$$y = c_0 e^{\frac{x^2}{2}}+c_2\left(e^{\frac{x^2}{2}}\operatorname{erf}(x)\right)$$

Verification

```
restart;
ode:=diff(diff(y(x),x),x)-(x^2+1)*y(x)=0;
y0:=_C1*exp(x^2/2)+_C2*exp(x^2/2)*erf(x);
odetest(y(x)=y0,ode);
0
```

2.1012 ODE No. 1012

$$y''(x)-\left(a+x^2\right)y(x)=0$$

✓ **Mathematica** : cpu = 0.0119168 (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 = 0.175 (sec), leaf count = 29

$$\left\{y(x)=1\left(\_C1\, M_{-\frac{a}{4},\frac{1}{4}}\left(x^2\right)+\_C2\, W_{-\frac{a}{4},\frac{1}{4}}\left(x^2\right)\right)\frac{1}{\sqrt{x}}\right\}$$

2.1013 ODE No. 1013

$$y''(x)-\left(a^2x^2+a\right)y(x)=0$$

✓ **Mathematica** : cpu = 0.0225387 (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 = 0.042 (sec), leaf count = 22

$$\left\{y(x)=\mathrm{e}^{\frac{ax^2}{2}}\left(\mathit{Erf}\left(\sqrt{a}x\right)\_C2+\_C1\right)\right\}$$

2.1014 ODE No. 1014

$$y''(x) - cx^a y(x) = 0$$

✓ **Mathematica** : cpu = 0.0461244 (sec), leaf count = 119

$$\left\{\left\{y(x) \to (a+2)^{-\frac{1}{a+2}}\sqrt{x}c^{\frac{1}{2a+4}}\left(c_1\Gamma\left(\frac{a+1}{a+2}\right)I_{-\frac{1}{a+2}}\left(\frac{2\sqrt{c}x^{\frac{a}{2}+1}}{a+2}\right)+(-1)^{\frac{1}{a+2}}c_2\Gamma\left(1+\frac{1}{a+2}\right)I_{\frac{1}{a+2}}\left(\frac{2\sqrt{c}x^{\frac{a}{2}+1}}{a+2}\right)\right.\right.\right.$$

✓ **Maple** : cpu = 0.122 (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 = 0.366042 (sec), leaf count = 0 , could not solve

```
DSolve[-((-1 + a^2*x^(2*n))*y[x]) + Derivative[2][y][x] == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x) = DESol\left(\left\{\frac{d^2}{dx^2}\_Y(x) + \left(-a^2x^{2n}+1\right)\_Y(x)\right\}, \{\_Y(x)\}\right)\right\}$$

2.1016 ODE No. 1016

$$y(x)\left(ax^{2c} + bx^{c-1}\right) + y''(x) = 0$$

✓ **Mathematica** : cpu = 0.232644 (sec), leaf count = 225

$$\left\{\left\{y(x) \to 2^{\frac{c}{2c+2}}x^{-c/2}\left(x^{c+1}\right)^{\frac{c}{2c+2}}e^{-\frac{\sqrt{a}x^{c+1}}{\sqrt{-(c+1)^2}}}\left(c_1U\left(-\frac{(c+1)\left(cb+b+\sqrt{a}c\sqrt{-(c+1)^2}\right)}{2\sqrt{a}\left(-(c+1)^2\right)^{3/2}}, \frac{c}{c+1}, \frac{2\sqrt{a}x^{c+1}}{\sqrt{-(c+1)^2}}\right)\right.\right.\right.$$

✓ **Maple** : cpu = 0.243 (sec), leaf count = 91

$$\left\{y(x) = x^{-\frac{c}{2}}\left(W_{\frac{-ib}{2c+2}\frac{1}{\sqrt{a}},(2c+2)^{-1}}\left(\frac{2\,ix^{c+1}}{c+1}\sqrt{a}\right)\_C2 + M_{\frac{-ib}{2c+2}\frac{1}{\sqrt{a}},(2c+2)^{-1}}\left(\frac{2\,ix^{c+1}}{c+1}\sqrt{a}\right)\_C1\right)\right\}$$

2.1017 ODE No. 1017

$$\left(e^{2x} - v^2\right) y(x) + y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0317907 (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 = 0.047 (sec), leaf count = 17

$$\{y(x) = \_C1\, J_v(\mathrm{e}^x) + \_C2\, Y_v(\mathrm{e}^x)\}$$

2.1018 ODE No. 1018

$$a e^{bx} y(x) + y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0252234 (sec), leaf count = 55

$$\left\{\left\{y(x) \to c_1 J_0\left(\frac{2\sqrt{a}\sqrt{e^{bx}}}{b}\right) + 2 c_2 Y_0\left(\frac{2\sqrt{a}\sqrt{e^{bx}}}{b}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.057 (sec), leaf count = 39

$$\left\{y(x) = \_C1\, J_0\left(2\,\frac{\sqrt{a}\mathrm{e}^{1/2\,bx}}{b}\right) + \_C2\, Y_0\left(2\,\frac{\sqrt{a}\mathrm{e}^{1/2\,bx}}{b}\right)\right\}$$

2.1019 ODE No. 1019

$$y''(x) - y(x)\left(4a^2b^2x^2e^{2bx^2} - 1\right) = 0$$

✗ **Mathematica** : cpu = 0.827112 (sec), leaf count = 0 , could not solve

```
DSolve[-((-1 + 4*a^2*b^2*E^(2*b*x^2)*x^2)*y[x]) + Derivative[2][y][x] == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x) = \mathit{DESol}\left(\left\{\frac{\mathrm{d}^2}{\mathrm{d}x^2}\_Y(x) + \left(-4\,a^2b^2x^2\mathrm{e}^{2\,bx^2} + 1\right)\_Y(x)\right\}, \{\_Y(x)\}\right)\right\}$$

2.1020 ODE No. 1020

$$y(x)\left(ae^{2x}+be^{x}+c\right)+y''(x)=0$$

✓ **Mathematica** : cpu = 0.720345 (sec), leaf count = 136

$$\left\{\left\{y(x)\to e^{-i\sqrt{a}e^{x}}\left(e^{x}\right)^{i\sqrt{c}}\left(c_1U\left(\frac{ib}{2\sqrt{a}}+i\sqrt{c}+\frac{1}{2},2i\sqrt{c}+1,2i\sqrt{a}e^{x}\right)+c_2L_{-\frac{ib}{2\sqrt{a}}-i\sqrt{c}-\frac{1}{2}}^{2i\sqrt{c}}\left(2i\sqrt{a}e^{x}\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.215 (sec), leaf count = 58

$$\left\{y(x)=\mathrm{e}^{-\frac{x}{2}}\left(W_{-\frac{i}{2}b\frac{1}{\sqrt{a}},i\sqrt{c}}(2\,i\sqrt{a}\mathrm{e}^{x})\_C2+M_{-\frac{i}{2}b\frac{1}{\sqrt{a}},i\sqrt{c}}(2\,i\sqrt{a}\mathrm{e}^{x})\_C1\right)\right\}$$

2.1021 ODE No. 1021

$$y(x)\left(a\cos^2(x)+b\right)+y''(x)=0$$

✓ **Mathematica** : cpu = 0.0512064 (sec), leaf count = 40

$$\left\{\left\{y(x)\to c_1\text{MathieuC}\left[\frac{a}{2}+b,-\frac{a}{4},x\right]+c_2\text{MathieuS}\left[\frac{a}{2}+b,-\frac{a}{4},x\right]\right\}\right\}$$

✓ **Maple** : cpu = 0.299 (sec), leaf count = 39

$$\left\{y(x)=\_C1\ \mathit{MathieuC}\left(-\frac{a}{2}-b,\frac{a}{4},ix\right)+\_C2\ \mathit{MathieuS}\left(-\frac{a}{2}-b,\frac{a}{4},ix\right)\right\}$$

2.1022 ODE No. 1022

$$y(x)(a\cos(2x)+b)+y''(x)=0$$

✓ **Mathematica** : cpu = 0.0326166 (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 = 0.239 (sec), leaf count = 21

$$\left\{y(x)=\_C1\ \mathit{MathieuC}\left(b,-\frac{a}{2},x\right)+\_C2\ \mathit{MathieuS}\left(b,-\frac{a}{2},x\right)\right\}$$

2.1023 ODE No. 1023

$$y(x)\left(a\cos^2(x)+b\right)+y''(x)=0$$

✓ **Mathematica** : cpu = 0.0178785 (sec), leaf count = 40

$$\left\{\left\{y(x)\to c_1\text{MathieuC}\left[\frac{a}{2}+b,-\frac{a}{4},x\right]+c_2\text{MathieuS}\left[\frac{a}{2}+b,-\frac{a}{4},x\right]\right\}\right\}$$

✓ **Maple** : cpu = 0.229 (sec), leaf count = 29

$$\left\{y(x)=\_C1\ \mathit{MathieuC}\left(\frac{a}{2}+b,-\frac{a}{4},x\right)+\_C2\ \mathit{MathieuS}\left(\frac{a}{2}+b,-\frac{a}{4},x\right)\right\}$$

2.1024 ODE No. 1024

$$y''(x)-y(x)\left(2\tan^2(x)+1\right)=0$$

✓ **Mathematica** : cpu = 0.194411 (sec), leaf count = 54

$$\left\{\left\{y(x)\to\frac{\sqrt[4]{\sin^2(x)}\left(-c_2\sqrt{\sin^2(x)}+2c_1\sec(x)+c_2\sec(x)\sin^{-1}(\cos(x))\right)}{2\sqrt[4]{-\sin^2(x)}}\right\}\right\}$$

✓ **Maple** : cpu = 0.149 (sec), leaf count = 30

$$\left\{y(x)=\frac{i\cos(x)\sin(x)\_C2+\ln(\cos(x)+i\sin(x))\_C2+\_C1}{\cos(x)}\right\}$$

2.1025 ODE No. 1025

$$y''(x)-y(x)\left(a+(m-1)m\sec^2(x)+(n-1)n\csc^2(x)\right)=0$$

✓ **Mathematica** : cpu = 1.20371 (sec), leaf count = 158

$$\left\{\left\{y(x)\to\frac{(-1)^{-m}\cos^2(x)^{-\frac{m}{2}-\frac{1}{4}}\left(-\sin^2(x)\right)^{n/2}\left(c_1(-1)^m\cos^2(x)^{m+\frac{1}{2}}{}_2F_1\left(\frac{1}{2}\left(m+n-\sqrt{-a}\right),\frac{1}{2}\left(m+n+\sqrt{-a}\right)\right.\right.}{\sqrt{c}}\right.\right.$$

✓ **Maple** : cpu = 0.243 (sec), leaf count = 102

$$\left\{y(x)=(\sin(x))^n\left((\cos(x))^{-m+1}{}_2\mathrm{F}_1\left(\frac{n}{2}-\frac{m}{2}+\frac{i}{2}\sqrt{a}+\frac{1}{2},\frac{n}{2}-\frac{m}{2}-\frac{i}{2}\sqrt{a}+\frac{1}{2};\frac{3}{2}-m;(\cos(x))^2\right)\_C2+(\cos(\right.\right.$$

2.1026 ODE No. 1026

$$y''(x) - y(x)(B + n(n+1)\wp(x; \text{g2}, \text{g3})) = 0$$

✗ **Mathematica** : cpu = 0.273555 (sec), leaf count = 0 , could not solve

```
DSolve[-((B + n*(1 + n)*WeierstrassP[x, {g2, g3}])*y[x]) + Derivative[2][y][x] == 0, y[x], x
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x) = DESol\left(\left\{\frac{\mathrm{d}^2}{\mathrm{d}x^2}\_Y(x) + (-n(n+1)\ \mathit{WeierstrassP}(x, g2, g3) - B)\_Y(x)\right\}, \{\_Y(x)\}\right)\right\}$$

2.1027 ODE No. 1027

$$y(x)\left(a\,\text{sn}(x|k)^2 + b\right) + y''(x) = 0$$

✗ **Mathematica** : cpu = 13.1471 (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 = 0.482 (sec), leaf count = 69

$$\left\{y(x) = \_C1\ \mathit{HeunG}\left(k^{-2}, \frac{b}{4\,k^2}, -\frac{n}{2}, \frac{n}{2} + \frac{1}{2}, \frac{1}{2}, \frac{1}{2}, (\mathit{JacobiSN}(x,k))^2\right) + \_C2\ \mathit{HeunG}\left(k^{-2}, \frac{k^2+b+1}{4\,k^2}, \frac{n}{2} + 1, \right.$$

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 = 0.277937 (sec), leaf count = 0 , could not solve

```
DSolve[-(y[x]*(b + a*p[x] + (p^4)[x]/30 + (7*Derivative[2][p][x])/3)) + Derivative[2][y][x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x) = DESol\left(\left\{\frac{\mathrm{d}^2}{\mathrm{d}x^2}\_Y(x) + \left(-\frac{\frac{\mathrm{d}^4}{\mathrm{d}x^4}p(x)}{30} - \frac{7\,\frac{\mathrm{d}^2}{\mathrm{d}x^2}p(x)}{3} - ap(x) - b\right)\_Y(x)\right\}, \{\_Y(x)\}\right)\right\}$$

2.1029 ODE No. 1029

$$y''(x) - y(x)\left(f'(x) + f(x)^2\right) = 0$$

✗ **Mathematica** : cpu = 0.146941 (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 = 0.142 (sec), leaf count = 22

$$\left\{y(x) = \left(\int e^{\int -2\,f(x)\,dx}\,dx + \_C1\right) e^{\int f(x)\,dx}\_C2\right\}$$

2.1030 ODE No. 1030

$$y(x)(l + P(x)) + y''(x) = 0$$

✗ **Mathematica** : cpu = 0.224721 (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

$$\left\{y(x) = \mathit{DESol}\left(\left\{(P(x) + l)\_Y(x) + \frac{d^2}{dx^2}\_Y(x)\right\}, \{\_Y(x)\}\right)\right\}$$

2.1031 ODE No. 1031

$$y''(x) - f(x)y(x) = 0$$

✗ **Mathematica** : cpu = 0.103392 (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

$$\left\{y(x) = \mathit{DESol}\left(\left\{-f(x)\_Y(x) + \frac{d^2}{dx^2}\_Y(x)\right\}, \{\_Y(x)\}\right)\right\}$$

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 = 0.577368 (sec), leaf count = 0 , could not solve

```
DSolve[y[x]*((g^3)[x]/(2*Derivative[1][g][x]) + Derivative[1][g][x]^2 + ((1/4 - v^2)*Derivat
```

✓ **Maple** : cpu = 0.125 (sec), leaf count = 48

$$\left\{y(x)=1\left(\_C2\,W_{\frac{i}{2}v^2-\frac{i}{8},\,\frac{1}{2}}(2\,ig(x))+\_C1\,M_{\frac{i}{2}v^2-\frac{i}{8},\,\frac{1}{2}}(2\,ig(x))\right)\frac{1}{\sqrt{\frac{\mathrm{d}}{\mathrm{d}x}g\left(x\right)}}\right\}$$

2.1033 ODE No. 1033

$$ae^{-2x}y(x)+y''(x)+y'(x)=0$$

✓ **Mathematica** : cpu = 0.0191126 (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 = 0.012 (sec), leaf count = 27

$$\left\{y(x)=\_C1\ \sin\left(\mathrm{e}^{-x}\sqrt{a}\right)+\_C2\ \cos\left(\mathrm{e}^{-x}\sqrt{a}\right)\right\}$$

Hand solution

$$y''+y'+ae^{-2x}y=0$$

Let $y(x)=\eta(\xi)$ where $\xi=e^{-x}$, hence

$$\begin{aligned}\frac{dy}{dx}&=\frac{d\eta}{d\xi}\frac{d\xi}{dx}\\&=\frac{d\eta}{d\xi}\left(-e^{-x}\right)\end{aligned}$$

And

$$
\begin{aligned}
\frac{d^2y}{dx^2} &= \frac{d}{dx}\left(\frac{d\eta}{d\xi}\left(-e^{-x}\right)\right) \\
&= \frac{d^2\eta}{d\xi^2}\frac{d\xi}{dx}\left(-e^{-x}\right) + \frac{d\eta}{d\xi}\left(e^{-x}\right) \\
&= \frac{d^2\eta}{d\xi^2}\left(-e^{-x}\right)\left(-e^{-x}\right) + \frac{d\eta}{d\xi}\left(e^{-x}\right) \\
&= \frac{d^2\eta}{d\xi^2}\left(e^{-2x}\right) + \frac{d\eta}{d\xi}\left(e^{-x}\right)
\end{aligned}
$$

Hence the original ODE becomes

$$
\begin{aligned}
\frac{d^2\eta}{d\xi^2}\left(e^{-2x}\right) + \frac{d\eta}{d\xi}\left(e^{-x}\right) + \frac{d\eta}{d\xi}\left(-e^{-x}\right) + ae^{-2x}\eta(\xi) = 0 \\
\eta'' + a\eta = 0
\end{aligned}
$$

This is standard second order with constant coefficients. The solution is

$$
\eta = c_1 \cos\left(\sqrt{a}\xi\right) + c_2 \sin\left(\sqrt{a}\xi\right)
$$

Substituting back

$$
y(x) = c_1 \cos\left(\sqrt{a}e^{-x}\right) + c_2 \sin\left(\sqrt{a}e^{-x}\right)
$$

Verification

```
restart;
ode:=diff(diff(y(x),x),x)+diff(y(x),x)+a*exp(-2*x)*y(x)=0;
ys:=_C1*cos(sqrt(a)*exp(-x))+_C2*sin(sqrt(a)*exp(-x));
odetest(y(x)=ys,ode);
0
```

2.1034 ODE No. 1034

$$
y''(x) - y'(x) + e^{2x}y(x) = 0
$$

✓ **Mathematica** : cpu = 0.0126528 (sec), leaf count = 20

$$
\{\{y(x) \to c_2 \sin\left(e^x\right) + c_1 \cos\left(e^x\right)\}\}
$$

✓ **Maple** : cpu = 0.01 (sec), leaf count = 15

$$
\{y(x) = \_C1 \sin\left(e^x\right) + \_C2 \cos\left(e^x\right)\}
$$

Hand solution

$$y'' - y' + e^{2x}y = 0$$

Let $y(x) = \eta(\xi)$ where $\xi = e^x$, hence

$$\begin{aligned}\frac{dy}{dx} &= \frac{d\eta}{d\xi}\frac{d\xi}{dx}\\ &= \frac{d\eta}{d\xi}e^x\end{aligned}$$

And

$$\begin{aligned}\frac{d^2y}{dx^2} &= \frac{d}{dx}\left(\frac{d\eta}{d\xi}e^x\right)\\ &= \frac{d^2\eta}{d\xi^2}\frac{d\xi}{dx}(e^x) + \frac{d\eta}{d\xi}(e^x)\\ &= \frac{d^2\eta}{d\xi^2}(e^x)(e^x) + \frac{d\eta}{d\xi}(e^x)\\ &= \frac{d^2\eta}{d\xi^2}(e^{2x}) + \frac{d\eta}{d\xi}(e^x)\end{aligned}$$

Hence the original ODE becomes

$$\begin{aligned}\frac{d^2\eta}{d\xi^2}(e^{2x}) + \frac{d\eta}{d\xi}(e^x) - \frac{d\eta}{d\xi}(e^x) + e^{2x}\eta = 0\\ \eta'' + \eta = 0\end{aligned}$$

This is standard second order with constant coefficients. The solution is

$$\eta = c_1 \cos(\xi) + c_2 \sin(\xi)$$

Substituting back

$$y(x) = c_1 \cos(e^x) + c_2 \sin(e^x)$$

Verification

```
restart;
ode:=diff(diff(y(x),x),x)-diff(y(x),x)+exp(2*x)*y(x)=0;
ys:=_C1*cos(exp(x))+_C2*sin(exp(x));
odetest(y(x)=ys,ode);
0
```

2.1035 ODE No. 1035

$$ay'(x) + by(x) + y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0061069 (sec), leaf count = 47

$$\left\{\left\{y(x) \to e^{-\frac{1}{2}x\left(\sqrt{a^2-4b}+a\right)}\left(c_2 e^{x\sqrt{a^2-4b}} + c_1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.014 (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 = 0.543163 (sec), leaf count = 150

$$\left\{\left\{y(x) \to e^{-\frac{1}{2}x\left(\sqrt{a^2-4b}+a\right)}\left(\int_1^x -\frac{f(K[1])e^{\frac{1}{2}\left(\sqrt{a^2-4b}+a\right)K[1]}}{\sqrt{a^2-4b}}\, dK[1] + e^{x\sqrt{a^2-4b}} \int_1^x \frac{f(K[2])e^{\frac{1}{2}\left(a-\sqrt{a^2-4b}\right)K[2]}}{\sqrt{a^2-4b}}\, dK\right.\right.\right.$$

✓ **Maple** : cpu = 0.112 (sec), leaf count = 124

$$\left\{y(x) = \mathrm{e}^{-\frac{x}{2}\left(a-\sqrt{a^2-4\,b}\right)}\_C2 + \mathrm{e}^{-\frac{x}{2}\left(a+\sqrt{a^2-4\,b}\right)}\_C1 + 1\left(\int f(x)\,\mathrm{e}^{-\frac{x}{2}\left(-a+\sqrt{a^2-4\,b}\right)}\,\mathrm{d}x\mathrm{e}^{x\sqrt{a^2-4\,b}} - \int f(x)\,\mathrm{e}^{\frac{x}{2}\left(a+\sqrt{a\right.}}\right.\right.$$

2.1037 ODE No. 1037

$$ay'(x) + y(x)\left(-\left(b^2x^2 + c\right)\right) + y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0529862 (sec), leaf count = 74

$$\left\{\left\{y(x) \to e^{-\frac{1}{2}x(a+bx)}\left(c_1 H_{-\frac{a^2+4(b+c)}{8b}}\left(\sqrt{b}x\right) + c_2\, {}_1F_1\left(\frac{a^2+4(b+c)}{16b}; \frac{1}{2}; bx^2\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.104 (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 = 0.290401 (sec), leaf count = 0 , could not solve

```
DSolve[f[x]*y[x] + 2*a*Derivative[1][y][x] + Derivative[2][y][x] == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x) = DESol\left(\left\{f(x)\_Y(x) + 2\,a\frac{\mathrm{d}}{\mathrm{d}x}\_Y(x) + \frac{\mathrm{d}^2}{\mathrm{d}x^2}\_Y(x)\right\}, \{\_Y(x)\}\right)\right\}$$

2.1039 ODE No. 1039

$$y''(x) + xy'(x) + y(x) = 0$$

✓ **Mathematica** : cpu = 0.0128397 (sec), leaf count = 41

$$\left\{\left\{y(x) \to \frac{1}{2}e^{-\frac{x^2}{2}}\left(\sqrt{2\pi}c_1 \operatorname{erfi}\left(\frac{x}{\sqrt{2}}\right) + 2c_2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.017 (sec), leaf count = 25

$$\left\{y(x) = \left(Erf\left(\frac{i}{2}\sqrt{2}x\right)\_C1 + \_C2\right)\left(\mathrm{e}^{\frac{x^2}{2}}\right)^{-1}\right\}$$

2.1040 ODE No. 1040

$$y''(x) + xy'(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 0.0838 (sec), leaf count = 45

$$\left\{\left\{y(x) \to -\sqrt{\frac{\pi}{2}} c_2 x \operatorname{erf}\left(\frac{x}{\sqrt{2}}\right) - c_2 e^{-\frac{x^2}{2}} + c_1 x\right\}\right\}$$

✓ **Maple** : cpu = 0.045 (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 = 0.0100904 (sec), leaf count = 47

$$\left\{\left\{y(x) \to e^{-\frac{x^2}{2}}\left(c_1 H_n\left(\frac{x}{\sqrt{2}}\right) + c_2 \, {}_1F_1\left(-\frac{n}{2}; \frac{1}{2}; \frac{x^2}{2}\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.08 (sec), leaf count = 41

$$\left\{y(x) = \mathrm{e}^{-\frac{x^2}{2}} x\left(U\left(-\frac{n}{2} + \frac{1}{2}, \frac{3}{2}, \frac{x^2}{2}\right)\_C2 + M\left(-\frac{n}{2} + \frac{1}{2}, \frac{3}{2}, \frac{x^2}{2}\right)\_C1\right)\right\}$$

2.1042 ODE No. 1042

$$-ny(x) + y''(x) + xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.00874996 (sec), leaf count = 53

$$\left\{\left\{y(x) \to e^{-\frac{x^2}{2}}\left(c_1 H_{-n-1}\left(\frac{x}{\sqrt{2}}\right) + c_2 \, {}_1F_1\left(\frac{n+1}{2}; \frac{1}{2}; \frac{x^2}{2}\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.075 (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 = 0.0598453 (sec), leaf count = 54

$$\left\{\left\{y(x)\to \frac{1}{4}c_2\left(\sqrt{2\pi}\left(x^2-1\right)\text{erfi}\left(\frac{x}{\sqrt{2}}\right)-2e^{\frac{x^2}{2}}x\right)+c_1\left(x^2-1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.255 (sec), leaf count = 39

$$\left\{y(x) = -2\,e^{1/2\,x^2}\_C1\,x + (x-1)(1+x)\left(\sqrt{2}erfi\left(\frac{\sqrt{2}x}{2}\right)\sqrt{\pi}\_C1 + \_C2\right)\right\}$$

Hand solution

$$y'' - xy' + 2y = 0 \tag{1}$$

Second order with varying coefficient. Using power series, let $y = \sum_{n=0}^{\infty} c_n x^n$, hence

$$\begin{aligned}
y' &= \sum_{n=0}^{\infty} nc_n x^{n-1} = \sum_{n=1}^{\infty} nc_n x^{n-1} = \sum_{n=0}^{\infty} (n+1)\,c_{n+1}x^n \\
y'' &= \sum_{n=0}^{\infty} n(n+1)\,c_{n+1}x^{n-1} = \sum_{n=1}^{\infty} n(n+1)\,c_{n+1}x^{n-1} = \sum_{n=0}^{\infty} (n+1)\,(n+2)\,c_{n+2}x^n
\end{aligned}$$

Substituting back in the original ODE gives

$$\begin{aligned}
\sum_{n=0}^{\infty}(n+1)\,(n+2)\,c_{n+2}x^n - x\sum_{n=0}^{\infty}(n+1)\,c_{n+1}x^n + 2\sum_{n=0}^{\infty}c_n x^n &= 0 \\
\sum_{n=0}^{\infty}(n+1)\,(n+2)\,c_{n+2}x^n - \sum_{n=0}^{\infty}(n+1)\,c_{n+1}x^{n+1} + \sum_{n=0}^{\infty}2c_n x^n &= 0 \\
\sum_{n=0}^{\infty}(n+1)\,(n+2)\,c_{n+2}x^n - \sum_{n=1}^{\infty}nc_n x^n + \sum_{n=0}^{\infty}2c_n x^n &= 0
\end{aligned}$$

For $n = 0$

$$\begin{aligned}
(n+1)\,(n+2)\,c_{n+2} + 2c_n &= 0 \\
(1)\,(2)\,c_2 + 2c_0 &= 0 \\
c_2 &= -c_0
\end{aligned}$$

For $n \geq 1$

$$\begin{aligned}
(n+1)\,(n+2)\,c_{n+2} - nc_n + 2c_n &= 0 \\
c_{n+2} &= \frac{c_n(n-2)}{(n+1)\,(n+2)}
\end{aligned}$$

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

$$\begin{aligned}
y &= \sum_{n=0}^{\infty} c_n x^n \\
&= c_0 + c_1 x + c_2 x^2 + c_3 x^3 + \cdots \\
&= c_0 + c_1 x - c_0 x^2 - \frac{c_1}{(2)(3)} x^3 - \frac{c_1}{(2)(3)(4)(5)} x^5 - \frac{3c_1}{(2)(3)(4)(5)(6)(7)} x^7 - \frac{(3)(5)c_1}{(2)(3)(4)(5)(6)(7)(8)(9)} x^9 - \cdot \\
&= c_0(1-x^2) + c_1\left(x - \frac{1}{(2)(3)} x^3 - \frac{1}{(2)(3)(4)(5)} x^5 - \frac{3}{(2)(3)(4)(5)(6)(7)} x^7 - \frac{(3)(5)}{(2)(3)(4)(5)(6)(7)(8)(9)} x^9\right) \\
&= c_0(1-x^2) + c_1\left(x - \frac{1}{3!} x^3 - \frac{1}{5!} x^5 - \frac{3}{7!} x^7 - \frac{15}{9!} x^9 - \cdots\right)
\end{aligned}$$

Hence

$$y(x) = c_0(1-x^2) + c_1\left(x - \frac{1}{6}x^3 - \frac{1}{120}x^5 - \frac{1}{1680}x^7 - \frac{1}{24\,192}x^9 - \cdots\right)$$

Verification

```
restart;
Order:=10:
sol:=dsolve(ode,y(x),series):
subs({y(0)=c0,D(y)(0)=c1},rhs(sol)):
```

```
sol:=convert(%,polynom):

sol:=collect(sol,{c0,c1});
sol := (-x^2+1)*c0+(x-(1/6)*x^3-(1/120)*x^5-(1/1680)*x^7-(1/24192)*x^9)*c1
```

2.1044 ODE No. 1044

$$-ay(x) + y''(x) - xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.00984623 (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 = 0.077 (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 = 0.0354472 (sec), leaf count = 39

$$\left\{\left\{y(x) \to \sqrt{\frac{\pi}{2}} c_2 e^{x-2} \operatorname{erfi}\left(\frac{x-2}{\sqrt{2}}\right) + c_1 e^x\right\}\right\}$$

✓ **Maple** : cpu = 0.01 (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 = 0.00801016 (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 = 0.08 (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 = 0.0155915 (sec), leaf count = 20

$$\left\{\left\{y(x) \to e^{-x^2}(c_2 x + c_1)\right\}\right\}$$

✓ **Maple** : cpu = 0.034 (sec), leaf count = 16

$$\left\{y(x) = \mathrm{e}^{-x^2}(\_C2\, x + \_C1)\right\}$$

Hand solution

$$y'' + 4xy' + (4x^2 + 2)\, y = 0 \tag{1}$$

Second order with varying coefficient. Using power series, let $y = \sum_{n=0}^{\infty} c_n x^n$, hence

$$y' = \sum_{n=0}^{\infty} n c_n x^{n-1} = \sum_{n=1}^{\infty} n c_n x^{n-1} = \sum_{n=0}^{\infty} (n+1)\, c_{n+1} x^n$$
$$y'' = \sum_{n=0}^{\infty} n(n+1)\, c_{n+1} x^{n-1} = \sum_{n=1}^{\infty} n(n+1)\, c_{n+1} x^{n-1} = \sum_{n=0}^{\infty} (n+1)\,(n+2)\, c_{n+2} x^n$$

Substituting back in the original ODE gives

$$\sum_{n=0}^{\infty} (n+1)\,(n+2)\, c_{n+2} x^n + 4x \sum_{n=0}^{\infty} (n+1)\, c_{n+1} x^n + (4x^2 + 2) \sum_{n=0}^{\infty} c_n x^n = 0$$
$$\sum_{n=0}^{\infty} (n+1)\,(n+2)\, c_{n+2} x^n + \sum_{n=0}^{\infty} 4(n+1)\, c_{n+1} x^{n+1} + \sum_{n=0}^{\infty} 4 c_n x^{n+2} + \sum_{n=0}^{\infty} 2 c_n x^n = 0$$
$$\sum_{n=0}^{\infty} (n+1)\,(n+2)\, c_{n+2} x^n + \sum_{n=1}^{\infty} 4 n c_n x^n + \sum_{n=2}^{\infty} 4 c_{n-2} x^n + \sum_{n=0}^{\infty} 2 c_n x^n = 0$$

For $n = 0$

$$\begin{aligned}(n+1)\,(n+2)\, c_{n+2} + 2c_n &= 0\\ (1)\,(2)\, c_2 + 2c_0 &= 0\\ c_2 &= -c_0\end{aligned}$$

For $n = 1$

$$\begin{aligned}(n+1)\,(n+2)\, c_{n+2} + 4nc_n + 2c_n &= 0\\ (2)\,(3)\, c_3 + 4c_1 + 2c_1 &= 0\\ c_3 &= -c_1\end{aligned}$$

For $n \geq 2$

$$(n+1)(n+2)c_{n+2} + 4nc_n + 4c_{n-2} + 2c_n = 0$$
$$c_{n+2} = \frac{(-4n-2)c_n - 4c_{n-2}}{(n+1)(n+2)}$$

Hence for $n = 2$

$$c_4 = \frac{(-8-2)c_2 - 4c_0}{(3)(4)} = \frac{(-8-2)(-c_0) - 4c_0}{(3)(4)} = c_0 \frac{6}{(3)(4)}$$

For $n = 3$

$$c_5 = \frac{(-12-2)c_3 - 4c_1}{(4)(5)} = \frac{(-12-2)(-c_1) - 4c_1}{(4)(5)} = c_1 \frac{10}{(4)(5)}$$

For $n = 4$

$$c_6 = \frac{(-16-2)c_4 - 4c_2}{(5)(6)} = \frac{(-16-2)\left(c_0 \frac{6}{(3)(4)}\right) - 4(-c_0)}{(5)(6)} = c_0 \frac{-5}{(5)(6)}$$

For $n = 5$

$$c_7 = \frac{(-20-2)c_5 - 4c_3}{(6)(7)} = \frac{(-20-2)\left(c_1 \frac{10}{(4)(5)}\right) - 4(-c_1)}{(6)(7)} = c_1 \frac{-7}{(6)(7)}$$

For $n = 6$

$$c_8 = \frac{(-24-2)c_6 - 4c_4}{(7)(8)} = \frac{(-24-2)\left(c_0 \frac{-5}{(5)(6)}\right) - 4\left(c_0 \frac{6}{(3)(4)}\right)}{(7)(8)} = c_0 \frac{7}{3} \frac{1}{(7)(8)}$$

And so on. Hence

$$\begin{aligned}
y &= \sum_{n=0}^{\infty} c_n x^n \\
&= c_0 + c_1 x + c_2 x^2 + \cdots \\
&= c_0 + c_1 x - c_0 x^2 - c_1 x^3 + c_0 \frac{6}{(3)(4)} x^4 + c_1 \frac{10}{(4)(5)} x^5 - c_0 \frac{5}{(5)(7)} x^6 - c_1 \frac{7}{(6)(7)} x^7 + c_0 \frac{12}{7} \frac{1}{(7)(8)} x^8 + \cdots \\
&= c_0 \left(1 - x^2 + \frac{6}{(3)(4)} x^4 - \frac{5}{(5)(6)} x^6 + \frac{7}{3} \frac{1}{(7)(8)} x^8 + \cdots\right) + c_1 \left(x - x^3 + \frac{10}{(4)(5)} x^5 - \frac{7}{(6)(7)} x^7 + \cdots\right) \\
&= c_0 \left(1 - x^2 + \frac{1}{2} x^4 - \frac{1}{6} x^6 + \frac{1}{24} x^8 + \cdots\right) + c_1 \left(x - x^3 + \frac{1}{2} x^5 - \frac{1}{6} x^7 + \cdots\right)
\end{aligned}$$

But Taylor series for $e^{-x^2} = 1 - x^2 + \frac{1}{2}x^4 - \frac{x^6}{4} + \cdots$, therefore the above becomes

$$y = c_0 e^{-x^2} + c_1 x e^{-x^2}$$

Verification

```
restart;
restart;
ode:=diff(diff(y(x),x),x)+4*x*diff(y(x),x)+(4*x^2+2)*y(x)=0;
y0:=_C0*exp(-x^2)+_C1*x*exp(-x^2);
odetest(y(x)=y0,ode);
0
```

2.1048 ODE No. 1048

$$(2n + 3x^2 - 1)\, y(x) + y''(x) - 4xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.0117981 (sec), leaf count = 37

$$\left\{\left\{y(x) \to e^{\frac{x^2}{2}} \left(c_1 H_n(x) + c_2\, {}_1F_1\left(-\frac{n}{2}; \frac{1}{2}; x^2\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.079 (sec), leaf count = 37

$$\left\{y(x) = \mathrm{e}^{\frac{x^2}{2}} x \left(U\left(-\frac{n}{2} + \frac{1}{2}, \frac{3}{2}, x^2\right)\_C2 + M\left(-\frac{n}{2} + \frac{1}{2}, \frac{3}{2}, x^2\right)\_C1\right)\right\}$$

2.1049 ODE No. 1049

$$(4x^2 - 1)\, y(x) + y''(x) - 4xy'(x) - e^x = 0$$

✓ **Mathematica** : cpu = 0.0728444 (sec), leaf count = 105

$$\left\{\left\{y(x) \to \frac{1}{4} e^{x(x-i)-\frac{i}{2}} \left(2e^{\frac{i}{2}} \left(2c_1 - ic_2 e^{2ix}\right) - ie^i \sqrt{\pi}\,\mathrm{erf}\left(-x + \left(\frac{1}{2} + \frac{i}{2}\right)\right) + \sqrt{\pi} e^{2ix}\,\mathrm{erfi}\left(\left(\frac{1}{2} + \frac{i}{2}\right) - ix\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.193 (sec), leaf count = 66

$$\left\{y(x) = \frac{\mathrm{e}^{x^2} \left(\left(i\cos(x) + \sin(x)\right) \mathrm{e}^{\frac{i}{2}} \sqrt{\pi}\, Erf\left(x - \frac{1}{2} - \frac{i}{2}\right) - \left(i\cos(x) - \sin(x)\right) \mathrm{e}^{-\frac{i}{2}} \sqrt{\pi}\, Erf\left(x - \frac{1}{2} + \frac{i}{2}\right) + 4\sin(x)\_\right.}{4}\right.$$

2.1050 ODE No. 1050

$$(4x^2-2)\,y(x)+y''(x)-4xy'(x)=0$$

✓ **Mathematica** : cpu = 0.0140879 (sec), leaf count = 18

$$\left\{\left\{y(x)\to e^{x^2}(c_2x+c_1)\right\}\right\}$$

✓ **Maple** : cpu = 0.029 (sec), leaf count = 14

$$\left\{y(x)=\mathrm{e}^{x^2}(\_C2\,x+\_C1)\right\}$$

2.1051 ODE No. 1051

$$(4x^2-3)\,y(x)-e^{x^2}+y''(x)-4xy'(x)=0$$

✓ **Mathematica** : cpu = 0.040708 (sec), leaf count = 34

$$\left\{\left\{y(x)\to \frac{1}{2}e^{(x-1)x}\left(c_2e^{2x}+2c_1-2e^x\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.039 (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 = 0.0230411 (sec), leaf count = 67

$$\left\{\left\{y(x)\to e^{-\frac{ax^2}{2}}\left(c_1H_{\frac{b}{a}-1}\left(\frac{\sqrt{a}x}{\sqrt{2}}\right)+c_2\,{}_1F_1\left(\frac{a-b}{2a};\frac{1}{2};\frac{ax^2}{2}\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.095 (sec), leaf count = 58

$$\left\{y(x)=\mathrm{e}^{-\frac{ax^2}{2}}x\left(U\left(\frac{2\,a-b}{2\,a},\frac{3}{2},\frac{ax^2}{2}\right)\_C2+M\left(\frac{2\,a-b}{2\,a},\frac{3}{2},\frac{ax^2}{2}\right)\_C1\right)\right\}$$

2.1053 ODE No. 1053

$$a^2x^2y(x) + 2axy'(x) + y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0332627 (sec), leaf count = 56

$$\left\{\left\{y(x) \to \frac{e^{-\frac{ax^2}{2}-\sqrt{a}x}\left(c_2 e^{2\sqrt{a}x} + 2\sqrt{a}c_1\right)}{2\sqrt{a}}\right\}\right\}$$

✓ **Maple** : cpu = 0.048 (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 = 0.0556766 (sec), leaf count = 132

$$\left\{\left\{y(x) \to e^{\frac{cx}{a}-\frac{ax^2}{2}-bx}\left(c_2\, {}_1F_1\left(\frac{a^3 - da^2 + bca - c^2}{2a^3}; \frac{1}{2}; \frac{(xa^2 + ba - 2c)^2}{2a^3}\right) + c_1 H_{\frac{-a^3+da^2-bca+c^2}{a^3}}\left(\frac{xa^2 + ba - 2c}{\sqrt{2}a^{3/2}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.051 (sec), leaf count = 98

$$\left\{y(x) = \mathrm{e}^{-\frac{cx}{a}}\left(U\left(\frac{da^2 - abc + c^2}{2\,a^3}, \frac{1}{2}, -\frac{(a^2x + ab - 2\,c)^2}{2\,a^3}\right)\_C2 + M\left(\frac{da^2 - abc + c^2}{2\,a^3}, \frac{1}{2}, -\frac{(a^2x + ab - 2\,c)^2}{2\,a^3}\right.\right.\right.$$

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 = 0.238683 (sec), leaf count = 305

$$\left\{\left\{y(x) \to \exp\left(-\frac{x\left(a\left(x\sqrt{a^2 - 4\mathrm{a1}} + 2b\right) + 2b\sqrt{a^2 - 4\mathrm{a1}} + a^2x - 4(\mathrm{a1}x + \mathrm{b1})\right)}{4\sqrt{a^2 - 4\mathrm{a1}}}\right)\left(c_1 H_{\frac{-a^3-\left(\sqrt{a^2-4\mathrm{a1}}-2\mathrm{c1}\right)a^2+(4a}{}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.24 (sec), leaf count = 262

$$\left\{y(x) = \mathrm{e}^{-\frac{x}{4}\left((ax+2\,b)(a^2-4\,a1)^{\frac{3}{2}}+(a^2-4\,a1)(a^2x+2\,ab-4\,a1\,x-4\,b1)\right)(a^2-4\,a1)^{-\frac{3}{2}}}\left(\_C2\,(a^2x + ab - 4\,a1\,x - 2\,b1)\,{}_1\mathrm{F}_1(\frac{1}{4}\right.\right.$$

2.1056 ODE No. 1056

$$x^2(-y'(x)) + y''(x) + xy(x) = 0$$

✓ **Mathematica** : cpu = 0.0515459 (sec), leaf count = 51

$$\left\{\left\{y(x) \to -c_2 e^{\frac{x^3}{3}} + \frac{c_2 \sqrt[3]{-x^3}\,\Gamma\left(\frac{2}{3}, -\frac{x^3}{3}\right)}{\sqrt[3]{3}} + c_1 x\right\}\right\}$$

✓ **Maple** : cpu = 0.13 (sec), leaf count = 48

$$\left\{y(x) = \frac{1}{x^2}\left(-\left(-x^3\right)^{\frac{2}{3}} \sqrt[3]{3}\mathrm{e}^{\frac{x^3}{3}}\_C2 + x^3\left(\_C2\,\Gamma\left(\frac{2}{3}\right) - \_C2\,\Gamma\left(\frac{2}{3}, -\frac{x^3}{3}\right) + \_C1\right)\right)\right\}$$

2.1057 ODE No. 1057

$$x^2(-y'(x)) + y''(x) - (x+1)^2 y(x) = 0$$

✓ **Mathematica** : cpu = 0.836213 (sec), leaf count = 43

$$\left\{\left\{y(x) \to e^{\frac{x^3}{3}+x}\left(c_2 \int_1^x e^{-\frac{1}{3}K[1](K[1]^2+6)}\,dK[1] + c_1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.22 (sec), leaf count = 50

$$\left\{y(x) = \_C1\ \mathit{HeunT}\left(0, -3, 2\sqrt[3]{3}, \frac{3^{\frac{2}{3}}x}{3}\right)\mathrm{e}^{-x} + \_C2\ \mathit{HeunT}\left(0, 3, 2\sqrt[3]{3}, -\frac{3^{\frac{2}{3}}x}{3}\right)\mathrm{e}^{\frac{x\left(x^2+3\right)}{3}}\right\}$$

2.1058 ODE No. 1058

$$\left(x^4-2\right)xy(x) - (x+1)x^2 y'(x) + y''(x) = 0$$

✓ **Mathematica** : cpu = 0.896519 (sec), leaf count = 43

$$\left\{\left\{y(x) \to e^{\frac{x^3}{3}}\left(c_2 \int_1^x e^{\frac{1}{12}K[1]^3(3K[1]-4)}\,dK[1] + c_1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.138 (sec), leaf count = 29

$$\left\{y(x) = \mathrm{e}^{\frac{x^3}{3}}\left(\int \mathrm{e}^{\frac{x^4}{4}-\frac{x^3}{3}}\,\mathrm{d}x\_C2 + \_C1\right)\right\}$$

2.1059 ODE No. 1059

$$x^4y'(x) - x^3y(x) + y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0708582 (sec), leaf count = 49

$$\left\{\left\{y(x) \to -c_2e^{-\frac{x^5}{5}} + \frac{c_2\sqrt[5]{x^5}\Gamma\left(\frac{4}{5}, \frac{x^5}{5}\right)}{\sqrt[5]{5}} + c_1x\right\}\right\}$$

✓ **Maple** : cpu = 0.084 (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 = 0.0386134 (sec), leaf count = 81

$$\left\{\left\{y(x) \to c_2q^{-1/q}a^{\frac{1}{q}}\left(x^q\right)^{\frac{1}{q}}\,{}_1F_1\left(\frac{a+b}{aq};1+\frac{1}{q};-\frac{ax^q}{q}\right) + c_1\,{}_1F_1\left(\frac{b}{aq};\frac{q-1}{q};-\frac{ax^q}{q}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.194 (sec), leaf count = 81

$$\left\{y(x) = e^{-\frac{ax^q}{q}}x\left(M\left(\frac{aq-b}{aq},\,\frac{q+1}{q},\,\frac{ax^q}{q}\right)\_C1 + U\left(\frac{aq-b}{aq},\,\frac{q+1}{q},\,\frac{ax^q}{q}\right)\_C2\right)\right\}$$

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 = 0.101153 (sec), leaf count = 45

$$\left\{\left\{y(x) \to \frac{1}{18}e^{-\frac{1}{3}(\sqrt{x}+9)x}\left(3c_2e^{6x} + 18c_1 - 2e^{3x}x\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.09 (sec), leaf count = 28

$$\left\{y(x) = -\frac{-9\cosh(3\,x)\_C1 - 9\sinh(3\,x)\_C2 + x}{9}e^{-\frac{1}{3}x^{\frac{3}{2}}}\right\}$$

2.1062 ODE No. 1062

$$\frac{(x+\sqrt{x}-8)\,y(x)}{4x^2}+y''(x)-\frac{y'(x)}{\sqrt{x}}=0$$

✓ **Mathematica** : cpu = 0.0307812 (sec), leaf count = 30

$$\left\{\left\{y(x)\to \frac{e^{\sqrt{x}}\left(c_2x^3+3c_1\right)}{3x}\right\}\right\}$$

✓ **Maple** : cpu = 0.029 (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 = 0.0499639 (sec), leaf count = 28

$$\left\{\left\{y(x)\to c_1e^{e^x}+c_2e^{x+e^x}+e^x+2\right\}\right\}$$

✓ **Maple** : cpu = 0.347 (sec), leaf count = 61

$$\left\{y(x)=\left(\_C1\,\cosh\left(\frac{x}{2}\right)+\_C2\,\sinh\left(\frac{x}{2}\right)\right)\mathrm{e}^{\mathrm{e}^x+\frac{x}{2}}+\mathrm{e}^{\frac{x}{2}}\left(\left(\mathrm{e}^{2\,x}+\mathrm{e}^x+1\right)\cosh\left(\frac{x}{2}\right)-3\,\sinh\left(x/2\right)\left(\mathrm{e}^x+1/3\,\mathrm{e}^{2\,x}+\right.\right.\right.$$

2.1064 ODE No. 1064

$$ay'(x)+by(x)+y''(x)+\tan(x)=0$$

✓ **Mathematica** : cpu = 0.685173 (sec), leaf count = 502

$$\left\{\left\{y(x)\to \frac{e^{-\frac{1}{2}x\left(\sqrt{a^2-4b}+a\right)}\left(\left(2a-i(b-4)\right)\left(2ib\sqrt{a^2-4b}\left(c_2e^{x\sqrt{a^2-4b}}+c_1\right)+\left(\sqrt{a^2-4b}+a\right)e^{\frac{1}{2}x\left(\sqrt{a^2-4b}+a\right)}\,2\right.\right.\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.297 (sec), leaf count = 125

$$\left\{y(x)=\mathrm{e}^{-\frac{x}{2}\left(a-\sqrt{a^2-4\,b}\right)}\_C2+\mathrm{e}^{-\frac{x}{2}\left(a+\sqrt{a^2-4\,b}\right)}\_C1-1\left(\int\tan\left(x\right)\mathrm{e}^{-\frac{x}{2}\left(-a+\sqrt{a^2-4\,b}\right)}\,\mathrm{d}x\mathrm{e}^{x\sqrt{a^2-4\,b}}-\int\tan\left(x\right)\mathrm{e}^{\frac{x}{2}\left(\right.}\right.\right.$$

2.1065 ODE No. 1065

$$\left(n^2-a^2\right) y(x)+2n\cot(x)y'(x)+y''(x)=0$$

✓ **Mathematica** : cpu = 0.177608 (sec), leaf count = 83

$$\left\{\left\{y(x)\to\left(-\sin^2(x)\right)^{\frac{1}{4}-\frac{n}{2}}\left(c_1P_{\sqrt{2n^2-a^2}-\frac{1}{2}}^{n-\frac{1}{2}}(\cos(x))+c_2Q_{\sqrt{2n^2-a^2}-\frac{1}{2}}^{n-\frac{1}{2}}(\cos(x))\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.265 (sec), leaf count = 60

$$\left\{y(x)=(\sin(x))^{-n+\frac{1}{2}}\left(\mathit{LegendreQ}\left(-\frac{1}{2}+\sqrt{-a^2+2\,n^2},n-\frac{1}{2},\cos(x)\right)\_C2+\mathit{LegendreP}\left(-\frac{1}{2}+\sqrt{-a^2+2\,n\right.\right.$$

2.1066 ODE No. 1066

$$y''(x)+\tan(x)y'(x)+y(x)\cos^2(x)=0$$

✓ **Mathematica** : cpu = 0.0380861 (sec), leaf count = 18

$$\{\{y(x)\to c_2\sin(\sin(x))+c_1\cos(\sin(x))\}\}$$

✓ **Maple** : cpu = 0.075 (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 = 0.0358117 (sec), leaf count = 21

$$\{\{y(x)\to c_1\cosh(\sin(x))+ic_2\sinh(\sin(x))\}\}$$

✓ **Maple** : cpu = 0.051 (sec), leaf count = 17

$$\left\{y(x)=\_C1\ \mathrm{e}^{\sin(x)}+\_C2\ \mathrm{e}^{-\sin(x)}\right\}$$

2.1068 ODE No. 1068

$$v(v+1)y(x)+y''(x)+\cot(x)y'(x)=0$$

✓ **Mathematica** : cpu = 0.149181 (sec), leaf count = 20

$$\{\{y(x)\to c_1P_v(\cos(x))+c_2Q_v(\cos(x))\}\}$$

✓ **Maple** : cpu = 0.246 (sec), leaf count = 45

$$\left\{y(x)=\_C1\ {}_2\mathrm{F}_1(-\frac{v}{2},\frac{1}{2}+\frac{v}{2};\ \frac{1}{2};\ (\cos(x))^2)+\_C2\ \cos(x)\,{}_2\mathrm{F}_1(1+\frac{v}{2},\frac{1}{2}-\frac{v}{2};\ \frac{3}{2};\ (\cos(x))^2)\right\}$$

2.1069 ODE No. 1069

$$y''(x)-\cot(x)y'(x)+y(x)\sin^2(x)=0$$

✓ **Mathematica** : cpu = 0.0394959 (sec), leaf count = 19

$$\{\{y(x)\to c_1\cos(\cos(x))-c_2\sin(\cos(x))\}\}$$

✓ **Maple** : cpu = 0.105 (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 = 0.354835 (sec), leaf count = 129

$$\left\{\left\{y(x)\to c_1\,{}_2F_1\left(\frac{1}{4}\left(-a-\sqrt{a^2+4b}\right),\frac{1}{4}\left(\sqrt{a^2+4b}-a\right);\frac{1-a}{2};\cos^2(x)\right)+i^{a+1}c_2\cos^{a+1}(x)\,{}_2F_1\left(\frac{1}{4}\left(a-\sqrt{a^2\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.196 (sec), leaf count = 60

$$\left\{y(x)=(\cos(x))^{\frac{1}{2}+\frac{a}{2}}\left(LegendreQ\left(\frac{1}{2}\sqrt{a^2+4\,b}-\frac{1}{2},\frac{1}{2}+\frac{a}{2},\sin(x)\right)\_C2+LegendreP\left(\frac{1}{2}\sqrt{a^2+4\,b}-\frac{1}{2},\frac{1}{2}+\frac{a}{2}\right.\right.\right.$$

2.1071 ODE No. 1071

$$\left(b^2-a^2\right)y(x)+2a\cot(ax)y'(x)+y''(x)=0$$

✓ **Mathematica** : cpu = 0.0894967 (sec), leaf count = 43

$$\left\{\left\{y(x)\to\frac{1}{2}e^{-ibx}\csc(ax)\left(2c_1-\frac{ic_2e^{2ibx}}{b}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.063 (sec), leaf count = 24

$$\left\{y(x)=\frac{\_C1\ \sin(bx)+\_C2\ \cos(bx)}{\sin(ax)}\right\}$$

2.1072 ODE No. 1072

$$y(x)\left(-4anp(x)^2+a+bp(x)\right)+ap''(x)y'(x)+y''(x)=0$$

✗ **Mathematica** : cpu = 0.298386 (sec), leaf count = 0 , could not solve

```
DSolve[(a + b*p[x] - 4*a*n*p[x]^2)*y[x] + a*Derivative[1][y][x]*Derivative[2][p][x] + Deriva
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x)=DESol\left(\left\{\frac{d^2}{dx^2}\_Y(x)+a\left(\frac{d^2}{dx^2}p(x)\right)\frac{d}{dx}\_Y(x)+\left(a+bp(x)-4\,na(p(x))^2\right)\_Y(x)\right\},\{\_Y(x)\}\right)\right\}$$

2.1073 ODE No. 1073

$$\frac{y'(x)\left(-\wp(x;a,b)\wp'(x;a,b)+\wp(x;a,b)^3-6\wp(x;a,b)^2+\frac{a}{2}\right)}{\wp'(x;a,b)-\wp(x;a,b)^2}+\frac{y(x)\left(\wp(x;a,b)^2(-\wp'(x;a,b))-\left(6\wp(x;a,b)^2-\frac{a}{2}\right)\wp\right.}{\wp(x;a,b)^2+\wp'(x;a,b)}$$

✗ **Mathematica** : cpu = 1.44734 (sec), leaf count = 0 , could not solve

```
DSolve[((-(WeierstrassP[x, {a, b}]*(-a/2 + 6*WeierstrassP[x, {a, b}]^2)) - WeierstrassP[x, {
WeierstrassP[x, {a, b}]^2 + WeierstrassPPrime[x, {a, b}]) + Derivative[2][y][x] == 0, y[x],
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x)=DESol\left(\left\{\frac{d^2}{dx^2}\_Y(x)+\frac{\frac{d}{dx}\_Y(x)}{WeierstrassPPrime\,(x,a,b)+(\,WeierstrassP\,(x,a,b))^2}\left(11\ WeierstrassP(x,a,b\right.\right.\right.$$

2.1074 ODE No. 1074

$$\frac{k^2\text{cn}(x|k)\text{sn}(x|k)y'(x)}{\text{dn}(x|k)} + n^2y(x)\text{dn}(x|k)^2 + y''(x) = 0$$

✗ **Mathematica** : cpu = 57.8056 (sec), leaf count = 0 , could not solve

```
DSolve[n^2*JacobiDN[x, k]^2*y[x] + (k^2*JacobiCN[x, k]*JacobiSN[x, k]*Derivative[1][y][x])/J
```

✓ **Maple** : cpu = 0.031 (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 = 0.2011 (sec), leaf count = 0 , could not solve

```
DSolve[g[x]*y[x] + f[x]*Derivative[1][y][x] + Derivative[2][y][x] == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x) = DESol\left(\left\{g(x)\_Y(x) + f(x)\frac{\mathrm{d}}{\mathrm{d}x}\_Y(x) + \frac{\mathrm{d}^2}{\mathrm{d}x^2}\_Y(x)\right\}, \{\_Y(x)\}\right)\right\}$$

2.1076 ODE No. 1076

$$y(x)\,(a + f'(x)) + f(x)y'(x) - g(x) + y''(x) = 0$$

✗ **Mathematica** : cpu = 0.220469 (sec), leaf count = 0 , could not solve

```
DSolve[-g[x] + y[x]*(a + Derivative[1][f][x]) + f[x]*Derivative[1][y][x] + Derivative[2][y][
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x) = DESol\left(\left\{\frac{\mathrm{d}^2}{\mathrm{d}x^2}\_Y(x) + f(x)\frac{\mathrm{d}}{\mathrm{d}x}\_Y(x) + \left(\frac{\mathrm{d}}{\mathrm{d}x}f(x) + a\right)\_Y(x) - g(x)\right\}, \{\_Y(x)\}\right)\right\}$$

2.1077 ODE No. 1077

$$y'(x)(af(x)+b)+y(x)(cf(x)+d)+y''(x)=0$$

✗ **Mathematica** : cpu = 0.331169 (sec), leaf count = 0 , could not solve

```
DSolve[(d + c*f[x])*y[x] + (b + a*f[x])*Derivative[1][y][x] + Derivative[2][y][x] == 0, y[x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x)=DESol\left(\left\{\frac{d^2}{dx^2}\_Y(x)+(af(x)+b)\frac{d}{dx}\_Y(x)+(cf(x)+d)\_Y(x)\right\},\{\_Y(x)\}\right)\right\}$$

2.1078 ODE No. 1078

$$y(x)\left(a+\frac{f'(x)}{2}+\frac{f(x)^2}{4}\right)+f(x)y'(x)+y''(x)=0$$

✓ **Mathematica** : cpu = 0.072014 (sec), leaf count = 68

$$\left\{\left\{y(x)\to\frac{\left(2\sqrt{a}c_1-ic_2e^{2i\sqrt{a}x}\right)e^{-\frac{1}{2}\int_1^x f(K[1])\,dK[1]-i\sqrt{a}x}}{2\sqrt{a}}\right\}\right\}$$

✓ **Maple** : cpu = 0.033 (sec), leaf count = 33

$$\left\{y(x)=e^{-\frac{\int f(x)\,dx}{2}}\left(\sinh\left(\sqrt{-a}x\right)\_C1+\cosh\left(\sqrt{-a}x\right)\_C2\right)\right\}$$

2.1079 ODE No. 1079

$$by(x)f(x)^{2a}-\frac{af'(x)y'(x)}{f(x)}+y''(x)=0$$

✓ **Mathematica** : cpu = 0.264742 (sec), leaf count = 135

$$\left\{\left\{y(x)\to\frac{1}{2}\left(e^{c_2+\int_1^x -i\sqrt{b}f(K[1])^a\,dK[1]}-2c_1\exp\left(-c_2-\int_1^x -i\sqrt{b}f(K[1])^a\,dK[1]\right)\right)\right\},\left\{y(x)\to\frac{1}{2}\left(e^{c_2+\int_1^x i\sqrt{b}f(I\right.\right.$$

✓ **Maple** : cpu = 0.023 (sec), leaf count = 37

$$\left\{y(x)=\_C1\,e^{\int i(f(x))^a\sqrt{b}\,dx}+\_C2\,e^{-\int i(f(x))^a\sqrt{b}\,dx}\right\}$$

2.1080 ODE No. 1080

$$y(x)\left(a^2+\frac{af'(x)}{f(x)}-b^2f(x)^2\right)-y'(x)\left(2a+\frac{f'(x)}{f(x)}\right)+y''(x)=0$$

✗ **Mathematica** : cpu = 0.331564 (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][x]/f
```

✓ **Maple** : cpu = 0.355 (sec), leaf count = 74

$$\left\{y(x)=\mathrm{e}^{\int -1\left(\frac{f(x)\left(\mathrm{e}^{\_C1\,b}\right)^2 b}{\left(\mathrm{e}^{\int f(x)\,\mathrm{d}x b}\right)^2}+bf(x)-\frac{\left(\mathrm{e}^{\_C1\,b}\right)^2 a}{\left(\mathrm{e}^{\int f(x)\,\mathrm{d}x b}\right)^2}+a\right)\left(\frac{\left(\mathrm{e}^{\_C1\,b}\right)^2}{\left(\mathrm{e}^{\int f(x)\,\mathrm{d}x b}\right)^2}-1\right)^{-1}\mathrm{d}x}\_C2\right\}$$

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 = 0.857037 (sec), leaf count = 0 , could not solve

```
DSolve[-((a^2*y[x]*Derivative[1][f][x]^2)/(b^2 + f[x]^2)) + (f[x]*(f^3)[x]*Derivative[1][y][
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x)=DESol\left(\left\{\frac{\mathrm{d}^2}{\mathrm{d}x^2}\_Y(x)+\frac{f(x)\left(\frac{\mathrm{d}^3}{\mathrm{d}x^3}f(x)\right)\frac{\mathrm{d}}{\mathrm{d}x}\_Y(x)}{(f(x))^2+b^2}-\frac{\left(\frac{\mathrm{d}}{\mathrm{d}x}f(x)\right)^2a^2\_Y(x)}{(f(x))^2+b^2}\right\},\{\_Y(x)\}\right)\right\}$$

2.1082 ODE No. 1082

$$y(x)\left(\frac{(m^2-v^2)\,g'(x)^2}{g(x)}+g'(x)^2\right)-y'(x)\left(\frac{(2m-1)g'(x)}{g(x)}+\frac{g''(x)}{g'(x)}\right)+y''(x)=0$$

✗ **Mathematica** : cpu = 0.693124 (sec), leaf count = 0 , could not solve

```
DSolve[y[x]*(Derivative[1][g][x]^2 + ((m^2 - v^2)*Derivative[1][g][x]^2)/g[x]) - Derivative[
1 + 2*m)*Derivative[1][g][x])/g[x] + Derivative[2][g][x]/Derivative[1][g][x]) + Derivative[2
```

✓ **Maple** : cpu = 0.153 (sec), leaf count = 74

$$\left\{y(x)=(g(x))^{2m}\mathrm{e}^{-ig(x)}\left(U\left(\frac{i}{2}m^2-\frac{i}{2}v^2+m+\frac{1}{2},\,2m+1,\,2ig(x)\right)\_C2+M\left(\frac{i}{2}m^2-\frac{i}{2}v^2+m+\frac{1}{2},\,2m+1\right.\right.$$

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 = 0.960569 (sec), leaf count = 0 , could not solve

```
DSolve[-((Derivative[1][f][x]*Derivative[1][y][x])/f[x]) + y[x]*((3*Derivative[1][f][x]^2)/(
```

✓ **Maple** : cpu = 0.108 (sec), leaf count = 31

$$\left\{y(x)=\sqrt{\frac{f\left(x\right)g\left(x\right)}{\frac{\mathrm{d}}{\mathrm{d}x}g\left(x\right)}}\left(Y_v(g(x))\_C2+J_v(g(x))\_C1\right)\right\}$$

2.1084 ODE No. 1084

$$-y'(x)\left(\frac{2f'(x)}{f(x)}-\frac{g'(x)}{g(x)}+\frac{g''(x)}{g'(x)}\right)+y(x)\left(-\frac{f''(x)}{f(x)}+\frac{f'(x)\left(\frac{2f'(x)}{f(x)}-\frac{g'(x)}{g(x)}+\frac{g''(x)}{g'(x)}\right)}{f(x)}-\frac{v^2g'(x)^2}{g(x)^2}+g'(x)^2\right)+y''(x$$

✗ **Mathematica** : cpu = 0.968753 (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] + Deri
```

✓ **Maple** : cpu = 0.088 (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

$$-y'(x)\left(\frac{(2v-1)g'(x)}{g(x)}+\frac{g''(x)}{g'(x)}+\frac{2h'(x)}{h(x)}\right)+y(x)\left(g'(x)^2+\frac{h'(x)\left(\frac{(2v-1)g'(x)}{g(x)}+\frac{g''(x)}{g'(x)}+\frac{2h'(x)}{h(x)}\right)}{h(x)}-\frac{h''(x)}{h(x)}\right)+y''(x$$

✗ **Mathematica** : cpu = 1.02104 (sec), leaf count = 0 , could not solve

```
DSolve[-(Derivative[1][y][x]*(((-1 + 2*v)*Derivative[1][g][x])/g[x] + (2*Derivative[1][h][x]
1 + 2*v)*Derivative[1][g][x])/g[x] + (2*Derivative[1][h][x])/h[x] + Derivative[2][g][x]/Deri
```

✓ **Maple** : cpu = 0.081 (sec), leaf count = 24

$$\{y(x)=h(x)\left(g(x)\right)^v\left(Y_v(g(x))\_C2+J_v(g(x))\_C1\right)\}$$

2.1086 ODE No. 1086

$$4y''(x) + 9xy(x) = 0$$

✓ **Mathematica** : cpu = 0.00602402 (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 = 0.031 (sec), leaf count = 29

$$\left\{y(x) = \_C1 \operatorname{Ai}\left(-\frac{3^{\frac{2}{3}}\sqrt[3]{2}x}{2}\right) + \_C2 \operatorname{Bi}\left(-\frac{3^{\frac{2}{3}}\sqrt[3]{2}x}{2}\right)\right\}$$

2.1087 ODE No. 1087

$$4y''(x) - \left(a + x^2\right) y(x) = 0$$

✓ **Mathematica** : cpu = 0.00979663 (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 = 0.103 (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 = 0.11521 (sec), leaf count = 97

$$\left\{\left\{y(x) \to \frac{3\sqrt[8]{-1}c_2\sqrt[4]{-\cos^4(x)}\sqrt{1 + i\sqrt{-\cos^4(x)}} + 3(-1)^{7/8}c_2 \sinh^{-1}\left(\frac{(1+i)\sqrt[4]{-\cos^4(x)}}{\sqrt{2}}\right) - 2(-1)^{7/8}c_1}{2\sqrt[8]{-\cos^4(x)}}\right\}\right\}$$

✓ **Maple** : cpu = 0.149 (sec), leaf count = 31

$$\left\{y(x) = \left(i\cos(x)\sin(x)\_C2 - \ln\left(\sin(x) + i\cos(x)\right)\_C2 + \_C1\right)\frac{1}{\sqrt{\cos(x)}}\right\}$$

2.1089 ODE No. 1089

$$-y'(x)(ab+c+x)+ay''(x)+y(x)(b(c+x)+d)=0$$

✓ **Mathematica** : cpu = 0.0480862 (sec), leaf count = 63

$$\left\{\left\{y(x)\to e^{bx}\left(c_1H_d\left(\frac{-ab+c+x}{\sqrt{2}\sqrt{a}}\right)+c_2\,{}_1F_1\left(-\frac{d}{2};\frac{1}{2};\frac{(-ab+c+x)^2}{2a}\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.054 (sec), leaf count = 58

$$\left\{y(x)=\mathrm{e}^{bx}\left(U\left(-\frac{d}{2},\frac{1}{2},\frac{(ab-c-x)^2}{2\,a}\right)\_C2+M\left(-\frac{d}{2},\frac{1}{2},\frac{(ab-c-x)^2}{2\,a}\right)\_C1\right)\right\}$$

2.1090 ODE No. 1090

$$a\left(a^2-2be^{-ax}\right)y'(x)+a^2y''(x)+b^2e^{-2ax}y(x)=0$$

✓ **Mathematica** : cpu = 0.0346901 (sec), leaf count = 45

$$\left\{\left\{y(x)\to\frac{e^{-\frac{be^{-ax}}{a^2}-ax}\left(a^2c_1e^{ax}-bc_2\right)}{a^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.053 (sec), leaf count = 40

$$\left\{y(x)=\mathrm{e}^{-\frac{a^3x+2\,b\mathrm{e}^{-ax}}{2\,a^2}}\left(\sinh\left(\frac{ax}{2}\right)\_C1+\cosh\left(\frac{ax}{2}\right)\_C2\right)\right\}$$

2.1091 ODE No. 1091

$$x\left(y''(x)+y(x)\right)-\cos(x)=0$$

✓ **Mathematica** : cpu = 0.0289538 (sec), leaf count = 41

$$\left\{\left\{y(x)\to c_2\sin(x)+c_1\cos(x)+\frac{1}{2}(\mathrm{Ci}(2x)\sin(x)-\mathrm{Si}(2x)\cos(x)+\log(x)\sin(x))\right\}\right\}$$

✓ **Maple** : cpu = 0.046 (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 = 0.0979126 (sec), leaf count = 53

$$\left\{\left\{y(x)\to e^{-ix}x\left(c_2\,{}_1F_1\left(\frac{ia}{2}+1;2;2ix\right)+c_1U\left(\frac{ia}{2}+1,2,2ix\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.059 (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 = 0.00581219 (sec), leaf count = 13

$$\{\{y(x)\to c_1\log(x)+c_2\}\}$$

✓ **Maple** : cpu = 0.007 (sec), leaf count = 10

$$\{y(x)=\_C2\,\ln(x)+\_C1\}$$

2.1094 ODE No. 1094

$$ay(x)+xy''(x)+y'(x)=0$$

✓ **Mathematica** : cpu = 0.0239038 (sec), leaf count = 41

$$\left\{\left\{y(x)\to c_1J_0\left(2\sqrt{a}\sqrt{x}\right)+2c_2Y_0\left(2\sqrt{a}\sqrt{x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.01 (sec), leaf count = 29

$$\left\{y(x)=\_C1\,J_0\left(2\,\sqrt{a}\sqrt{x}\right)+\_C2\,Y_0\left(2\,\sqrt{a}\sqrt{x}\right)\right\}$$

2.1095 ODE No. 1095

$$lxy(x) + xy''(x) + y'(x) = 0$$

✓ **Mathematica** : cpu = 0.00947089 (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 = 0.035 (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 = 0.0139862 (sec), leaf count = 55

$$\left\{\left\{y(x) \to e^{-ix}\left(c_1 U\left(\frac{ia}{2} + \frac{1}{2}, 1, 2ix\right) + c_2 L_{-\frac{1}{2}i(a-i)}(2ix)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.076 (sec), leaf count = 39

$$\left\{y(x) = e^{-ix}\left(U\left(\frac{1}{2} + \frac{i}{2}a,\, 1,\, 2\,ix\right)\_C2 + M\left(\frac{1}{2} + \frac{i}{2}a,\, 1,\, 2\,ix\right)\_C1\right)\right\}$$

2.1097 ODE No. 1097

$$ay(x) + xy''(x) - y'(x) = 0$$

✓ **Mathematica** : cpu = 0.0284552 (sec), leaf count = 45

$$\{\{y(x) \to 2ax(c_1 J_2(2\sqrt{a}\sqrt{x}) - c_2 Y_2(2\sqrt{a}\sqrt{x}))\}\}$$

✓ **Maple** : cpu = 0.012 (sec), leaf count = 31

$$\{y(x) = x(Y_2(2\,\sqrt{a}\sqrt{x})\_C2 + J_2(2\,\sqrt{a}\sqrt{x})\_C1)\}$$

2.1098 ODE No. 1098

$$-ax^3y(x) + xy''(x) - y'(x) = 0$$

✓ **Mathematica** : cpu = 0.0106471 (sec), leaf count = 41

$$\left\{\left\{y(x) \to c_1 \cosh\left(\frac{\sqrt{a}x^2}{2}\right) + ic_2 \sinh\left(\frac{\sqrt{a}x^2}{2}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.01 (sec), leaf count = 27

$$\left\{y(x) = \_C1 \sinh\left(\frac{x^2}{2}\sqrt{a}\right) + \_C2 \cosh\left(\frac{x^2}{2}\sqrt{a}\right)\right\}$$

2.1099 ODE No. 1099

$$x^3\left(e^{x^3} - v^2\right)y(x) + xy''(x) - y'(x) = 0$$

✗ **Mathematica** : cpu = 1.12663 (sec), leaf count = 0 , could not solve

```
DSolve[(E^x^3 - v^2)*x^3*y[x] - Derivative[1][y][x] + x*Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 0.055 (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 = 0.032129 (sec), leaf count = 37

$$\left\{\left\{y(x) \to \frac{e^{-x}\left(e^{2x}(2c_2 + 2x - 1) + 4c_1\right)}{4x}\right\}\right\}$$

✓ **Maple** : cpu = 0.041 (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 $\lim_{x\to 0} x^2 q(x) = \lim_{x\to 0} -x^2 = 0$ which is analytic. Hence the singularity is regular (removable). Using Frobenius series, assume that

$$y = \sum_{n=-\infty}^{\infty} c_n x^{n+r}$$

Where $c_n = 0$ for $n < 0$. Hence

$$\begin{aligned} y' &= \sum (n+r)\, c_n x^{n+r-1} \\ y'' &= \sum (n+r)\,(n+r-1)\, c_n x^{n+r-2} \end{aligned}$$

Substituting back in the original ODE gives

$$\sum (n+r)\,(n+r-1)\, c_n x^{n+r-1} + \sum 2(n+r)\, c_n x^{n+r-1} - \sum c_n x^{n+r+1} = 0$$

Adjusting so that all have same power x^{n+r} gives

$$\sum (n+r+1)\,(n+r)\, c_{n+1} x^{n+r} + \sum 2(n+r+1)\, c_{n+1} x^{n+r} - \sum c_{n-1} x^{n+r} = 0$$

Hence

$$\begin{aligned} (n+r+1)\,(n+r)\, c_{n+1} + 2(n+r+1)\, c_{n+1} - c_{n-1} &= 0 \\ (n+r+1)\,(2+(n+r))\, c_{n+1} - c_{n-1} &= 0 \end{aligned} \tag{2}$$

We want equation with c_0 in it. Hence let $n = -1$

$$(-1+r+1)\,(2+(-1+r))\, c_0 - c_{-2} = 0$$

But $c_n = 0$ for all $n < 0$ hence

$$(-1+r+1)\,(2+(-1+r))\, c_0 = 0$$

But $c_0 \neq 0$, as this is the basis for this method. Therefore, we obtain the indicial equation for r

$$\begin{aligned} (-1+r+1)\,(2+(-1+r)) &= 0 \\ r(r+1) &= 0 \end{aligned}$$

Hence $r = 0$ or $r = -1$ are the roots. Now for each r we find a solution. Using $r = 0$, we go back the recurrence equation (2)

$$\begin{aligned} (n+1)\,(2+n)\, c_{n+1} - c_{n-1} &= 0 \\ c_{n+1} &= \frac{c_{n-1}}{(n+1)\,(2+n)} \end{aligned}$$

For $n = 0$

$$c_1 = \frac{c_{-1}}{(n+1)\,(2+n)} = 0$$

For $n = 1$

$$c_2 = \frac{c_0}{(2)\,(3)}$$

For $n = 2$

$$c_3 = \frac{c_1}{(n+1)\,(2+n)} = 0$$

For $n = 3$

$$c_4 = \frac{c_2}{(4)(5)} = \frac{c_0}{(2)(3)(4)(5)}$$

And so on. Hence, for $r = 0$ we have

$$\begin{aligned}
y_{r=0} &= \sum_{n=0}^{\infty} c_n x^n = c_0 + c_1 x^1 + c_2 x^2 + c_3 x^3 + \cdots \\
&= c_0 + \frac{c_0}{6} x^2 + \frac{c_0}{120} x^4 + \cdots \\
&= A\left(1 + \frac{1}{6} x^2 + \frac{1}{120} x^4 + \cdots\right) \qquad (3)
\end{aligned}$$

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

$$
\begin{aligned}
\frac{1}{x}e^x - \frac{1}{x}e^{-x} &= \left(\frac{1}{x} + 1 + \frac{1}{2}x + \frac{1}{6}x^2 + \frac{1}{24}x^3 + \frac{1}{120}x^4 + \cdots\right) - \left(\frac{1}{x} - 1 + \frac{1}{2}x - \frac{1}{6}x^2 + \frac{1}{24}x^3 - \frac{1}{120}x^4 + \cdots\right) \\
&= 2 + 2\frac{1}{6}x^2 + 2\frac{1}{120}x^4 + \cdots \\
&= 2\left(1 + \frac{1}{6}x^2 + \frac{1}{120}x^4 + \cdots\right)
\end{aligned}
$$

Hence

$$\left(1+\frac{1}{6}x^2+\frac{1}{120}x^4+\cdots\right)=\frac{1}{2x}\left(e^x-e^{-x}\right)$$

But $y_{r=0}=A\left(1+\frac{1}{6}x^2+\frac{1}{120}x^4+\cdots\right)$, therefore comparing the result we found above, wee see that we can write $y_{r=0}$ as

$$\begin{aligned}
y_{r=0} &= A\left(\frac{1}{2x}\left(e^x-e^{-x}\right)\right)\\
&= \frac{A}{2x}\left(e^x-e^{-x}\right)
\end{aligned}$$

Therefore

$$\begin{aligned}
y_h &= y_{r=0}+y_{r=-1}\\
&= \frac{A}{2x}\left(e^x-e^{-x}\right)+\frac{B}{2x}\left(e^x+e^{-x}\right)\\
&= \frac{1}{x}\left(\frac{A}{2}e^x-\frac{A}{2}e^{-x}+\frac{B}{2}e^x+\frac{B}{2}e^{-x}\right)\\
&= \frac{1}{x}\left(e^x\left(\frac{A}{2}+\frac{B}{2}\right)+e^{-x}\left(-\frac{A}{2}+\frac{B}{2}\right)\right)
\end{aligned}$$

Let $\frac{A+B}{2}=A_0$, $\frac{B-A}{2}=B_0$ hence the above becomes

$$y_h=\frac{1}{x}\left(A_0e^x+B_0e^{-x}\right)$$

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 $y_p=u_1y_1+u_2y_2$ 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 = 0.0242356 (sec), leaf count = 52

$$\left\{\left\{y(x) \to \frac{2c_1 e^{-i\sqrt{a}x} - \frac{ic_2 e^{i\sqrt{a}x}}{\sqrt{a}}}{2x}\right\}\right\}$$

✓ **Maple** : cpu = 0.035 (sec), leaf count = 29

$$\left\{y(x) = \frac{1}{x}\left(\_C2\cosh\left(\sqrt{-a}x\right) + \_C1\sinh\left(\sqrt{-a}x\right)\right)\right\}$$

$$\boxed{\textbf{Hand solution}}$$

$$xy'' + 2y' + axy = 0 \tag{1}$$

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 $\lim_{x\to 0} x^2q(x) = \lim_{x\to 0} -ax^2 = 0$ 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

$$\begin{aligned} (n+r+1)(n+r)\, c_{n+1} + 2(n+r+1)\, c_{n+1} + a c_{n-1} &= 0 \\ (n+r+1)(2+(n+r))\, c_{n+1} + a c_{n-1} &= 0 \end{aligned} \tag{2}$$

We want equation with c_0 in it. Hence let $n = -1$

$$(-1+r+1)(2+(-1+r))\, c_0 + a c_{-2} = 0$$

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)

$$\begin{aligned} (n+1)(2+n)\, c_{n+1} + a c_{n-1} &= 0 \\ c_{n+1} &= \frac{-a c_{n-1}}{(n+1)(2+n)} \end{aligned}$$

For $n = 0$

$$c_1 = \frac{-a c_{-1}}{(n+1)(2+n)} = 0$$

For $n = 1$

$$c_2 = \frac{-a c_0}{(2)(3)}$$

For $n = 2$

$$c_3 = \frac{-a c_1}{(n+1)(2+n)} = 0$$

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

$$\begin{aligned}
y_{r=0}&=\sum_{n=0}^{\infty}c_nx^n=c_0+c_1x^1+c_2x^2+c_3x^3+\cdots\\
&=c_0-a\frac{c_0}{6}x^2+a^2\frac{c_0}{120}x^4+\cdots\\
&=A\left(1-a\frac{1}{6}x^2+a^2\frac{1}{120}x^4+\cdots\right)
\end{aligned}\tag{3}$$

Where A is used as arbitrary constant instead of a_0. Now we find the solution for $r=-1$. we go back the recurrence equation (2)

$$\begin{aligned}
(n-1+1)(2+(n-1))\,c_{n+1}+ac_{n-1}&=0\\
n(1+n)\,c_{n+1}+ac_{n-1}&=0\\
c_{n+1}&=\frac{-ac_{n-1}}{n(1+n)}
\end{aligned}$$

For $n=0$

$$c_1=\frac{-ac_{-1}}{n(1+n)}=0$$

For $n=1$

$$c_2=\frac{-ac_0}{2}$$

For $n=2$

$$c_3=\frac{-ac_1}{n(1+n)}=0$$

For $n=3$

$$c_4=\frac{-ac_2}{(3)(4)}=\frac{-a(-ac_0)}{(2)(3)(4)}=\frac{a^2c_0}{(2)(3)(4)}$$

For $n=4$

$$c_5=\frac{-ac_3}{n(1+n)}=0$$

For $n=5$

$$c_6=\frac{-ac_4}{(5)(6)}=\frac{-a\left(a^2c_0\right)}{(2)(3)(4)(5)(6)}=\frac{-a^3c_0}{(2)(3)(4)(5)(6)}$$

And so on. Hence solution is

$$\begin{aligned}
y_{r=-1}&=\frac{1}{x}\sum_{n=0}^{\infty}c_nx^n=\frac{1}{x}\left(c_0-\frac{ac_0}{2}x^2+\frac{a^2c_0}{(2)(3)(4)}x^4-\frac{a^3c_0}{(2)(3)(4)(5)(6)}x^6+\cdots\right)\\
&=\frac{B}{x}\left(1-\frac{a}{2}x^2+\frac{a^2}{24}x^4-\frac{a^3}{720}x^6+\cdots\right)
\end{aligned}$$

Where B is used as arbitrary constant instead of a_0. Therefore, the homogeneous solution found is

$$
\begin{aligned}
y_h &= y_{r=0} + y_{r=-1} \\
&= A\left(1 - a\frac{1}{6}x^2 + a^2\frac{1}{120}x^4 + \cdots\right) + \frac{B}{x}\left(1 - \frac{a}{2}x^2 + \frac{a^2}{24}x^4 - \frac{a^3}{720}x^6 + \cdots\right) \\
&= A\left(1 - \frac{1}{6}\left(\sqrt{a}x\right)^2 + \frac{1}{120}\left(\sqrt{a}x\right)^4 + \cdots\right) + \frac{B}{x}\left(1 - \frac{1}{2}\left(\sqrt{a}x\right)^2 + \frac{1}{24}\left(\sqrt{a}x\right)^4 - \frac{1}{720}\left(\sqrt{a}x\right)^6 + \cdots\right)
\end{aligned}
$$

But

$$
\sin x = x - \frac{1}{6}x^3 + \frac{1}{120}x^5 - \cdots \tag{3}
$$

And

$$
\cos x = 1 - \frac{1}{2}x^2 + \frac{1}{24}x^4 - \frac{1}{720}x^6 + \cdots \tag{4}
$$

Therefore

$$
\begin{aligned}
\sin\left(\sqrt{a}x\right) &= \sqrt{a}x - \frac{1}{6}\left(\sqrt{a}x\right)^3 + \frac{1}{120}\left(\sqrt{a}x\right)^5 - \cdots \\
\cos\left(\sqrt{a}x\right) &= 1 - \frac{1}{2}\left(\sqrt{a}x\right)^2 + \frac{1}{24}\left(\sqrt{a}x\right)^4 - \frac{1}{720}\left(\sqrt{a}x\right)^6 + \cdots
\end{aligned}
$$

Therefore, using the above, we can write y_h as

$$
\begin{aligned}
y_h &= \frac{A}{\sqrt{a}x}\sqrt{a}x\left(1 - \frac{1}{6}\left(\sqrt{a}x\right)^2 + \frac{1}{120}\left(\sqrt{a}x\right)^4 + \cdots\right) + \frac{B}{x}\cos\left(\sqrt{a}x\right) \\
&= \frac{A}{\sqrt{a}x}\left(\sqrt{a}x - \frac{1}{6}\left(\sqrt{a}x\right)^3 + \frac{1}{120}\left(\sqrt{a}x\right)^5 + \cdots\right) + \frac{B}{x}\cos\left(\sqrt{a}x\right) \\
&= \frac{A}{\sqrt{a}x}\sin\left(\sqrt{a}x\right) + \frac{B}{x}\cos\left(\sqrt{a}x\right)
\end{aligned}
$$

Let $A_0 = \frac{A}{\sqrt{a}}$, hence the above becomes the same solution found using the transformation method

$$
y(x) = \frac{1}{x}\left(A_0 \sin\left(\sqrt{a}x\right) + B\cos\left(\sqrt{a}x\right)\right)
$$

Clearly, the transformation method is much faster and better. But the trick is to see the correct transformation needed and this is not always easy.

<u>Third method</u> Using Laplace transform. Using property $\mathcal{L}xf(x) = -\frac{d}{ds}F(s)$ then the Laplace transform of the ODE becomes

$$
\begin{aligned}
\mathcal{L}\left(xy'' + 2y' + axy\right) &= 0 \\
-\frac{d}{ds}\left(\mathcal{L}y''\right) + 2\left(-\frac{d}{ds}\left(\mathcal{L}y'\right)\right) + a\left(-\frac{d}{ds}Y\right) &= 0 \\
-\frac{d}{ds}\left(s^2Y - sA - B\right) + 2\left(-\frac{d}{ds}(sY - A)\right) + a(-Y') &= 0
\end{aligned}
$$

Where $A = y(0)\,, B = y'(0)$. Simplifying gives

$$\begin{aligned}
-\left(2sY + s^2Y' - A\right) - 2\left(Y + sY'\right) - aY' &= 0\\
Y'\left(-s^2 - 2s - a\right) + Y(-2s - 2) + A &= 0\\
Y' + Y\frac{2s+2}{s^2+2s+a} &= \frac{A}{s^2+2s+a}
\end{aligned}$$

This is first order ODE, which is solved easily using an integrating factor. Solving for $Y(s)$ gives

$$Y(s) = \frac{As + c_1}{s^2 + a + 2s}$$

Where c_1 is constant of integration. The inverse Laplace of the above is

$$y(x) = e^{-x}\left(A\cos\left(x\sqrt{1-a}\right) + \frac{(-A+c_1)}{\sqrt{1-a}}\sinh\left(x\sqrt{1-a}\right)\right)$$

I need to find why the above does not verify. May be I made a mistake somewhere. Verification of the result of the first two methods is below.

```
restart;
ode:=x*diff(diff(y(x),x),x)+2*diff(y(x),x)+a*x*y(x)=0;
y0:=1/x*( _C1* cos(sqrt(a)*x)+ _C2*sin(sqrt(a)*x));
odetest(y(x)=y0,ode);
0
```

2.1102 ODE No. 1102

$$ax^2y(x) + xy''(x) + 2y'(x) = 0$$

✓ **Mathematica** : cpu = 0.00748251 (sec), leaf count = 36

$$\left\{\left\{y(x)\to\frac{c_1\text{Ai}\left(\sqrt[3]{-a}x\right) + c_2\text{Bi}\left(\sqrt[3]{-a}x\right)}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.037 (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

$$\begin{aligned}
x\left(\frac{u''}{x} - \frac{u'}{x^2} - \frac{u'}{x^2} + 2\frac{u}{x^3}\right) + 2\left(\frac{u'}{x} - \frac{u}{x^2}\right) + ax^2\left(\frac{u}{x}\right) &= 0 \\
u'' - 2\frac{u'}{x} + 2\frac{u}{x^2} + \frac{2u'}{x} - \frac{2u}{x^2} + axu &= 0 \\
u'' + axu &= 0 \qquad (2)
\end{aligned}$$

This is Emdon-Fowler. (form is $u'' + x^n u = 0$) with $n = 1$. Assume that

$$u = \sum_{n=0}^{\infty} c_n x^n$$

Hence

$$\begin{aligned}
u' &= \sum_{n=0} n c_n x^{n-1} = \sum_{n=1} n c_n x^{n-1} = \sum_{n=0} (n+1)\, c_{n+1} x^n \\
u'' &= \sum_{n=0} n(n+1)\, c_{n+1} x^{n-1} = \sum_{n=1} n(n+1)\, c_{n+1} x^{n-1} = \sum_{n=0} (n+1)\,(n+2)\, c_{n+2} x^n
\end{aligned}$$

Substituting back in (2) gives

$$\begin{aligned}
\sum_{n=0} (n+1)\,(n+2)\, c_{n+2} x^n + \sum_{n=0} a c_n x^{n+1} &= 0 \\
\sum_{n=0} (n+1)\,(n+2)\, c_{n+2} x^n + \sum_{n=1} a c_{n-1} x^n &= 0
\end{aligned}$$

For $n = 0$

$$(1)\,(2)\, c_2 = 0$$

Hence $c_2 = 0$. For $n \geq 1$

$$\begin{aligned}
(n+1)\,(n+2)\, c_{n+2} + a c_{n-1} &= 0 \\
c_{n+2} &= \frac{-a c_{n-1}}{(n+1)\,(n+2)} \qquad (3)
\end{aligned}$$

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)

$$c_5 = \frac{-ac_2}{(4)(5)} = 0$$

For $n = 4$, from (3)

$$c_6 = \frac{-ac_3}{(5)(6)} = \frac{-a}{(5)(6)} \left(\frac{-ac_0}{(2)(3)} \right) = \frac{a^2 c_0}{(2)(3)(5)(6)}$$

For $n = 5$, from (3)

$$c_7 = \frac{-ac_4}{(6)(7)} = \frac{-a}{(6)(7)} \left(\frac{-ac_1}{(3)(4)} \right) = \frac{a^2 c_1}{(3)(4)(6)(7)}$$

For $n = 6$, from (3)

$$c_8 = \frac{-ac_5}{(7)(8)} = 0$$

For $n = 7$, from (3)

$$c_9 = \frac{-ac_6}{(8)(9)} = \frac{-a}{(8)(9)} \left(\frac{a^2 c_0}{(2)(3)(5)(6)} \right) = \frac{-a^3 c_0}{(2)(3)(5)(6)(8)(9)}$$

For $n = 8$, from (3)

$$c_{10} = \frac{-ac_7}{(9)(10)} = \frac{-a}{(9)(10)} \left(\frac{a^2 c_1}{(3)(4)(6)(7)} \right) = \frac{-a^3 c_1}{(3)(4)(6)(7)(9)(10)}$$

And so on. Hence,

$$\begin{aligned}
u &= \sum_{n=0}^{\infty} c_n x^n = c_0 + c_1 x^1 + c_2 x^2 + c_3 x^3 + \cdots \\
&= c_0 + c_1 x + 0 + c_3 x^3 + c_4 x^4 + 0 + c_6 x^6 + c_7 x^7 + 0 + c_9 x^9 + \cdots \\
&= c_0 + c_1 x - \frac{ac_0}{(2)(3)} x^3 - \frac{ac_1}{(3)(4)} x^4 + \frac{a^2 c_0}{(2)(3)(5)(6)} x^6 + \frac{a^2 c_1}{(3)(4)(6)(7)} x^7 - \frac{a^3 c_0}{(2)(3)(5)(6)(8)(9)} x^9 - \frac{a}{(3)(4)(6)} \\
&= c_0 \left(1 - \frac{a}{6} x^3 + \frac{a^2}{180} x^6 - \frac{a^3}{12\,960} x^9 + \cdots \right) + x c_1 \left(1 - \frac{a}{12} x^3 + \frac{a^2}{504} x^6 - \frac{a^3}{45\,360} x^9 + \cdots \right) \\
&= c_0 \left(1 - \frac{1}{6} \left(a^{\frac{1}{3}} x \right)^3 + \frac{1}{180} \left(a^{\frac{1}{3}} x \right)^6 - \frac{1}{12\,960} \left(a^{\frac{1}{3}} x \right)^9 + \cdots \right) + x c_1 \left(1 - \frac{1}{12} \left(a^{\frac{1}{3}} x \right)^3 + \frac{1}{504} \left(a^{\frac{1}{3}} x \right)^6 - \frac{1}{45\,360} \left(a^{\frac{1}{3}} \right.
\end{aligned}$$

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 = 0.0284562 (sec), leaf count = 56

$$\left\{\left\{y(x)\to 2a^{3/2}x^{3/2}\left(3c_1J_3\left(2\sqrt{a}\sqrt{x}\right) - ic_2Y_3\left(2\sqrt{a}\sqrt{x}\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.011 (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 = 0.0375991 (sec), leaf count = 77

$$\left\{\left\{y(x)\to a^{\frac{1}{2}-\frac{v}{2}}x^{\frac{1}{2}-\frac{v}{2}}\left(c_2\Gamma(2-v)J_{1-v}\left(2\sqrt{a}\sqrt{x}\right) + c_1\Gamma(v)J_{v-1}\left(2\sqrt{a}\sqrt{x}\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.015 (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 = 0.0237124 (sec), leaf count = 54

$$\left\{\left\{y(x) \to x^{\frac{1}{2}-\frac{a}{2}}\left(c_1 J_{\frac{a-1}{2}}\left(\sqrt{b}x\right) + c_2 Y_{\frac{a-1}{2}}\left(\sqrt{b}x\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.053 (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 = 0.0563441 (sec), leaf count = 165

$$\left\{\left\{y(x) \to \left(\frac{1}{\mathrm{a1}}+1\right)^{\frac{a-1}{\mathrm{a1}+1}} \mathrm{a1}^{\frac{a-1}{\mathrm{a1}+1}} b^{\frac{1-a}{2\mathrm{a1}+2}} \left(x^{\mathrm{a1}}\right)^{-\frac{a-1}{2\mathrm{a1}}} \left(c_2\Gamma\left(\frac{-a+\mathrm{a1}+2}{\mathrm{a1}+1}\right) J_{\frac{1-a}{\mathrm{a1}+1}}\left(\frac{2\sqrt{b}\left(x^{\mathrm{a1}}\right)^{\frac{\mathrm{a1}+1}{2\mathrm{a1}}}}{\mathrm{a1}+1}\right) + c_1\Gamma\left(\frac{a+\mathrm{a1}}{\mathrm{a1}+1}\right)\right.\right.\right.$$

✓ **Maple** : cpu = 0.109 (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 = 0.033487 (sec), leaf count = 36

$$\left\{\left\{y(x) \to e^{-x}\left(c_1 U(b-a,b,x) + c_2 L_{a-b}^{b-1}(x)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.089 (sec), leaf count = 30

$$\left\{y(x) = \mathrm{e}^{-x}(M(-a+b,\, b,\, x)\_C1 + U(-a+b,\, b,\, x)\_C2)\right\}$$

2.1108 ODE No. 1108

$$(a+b+x)y'(x)+ay(x)+xy''(x)=0$$

✓ **Mathematica** : cpu = 0.0389206 (sec), leaf count = 33

$$\left\{\left\{y(x)\to e^{-x}\left(c_1U(b,a+b,x)+c_2L_{-b}^{a+b-1}(x)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.084 (sec), leaf count = 26

$$\{y(x)=\mathrm{e}^{-x}(M(b,\,a+b,\,x)\_C1+U(b,\,a+b,\,x)\_C2)\}$$

2.1109 ODE No. 1109

$$xy''(x)-xy'(x)-y(x)-e^x x(x+1)=0$$

✓ **Mathematica** : cpu = 0.0610005 (sec), leaf count = 45

$$\{\{y(x)\to -c_2(e^x x\mathrm{Ei}(-x)+1)+c_1e^x x+e^x\left(x^2+x-x\log(-x)-1\right)\}\}$$

✓ **Maple** : cpu = 0.033 (sec), leaf count = 33

$$\left\{y(x)=\mathrm{e}^x\left(-\_C1\ Ei(1,x)\,x+x^2+\_C2\,x-x\ln(x)+\mathrm{e}^{-x}\_C1-1\right)\right\}$$

2.1110 ODE No. 1110

$$-ay(x)+xy''(x)-xy'(x)=0$$

✓ **Mathematica** : cpu = 0.0458876 (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 = 0.05 (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 = 0.0209788 (sec), leaf count = 19

$$\{\{y(x) \to c_1 e^x - c_2(x+1)\}\}$$

✓ **Maple** : cpu = 0.026 (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

$$\begin{aligned}\mathcal{L}(xy'') &= -\frac{d}{ds}(s^2Y - As - B) \\ &= -(2sY + s^2Y' - A)\end{aligned}$$

And

$$\begin{aligned}\mathcal{L}((x+1)\,y') &= \mathcal{L}(xy' + y') \\ &= -\frac{d}{ds}(\mathcal{L}y') + \mathcal{L}y' \\ &= -\frac{d}{ds}(sY - y(0)) + (sY - y(0)) \\ &= -\frac{d}{ds}(sY - A) + (sY - y(0)) \\ &= -(Y + sY') + (sY - A) \\ &= -Y - sY' + sY - A\end{aligned}$$

Hence Laplace transform of the ODE becomes

$$\begin{aligned}-(2sY + s^2Y' - A) - (-Y - sY' + sY - A) + Y &= 0 \\ -2sY - s^2Y' + A + Y + sY' - sY + A + Y &= 0 \\ Y'(s - s^2) + Y(-2s + 1 - s + 1) &= -2A \\ Y'(s^2 - s) + Y(3s - 2) &= 2A \\ Y' + \frac{(3s-2)}{s\,(s-1)}Y &= \frac{2A}{s\,(s-1)}\end{aligned}$$

The integrating factor is $\mu = e^{\int \frac{(3s-2)}{s(s-1)}} = e^{\ln(s-1)+2\ln(s)} = (s-1)\,s^2$, hence

$$
\begin{aligned}
d\big((s-1)\,s^2 Y\big) &= (s-1)\,s^2 \frac{2A}{s\,(s-1)} \\
(s-1)\,s^2 Y &= 2A \int s ds + c_1 \\
(s-1)\,s^2 Y &= 2A \frac{s^2}{2} + c_1 \\
Y &= \frac{A s^2 + c_1}{(s-1)\,s^2}
\end{aligned}
$$

Inverse Laplace transform gives

$$
\begin{aligned}
y(x) &= -c_1 + (A + c_1)\,e^x - c_1 x \\
&= -c_1(1+x) + (A+c_1)\,e^x
\end{aligned}
$$

Let $-c_1 = A_0, A + c_1 + B_0$, hence

$$
y(x) = A_0(1+x) + B_0 e^x
$$

Verification

```
rrestart;
ode:=x*diff(diff(y(x),x),x)-(1+x)*diff(y(x),x)+y(x)=0;
y0:=_C0*(1+x)+_C1*exp(x);
odetest(y(x)=y0,ode);
0
```

2.1112 ODE No. 1112

$$
xy''(x) - (x+1)y'(x) - 2(x-1)y(x) = 0
$$

✓ **Mathematica** : cpu = 0.0289736 (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 = 0.034 (sec), leaf count = 22

$$
\left\{y(x) = \_C1\, \mathrm{e}^{2\,x} + \_C2\, \mathrm{e}^{-x}(3\,x+1)\right\}
$$

2.1113 ODE No. 1113

$$-ay(x) + (b-x)y'(x) + xy''(x) = 0$$

✓ **Mathematica** : cpu = 0.0228987 (sec), leaf count = 24

$$\left\{\left\{y(x)\to c_1U(a,b,x)+c_2L_{-a}^{b-1}(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.064 (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 = 0.083672 (sec), leaf count = 39

$$\left\{\left\{y(x)\to c_2G_{1,2}^{2,0}\left(-2x\left|\begin{array}{c}\frac{1}{2}\\-1,0\end{array}\right.\right)+c_1e^x(I_0(x)-I_1(x))\right\}\right\}$$

✓ **Maple** : cpu = 0.069 (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 = 0.0699415 (sec), leaf count = 63

$$\left\{\left\{y(x)\to e^{-\frac{1}{2}\left(\sqrt{17}-3\right)x}\left(c_2\,{}_1F_1\left(1-\frac{6}{\sqrt{17}};2;\sqrt{17}x\right)+c_1U\left(1-\frac{6}{\sqrt{17}},2,\sqrt{17}x\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.644 (sec), leaf count = 47

$$\left\{y(x) = e^{-\frac{x\left(-3+\sqrt{17}\right)}{2}}\left(U\left(1-\frac{6\sqrt{17}}{17},\, 2,\, \sqrt{17}x\right)\_C2 + M\left(1-\frac{6\sqrt{17}}{17},\, 2,\, \sqrt{17}x\right)\_C1\right)\right\}$$

2.1116 ODE No. 1116

$$y'(x)(ax+b+n)+any(x)+xy''(x)=0$$

✓ **Mathematica** : cpu = 0.069785 (sec), leaf count = 38

$$\left\{\left\{y(x)\to e^{-ax}\left(c_1U(b,b+n,ax)+c_2L_{-b}^{b+n-1}(ax)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.092 (sec), leaf count = 31

$$\{y(x)=\mathrm{e}^{-ax}(U(b,\,b+n,\,ax)\_C2+M(b,\,b+n,\,ax)\_C1)\}$$

2.1117 ODE No. 1117

$$-(x+1)(a+b)y'(x)+abxy(x)+xy''(x)=0$$

✓ **Mathematica** : cpu = 0.104556 (sec), leaf count = 87

$$\left\{\left\{y(x)\to e^{bx}x^{a+b+1}\left(c_1U\left(\frac{a^2+ba+a-b}{a-b},a+b+2,(a-b)x\right)+c_2L_{-\frac{a^2+ba+a-b}{a-b}}^{a+b+1}((a-b)x)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.127 (sec), leaf count = 82

$$\left\{y(x)=\mathrm{e}^{bx}x^{a+b+1}\left(U\left(\frac{a^2+ab+a-b}{a-b},\,a+b+2,\,x(a-b)\right)\_C2+M\left(\frac{a^2+ab+a-b}{a-b},\,a+b+2,\,x(a-b)\right)\_\right.$$

2.1118 ODE No. 1118

$$y'(x)(x(a+b)+m+n)+y(x)(abx+an+bm)+xy''(x)=0$$

✓ **Mathematica** : cpu = 0.108816 (sec), leaf count = 46

$$\left\{\left\{y(x)\to e^{-ax}\left(c_1U(m,m+n,(a-b)x)+c_2L_{-m}^{m+n-1}((a-b)x)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.112 (sec), leaf count = 39

$$\{y(x)=\mathrm{e}^{-ax}(M(m,\,m+n,\,x(a-b))\_C1+U(m,\,m+n,\,x(a-b))\_C2)\}$$

2.1119 ODE No. 1119

$$y(x)\left(a^2x+2ab\right)-2(ax+b)y'(x)+xy''(x)=0$$

✓ **Mathematica** : cpu = 0.189295 (sec), leaf count = 75

$$\left\{\left\{y(x)\to \frac{e^{ax}x^{b-\frac{1}{2}\sqrt{(2b+1)^2}+\frac{1}{2}}\left(c_2x^{\sqrt{(2b+1)^2}}+\sqrt{(2b+1)^2}c_1\right)}{\sqrt{(2b+1)^2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.046 (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 = 0.067916 (sec), leaf count = 135

$$\left\{\left\{y(x)\to e^{-\frac{1}{2}x\left(\sqrt{a^2-4c}+a\right)}\left(c_1U\left(\frac{ab+\sqrt{a^2-4c}b-2d}{2\sqrt{a^2-4c}},b,\sqrt{a^2-4c}x\right)+c_2L^{b-1}_{-\frac{ab+\sqrt{a^2-4c}b-2d}{2\sqrt{a^2-4c}}}\left(\sqrt{a^2-4c}x\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.219 (sec), leaf count = 109

$$\left\{y(x)=\mathrm{e}^{-\frac{x}{2}\left(a+\sqrt{a^2-4\,c}\right)}\left(U\left(\frac{1}{2}\left(b\sqrt{a^2-4\,c}+ab-2\,d\right)\frac{1}{\sqrt{a^2-4\,c}},\,b,\,\sqrt{a^2-4\,cx}\right)\_C2+M\left(\frac{1}{2}\left(b\sqrt{a^2-4\,c}+\right.\right.\right.$$

2.1121 ODE No. 1121

$$-\left(x^2-x\right)y'(x)+xy''(x)+(x-1)y(x)=0$$

✓ **Mathematica** : cpu = 11.5796 (sec), leaf count = 36

$$\left\{\left\{y(x)\to x\left(c_2\int_1^x\frac{e^{\frac{1}{2}(K[1]-2)K[1]}}{K[1]^2}\,dK[1]+c_1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.029 (sec), leaf count = 23

$$\left\{y(x)=\left(\int\frac{1}{x^2}\mathrm{e}^{\frac{x(x-2)}{2}}\,\mathrm{d}x\_C1+\_C2\right)x\right\}$$

2.1122 ODE No. 1122

$$-\left(x^2-x-2\right)y'(x)+xy''(x)-x(x+3)y(x)=0$$

✓ **Mathematica** : cpu = 11.2998 (sec), leaf count = 44

$$\left\{\left\{y(x)\to e^{\frac{x^2}{2}}\left(c_2\int_1^x \frac{e^{-\frac{1}{2}K[1](K[1]+2)}}{K[1]^2}\,dK[1]+c_1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.19 (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 = 0.0141062 (sec), leaf count = 53

$$\left\{\left\{y(x)\to e^{-\frac{1}{2}x^2\left(\sqrt{a^2-b}-a\right)}\left(c_2e^{x^2\sqrt{a^2-b}}+c_1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.057 (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 = 0.0897926 (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 = 0.09 (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

$$-4x^5 - 4x^3 y(x) + \left(4x^2 - 1\right) y'(x) + x y''(x) = 0$$

✓ **Mathematica** : cpu = 0.214833 (sec), leaf count = 45

$$\left\{\left\{y(x) \to c_1 e^{\left(\sqrt{2}-1\right)x^2} + c_2 e^{-\left(1+\sqrt{2}\right)x^2} - x^2 - 2\right\}\right\}$$

✓ **Maple** : cpu = 0.053 (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

$$\left(a^2 x^3 + a\right) y(x) + \left(2a x^3 - 1\right) y'(x) + x y''(x) = 0$$

✗ **Mathematica** : cpu = 1.34656 (sec), leaf count = 0 , DifferentialRoot result

$$\left\{\left\{y(x) \to \text{DifferentialRoot}\left(\{y, x\}, \left\{\left(a^2 x^3 + a\right) y(x) + \left(2x^3 a - 1\right) y'(x) + x y''(x) = 0, y(1) = c_1, y'(1) = c_2\right\}\right)(x)$$

✓ **Maple** : cpu = 0.043 (sec), leaf count = 19

$$\left\{y(x) = \mathrm{e}^{-\frac{a x^3}{3}} \left(\_C2\, x^2 + \_C1\right)\right\}$$

2.1127 ODE No. 1127

$$y(x)\left(a^2 x \log^2(x) + a\log(x) + a\right) + (2ax\log(x) + 1)y'(x) + x y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0437949 (sec), leaf count = 25

$$\left\{\left\{y(x) \to e^{ax} x^{-ax}(c_2 \log(x) + c_1)\right\}\right\}$$

✓ **Maple** : cpu = 0.022 (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 = 0.262977 (sec), leaf count = 0 , could not solve

```
DSolve[f[x]*y[x] + (2 + x*f[x])*Derivative[1][y][x] + x*Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 0.256 (sec), leaf count = 32

$$\left\{y(x)=\frac{1}{x}\left(\_C2 \int e^{\int \frac{-xf(x)-2}{x}\,dx}x^2\,dx+\_C1\right)\right\}$$

2.1129 ODE No. 1129

$$(x-3)y''(x)-(4x-9)y'(x)+(3x-6)y(x)=0$$

✓ **Mathematica** : cpu = 0.0433812 (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 = 0.041 (sec), leaf count = 30

$$\left\{y(x)=e^{x}\_C1+\_C2\,e^{3x}\left(4x^3-42x^2+150x-183\right)\right\}$$

2.1130 ODE No. 1130

$$ay(x)+2xy''(x)+y'(x)=0$$

✓ **Mathematica** : cpu = 0.0129997 (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 = 0.015 (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 = 0.0120464 (sec), leaf count = 48

$$\left\{\left\{y(x) \to \sqrt{x}\left(c_1 U\left(\frac{1}{2} - a, \frac{3}{2}, \frac{x}{2}\right) + c_2 L_{a-\frac{1}{2}}^{\frac{1}{2}}\left(\frac{x}{2}\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.086 (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 = 0.0120976 (sec), leaf count = 44

$$\left\{\left\{y(x) \to \sqrt{x}\left(c_1 U\left(\frac{1-a}{2}, \frac{3}{2}, x\right) + c_2 L_{\frac{a-1}{2}}^{\frac{1}{2}}(x)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.085 (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 = 0.100542 (sec), leaf count = 78

$$\left\{\left\{y(x) \to 2^{5/8} c_1 e^{x-\frac{1}{2}} - \frac{2^{3/8} c_2 e^{\frac{x}{2}-\frac{1}{4}}}{\sqrt[4]{2x-1}} + \frac{c_2 e^{x-\frac{1}{2}} \Gamma\left(\frac{3}{4}, \frac{1}{4}(2x-1)\right)}{\sqrt[8]{2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.122 (sec), leaf count = 37

$$\left\{y(x) = 1 e^{\frac{x}{2}}\left(U\left(1, \frac{3}{4}, \frac{x}{2} - \frac{1}{4}\right)\_C2 + M\left(1, \frac{3}{4}, \frac{x}{2} - \frac{1}{4}\right)\_C1\right)\frac{1}{\sqrt[4]{2\,x-1}}\right\}$$

2.1134 ODE No. 1134

$$4xy''(x) - (a + x)y(x) = 0$$

✓ **Mathematica** : cpu = 0.100412 (sec), leaf count = 44

$$\left\{\left\{y(x) \to \frac{1}{4}e^{-x/2}x\left(c_2\,{}_1F_1\left(\frac{a}{4}+1;2;x\right) + c_1U\left(\frac{a}{4}+1,2,x\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.052 (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 = 0.011113 (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 = 0.013 (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 = 0.0228267 (sec), leaf count = 23

$$\left\{\left\{y(x) \to e^{x/2}(c_2\mathrm{Ei}(-x) + c_1)\right\}\right\}$$

✓ **Maple** : cpu = 0.035 (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 = 0.102561 (sec), leaf count = 48

$$\left\{\left\{y(x) \to \frac{1}{4}e^{-x/2}x\left(c_2\,{}_1F_1\left(\frac{1}{2}-\frac{l}{4};2;x\right)+c_1U\left(\frac{1}{2}-\frac{l}{4},2,x\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.061 (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 = 0.0330739 (sec), leaf count = 32

$$\left\{\left\{y(x) \to e^{-x/2}\left(c_1U(-n,m,x)+c_2L_n^{m-1}(x)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.078 (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 = 0.0150936 (sec), leaf count = 59

$$\left\{\left\{y(x) \to e^{-x/4}\sqrt{x}\left(c_1U\left(\frac{a+6}{8},\frac{3}{2},\frac{x}{2}\right)+c_2L_{\frac{1}{8}(-a-6)}^{\frac{1}{2}}\left(\frac{x}{2}\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.085 (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 = 0.0523907 (sec), leaf count = 120

$$\left\{\left\{y(x)\to a^{\frac{1}{2}\left(\frac{b}{a}-1\right)}c^{\frac{a-b}{2a}}x^{\frac{a-b}{2a}}\left(c_1\Gamma\left(\frac{b}{a}\right)J_{\frac{b}{a}-1}\left(\frac{2\sqrt{c}\sqrt{x}}{\sqrt{a}}\right)+c_2\Gamma\left(2-\frac{b}{a}\right)J_{1-\frac{b}{a}}\left(\frac{2\sqrt{c}\sqrt{x}}{\sqrt{a}}\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.026 (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 = 0.131667 (sec), leaf count = 63

$$\left\{\left\{y(x)\to\frac{1}{2}\left(\frac{b^2c_2e^{-\frac{bx}{a}}\mathrm{Ei}\left(\frac{bx}{a}\right)}{a^2}-\frac{c_2(a+bx)}{ax^2}+2c_1e^{-\frac{bx}{a}}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.056 (sec), leaf count = 55

$$\left\{y(x) = \frac{1}{x^2}\left(Ei\left(1,-\frac{bx}{a}\right)e^{-\frac{bx}{a}}\_C2\,b^2x^2 + \_C1\,e^{-\frac{bx}{a}}x^2 + a\_C2\,(bx+a)\right)\right\}$$

2.1142 ODE No. 1142

$$cy(x)\sqrt[5]{ax+b} + 5(ax+b)y''(x) + 8ay'(x) = 0$$

✓ **Mathematica** : cpu = 0.0729157 (sec), leaf count = 89

$$\left\{\left\{y(x)\to\frac{3a\left(c_2\sin\left(\frac{\sqrt{5}\sqrt{c}(ax+b)^{3/5}}{3a}\right)+2c_1\cos\left(\frac{\sqrt{5}\sqrt{c}(ax+b)^{3/5}}{3a}\right)\right)}{\sqrt{5}\sqrt{c}(ax+b)^{3/5}}\right\}\right\}$$

✓ **Maple** : cpu = 0.123 (sec), leaf count = 53

$$\left\{y(x) = 1\left(\_C2\,\cosh\left(\frac{1}{3a}(ax+b)^{\frac{3}{5}}\sqrt{-5c}\right) + \_C1\,\sinh\left(\frac{1}{3a}(ax+b)^{\frac{3}{5}}\sqrt{-5c}\right)\right)(ax+b)^{-\frac{3}{5}}\right\}$$

2.1143 ODE No. 1143

$$(a+bx)y'(x)+2axy''(x)+cy(x)=0$$

✓ **Mathematica** : cpu = 0.0484302 (sec), leaf count = 70

$$\left\{\left\{y(x)\to \sqrt{x}e^{-\frac{bx}{2a}}\left(c_1U\left(1-\frac{c}{b},\frac{3}{2},\frac{bx}{2a}\right)+c_2L_{\frac{c}{b}-1}^{\frac{1}{2}}\left(\frac{bx}{2a}\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.117 (sec), leaf count = 57

$$\left\{y(x)=\sqrt{x}\mathrm{e}^{-\frac{bx}{2a}}\left(U\left(\frac{b-c}{b},\frac{3}{2},\frac{bx}{2a}\right)\_C2+M\left(\frac{b-c}{b},\frac{3}{2},\frac{bx}{2a}\right)\_C1\right)\right\}$$

2.1144 ODE No. 1144

$$(3a+bx)y'(x)+2axy''(x)+cy(x)=0$$

✓ **Mathematica** : cpu = 0.0486987 (sec), leaf count = 69

$$\left\{\left\{y(x)\to e^{-\frac{bx}{2a}}\left(c_1U\left(\frac{3}{2}-\frac{c}{b},\frac{3}{2},\frac{bx}{2a}\right)+c_2L_{\frac{c}{b}-\frac{3}{2}}^{\frac{1}{2}}\left(\frac{bx}{2a}\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.092 (sec), leaf count = 60

$$\left\{y(x)=\mathrm{e}^{-\frac{bx}{2a}}\left(U\left(\frac{3b-2c}{2b},\frac{3}{2},\frac{bx}{2a}\right)\_C2+M\left(\frac{3b-2c}{2b},\frac{3}{2},\frac{bx}{2a}\right)\_C1\right)\right\}$$

2.1145 ODE No. 1145

$$y(x)(\mathrm{a0}x+\mathrm{b0})+(\mathrm{a1}x+\mathrm{b1})y'(x)+(\mathrm{a2}x+\mathrm{b2})y''(x)=0$$

✓ **Mathematica** : cpu = 0.434565 (sec), leaf count = 301

$$\left\{\left\{y(x)\to e^{-\frac{x\left(\sqrt{\mathrm{a1}^2-4\mathrm{a0}\mathrm{a2}}+\mathrm{a1}\right)}{2\mathrm{a2}}}(\mathrm{a2}x+\mathrm{b2})^{\frac{\mathrm{a1}\mathrm{b2}+\mathrm{a2}^2-\mathrm{a2}\mathrm{b1}}{\mathrm{a2}^2}}\left(c_1U\left(\frac{2\left(\sqrt{\mathrm{a1}^2-4\mathrm{a0}\mathrm{a2}}-\mathrm{b0}\right)\mathrm{a2}^2+\left(\mathrm{a1}\mathrm{b1}-\sqrt{\mathrm{a1}^2-4\mathrm{a0}\mathrm{a}\right.}{2\mathrm{a2}^2\sqrt{\mathrm{a1}^2-}}\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.212 (sec), leaf count = 248

$$\left\{y(x)=\mathrm{e}^{-\frac{x}{2\,a2}\left(\sqrt{-4\,a0\,a2+a1^2}+a1\right)}(a2\,x+b2)^{\frac{a1\,b2+a2^2-a2\,b1}{a2^2}}\left(M\left(\frac{1}{2\,a2^2}\left(\left(a1\,b2+2\,a2^2-a2\,b1\right)\sqrt{-4\,a0\,a2+a\right.\right.\right.\right.$$

2.1146 ODE No. 1146

$$x^2y''(x) - 6y(x) = 0$$

✓ **Mathematica** : cpu = 0.0283176 (sec), leaf count = 18

$$\left\{\left\{y(x)\to \frac{c_1x^5+c_2}{x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.009 (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 = 0.0186304 (sec), leaf count = 18

$$\left\{\left\{y(x)\to \frac{c_1x^7+c_2}{x^3}\right\}\right\}$$

✓ **Maple** : cpu = 0.009 (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 = 0.0111767 (sec), leaf count = 42

$$\left\{\left\{y(x)\to x^{\frac{1}{2}-\frac{1}{2}\sqrt{1-4a}}\left(c_2x^{\sqrt{1-4a}}+c_1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.013 (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 = 0.0695972 (sec), leaf count = 95

$$\left\{\left\{y(x)\to \sqrt{a}\sqrt{x}\left(c_1\Gamma\left(1-\sqrt{1-4b}\right)J_{-\sqrt{1-4b}}\left(2\sqrt{a}\sqrt{x}\right)+c_2\Gamma\left(\sqrt{1-4b}+1\right)J_{\sqrt{1-4b}}\left(2\sqrt{a}\sqrt{x}\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.015 (sec), leaf count = 45

$$\left\{y(x)=\sqrt{x}\left(Y_{\sqrt{1-4\,b}}(2\,\sqrt{a}\sqrt{x})\_C2+J_{\sqrt{1-4\,b}}(2\,\sqrt{a}\sqrt{x})\_C1\right)\right\}$$

2.1150 ODE No. 1150

$$x^2y''(x)+\left(x^2-2\right)y(x)=0$$

✓ **Mathematica** : cpu = 0.0106945 (sec), leaf count = 42

$$\left\{\left\{y(x)\to -\frac{\sqrt{\frac{2}{\pi}}\left((c_2x-c_1)\sin(x)+(c_1x+c_2)\cos(x)\right)}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.078 (sec), leaf count = 27

$$\left\{y(x)=\frac{(\_C1\,x+\_C2)\cos(x)+\sin(x)\,(\_C2\,x-\_C1)}{x}\right\}$$

2.1151 ODE No. 1151

$$x^2y''(x)-\left(ax^2+2\right)y(x)=0$$

✓ **Mathematica** : cpu = 0.0205571 (sec), leaf count = 88

$$\left\{\left\{y(x)\to -\frac{i\sqrt{\frac{2}{\pi}}\sqrt{x}\left((c_1+i\sqrt{a}c_2x)\sinh\left(\sqrt{a}x\right)-\left(\sqrt{a}c_1x+ic_2\right)\cosh\left(\sqrt{a}x\right)\right)}{\left(-i\sqrt{a}x\right)^{3/2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.094 (sec), leaf count = 43

$$\left\{y(x)=\frac{1}{x}\left(\_C2\,\left(ax+\sqrt{a}\right)\mathrm{e}^{-\sqrt{a}x}-\_C1\,\mathrm{e}^{\sqrt{a}x}\left(ax-\sqrt{a}\right)\right)\right\}$$

2.1152 ODE No. 1152

$$\left(a^2x^2-6\right)y(x)+x^2y''(x)=0$$

✓ **Mathematica** : cpu = 0.021205 (sec), leaf count = 79

$$\left\{\left\{y(x)\to -\frac{\sqrt{\frac{2}{\pi}}\sqrt{x}\left(\left(c_1\left(a^2x^2-3\right)+3ac_2x\right)\sin(ax)+\left(-a^2c_2x^2+3ac_1x+3c_2\right)\cos(ax)\right)}{(ax)^{5/2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.263 (sec), leaf count = 53

$$\left\{y(x)=\frac{\left(\_C1\,a^2x^2+3\_C2\,ax-3\_C1\right)\cos(ax)+\sin(ax)\left(\_C2\,a^2x^2-3\_C1\,ax-3\_C2\right)}{x^2}\right\}$$

2.1153 ODE No. 1153

$$y(x)\left(ax^2-(v-1)v\right)+x^2y''(x)=0$$

✓ **Mathematica** : cpu = 0.0367764 (sec), leaf count = 44

$$\left\{\left\{y(x)\to \sqrt{x}\left(c_1J_{v-\frac{1}{2}}\left(\sqrt{a}x\right)+c_2Y_{v-\frac{1}{2}}\left(\sqrt{a}x\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.032 (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 = 0.0222862 (sec), leaf count = 88

$$\left\{\left\{y(x)\to c_1M_{-\frac{ib}{2\sqrt{a}},-\frac{1}{2}i\sqrt{4c-1}}\left(2i\sqrt{a}x\right)+c_2W_{-\frac{ib}{2\sqrt{a}},-\frac{1}{2}i\sqrt{4c-1}}\left(2i\sqrt{a}x\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.135 (sec), leaf count = 57

$$\left\{y(x)=\_C1\,M_{-\frac{i}{2}b\frac{1}{\sqrt{a}},\,\frac{1}{2}\sqrt{1-4\,c}}\left(2\,i\sqrt{a}x\right)+\_C2\,W_{-\frac{i}{2}b\frac{1}{\sqrt{a}},\,\frac{1}{2}\sqrt{1-4\,c}}\left(2\,i\sqrt{a}x\right)\right\}$$

2.1155 ODE No. 1155

$$y(x)\left(ax^k-(b-1)b\right)+x^2y''(x)=0$$

✓ **Mathematica** : cpu = 0.0617713 (sec), leaf count = 116

$$\left\{\left\{y(x)\to k^{-1/k}a^{\frac{1}{2}/k}\left(x^k\right)^{\frac{1}{2}/k}\left(c_1\Gamma\left(\frac{-2b+k+1}{k}\right)J_{\frac{1-2b}{k}}\left(\frac{2\sqrt{a}\sqrt{x^k}}{k}\right)+c_2\Gamma\left(\frac{2b+k-1}{k}\right)J_{\frac{2b-1}{k}}\left(\frac{2\sqrt{a}\sqrt{x^k}}{k}\right)\right)\right.\right.$$

✓ **Maple** : cpu = 0.052 (sec), leaf count = 67

$$\left\{y(x)=\sqrt{x}\left(Y_{\frac{1}{k}\sqrt{(2b-1)^2}}\left(2\frac{\sqrt{a}x^{k/2}}{k}\right)\_C2+J_{\frac{1}{k}\sqrt{(2b-1)^2}}\left(2\frac{\sqrt{a}x^{k/2}}{k}\right)\_C1\right)\right\}$$

2.1156 ODE No. 1156

$$x^2y''(x)+\frac{y(x)}{\log(x)}-e^xx(x\log(x)+2)=0$$

✗ **Mathematica** : cpu = 0.237513 (sec), leaf count = 0 , could not solve

```
DSolve[-(E^x*x*(2 + x*Log[x])) + y[x]/Log[x] + x^2*Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 0.147 (sec), leaf count = 71

$$\left\{y(x)=\ln(x)\_C2-(Ei(1,-\ln(x))\ln(x)+x)\_C1-\left(-\int\frac{(Ei(1,-\ln(x))\ln(x)+x)\,e^x(2+x\ln(x))}{x}\,dx+e\right.\right.$$

2.1157 ODE No. 1157

$$ay'(x)+x^2y''(x)-xy(x)=0$$

✗ **Mathematica** : cpu = 0.545533 (sec), leaf count = 0 , DifferentialRoot result

$$\left\{\left\{y(x)\to\text{DifferentialRoot}\left(\{y,x\},\left\{y''(x)x^2-y(x)x+ay'(x)=0,y(1)=c_1,y'(1)=c_2\right\}\right)(x)\right\}\right\}$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x)=DESol\left(\left\{\frac{d^2}{dx^2}\_Y(x)+\frac{a\frac{d}{dx}\_Y(x)}{x^2}-\frac{\_Y(x)}{x}\right\},\{\_Y(x)\}\right)\right\}$$

2.1158 ODE No. 1158

$$-y(x)\left(ab+b^2x^2\right)+ay'(x)+x^2y''(x)=0$$

✓ **Mathematica** : cpu = 16.9016 (sec), leaf count = 37

$$\left\{\left\{y(x)\to e^{bx}\left(c_2\int_1^x e^{\frac{a}{K[1]}-2bK[1]}\,dK[1]+c_1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.268 (sec), leaf count = 178

$$\left\{y(x)=\sqrt{x}\left(\mathrm{e}^{bx}\mathit{HeunD}\left(-4\sqrt{2}\sqrt{ab},-1-4\sqrt{2}\sqrt{ab},8\sqrt{2}\sqrt{ab},-4\sqrt{2}\sqrt{ab}+1,1\left(\sqrt{2}\sqrt{ab}x-a\right)\left(\sqrt{2}\sqrt{ab}x+a\right)^{-}\right.\right.\right.$$

2.1159 ODE No. 1159

$$-ax^2+x^2y''(x)+xy'(x)-y(x)=0$$

✓ **Mathematica** : cpu = 0.0162139 (sec), leaf count = 39

$$\left\{\left\{y(x)\to\frac{2ax^3+3c_1\left(x^2+1\right)+3ic_2\left(x^2-1\right)}{6x}\right\}\right\}$$

✓ **Maple** : cpu = 0.015 (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 = 0.0106708 (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 = 0.014 (sec), leaf count = 23

$$\left\{y(x)=\_C1\,\sin\left(\sqrt{a}\ln(x)\right)+\_C2\,\cos\left(\sqrt{a}\ln(x)\right)\right\}$$

2.1161 ODE No. 1161

$$-(a+x)y(x)+x^2y''(x)+xy'(x)=0$$

✓ **Mathematica** : cpu = 0.0526409 (sec), leaf count = 78

$$\left\{\left\{y(x)\to(-1)^{-\sqrt{a}}c_1\Gamma\left(1-2\sqrt{a}\right)I_{-2\sqrt{a}}\left(2\sqrt{x}\right)+(-1)^{\sqrt{a}}c_2\Gamma\left(2\sqrt{a}+1\right)I_{2\sqrt{a}}\left(2\sqrt{x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.013 (sec), leaf count = 31

$$\left\{y(x)=\_C1\ I_{2\sqrt{a}}\left(2\sqrt{x}\right)+\_C2\ K_{2\sqrt{a}}\left(2\sqrt{x}\right)\right\}$$

2.1162 ODE No. 1162

$$\left(x^2-v^2\right)y(x)+x^2y''(x)+xy'(x)=0$$

✓ **Mathematica** : cpu = 0.0644025 (sec), leaf count = 18

$$\{\{y(x)\to c_1J_v(x)+c_2Y_v(x)\}\}$$

✓ **Maple** : cpu = 0.012 (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 = 0.370173 (sec), leaf count = 70

$$\left\{\left\{y(x)\to J_v(x)\int_1^x-\frac{\pi f(K[1])Y_v(K[1])}{2K[1]}\,dK[1]+Y_v(x)\int_1^x\frac{\pi f(K[2])J_v(K[2])}{2K[2]}\,dK[2]+c_1J_v(x)+c_2Y_v(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.119 (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 = 0.0238251 (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 = 0.031 (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 = 0.086492 (sec), leaf count = 26

$$\left\{\left\{y(x)\to\frac{c_2(a+x)}{a^2}+c_1xe^{a/x}\right\}\right\}$$

✓ **Maple** : cpu = 0.016 (sec), leaf count = 19

$$\left\{y(x)=(x+a)\_C1+\_C2\,e^{\frac{a}{x}}x\right\}$$

2.1166 ODE No. 1166

$$-3x^3+x^2y''(x)-xy'(x)+y(x)=0$$

✓ **Mathematica** : cpu = 0.0153237 (sec), leaf count = 23

$$\left\{\left\{y(x)\to c_1x+c_2x\log(x)+\frac{3x^3}{4}\right\}\right\}$$

✓ **Maple** : cpu = 0.016 (sec), leaf count = 21

$$\left\{y(x)=\frac{x\left(4\_C1\ \ln(x)+3x^2+4\_C2\right)}{4}\right\}$$

2.1167 ODE No. 1167

$$y(x)\left(ax^m+b\right)+x^2y''(x)-xy'(x)=0$$

✓ **Mathematica** : cpu = 0.0899152 (sec), leaf count = 130

$$\left\{\left\{y(x)\to m^{-2/m}a^{\frac{1}{m}}\left(x^m\right)^{\frac{1}{m}}\left(c_1\Gamma\left(1-\frac{2i\sqrt{b-1}}{m}\right)J_{-\frac{2i\sqrt{b-1}}{m}}\left(\frac{2\sqrt{a}\sqrt{x^m}}{m}\right)+c_2\Gamma\left(\frac{2i\sqrt{b-1}}{m}+1\right)J_{\frac{2i\sqrt{b-1}}{m}}\left(\frac{2\sqrt{a}\sqrt{}}{m}\right.\right.\right.$$

✓ **Maple** : cpu = 0.033 (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 = 0.00630785 (sec), leaf count = 15

$$\left\{\left\{y(x)\to c_2-\frac{c_1}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.009 (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 = 0.0757834 (sec), leaf count = 103

$$\left\{\left\{y(x)\to\frac{c_1\Gamma\left(1-\sqrt{4b^2+1}\right)J_{-\sqrt{4b^2+1}}(2\sqrt{a}\sqrt{x})+c_2\Gamma\left(\sqrt{4b^2+1}+1\right)J_{\sqrt{4b^2+1}}(2\sqrt{a}\sqrt{x})}{\sqrt{a}\sqrt{x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.029 (sec), leaf count = 49

$$\left\{y(x)=1\left(\_C2\,Y_{\sqrt{4\,b^2+1}}(2\,\sqrt{a}\sqrt{x})+\_C1\,J_{\sqrt{4\,b^2+1}}(2\,\sqrt{a}\sqrt{x})\right)\frac{1}{\sqrt{x}}\right\}$$

2.1170 ODE No. 1170

$$y(x)\left(ax^2+b\right)+x^2y''(x)+2xy'(x)=0$$

✓ **Mathematica** : cpu = 0.0257222 (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 = 0.042 (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 = 0.0591145 (sec), leaf count = 92

$$\left\{\left\{y(x)\to e^{-i\sqrt{l}x}x^n\left(c_1U\left(\frac{ia}{2\sqrt{l}}+n+1,2n+2,2i\sqrt{l}x\right)+c_2L_{-\frac{ia}{2\sqrt{l}}-n-1}^{2n+1}\left(2i\sqrt{l}x\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.133 (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 = 0.0715859 (sec), leaf count = 145

$$\left\{\left\{y(x)\to 2^{\frac{1}{2}-\frac{1}{2}\sqrt{1-4a}}\left(\frac{1}{x}\right)^{\frac{1}{2}-\frac{1}{2}\sqrt{1-4a}}\left(2^{\sqrt{1-4a}}c_2\left(\frac{1}{x}\right)^{\sqrt{1-4a}}\,{}_1F_1\left(\frac{1}{2}\left(\sqrt{1-4a}+1\right);\sqrt{1-4a}+1;-\frac{2}{x}\right)+c_1\,{}_1F_1\left(\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.037 (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 = 0.126024 (sec), leaf count = 74

$$\left\{\left\{y(x)\to(-2)^{1-b}c_1a^{1-b}\left(\frac{1}{x}\right)^{1-b}\,{}_1F_1\left(1-b;2-2b;\frac{2a}{x}\right)+(-2)^bc_2a^b\left(\frac{1}{x}\right)^b\,{}_1F_1\left(b;2b;\frac{2a}{x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.094 (sec), leaf count = 37

$$\left\{y(x)=1\mathrm{e}^{\frac{a}{x}}\left(K_{b-\frac{1}{2}}\left(\frac{a}{x}\right)\_C2+I_{b-\frac{1}{2}}\left(\frac{a}{x}\right)\_C1\right)\frac{1}{\sqrt{x}}\right\}$$

2.1174 ODE No. 1174

$$x^5(-\log(x))+x^2y''(x)-2xy'(x)+2y(x)=0$$

✓ **Mathematica** : cpu = 0.024225 (sec), leaf count = 32

$$\left\{\left\{y(x)\to c_2x^2+c_1x-\frac{7x^5}{144}+\frac{1}{12}x^5\log(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.047 (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 = 0.190055 (sec), leaf count = 33

$$\left\{\left\{y(x)\to\frac{-(2a+1)\sin(x)-ax\cos(x)+c_2x^5+c_1}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.06 (sec), leaf count = 29

$$\left\{y(x)=\frac{(-2\,a-1)\sin(x)+x^5\_C2-ax\cos(x)+\_C1}{x}\right\}$$

2.1176 ODE No. 1176

$$x^2y''(x) + (x^2+2)\,y(x) - 2xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.0196886 (sec), leaf count = 33

$$\left\{\left\{y(x)\to c_1e^{-ix}x - \frac{1}{2}ic_2e^{ix}x\right\}\right\}$$

✓ **Maple** : cpu = 0.034 (sec), leaf count = 15

$$\{y(x) = x(\cos(x)\_C2 + \sin(x)\_C1)\}$$

2.1177 ODE No. 1177

$$x^2y''(x) + (x^2+2)\,y'(x) + x^2(-\sec(x)) - 2xy'(x) = 0$$

✗ **Mathematica** : cpu = 300.004 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.08 (sec), leaf count = 34

$$\left\{y(x) = x\left(-\cos(x)\int\frac{\sin(x)}{\cos(x)\,x}\,dx + \cos(x)\_C1 + \sin(x)\,(\_C2 + \ln(x))\right)\right\}$$

2.1178 ODE No. 1178

$$x^3(-\sec(x)) + x^2y''(x) + (x^2+2)\,y(x) - 2xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.0654924 (sec), leaf count = 63

$$\left\{\left\{y(x)\to \frac{1}{2}e^{-ix}x\left(-ic_2e^{2ix} + 2c_1 + e^{2ix}\log\left(1+e^{-2ix}\right) + \log\left(1+e^{2ix}\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.03 (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 = 0.0230478 (sec), leaf count = 38

$$\left\{\left\{y(x)\to c_1xe^{-iax}-\frac{ic_2xe^{iax}}{2a}\right\}\right\}$$

✓ **Maple** : cpu = 0.034 (sec), leaf count = 19

$$\{y(x)=x(\cos(ax)\_C2+\sin(ax)\_C1)\}$$

2.1180 ODE No. 1180

$$-f(x)+\left(-v^2+x^2+1\right)y(x)+x^2y''(x)+3xy'(x)=0$$

✓ **Mathematica** : cpu = 0.240979 (sec), leaf count = 66

$$\left\{\left\{y(x)\to\frac{J_v(x)\int_1^x-\frac{1}{2}\pi f(K[1])Y_v(K[1])\,dK[1]+Y_v(x)\int_1^x\frac{1}{2}\pi f(K[2])J_v(K[2])\,dK[2]+c_1J_v(x)+c_2Y_v(x)}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.052 (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 = 0.0531644 (sec), leaf count = 27

$$\left\{\left\{y(x)\to\frac{e^{-1/x}\left(c_1-c_2\mathrm{Ei}\left(\frac{1}{x}\right)\right)}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.02 (sec), leaf count = 25

$$\left\{y(x)=\frac{1}{e^{x^{-1}}x}\left(\_C1\;Ei\left(1,-x^{-1}\right)+\_C2\right)\right\}$$

2.1182 ODE No. 1182

$$x^2y''(x) - 3xy'(x) + 4y(x) - 5x = 0$$

✓ **Mathematica** : cpu = 0.0188013 (sec), leaf count = 20

$$\{\{y(x) \to x(c_1x + 2c_2x\log(x) + 5)\}\}$$

✓ **Maple** : cpu = 0.015 (sec), leaf count = 20

$$\{y(x) = x^2\_C2 + x^2\ln(x)\_C1 + 5x\}$$

2.1183 ODE No. 1183

$$x^2y''(x) + x^2(-\log(x)) - 3xy'(x) - 5y(x) = 0$$

✓ **Mathematica** : cpu = 0.0323209 (sec), leaf count = 27

$$\left\{\left\{y(x) \to c_1x^5 + \frac{c_2}{x} - \frac{1}{9}x^2\log(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.013 (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 = 0.0216799 (sec), leaf count = 30

$$\left\{\left\{y(x) \to \frac{1}{2}x^2\left(2c_2x + 2c_1 + x^2 + 2\log(x) + 2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.028 (sec), leaf count = 25

$$\left\{y(x) = \frac{x^2\left(2\_C1\,x + x^2 + 2\ln(x) + 2\_C2 + 2\right)}{2}\right\}$$

2.1185 ODE No. 1185

$$-\left(2x^3-4\right)y(x)+x^2y''(x)+5xy'(x)=0$$

✓ **Mathematica** : cpu = 0.0418197 (sec), leaf count = 65

$$\left\{\left\{y(x)\to \frac{6\sqrt[3]{3}c_2K_0\left(\frac{2}{3}\sqrt{2}x^{3/2}\right)-3\sqrt[3]{-3}c_1I_0\left(\frac{2}{3}\sqrt{2}x^{3/2}\right)}{2^{2/3}x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.031 (sec), leaf count = 33

$$\left\{y(x)=\frac{1}{x^2}\left(\_C1\ I_0\left(\frac{2\sqrt{2}}{3}x^{\frac{3}{2}}\right)+\_C2\ K_0\left(\frac{2\sqrt{2}}{3}x^{\frac{3}{2}}\right)\right)\right\}$$

2.1186 ODE No. 1186

$$x^3(-\sin(x))+x^2y''(x)-5xy'(x)+8y(x)=0$$

✓ **Mathematica** : cpu = 0.0352795 (sec), leaf count = 37

$$\left\{\left\{y(x)\to \frac{1}{2}x^2\left(2c_2x^2+2c_1+x^2\text{Ci}(x)-x\sin(x)+\cos(x)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.028 (sec), leaf count = 36

$$\left\{y(x)=\frac{x^4\,Ci(x)}{2}-\frac{\sin(x)\,x^3}{2}+\frac{x^2\left(2\_C1\ x^2+2\_C2+\cos(x)\right)}{2}\right\}$$

2.1187 ODE No. 1187

$$axy'(x)+by(x)+x^2y''(x)=0$$

✓ **Mathematica** : cpu = 0.0138348 (sec), leaf count = 57

$$\left\{\left\{y(x)\to x^{\frac{1}{2}\left(-\sqrt{a^2-2a-4b+1}-a+1\right)}\left(c_2x^{\sqrt{a^2-2a-4b+1}}+c_1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.018 (sec), leaf count = 53

$$\left\{y(x)=\_C1\ x^{-\frac{a}{2}+\frac{1}{2}+\frac{1}{2}\sqrt{a^2-2a-4b+1}}+\_C2\ x^{-\frac{a}{2}+\frac{1}{2}-\frac{1}{2}\sqrt{a^2-2a-4b+1}}\right\}$$

2.1188 ODE No. 1188

$$(ax+b)y'(x)+cy(x)+x^2y''(x)=0$$

✓ **Mathematica** : cpu = 0.152778 (sec), leaf count = 243

$$\left\{\left\{y(x)\to -i^{-\sqrt{a^2-2a-4c+1}+a+1}b^{\frac{1}{2}\left(-\sqrt{a^2-2a-4c+1}+a-1\right)}\left(\frac{1}{x}\right)^{\frac{1}{2}\left(-\sqrt{a^2-2a-4c+1}+a-1\right)}\left(c_1\,{}_1F_1\left(\frac{1}{2}\left(a-\sqrt{a^2-2a-\right.\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.177 (sec), leaf count = 114

$$\left\{y(x)=x^{-\frac{1}{2}\sqrt{a^2-2\,a-4\,c+1}-\frac{a}{2}+\frac{1}{2}}\left(U\left(-\frac{1}{2}+\frac{1}{2}\sqrt{a^2-2\,a-4\,c+1}+\frac{a}{2},\,1+\sqrt{a^2-2\,a-4\,c+1},\,\frac{b}{x}\right)\_C2+M\left(-\right.\right.\right.$$

2.1189 ODE No. 1189

$$axy'(x)+y(x)\left(bx^m+c\right)+x^2y''(x)=0$$

✓ **Mathematica** : cpu = 0.077654 (sec), leaf count = 168

$$\left\{\left\{y(x)\to m^{\frac{a-1}{m}}b^{-\frac{a-1}{2m}}\left(x^m\right)^{-\frac{a-1}{2m}}\left(c_1\Gamma\left(1-\frac{\sqrt{a^2-2a-4c+1}}{m}\right)J_{-\frac{\sqrt{a^2-2a-4c+1}}{m}}\left(\frac{2\sqrt{b}\sqrt{x^m}}{m}\right)+c_2\Gamma\left(\frac{m+\sqrt{a^2-}}{}\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.033 (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 = 0.0337916 (sec), leaf count = 95

$$\left\{\left\{y(x)\to e^{-x}x^{\frac{1}{2}\left(\sqrt{1-4b}+1\right)}\left(c_1U\left(\frac{1}{2}\left(-2a+\sqrt{1-4b}+1\right),\sqrt{1-4b}+1,x\right)+c_2L_{a-\frac{1}{2}\sqrt{1-4b}-\frac{1}{2}}^{\sqrt{1-4b}}(x)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.102 (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 = 0.0108513 (sec), leaf count = 72

$$\left\{\left\{y(x) \to \frac{e^{-x/2}\left(2(2c_1 + ic_2x)\sinh\left(\frac{x}{2}\right) - 2(c_1x + 2ic_2)\cosh\left(\frac{x}{2}\right)\right)}{\sqrt{\pi}\sqrt{-ix}\sqrt{x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.017 (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 = 11.8587 (sec), leaf count = 34

$$\left\{\left\{y(x) \to e^{-x}\left(c_2\int_1^x e^{K[1]-\frac{1}{K[1]}}\,dK[1] + c_1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.15 (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 = 0.0545397 (sec), leaf count = 42

$$\left\{\left\{y(x) \to \frac{c_1((x-8)x+20) - c_2e^{-x}\left(x^3+9x^2+36x+60\right)}{x^3}\right\}\right\}$$

✓ **Maple** : cpu = 0.039 (sec), leaf count = 38

$$\left\{y(x) = \frac{\_C2\ \left(x^3 + 9\,x^2 + 36\,x + 60\right)\mathrm{e}^{-x} + \_C1\ \left(x^2 - 8\,x + 20\right)}{x^3}\right\}$$

2.1194 ODE No. 1194

$$x^2y''(x) + (x+1)xy'(x) + (3x-1)y(x) = 0$$

✓ **Mathematica** : cpu = 0.0654543 (sec), leaf count = 66

$$\left\{\left\{y(x)\to \frac{e^{-x}\left(c_2(x-3)x^2\text{Ei}(x)+6c_1x^3-x^2\left(c_2e^x+18c_1\right)+2c_2e^xx+c_2e^x\right)}{6x}\right\}\right\}$$

✓ **Maple** : cpu = 0.054 (sec), leaf count = 48

$$\left\{y(x) = \frac{x^2\_C2\,\mathrm{e}^{-x}(x-3)\,Ei(1,-x)+\_C1\,x^2(x-3)\,\mathrm{e}^{-x}+\_C2\,\left(x^2-2\,x-1\right)}{x}\right\}$$

2.1195 ODE No. 1195

$$x^2y''(x) + (x+3)xy'(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 0.0300203 (sec), leaf count = 63

$$\left\{\left\{y(x)\to e^{-x}x^{\sqrt{2}-1}\left(c_1U\left(2+\sqrt{2},1+2\sqrt{2},x\right)+c_2L_{-2-\sqrt{2}}^{2\sqrt{2}}(x)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.121 (sec), leaf count = 93

$$\left\{y(x) = -1\mathrm{e}^{-\frac{x}{2}}\left(-\_C1\,\left(\sqrt{2}+x+1\right)I_{-\frac{1}{2}+\sqrt{2}}\left(\frac{x}{2}\right)-\_C1\,\left(-\sqrt{2}+x+1\right)I_{\frac{1}{2}+\sqrt{2}}\left(\frac{x}{2}\right)+\_C2\,\left(\left(-x-\sqrt{2}-1\right)\right.\right.\right.$$

2.1196 ODE No. 1196

$$x^2y''(x) - (x-1)xy'(x) + (x-1)y(x) = 0$$

✓ **Mathematica** : cpu = 0.0334486 (sec), leaf count = 34

$$\left\{\left\{y(x)\to \frac{c_2\left(x^2\text{Ei}(x)-e^x(x+1)\right)}{2x}+c_1x\right\}\right\}$$

✓ **Maple** : cpu = 0.038 (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 = 0.0205183 (sec), leaf count = 67

$$\left\{\left\{y(x)\to \frac{e^{x/2}\left(c_1 J_{\frac{1}{2}\sqrt{4a+1}}\left(-\frac{ix}{2}\right)+c_2 Y_{\frac{1}{2}\sqrt{4a+1}}\left(-\frac{ix}{2}\right)\right)}{\sqrt{x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.046 (sec), leaf count = 43

$$\left\{y(x)=1\mathrm{e}^{\frac{x}{2}}\left(K_{\frac{1}{2}\sqrt{4a+1}}\left(\frac{x}{2}\right)\_C2+I_{\frac{1}{2}\sqrt{4a+1}}\left(\frac{x}{2}\right)\_C1\right)\frac{1}{\sqrt{x}}\right\}$$

2.1198 ODE No. 1198

$$x^2y''(x)-\left(x^2-2x\right)y'(x)-(3x+2)y(x)=0$$

✓ **Mathematica** : cpu = 0.0338092 (sec), leaf count = 41

$$\left\{\left\{y(x)\to c_1 e^x x-\frac{c_2\left(e^x x^3\mathrm{Ei}(-x)+x^2-x+2\right)}{6x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.043 (sec), leaf count = 37

$$\left\{y(x)=\frac{\mathrm{e}^x Ei(1,x)\_C2\,x^3+\_C1\,x^3\mathrm{e}^x-\_C2\left(x^2-x+2\right)}{x^2}\right\}$$

2.1199 ODE No. 1199

$$x^2y''(x)-(x+4)xy'(x)+4y(x)=0$$

✓ **Mathematica** : cpu = 0.0140319 (sec), leaf count = 41

$$\left\{\left\{y(x)\to c_2 e^x x^4-\frac{1}{6}c_1 x\left(e^x x^3\mathrm{Ei}(-x)+x^2-x+2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.02 (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 = 0.0237588 (sec), leaf count = 45

$$\left\{\left\{y(x)\to e^{-x}\sqrt{x}\left(c_1J_{v-\frac{1}{2}}(-ix)+c_2Y_{v-\frac{1}{2}}(-ix)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.016 (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 = 0.0608904 (sec), leaf count = 44

$$\left\{\left\{y(x)\to\frac{e^{-2x}\left(c_2e^{2x}\left(2x^2-4x+3\right)+c_1(4x+6)\right)}{4x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.02 (sec), leaf count = 34

$$\left\{y(x)=\frac{\_C1\left(2x^2-4x+3\right)}{x^2}+\frac{\_C2\,\mathrm{e}^{-2x}(2x+3)}{x^2}\right\}$$

2.1202 ODE No. 1202

$$x^2y''(x)-2(x+1)xy'(x)+2(x+1)y(x)=0$$

✓ **Mathematica** : cpu = 0.0164091 (sec), leaf count = 21

$$\left\{\left\{y(x)\to x\left(\frac{1}{2}c_2e^{2x}+c_1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.034 (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 = 0.0235396 (sec), leaf count = 80

$$\left\{\left\{y(x)\to -\frac{ax^{3/2}e^{-\frac{ax}{2}}\left(2(2c_1+iac_2x)\sinh\left(\frac{ax}{2}\right)-2(ac_1x+2ic_2)\cosh\left(\frac{ax}{2}\right)\right)}{\sqrt{\pi}(-iax)^{5/2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.023 (sec), leaf count = 28

$$\left\{y(x) = \frac{\_C2\,(ax+2)\,e^{-ax} + \_C1\,(ax-2)}{x}\right\}$$

2.1204 ODE No. 1204

$$x^2(a+2b)y'(x) + y(x)\left(bx^2(a+b)-2\right) + x^2y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0233403 (sec), leaf count = 84

$$\left\{\left\{y(x)\to -\frac{ax^{3/2}e^{-\frac{1}{2}x(a+2b)}\left(2(2c_1+iac_2x)\sinh\left(\frac{ax}{2}\right)-2(ac_1x+2ic_2)\cosh\left(\frac{ax}{2}\right)\right)}{\sqrt{\pi}(-iax)^{5/2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.052 (sec), leaf count = 35

$$\left\{y(x) = \frac{\_C2\,(ax+2)\,e^{-(a+b)x} + \_C1\,e^{-bx}(ax-2)}{x}\right\}$$

2.1205 ODE No. 1205

$$ax^2y'(x) + f(x)y(x) + x^2y''(x) = 0$$

✗ **Mathematica** : cpu = 0.230407 (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 = 0.124064 (sec), leaf count = 102

$$\left\{\left\{y(x)\to e^{-ax}x^{\frac{1}{2}-\frac{b}{2}}\left(c_1J_{\frac{1}{2}\sqrt{b^2-2b-4d+1}}\left(-i\sqrt{a^2-cx}\right)+c_2Y_{\frac{1}{2}\sqrt{b^2-2b-4d+1}}\left(-i\sqrt{a^2-cx}\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.069 (sec), leaf count = 76

$$\left\{y(x)=\mathrm{e}^{-ax}x^{-\frac{b}{2}+\frac{1}{2}}\left(Y_{\frac{1}{2}\sqrt{b^2-2\,b-4\,d+1}}\left(\sqrt{-a^2+cx}\right)\_C2+J_{\frac{1}{2}\sqrt{b^2-2\,b-4\,d+1}}\left(\sqrt{-a^2+cx}\right)\_C1\right)\right\}$$

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 = 0.134997 (sec), leaf count = 223

$$\left\{\left\{y(x)\to e^{-\frac{1}{2}x\left(\sqrt{a^2-4\mathrm{a1}}+a\right)}x^{\frac{1}{2}\left(\sqrt{b^2-2b-4\mathrm{c1}+1}-b+1\right)}\left(c_1U\left(\frac{ab-2\mathrm{b1}+\sqrt{a^2-4\mathrm{a1}}\left(\sqrt{b^2-2b-4\mathrm{c1}+1}+1\right)}{2\sqrt{a^2-4\mathrm{a1}}},\sqrt{b^2\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.232 (sec), leaf count = 110

$$\left\{y(x)=\mathrm{e}^{-\frac{ax}{2}}x^{-\frac{b}{2}}\left(M_{-\frac{ab-2\,b1}{2}\frac{1}{\sqrt{a^2-4\,a1}},\frac{1}{2}\sqrt{b^2-2\,b-4\,c1+1}}\left(\sqrt{a^2-4\,a1}x\right)\_C1+W_{-\frac{ab-2\,b1}{2}\frac{1}{\sqrt{a^2-4\,a1}},\frac{1}{2}\sqrt{b^2-2\,b-4\,c1+1}}\left(\sqrt{\right.\right.\right.$$

2.1208 ODE No. 1208

$$x^3y'(x)+x^2y''(x)+\left(x^2-2\right)y(x)=0$$

✓ **Mathematica** : cpu = 0.0603525 (sec), leaf count = 49

$$\left\{\left\{y(x)\to\frac{\sqrt{2\pi}c_2\mathrm{erf}\left(\frac{x}{\sqrt{2}}\right)-2c_2e^{-\frac{x^2}{2}}x+2c_1}{2x}\right\}\right\}$$

✓ **Maple** : cpu = 0.049 (sec), leaf count = 35

$$\left\{y(x)=\frac{1}{x}\left(\sqrt{\pi}\sqrt{2}Erf\left(\frac{\sqrt{2}x}{2}\right)\_C2-2\,\mathrm{e}^{-1/2\,x^2}\_C2\,x+\_C1\right)\right\}$$

2.1209 ODE No. 1209

$$x^2y''(x) + (x^2+2)\,xy'(x) + (x^2-2)\,y(x) = 0$$

✓ **Mathematica** : cpu = 0.0236407 (sec), leaf count = 59

$$\left\{\left\{y(x) \to \frac{e^{-\frac{x^2}{2}}\left(2\left(c_1e^{\frac{x^2}{2}}x + c_2\right) - \sqrt{2\pi}c_1\text{erfi}\left(\frac{x}{\sqrt{2}}\right)\right)}{2x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.061 (sec), leaf count = 41

$$\left\{y(x) = \frac{1}{x^2}\left(\left(-\mathit{Erf}\left(\frac{i}{2}\sqrt{2}x\right)\pi\,\_C2 + \_C1\right)\mathrm{e}^{-\frac{x^2}{2}} + i\sqrt{\pi}\sqrt{2}\_C2\,x\right)\right\}$$

2.1210 ODE No. 1210

$$y(x)\left(a((-1)^n-1)+2nx^2\right) - 2x\left(x^2-a\right)y'(x) + x^2y''(x) = 0$$

✓ **Mathematica** : cpu = 0.300872 (sec), leaf count = 231

$$\left\{\left\{y(x) \to i^{-a}(-1)^{\frac{1}{4}\left(1-\sqrt{4a^2-4a(-1)^n+1}\right)}x^{\frac{1}{2}\left(-\sqrt{4a^2-4a(-1)^n+1}-2a+1\right)}\left(c_1\,{}_1F_1\left(\frac{1}{4}\left(-2a-2n-\sqrt{4a^2-4(-1)^na+1}\right.\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.664 (sec), leaf count = 81

$$\left\{y(x) = \mathrm{e}^{\frac{x^2}{2}}x^{-\frac{1}{2}-a}\left(W_{\frac{n}{2}+\frac{a}{2}+\frac{1}{4},\,\frac{1}{4}\sqrt{1-4\,(-1)^na+4\,a^2}}\left(x^2\right)\_C2 + M_{\frac{n}{2}+\frac{a}{2}+\frac{1}{4},\,\frac{1}{4}\sqrt{1-4\,(-1)^na+4\,a^2}}\left(x^2\right)\_C1\right)\right\}$$

2.1211 ODE No. 1211

$$4x^3y'(x) + x^2y''(x) + \left(4x^4+2x^2+1\right)y(x) = 0$$

✓ **Mathematica** : cpu = 0.0601928 (sec), leaf count = 60

$$\left\{\left\{y(x) \to \frac{1}{3}e^{-x^2}x^{\frac{1}{2}-\frac{i\sqrt{3}}{2}}\left(3c_1 - i\sqrt{3}c_2x^{i\sqrt{3}}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.067 (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

$$x\left(ax^2+b\right)y'(x)+f(x)y(x)+x^2y''(x)=0$$

✗ **Mathematica** : cpu = 0.405265 (sec), leaf count = 0 , could not solve

```
DSolve[f[x]*y[x] + x*(b + a*x^2)*Derivative[1][y][x] + x^2*Derivative[2][y][x] == 0, y[x], x
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x)=DESol\left(\left\{\frac{f(x)\_Y(x)}{x^2}+\frac{(ax^2+b)\frac{d}{dx}\_Y(x)}{x}+\frac{d^2}{dx^2}\_Y(x)\right\},\{\_Y(x)\}\right)\right\}$$

2.1213 ODE No. 1213

$$\left(x^3+1\right)xy'(x)+x^2y''(x)-y(x)=0$$

✓ **Mathematica** : cpu = 0.0940059 (sec), leaf count = 54

$$\left\{\left\{y(x)\to\frac{\sqrt[3]{3}c_1\,{}_1F_1\left(-\frac{1}{3};\frac{1}{3};-\frac{x^3}{3}\right)}{x}+\frac{c_2x\,{}_1F_1\left(\frac{1}{3};\frac{5}{3};-\frac{x^3}{3}\right)}{\sqrt[3]{3}}\right\}\right\}$$

✓ **Maple** : cpu = 0.057 (sec), leaf count = 53

$$\left\{y(x)=x^{\frac{3}{2}}\left(\_C1\,I_{-\frac{1}{6}}\left(\frac{x^3}{6}\right)+\_C1\,I_{\frac{5}{6}}\left(\frac{x^3}{6}\right)-\_C2\left(K_{\frac{1}{6}}\left(\frac{x^3}{6}\right)-K_{\frac{5}{6}}\left(\frac{x^3}{6}\right)\right)\right)e^{-\frac{x^3}{6}}\right\}$$

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 = 0.333472 (sec), leaf count = 191

$$\left\{\left\{y(x)\to\frac{e^{-\frac{x^2}{2}}2^{\frac{1}{4}\left(\sqrt{4a^2-4a(-1)^n+1}+2\right)}\left(x^2\right)^{\frac{1}{4}\left(\sqrt{4a^2-4a(-1)^n+1}+2\right)}\left(c_1U\left(\frac{1}{4}\left(-2a-2n+\sqrt{4a^2-4(-1)^na+1}+1\right.\right.\right.}{\sqrt{x}}\right.\right.$$

✓ **Maple** : cpu = 0.606 (sec), leaf count = 71

$$\left\{y(x)=1\left(\_C2\,W_{\frac{n}{2}+\frac{a}{2}+\frac{1}{4},\frac{1}{4}\sqrt{1-4(-1)^na+4a^2}}\left(x^2\right)+\_C1\,M_{\frac{n}{2}+\frac{a}{2}+\frac{1}{4},\frac{1}{4}\sqrt{1-4(-1)^na+4a^2}}\left(x^2\right)\right)\frac{1}{\sqrt{x}}\right\}$$

2.1215 ODE No. 1215

$$xy'(x)(ax^n + b) + y(x)\left(\mathrm{a1}x^{2n} + \mathrm{b1}x^n + \mathrm{c1}\right) + x^2y''(x) = 0$$

✓ **Mathematica** : cpu = 0.170168 (sec), leaf count = 410

$$\left\{\left\{y(x) \to 2^{\frac{1}{2}\left(\frac{\sqrt{n^2\left(b^2-2b-4\mathrm{c1}+1\right)}}{n^2}+1\right)} x^{\frac{1}{2}(-b-n+1)} e^{-\frac{\left(\sqrt{a^2-4\mathrm{a1}}+a\right)x^n}{2n}} (x^n)^{\frac{1}{2}\left(\frac{\sqrt{n^2\left(b^2-2b-4\mathrm{c1}+1\right)}}{n^2}+1\right)} \left(c_1 U\left(\frac{\left(n^2 + \sqrt{(b^2 -\right.}{}\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.198 (sec), leaf count = 148

$$\left\{y(x) = \mathrm{e}^{-\frac{ax^n}{2n}} x^{-\frac{b}{2}-\frac{n}{2}+\frac{1}{2}} \left(W_{-\frac{(b+n-1)a-2\,b1}{2\,n}\frac{1}{\sqrt{a^2-4\,a1}},\,\frac{1}{2\,n}\sqrt{b^2-2\,b-4\,c1+1}}\left(\frac{x^n}{n}\sqrt{a^2-4\,a1}\right)\_C2 + M_{-\frac{(b+n-1)a-2\,b1}{2\,n}\frac{1}{\sqrt{a^2-4}}}\right.\right.$$

2.1216 ODE No. 1216

$$xy'(x)\left(ax^{\mathrm{a1}} + b\right) + y(x)\left(Ax^{2\mathrm{a1}} + Bx^{\mathrm{a1}} + Cx^{\mathrm{b1}} + \mathrm{DD}\right) + x^2y''(x) = 0$$

✗ **Mathematica** : cpu = 1.54516 (sec), leaf count = 0 , could not solve

```
DSolve[(DD + B*x^a1 + A*x^(2*a1) + C*x^b1)*y[x] + x*(b + a*x^a1)*Derivative[1][y][x] + x^2*D
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x) = DESol\left(\left\{\frac{\mathrm{d}^2}{\mathrm{d}x^2}\_Y(x) + \frac{\left(ax^{a1}+b\right)\frac{\mathrm{d}}{\mathrm{d}x}\_Y(x)}{x} + \frac{\left(Ax^{2\,a1} + Bx^{a1} + Cx^{b1} + DD\right)\_Y(x)}{x^2}\right\}, \{\_Y(x)\}\right)\right.$$

2.1217 ODE No. 1217

$$-y(x)(a + x\tan(x)) + x^2y''(x) - \left(2x^2\tan(x) - x\right)y'(x) = 0$$

✓ **Mathematica** : cpu = 0.158318 (sec), leaf count = 29

$$\left\{\left\{y(x) \to \sec(x)\left(c_1 J_{\sqrt{a}}(x) + c_2 Y_{\sqrt{a}}(x)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.042 (sec), leaf count = 24

$$\left\{y(x) = \frac{1}{\cos(x)}\left(\_C2\,Y_{\sqrt{a}}(x) + \_C1\,J_{\sqrt{a}}(x)\right)\right\}$$

2.1218 ODE No. 1218

$$y(x)(a + x\cot(x)) + x^2y''(x) + (2x^2\cot(x) + x)\,y'(x) = 0$$

✓ **Mathematica** : cpu = 0.160669 (sec), leaf count = 37

$$\left\{\left\{y(x) \to \csc(x)\left(c_1 J_{i\sqrt{a}}(x) + c_2 Y_{i\sqrt{a}}(x)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.042 (sec), leaf count = 30

$$\left\{y(x) = \frac{1}{\sin(x)}\left(\_C2\; Y_{i\sqrt{a}}(x) + \_C1\; J_{i\sqrt{a}}(x)\right)\right\}$$

2.1219 ODE No. 1219

$$y(x)\left(ax^2 + bx + c + xf'(x) + f(x)^2 - f(x)\right) + 2xf(x)y'(x) + x^2y''(x) = 0$$

✗ **Mathematica** : cpu = 300.034 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.095 (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 = 200.107 (sec), leaf count = 61

$$\left\{\left\{y(x) \to \left(c_1 J_{v-\frac{1}{2}}\left(\sqrt{a}x\right) + c_2 Y_{v-\frac{1}{2}}\left(\sqrt{a}x\right)\right) e^{\int_1^x \left(\frac{1}{2K[1]} - f(K[1])\right) dK[1]}\right\}\right\}$$

✓ **Maple** : cpu = 0.02 (sec), leaf count = 40

$$\left\{y(x) = \sqrt{x}\mathrm{e}^{-\frac{\int 2\,f(x)\,\mathrm{d}x}{2}}\left(Y_{v-\frac{1}{2}}\left(\sqrt{a}x\right)\_C2 + J_{v-\frac{1}{2}}\left(\sqrt{a}x\right)\_C1\right)\right\}$$

2.1221 ODE No. 1221

$$y(x)\left(x^2\left(-f'(x)+f(x)^2+1\right)-xf(x)-v^2\right)+\left(x-2x^2f(x)\right)y'(x)+x^2y''(x)=0$$

✓ **Mathematica** : cpu = 0.0622702 (sec), leaf count = 30

$$\left\{\left\{y(x)\to\left(c_1J_v(x)+c_2Y_v(x)\right)e^{\int_1^x f(K[1])\,dK[1]}\right\}\right\}$$

✓ **Maple** : cpu = 0.027 (sec), leaf count = 35

$$\left\{y(x)=\sqrt{x}\mathrm{e}^{-\frac{1}{2}\int\frac{-2xf(x)+1}{x}\mathrm{d}x}\left(Y_v(x)\_C2+J_v(x)\_C1\right)\right\}$$

2.1222 ODE No. 1222

$$\left(x^2+1\right)y''(x)+xy'(x)+2y(x)=0$$

✓ **Mathematica** : cpu = 0.0218411 (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 = 0.015 (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

$$\left(x^2+1\right)y''(x)+xy'(x)-9y(x)=0$$

✓ **Mathematica** : cpu = 0.0206678 (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 = 0.017 (sec), leaf count = 39

$$\left\{y(x)=\_C1\sin\left(3\arctan\left(\frac{x}{\sqrt{-x^2-1}}\right)\right)+\_C2\cos\left(3\arctan\left(\frac{x}{\sqrt{-x^2-1}}\right)\right)\right\}$$

2.1224 ODE No. 1224

$$ay(x) + (x^2 + 1)\, y''(x) + xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.0199798 (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 = 0.019 (sec), leaf count = 23

$$\left\{y(x) = \_C1\ \sin\left(\sqrt{a}Arcsinh(x)\right) + \_C2\ \cos\left(\sqrt{a}Arcsinh(x)\right)\right\}$$

2.1225 ODE No. 1225

$$(x^2 + 1)\, y''(x) - xy'(x) + y(x) = 0$$

✓ **Mathematica** : cpu = 0.0336038 (sec), leaf count = 29

$$\left\{\left\{y(x) \to -c_2\sqrt{x^2+1} + c_1 x + c_2 x \sinh^{-1}(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.04 (sec), leaf count = 23

$$\left\{y(x) = -\sqrt{x^2+1}\_C2 + x(\_C2\ Arcsinh(x) + \_C1)\right\}$$

2.1226 ODE No. 1226

$$-(v-1)vy(x) + (x^2 + 1)\, y''(x) + 2xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.0200627 (sec), leaf count = 30

$$\{\{y(x) \to c_1 P_{v-1}(ix) + c_2 Q_{v-1}(ix)\}\}$$

✓ **Maple** : cpu = 0.046 (sec), leaf count = 25

$$\{y(x) = \_C1\ LegendreP(v-1, ix) + \_C2\ LegendreQ(v-1, ix)\}$$

2.1227 ODE No. 1227

$$(x^2+1)\,y''(x)-2xy'(x)+2y(x)=0$$

✓ **Mathematica** : cpu = 0.0355829 (sec), leaf count = 21

$$\{\{y(x)\to c_2x-c_1(x-i)^2\}\}$$

✓ **Maple** : cpu = 0.016 (sec), leaf count = 16

$$\{y(x)=\_C2\,x^2+\_C1\,x-\_C2\}$$

2.1228 ODE No. 1228

$$ay(x)+(x^2+1)\,y''(x)+3xy'(x)=0$$

✓ **Mathematica** : cpu = 0.0161547 (sec), leaf count = 66

$$\left\{\left\{y(x)\to\frac{c_1P_{\sqrt{1-a}-\frac{1}{2}}^{\frac{1}{2}}(ix)+c_2Q_{\sqrt{1-a}-\frac{1}{2}}^{\frac{1}{2}}(ix)}{\sqrt[4]{x^2+1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.099 (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 = 0.0451849 (sec), leaf count = 33

$$\left\{\left\{y(x)\to-\frac{-3c_2x-3c_1+x^3+6\cos(x)}{3x^2+3}\right\}\right\}$$

✓ **Maple** : cpu = 0.018 (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 = 0.0274226 (sec), leaf count = 68

$$\left\{\left\{y(x) \to (x^2+1)^{\frac{1}{2}-\frac{a}{4}} \left(c_1 P_{\frac{a-4}{2}}^{\frac{a-2}{2}}(ix) + c_2 Q_{\frac{a-4}{2}}^{\frac{a-2}{2}}(ix)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.147 (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 = 0.0809444 (sec), leaf count = 56

$$\left\{\left\{y(x) \to c_1\, {}_2F_1\left(-\frac{v}{2} - \frac{1}{2}, \frac{v}{2}; \frac{1}{2}; x^2\right) + ic_2 x\, {}_2F_1\left(-\frac{v}{2}, \frac{v+1}{2}; \frac{3}{2}; x^2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.057 (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 = 300. (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.309 (sec), leaf count = 409

$$\left\{y(x) = 3(1+x)\left(-{}_2\mathrm{F}_1(n/2+1, -n/2+1/2; 1/2; x^2)(n+1)\int 1/3\, \frac{}{(({}_2\mathrm{F}_1(n/2+1, -n/2+1/2; 1/2; x^2) + (n\right.$$

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 = 300.008 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.174 (sec), leaf count = 409

$$\left\{y(x) = 3\left(-{}_2\mathrm{F}_1(n/2+1, -n/2+1/2;\, 1/2;\, x^2)(n+1)\int 1/3\,\frac{}{((_2\mathrm{F}_1(n/2+1, -n/2+1/2;\, 1/2;\, x^2) + (n^2+n-\right.$$

2.1234 ODE No. 1234

$$(x^2-1)\,y''(x) + xy'(x) + 2 = 0$$

✓ **Mathematica** : cpu = 0.0317853 (sec), leaf count = 38

$$\left\{\left\{y(x) \to \log\left(\sqrt{x^2-1}+x\right)\left(c_1 - \log\left(\sqrt{x^2-1}+x\right)\right) + c_2\right\}\right\}$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , exception

`time expired`

2.1235 ODE No. 1235

$$ay(x) + (x^2-1)\,y''(x) + xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.0320253 (sec), leaf count = 50

$$\left\{\left\{y(x) \to c_2 \sin\left(\sqrt{a}\log\left(\sqrt{x^2-1}+x\right)\right) + c_1\cos\left(\sqrt{a}\log\left(\sqrt{x^2-1}+x\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.023 (sec), leaf count = 45

$$\left\{y(x) = 1\left(\_C1\left(\left(x+\sqrt{x^2-1}\right)^{i\sqrt{a}}\right)^2 + \_C2\right)\left(\left(x+\sqrt{x^2-1}\right)^{i\sqrt{a}}\right)^{-1}\right\}$$

2.1236 ODE No. 1236

$$f(x)y(x) + (x^2 - 1) y''(x) + xy'(x) = 0$$

✗ **Mathematica** : cpu = 0.386923 (sec), leaf count = 0 , could not solve

```
DSolve[f[x]*y[x] + x*Derivative[1][y][x] + (-1 + x^2)*Derivative[2][y][x] == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x) = DESol\left(\left\{\frac{f(x)\_Y(x)}{x^2-1} + \frac{x\frac{\mathrm{d}}{\mathrm{d}x}\_Y(x)}{x^2-1} + \frac{\mathrm{d}^2}{\mathrm{d}x^2}\_Y(x)\right\}, \{\_Y(x)\}\right)\right\}$$

2.1237 ODE No. 1237

$$(x^2 - 1) y''(x) + 2xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.0115124 (sec), leaf count = 27

$$\left\{\left\{y(x) \to \frac{1}{2}c_1(\log(1-x) - \log(x+1)) + c_2\right\}\right\}$$

✓ **Maple** : cpu = 0.033 (sec), leaf count = 20

$$\left\{y(x) = \_C1 - \frac{(\ln(1+x) - \ln(x-1))\_C2}{2}\right\}$$

2.1238 ODE No. 1238

$$-a + (x^2 - 1) y''(x) + 2xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.0217711 (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 = 0.02 (sec), leaf count = 26

$$\left\{y(x) = \frac{(a - \_C1)\ln(1+x)}{2} + \frac{(a + \_C1)\ln(x-1)}{2} + \_C2\right\}$$

2.1239 ODE No. 1239

$$-ly(x) + (x^2-1)\,y''(x) + 2xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.0152376 (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

$$\left\{y(x) = \_C1\ LegendreP\left(\frac{1}{2}\sqrt{1+4\,l} - \frac{1}{2}, x\right) + \_C2\ LegendreQ\left(\frac{1}{2}\sqrt{1+4\,l} - \frac{1}{2}, x\right)\right\}$$

2.1240 ODE No. 1240

$$-v(v+1)y(x) + (x^2-1)\,y''(x) + 2xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.0199353 (sec), leaf count = 18

$$\{\{y(x) \to c_1 P_v(x) + c_2 Q_v(x)\}\}$$

✓ **Maple** : cpu = 0.044 (sec), leaf count = 15

$$\{y(x) = \_C1\ LegendreP(v,x) + \_C2\ LegendreQ(v,x)\}$$

2.1241 ODE No. 1241

$$-(v-1)(v+2)y(x) + (x^2-1)\,y''(x) - 2xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.0172091 (sec), leaf count = 26

$$\left\{\left\{y(x) \to (x^2-1)\left(c_1 P_v^2(x) + c_2 Q_v^2(x)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.052 (sec), leaf count = 24

$$\{y(x) = (x-1)(1+x)(\_C2\ LegendreQ(v,2,x) + \_C1\ LegendreP(v,2,x))\}$$

2.1242 ODE No. 1242

$$(x^2-1)\,y''(x)-(x^2-x)\,y(x)-(3x+1)y'(x)=0$$

✓ **Mathematica** : cpu = 0.0846636 (sec), leaf count = 50

$$\left\{\left\{y(x)\to e^{-x-2}\left(c_2(x+1)^2\text{Ei}(2(x+1))+e^2\left(c_1(x+1)^2-2c_2e^{2x}\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.078 (sec), leaf count = 41

$$\left\{y(x)=\_C2\,e^{-2-x}(1+x)^2\,Ei(1,-2\,x-2)+\_C1\,e^{-x}(1+x)^2+2\,e^{x}\_C2\right\}$$

2.1243 ODE No. 1243

$$(x^2-1)\,y''(x)+(x^2+1)\,y(x)+4xy'(x)=0$$

✓ **Mathematica** : cpu = 0.0328233 (sec), leaf count = 41

$$\left\{\left\{y(x)\to\frac{e^{-ix}\left(2c_1-ic_2e^{2ix}\right)}{2\left(x^2-1\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.046 (sec), leaf count = 21

$$\left\{y(x)=\frac{\_C2\,\cos(x)+\_C1\,\sin(x)}{x^2-1}\right\}$$

2.1244 ODE No. 1244

$$-(v-n)(n+v+1)y(x)+2(n+1)xy'(x)+(x^2-1)\,y''(x)=0$$

✓ **Mathematica** : cpu = 0.0324701 (sec), leaf count = 32

$$\left\{\left\{y(x)\to\left(x^2-1\right)^{-n/2}\left(c_1P_v^n(x)+c_2Q_v^n(x)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.083 (sec), leaf count = 27

$$\left\{y(x)=\left(x^2-1\right)^{-\frac{n}{2}}\left(LegendreQ(v,n,x)\_C2+LegendreP(v,n,x)\_C1\right)\right\}$$

2.1245 ODE No. 1245

$$-(-n+v+1)(n+v)y(x)-2(n-1)xy'(x)+\left(x^2-1\right)y''(x)=0$$

✓ **Mathematica** : cpu = 0.0237675 (sec), leaf count = 32

$$\left\{\left\{y(x)\to\left(x^2-1\right)^{n/2}\left(c_1P_v^n(x)+c_2Q_v^n(x)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.057 (sec), leaf count = 27

$$\left\{y(x)=\left(x^2-1\right)^{\frac{n}{2}}\left(\mathit{LegendreQ}(v,n,x)\_\mathit{C2}+\mathit{LegendreP}(v,n,x)\_\mathit{C1}\right)\right\}$$

2.1246 ODE No. 1246

$$-2(v-1)xy'(x)-2vy(x)+\left(x^2-1\right)y''(x)=0$$

✓ **Mathematica** : cpu = 0.0216133 (sec), leaf count = 32

$$\left\{\left\{y(x)\to\left(x^2-1\right)^{v/2}\left(c_1P_v^v(x)+c_2Q_v^v(x)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.186 (sec), leaf count = 28

$$\left\{y(x)=\left(x^2-1\right)^v\left({}_2\mathrm{F}_1(\frac{1}{2},v+1;\,\frac{3}{2};\,x^2)\_\mathit{C2}\,x+\_\mathit{C1}\right)\right\}$$

2.1247 ODE No. 1247

$$2axy'(x)+(a-1)ay(x)+\left(x^2-1\right)y''(x)=0$$

✓ **Mathematica** : cpu = 0.238582 (sec), leaf count = 87

$$\left\{\left\{y(x)\to\frac{\sqrt{1-x^2}\left(x^2-1\right)^{-a/2}e^{-\sqrt{(a-1)^2}\tanh^{-1}(x)}\left(c_2e^{2\sqrt{(a-1)^2}\tanh^{-1}(x)}+2\sqrt{(a-1)^2}c_1\right)}{2\sqrt{(a-1)^2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.03 (sec), leaf count = 27

$$\left\{y(x)=\_\mathit{C1}\,(x-1)^{1-a}+\_\mathit{C2}\,(1+x)^{1-a}\right\}$$

2.1248 ODE No. 1248

$$axy'(x) + y(x)\left(bx^2 + cx + d\right) + \left(x^2 - 1\right)y''(x) = 0$$

✗ **Mathematica** : cpu = 2.36073 (sec), leaf count = 0 , DifferentialRoot result

$$\{\{y(x) \to \text{DifferentialRoot}(\{y, x\}, \{\left(bx^2 + cx + d\right)y(x) + xay'(x) + \left(x^2 - 1\right)y''(x) = 0, y(0) = c_1, y'(0) = c_2\})$$

✓ **Maple** : cpu = 0.265 (sec), leaf count = 134

$$\left\{y(x) = \left(x^2 - 1\right)^{-\frac{a}{4}} e^{\sqrt{-b}x}\left(\left(\frac{x}{2} - \frac{1}{2}\right)^{\frac{a}{4}}\left(\frac{x}{2} + \frac{1}{2}\right)^{1-\frac{a}{4}} \mathit{HeunC}\left(4\sqrt{-b}, 1 - \frac{a}{2}, \frac{a}{2} - 1, 2c, d - c - \frac{a^2}{8} + b + \frac{1}{2}, \frac{x}{2} + \right.\right.\right.$$

2.1249 ODE No. 1249

$$(ax + b)y'(x) + cy(x) + \left(x^2 - 1\right)y''(x) = 0$$

✓ **Mathematica** : cpu = 0.195012 (sec), leaf count = 190

$$\left\{\left\{y(x) \to \frac{1}{2}(x-1)^{\frac{1}{2}(-a-b)}\left(2c_1(x-1)^{\frac{a+b}{2}} {}_2F_1\left(\frac{1}{2}\left(a - \sqrt{a^2 - 2a - 4c + 1} - 1\right), \frac{1}{2}\left(a + \sqrt{a^2 - 2a - 4c + 1} - 1\right.\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.081 (sec), leaf count = 134

$$\left\{y(x) = \_C1\, {}_2\mathrm{F}_1\left(-\frac{1}{2} - \frac{1}{2}\sqrt{a^2 - 2a - 4c + 1} + \frac{a}{2}, -\frac{1}{2} + \frac{1}{2}\sqrt{a^2 - 2a - 4c + 1} + \frac{a}{2}; \frac{a}{2} - \frac{b}{2}; \frac{x}{2} + \frac{1}{2}\right) + \_C2\left(\frac{x}{2}\right.\right.$$

2.1250 ODE No. 1250

$$\left(x^2 - a^2\right)y''(x) + 8xy'(x) + 12y(x) = 0$$

✓ **Mathematica** : cpu = 0.058135 (sec), leaf count = 38

$$\left\{\left\{y(x) \to \frac{\frac{c_2\left(a^2 + 3x^2\right)}{(a-x)^3} + 3c_1}{3(a+x)^3}\right\}\right\}$$

✓ **Maple** : cpu = 0.031 (sec), leaf count = 41

$$\left\{y(x) = \frac{3\_C2\, a^2 x + \_C2\, x^3 + \_C1\, a^2 + 3\_C1\, x^2}{(a-x)^3 (x+a)^3}\right\}$$

2.1251 ODE No. 1251

$$x(x+1)y''(x)-(x-1)y'(x)+y(x)=0$$

✓ **Mathematica** : cpu = 0.0402201 (sec), leaf count = 23

$$\{\{y(x)\to c_1(x-1)+c_2((x-1)\log(x)-4)\}\}$$

✓ **Maple** : cpu = 0.043 (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 = 0.182256 (sec), leaf count = 131

$$\left\{\left\{y(x)\to c_2x^{1-b}\,{}_2F_1\left(\frac{1}{2}\left(a-2b-\sqrt{a^2-2a-4c+1}+1\right),\frac{1}{2}\left(a-2b+\sqrt{a^2-2a-4c+1}+1\right);2-b;-x\right)+\right.\right.$$

✓ **Maple** : cpu = 0.059 (sec), leaf count = 124

$$\left\{y(x)=\_C1\,{}_2\mathrm{F}_1(-\frac{1}{2}-\frac{1}{2}\sqrt{a^2-2\,a-4\,c+1}+\frac{a}{2},-\frac{1}{2}+\frac{1}{2}\sqrt{a^2-2\,a-4\,c+1}+\frac{a}{2};\,a-b;\,1+x)+\_C2\,(1+\right.$$

2.1253 ODE No. 1253

$$x(x+1)y''(x)+(3x+2)y'(x)+y(x)=0$$

✓ **Mathematica** : cpu = 0.0290945 (sec), leaf count = 28

$$\left\{\left\{y(x)\to\frac{c_2\log(2(x+1))+2c_1}{\sqrt{2}x}\right\}\right\}$$

✓ **Maple** : cpu = 0.009 (sec), leaf count = 16

$$\left\{y(x)=\frac{\ln(1+x)\,\_C1+\_C2}{x}\right\}$$

2.1254 ODE No. 1254

$$(x^2+x-2)\,y''(x)+(x^2-x)\,y'(x)-(6x^2+7x)\,y(x)=0$$

✓ **Mathematica** : cpu = 0.102536 (sec), leaf count = 52

$$\left\{\left\{y(x)\to 39c_2e^{2x-5}(x-1)\text{Ei}(5-5x)+c_1\left(-e^{2x}\right)(x-1)+\frac{1}{5}c_2e^{-3x}(x+44)\right\}\right\}$$

✓ **Maple** : cpu = 0.083 (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 = 0.243898 (sec), leaf count = 87

$$\left\{\left\{y(x)\to\frac{(a^2+a(2x-1)+2(x-1)x)\left(\frac{c_2x^{a+1}(1-x)^{1-a}}{(a-1)a(a+1)(a^2+a(2x-1)+2(x-1)x)}+c_1\right)}{a^2+3a+4}\right\}\right\}$$

✓ **Maple** : cpu = 0.023 (sec), leaf count = 42

$$\left\{y(x)=\_C1\,\left(a^2+a(2\,x-1)+2\,x^2-2\,x\right)+\frac{\_C2\,x^a x(x-1)}{(x-1)^a}\right\}$$

2.1256 ODE No. 1256

$$-v(v+1)y(x)+(x-1)xy''(x)+(2x-1)y'(x)=0$$

✓ **Mathematica** : cpu = 0.0247956 (sec), leaf count = 26

$$\{\{y(x)\to c_1P_v(2x-1)+c_2Q_v(2x-1)\}\}$$

✓ **Maple** : cpu = 0.117 (sec), leaf count = 51

$$\left\{y(x)=\_C1\;{}_2\mathrm{F}_1(-v,-v;\;-2\,v;\;x^{-1})x^v+\_C2\;{}_2\mathrm{F}_1(v+1,v+1;\;2\,v+2;\;x^{-1})x^{-v-1}\right\}$$

2.1257 ODE No. 1257

$$((a+1)x+b)y'(x)+(x-1)xy''(x)=0$$

✓ **Mathematica** : cpu = 0.0536584 (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 = 0.256 (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 = 0.182206 (sec), leaf count = 130

$$\left\{\left\{y(x)\to (-1)^{b+1}c_2 x^{b+1}\,{}_2F_1\left(\frac{1}{2}\left(a+2b-\sqrt{a^2-2a-4c+1}+1\right),\frac{1}{2}\left(a+2b+\sqrt{a^2-2a-4c+1}+1\right);b+2\right.\right.\right.$$

✓ **Maple** : cpu = 0.059 (sec), leaf count = 110

$$\left\{y(x)=\_C1\,{}_2\mathrm{F}_1(-\frac{1}{2}-\frac{1}{2}\sqrt{a^2-2\,a-4\,c+1}+\frac{a}{2},-\frac{1}{2}+\frac{1}{2}\sqrt{a^2-2\,a-4\,c+1}+\frac{a}{2};\,-b;\,x)+\_C2\,x^{b+1}{}_2\mathrm{F}_1(\frac{1}{2}\right.$$

2.1259 ODE No. 1259

$$((a+1)x+b)y'(x)-ly(x)+(x-1)xy''(x)=0$$

✓ **Mathematica** : cpu = 0.158904 (sec), leaf count = 112

$$\left\{\left\{y(x)\to (-1)^{b+1}c_2 x^{b+1}\,{}_2F_1\left(\frac{1}{2}\left(a+2b-\sqrt{a^2+4l}+2\right),\frac{1}{2}\left(a+2b+\sqrt{a^2+4l}+2\right);b+2;x\right)+c_1\,{}_2F_1\left(\frac{1}{2}\left(a\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.064 (sec), leaf count = 92

$$\left\{y(x)=\_C1\,{}_2\mathrm{F}_1(\frac{a}{2}-\frac{1}{2}\sqrt{a^2+4\,l},\frac{a}{2}+\frac{1}{2}\sqrt{a^2+4\,l};\,-b;\,x)+\_C2\,x^{b+1}{}_2\mathrm{F}_1(\frac{a}{2}-\frac{1}{2}\sqrt{a^2+4\,l}+b+1,\frac{a}{2}+\frac{1}{2}\sqrt{a^2\right.$$

2.1260 ODE No. 1260

$$y'(x)(x(\mathrm{a1}+\mathrm{b1}+1)-\mathrm{d1})+\mathrm{a1b1d1}+(x-1)xy''(x)=0$$

✓ **Mathematica** : cpu = 0.209561 (sec), leaf count = 65

$$\left\{\left\{y(x)\to \mathrm{a1b1}x\Gamma(\mathrm{d1}+1)\,{}_3\tilde{F}_2(1,\mathrm{a1}+\mathrm{b1}+1,1;\mathrm{d1}+1,2;x)-\frac{c_1x^{1-\mathrm{d1}}\,{}_2F_1(1-\mathrm{d1},\mathrm{a1}+\mathrm{b1}-\mathrm{d1}+1;2-\mathrm{d1};x)}{\mathrm{d1}-1}\right.\right.$$

✓ **Maple** : cpu = 0.49 (sec), leaf count = 76

$$\left\{y(x)=\int\left(-{}_2\mathrm{F}_1(d1,-a1-b1+d1;\,1+d1;\,x)a1\,b1\,(-signum(x-1))^{-a1-b1+d1}\,(signum(x-1))^{a1+b1-d1}+\right.\right.$$

2.1261 ODE No. 1261

$$y(x)(2lx(-n+p-1)+2lp+m)+2\left(x(-2l+n+1)-lx^2+n+1\right)y'(x)+x(x+2)y''(x)=0$$

✗ **Mathematica** : cpu = 2.79339 (sec), leaf count = 0 , DifferentialRoot result

$$\{\{y(x)\to \mathrm{DifferentialRoot}(\{y,x\},\{(-2xl-2xnl+2xpl+2pl+m)y(x)+2\left(-lx^2-2lx+nx+x+n+1\right)y'(x$$

✓ **Maple** : cpu = 0.247 (sec), leaf count = 105

$$\left\{y(x)=(x+2)^{-\frac{n}{2}-\frac{1}{2}}\left(-\frac{x}{2}-1\right)^{\frac{n}{2}+\frac{1}{2}}\left(HeunC\left(4\,l,-n,n,-4\,pl,\frac{(4\,n+4\,p+4)\,l}{2}-\frac{n^2}{2}+m-n,-\frac{x}{2}\right)x^{-n}\_C2\right.\right.$$

2.1262 ODE No. 1262

$$\left(x^2+x-1\right)y'(x)+(x+1)^2y''(x)-(x+2)y(x)=0$$

✓ **Mathematica** : cpu = 39.5672 (sec), leaf count = 45

$$\left\{\left\{y(x)\to e^{-x}\left(c_2\int_1^x e^{\frac{K[1]^2+K[1]-1}{K[1]+1}}(K[1]+1)\,dK[1]+c_1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.25 (sec), leaf count = 53

$$\left\{y(x)=(1+x)\left(\_C1\,\mathrm{e}^{-x}HeunD\left(4,4,-8,12,\frac{x}{x+2}\right)+\_C2\,HeunD\left(-4,4,-8,12,\frac{x}{x+2}\right)\mathrm{e}^{\frac{x-1}{2x+2}}\right)\right\}$$

2.1263 ODE No. 1263

$$-(20x+30)\left(x^2+3x\right)^{7/3}+x(x+3)y''(x)+(3x-1)y'(x)+y(x)=0$$

✗ **Mathematica** : cpu = 299.998 (sec), leaf count = 0 , timed out

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✓ **Maple** : cpu = 0.087 (sec), leaf count = 52

$$\left\{y(x)=1\left(\_C2+\int \frac{1}{x^2+3\,x}\left(\_C1+3\left(x^2+3\,x\right)^{7/3}x(x+3)\right)(x+3)^{\frac{7}{3}}x^{-\frac{4}{3}}\,dx\right)x^{\frac{4}{3}}(x+3)^{-\frac{7}{3}}\right\}$$

2.1264 ODE No. 1264

$$\left(x^2+3x+4\right)y''(x)+\left(x^2+x+1\right)y'(x)-(2x+3)y(x)=0$$

✓ **Mathematica** : cpu = 0.0680353 (sec), leaf count = 23

$$\left\{\left\{y(x)\to c_2\left(x^2+x+3\right)+c_1e^{-x}\right\}\right\}$$

✓ **Maple** : cpu = 0.047 (sec), leaf count = 19

$$\left\{y(x)=\_C1\,e^{-x}+\_C2\,\left(x^2+x+3\right)\right\}$$

2.1265 ODE No. 1265

$$(x-2)(x-1)y''(x)-(2x-3)y'(x)+y(x)=0$$

✓ **Mathematica** : cpu = 0.046694 (sec), leaf count = 57

$$\left\{\left\{y(x)\to\left(x^2-3x+2\right)\left(c_1P_{\frac{1}{2}\left(-1+\sqrt{5}\right)}^2(2x-3)+c_2Q_{\frac{1}{2}\left(-1+\sqrt{5}\right)}^2(2x-3)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.704 (sec), leaf count = 93

$$\left\{y(x)=(x-2)^2\left(\_C2\;{}_2\mathrm{F}_1\left(\frac{1}{2}+\frac{\sqrt{5}}{2},\frac{5}{2}+\frac{\sqrt{5}}{2};\sqrt{5}+1;(x-1)^{-1}\right)(x-1)^{-\frac{1}{2}-\frac{\sqrt{5}}{2}}+\_C1\;{}_2\mathrm{F}_1\left(\frac{1}{2}-\frac{\sqrt{5}}{2},\frac{5}{2}-\frac{\sqrt{5}}{2};\right.\right.\right.$$

2.1266 ODE No. 1266

$$(x-2)^2y''(x)-(x-2)y'(x)-3y(x)=0$$

✓ **Mathematica** : cpu = 0.0310244 (sec), leaf count = 22

$$\left\{\left\{y(x)\to c_1(x-2)^3+\frac{c_2}{x-2}\right\}\right\}$$

✓ **Maple** : cpu = 0.012 (sec), leaf count = 19

$$\left\{y(x)=\frac{\_C1+\_C2\,(x-2)^4}{x-2}\right\}$$

2.1267 ODE No. 1267

$$-\left(l+2x^2-5x\right)y'(x)+2x^2y''(x)-(4x-1)y(x)=0$$

✓ **Mathematica** : cpu = 0.414811 (sec), leaf count = 154

$$\left\{\left\{y(x)\to\frac{e^{x-\frac{l}{2x}}\left(\frac{\sqrt{2\pi}c_2e^{-\sqrt{2}\sqrt{-l}}l\left(e^{2\sqrt{2}\sqrt{-l}}\operatorname{erf}\left(\frac{\sqrt{-l}}{\sqrt{2}\sqrt{x}}+\sqrt{x}\right)+\operatorname{erf}\left(\frac{\sqrt{2}\sqrt{-l}-2x}{2\sqrt{x}}\right)-e^{2\sqrt{2}\sqrt{-l}}+1\right)}{(-l)^{3/2}}+2c_1\right)}{2\sqrt{x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.081 (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 = 1.62191 (sec), leaf count = 0 , DifferentialRoot result

$$\{\{y(x)\to\text{DifferentialRoot}(\{y,x\},\{(xa+b)y(x)+(2x-1)y'(x)+2(x-1)xy''(x)=0,y(2)=c_1,y'(2)=c_2\})($$

✓ **Maple** : cpu = 0.123 (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 = 0.097837 (sec), leaf count = 59

$$\left\{\left\{y(x)\to c_1\,{}_2F_1\left(\frac{1}{2},v+1;v+\frac{3}{2};x\right)-ic_2 i^{-2v}x^{-v-\frac{1}{2}}\,{}_2F_1\left(\frac{1}{2},-v;\frac{1}{2}-v;x\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.096 (sec), leaf count = 40

$$\left\{y(x)=\_C1\,{}_2\mathrm{F}_1(\frac{1}{2},v+1;\ \frac{3}{2}+v;\ x)+\_C2\,x^{-\frac{1}{2}-v}{}_2\mathrm{F}_1(\frac{1}{2},-v;\ \frac{1}{2}-v;\ x)\right\}$$

2.1270 ODE No. 1270

$$\left(2x^2+6x+4\right)y''(x)+\left(10x^2+21x+8\right)y'(x)+\left(12x^2+17x+8\right)y(x)=0$$

✗ **Mathematica** : cpu = 307.475 (sec), leaf count = 0 , timed out

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✓ **Maple** : cpu = 0.192 (sec), leaf count = 46

$$\left\{y(x)=\mathrm{e}^{-2x}(x+2)^4\left(\_C2\,(1+x)^{\frac{5}{2}}\,HeunC\left(-1,\frac{5}{2},4,-\frac{7}{4},\frac{7}{2},-1-x\right)+\_C1\,HeunC\left(-1,-\frac{5}{2},4,-\frac{7}{4},\frac{7}{2},-1-\right.\right.$$

2.1271 ODE No. 1271

$$4x^2y''(x)+y(x)=0$$

✓ **Mathematica** : cpu = 0.0131437 (sec), leaf count = 24

$$\left\{\left\{y(x)\to\frac{1}{2}\sqrt{x}(c_2\log(x)+2c_1)\right\}\right\}$$

✓ **Maple** : cpu = 0.009 (sec), leaf count = 14

$$\{y(x)=\sqrt{x}(\ln(x)\,\_C2+\_C1)\}$$

2.1272 ODE No. 1272

$$(4a^2x^2+1)\,y(x)+4x^2y''(x)=0$$

✓ **Mathematica** : cpu = 0.0135251 (sec), leaf count = 28

$$\left\{\left\{y(x)\to\sqrt{x}(c_1J_0(ax)+c_2Y_0(ax))\right\}\right\}$$

✓ **Maple** : cpu = 0.039 (sec), leaf count = 23

$$\{y(x)=\sqrt{x}(Y_0(ax)\_C2+J_0(ax)\_C1)\}$$

2.1273 ODE No. 1273

$$4x^2y''(x)-y(x)\left(-4kx+4m^2+x^2-1\right)=0$$

✓ **Mathematica** : cpu = 0.0184928 (sec), leaf count = 20

$$\{\{y(x)\to c_1M_{k,m}(x)+c_2W_{k,m}(x)\}\}$$

✓ **Maple** : cpu = 0.081 (sec), leaf count = 17

$$\{y(x)=\_C1\,M_{k,\,m}(x)+\_C2\,W_{k,\,m}(x)\}$$

2.1274 ODE No. 1274

$$(x-v^2)\,y(x)+4x^2y''(x)+4xy'(x)=0$$

✓ **Mathematica** : cpu = 0.0449936 (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 = 0.013 (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 = 0.0396806 (sec), leaf count = 97

$$\left\{\left\{y(x)\to e^{-x/2}x^{\frac{\sqrt{m^2-1}}{2}}\left(c_1U\left(\frac{1}{2}\left(-2l+m+\sqrt{m^2-1}\right),\sqrt{m^2-1}+1,x\right)+c_2L_{l-\frac{m}{2}-\frac{\sqrt{m^2-1}}{2}}^{\sqrt{m^2-1}}(x)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.164 (sec), leaf count = 53

$$\left\{y(x)=1\left(\_C2\,W_{l-\frac{m}{2}+\frac{1}{2},\,\frac{1}{2}\sqrt{m-1}\sqrt{m+1}}(x)+\_C1\,M_{l-\frac{m}{2}+\frac{1}{2},\,\frac{1}{2}\sqrt{m-1}\sqrt{m+1}}(x)\right)\frac{1}{\sqrt{x}}\right\}$$

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 = 0.0636727 (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 = 0.074 (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 = 0.0294763 (sec), leaf count = 49

$$\left\{\left\{y(x)\to\frac{e^{-\frac{\sqrt{a}x}{2}}\left(c_2e^{\sqrt{a}x}+\sqrt{a}c_1\right)}{\sqrt{a}\sqrt{x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.064 (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 = 0.267897 (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 = 0.184021 (sec), leaf count = 45

$$\left\{\left\{y(x)\to c_1x^{\frac{1}{8}\left(\sqrt{17}-1\right)}+c_2x^{-\frac{1}{8}-\frac{\sqrt{17}}{8}}-\log(x)-1\right\}\right\}$$

✓ **Maple** : cpu = 0.334 (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 = 0.0419416 (sec), leaf count = 52

$$\left\{\left\{y(x)\to\frac{c_2e^{-x}\left(4e^{2x}x^2\text{Ei}(-2x)+2x-1\right)}{2x^{3/2}}+c_1e^x\sqrt{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.061 (sec), leaf count = 40

$$\left\{y(x)=(4\,e^x\,Ei(1,2\,x)\_C2\,x^2+(-2\,x+1)\_C2\,e^{-x}+\_C1\,x^2e^x)x^{-\frac{3}{2}}\right\}$$

2.1281 ODE No. 1281

$$4x^2y''(x) + (4x^2 - 4x - 1)\,y(x) - 4(2x-1)xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.0213298 (sec), leaf count = 21

$$\left\{\left\{y(x) \to \frac{e^x(c_2x + c_1)}{\sqrt{x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.051 (sec), leaf count = 15

$$\left\{y(x) = e^x(x\_C2 + \_C1)\frac{1}{\sqrt{x}}\right\}$$

2.1282 ODE No. 1282

$$4x^3y'(x) + 4x^2y''(x) + (x^2-4)(x^2+6)\,y(x) = 0$$

✓ **Mathematica** : cpu = 0.0236423 (sec), leaf count = 32

$$\left\{\left\{y(x) \to \frac{e^{-\frac{x^2}{4}}(c_2x^5 + 5c_1)}{5x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.049 (sec), leaf count = 21

$$\left\{y(x) = \frac{\_C2\,x^5 + \_C1}{x^2}e^{-\frac{x^2}{4}}\right\}$$

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 = 0.113597 (sec), leaf count = 89

$$\left\{\left\{y(x) \to c_1e^{x/2}x^{-\frac{x}{2}-1} + \frac{1}{3}c_2e^{x/2}x^{2-\frac{x}{2}} - \frac{1}{9}\sqrt{e^xx^{-x}}x^2 + \frac{1}{3}\sqrt{e^xx^{-x}}x^2\log(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.156 (sec), leaf count = 48

$$\left\{y(x) = \frac{x^2}{3}\left(\ln(x) - \frac{1}{3}\right)\sqrt{x^{-x}e^x} + e^{\frac{x}{2}}\left(\_C1\,x^{-\frac{x}{2}+2} + \_C2\,x^{-\frac{x}{2}-1}\right)\right\}$$

2.1284 ODE No. 1284

$$(2x+1)^2 y''(x) - 2(2x+1)y'(x) - 12y(x) - 3x - 1 = 0$$

✓ **Mathematica** : cpu = 0.0463017 (sec), leaf count = 41

$$\left\{\left\{y(x) \to \frac{192c_1(2x+1)^4 + 192c_2 - 72x^2 - 56x - 7}{192(2x+1)}\right\}\right\}$$

✓ **Maple** : cpu = 0.023 (sec), leaf count = 41

$$\left\{y(x) = \frac{\_C1}{2\,x+1} + (2\,x+1)^3\,\_C2 + \frac{-72\,x^2 - 56\,x - 7}{384\,x+192}\right\}$$

2.1285 ODE No. 1285

$$((4a+2)x - a)y'(x) + (a-1)ay(x) + x(4x-1)y''(x) = 0$$

✓ **Mathematica** : cpu = 0.340803 (sec), leaf count = 119

$$\left\{\left\{y(x) \to \frac{\sqrt[4]{4x-1}\,x^{\frac{1}{2}-\frac{a}{2}} e^{-\sqrt{-(a-1)^2}\tan^{-1}\left(\sqrt{4x-1}\right)} \left(4\sqrt{-(a-1)^2}c_1 e^{2\sqrt{-(a-1)^2}\tan^{-1}\left(\sqrt{4x-1}\right)} - c_2\right)}{2\sqrt{-(a-1)^2}\sqrt[4]{1-4x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.119 (sec), leaf count = 52

$$\left\{y(x) = \_C1\,{}_2\mathrm{F}_1\left(\frac{a}{2}, \frac{a}{2} - \frac{1}{2};\, a;\, 4\,x\right) + \_C2\,x^{1-a}{}_2\mathrm{F}_1\left(1 - \frac{a}{2}, -\frac{a}{2} + \frac{1}{2};\, -a+2;\, 4\,x\right)\right\}$$

2.1286 ODE No. 1286

$$(3x-1)^2 y''(x) + 3(3x-1)y'(x) - 9y(x) - \log^2(3x-1) = 0$$

✓ **Mathematica** : cpu = 0.111073 (sec), leaf count = 80

$$\left\{\left\{y(x) \to \frac{-81c_1x^2 - 81ic_2x^2 + 54c_1x + 54ic_2x - 18c_1 - 12x + (2-6x)\log^2(3x-1) - 2\log(1-3x) + 2\log(3x}{54x - 18}\right.\right.$$

✓ **Maple** : cpu = 0.023 (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 = 0.0198412 (sec), leaf count = 51

$$\left\{\left\{y(x)\to c_2\sqrt[3]{-(x-1)x}Q_1^{\frac{2}{3}}(2x-1)+\frac{c_1x^{2/3}(6x-5)}{3\Gamma\left(\frac{4}{3}\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.029 (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 = 0.0378672 (sec), leaf count = 43

$$\left\{\left\{y(x)\to e^{-i\sqrt{x}}\sqrt[4]{x}\left(c_1e^{2i\sqrt{x}}+ic_2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.03 (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 = 0.0854684 (sec), leaf count = 51

$$\left\{\left\{y(x)\to\frac{e^{-\sqrt{x}}\left(c_2\left(\sqrt{x}+1\right)-c_1e^{2\sqrt{x}}\left(\sqrt{x}-1\right)\right)}{x^{5/4}}\right\}\right\}$$

✓ **Maple** : cpu = 0.095 (sec), leaf count = 33

$$\left\{y(x)=1\left(\_C2\,\left(\sqrt{x}+1\right)\mathrm{e}^{-\sqrt{x}}+\_C1\,\mathrm{e}^{\sqrt{x}}\left(\sqrt{x}-1\right)\right)x^{-\frac{5}{4}}\right\}$$

2.1290 ODE No. 1290

$$\left(27x^2+4\right)y''(x)+27xy'(x)-3y(x)=0$$

✓ **Mathematica** : cpu = 0.173814 (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 = 0.022 (sec), leaf count = 47

$$\left\{y(x)=\_C1\ \sin\left(\frac{1}{3}\arctan\left(3\frac{\sqrt{3}x}{\sqrt{-27\,x^2-4}}\right)\right)+\_C2\ \cos\left(\frac{1}{3}\arctan\left(3\frac{\sqrt{3}x}{\sqrt{-27\,x^2-4}}\right)\right)\right\}$$

2.1291 ODE No. 1291

$$48(x-1)xy''(x)+(152x-40)y'(x)+53y(x)=0$$

✓ **Mathematica** : cpu = 0.0827475 (sec), leaf count = 82

$$\left\{\left\{y(x)\to\sqrt[6]{-1}c_2\sqrt[6]{x}\,{}_2F_1\left(\frac{5}{4}-\frac{\sqrt{\frac{5}{2}}}{6},\frac{1}{12}\left(15+\sqrt{10}\right);\frac{7}{6};x\right)+c_1\,{}_2F_1\left(\frac{1}{12}\left(13-\sqrt{10}\right),\frac{1}{12}\left(13+\sqrt{10}\right);\frac{5}{6};x\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.075 (sec), leaf count = 62

$$\left\{y(x)=\_C1\ {}_2\mathrm{F}_1(\frac{13}{12}-\frac{\sqrt{5}\sqrt{2}}{12},\frac{13}{12}+\frac{\sqrt{5}\sqrt{2}}{12};\ \frac{5}{6};\ x)+\_C2\ \sqrt[6]{x}{}_2\mathrm{F}_1(\frac{5}{4}-\frac{\sqrt{5}\sqrt{2}}{12},\frac{5}{4}+\frac{\sqrt{5}\sqrt{2}}{12};\ \frac{7}{6};\ x)\right\}$$

2.1292 ODE No. 1292

$$50(x-1)xy''(x)+25(2x-1)y'(x)-2y(x)=0$$

✓ **Mathematica** : cpu = 0.0421963 (sec), leaf count = 53

$$\left\{\left\{y(x)\to c_1\cosh\left(\frac{2}{5}\log\left(\sqrt{x-1}+\sqrt{x}\right)\right)+ic_2\sinh\left(\frac{2}{5}\log\left(\sqrt{x-1}+\sqrt{x}\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.062 (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 = 0.356465 (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 = 0.07 (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 = 0.222597 (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 = 0.07 (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 = 0.305193 (sec), leaf count = 229

$$\left\{\left\{y(x)\to e^{-\frac{i\sqrt{c}x}{\sqrt{a}}}x^{\frac{\sqrt{a^2-2a(b+2f)+b^2}+a-b}{2a}}\left(c_1U\left(\frac{a+\frac{id\sqrt{a}}{\sqrt{c}}+\sqrt{a^2-2(b+2f)a+b^2}}{2a},\frac{a+\sqrt{a^2-2(b+2f)a+b^2}}{a},\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.317 (sec), leaf count = 106

$$\left\{y(x)=x^{-\frac{b}{2a}}\left(M_{-\frac{i}{2}d\frac{1}{\sqrt{c}}\frac{1}{\sqrt{a}},\,\frac{1}{2a}\sqrt{a^2+(-2b-4f)a+b^2}}\left(2ix\sqrt{c}\frac{1}{\sqrt{a}}\right)\_C1+W_{-\frac{i}{2}d\frac{1}{\sqrt{c}}\frac{1}{\sqrt{a}},\,\frac{1}{2a}\sqrt{a^2+(-2b-4f)a+b^2}}\left(2ix\sqrt{c}\frac{1}{\sqrt{a}}\right.\right.\right.$$

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 = 0.597203 (sec), leaf count = 272

$$\left\{\left\{y(x)\to e^{-\frac{x\left(\sqrt{\mathrm{a1}^2-4\mathrm{a0}\mathrm{a2}}+\mathrm{a1}\right)}{2\mathrm{a2}}}x^{\frac{\sqrt{\mathrm{a2}^2-2\mathrm{a2}(\mathrm{b1}+2\mathrm{c0})+\mathrm{b1}^2}+\mathrm{a2}-\mathrm{b1}}{2\mathrm{a2}}}\left(c_1U\left(\frac{-\frac{2\mathrm{b0}\mathrm{a2}}{\sqrt{\mathrm{a1}^2-4\mathrm{a0}\mathrm{a2}}}+\mathrm{a2}+\frac{\mathrm{a1}\mathrm{b1}}{\sqrt{\mathrm{a1}^2-4\mathrm{a0}\mathrm{a2}}}+\sqrt{\mathrm{a2}^2-2(\mathrm{b1}+\right.\right.\right.\right.}{2\mathrm{a2}}$$

✓ **Maple** : cpu = 0.359 (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 = 0.0384806 (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 = 0.024 (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 = 0.0850406 (sec), leaf count = 135

$$\left\{\left\{y(x)\to\left(ax^2+1\right)^{\frac{1}{2}-\frac{b}{4a}}\left(c_1P_{\frac{\sqrt{a^2-2(b+2c)a+b^2}-a}{2a}}^{\frac{b}{2a}-1}\left(i\sqrt{a}x\right)+c_2Q_{\frac{\sqrt{a^2-2(b+2c)a+b^2}-a}{2a}}^{\frac{b}{2a}-1}\left(i\sqrt{a}x\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.144 (sec), leaf count = 124

$$\left\{y(x)=\left(ax^2+1\right)^{\frac{2\,a-b}{4\,a}}\left(\mathit{LegendreP}\left(\frac{1}{2\,a}\left(\sqrt{a^2+(-2\,b-4\,c)\,a+b^2}-a\right),\frac{2\,a-b}{2\,a},\sqrt{-a}x\right)\_C1+\mathit{LegendreQ}\left(\right.\right.\right.$$

2.1299 ODE No. 1299

$$\left(a^2x^2-1\right)y''(x)+2a^2xy'(x)=0$$

✓ **Mathematica** : cpu = 0.0148716 (sec), leaf count = 19

$$\left\{\left\{y(x)\to c_2-\frac{c_1\tanh^{-1}(ax)}{a}\right\}\right\}$$

✓ **Maple** : cpu = 0.019 (sec), leaf count = 27

$$\left\{y(x)=\_C1-\frac{(-\ln(ax-1)+\ln(ax+1))\_C2}{2a}\right\}$$

2.1300 ODE No. 1300

$$\left(a^2x^2-1\right)y''(x)+2a^2xy'(x)-2a^2y(x)=0$$

✓ **Mathematica** : cpu = 0.0588883 (sec), leaf count = 39

$$\left\{\left\{y(x)\to ac_1x-\frac{1}{2}c_2(ax\log(1-ax)-ax\log(ax+1)+2)\right\}\right\}$$

✓ **Maple** : cpu = 0.048 (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

$$\left(ax^2+bx\right)y''(x)-2ay(x)+2by'(x)=0$$

✓ **Mathematica** : cpu = 0.034348 (sec), leaf count = 30

$$\left\{\left\{y(x)\to\frac{\frac{c_2(ax+b)^3}{a}+3c_1}{3x}\right\}\right\}$$

✓ **Maple** : cpu = 0.024 (sec), leaf count = 19

$$\left\{y(x)=\frac{\_C1+\_C2\,(ax+b)^3}{x}\right\}$$

2.1302 ODE No. 1302

$$\text{A0}y(x)(ax+b)+\text{A1}(ax+b)y'(x)+\text{A2}(ax+b)^2y''(x)=0$$

✓ **Mathematica** : cpu = 0.0871118 (sec), leaf count = 165

$$\left\{\left\{y(x)\to(-1)^{-\frac{\text{A1}}{a\text{A2}}}\left(\frac{b}{a}+x\right)^{\frac{\text{A1}}{2a\text{A2}}}(\text{A2}(ax+b))^{-\frac{\text{A1}}{2a\text{A2}}}\left(-\frac{\text{A0}(ax+b)}{a^2\text{A2}}\right)^{\frac{1}{2}-\frac{\text{A1}}{2a\text{A2}}}\left(c_1(-1)^{\frac{\text{A1}}{a\text{A2}}}I_{\frac{\text{A1}}{a\text{A2}}-1}\left(2\sqrt{-\frac{\text{A0}(b+}{a^2\text{A2}}}\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.079 (sec), leaf count = 98

$$\left\{y(x)=(ax+b)^{-\frac{-aA2+A1}{2\,aA2}}\left(Y_{\frac{aA2-A1}{aA2}}\left(2\sqrt{A0}\sqrt{\frac{ax+b}{a^2A2}}\right)\_C2+J_{\frac{aA2-A1}{aA2}}\left(2\sqrt{A0}\sqrt{\frac{ax+b}{a^2A2}}\right)\_C1\right)\right\}$$

2.1303 ODE No. 1303

$$y''(x)\left(ax^2+bx+c\right)+(dx+f)y'(x)+gy(x)=0$$

✗ **Mathematica** : cpu = 15.6022 (sec), leaf count = 0 , DifferentialRoot result

$$\{\{y(x)\to\text{DifferentialRoot}(\{y,x\},\{gy(x)+(xd+f)y'(x)+\left(ax^2+bx+c\right)y''(x)=0,y(0)=c_1,y'(0)=c_2\})\,(x$$

✓ **Maple** : cpu = 0.25 (sec), leaf count = 501

$$\left\{y(x)=\_C1\,{}_2\mathrm{F}_1(\frac{1}{2\,a}\left(-a+d+\sqrt{a^2+(-2\,d-4\,g)\,a+d^2}\right),-\frac{1}{2\,a}\left(a-d+\sqrt{a^2+(-2\,d-4\,g)\,a+d^2}\right);\frac{1}{2\,a^2}\left(\right.\right.$$

2.1304 ODE No. 1304

$$x^3y''(x)+xy'(x)-(2x+3)y(x)=0$$

✓ **Mathematica** : cpu = 0.0580557 (sec), leaf count = 50

$$\left\{\left\{y(x)\to\frac{c_2e^{\frac{1}{x}}\text{Ei}\left(-\frac{1}{x}\right)+c_2x\left(2x^2-x+1\right)+6c_1e^{\frac{1}{x}}}{6x}\right\}\right\}$$

✓ **Maple** : cpu = 0.039 (sec), leaf count = 38

$$\left\{y(x)=\frac{1}{x}\left(Ei\left(1,x^{-1}\right)\mathrm{e}^{x^{-1}}\_C2+\_C1\,\mathrm{e}^{x^{-1}}-2\,x\left(x^2-x/2+1/2\right)\_C2\right)\right\}$$

2.1305 ODE No. 1305

$$x^3y''(x) + 2xy'(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 0.0861474 (sec), leaf count = 47

$$\left\{\left\{y(x)\to c_2G_{1,2}^{2,0}\left(-\frac{2}{x}|\begin{array}{c}\frac{1}{2}\\-1,0\end{array}\right)+c_1e^{\frac{1}{x}}\left(I_0\left(\frac{1}{x}\right)-I_1\left(\frac{1}{x}\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.063 (sec), leaf count = 44

$$\left\{y(x)=\left(\_C2\,K_1\left(-x^{-1}\right)-\_C2\,K_0\left(-x^{-1}\right)+\_C1\,\left(I_0\left(x^{-1}\right)-I_1\left(x^{-1}\right)\right)\right)\mathrm{e}^{x^{-1}}\right\}$$

2.1306 ODE No. 1306

$$y(x)\left(ax^2+a+bx\right)+x^3y''(x)+x^2y'(x)=0$$

✗ **Mathematica** : cpu = 1.08728 (sec), leaf count = 0 , DifferentialRoot result

$$\left\{\left\{y(x)\to \text{DifferentialRoot}\left(\{y,x\},\left\{y''(x)x^3+y'(x)x^2+\left(ax^2+bx+a\right)y(x)=0,y(1)=c_1,y'(1)=c_2\right\}\right)(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.255 (sec), leaf count = 69

$$\left\{y(x)=HeunD\left(0,8\,a+4\,b,0,8\,a-4\,b,\frac{1+x}{x-1}\right)\left(\int\frac{1}{x}\left(HeunD\left(0,8\,a+4\,b,0,8\,a-4\,b,\frac{1+x}{x-1}\right)\right)^{-2}\mathrm{d}x\_C2+\_\right.\right.$$

2.1307 ODE No. 1307

$$x^3y''(x) + (x+1)xy'(x) - 2y(x) = 0$$

✓ **Mathematica** : cpu = 0.105896 (sec), leaf count = 44

$$\left\{\left\{y(x)\to\frac{-c_2e^{\frac{1}{x}}(x+1)\text{Ei}\left(-\frac{1}{x}\right)+c_1e^{\frac{1}{x}}(x+1)-c_2x}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.059 (sec), leaf count = 36

$$\left\{y(x)=\frac{\_C2\,\mathrm{e}^{x^{-1}}(1+x)\,Ei\left(1,x^{-1}\right)+\_C1\,(1+x)\,\mathrm{e}^{x^{-1}}-\_C2\,x}{x}\right\}$$

2.1308 ODE No. 1308

$$x^3y''(x) - x^2y'(x) + xy(x) - \log^3(x) = 0$$

✓ **Mathematica** : cpu = 0.0229918 (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 = 0.02 (sec), leaf count = 40

$$\left\{y(x) = \frac{2\left(\ln(x)\right)^3 + 6\left(\ln(x)\right)^2 + \left(8\_C1\,x^2 + 9\right)\ln(x) + 8\_C2\,x^2 + 6}{8\,x}\right\}$$

2.1309 ODE No. 1309

$$x^3y''(x) - \left(x^2 - 1\right)y'(x) + xy(x) = 0$$

✓ **Mathematica** : cpu = 0.100607 (sec), leaf count = 77

$$\left\{\left\{y(x)\to c_2 G_{1,2}^{2,0}\left(-\frac{1}{2x^2}\middle|\begin{array}{c}1\\ -\frac{1}{2},-\frac{1}{2}\end{array}\right) + \frac{c_1 e^{\frac{1}{4x^2}}\left(\left(2x^2-1\right)I_0\left(\frac{1}{4x^2}\right) + I_1\left(\frac{1}{4x^2}\right)\right)}{\sqrt{2}x}\right\}\right\}$$

✓ **Maple** : cpu = 0.103 (sec), leaf count = 85

$$\left\{y(x) = \frac{\_C1}{x}e^{\frac{1}{4\,x^2}}\left(2\,x^2 I_0(1/4\,x^{-2}) + I_1\left(\frac{1}{4\,x^2}\right) - I_0\left(\frac{1}{4\,x^2}\right)\right) + \frac{\_C2}{x}e^{\frac{1}{4\,x^2}}\left(2\,K_0(-1/4\,x^{-2})x^2 - K_0\left(-\frac{1}{4\,x^2}\right)\right.$$

2.1310 ODE No. 1310

$$x^3y''(x) + 3x^2y'(x) + xy(x) - 1 = 0$$

✓ **Mathematica** : cpu = 0.013001 (sec), leaf count = 27

$$\left\{\left\{y(x)\to \frac{2c_2\log(x) + 2c_1 + \log^2(x)}{2x}\right\}\right\}$$

✓ **Maple** : cpu = 0.013 (sec), leaf count = 20

$$\left\{y(x) = \frac{1}{x}\left(\_C1\,\ln(x) + \frac{\left(\ln(x)\right)^2}{2} + \_C2\right)\right\}$$

2.1311 ODE No. 1311

$$-v(v+1)xy(x)+x\left(x^2+1\right)y''(x)+\left(2x^2+1\right)y'(x)=0$$

✓ **Mathematica** : cpu = 0.144455 (sec), leaf count = 61

$$\left\{\left\{y(x)\to c_2G_{2,2}^{2,0}\left(-x^2\middle|\begin{array}{c}\frac{1-v}{2},\frac{v+2}{2}\\0,0\end{array}\right)+c_1\,{}_2F_1\left(-\frac{v}{2},\frac{v+1}{2};1;-x^2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.157 (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 = 0.0264153 (sec), leaf count = 26

$$\left\{\left\{y(x)\to\frac{c_2x^3+3c_1}{3x^2+3}\right\}\right\}$$

✓ **Maple** : cpu = 0.023 (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 = 0.226062 (sec), leaf count = 75

$$\left\{\left\{y(x)\to c_1\,{}_2F_1\left(\frac{n-v}{2},\frac{1}{2}(n+v+1);n+1;-x^2\right)+c_2x^{-2n}\,{}_2F_1\left(\frac{1}{2}(-n-v),\frac{1}{2}(-n+v+1);1-n;-x^2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.096 (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 = 0.204575 (sec), leaf count = 75

$$\left\{\left\{y(x)\to c_1\,{}_2F_1\left(\frac{1}{2}(-n-v),\frac{1}{2}(-n+v+1);1-n;-x^2\right)+c_2x^{2n}\,{}_2F_1\left(\frac{n-v}{2},\frac{1}{2}(n+v+1);n+1;-x^2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.084 (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

$$ax^3y(x)+\left(x^2-1\right)xy''(x)+y'(x)=0$$

✓ **Mathematica** : cpu = 0.0304068 (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 = 0.022 (sec), leaf count = 45

$$\left\{y(x)=\_C1\ \sin\left((x-1)\,(1+x)\,\sqrt{a}\frac{1}{\sqrt{x^2-1}}\right)+\_C2\ \cos\left((x-1)\,(1+x)\,\sqrt{a}\frac{1}{\sqrt{x^2-1}}\right)\right\}$$

2.1316 ODE No. 1316

$$x\left(x^2-1\right)y''(x)+\left(x^2-1\right)y'(x)-xy(x)=0$$

✓ **Mathematica** : cpu = 0.0984821 (sec), leaf count = 38

$$\left\{\left\{y(x)\to c_2G_{2,2}^{2,0}\left(x^2|\begin{array}{c}\frac{1}{2},\frac{3}{2}\\0,0\end{array}\right)+\frac{2c_1E(x^2)}{\pi}\right\}\right\}$$

✓ **Maple** : cpu = 0.044 (sec), leaf count = 18

$$\{y(x)=\_C1\ \mathit{EllipticE}(x)+\_C2\ (\mathit{EllipticCE}(x)-\mathit{EllipticCK}(x))\}$$

2.1317 ODE No. 1317

$$x(x^2-1)\,y''(x)+(3x^2-1)\,y'(x)+xy(x)=0$$

✓ **Mathematica** : cpu = 0.133468 (sec), leaf count = 38

$$\left\{\left\{y(x)\to c_2 G_{2,2}^{2,0}\left(x^2\middle| \begin{array}{c}\frac{1}{2},\frac{1}{2}\\ 0,0\end{array}\right)+\frac{2c_1K(x^2)}{\pi}\right\}\right\}$$

✓ **Maple** : cpu = 0.045 (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 = 0.321832 (sec), leaf count = 146

$$\left\{\left\{y(x)\to c_1\,{}_2F_1\left(\frac{1}{4}\left(a-\sqrt{a^2-2a-4c+1}-1\right),\frac{1}{4}\left(a+\sqrt{a^2-2a-4c+1}-1\right);\frac{1-b}{2};x^2\right)+i^{b+1}c_2x^{b+1}\,{}_2F_1\right.\right.$$

✓ **Maple** : cpu = 0.145 (sec), leaf count = 122

$$\left\{y(x)=\_C1\ {}_2\mathrm{F}_1(-\frac{1}{4}+\frac{a}{4}+\frac{1}{4}\sqrt{a^2-2\,a-4\,c+1},-\frac{1}{4}+\frac{a}{4}-\frac{1}{4}\sqrt{a^2-2\,a-4\,c+1};-\frac{b}{2}+\frac{1}{2};\,x^2)+\_C2\ x^{b+1}{}_2\right.$$

2.1319 ODE No. 1319

$$x(x^2+2)\,y''(x)-y'(x)-6xy(x)=0$$

✓ **Mathematica** : cpu = 0.115287 (sec), leaf count = 69

$$\left\{\left\{y(x)\to c_1x^{3/2}(x^2+2)^{3/4}-\frac{1}{3}c_2\left(\sqrt[4]{2}(x^2+2)^{3/4}x^2\,{}_2F_1\left(\frac{1}{4},\frac{3}{4};\frac{5}{4};-\frac{x^2}{2}\right)+x^2+1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.116 (sec), leaf count = 31

$$\left\{y(x)=(x^2+2)^{\frac{3}{4}}\left(x^{\frac{3}{2}}\_C1+{}_2\mathrm{F}_1(-\frac{3}{4},\frac{7}{4};\frac{1}{4};-\frac{x^2}{2})\_C2\right)\right\}$$

2.1320 ODE No. 1320

$$x\left(x^2-2\right) y''(x)+\left(x^2+4x+2\right) y(x)-\left(x^3+3x^2-2x-2\right) y'(x)=0$$

✓ **Mathematica** : cpu = 0.0750254 (sec), leaf count = 21

$$\left\{\left\{y(x)\to c_1e^xx^2+c_2(x-1)\right\}\right\}$$

✓ **Maple** : cpu = 0.052 (sec), leaf count = 17

$$\left\{y(x)=\_C1\,(x-1)+\_C2\,\mathrm{e}^{x}x^{2}\right\}$$

2.1321 ODE No. 1321

$$(x+1)x^2y''(x)-(2x+1)xy'(x)+(2x+1)y(x)=0$$

✓ **Mathematica** : cpu = 0.0291787 (sec), leaf count = 17

$$\{\{y(x)\to x(c_2(x+\log(x))+c_1)\}\}$$

✓ **Maple** : cpu = 0.023 (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 = 0.0360584 (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 = 0.03 (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 = 0.755545 (sec), leaf count = 0 , DifferentialRoot result

$$\{\{y(x) \to \text{DifferentialRoot}(\{y, x\}, \{(-2x-2)y(x) + (2x-4)y'(x) + (x-1)xy''(x) = 0, y(2) = c_1, y'(2) = c_2\})$$

✓ **Maple** : cpu = 0.021 (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 = 0.0317591 (sec), leaf count = 24

$$\{\{y(x) \to x^2(c_1 x - c_2(x\log(x) + 1))\}\}$$

✓ **Maple** : cpu = 0.031 (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 = 0.283815 (sec), leaf count = 52

$$\left\{\left\{y(x) \to (-1)^\alpha c_1 x^\alpha\, {}_2F_1(a+\alpha, \alpha+b; \alpha-\beta+1; x) + (-1)^\beta c_2 x^\beta\, {}_2F_1(a+\beta, b+\beta; -\alpha+\beta+1; x)\right\}\right\}$$

✓ **Maple** : cpu = 0.155 (sec), leaf count = 86

$$\Big\{y(x) = (x-1)^{1-a-\alpha-b-\beta} \Big(x^\beta{}_2\mathrm{F}_1(1-a-\alpha, 1-\alpha-b;\ 1+\beta-\alpha;\ x)\_C2 + x^\alpha{}_2\mathrm{F}_1(1-b-\beta, 1-a-\beta;\ 1-\beta$$

2.1326 ODE No. 1326

$$y''(x) = -\frac{y'(x)}{x+1} - \frac{y(x)}{x(x+1)^2}$$

✓ **Mathematica** : cpu = 0.0269753 (sec), leaf count = 26

$$\left\{\left\{y(x) \to \frac{c_1 x + c_2 x \log(x) - c_2}{x+1}\right\}\right\}$$

✓ **Maple** : cpu = 0.029 (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 = 0.204115 (sec), leaf count = 105

$$\left\{\left\{y(x) \to \left(-\frac{1}{2}\right)^{-\frac{1}{\sqrt{2}}} x^{-\frac{1}{\sqrt{2}}} \left(\left(-\frac{1}{2}\right)^{\sqrt{2}} c_2 x^{\sqrt{2}}\, {}_2F_1\left(\frac{1}{\sqrt{2}}, -1+\frac{1}{\sqrt{2}}; 1+\sqrt{2}; \frac{x}{2}\right) + c_1\, {}_2F_1\left(-\frac{1}{\sqrt{2}}, -1-\frac{1}{\sqrt{2}}; 1-\sqrt{2}\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.528 (sec), leaf count = 81

$$\left\{y(x) = (x-2)^2 \left(\_C1\, {}_2\mathrm{F}_1(1-\frac{\sqrt{2}}{2}, 2-\frac{\sqrt{2}}{2}; 1-\sqrt{2}; \frac{x}{2}) x^{-\frac{\sqrt{2}}{2}} + \_C2\, {}_2\mathrm{F}_1(2+\frac{\sqrt{2}}{2}, 1+\frac{\sqrt{2}}{2}; 1+\sqrt{2}; \frac{x}{2}) x^{\frac{\sqrt{2}}{2}}\right)\right.$$

2.1328 ODE No. 1328

$$y''(x) = \frac{2y(x)}{(x-1)^2 x}$$

✓ **Mathematica** : cpu = 0.0246884 (sec), leaf count = 33

$$\left\{\left\{y(x) \to \frac{-c_2 x^2 - c_1 x + 2c_2 x \log(x) + c_2}{x-1}\right\}\right\}$$

✓ **Maple** : cpu = 0.03 (sec), leaf count = 27

$$\left\{y(x) = \frac{2\ln(x)\_C2\, x - \_C2\, x^2 + \_C1\, x + \_C2}{x-1}\right\}$$

2.1329 ODE No. 1329

$$y''(x) = -\frac{y'(x)\left(-x(a(\delta + \text{gamma1}) + \alpha + \beta - \delta + 1) + a\text{gamma1} + x^2(\alpha + \beta + 1)\right)}{(x-1)x(x-a)} - \frac{y(x)(\alpha\beta x - q)}{(x-1)x(x-a)}$$

✗ **Mathematica** : cpu = 6.43599 (sec), leaf count = 0 , DifferentialRoot result

$$\left\{\left\{y(x) \to \text{DifferentialRoot}\left(\{y, x\}, \left\{(x\alpha\beta - q)y(x) + \left(\alpha x^2 + \beta x^2 + x^2 - \alpha x - \beta x - a\delta x + \delta x - a\text{gamma1}x - x\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.365 (sec), leaf count = 64

$$\left\{y(x) = \_C1\ HeunG(a, q, \alpha, \beta, \gamma 1, \delta, x) + \_C2\ x^{1-\gamma 1} HeunG(a, q - (-1 + \gamma 1)\left(\delta\left(a - 1\right) + \alpha + \beta - \gamma 1 + 1\right), \beta +\right.$$

2.1330 ODE No. 1330

$$y''(x) = -\frac{y'(x)\left(Ax^2 + Bx + C\right)}{(x-a)(x-b)(x-c)} - \frac{(\text{DD}x + e)y(x)}{(x-a)(x-b)(x-c)}$$

✗ **Mathematica** : cpu = 178.434 (sec), leaf count = 0 , DifferentialRoot result

$$\left\{\left\{y(x) \to \text{DifferentialRoot}\left(\{y, x\}, \left\{(x\text{DD} + e)y(x) + \left(Ax^2 + Bx + C\right)y'(x) - (a-x)(b-x)(c-x)y''(x) = 0, y\right.\right.\right.\right.$$

✓ **Maple** : cpu = 1.19 (sec), leaf count = 1147

$$\left\{y(x) = \_C1\ HeunG\left(\frac{a-c}{a-b}, \frac{DD\,a + E}{a-b}, \frac{A}{2} - \frac{1}{2} + \frac{1}{2}\sqrt{A^2 - 2A - 4DD + 1}, 1\left(\left(A(b-c)a - Abc - Bc - C\right)\sqrt{A\right.\right.\right.$$

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 = 0.0489873 (sec), leaf count = 41

$$\left\{\left\{y(x) \to \frac{\sqrt[4]{x-2}\sqrt{x}\left(2c_2\sqrt{x-2} + c_1\right)}{\sqrt[4]{2-x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.029 (sec), leaf count = 19

$$\left\{y(x) = \_C1\ \sqrt{x} + \_C2\ \sqrt{x\left(x-2\right)}\right\}$$

2.1332 ODE No. 1332

$$y''(x) = \frac{y'(x)}{x+1} - \frac{(3x+1)y(x)}{4x^2(x+1)}$$

✓ **Mathematica** : cpu = 0.0272098 (sec), leaf count = 21

$$\left\{\left\{y(x) \to \sqrt{x}(c_2(x+\log(x))+c_1)\right\}\right\}$$

✓ **Maple** : cpu = 0.023 (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 = 0.121454 (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 = 0.081 (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 = 0.224619 (sec), leaf count = 89

$$\left\{\left\{y(x) \to i^{-c} x^{-c/2}\left(c_1\, {}_2F_1\left(\frac{1}{2}(a-b-c), \frac{1}{2}(a+b-c); 1-c; x\right) + i^{2c} c_2 x^c\, {}_2F_1\left(\frac{1}{2}(a-b+c), \frac{1}{2}(a+b+c); c+1\right.\right.\right.$$

✓ **Maple** : cpu = 0.097 (sec), leaf count = 89

$$\left\{y(x) = (x-1)^{1-a}\left(x^{-\frac{c}{2}} {}_2\mathrm{F}_1(-\frac{a}{2} + \frac{b}{2} - \frac{c}{2} + 1, -\frac{a}{2} - \frac{b}{2} - \frac{c}{2} + 1;\ 1-c;\ x)\_C2 + x^{\frac{c}{2}} {}_2\mathrm{F}_1(-\frac{a}{2} - \frac{b}{2} + \frac{c}{2} + 1, -\frac{a}{2} \right.\right.$$

2.1335 ODE No. 1335

$$y''(x) = -\frac{y(x)(ax+b)}{4(x-1)^2x} - \frac{(3x-1)y'(x)}{2(x-1)x}$$

✓ **Mathematica** : cpu = 0.367353 (sec), leaf count = 510

$$\left\{\left\{y(x)\to \frac{(x-1)^{\frac{2a\sqrt{-4\sqrt{(4a-1)(a+b)}-8a-4b+1}+2b\left(\sqrt{-4\sqrt{(4a-1)(a+b)}-8a-4b+1}+2\right)-\sqrt{(4a-1)(a+b)}\sqrt{-4\sqrt{(4a-1)(a+b)}-8a-4b+1}+1}{8b+2}}\left(c_{1}\,2\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.064 (sec), leaf count = 57

$$\left\{y(x) = \_C1\ LegendreP\left(\frac{1}{2}\sqrt{1-4\,a}-\frac{1}{2},\sqrt{-a-b},\sqrt{x}\right)+\_C2\ LegendreQ\left(\frac{1}{2}\sqrt{1-4\,a}-\frac{1}{2},\sqrt{-a-b},\sqrt{x}\right)\right\}$$

2.1336 ODE No. 1336

$$y''(x) = -\frac{(1-3x)y(x)}{(x-1)(2x-1)^2}$$

✓ **Mathematica** : cpu = 0.056992 (sec), leaf count = 51

$$\{\{y(x)\to -\sqrt{1-2x}(c_1x+2c_2(x-1)\log(x-1)-2c_2(x-1)\log(2x-1)-c_1+c_2)\}\}$$

✓ **Maple** : cpu = 0.052 (sec), leaf count = 44

$$\{y(x) = \sqrt{2\,x-1}(2\_C2\,(x-1)\ln(2\,x-1)-2\_C2\,(x-1)\ln(x-1)+\_C1\,x-\_C1-\_C2)\}$$

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 = 0.0918773 (sec), leaf count = 53

$$\left\{\left\{y(x)\to \frac{c_1\sqrt{a-b}+c_2\sqrt{b+x}}{\sqrt{a-b}\sqrt{\frac{a+x}{a-b}}}\right\}\right\}$$

✓ **Maple** : cpu = 0.043 (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 = 0.0743428 (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 = 0.037 (sec), leaf count = 27

$$\left\{y(x) = \_C2\,(x-2)^{\frac{17}{6}}\sqrt[6]{x} + 18\,x\_C1\left(x^2 - \frac{17\,x}{3} + \frac{187}{18}\right)\right\}$$

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 = 0.288985 (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 = 0.164 (sec), leaf count = 76

$$\left\{y(x) = (ax+1)^{-b+c-d}\left(x^d{}_2\mathrm{F}_1(c,1-b+c;\,1+c+d;\,-ax)\_C1 + x^{-c}{}_2\mathrm{F}_1(-d,1-b-d;\,1-c-d;\,-ax)\_C2\right.\right.$$

2.1340 ODE No. 1340

$$y''(x) = \frac{2(ax+2b)y'(x)}{x(ax+b)} - \frac{y(x)(2ax+6b)}{x^2(ax+b)}$$

✓ **Mathematica** : cpu = 0.0400482 (sec), leaf count = 23

$$\left\{\left\{y(x) \to \frac{x^2(c_2x+c_1)}{ax+b}\right\}\right\}$$

✓ **Maple** : cpu = 0.032 (sec), leaf count = 20

$$\left\{y(x) = \frac{x^2(\_C2\,x + \_C1)}{ax+b}\right\}$$

2.1341 ODE No. 1341

$$y''(x) = -\frac{y(x)(avx-b)}{x^2(ax+b)} - \frac{(2ax+b)y'(x)}{x(ax+b)} + Ax$$

✗ **Mathematica** : cpu = 300.001 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.199 (sec), leaf count = 201

$$\left\{y(x) = \frac{1}{a^2\,(v+6)\,(v+2)\,(v+12)}\left(x^{-\frac{1}{2}+\frac{1}{2}\sqrt{1-4\,v}}a^2\_C2\,(v+6)\,(v+2)\,(v+12)\,{}_2\mathrm{F}_1(\frac{3}{2}-\frac{1}{2}\sqrt{1-4\,v}, -\frac{1}{2}-\frac{1}{2}\sqrt{1\right.\right.$$

2.1342 ODE No. 1342

$$y''(x) = -\frac{ay(x)}{x^4}$$

✓ **Mathematica** : cpu = 0.0985026 (sec), leaf count = 52

$$\left\{\left\{y(x) \to c_1xe^{\frac{i\sqrt{a}}{x}} - \frac{ic_2xe^{-\frac{i\sqrt{a}}{x}}}{2\sqrt{a}}\right\}\right\}$$

✓ **Maple** : cpu = 0.031 (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 = 0.780039 (sec), leaf count = 0 , DifferentialRoot result

$$\left\{\left\{y(x) \to \text{DifferentialRoot}\left(\{y,x\}, \left\{y''(x)x^4 + \left(-a^2x^2 + ax^2 - bx - b^2\right)y(x) = 0, y(1) = c_1, y'(1) = c_2\right\}\right)(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.125 (sec), leaf count = 58

$$\left\{y(x) = I_{a+1}\left(\frac{b}{x}\right)\_C1\, b - K_{a+1}\left(\frac{b}{x}\right)\_C2\, b + 2\left(ax + b/2\right)\left(\_C1\, I_a\left(\frac{b}{x}\right) + \_C2\, K_a\left(\frac{b}{x}\right)\right)\right\}$$

2.1344 ODE No. 1344

$$y''(x) = -\frac{\left(e^{2/x} - v^2\right)y(x)}{x^4}$$

✓ **Mathematica** : cpu = 0.605905 (sec), leaf count = 100

$$\left\{\left\{y(x) \to \frac{(-1)^{-v}2^{\frac{3v}{2}+\frac{1}{2}}\left(-e^{2/x}\right)^{-v/2}\left(e^{2/x}\right)^{v/2}\left(c_1(-1)^v I_v\left(\sqrt{-e^{2/x}}\right) + c_2 K_v\left(\sqrt{-e^{2/x}}\right)\right)}{\log\left(e^{2/x}\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.054 (sec), leaf count = 23

$$\left\{y(x) = x\left(Y_v\left(e^{x^{-1}}\right)\_C2 + J_v\left(e^{x^{-1}}\right)\_C1\right)\right\}$$

2.1345 ODE No. 1345

$$y''(x) = \frac{2y(x)}{x^4} - \frac{y'(x)}{x^3}$$

✓ **Mathematica** : cpu = 0.0528025 (sec), leaf count = 45

$$\left\{\left\{y(x) \to \frac{1}{2}e^{\frac{1}{2x^2}}x\left(2c_1 - \sqrt{2\pi}c_2\text{erf}\left(\frac{1}{\sqrt{2}x}\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.057 (sec), leaf count = 25

$$\left\{y(x) = xe^{\frac{1}{2\,x^2}}\left(Erf\left(\frac{\sqrt{2}}{2\,x}\right)\_C2 + \_C1\right)\right\}$$

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 = 0.106843 (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 = 0.06 (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 = 0.11283 (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 = 0.033 (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

$$y''(x) = -\frac{y(x)\left(a\left(x^4+1\right)+bx^2\right)}{x^4} - \frac{y'(x)}{x}$$

✗ **Mathematica** : cpu = 1.49471 (sec), leaf count = 0 , DifferentialRoot result

$$\left\{\left\{y(x)\to \text{DifferentialRoot}\left(\{y,x\},\left\{y''(x)x^4 + y'(x)x^3 + \left(ax^4+bx^2+a\right)y(x) = 0, y(1) = c_1, y'(1) = c_2\right\}\right)(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.237 (sec), leaf count = 73

$$\left\{y(x) = \mathit{HeunD}\left(0, 2\,a+b, 0, 2\,a-b, \frac{x^2+1}{x^2-1}\right)\left(\int \frac{1}{x}\left(\mathit{HeunD}\left(0, 2\,a+b, 0, 2\,a-b, \frac{x^2+1}{x^2-1}\right)\right)^{-2} \mathrm{d}x\_C2 + \_C1\right.\right.$$

2.1349 ODE No. 1349

$$y''(x) = -\frac{y(x)}{x^4} - \frac{(x^2+1)\,y'(x)}{x^3}$$

✓ **Mathematica** : cpu = 0.119534 (sec), leaf count = 73

$$\left\{\left\{y(x)\to c_2 G_{1,2}^{2,0}\left(-\frac{1}{2x^2}\middle|\begin{array}{c}\frac{3}{2}\\0,0\end{array}\right)+\frac{c_1 e^{\frac{1}{4x^2}}\left(\left(2x^2-1\right)I_0\left(\frac{1}{4x^2}\right)+I_1\left(\frac{1}{4x^2}\right)\right)}{2x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.08 (sec), leaf count = 85

$$\left\{y(x)=\frac{\_C1}{x^2}\mathrm{e}^{\frac{1}{4\,x^2}}\left(2\,x^2 I_0(1/4\,x^{-2})+I_1\left(\frac{1}{4\,x^2}\right)-I_0\left(\frac{1}{4\,x^2}\right)\right)+\frac{\_C2}{x^2}\mathrm{e}^{\frac{1}{4\,x^2}}\left(2\,K_0(-1/4\,x^{-2})x^2-K_0\left(-\frac{1}{4\,x^2}\right)\right.$$

2.1350 ODE No. 1350

$$y''(x) = -\frac{a^2 y(x)}{x^4} - \frac{2y'(x)}{x}$$

✓ **Mathematica** : cpu = 0.0110433 (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 = 0.012 (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 = 0.0414213 (sec), leaf count = 44

$$\left\{\left\{y(x)\to\frac{1}{2}e^{\frac{1}{2x^2}}\left(2c_1-\sqrt{2\pi}c_2\operatorname{erf}\left(\frac{1}{\sqrt{2}x}\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.038 (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 = 0.0153336 (sec), leaf count = 51

$$\left\{\left\{y(x) \to e^{\frac{a-\sqrt{a^2-b}}{x}} \left(c_1 e^{\frac{2\sqrt{a^2-b}}{x}} + c_2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.047 (sec), leaf count = 43

$$\left\{y(x) = \_C1\, \mathrm{e}^{\frac{1}{x}\left(a-\sqrt{a^2-b}\right)} + \_C2\, \mathrm{e}^{\frac{1}{x}\left(\sqrt{a^2-b}+a\right)}\right\}$$

2.1353 ODE No. 1353

$$y''(x) = \frac{(2x^2-1)\,y'(x)}{x^3} - \frac{y(x)}{x^4}$$

✓ **Mathematica** : cpu = 0.135227 (sec), leaf count = 77

$$\left\{\left\{y(x) \to \frac{-\sqrt{2\pi}c_2(x^4+2x^2-1)\,\mathrm{erfi}\left(\frac{1}{\sqrt{2}x}\right) + 2c_2 e^{\frac{1}{2x^2}} x(x^2-1) + 16c_1(x^4+2x^2-1)}{16x}\right\}\right\}$$

✓ **Maple** : cpu = 0.221 (sec), leaf count = 66

$$\left\{y(x) = \frac{1}{x}\left(\_C1\,\sqrt{2}\sqrt{\pi}(x^4+2\,x^2-1)\;\mathit{erfi}\left(\frac{\sqrt{2}}{2\,x}\right) + (-2\,\_C1\,x^3 + 2\,\_C1\,x)\,\mathrm{e}^{\frac{1}{2\,x^2}} + \_C2\,(x^4+2\,x^2-1)\right)\right\}$$

2.1354 ODE No. 1354

$$y''(x) = \frac{(2x^2-1)\,y'(x)}{x^3} - \frac{2y(x)}{x^4}$$

✓ **Mathematica** : cpu = 0.0955671 (sec), leaf count = 78

$$\left\{\left\{y(x) \to \frac{5\sqrt{2\pi}c_2(1-5x^2)\,\mathrm{erfi}\left(\frac{1}{\sqrt{2}x}\right) + 12c_1(5x^2-1) + 10c_2 e^{\frac{1}{2x^2}} x(2x^4+4x^2-1)}{60x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.336 (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 = 0.142446 (sec), leaf count = 57

$$\left\{\left\{y(x) \to -\frac{1}{2}c_2\sqrt[3]{x^3+1}x^2\,{}_2F_1\left(\frac{1}{3},\frac{2}{3};\frac{5}{3};-x^3\right) + c_1\sqrt[3]{x^3+1} + c_2x^2\right\}\right\}$$

✓ **Maple** : cpu = 0.133 (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 = 0.337124 (sec), leaf count = 78

$$\left\{\left\{y(x) \to c_1x^{-n}\,{}_2F_1\left(\frac{1}{2}(-n-v),\frac{1}{2}(-n+v+1);1-n;-x^2\right) + c_2x^n\,{}_2F_1\left(\frac{n-v}{2},\frac{1}{2}(n+v+1);n+1;-x^2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.088 (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 = 0.78533 (sec), leaf count = 264

$$\left\{\left\{y(x) \to x^{-\frac{1}{2}\sqrt{a^2-4a-4c+4}-\frac{a}{2}+1}\left(c_1\,{}_2F_1\left(\frac{1}{4}\left(-\sqrt{a^2-2a-4b+1}-\sqrt{a^2-4a-4c+4}+1\right),\frac{1}{4}\left(\sqrt{a^2-2a-4b\right.\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.13 (sec), leaf count = 97

$$\left\{y(x) = x^{1-\frac{a}{2}}\left(LegendreQ\left(-\frac{1}{2}+\frac{1}{2}\sqrt{a^2-2\,a-4\,b+1},\frac{1}{2}\sqrt{a^2-4\,a-4\,c+4},\sqrt{x^2+1}\right)\_C2 + LegendreP\left(-\right.\right.\right.$$

2.1358 ODE No. 1358

$$y''(x) = \frac{(x^2-2)\,y'(x)}{x\,(x^2-1)} - \frac{(x^2-2)\,y(x)}{x^2\,(x^2-1)}$$

✓ **Mathematica** : cpu = 0.0721046 (sec), leaf count = 45

$$\left\{\left\{y(x)\to \frac{x\sqrt[4]{x^2-1}\left(c_2\log\left(\sqrt{x^2-1}+x\right)+c_1\right)}{\sqrt[4]{1-x^2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.049 (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 = 0.126065 (sec), leaf count = 84

$$\left\{\left\{y(x)\to c_1 i^{-v}x^{-v}\,{}_2F_1\left(\frac{1}{2}-\frac{v}{2},-\frac{v}{2};\frac{1}{2}-v;x^2\right)+c_2 i^{v+1}x^{v+1}\,{}_2F_1\left(\frac{v+1}{2},\frac{v+2}{2};v+\frac{3}{2};x^2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.102 (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 = 0.108226 (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 = 0.084 (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 = 0.595239 (sec), leaf count = 36

$$\{\{y(x) \to c_1 x^{-a} - c_2 x^{a+1}(2a(x^2-1)+x^2-3)\}\}$$

✓ **Maple** : cpu = 0.039 (sec), leaf count = 33

$$\{y(x) = \_C1\, x^{-a} + \_C2\, (2\, ax^2 + x^2 - 2\, a - 3)\, x^{a+1}\}$$

2.1362 ODE No. 1362

$$y''(x) = \frac{2xy'(x)}{x^2-1} - \frac{y(x)\,((x^2-1)\,x^2(a-n)(a+n+1) + 2ax^2 + n(n+1)\,(x^2-1))}{x^2\,(x^2-1)}$$

✗ **Mathematica** : cpu = 16.6608 (sec), leaf count = 0 , DifferentialRoot result

$$\{\{y(x) \to \text{DifferentialRoot}(\{y,x\},\{-2y'(x)x^3 + (a^2x^4 - n^2x^4 + ax^4 - nx^4 - a^2x^2 + 2n^2x^2 + ax^2 + 2nx^2 - n^2$$

✓ **Maple** : cpu = 0.256 (sec), leaf count = 109

$$\left\{y(x) = \_C1\ HeunC\left(0, -n - \frac{1}{2}, -2, -\frac{a^2}{4} + \frac{n^2}{4} - \frac{a}{4} + \frac{n}{4}, -\frac{n^2}{4} - \frac{n}{4} + \frac{3}{4} + \frac{a^2}{4} - \frac{a}{4}, x^2\right) x^{-n} + \_C2\ HeunC\left(0,\right.\right.$$

2.1363 ODE No. 1363

$$y''(x) = -\frac{(ax^2+a-2)\, y'(x)}{x\,(x^2-1)} - \frac{by(x)}{x^2}$$

✓ **Mathematica** : cpu = 0.89897 (sec), leaf count = 211

$$\left\{\left\{y(x) \to (-1)^{\frac{1}{4}\left(-\sqrt{a^2-2a-4b+1}+a+7\right)} x^{\frac{1}{2}\left(-\sqrt{a^2-2a-4b+1}+a-1\right)} \left(c_1\, {}_2F_1\left(\frac{a-1}{2}, \frac{1}{2}\left(a - \sqrt{a^2-2a-4b+1} - 1\right); 1 -\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.148 (sec), leaf count = 161

$$\left\{y(x) = (x^2-1)^{-a+2} \left(x^{\frac{a}{2}-\frac{1}{2}-\frac{1}{2}\sqrt{a^2-2\,a-4\,b+1}}\, {}_2\mathrm{F}_1(-\frac{a}{2}+\frac{3}{2}, -\frac{a}{2}+\frac{3}{2}-\frac{1}{2}\sqrt{a^2-2\,a-4\,b+1}; 1 - \frac{1}{2}\sqrt{a^2-2\,a-4\right.\right.$$

2.1364 ODE No. 1364

$$y''(x) = \frac{y'(x)\left(2(a-1)x^2 - 2a + 2bc\left(x^2-1\right)x^c\right)}{x\left(x^2-1\right)} - \frac{y(x)\left(bc(2a-c-1)x^{c+2} - bc(2a-c+1)x^c + x^2((a-1)a -\right.}{x^2\left(x^2-1\right)}$$

✓ **Mathematica** : cpu = 0.181187 (sec), leaf count = 29

$$\left\{\left\{y(x) \to x^a e^{bx^c}\left(c_1 P_v(x) + c_2 Q_v(x)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.115 (sec), leaf count = 25

$$\left\{y(x) = x^a \mathrm{e}^{bx^c}\left(\mathit{LegendreQ}(v,x)\_C2 + \mathit{LegendreP}(v,x)\_C1\right)\right\}$$

2.1365 ODE No. 1365

$$y''(x) = -\frac{ay(x)}{\left(x^2+1\right)^2}$$

✓ **Mathematica** : cpu = 0.103752 (sec), leaf count = 66

$$\left\{\left\{y(x) \to \frac{1}{2}\sqrt{x^2+1}e^{-i\sqrt{a+1}\tan^{-1}(x)}\left(2c_1 e^{2i\sqrt{a+1}\tan^{-1}(x)} + \frac{ic_2}{\sqrt{a+1}}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.064 (sec), leaf count = 59

$$\left\{y(x) = \sqrt{x^2+1}\left(\left(\frac{x+i}{-x+i}\right)^{-\frac{1}{2}\sqrt{a+1}}\_C2 + \left(\frac{x+i}{-x+i}\right)^{\frac{1}{2}\sqrt{a+1}}\_C1\right)\right\}$$

2.1366 ODE No. 1366

$$y''(x) = -\frac{2xy'(x)}{x^2+1} - \frac{y(x)}{\left(x^2+1\right)^2}$$

✓ **Mathematica** : cpu = 0.0255187 (sec), leaf count = 22

$$\left\{\left\{y(x) \to \frac{c_2 x + c_1}{\sqrt{x^2+1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.01 (sec), leaf count = 17

$$\left\{y(x) = (\_C1\, x + \_C2)\frac{1}{\sqrt{x^2+1}}\right\}$$

2.1367 ODE No. 1367

$$y''(x) = -\frac{y(x)\left(a^2(x^2+1)^2 + m^2 - n(n+1)(x^2+1)\right)}{(x^2+1)^2} - \frac{2xy'(x)}{x^2+1}$$

✗ **Mathematica** : cpu = 2.39811 (sec), leaf count = 0 , DifferentialRoot result

$$\left\{\left\{y(x) \to \text{DifferentialRoot}\left(\{y,x\}, \left\{y''(x)\left(x^2+1\right)^2 + 2xy'(x)\left(x^2+1\right) + \left(a^2x^4 + 2a^2x^2 - n^2x^2 - nx^2 + a^2 + n\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.258 (sec), leaf count = 88

$$\left\{y(x) = \left(x^2+1\right)^{\frac{m}{2}}\left(\mathit{HeunC}\left(0, \frac{1}{2}, m, -\frac{a^2}{4}, \frac{1}{4} + \frac{a^2}{4} + \frac{m^2}{4} - \frac{n^2}{4} - \frac{n}{4}, -x^2\right)\_C2\,x + \mathit{HeunC}\left(0, -\frac{1}{2}, m, -\frac{a^2}{4}, \frac{1}{4}\right.\right.\right.$$

2.1368 ODE No. 1368

$$y''(x) = -\frac{axy'(x)}{x^2+1} - \frac{by(x)}{(x^2+1)^2}$$

✓ **Mathematica** : cpu = 0.0299726 (sec), leaf count = 92

$$\left\{\left\{y(x) \to \left(x^2+1\right)^{\frac{1}{2}-\frac{a}{4}}\left(c_1 P_{\frac{a-2}{2}}^{\frac{1}{2}\sqrt{a^2-4a+4b+4}}(ix) + c_2 Q_{\frac{a-2}{2}}^{\frac{1}{2}\sqrt{a^2-4a+4b+4}}(ix)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.082 (sec), leaf count = 71

$$\left\{y(x) = \left(x^2+1\right)^{\frac{1}{2}-\frac{a}{4}}\left(\mathit{LegendreQ}\left(\frac{a}{2}-1, \frac{1}{2}\sqrt{a^2-4\,a+4\,b+4}, ix\right)\_C2 + \mathit{LegendreP}\left(\frac{a}{2}-1, \frac{1}{2}\sqrt{a^2-4\,a+4\right.\right.\right.$$

2.1369 ODE No. 1369

$$y''(x) = -\frac{ay(x)}{(x^2-1)^2}$$

✓ **Mathematica** : cpu = 0.111289 (sec), leaf count = 67

$$\left\{\left\{y(x) \to \frac{1}{2}\sqrt{1-x^2}e^{-\sqrt{1-a}\tanh^{-1}(x)}\left(\frac{c_2 e^{2\sqrt{1-a}\tanh^{-1}(x)}}{\sqrt{1-a}} + 2c_1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.069 (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 = 0.0326601 (sec), leaf count = 53

$$\left\{\left\{y(x) \to c_1 \cosh\left(\frac{1}{2}a(\log(1-x)-\log(x+1))\right) + ic_2 \sinh\left(\frac{1}{2}a(\log(1-x)-\log(x+1))\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.013 (sec), leaf count = 19

$$\{y(x) = \_C1 \ \sinh(a\mathit{Artanh}(x)) + \_C2 \ \cosh(a\mathit{Artanh}(x))\}$$

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 = 0.0236699 (sec), leaf count = 48

$$\left\{\left\{y(x) \to c_1 P^a_{\frac{1}{2}(\sqrt{4\lambda+1}-1)}(x) + c_2 Q^a_{\frac{1}{2}(\sqrt{4\lambda+1}-1)}(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.061 (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

$$y''(x) = -\frac{y(x)\left((x^2-1)(ax^2+bx+c)-k^2\right)}{(x^2-1)^2} - \frac{2xy'(x)}{x^2-1}$$

✗ **Mathematica** : cpu = 4.30947 (sec), leaf count = 0 , DifferentialRoot result

$$\{\{y(x) \to \text{DifferentialRoot}(\{y,x\},\{(ax^4+bx^3-ax^2+cx^2-bx-k^2-c)\,y(x)+(2x^3-2x)\,y'(x)+(x^4-2x^2$$

✓ **Maple** : cpu = 0.303 (sec), leaf count = 110

$$\left\{y(x) = e^{\sqrt{-a}x}\left(\mathit{HeunC}\left(4\sqrt{-a}, -k, k, 2b, \frac{k^2}{2}+a-b+c, \frac{x}{2}+\frac{1}{2}\right)\sqrt{2x-2}(1+x)^{-\frac{k}{2}}(x-1)^{\frac{k}{2}-\frac{1}{2}}\_C2 + \mathit{Heun}\right.$$

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 = 2.45433 (sec), leaf count = 0 , DifferentialRoot result

$$\{\{y(x) \to \text{DifferentialRoot}(\{y,x\},\{(-a^2x^4 + 2a^2x^2 - n^2x^2 - nx^2 - a^2 - m^2 + n^2 + n)\, y(x) + (2x^3 - 2x)\, y'(x)$$

✓ **Maple** : cpu = 0.237 (sec), leaf count = 84

$$\left\{y(x) = (x^2-1)^{\frac{m}{2}}\left(\mathit{HeunC}\left(0, \frac{1}{2}, m, -\frac{a^2}{4}, \frac{1}{4} + \frac{a^2}{4} + \frac{m^2}{4} - \frac{n^2}{4} - \frac{n}{4}, x^2\right)\_C2\, x + \mathit{HeunC}\left(0, -\frac{1}{2}, m, -\frac{a^2}{4}, \frac{1}{4} +\right.\right.$$

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 = 0.0390137 (sec), leaf count = 26

$$\{\{y(x) \to (x^2-1)^a (c_1 P_v(x) + c_2 Q_v(x))\}\}$$

✓ **Maple** : cpu = 0.06 (sec), leaf count = 23

$$\{y(x) = (x^2-1)^a (\mathit{LegendreQ}(v,x)\_C2 + \mathit{LegendreP}(v,x)\_C1)\}$$

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 = 0.0568778 (sec), leaf count = 34

$$\left\{\left\{y(x) \to (x^2-1)^{a-\frac{n}{2}} (c_1 P_v^n(x) + c_2 Q_v^n(x))\right\}\right\}$$

✓ **Maple** : cpu = 0.077 (sec), leaf count = 29

$$\left\{y(x) = (x^2-1)^{a-\frac{n}{2}} (\mathit{LegendreQ}(v,n,x)\_C2 + \mathit{LegendreP}(v,n,x)\_C1)\right\}$$

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 = 0.108703 (sec), leaf count = 82

$$\left\{\left\{y(x)\to c_2\sin\left(\frac{\sqrt{b}\left(\log(x)-\log\left(\sqrt{a}\sqrt{a+x^2}+a\right)\right)}{\sqrt{a}}\right)+c_1\cos\left(\frac{\sqrt{b}\left(\log(x)-\log\left(\sqrt{a}\sqrt{a+x^2}+a\right)\right)}{\sqrt{a}}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.033 (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 = 0.258666 (sec), leaf count = 97

$$\left\{\left\{y(x)\to\frac{1}{2}\sqrt{a^2+x^2}e^{-i\sqrt{\frac{b^2}{a^2}+1}\tan^{-1}\left(\frac{x}{a}\right)}\left(2c_1e^{2i\sqrt{\frac{b^2}{a^2}+1}\tan^{-1}\left(\frac{x}{a}\right)}+\frac{ic_2}{a\sqrt{\frac{b^2}{a^2}+1}}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.129 (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

$$y''(x) = -\frac{2(x^2-1)\,y'(x)}{(x-1)^2x} - \frac{(-2x^2+2x+2)\,y(x)}{(x-1)^2x^2}$$

✓ **Mathematica** : cpu = 0.0598421 (sec), leaf count = 56

$$\left\{\left\{y(x)\to-\frac{x(c_1x^2-c_1x-2c_2x-2c_2(x-1)x\log(1-x)+2c_2(x-1)x\log(x)+c_2)}{(x-1)^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.051 (sec), leaf count = 48

$$\left\{y(x) = \frac{x}{(x-1)^2}\left(-\_C2\,x(x-1)\ln(x-1) + \_C2\,x(x-1)\ln(x) + \_C1\,x^2 + (-\_C1 - \_C2)\,x + \frac{\_C2}{2}\right)\right\}$$

2.1379 ODE No. 1379

$$y''(x) = \frac{12y(x)}{(x+1)^2\,(x^2+2x+3)}$$

✓ **Mathematica** : cpu = 0.0845654 (sec), leaf count = 71

$$\left\{\left\{y(x) \to \frac{2c_1\left(x^2+2x+3\right) - 3\sqrt{2}c_2\left(x^2+2x+3\right)\tan^{-1}\left(\frac{x+1}{\sqrt{2}}\right) + 2c_2\left(x^3+2x^2+4x+1\right)}{2(x+1)^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.072 (sec), leaf count = 60

$$\left\{y(x) = \frac{1}{(1+x)^2}\left(3\_C2\,\left(x^2+2\,x+3\right)\arctan\left(1/2\,(1+x)\,\sqrt{2}\right) - \_C2\,\left(x^3+2\,x^2+4\,x+1\right)\sqrt{2} + \_C1\,(x^2+$$

2.1380 ODE No. 1380

$$y''(x) = -\frac{by(x)}{x^2(x-a)^2}$$

✓ **Mathematica** : cpu = 0.341498 (sec), leaf count = 121

$$\left\{\left\{y(x) \to \frac{x^{\frac{1}{2}-\frac{1}{2}\sqrt{1-\frac{4b}{a^2}}}(x-a)^{\frac{1}{2}-\frac{1}{2}\sqrt{1-\frac{4b}{a^2}}}\left(ac_1\sqrt{1-\frac{4b}{a^2}}x^{\sqrt{1-\frac{4b}{a^2}}} + c_2(x-a)^{\sqrt{1-\frac{4b}{a^2}}}\right)}{a\sqrt{1-\frac{4b}{a^2}}}\right\}\right\}$$

✓ **Maple** : cpu = 0.1 (sec), leaf count = 67

$$\left\{y(x) = \sqrt{x\,(a-x)}\left(\left(\frac{x}{a-x}\right)^{\frac{1}{2\,a}\sqrt{a^2-4\,b}}\_C2 + \left(\frac{a-x}{x}\right)^{\frac{1}{2\,a}\sqrt{a^2-4\,b}}\_C1\right)\right\}$$

2.1381 ODE No. 1381

$$y''(x) = c - \frac{by(x)}{x^2(x-a)^2}$$

✓ **Mathematica** : cpu = 0.814882 (sec), leaf count = 371

$$\left\{\left\{y(x) \to \frac{acx^2(a-x)\left(1-\frac{x}{a}\right)^{-\frac{1}{2}\sqrt{1-\frac{4b}{a^2}}-\frac{1}{2}}\left(\left(\sqrt{1-\frac{4b}{a^2}}-3\right)\left(1-\frac{x}{a}\right)^{\sqrt{1-\frac{4b}{a^2}}}\,{}_2F_1\left(\frac{1}{2}\sqrt{1-\frac{4b}{a^2}}-\frac{1}{2},\frac{1}{2}\sqrt{1-\frac{4b}{a^2}}+\frac{3}{2}\right.\right.}{2\left(2a^2+b\right)}\right.\right.$$

✓ **Maple** : cpu = 0.204 (sec), leaf count = 175

$$\left\{y(x) = 1\left(\left(\_C2\,\sqrt{a^2-4\,b} - \int\sqrt{x\,(a-x)}\left(\frac{a-x}{x}\right)^{-\frac{1}{2\,a}\sqrt{a^2-4\,b}}\mathrm{d}xc\right)\left(\frac{a-x}{x}\right)^{\frac{1}{2\,a}\sqrt{a^2-4\,b}} + \left(\int\sqrt{x\,(a-x)}\left(\right.\right.\right.\right.$$

2.1382 ODE No. 1382

$$y''(x) = \frac{cy(x)}{(x-a)^2(x-b)^2}$$

✓ **Mathematica** : cpu = 0.792776 (sec), leaf count = 141

$$\left\{\left\{y(x) \to (x-a)^{\frac{1}{2}\left(1-\sqrt{\frac{4c}{(a-b)^2}+1}\right)}(x-b)^{\frac{1}{2}\left(1-\sqrt{\frac{4c}{(a-b)^2}+1}\right)}\left(c_1(x-a)^{\sqrt{\frac{4c}{(a-b)^2}+1}} - \frac{c_2(x-b)^{\sqrt{\frac{4c}{(a-b)^2}+1}}}{(a-b)\sqrt{\frac{4c}{(a-b)^2}+1}}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.141 (sec), leaf count = 104

$$\left\{y(x) = \sqrt{(a-x)\,(b-x)}\left(\left(\frac{a-x}{b-x}\right)^{\frac{1}{2\,a-2\,b}\sqrt{a^2-2\,ab+b^2+4\,c}}\_C1 + \left(\frac{a-x}{b-x}\right)^{-\frac{1}{2\,a-2\,b}\sqrt{a^2-2\,ab+b^2+4\,c}}\_C2\right)\right\}$$

2.1383 ODE No. 1383

$$y''(x) = -\frac{y'(x)\left((x-a)^2(\alpha+\beta+1)(x-b)+(x-a)(-\alpha-\beta+1)(x-b)^2\right)}{(x-a)^2(x-b)^2} - \frac{\alpha\beta(a-b)^2 y(x)}{(x-a)^2(x-b)^2}$$

✓ **Mathematica** : cpu = 0.155 (sec), leaf count = 44

$$\left\{\left\{y(x)\to c_1(x-a)^\alpha(x-b)^{-\alpha}+c_2(x-a)^\beta(x-b)^{-\beta}\right\}\right\}$$

✓ **Maple** : cpu = 0.056 (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

$$y''(x) = -\frac{y(x)\left(-\left(a^2-1\right)x^2+2(a+3)bx-b^2\right)}{4x^2}$$

✓ **Mathematica** : cpu = 0.0364139 (sec), leaf count = 106

$$\left\{\left\{y(x)\to c_1 M_{\frac{(a+3)b}{2\sqrt{a^2-1}},\frac{\sqrt{b^3+b}}{2\sqrt{b}}}\left(\sqrt{a^2-1}x\right)+c_2 W_{\frac{(a+3)b}{2\sqrt{a^2-1}},\frac{\sqrt{b^3+b}}{2\sqrt{b}}}\left(\sqrt{a^2-1}x\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.269 (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

$$y''(x) = -\frac{\left(ax^2+a-3\right)y(x)}{4\left(x^2+1\right)^2}$$

✓ **Mathematica** : cpu = 0.0211583 (sec), leaf count = 70

$$\left\{\left\{y(x)\to\sqrt{x^2+1}\left(c_1 P_{\frac{1}{2}\left(\sqrt{1-a}-1\right)}^{\frac{1}{2}}(ix)+c_2 Q_{\frac{1}{2}\left(\sqrt{1-a}-1\right)}^{\frac{1}{2}}(ix)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.074 (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 = 0.0981106 (sec), leaf count = 68

$$\left\{\left\{y(x) \to \frac{c_1(x^2+x+1) - 12\sqrt{3}c_2(x^2+x+1)\tan^{-1}\left(\frac{2x+1}{\sqrt{3}}\right) + c_2(16x^3+24x^2+30x+11)}{(2x+1)^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.074 (sec), leaf count = 58

$$\left\{y(x) = \frac{1}{(2x+1)^2}\left(36\_C2\,(x^2+x+1)\arctan\left(1/3\,(2x+1)\sqrt{3}\right) - 16\_C2\left(x^3+x^2+\frac{11\,x}{8}+3/16\right)\sqrt{3} + \_\right.$$

2.1387 ODE No. 1387

$$y''(x) = \frac{3y(x)}{4(x^2+x+1)^2}$$

✓ **Mathematica** : cpu = 0.0417614 (sec), leaf count = 45

$$\left\{\left\{y(x) \to \frac{1}{3}\sqrt{x^2+x+1}\left(2\sqrt{3}c_2\tan^{-1}\left(\frac{2x+1}{\sqrt{3}}\right)+3c_1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.033 (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 = 0.339264 (sec), leaf count = 109

$$\left\{\left\{y(x) \to \frac{(-1)^{-v}(x-1)^{\frac{a+1}{2}}x^{-v/2}\left(c_1(-1)^v x^{v+\frac{1}{2}}\,{}_2F_1\left(\frac{1}{2}(a+v+1),\frac{1}{2}(a+v+2);v+\frac{3}{2};x\right) - ic_2\,{}_2F_1\left(\frac{a-v}{2},\frac{1}{2}(a-\right.\right.}{\sqrt{1-x}}\right.\right.$$

✓ **Maple** : cpu = 0.086 (sec), leaf count = 76

$$\left\{y(x) = (x-1)^{-\frac{a}{2}}\left(x^{-\frac{v}{2}}{}_2\mathrm{F}_1(-\frac{v}{2}-\frac{a}{2},\frac{1}{2}-\frac{v}{2}-\frac{a}{2};\frac{1}{2}-v;x)\_C1 + x^{\frac{1}{2}+\frac{v}{2}}{}_2\mathrm{F}_1(1+\frac{v}{2}-\frac{a}{2},\frac{1}{2}+\frac{v}{2}-\frac{a}{2};\frac{3}{2}+v;x)\_\right.\right.$$

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 = 0.428805 (sec), leaf count = 91

$$\left\{\left\{y(x) \to \frac{(-1)^{-v}(x-1)^{n+\frac{1}{2}}x^{-v/2}\left(c_1(-1)^v x^{v+\frac{1}{2}}\,{}_2F_1\left(n+\frac{1}{2},n+v+1;v+\frac{3}{2};x\right) - ic_2\,{}_2F_1\left(n+\frac{1}{2},n-v;\frac{1}{2}-v;\right.\right.}{\sqrt{1-x}}\right.\right.$$

✓ **Maple** : cpu = 0.082 (sec), leaf count = 68

$$\left\{y(x) = (x-1)^{-n}\left(x^{-\frac{v}{2}}{}_2\mathrm{F}_1(-v-n,-n+\frac{1}{2};\frac{1}{2}-v;x)\_C1 + x^{\frac{1}{2}+\frac{v}{2}}{}_2\mathrm{F}_1(-n+\frac{1}{2},v-n+1;\frac{3}{2}+v;x)\_C2\right)\right\}$$

2.1390 ODE No. 1390

$$y''(x) = -\frac{3y(x)}{16(x-1)^2x^2}$$

✓ **Mathematica** : cpu = 0.0454112 (sec), leaf count = 49

$$\left\{\left\{y(x) \to \frac{(1-x)^{3/4}\sqrt[4]{x}\left(c_1\sqrt{-(x-1)x} + 2c_2x\right)}{\sqrt{-(x-1)x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.038 (sec), leaf count = 25

$$\left\{y(x) = \_C1\,\sqrt[4]{x-1}x^{\frac{3}{4}} + \_C2\,(x-1)^{\frac{3}{4}}\sqrt[4]{x}\right\}$$

2.1391 ODE No. 1391

$$y''(x) = \frac{(7ax^2+5)\,y'(x)}{x\,(ax^2+1)} - \frac{(15ax^2+5)\,y(x)}{x^2\,(ax^2+1)}$$

✓ **Mathematica** : cpu = 0.0658076 (sec), leaf count = 27

$$\left\{\left\{y(x) \to c_1x^5 - \frac{1}{4}c_2x(2ax^2+1)\right\}\right\}$$

✓ **Maple** : cpu = 0.03 (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 = 106.83 (sec), leaf count = 1

$Aborted

✓ **Maple** : cpu = 0.243 (sec), leaf count = 561

$$\left\{y(x) = (x^2-1)^{-\frac{b}{4a}} \left(\frac{x}{2}-\frac{1}{2}\right)^{\frac{1}{4a}\left(2a+\sqrt{4a^2+(-4b-4c-4d-4e)a+b^2}\right)} \left({}_2\mathrm{F}_1\left(\frac{1}{4a}\left(\sqrt{4a^2+(-4b-4c-4d-4e)a+\right.\right.\right.\right.$$

2.1393 ODE No. 1393

$$y''(x) = -\frac{y(x)(bx^2+cx+d)}{a(x-1)^2x^2}$$

✓ **Mathematica** : cpu = 20.861 (sec), leaf count = 1

$Aborted

✓ **Maple** : cpu = 0.176 (sec), leaf count = 299

$$\left\{y(x) = \_C1\,(x-1)^{-\frac{1}{2}\left(\sqrt{a-4b-4c-4d}-\sqrt{a}\right)\frac{1}{\sqrt{a}}} x^{\frac{1}{2}\left(\sqrt{a}+\sqrt{a-4d}\right)\frac{1}{\sqrt{a}}} {}_2\mathrm{F}_1\left(\frac{1}{2}\left(-\sqrt{a-4b-4c-4d}+\sqrt{a}+\sqrt{a-4d}+\right.\right.\right.$$

2.1394 ODE No. 1394

$$y''(x) = -\frac{cy(x)}{x^2(ax+b)^2} - \frac{2y'(x)}{x}$$

✓ **Mathematica** : cpu = 0.0581459 (sec), leaf count = 73

$$\left\{\left\{y(x) \to \left(c_2 e^{\frac{\sqrt{b^2-4c}(\log(x)-\log(ax+b))}{b}} + c_1\right) \exp\left(-\frac{\left(\sqrt{b^2-4c}+b\right)(\log(x)-\log(ax+b))}{2b}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.133 (sec), leaf count = 79

$$\left\{y(x) = \sqrt{\frac{ax+b}{x}}\left(\left(\frac{x}{ax+b}\right)^{-\frac{a}{2b}\sqrt{\frac{b^2-4c}{a^2}}}\_C2 + \left(\frac{x}{ax+b}\right)^{\frac{a}{2b}\sqrt{\frac{b^2-4c}{a^2}}}\_C1\right)\right\}$$

2.1395 ODE No. 1395

$$y''(x) = -\frac{y(x)}{(ax+b)^4}$$

✓ **Mathematica** : cpu = 0.166022 (sec), leaf count = 49

$$\left\{\left\{y(x) \to e^{-\frac{i}{a(ax+b)}}(ax+b)\left(c_2 + c_1 e^{\frac{2i}{a(ax+b)}}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.073 (sec), leaf count = 39

$$\left\{y(x) = (ax+b)\left(\_C2\ \cos\left(\frac{1}{a(ax+b)}\right) + \_C1\ \sin\left(\frac{1}{a(ax+b)}\right)\right)\right\}$$

2.1396 ODE No. 1396

$$y''(x) = -\frac{Ay(x)}{(ax^2+bx+c)^2}$$

✓ **Mathematica** : cpu = 1.60134 (sec), leaf count = 199

$$\left\{\left\{y(x) \to \sqrt{x(ax+b)+c}\exp\left(-\frac{\sqrt{4ac-b^2}\sqrt{1-\frac{4A}{b^2-4ac}}\tan^{-1}\left(\frac{2ax+b}{\sqrt{4ac-b^2}}\right)}{\sqrt{b^2-4ac}}\right)\left(c_1\exp\left(\frac{2\sqrt{4ac-b^2}\sqrt{1-\frac{4A}{b^2-4a}}}{\sqrt{b^2-4}}\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.168 (sec), leaf count = 178

$$\left\{y(x) = \sqrt{ax^2+bx+c}\left(\left(1\left(i\sqrt{4\,ca-b^2}-2\,ax-b\right)\left(2\,ax+b+i\sqrt{4\,ca-b^2}\right)^{-1}\right)^{-\frac{a}{2}\sqrt{\frac{-4\,ca+b^2-4\,A}{a^2}}\frac{1}{\sqrt{-4\,ca+b^2}}}\_C\right.\right.$$

2.1397 ODE No. 1397

$$y''(x) = \frac{y(x)}{x^5} - \frac{y'(x)}{x^4}$$

✓ **Mathematica** : cpu = 0.0533522 (sec), leaf count = 38

$$\left\{\left\{y(x) \to \frac{c_2\Gamma\left(\frac{1}{3}, -\frac{1}{3x^3}\right)}{3^{2/3}\sqrt[3]{-\frac{1}{x^3}}} + c_1 x\right\}\right\}$$

✓ **Maple** : cpu = 0.081 (sec), leaf count = 30

$$\left\{y(x) = -\frac{x}{2}\left(3\_C2\,\Gamma\left(1/3, -1/3\,x^{-3}\right)\Gamma(2/3) - 2\_C2\,\sqrt{3}\pi - 2\_C1\right)\right\}$$

2.1398 ODE No. 1398

$$y''(x) = -\frac{\left(-(2v+1)^2 + x^2 - 1\right) y(x)}{\left(x^2-1\right)^2} - \frac{\left(3x^2-1\right) y'(x)}{x\left(x^2-1\right)}$$

✗ **Mathematica** : cpu = 1.58797 (sec), leaf count = 0 , DifferentialRoot result

$$\left\{\left\{y(x) \to \text{DifferentialRoot}\left(\{y,x\}, \left\{x\left(x^2-4v^2-4v-2\right)y(x) + \left(3x^4-4x^2+1\right)y'(x) + \left(x^5-2x^3+x\right)y''(x) =\right.\right.\right.$$

✓ **Maple** : cpu = 0.217 (sec), leaf count = 69

$$\left\{y(x) = \_C1\,\left(x^2-1\right)^{-\frac{1}{2}-v}\,{}_2\mathrm{F}_1(-v,-v;\,-2\,v;\,-x^2+1) + \_C2\,\left(x^2-1\right)^{v+\frac{1}{2}}\,{}_2\mathrm{F}_1(v+1,v+1;\,2\,v+2;\,-x^2+1)\right.$$

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 = 0.0598421 (sec), leaf count = 51

$$\left\{\left\{y(x) \to \frac{1}{2}(1-x)^{3/2}\sqrt{3x+5}(3c_2\log(1-x) + c_2\log(3x+5) + 2c_1)\right\}\right\}$$

✓ **Maple** : cpu = 0.069 (sec), leaf count = 34

$$\left\{y(x) = \sqrt{3\,x+5}(x-1)^{\frac{3}{2}}\left(\_C2\,\ln\left(3\,x+5\right) + 3\,\_C2\,\ln\left(x-1\right) + \_C1\right)\right\}$$

2.1400 ODE No. 1400

$$y''(x) = \frac{y'(x)}{x} - \frac{ay(x)}{x^6}$$

✓ **Mathematica** : cpu = 0.0919225 (sec), leaf count = 58

$$\left\{\left\{y(x) \to \frac{1}{2}x^2 e^{-\frac{i\sqrt{a}}{2x^2}}\left(2c_1 e^{\frac{i\sqrt{a}}{x^2}} - \frac{ic_2}{\sqrt{a}}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.053 (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 = 0.0155547 (sec), leaf count = 56

$$\left\{\left\{y(x)\to e^{\frac{a-\sqrt{a^2-4b}}{4x^2}}\left(c_1e^{\frac{\sqrt{a^2-4b}}{2x^2}}+c_2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.059 (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

$$y''(x) = -\frac{y(x)\left(4a(a+1)x^4-2a\left(x^2-1\right)x^2+\left(x^2-1\right)^2\left(x^2-v^2\right)\right)}{x^2\left(x^2-1\right)^2} - \frac{\left((1-4a)x^2-1\right)y'(x)}{x\left(x^2-1\right)}$$

✗ **Mathematica** : cpu = 5.17423 (sec), leaf count = 0 , DifferentialRoot result

$$\{\{y(x)\to \mathrm{DifferentialRoot}(\{y,x\},\{(x^6+4a^2x^4-v^2x^4+2ax^4-2x^4+2v^2x^2+2ax^2+x^2-v^2)\,y(x)+(-4ax^5$$

✓ **Maple** : cpu = 0.308 (sec), leaf count = 58

$$\left\{y(x) = \left(x^2-1\right)^a\left(x^2-1\right)\left(\_C2\,x^{-v}\,HeunC\left(0,-v,1,\frac{1}{4},\frac{a}{2}+\frac{1}{4},x^2\right)+\_C1\,x^v\,HeunC\left(0,v,1,\frac{1}{4},\frac{a}{2}+\frac{1}{4},x^2\right)\right)$$

2.1403 ODE No. 1403

$$y''(x) = -y'(x)\left(\frac{-\mathrm{a1}-\mathrm{b1}+1}{x-\mathrm{c1}}+\frac{-\mathrm{a2}-\mathrm{b2}+1}{x-\mathrm{c2}}+\frac{-\mathrm{a3}-\mathrm{b3}+1}{x-\mathrm{c3}}\right) - \frac{y(x)\left(\frac{\mathrm{a1b1(c1-c2)(c1-c3)}}{x-\mathrm{c1}}+\frac{\mathrm{a2b2(c2-c1)(c2-c3)}}{x-\mathrm{c2}}\right.}{(x-\mathrm{c1})(x-\mathrm{c2})(x-\mathrm{c3}}$$

✗ **Mathematica** : cpu = 107.98 (sec), leaf count = 0 , DifferentialRoot result

$$\{\{y(x)\to \mathrm{DifferentialRoot}(\{y,x\},\{(\mathrm{c1}-x)^2(\mathrm{c2}-x)^2y''(x)(\mathrm{c3}-x)^2+(\mathrm{c1}-x)(\mathrm{c2}-x)\left(\mathrm{a1}x^2+\mathrm{a2}x^2+\mathrm{a3}x^2+\right.$$

✓ **Maple** : cpu = 0.914 (sec), leaf count = 298

$$\left\{y(x) = (x-c2)^{a2}(x-c3)^{b3}\left((x-c1)^{a1}\,HeunG\left(\frac{c1-c3}{c1-c2},\frac{((-a3-2\,b1-b2+2)\,c1+(a3+b1-1)\,c2+}{}\right.\right.$$

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 = 0.0260166 (sec), leaf count = 25

$$\left\{\left\{y(x)\to \frac{e^{\frac{1}{4x^2}}(c_2x+c_1)}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.052 (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 = 0.0826055 (sec), leaf count = 70

$$\left\{\left\{y(x)\to \frac{e^{-\frac{1}{4x^2}}x^{\frac{3}{2}-\frac{\sqrt{9-a}}{2}}\left(c_2x^{\sqrt{9-a}}+\sqrt{9-a}c_1\right)}{\sqrt{9-a}}\right\}\right\}$$

✓ **Maple** : cpu = 0.086 (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

$$y''(x) = -\frac{27xy(x)}{16\,(x^3-1)^2}$$

✗ **Mathematica** : cpu = 299.999 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.174 (sec), leaf count = 44

$$\left\{y(x) = \sqrt{x}\sqrt[4]{x^3-1}\left(\mathit{LegendreQ}\left(-\frac{1}{6},\frac{1}{3},\sqrt{-x^3+1}\right)\_C2 + \mathit{LegendreP}\left(-\frac{1}{6},\frac{1}{3},\sqrt{-x^3+1}\right)\_C1\right)\right\}$$

2.1407 ODE No. 1407

$$y''(x) = -y'(x)\left(\frac{\mathrm{b1}(-\mathrm{al1}-\mathrm{bl1}+1)}{\mathrm{b1}x-\mathrm{a1}}+\frac{\mathrm{b2}(-\mathrm{al2}-\mathrm{bl2}+1)}{\mathrm{b2}x-\mathrm{a2}}+\frac{\mathrm{b3}(-\mathrm{al3}-\mathrm{bl3}+1)}{\mathrm{b3}x-\mathrm{a3}}\right)-\frac{y(x)\left(\frac{\mathrm{al1bl1(a1b2-a2b1)(a3b1-}}{\mathrm{b1}x-\mathrm{a1}}\right.}{}$$

✗ **Mathematica** : cpu = 300.002 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 2.454 (sec), leaf count = 2597

$$\left\{y(x) = (b3\,x-a3)^{\frac{1}{2}\left((al3+bl3)\sqrt{(2\,al1+2\,al2+2\,al3+2\,bl1+2\,bl2+2\,bl3-4)\sqrt{al3^2+6\,al3\,bl3+bl3^2}+2\,bl3^2+(2\,al1+2\,al2+8\,al3+2\,bl1}\right.}\right.$$

2.1408 ODE No. 1408

$$y''(x) = -\frac{y(x)\left(Ax^2+B\right)}{x\left(x^2-\mathrm{a1}\right)\left(x^2-\mathrm{a2}\right)\left(x^2-\mathrm{a3}\right)}-\frac{y'(x)\left(x^2\left(\left(x^2-\mathrm{a1}\right)\left(x^2-\mathrm{a2}\right)+\left(x^2-\mathrm{a1}\right)\left(x^2-\mathrm{a3}\right)+\left(x^2-\mathrm{a2}\right)\left(x^2\right.\right.\right.}{x\left(x^2-\mathrm{a1}\right)\left(x^2-\mathrm{a2}\right)\left(x^2-\mathrm{a3}\right.}$$

✗ **Mathematica** : cpu = 77.8559 (sec), leaf count = 0 , DifferentialRoot result

$$\left\{\left\{y(x)\to \mathrm{DifferentialRoot}\left(\{y,x\},\left\{\left(Ax^2+B\right)y(x)+\left(2x^6-\mathrm{a1}x^4-\mathrm{a2}x^4-\mathrm{a3}x^4+\mathrm{a1a2a3}\right)y'(x)-x\left(\mathrm{a1}-x^2\right)\right.\right.\right.\right.$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x) = DESol\left(\left\{\frac{\mathrm{d}^2}{\mathrm{d}x^2}\_Y(x)+\frac{\left(x^2\left(\left(x^2-a1\right)\left(x^2-a2\right)+\left(x^2-a2\right)\left(x^2-a3\right)+\left(x^2-a3\right)\left(x^2-a1\right)\right)-\left(x^2\right.\right.}{\left(x^2-a1\right)\left(x^2-a2\right)x\left(x^2-a3\right)}\right.\right.\right.$$

2.1409 ODE No. 1409

$$y''(x) = -b^2x^{-2a}y(x)-\frac{ay'(x)}{x}$$

✓ **Mathematica** : cpu = 0.0275833 (sec), leaf count = 44

$$\left\{\left\{y(x)\to c_2\sin\left(\frac{bx^{1-a}}{1-a}\right)+c_1\cos\left(\frac{bx^{1-a}}{a-1}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.023 (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 = 0.146934 (sec), leaf count = 405

$$\left\{\left\{y(x) \to c_1 i^{\frac{-\sqrt{q^2+2q+4s+1}+q+1}{b}} a^{\frac{-\sqrt{q^2+2q+4s+1}+q+1}{2b}} \left(x^b\right)^{\frac{-\sqrt{q^2+2q+4s+1}+q+1}{2b}} {}_2F_1\left(\frac{p+q-\sqrt{p^2-2p-4r+1}-\sqrt{q^2+}}{2b}\right.\right.\right.$$

✓ **Maple** : cpu = 0.312 (sec), leaf count = 253

$$\left\{y(x) = \_C1\ {}_2\mathrm{F}_1(\frac{1}{2\,b}\left(p+q+\sqrt{q^2+2\,q+4\,s+1}-\sqrt{p^2-2\,p-4\,r+1}\right), \frac{1}{2\,b}\left(p+q+\sqrt{q^2+2\,q+4\,s+1}+\sqrt{}\right.\right.$$

2.1411 ODE No. 1411

$$y''(x) = \frac{y(x)}{e^x + 1}$$

✓ **Mathematica** : cpu = 0.370592 (sec), leaf count = 36

$$\left\{\left\{y(x) \to e^{-x}\left(c_1\left(e^x+1\right) + c_2\left(e^x+1\right)\log\left(e^x+1\right) + c_2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.025 (sec), leaf count = 27

$$\left\{y(x) = \frac{\_C1\ \left(\mathrm{e}^x+1\right)\ln\left(\mathrm{e}^x+1\right) + \_C2\ \mathrm{e}^x + \_C1 + \_C2}{\mathrm{e}^x}\right\}$$

2.1412 ODE No. 1412

$$y''(x) = \frac{y'(x)}{x\log(x)} + y(x)\log^2(x)$$

✓ **Mathematica** : cpu = 0.0183767 (sec), leaf count = 29

$$\{\{y(x) \to c_1\cosh(x(\log(x)-1)) + ic_2\sinh(x(\log(x)-1))\}\}$$

✓ **Maple** : cpu = 0.011 (sec), leaf count = 23

$$\{y(x) = \_C1\ \sinh\left(x(\ln\left(x\right)-1)\right) + \_C2\ \cosh\left(x(\ln\left(x\right)-1)\right)\}$$

2.1413 ODE No. 1413

$$y''(x) = \frac{y'(x)}{x(\log(x) - 1)} - \frac{y(x)}{x^2(\log(x) - 1)}$$

✗ **Mathematica** : cpu = 0.416748 (sec), leaf count = 0 , could not solve

```
DSolve[Derivative[2][y][x] == -(y[x]/(x^2*(-1 + Log[x]))) + Derivative[1][y][x]/(x*(-1 + Log[x])), y[x], x]
```

✓ **Maple** : cpu = 0.058 (sec), leaf count = 12

$$\{y(x) = \_C1\, x + \_C2\, \ln(x)\}$$

2.1414 ODE No. 1414

$$y''(x) = y(x)\left(-\operatorname{csch}^2(x)\right)\left(-a^2 \sinh^2(x) - (n-1)n\right)$$

✓ **Mathematica** : cpu = 1.25944 (sec), leaf count = 127

$$\left\{\left\{y(x) \to \frac{(-1)^{-n}\left(-\operatorname{sech}^2(x)\right)^{a/2} \tanh^2(x)^{-\frac{n}{2}-\frac{1}{4}}\left(c_1(-1)^n \tanh^2(x)^{n+\frac{1}{2}}\, {}_2F_1\left(\frac{a+n}{2}, \frac{1}{2}(a+n+1); n+\frac{1}{2}; \tanh^2(x)\right.\right.}{\sqrt{\tanh(x)}}\right.\right.$$

✓ **Maple** : cpu = 0.286 (sec), leaf count = 97

$$\left\{y(x) = \_C1\, (\sinh(x))^n\, {}_2\mathrm{F}_1(-\frac{a}{2} + \frac{n}{2}, \frac{a}{2} + \frac{n}{2}; \frac{1}{2}; \frac{\cosh(2x)}{2} + \frac{1}{2}) + \_C2\, (\sinh(x))^n\, (2\cosh(2x) + 2)^{\frac{3}{4}}\, {}_2\mathrm{F}_1(\frac{1}{2} -\right.$$

2.1415 ODE No. 1415

$$y''(x) = -\left(n^2 - a^2\right) y(x) - 2n \coth(x) y'(x)$$

✓ **Mathematica** : cpu = 0.922984 (sec), leaf count = 145

$$\left\{\left\{y(x) \to (-1)^{-n}\left(-\operatorname{sech}^2(x)\right)^{\frac{a+1}{2}} \tanh^{-n-\frac{1}{2}}(x) \tanh^2(x)^{-\frac{n}{2}-\frac{1}{4}} \operatorname{sech}^2(x)^{\frac{n-1}{2}}\left(c_1(-1)^n \tanh^2(x)^{n+\frac{1}{2}}\, {}_2F_1\left(\frac{a+n}{2}, \frac{1}{2}\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.169 (sec), leaf count = 36

$$\left\{y(x) = (\sinh(x))^{-n+\frac{1}{2}}\left(\mathit{LegendreP}\left(a - \frac{1}{2}, n - \frac{1}{2}, \cosh(x)\right)\_C1 + \mathit{LegendreQ}\left(a - \frac{1}{2}, n - \frac{1}{2}, \cosh(x)\right)\_C2\right)\right.$$

2.1416 ODE No. 1416

$$y''(x) = -(v-n)(n+v+1)y(x) - (2n+1)\cot(x)y'(x)$$

✓ **Mathematica** : cpu = 0.2122 (sec), leaf count = 35

$$\left\{\left\{y(x)\to\left(-\sin^2(x)\right)^{-n/2}\left(c_1P_v^n(\cos(x))+c_2Q_v^n(\cos(x))\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.227 (sec), leaf count = 26

$$\left\{y(x) = (\sin(x))^{-n}\left(LegendreP(v,n,\cos(x))\_C1 + LegendreQ(v,n,\cos(x))\_C2\right)\right\}$$

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 = 0.155358 (sec), leaf count = 45

$$\left\{\left\{y(x)\to e^{\frac{\cos(x)}{2}}\left(c_1\cos\left(\frac{1}{2}\sqrt{3}\cos(x)\right)+c_2\sin\left(\frac{1}{2}\sqrt{3}\cos(x)\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.292 (sec), leaf count = 31

$$\left\{y(x) = \mathrm{e}^{\frac{\cos(x)}{2}}\left(\cos\left(\frac{\sqrt{3}\cos(x)}{2}\right)\_C2 + \sin\left(\frac{\sqrt{3}\cos(x)}{2}\right)\_C1\right)\right\}$$

2.1418 ODE No. 1418

$$y''(x) = \frac{y(x)\sin(x)}{x\cos(x)-\sin(x)} - \frac{x\sin(x)y'(x)}{x\cos(x)-\sin(x)}$$

✗ **Mathematica** : cpu = 1.38993 (sec), leaf count = 0 , could not solve

```
DSolve[Derivative[2][y][x] == (Sin[x]*y[x])/(x*Cos[x] - Sin[x]) - (x*Sin[x]*Derivative[1][y]
```

✓ **Maple** : cpu = 13.562 (sec), leaf count = 59

$$\left\{y(x) = \sin(x)\left(\int \mathrm{e}^{\int \frac{-2(\cos(x))^3x+3(\cos(x))^2\sin(x)-\sin(x)}{\cos(x)(\cos(x)x-\sin(x))\sin(x)}\,\mathrm{d}x}\cos(x)\,\mathrm{d}x\_C2 + \_C1\right)\right\}$$

2.1419 ODE No. 1419

$$y''(x) = -\frac{\sec(x)y'(x)\left(x^2\sin(x) - 2x\cos(x)\right)}{x^2} - \frac{y(x)\sec(x)(2x\cos(x) - x\sin(x))}{x^2}$$

✗ **Mathematica** : cpu = 1.22522 (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 = 0.239 (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 = 0.483602 (sec), leaf count = 126

$$\left\{\left\{y(x) \to c_1 i^{1-n}\cos^{1-n}(x)\,{}_2F_1\left(\frac{1}{2}(-n - i\sqrt{a} + 1), \frac{1}{2}(-n + i\sqrt{a} + 1); \frac{3}{2} - n; \cos^2(x)\right) + c_2 i^n \cos^n(x)\,{}_2F_1\left(\frac{1}{2}(n\right.\right.\right.$$

✓ **Maple** : cpu = 0.368 (sec), leaf count = 123

$$\left\{y(x) = \_C1\ \sin(2x)(\cos(x))^{-n}\,{}_2\mathrm{F}_1(1 + \frac{i}{2}\sqrt{a} - \frac{n}{2}, 1 - \frac{i}{2}\sqrt{a} - \frac{n}{2}; \frac{3}{2} - n; \frac{\cos(2x)}{2} + \frac{1}{2}) + \_C2\ (\cos(x))^n\,(-2\right.$$

2.1421 ODE No. 1421

$$y''(x) = -a^2 n y(x)\sec^2(ax)\left((n-1)\sin^2(ax) + \cos^2(ax)\right) - a(n-1)\sin(2ax)\sec^2(ax)y'(x)$$

✓ **Mathematica** : cpu = 0.245691 (sec), leaf count = 65

$$\left\{\left\{y(x) \to \frac{2^{-n}\left(2ac_1 - ic_2e^{2iax}\right)\left(e^{-iax} + e^{iax}\right)^n}{a\left(1 + e^{2iax}\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.079 (sec), leaf count = 27

$$\left\{y(x) = \_C1\ (\cos(ax))^n + \_C2\ \sin(ax)(\cos(ax))^{n-1}\right\}$$

2.1422 ODE No. 1422

$$y''(x) = 2y(x)\csc^2(x)$$

✓ **Mathematica** : cpu = 0.097039 (sec), leaf count = 43

$$\left\{\left\{y(x)\to \frac{\cos(x)\left(c_2\log\left(\sqrt{-\sin^2(x)}+\cos(x)\right)+c_1\right)}{\sqrt{-\sin^2(x)}}-c_2\right\}\right\}$$

✓ **Maple** : cpu = 0.265 (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 = 0.0759872 (sec), leaf count = 61

$$\left\{\left\{y(x)\to \sqrt[4]{-\sin^2(x)}\left(c_1P_{-\frac{1}{2}}^{\frac{1}{2}\sqrt{1-4a}}(\cos(x))+c_2Q_{-\frac{1}{2}}^{\frac{1}{2}\sqrt{1-4a}}(\cos(x))\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.322 (sec), leaf count = 132

$$\Bigg\{y(x) = 1\sqrt{-2\cos(2x)+2}\,\sqrt[4]{2\cos(2x)+2}\left(\frac{\cos(2x)}{2}-\frac{1}{2}\right)^{\frac{1}{4}\sqrt{1-4a}}\Bigg({}_2\mathrm{F}_1(\frac{1}{4}\sqrt{1-4a}+\frac{3}{4},\frac{1}{4}\sqrt{1-4a}+\frac{3}{4};\frac{3}{2};$$

2.1424 ODE No. 1424

$$\sin^2(x)y''(x) - y(x)\left(a\sin^2(x)+(n-1)n\right) = 0$$

✓ **Mathematica** : cpu = 0.184523 (sec), leaf count = 65

$$\left\{\left\{y(x)\to \sqrt[4]{-\sin^2(x)}\left(c_1P_{i\sqrt{a}-\frac{1}{2}}^{n-\frac{1}{2}}(\cos(x))+c_2Q_{i\sqrt{a}-\frac{1}{2}}^{n-\frac{1}{2}}(\cos(x))\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.325 (sec), leaf count = 120

$$\Bigg\{y(x) = 1\left(\frac{\cos(2x)}{2}-\frac{1}{2}\right)^{\frac{n}{2}}\Bigg(\sqrt[4]{-2\cos(2x)+2}{}_2\mathrm{F}_1(\frac{1}{2}+\frac{i}{2}\sqrt{a}+\frac{n}{2},\frac{1}{2}-\frac{i}{2}\sqrt{a}+\frac{n}{2};\frac{3}{2};\frac{\cos(2x)}{2}+\frac{1}{2})(2\cos(2x)$$

2.1425 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 = 0.807588 (sec), leaf count = 194

$$\left\{\left\{y(x) \to \frac{c_1 \sin^2(x)^{a/2}(-2a\cos(x) + \cos(x) + 2)}{1-\cos(x)} - \frac{c_2 \sin^2(x)^{-a}(1-\cos(x))^{\frac{a-1}{2}}(\cos(x)+1)^{\frac{a+1}{2}}\left(\frac{(2a-1)(\cos(x)-1}{(2a-1)\cos(x)-2}\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.517 (sec), leaf count = 91

$$\left\{y(x) = 1\left(\_C2\, {}_2F_1(a-\frac{1}{2}, -\frac{1}{2}-a; \frac{3}{2}-a; \frac{\cos(x)}{2}+\frac{1}{2})(\cos(x)+1)^{-\frac{1}{4}-\frac{a}{2}}\sqrt{2\cos(x)+2}(\cos(x)-1)^{\frac{a}{2}-\frac{1}{4}} + 2\right.\right.$$

2.1426 ODE No. 1426

$$\sin^2(x)y''(x) - y(x)\left(a^2\cos^2(x) + \frac{b^2}{(2a-3)^2} + 3a + b\cos(x) + 2\right) = 0$$

✓ **Mathematica** : cpu = 6.68192 (sec), leaf count = 1362

$$\left\{\left\{y(x) \to \frac{(-1)^{-\frac{(2a+3)^2}{(3-2a)^2}} 2^{-\frac{\sqrt{(3-2a)^2\left(16a^4+8(2b-9)a^2-48ba+(2b+9)^2\right)}}{2(3-2a)^2}}(1-\cos(x))^{\frac{-4a^2-9}{(3-2a)^2}}(\cos(x)-1)^{-\frac{-8a^2+24a+\sqrt{(3-2a)^2\left(16a^4\right.}}{4(}}}{}\right.\right.$$

✓ **Maple** : cpu = 0.648 (sec), leaf count = 549

$$\left\{y(x) = 1\left(\frac{\cos(x)}{2} - \frac{1}{2}\right)^{\frac{1}{8a-12}\left(4a-6+\sqrt{4b^2+16(a-3/2)^2 b+16a^4-72a^2+81}\right)}\left({}_2F_1(\frac{1}{8a-12}\left(8a^2 + \sqrt{4b^2+16(a-3/\right.\right.\right.$$

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 = 201.201 (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]^2 -
```

✓ **Maple** : cpu = 1.825 (sec), leaf count = 179

$$\left\{y(x) = 1e^{\int \frac{1}{\sin(2x)(b\sin(2x)+\cos(2x)+1)}(2((a+1)\cos(2x)+a+1/2)b\sin(2x)-(\cos(2x)+1)((ab^2-a-2)\cos(2x)-ab^2-a+1))\,dx}\left(\int -2\,e^{-\right.\right.$$

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 = 0.426894 (sec), leaf count = 87

$$\left\{\left\{y(x) \to \sqrt[4]{-\sin^2(x)}\left(c_1 P_{\sqrt{b-a}-\frac{1}{2}}^{\frac{1}{2}\sqrt{-4a-4c+1}}(\cos(x)) + c_2 Q_{\sqrt{b-a}-\frac{1}{2}}^{\frac{1}{2}\sqrt{-4a-4c+1}}(\cos(x))\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.358 (sec), leaf count = 183

$$\left\{y(x) = 1\sqrt{-2\cos(2x)+2}\,\sqrt[4]{2\cos(2x)+2}\left(\frac{\cos(2x)}{2} - \frac{1}{2}\right)^{\frac{1}{4}\sqrt{-4a+1-4c}}\left(\sqrt{2\cos(2x)+2}\,{}_2F_1\left(\frac{1}{4}\sqrt{-4a+1-\right.\right.\right.$$

2.1429 ODE No. 1429

$$y''(x) = y(x)\csc^2(x) - \cot(x)y'(x)$$

✓ **Mathematica** : cpu = 0.0626327 (sec), leaf count = 51

$$\left\{\left\{y(x) \to c_1\cosh\left(\log\left(\cos\left(\frac{x}{2}\right)\right) - \log\left(\sin\left(\frac{x}{2}\right)\right)\right) - ic_2\sinh\left(\log\left(\cos\left(\frac{x}{2}\right)\right) - \log\left(\sin\left(\frac{x}{2}\right)\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.038 (sec), leaf count = 25

$$\left\{y(x) = \frac{\sin(x)\_C1}{\cos(x)-1} + \frac{(\cos(x)-1)\_C2}{\sin(x)}\right\}$$

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 = 0.490413 (sec), leaf count = 22

$$\{\{y(x)\to c_1P_v^n(\cos(x))+c_2Q_v^n(\cos(x))\}\}$$

✓ **Maple** : cpu = 0.399 (sec), leaf count = 101

$$\left\{y(x)=1\left(\frac{\cos(2x)}{2}-\frac{1}{2}\right)^{\frac{n}{2}}\left(\sin(2x)\,{}_2\mathrm{F}_1(1+\frac{v}{2}+\frac{n}{2},\frac{1}{2}-\frac{v}{2}+\frac{n}{2};\frac{3}{2};\frac{\cos(2x)}{2}+\frac{1}{2})\_C1+\sqrt{-2\cos(2x)+2}\,{}_2\right.\right.$$

2.1431 ODE No. 1431

$$y''(x) = \cot(2x)y'(x)-2y(x)$$

✓ **Mathematica** : cpu = 0.209077 (sec), leaf count = 64

$$\left\{\left\{y(x)\to -\frac{2}{3}c_2\cos(2x)\cos^{\frac{3}{2}}(x)\,{}_2F_1\left(\frac{1}{4},\frac{3}{4};\frac{7}{4};\cos^2(x)\right)+\frac{1}{2}c_1\cos(2x)-2c_2\sin^2(x)^{3/4}\cos^{\frac{3}{2}}(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.304 (sec), leaf count = 30

$$\left\{y(x)=(\sin(2x))^{\frac{3}{4}}\left(\mathit{LegendreQ}\left(\frac{1}{4},\frac{3}{4},\cos(2x)\right)\_C2+\mathit{LegendreP}\left(\frac{1}{4},\frac{3}{4},\cos(2x)\right)\_C1\right)\right\}$$

2.1432 ODE No. 1432

$$y''(x) = -\cot(x)y'(x)-\frac{1}{4}y(x)\left(-17\sin^2(x)-1\right)\csc^2(x)$$

✓ **Mathematica** : cpu = 0.0998785 (sec), leaf count = 33

$$\left\{\left\{y(x)\to\frac{e^{-2x}\left(c_2e^{4x}+4c_1\right)}{4\sqrt{\sin(x)}}\right\}\right\}$$

✓ **Maple** : cpu = 0.047 (sec), leaf count = 22

$$\left\{y(x)=(\_C2\cosh(2x)+\_C1\sinh(2x))\frac{1}{\sqrt{\sin(x)}}\right\}$$

2.1433 ODE No. 1433

$$y''(x) = -\frac{y(x)\sec^2(x)\left(2x^2 + x^2\sin^2(x) - 24\cos^2(x)\right)}{4x^2} - \tan(x)y'(x) + \sqrt{\cos(x)}$$

✓ **Mathematica** : cpu = 0.255515 (sec), leaf count = 35

$$\left\{\left\{y(x) \to \frac{(4c_2x^5 + 20c_1 - 5x^4)\sqrt{\cos(x)}}{20x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.112 (sec), leaf count = 28

$$\left\{y(x) = \frac{4\,x^5\_C1 - x^4 + 4\_C2}{4\,x^2}\sqrt{\cos(x)}\right\}$$

2.1434 ODE No. 1434

$$y''(x) = -\frac{b\cot(x)y'(x)}{a} - \frac{y(x)\csc^2(x)\left(c\cos^2(x) + d\cos(x) + e\right)}{a}$$

✓ **Mathematica** : cpu = 119.334 (sec), leaf count = 1

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✓ **Maple** : cpu = 0.732 (sec), leaf count = 517

$$\left\{y(x) = (\sin(x))^{-\frac{a+b}{2a}}\left(\frac{\cos(x)}{2} - \frac{1}{2}\right)^{\frac{1}{4a}\left(2a+\sqrt{a^2+(-2b-4c-4d-4e)a+b^2}\right)}\left({}_2\mathrm{F}_1(-\frac{1}{4a}\left(2i\sqrt{4ca-b^2} - \sqrt{a^2+(-2b\right.\right.\right.$$

2.1435 ODE No. 1435

$$y''(x) = -4y(x)\sin(3x)\csc^3(x)$$

✓ **Mathematica** : cpu = 0.157208 (sec), leaf count = 61

$$\left\{\left\{y(x) \to \sqrt[4]{-\sin^2(x)}\left(c_1 P_{-\frac{1}{2}+4i}^{\frac{i\sqrt{47}}{2}}(\cos(x)) + c_2 Q_{-\frac{1}{2}+4i}^{\frac{i\sqrt{47}}{2}}(\cos(x))\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.159 (sec), leaf count = 38

$$\left\{y(x) = \sqrt{\sin(x)}\left(\mathit{LegendreQ}\left(-\frac{1}{2} + 4\,i, \frac{i}{2}\sqrt{47}, \cos(x)\right)\_C2 + \mathit{LegendreP}\left(-\frac{1}{2} + 4\,i, \frac{i}{2}\sqrt{47}, \cos(x)\right)\_C1\right)\right\}$$

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 = 0.660572 (sec), leaf count = 33

$$\left\{\left\{y(x) \to \sqrt[4]{-\sin^2(x)}(c_1 P_v^n(\cos(x)) + c_2 Q_v^n(\cos(x)))\right\}\right\}$$

✓ **Maple** : cpu = 0.317 (sec), leaf count = 113

$$\left\{y(x) = 1\sqrt[4]{2\cos(2x) + 2}\left(\frac{\cos(2x)}{2} - \frac{1}{2}\right)^{\frac{n}{2}} \sqrt{-2\cos(2x) + 2}\left({}_2\mathrm{F}_1(1 + \frac{v}{2} + \frac{n}{2}, \frac{1}{2} - \frac{v}{2} + \frac{n}{2}; \frac{3}{2}; \frac{\cos(2x)}{2} + \frac{1}{2})\right.\right.$$

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 = 0.302907 (sec), leaf count = 36

$$\left\{\left\{y(x) \to \cos^{-\frac{3}{2}-\frac{\sqrt{13}}{2}}(x)\left(c_1\cos^{\sqrt{13}}(x) + c_2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.189 (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 = 1.06606 (sec), leaf count = 158

$$\left\{\left\{y(x) \to \frac{(-1)^{-m}\cos^2(x)^{-\frac{m}{2}-\frac{1}{4}}\left(-\sin^2(x)\right)^{n/2}\left(c_1(-1)^m\cos^2(x)^{m+\frac{1}{2}}\,{}_2F_1\left(\frac{1}{2}\left(m+n-\sqrt{-a}\right), \frac{1}{2}\left(m+n+\sqrt{-a}\right)\right.\right.}{\sqrt{\cdots}}\right.\right.$$

✓ **Maple** : cpu = 0.212 (sec), leaf count = 102

$$\left\{y(x) = (\sin(x))^n\left((\cos(x))^{-m+1}\,{}_2\mathrm{F}_1(\frac{n}{2} - \frac{m}{2} + \frac{i}{2}\sqrt{a} + \frac{1}{2}, \frac{n}{2} - \frac{m}{2} - \frac{i}{2}\sqrt{a} + \frac{1}{2}; \frac{3}{2} - m; (\cos(x))^2)\_C2 + (\cos(\right.\right.$$

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 = 0.844461 (sec), leaf count = 0 , could not solve

```
DSolve[Derivative[2][y][x] == (Derivative[1][phi][x]*Derivative[1][y][x])/(-phi[a] + phi[x])
(n*(1 + n)*(-phi[a] + phi[x])^2) + Derivative[2][phi][a]))/(-phi[a] + phi[x]), y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x) = DESol\left(\left\{\frac{d^2}{dx^2}\_Y(x) - \frac{\left(\frac{d}{dx}\phi(x)\right)\frac{d}{dx}\_Y(x)}{\phi(x) - \phi(a)} + \frac{\left(-n(n+1)(\phi(x) - \phi(a))^2 + \frac{d^2}{da^2}\phi(a)\right)\_Y(x)}{\phi(x) - \phi(a)}\right\}, \{\_Y$$

2.1440 ODE No. 1440

$$y''(x) = -\frac{y'(x)\left(-\phi''(x) - \phi(x)\phi'(x) + \phi(x^3)\right)}{\phi'(x) + \phi(x)^2} - \frac{y(x)\left(-\phi(x)\phi''(x) + \phi(x)^2(-\phi'(x)) + \phi'(x)^2\right)}{\phi'(x) + \phi(x)^2}$$

✗ **Mathematica** : cpu = 0.902358 (sec), leaf count = 0 , could not solve

```
DSolve[Derivative[2][y][x] == -((Derivative[1][y][x]*(phi[x^3] - phi[x]*Derivative[1][phi][x
(phi[x]^2*Derivative[1][phi][x]) + Derivative[1][phi][x]^2 - phi[x]*Derivative[2][phi][x]))/
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x) = DESol\left(\left\{\frac{\left(\left(\frac{d}{dx}\phi(x)\right)^2 - (\phi(x))^2\frac{d}{dx}\phi(x) - \phi(x)\frac{d^2}{dx^2}\phi(x)\right)\_Y(x)}{\frac{d}{dx}\phi(x) + (\phi(x))^2} + \frac{\left(\phi(x^3) - \phi(x)\frac{d}{dx}\phi(x) - \frac{d^2}{dx^2}\phi(x)\right)}{\frac{d}{dx}\phi(x) + (\phi(x))^2}\right.\right.\right.$$

2.1441 ODE No. 1441

$$y''(x) = -\frac{y'(x)(-\mathrm{cn}(x|k)\mathrm{dn}(x|k) - 2\mathrm{sn}(x|k))}{\mathrm{sn}(x|k)^2 - \mathrm{sn}(a|k)^2} - \frac{y(x)\left(6k^2\mathrm{sn}(a|k)^4 - 4(k^2+1)\mathrm{sn}(a|k)^2 + 2\right)}{\mathrm{sn}(x|k)^2 - \mathrm{sn}(a|k)^2} - \frac{1}{\mathrm{sn}(x|k)^2 - \mathrm{sn}(a|k)}$$

✗ **Mathematica** : cpu = 1.62038 (sec), leaf count = 0 , could not solve

```
DSolve[Derivative[2][y][x] == -(-JacobiSN[a, k]^2 + JacobiSN[x, k]^2)^(-1) - ((2 - 4*(1 + k^
JacobiSN[a, k]^2 + JacobiSN[x, k]^2) - ((-(JacobiCN[x, k]*JacobiDN[x, k]) - 2*JacobiSN[x, k]
JacobiSN[a, k]^2 + JacobiSN[x, k]^2), y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x) = DESol\left(\left\{\frac{d^2}{dx^2}\_Y(x) - 2\,\frac{JacobiSN(x,k)\,JacobiCN(x,k)\,JacobiDN(x,k)\,\frac{d}{dx}\_Y(x)}{(JacobiSN(x,k))^2 - JacobiSN(a,k)} - \frac{\left(-2 + 4(k^2 + 1\right.}{}\right.\right.\right.$$

2.1442 ODE No. 1442

$$y''(x) = \frac{y(x)}{f(x)} - \frac{xy'(x)}{f(x)}$$

✗ **Mathematica** : cpu = 0.226225 (sec), leaf count = 0 , could not solve

```
DSolve[Derivative[2][y][x] == y[x]/f[x] - (x*Derivative[1][y][x])/f[x], y[x], x]
```

✓ **Maple** : cpu = 0.074 (sec), leaf count = 30

$$\left\{y(x) = x\left(\int \mathrm{e}^{\int \frac{1}{x}\left(-2-\frac{x^2}{f(x)}\right)\,\mathrm{d}x}\,\mathrm{d}x\_C1 + \_C2\right)\right\}$$

2.1443 ODE No. 1443

$$y''(x) = -\frac{f'(x)y'(x)}{2f(x)} - \frac{g(x)y(x)}{f(x)}$$

✗ **Mathematica** : cpu = 0.29682 (sec), leaf count = 0 , could not solve

```
DSolve[Derivative[2][y][x] == -((g[x]*y[x])/f[x]) - (Derivative[1][f][x]*Derivative[1][y][x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x) = DESol\left(\left\{\frac{g(x)\_Y(x)}{f\,(x)} + \frac{\left(\frac{\mathrm{d}}{\mathrm{d}x}f(x)\right)\frac{\mathrm{d}}{\mathrm{d}x}\_Y(x)}{2\,f\,(x)} + \frac{\mathrm{d}^2}{\mathrm{d}x^2}\_Y(x)\right\}, \{\_Y(x)\}\right)\right\}$$

2.1444 ODE No. 1444

$$y''(x) = -by(x)f(x)^{2a} - \frac{af'(x)y'(x)}{f(x)}$$

✗ **Mathematica** : cpu = 1.5683 (sec), leaf count = 0 , could not solve

```
DSolve[Derivative[2][y][x] == -(b*f[x]^(2*a)*y[x]) - (a*Derivative[1][f][x]*Derivative[1][y]
```

✓ **Maple** : cpu = 0.014 (sec), leaf count = 37

$$\left\{y(x) = \_C1\,\mathrm{e}^{\int i(f(x))^a\sqrt{b}\,\mathrm{d}x} + \_C2\,\mathrm{e}^{-\int i(f(x))^a\sqrt{b}\,\mathrm{d}x}\right\}$$

2.1445 ODE No. 1445

$$y''(x) = -\frac{y'(x)\left(2f(x)g(x)g'(x)^2 - \left(g(x)^2-1\right)\left(2f'(x)g'(x)+f(x)g''(x)\right)\right)}{f(x)\left(g(x)^2-1\right)g'(x)} - \frac{y(x)\left(\left(g(x)^2-1\right)\left(f'(x)\left(2f'(x)g'(x\right.\right.\right.}{}$$

✗ **Mathematica** : cpu = 1.52307 (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]^2 - (-
1 + g[x]^2)*(2*Derivative[1][f][x]*Derivative[1][g][x] + f[x]*Derivative[2][g][x])))/(f[x]*(
1 + g[x]^2)*Derivative[1][g][x])) - (y[x]*(-(f[x]*Derivative[1][g][x]^2*(2*g[x]*Derivative[1
1 + g[x]^2)*(-(f[x]*Derivative[1][g][x]*Derivative[2][f][x]) + Derivative[1][f][x]*(2*Deriva
1 + g[x]^2)*Derivative[1][g][x]), y[x], x]
```

✓ **Maple** : cpu = 0.305 (sec), leaf count = 20

$$\{y(x) = f(x)\left(LegendreP(v,g(x))\_C1 + LegendreQ(v,g(x))\_C2\right)\}$$

2.1446 ODE No. 1446

$$y''(x) = -\frac{(x-1)y(x)}{x^4} - \frac{y'(x)}{x}$$

✓ **Mathematica** : cpu = 0.0578883 (sec), leaf count = 26

$$\left\{\left\{y(x)\to e^{-1/x}\left(c_1 - c_2\text{Ei}\left(\frac{2}{x}\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.051 (sec), leaf count = 22

$$\left\{y(x) = \mathrm{e}^{-x^{-1}}\left(Ei\left(1,-2x^{-1}\right)\_C2 + \_C1\right)\right\}$$

2.1447 ODE No. 1447

$$y''(x) = -\frac{(-x-1)y(x)}{x^4} - \frac{y'(x)}{x}$$

✓ **Mathematica** : cpu = 0.0352626 (sec), leaf count = 24

$$\left\{\left\{y(x)\to e^{\frac{1}{x}}\left(c_1 - c_2\text{Ei}\left(-\frac{2}{x}\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.053 (sec), leaf count = 20

$$\left\{y(x) = \mathrm{e}^{x^{-1}}\left(Ei\left(1,2x^{-1}\right)\_C2 + \_C1\right)\right\}$$

2.1448 ODE No. 1448

$$y''(x) = -\frac{b^2 y(x)}{(x^2 - a^2)^2}$$

✓ **Mathematica** : cpu = 0.368429 (sec), leaf count = 142

$$\left\{\left\{y(x) \to \frac{(x-a)^{\frac{1}{2}-\frac{1}{2}\sqrt{1-\frac{b^2}{a^2}}}(a+x)^{\frac{1}{2}-\frac{1}{2}\sqrt{1-\frac{b^2}{a^2}}}\left(2ac_1\sqrt{1-\frac{b^2}{a^2}}(x-a)^{\sqrt{1-\frac{b^2}{a^2}}} - c_2(a+x)^{\sqrt{1-\frac{b^2}{a^2}}}\right)}{2a\sqrt{1-\frac{b^2}{a^2}}}\right\}\right\}$$

✓ **Maple** : cpu = 0.116 (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 = 0.0546754 (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 = 0.04 (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 = 300.009 (sec), leaf count = 0 , timed out

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✓ **Maple** : cpu = 0.437 (sec), leaf count = 1616

$$\left\{y(x) = \int -11211200\, bx^3\left(\left(-5/8\, x^6 {}_0\mathrm{F}_2(\ ;\ \frac{13}{6}, 7/3;\ -\frac{x^6 a}{216})a + 35\, {}_0\mathrm{F}_2(\ ;\ 7/6, 4/3;\ -\frac{x^6 a}{216})\right) {}_0\mathrm{F}_2(\ ;\ 5/6, 7/6;\ -\frac{x^6}{21}\right.$$

2.1451 ODE No. 1451

$$y^{(3)}(x) - ax^b y(x) = 0$$

✓ **Mathematica** : cpu = 0.0238331 (sec), leaf count = 164

$$\left\{\left\{y(x) \to (-1)^{\frac{1}{b+3}}(b+3)^{-\frac{6}{b+3}} x a^{\frac{1}{b+3}} \left((-1)^{\frac{1}{b+3}} c_3 x a^{\frac{1}{b+3}} {}_0F_2\left(;1+\frac{1}{b+3}, 1+\frac{2}{b+3}; \frac{ax^{b+3}}{(b+3)^3}\right) + (b+3)^{\frac{3}{b+3}} c_2\, {}_0F_2\left(\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.123 (sec), leaf count = 114

$$\left\{y(x) = \_C1\, {}_0\mathrm{F}_2\left(\,;\frac{b+1}{b+3}, \frac{b+2}{b+3}; \frac{x^{b+3}a}{(b+3)^3}\right) + \_C2\, x\, {}_0\mathrm{F}_2\left(\,;\frac{b+2}{b+3}, \frac{b+4}{b+3}; \frac{x^{b+3}a}{(b+3)^3}\right) + \_C3\, x^2\, {}_0\mathrm{F}_2\left(\,;\frac{b+5}{b+3}, \frac{b+4}{b+3}\right.\right.$$

2.1452 ODE No. 1452

$$y^{(3)}(x) + 3y'(x) - 4y(x) = 0$$

✓ **Mathematica** : cpu = 0.00843094 (sec), leaf count = 52

$$\left\{\left\{y(x) \to e^{-x/2}\left(c_3 e^{3x/2} + c_1 \sin\left(\frac{\sqrt{15}x}{2}\right) + c_2 \cos\left(\frac{\sqrt{15}x}{2}\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.01 (sec), leaf count = 35

$$\left\{y(x) = \mathrm{e}^{x}\_C1 + \_C2\, \mathrm{e}^{-\frac{x}{2}} \sin\left(\frac{\sqrt{15}x}{2}\right) + \_C3\, \mathrm{e}^{-\frac{x}{2}} \cos\left(\frac{\sqrt{15}x}{2}\right)\right\}$$

2.1453 ODE No. 1453

$$a^2(-y'(x)) - e^{2ax}\sin^2(x) + y^{(3)}(x) = 0$$

✓ **Mathematica** : cpu = 0.688545 (sec), leaf count = 128

$$\left\{\left\{y(x) \to \frac{e^{-ax}\left(-9\left(a^2-4\right)a^4 e^{3ax}\cos(2x) - 3\left(11a^2-4\right)a^3 e^{3ax}\sin(2x) + \left(9a^6+49a^4+56a^2+16\right)\left(12a^2 c_1 e^{2ax}\right.\right.}{12a^3\left(9a^6+49a^4+56a^2+16\right)}\right.\right.$$

✓ **Maple** : cpu = 0.135 (sec), leaf count = 122

$$\left\{y(x) = \frac{1}{108\,a^9 + 588\,a^7 + 672\,a^5 + 192\,a^3}\left(\left(\left(-9\,a^6 + 36\,a^4\right)\cos(2\,x) + \left(-33\,a^5 + 12\,a^3\right)\sin(2\,x) + 9\,a^6 + 49\,a^4\right.\right.\right.$$

2.1454 ODE No. 1454

$$2axy'(x) + ay(x) + y^{(3)}(x) = 0$$

✓ **Mathematica** : cpu = 0.00999822 (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 = 0.06 (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 = 0.0294788 (sec), leaf count = 127

$$\left\{\left\{y(x) \to \sqrt[3]{-\frac{1}{3}}c_2 x\, {}_2F_2\left(\frac{1}{3}-\frac{a}{3},\frac{1}{3}-\frac{b}{3};\frac{2}{3},\frac{4}{3};\frac{x^3}{3}\right) + c_1\, {}_2F_2\left(-\frac{a}{3},-\frac{b}{3};\frac{1}{3},\frac{2}{3};\frac{x^3}{3}\right) + \left(-\frac{1}{3}\right)^{2/3} c_3 x^2\, {}_2F_2\left(\frac{2}{3}-\frac{a}{3},\frac{2}{3}\right.\right.$$

✓ **Maple** : cpu = 0.161 (sec), leaf count = 71

$$\left\{y(x) = \_C1\, {}_2\text{F}_2(-\frac{a}{3},-\frac{b}{3};\frac{1}{3},\frac{2}{3};\frac{x^3}{3}) + \_C2\, x {}_2\text{F}_2(\frac{1}{3}-\frac{b}{3},\frac{1}{3}-\frac{a}{3};\frac{2}{3},\frac{4}{3};\frac{x^3}{3}) + \_C3\, x^2 {}_2\text{F}_2(-\frac{a}{3}+\frac{2}{3},-\frac{b}{3}+\frac{2}{3};\frac{4}{3},\right.$$

2.1456 ODE No. 1456

$$x^{2c-2}y'(x) + (c-1)x^{2c-3}y(x) + y^{(3)}(x) = 0$$

✓ **Mathematica** : cpu = 0.038073 (sec), leaf count = 183

$$\left\{\left\{y(x) \to c_1\, {}_1F_2\left(\frac{1}{2}-\frac{1}{2c};1-\frac{1}{c},1-\frac{1}{2c};-\frac{x^{2c}}{4c^2}\right) + 4^{-1/c}c_3 c^{-2/c}\left(x^{2c}\right)^{\frac{1}{c}}\, {}_1F_2\left(\frac{1}{2}+\frac{1}{2c};1+\frac{1}{2c},1+\frac{1}{c};-\frac{x^{2c}}{4c^2}\right) + 2^{-}\right.\right.$$

✓ **Maple** : cpu = 0.077 (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 = 0.0821236 (sec), leaf count = 0 , could not solve

```
DSolve[b*y[x] - 3*(a + 2*WeierstrassP[x, {g2, g3}])*Derivative[1][y][x] + Derivative[3][y][x
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x)=\mathit{DESol}\left(\left\{\frac{\mathrm{d}^3}{\mathrm{d}x^3}\_Y(x)+(-6\,\mathit{WeierstrassP}(x,g2,g3)-3\,a)\,\frac{\mathrm{d}}{\mathrm{d}x}\_Y(x)+b\_Y(x)\right\},\{\_Y(x)\}\right)\right\}$$

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 = 0.0320941 (sec), leaf count = 0 , could not solve

```
DSolve[((-a + (1 - n^2)*WeierstrassPPrime[x, {g2, g3}])*y[x])/2 + (1 - n^2)*WeierstrassP[x,
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x)=\mathit{DESol}\left(\left\{\frac{\mathrm{d}^3}{\mathrm{d}x^3}\_Y(x)+\left(-n^2\,\mathit{WeierstrassP}(x,g2,g3)+\mathit{WeierstrassP}(x,g2,g3)\right)\frac{\mathrm{d}}{\mathrm{d}x}\_Y(x)+\left(-\frac{\mathit{Weie}}{}\right.\right.\right.$$

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 = 0.0285243 (sec), leaf count = 0 , could not solve

```
DSolve[-2*n*(1 + n)*WeierstrassPPrime[x, {g2, g3}]*y[x] - (a + 4*n*(1 + n)*WeierstrassP[x, {
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x)=\left(\mathit{DESol}\left(\left\{\frac{\mathrm{d}^2}{\mathrm{d}x^2}\_Y(x)+\left(-n^2\,\mathit{WeierstrassP}(x,g2,g3)-n\,\mathit{WeierstrassP}(x,g2,g3)-\frac{a}{4}\right)\_Y(x)\right\},\{\_\right.\right.\right.$$

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 = 0.0136643 (sec), leaf count = 0 , could not solve

```
DSolve[B*WeierstrassPPrime[x, {g2, g3}]*y[x] + (a + A*WeierstrassP[x, {g2, g3}])*Derivative[
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x) = DESol\left(\left\{\frac{\mathrm{d}^3}{\mathrm{d}x^3}\_Y(x) + (A\, WeierstrassP(x, g2, g3) + a)\frac{\mathrm{d}}{\mathrm{d}x}\_Y(x) + B\, WeierstrassPPrime(x, g2, g3)\_\right.\right.\right.$$

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 = 0.0307655 (sec), leaf count = 0 , could not solve

```
DSolve[(b - 3*k^2*JacobiCN[z, x]*JacobiDN[z, x]*JacobiSN[z, x] + c*JacobiSN[z, x]^2)*y[x] -
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x) = DESol\left(\left\{\frac{\mathrm{d}^3}{\mathrm{d}x^3}\_Y(x) + \left(-3\,k^2(JacobiSN(z,x))^2 - a\right)\frac{\mathrm{d}}{\mathrm{d}x}\_Y(x) + \left(b + c(JacobiSN(z,x))^2 - 3\,k^2 Jaco\right.\right.\right.\right.$$

2.1462 ODE No. 1462

$$-y'(x)\left(a + 6k^2\sin^2(x)\right) + by(x) + y^{(3)}(x) = 0$$

✗ **Mathematica** : cpu = 0.0237383 (sec), leaf count = 0 , could not solve

```
DSolve[b*y[x] - (a + 6*k^2*Sin[x]^2)*Derivative[1][y][x] + Derivative[3][y][x] == 0, y[x], x
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x) = DESol\left(\left\{\frac{\mathrm{d}^3}{\mathrm{d}x^3}\_Y(x) + \left(-6\,k^2(\sin(x))^2 - a\right)\frac{\mathrm{d}}{\mathrm{d}x}\_Y(x) + b\_Y(x)\right\}, \{\_Y(x)\}\right)\right\}$$

2.1463 ODE No. 1463

$$y(x)f'(x) + 2f(x)y'(x) + y^{(3)}(x) = 0$$

✗ **Mathematica** : cpu = 0.0680593 (sec), leaf count = 0 , could not solve

```
DSolve[y[x]*Derivative[1][f][x] + 2*f[x]*Derivative[1][y][x] + Derivative[3][y][x] == 0, y[x
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x) = \left(DESol\left(\left\{\frac{d^2}{dx^2}\_Y(x) + \frac{f(x)\_Y(x)}{2}\right\}, \{\_Y(x)\}\right)\right)^2\right\}$$

2.1464 ODE No. 1464

$$y^{(3)}(x) - 2y''(x) - 3y'(x) + 10y(x) = 0$$

✓ **Mathematica** : cpu = 0.00635072 (sec), leaf count = 34

$$\{\{y(x) \to e^{-2x}(c_1e^{4x}\sin(x) + c_2e^{4x}\cos(x) + c_3)\}\}$$

✓ **Maple** : cpu = 0.01 (sec), leaf count = 27

$$\{y(x) = \_C1\,e^{-2\,x} + \_C2\,e^{2\,x}\sin(x) + \_C3\,e^{2\,x}\cos(x)\}$$

2.1465 ODE No. 1465

$$-a^2y'(x) + 2a^2y(x) + y^{(3)}(x) - 2y''(x) - \sinh(x) = 0$$

✓ **Mathematica** : cpu = 0.10017 (sec), leaf count = 52

$$\left\{\left\{y(x) \to \frac{e^{-x} - 3e^x}{6 - 6a^2} + c_1e^{-ax} + c_3e^{ax} + c_2e^{2x}\right\}\right\}$$

✓ **Maple** : cpu = 0.1 (sec), leaf count = 214

$$\left\{y(x) = \frac{1}{12\,a^5 - 60\,a^3 + 48\,a}\left(-3\,(a+1)\,((a-2)\,e^{-ax} + e^{ax}(a+2))\cosh((a-1)\,x) + 3\,(a-1)\,((a-2)\,e^{-ax} + e\right.$$

2.1466 ODE No. 1466

$$a^3(-y(x)) + 3a^2y'(x) - 3ay''(x) - e^{ax} + y^{(3)}(x) = 0$$

✓ **Mathematica** : cpu = 0.0174826 (sec), leaf count = 34

$$\left\{\left\{y(x) \to \frac{1}{6}e^{ax}\left(6c_3x^2 + 6c_2x + 6c_1 + x^3\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.023 (sec), leaf count = 27

$$\left\{y(x) = \frac{\mathrm{e}^{ax}\left(6\_C3\,x^2 + x^3 + 6\_C2\,x + 6\_C1\right)}{6}\right\}$$

2.1467 ODE No. 1467

$$\mathrm{a0}y(x) + \mathrm{a1}y'(x) + \mathrm{a2}y''(x) + y^{(3)}(x) = 0$$

✓ **Mathematica** : cpu = 0.00651583 (sec), leaf count = 84

$$\left\{\left\{y(x) \to c_1e^{x\mathrm{Root}\left[\#1^3+\#1^2\mathrm{a2}+\#1\mathrm{a1}+\mathrm{a0}\&,1\right]} + c_2e^{x\mathrm{Root}\left[\#1^3+\#1^2\mathrm{a2}+\#1\mathrm{a1}+\mathrm{a0}\&,2\right]} + c_3e^{x\mathrm{Root}\left[\#1^3+\#1^2\mathrm{a2}+\#1\mathrm{a1}+\mathrm{a0}\&,3\right]}\right\}\right.$$

✓ **Maple** : cpu = 0.029 (sec), leaf count = 590

$$\left\{y(x) = \_C1\,\mathrm{e}^{-x\left(\left(\frac{i}{12}\sqrt{3}+\frac{1}{12}\right)\left(36\,a1\,a2-108\,a0-8\,a2^3+12\,\sqrt{12\,a0\,a2^3-3\,a1^2a2^2-54\,a1\,a2\,a0+12\,a1^3+81\,a0^2}\right)^{\frac{2}{3}}+\frac{a2}{3}\sqrt[3]{36\,a1\,a2-10}\right.}\right.$$

2.1468 ODE No. 1468

$$2\left(2a + 4x^2 - 1\right)y'(x) - 8axy(x) + y^{(3)}(x) - 6xy''(x) = 0$$

✓ **Mathematica** : cpu = 0.0918351 (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 = 0.091 (sec), leaf count = 59

$$\left\{y(x) = x^2\left(\left(U\left(\frac{1}{2} - \frac{a}{4}, \frac{3}{2}, x^2\right)\right)^2\_C2 + U\left(\frac{1}{2} - \frac{a}{4}, \frac{3}{2}, x^2\right)M\left(\frac{1}{2} - \frac{a}{4}, \frac{3}{2}, x^2\right)\_C3 + \left(M\left(\frac{1}{2} - \frac{a}{4}, \frac{3}{2}, x^2\right)\right)\right.\right.$$

2.1469 ODE No. 1469

$$a^3x^3y(x) + 3a^2x^2y'(x) + 3axy''(x) + y^{(3)}(x) = 0$$

✓ **Mathematica** : cpu = 0.0194221 (sec), leaf count = 68

$$\left\{\left\{y(x) \to e^{-\frac{ax^2}{2}-\sqrt{3}\sqrt{ax}}\left(c_1e^{\sqrt{3}\sqrt{ax}} + c_3e^{2\sqrt{3}\sqrt{ax}} + c_2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.031 (sec), leaf count = 37

$$\left\{y(x) = \mathrm{e}^{-\frac{ax^2}{2}}\left(\_C1 + \_C2\,\mathrm{e}^{\sqrt{3}\sqrt{ax}} + \_C3\,\mathrm{e}^{-\sqrt{3}\sqrt{ax}}\right)\right\}$$

2.1470 ODE No. 1470

$$y^{(3)}(x) - \sin(x)y''(x) - 2\cos(x)y'(x) + y(x)\sin(x) - \log(x) = 0$$

✗ **Mathematica** : cpu = 300.062 (sec), leaf count = 0 , timed out

```
$Aborted
```

✓ **Maple** : cpu = 0.093 (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 = 0.0833206 (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] == 0
```

✓ **Maple** : cpu = 0.223 (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 = 0.0841734 (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[3][y][
```

✓ **Maple** : cpu = 0.299 (sec), leaf count = 33

$$\left\{y(x) = \left(\int \_C1 + \_C2 \int \mathrm{e}^{-\int x^2 f(x)+3x^{-1}\,\mathrm{d}x}\,\mathrm{d}x\,\mathrm{d}x + \_C3\right)x\right\}$$

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 = 0.0148121 (sec), leaf count = 0 , could not solve

```
DSolve[y[x]*(f[x]*g[x] + Derivative[1][g][x]) + g[x]*Derivative[1][y][x] + f[x]*Derivative[2
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x) = DESol\left(\left\{\frac{\mathrm{d}^3}{\mathrm{d}x^3}\_Y(x) + f(x)\frac{\mathrm{d}^2}{\mathrm{d}x^2}\_Y(x) + g(x)\frac{\mathrm{d}}{\mathrm{d}x}\_Y(x) + \left(f(x)\,g(x) + \frac{\mathrm{d}}{\mathrm{d}x}g(x)\right)\_Y(x)\right\}, \{\_Y(x)\}$$

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 = 0.0157647 (sec), leaf count = 0 , could not solve

```
DSolve[y[x]*(4*f[x]*g[x] + 2*Derivative[1][g][x]) + (2*f[x]^2 + 4*g[x] + Derivative[1][f][x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x) = \left(DESol\left(\left\{\frac{\mathrm{d}^2}{\mathrm{d}x^2}\_Y(x) + f(x)\frac{\mathrm{d}}{\mathrm{d}x}\_Y(x) + g(x)\,\_Y(x)\right\}, \{\_Y(x)\}\right)\right)^2\right\}$$

2.1475 ODE No. 1475

$$4y^{(3)}(x) - 8y''(x) - 11y'(x) - 3y(x) + 18e^x = 0$$

✓ **Mathematica** : cpu = 0.0278533 (sec), leaf count = 37

$$\left\{\left\{y(x) \to e^{-x/2}\left(c_2x + c_3e^{7x/2} + c_1 + e^{3x/2}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.022 (sec), leaf count = 23

$$\left\{y(x) = (\_C3\,x + \_C2)\,\mathrm{e}^{-\frac{x}{2}} + \_C1\,\mathrm{e}^{3\,x} + \mathrm{e}^{x}\right\}$$

2.1476 ODE No. 1476

$$-36n^2y'(x)\wp(x;\mathrm{g2},\mathrm{g3}) - 2(n+3)(4n-3)ny(x)\phi'(x) + 27y^{(3)}(x) = 0$$

✗ **Mathematica** : cpu = 0.131039 (sec), leaf count = 0 , could not solve

```
DSolve[-2*n*(3 + n)*(-3 + 4*n)*y[x]*Derivative[1][phi][x] - 36*n^2*WeierstrassP[x, {g2, g3}]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x) = DESol\left(\left\{27\,\frac{\mathrm{d}^3}{\mathrm{d}x^3}\_Y(x) - 36\,n^2\,WeierstrassP(x, g2, g3)\,\frac{\mathrm{d}}{\mathrm{d}x}\_Y(x) + (-8\,WeierstrassPPrime(x, g2, g3)\right.\right.\right.$$

2.1477 ODE No. 1477

$$xy^{(3)}(x) + 3y''(x) + xy(x) = 0$$

✓ **Mathematica** : cpu = 0.180387 (sec), leaf count = 43

$$\left\{\left\{y(x) \to \frac{c_1e^{-x} + c_2e^{\sqrt[3]{-1}x} + c_3e^{-(-1)^{2/3}x}}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.022 (sec), leaf count = 41

$$\left\{y(x) = \frac{1}{x}\left(\_C1\,\mathrm{e}^{-x} + \_C2\,\mathrm{e}^{\frac{x}{2}}\sin\left(\frac{\sqrt{3}x}{2}\right) + \_C3\,\mathrm{e}^{\frac{x}{2}}\cos\left(\frac{\sqrt{3}x}{2}\right)\right)\right\}$$

2.1478 ODE No. 1478

$$-ax^2y(x) + xy^{(3)}(x) + 3y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0354546 (sec), leaf count = 90

$$\left\{\left\{y(x) \to \frac{(2-2i)c_1\,{}_0F_2\left(;\frac{1}{2},\frac{3}{4};\frac{ax^4}{64}\right)}{\sqrt[4]{a}x} + c_2\,{}_0F_2\left(;\frac{3}{4},\frac{5}{4};\frac{ax^4}{64}\right) + \left(\frac{1}{4}+\frac{i}{4}\right)\sqrt[4]{a}c_3x\,{}_0F_2\left(;\frac{5}{4},\frac{3}{2};\frac{ax^4}{64}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.134 (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 = 0.157511 (sec), leaf count = 153

$$\left\{\left\{y(x) \to \frac{1}{2}ic_2x\,{}_1F_2\left(\frac{a}{2}+\frac{1}{2};\frac{3}{2},\frac{a}{2}+\frac{b}{2}+\frac{1}{2};\frac{x^2}{4}\right) + c_1\,{}_1F_2\left(\frac{a}{2};\frac{1}{2},\frac{a}{2}+\frac{b}{2};\frac{x^2}{4}\right) + c_3\left(\frac{i}{2}\right)^{-a-b+2} x^{-a-b+2}\,{}_1F_2\left(1-\right.\right.\right.$$

✓ **Maple** : cpu = 0.264 (sec), leaf count = 92

$$\left\{y(x) = \_C1\,{}_1\mathrm{F}_2(\frac{a}{2};\frac{1}{2},\frac{a}{2}+\frac{b}{2};\frac{x^2}{4}) + \_C2\,x{}_1\mathrm{F}_2(\frac{1}{2}+\frac{a}{2};\frac{3}{2},\frac{a}{2}+\frac{b}{2}+\frac{1}{2};\frac{x^2}{4}) + \_C3\,x^{-a-b+2}{}_1\mathrm{F}_2(1-\frac{b}{2};2-\frac{b}{2}-\right.$$

2.1480 ODE No. 1480

$$-(2v+x)y''(x) - (-2v+x-1)y'(x) + xy^{(3)}(x) + (x-1)y(x) = 0$$

✓ **Mathematica** : cpu = 0.240311 (sec), leaf count = 91

$$\left\{\left\{y(x) \to \frac{1}{4}e^x\left(\frac{4c_3x^{2v+2}\Gamma\left(v+\frac{3}{2}\right)\,{}_1\tilde{F}_1\left(v+\frac{3}{2};2v+3;-2x\right)}{\Gamma\left(\frac{1}{2}-v\right)} + c_2 4^{-v}G_{2,3}^{2,1}\left(2x\middle|\begin{array}{c}1,v+\frac{3}{2}\\1,2(v+1),0\end{array}\right) + 4c_1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.282 (sec), leaf count = 35

$$\left\{y(x) = \mathrm{e}^x\_C1 + \_C2\,x^{v+1}I_{-v-1}(x) + \_C3\,x^{v+1}K_{v+1}(x)\right\}$$

2.1481 ODE No. 1481

$$-f(x)+\left(x^{2}-3\right)y''(x)+xy^{(3)}(x)+4xy'(x)+2y(x)=0$$

✓ **Mathematica** : cpu = 1.13899 (sec), leaf count = 340

$$\left\{\left\{y(x)\to\frac{1}{240}\left(240e^{-\frac{x^2}{2}}x^5\left(\int_1^x\frac{f(K[1])\left(8\sqrt{2\pi}K[1]^5\mathrm{erfi}\left(\frac{K[1]}{\sqrt{2}}\right)-15K[1]^4\mathrm{Ei}\left(\frac{K[1]^2}{2}\right)+2e^{\frac{K[1]^2}{2}}\left(-8K[1]^4+7K\right.\right.}{240K[1]^4}\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.056 (sec), leaf count = 44

$$\left\{y(x)=\left(\_C3+\int\frac{2\_C1\,x+\_C2-\iint-f(x)\,\mathrm{d}x\,\mathrm{d}x}{x^6}\mathrm{e}^{\frac{x^2}{2}}\,\mathrm{d}x\right)\mathrm{e}^{-\frac{x^2}{2}}x^5\right\}$$

2.1482 ODE No. 1482

$$axy(x)-b+2xy^{(3)}(x)+3y''(x)=0$$

✗ **Mathematica** : cpu = 300.029 (sec), leaf count = 0 , timed out

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✓ **Maple** : cpu = 0.451 (sec), leaf count = 1616

$$\left\{y(x)=-\int 2802800\,bx\left(\left(-5/8\,{}_0\mathrm{F}_2\left(\,;\frac{13}{6},7/3;-\frac{ax^3}{54}\right)ax^3+\frac{35}{4}{}_0\mathrm{F}_2\left(\,;7/6,4/3;-\frac{ax^3}{54}\right)\right){}_0\mathrm{F}_2\left(\,;5/6,7/6;-\frac{ax^3}{54}\right.\right.\right.$$

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 = 0.160165 (sec), leaf count = 105

$$\left\{\left\{y(x)\to e^{x}\left(\frac{2c_3\Gamma\left(\frac{5}{2}-3\nu\right)\left(\Gamma(2-2\nu)\,{}_1\tilde{F}_1\left(\frac{3}{2}-3\nu;1-2\nu;-x\right)+2\nu-1\right)}{3(2\nu-1)\Gamma(2-2\nu)\Gamma\left(\frac{3}{2}-\nu\right)}+c_2G_{2,3}^{2,1}\left(x\left|\begin{array}{c}1,3\nu-\frac{1}{2}\\1,2\nu,0\end{array}\right.\right)+c_1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.288 (sec), leaf count = 37

$$\left\{y(x)=\mathrm{e}^{x}\_C1+\_C2\,\mathrm{e}^{\frac{x}{2}}x^{\nu}I_{\nu}\left(\frac{x}{2}\right)+\_C3\,\mathrm{e}^{\frac{x}{2}}x^{\nu}K_{\nu}\left(\frac{x}{2}\right)\right\}$$

2.1484 ODE No. 1484

$$6y'(x)(ak+bx)+3(2ax+k)y''(x)+y(x)(3bk+2cx)+2xy^{(3)}(x)=0$$

✗ **Mathematica** : cpu = 63.4979 (sec), leaf count = 0 , DifferentialRoot result

$$\left\{\left\{y(x)\to \text{DifferentialRoot}\left(\{y,x\},\left\{(2xc+3bk)y(x)+(6xb+6ak)y'(x)+(6xa+3k)y''(x)+2xy^{(3)}(x)=0,y(1\right.\right.\right.$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x)=DESol\left(\left\{(3\,bk+2\,cx)\_Y(x)+(6\,ak+6\,bx)\frac{\mathrm{d}}{\mathrm{d}x}\_Y(x)+(6\,ax+3\,k)\frac{\mathrm{d}^2}{\mathrm{d}x^2}\_Y(x)+2\,x\frac{\mathrm{d}^3}{\mathrm{d}x^3}\_Y(x)\right\},\{\right.\right.$$

2.1485 ODE No. 1485

$$(x-2)xy^{(3)}(x)-(x-2)xy''(x)-2y'(x)+2y(x)=0$$

✓ **Mathematica** : cpu = 0.157839 (sec), leaf count = 59

$$\left\{\left\{y(x)\to \frac{1}{4}c_3\left(-4e^{x-2}\text{Ei}(2-x)+x^2\log(2-x)-x^2\log(x)+2x+2\right)+c_1x^2+c_2e^x\right\}\right\}$$

✓ **Maple** : cpu = 0.411 (sec), leaf count = 51

$$\left\{y(x)=\_C3\;Ei(1,x-2)\,e^{x-2}+\frac{\_C3\,x^2\ln(x-2)}{4}+\_C2\,e^x-\frac{\_C3\,\ln(x)\,x^2}{4}+\frac{(2\,x+2)\_C3}{4}+\_C1\,x^2\right\}$$

2.1486 ODE No. 1486

$$(2x-1)y^{(3)}(x)-8xy'(x)+8y(x)=0$$

✓ **Mathematica** : cpu = 0.191351 (sec), leaf count = 63

$$\left\{\left\{y(x)\to \frac{1}{4}\left(c_3e^{2x-2}\text{Ei}(2-4x)-\frac{2c_3x\text{Ei}(1-2x)}{e}+4c_1x-4c_2e^{2x}-c_3e^{-2x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.27 (sec), leaf count = 51

$$\left\{y(x)=\_C1\;x+\_C2\;e^{2\,x}-\frac{\_C3\;\left(2\,xe^{-1}Ei(1,2\,x-1)-Ei(1,4\,x-2)\,e^{2\,x-2}-e^{-2\,x}\right)}{4}\right\}$$

2.1487 ODE No. 1487

$$(2x-1)y^{(3)}(x)+(x+4)y''(x)+2y'(x)=0$$

✗ **Mathematica** : cpu = 299.998 (sec), leaf count = 0 , timed out

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✓ **Maple** : cpu = 0.091 (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 = 0.609429 (sec), leaf count = 97

$$\left\{\left\{y(x)\to\frac{c_1e^{-\sqrt[3]{a}x}\left(\sqrt[3]{a}x+2\right)+c_2e^{\sqrt[3]{-1}\sqrt[3]{a}x}\left(\sqrt[3]{a}x+2(-1)^{2/3}\right)+c_3e^{-(-1)^{2/3}\sqrt[3]{a}x}\left(\sqrt[3]{a}x-2\sqrt[3]{-1}\right)}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.638 (sec), leaf count = 135

$$\left\{y(x)=\frac{1}{x}\left(-\left(\left(-i-\sqrt{3}\right)\left(-a^4\right)^{\frac{2}{3}}+ia^3x\right)\_C2\,\mathrm{e}^{\frac{\frac{i}{2}\left(-\sqrt{3}+i\right)x\sqrt[3]{-a^4}}{a}}-\left(\left(-i+\sqrt{3}\right)\left(-a^4\right)^{\frac{2}{3}}+ia^3x\right)\_C3\,\mathrm{e}^{\frac{\frac{i}{2}\left(\sqrt{3}+i\right)x}{a}}\right.$$

2.1489 ODE No. 1489

$$x^2y^{(3)}(x)+(x+1)y''(x)-y(x)=0$$

✗ **Mathematica** : cpu = 0.870912 (sec), leaf count = 0 , DifferentialRoot result

$$\left\{\left\{y(x)\to\text{DifferentialRoot}\left(\{y,x\},\left\{y^{(3)}(x)x^2-y(x)+(x+1)y''(x)=0,y(1)=c_1,y'(1)=c_2,y''(1)=c_3\right\}\right)(x\right.$$

✗ **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

$$x^2y^{(3)}(x) + (x^2+1)\,y'(x) - xy''(x) = 0$$

✓ **Mathematica** : cpu = 0.0379811 (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 = 0.072 (sec), leaf count = 18

$$\{y(x) = \_C1 + \_C2\,xJ_1(x) + \_C3\,xY_1(x)\}$$

2.1491 ODE No. 1491

$$(-4a^2\nu^2 + 4a^2x^{2a} + 1)\,y'(x) + x^2y^{(3)}(x) + 3xy''(x) = 4a^3x^{2a-1}y(x)$$

✓ **Mathematica** : cpu = 0.0508099 (sec), leaf count = 102

$$\left\{\left\{y(x) \to c_2\left(x^{2a}\right)^{-\nu}\,{}_1F_2\left(-\nu-\frac{1}{2};1-2\nu,1-\nu;-x^{2a}\right) + c_3\left(x^{2a}\right)^{\nu}\,{}_1F_2\left(\nu-\frac{1}{2};\nu+1,2\nu+1;-x^{2a}\right) + c_1\,{}_1F_2\left(\right.\right.\right.$$

✓ **Maple** : cpu = 0.098 (sec), leaf count = 88

$$\left\{y(x) = \_C1\,{}_1\mathrm{F}_2(-\frac{1}{2};\,\nu+1,-\nu+1;\,-x^{2\,a}) + \_C2\,x^{-2\,a\nu}{}_1\mathrm{F}_2(-\frac{1}{2}-\nu;\,1-2\,\nu,-\nu+1;\,-x^{2\,a}) + \_C3\,x^{2\,a\nu}{}_1\mathrm{F}_2(\right.$$

2.1492 ODE No. 1492

$$(4x(n-m) + m(2m-1) + 2x^2)\,y'(x) - 2n(-2m+2x+1)y(x) - 3x(x-m)y''(x) + x^2y^{(3)}(x) = 0$$

✓ **Mathematica** : cpu = 0.445626 (sec), leaf count = 43

$$\{\{y(x) \to c_2U(-n,m,x)L_n^{m-1}(x) + c_1U(-n,m,x)^2 + c_3L_n^{m-1}(x)^2\}\}$$

✓ **Maple** : cpu = 0.123 (sec), leaf count = 39

$$\left\{y(x) = \_C1\,(M(-n,\,m,\,x))^2 + \_C2\,(U(-n,\,m,\,x))^2 + \_C3\,M(-n,\,m,\,x)U(-n,\,m,\,x)\right\}$$

2.1493 ODE No. 1493

$$-f(x)+x^2y^{(3)}(x)+\left(x^2+2\right)y'(x)+4xy''(x)+3xy(x)=0$$

✓ **Mathematica** : cpu = 8.32757 (sec), leaf count = 868

$$\left\{\left\{y(x)\to J_0(x)c_1+2Y_0(x)c_2+J_0(x)\int_1^x -\frac{}{K[1]\left(2\left(8(J_1(K[1])Y_0(K[1])-J_0(K[1])Y_1(K[1]))\,{}_1F_2\left(3;\frac{5}{2},\frac{5}{2};-\frac{1}{4}K\right.\right.\right.}\right.\right.$$

✓ **Maple** : cpu = 0.367 (sec), leaf count = 1033

$$\left\{y(x)=\frac{1}{x}\left(\int 18\,\frac{}{((-18\,x^2J_0\,(x)-72\,xJ_1\,(x)+54\,J_0\,(x))\,{}_1\mathrm{F}_2(1;\,1/2,1/2;\,-1/4\,x^2)+8\,x^2\,(9/4\,J_0\,(x)\,(x^2+9)\,{}_1\mathrm{F}\right.\right.$$

2.1494 ODE No. 1494

$$x^2y^{(3)}(x)+5xy''(x)+4y'(x)-\log(x)=0$$

✓ **Mathematica** : cpu = 0.0326883 (sec), leaf count = 43

$$\left\{\left\{y(x)\to\frac{(x^2-8c_2)\log(x)-2\left(-2c_3x+2c_1+4c_2+x^2\right)}{4x}\right\}\right\}$$

✓ **Maple** : cpu = 0.023 (sec), leaf count = 32

$$\left\{y(x)=\frac{(x^2+4\_C2)\ln(x)-2\,x^2+4\_C1\,x+4\_C3}{4\,x}\right\}$$

2.1495 ODE No. 1495

$$x^2y^{(3)}(x)+6xy''(x)+6y'(x)=0$$

✓ **Mathematica** : cpu = 0.02019 (sec), leaf count = 24

$$\left\{\left\{y(x)\to-\frac{c_2}{2x^2}-\frac{c_1}{x}+c_3\right\}\right\}$$

✓ **Maple** : cpu = 0.013 (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 = 0.292804 (sec), leaf count = 58

$$\left\{\left\{y(x) \to \frac{c_1 e^{-\sqrt[3]{a}x} + c_2 e^{\sqrt[3]{-1}\sqrt[3]{a}x} + c_3 e^{-(-1)^{2/3}\sqrt[3]{a}x}}{x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.028 (sec), leaf count = 57

$$\left\{y(x) = \frac{1}{x^2}\left(\_C1\, e^{\frac{(i\sqrt{3}-1)x}{2}\sqrt[3]{-a}} + \_C2\, e^{-\frac{(i\sqrt{3}+1)x}{2}\sqrt[3]{-a}} + \_C3\, e^{\sqrt[3]{-a}x}\right)\right\}$$

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 = 0.539638 (sec), leaf count = 127

$$\left\{\left\{y(x) \to c_1\,{}_0F_2\left(;\frac{2}{3}-p,\frac{1}{3}-q;\frac{x^3}{27}\right) + c_2(-1)^{p+\frac{1}{3}}3^{-3p-1}x^{3p+1}\,{}_0F_2\left(;p+\frac{4}{3},p-q+\frac{2}{3};\frac{x^3}{27}\right) + c_3(-1)^{q+\frac{2}{3}}3^{-3q-2}\right.\right.$$

✓ **Maple** : cpu = 0.284 (sec), leaf count = 77

$$\left\{y(x) = \_C1\,{}_0\mathrm{F}_2(\,;-p+\frac{2}{3},-q+\frac{1}{3};\frac{x^3}{27}) + \_C2\,x^{3p+1}{}_0\mathrm{F}_2(\,;p+\frac{4}{3},-q+\frac{2}{3}+p;\frac{x^3}{27}) + \_C3\,x^{3q+2}{}_0\mathrm{F}_2(\,;q+\frac{5}{3}\right.$$

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 = 12.2679 (sec), leaf count = 353

$$\left\{\left\{y(x) \to 2^{-n-\frac{3}{2}}\left(\pi c_3 4^n x^4 \sec(\pi n)\Gamma\left(\frac{3}{2}-n\right)\left(\sqrt{a}x\right)^{-n-\frac{1}{2}} J_{n+\frac{1}{2}}\left(\sqrt{a}x\right)\,{}_1\tilde{F}_2\left(\frac{3}{2}-n;\frac{1}{2}-n,\frac{5}{2}-n;-\frac{ax^2}{4}\right) + \frac{J_n}{}\right.\right.\right.$$

✓ **Maple** : cpu = 0.291 (sec), leaf count = 53

$$\left\{y(x) = \_C1\,x^{n+\frac{1}{2}}J_{-n-\frac{1}{2}}\left(\sqrt{a}x\right) + \_C2\,x^{n+\frac{1}{2}}Y_{-n-\frac{1}{2}}\left(\sqrt{a}x\right) + \_C3\left(ax^2+4n-2\right)\right\}$$

2.1499 ODE No. 1499

$$-\left(\nu^2+x^2-\frac{1}{4}\right)y'(x)+\left(\nu^2+x^2-2x-\frac{1}{4}\right)y(x)+x^2y^{(3)}(x)-\left(x^2-2x\right)y''(x)=0$$

✓ **Mathematica** : cpu = 0.261697 (sec), leaf count = 91

$$\left\{\left\{y(x)\to e^x\left(\frac{c_3x^{\nu+\frac{1}{2}}\Gamma\left(\nu+\frac{1}{2}\right)\,{}_1\tilde{F}_1\left(\nu+\frac{1}{2};2\nu+1;-2x\right)}{\Gamma\left(\frac{3}{2}-\nu\right)}+c_22^{-\nu-\frac{1}{2}}G_{2,3}^{2,1}\left(2x\left|\begin{array}{c}1,0\\ \frac{1}{2}-\nu,\nu+\frac{1}{2},0\end{array}\right.\right)+c_1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.298 (sec), leaf count = 25

$$\left\{y(x)=e^x\_C1+\_C2\sqrt{x}I_\nu(x)+\_C3\sqrt{x}K_\nu(x)\right\}$$

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 = 54.8371 (sec), leaf count = 0 , DifferentialRoot result

$$\left\{\left\{y(x)\to \text{DifferentialRoot}\left(\{y,x\},\left\{y^{(3)}(x)x^2-(x+v)y''(x)x-(x+1)\nu y(x)+(2x\nu+\nu)y'(x)=0,y(1)=c_1,\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.247 (sec), leaf count = 55

$$\left\{y(x)=e^x\_C1+\_C2\,x^{\frac{\nu}{2}+\frac{1}{2}}J_{-\nu-1}\left(2\sqrt{\nu}\sqrt{x}\right)+\_C3\,x^{\frac{\nu}{2}+\frac{1}{2}}Y_{-\nu-1}\left(2\sqrt{\nu}\sqrt{x}\right)\right\}$$

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 = 0.209698 (sec), leaf count = 80

$$\left\{\left\{y(x)\to e^x\left(\frac{c_3x^{\nu+\frac{1}{2}}\Gamma\left(\nu+\frac{1}{2}\right)\,{}_1\tilde{F}_1\left(\nu+\frac{1}{2};2\nu+1;-x\right)}{\Gamma\left(\frac{3}{2}-\nu\right)}+c_2G_{2,3}^{2,1}\left(x\left|\begin{array}{c}1,0\\ \frac{1}{2}-\nu,\nu+\frac{1}{2},0\end{array}\right.\right)+c_1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.258 (sec), leaf count = 37

$$\left\{y(x)=e^x\_C1+\_C2\,e^{\frac{x}{2}}\sqrt{x}I_\nu\left(\frac{x}{2}\right)+\_C3\,e^{\frac{x}{2}}\sqrt{x}K_\nu\left(\frac{x}{2}\right)\right\}$$

2.1502 ODE No. 1502

$$-(x^4-6x)\,y''(x)-(2x^3-6)\,y'(x)+x^2y^{(3)}(x)+2x^2y(x)=0$$

✓ **Mathematica** : cpu = 0.0932021 (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 = 0.49 (sec), leaf count = 103

$$\left\{y(x)=\frac{1}{x^2}\left(\_C2\int e^{\frac{x^3}{6}}\sqrt{x}\left(I_{\frac{1}{6}}\left(-\frac{x^3}{6}\right)x^3+I_{-\frac{5}{6}}\left(-\frac{x^3}{6}\right)x^3-2\,I_{1/6}(-1/6\,x^3)\right)\,dx+\_C3\int e^{\frac{x^3}{6}}\sqrt{x}\left(K_{\frac{5}{6}}\left(-\frac{x^3}{6}\right.\right.\right.$$

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 = 0.124512 (sec), leaf count = 62

$$\left\{\left\{y(x)\to c_3-\frac{100(3c_2-1)\,x^3+900c_2x+225c_1+36x^5-60\left(3x^4+10x^2+15\right)x\log(x)}{900\left(x^2+1\right)^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.031 (sec), leaf count = 67

$$\left\{y(x)=\frac{\left(45\,x^5+150\,x^3+225\,x\right)\ln(x)-9\,x^5+225\,\_C1\,x^4+(225\,\_C2-50)\,x^3+450\,\_C1\,x^2+(675\,\_C2-}{225\,\left(x^2+1\right)^2}\right.$$

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 = 0.122186 (sec), leaf count = 41

$$\left\{\left\{y(x)\to\frac{1}{4}\left(2c_1x^2+2ic_2e^{-ix}-c_3e^{ix}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.226 (sec), leaf count = 18

$$\left\{y(x)=\_C1\,x^2+\_C2\,\cos(x)+\_C3\,\sin(x)\right\}$$

2.1505 ODE No. 1505

$$(2ax+b)y'(x)+ay(x)+2(x-1)xy^{(3)}(x)+3(2x-1)y''(x)=0$$

✗ **Mathematica** : cpu = 62.4149 (sec), leaf count = 0 , DifferentialRoot result

$$\left\{\left\{y(x)\to \text{DifferentialRoot}\left(\{y,x\},\left\{ay(x)+(2xa+b)y'(x)+(6x-3)y''(x)+2(x-1)xy^{(3)}(x)=0,y(2)=c_1,\right.\right.\right.$$

✓ **Maple** : cpu = 0.175 (sec), leaf count = 79

$$\left\{y(x)=\_C1\left(MathieuC\left(-\frac{a}{2}-\frac{b}{2}+1,\frac{a}{4},\arccos\left(\sqrt{x}\right)\right)\right)^2+\_C2\left(MathieuS\left(-\frac{a}{2}-\frac{b}{2}+1,\frac{a}{4},\arccos\left(\sqrt{x}\right)\right)\right.\right.$$

2.1506 ODE No. 1506

$$4x^2y^{(3)}(x)+\left(x^2+14x-1\right)y''(x)+4(x+1)y'(x)+2y(x)=0$$

✗ **Mathematica** : cpu = 300.073 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.063 (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 = 2.75405 (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*(b +`

✓ **Maple** : cpu = 0.727 (sec), leaf count = 1211

$$\left\{y(x)=-(ax+b)^{\frac{(2b+\beta)a-\alpha b}{ab}}\left(-HeunC\left(0,\frac{2b-\beta}{b},\frac{(2b+\beta)a-\alpha b}{ab},-\frac{b}{a^2},\frac{(4a-\alpha)b^2-\alpha\beta b+a\beta^2}{2ab^2},-\frac{ax}{b}\right)\left(\right.\right.\right.$$

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 = 0.980183 (sec), leaf count = 143

$$\left\{\left\{y(x)\to 3^{-\nu-1}xa^{-\nu/3}\left(a^{\frac{\nu+1}{3}}\left(c_3a^{\nu/3}x^\nu\,{}_0F_2\left(;\frac{\nu}{3}+1,\frac{2\nu}{3}+1;-\frac{ax^3}{27}\right)+c_1 3^\nu\,{}_0F_2\left(;1-\frac{\nu}{3},\frac{\nu}{3}+1;-\frac{ax^3}{27}\right)\right)+\sqrt[3]{a}\right.\right.$$

✓ **Maple** : cpu = 0.158 (sec), leaf count = 81

$$\left\{y(x)=\_C1\,x\,{}_0\mathrm{F}_2(\,;\,\frac{\nu}{3}+1,-\frac{\nu}{3}+1;\,-\frac{ax^3}{27})+\_C2\,x^{-\nu+1}{}_0\mathrm{F}_2(\,;\,-\frac{\nu}{3}+1,1-\frac{2\,\nu}{3};\,-\frac{ax^3}{27})+\_C3\,x^{\nu+1}{}_0\mathrm{F}_2(\,;\,\frac{\nu}{3}\right.$$

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 = 0.012057 (sec), leaf count = 33

$$\left\{\left\{y(x)\to x\left(c_1J_\nu(x)^2+c_3Y_\nu(x)^2+c_2J_\nu(x)Y_\nu(x)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.06 (sec), leaf count = 29

$$\left\{y(x)=x\left(\left(Y_\nu(x)\right)^2\_C2+Y_\nu(x)J_\nu(x)\_C3+\left(J_\nu(x)\right)^2\_C1\right)\right\}$$

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 = 0.0928421 (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))*Deri
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x)=DESol\left(\left\{x^3\frac{\mathrm{d}^3}{\mathrm{d}x^3}\_Y(x)+\left(x^{2\,\nu}ax-\nu^2x+x\right)\frac{\mathrm{d}}{\mathrm{d}x}\_Y(x)+\left(x^{2\,\nu}a\nu-ax^{2\,\nu}+bx^{3\,\nu}+\nu^2-1\right)\_Y(x)\right\},\{\right.$$

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 = 0.0427147 (sec), leaf count = 52

$$\left\{\left\{y(x)\to\frac{c_1}{x^2}+\left(c_3x+\frac{x^4}{9}-\frac{3x^3}{10}\right)\log(x)+c_2x-\frac{x^4}{9}-\frac{x^3}{25}\right\}\right\}$$

✓ **Maple** : cpu = 0.035 (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 = 0.0430305 (sec), leaf count = 29

$$\left\{\left\{y(x)\to\frac{-c_1x^{-a}+c_2x^a+ac_3}{a}\right\}\right\}$$

✓ **Maple** : cpu = 0.015 (sec), leaf count = 18

$$\{y(x)=\_C1+\_C2\,x^{-a}+\_C3\,x^a\}$$

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 = 0.0863071 (sec), leaf count = 23

$$\{\{y(x)\to x(c_1x-c_2\sin(x)+c_3\cos(x))\}\}$$

✓ **Maple** : cpu = 0.216 (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 = 0.820408 (sec), leaf count = 97

$$\left\{\left\{y(x)\to\frac{c_1e^{-\sqrt[3]{a}x}\left(\sqrt[3]{a}x+2\right)+c_2e^{\sqrt[3]{-1}\sqrt[3]{a}x}\left(\sqrt[3]{a}x+2(-1)^{2/3}\right)+c_3e^{-(-1)^{2/3}\sqrt[3]{a}x}\left(\sqrt[3]{a}x-2\sqrt[3]{-1}\right)}{x^3}\right\}\right\}$$

✓ **Maple** : cpu = 0.525 (sec), leaf count = 135

$$\left\{y(x)=\frac{1}{x^3}\left(-\left(\left(-i-\sqrt{3}\right)\left(-a^4\right)^{\frac{2}{3}}+ia^3x\right)\_C2\,e^{\frac{\frac{i}{2}\left(-\sqrt{3}+i\right)x}{a}\sqrt[3]{-a^4}}-\left(\left(-i+\sqrt{3}\right)\left(-a^4\right)^{\frac{2}{3}}+ia^3x\right)\_C3\,e^{\frac{\frac{i}{2}\left(\sqrt{3}+i\right)}{a}}\right.\right.$$

2.1515 ODE No. 1515

$y(x)\left(a\left(4c^2\nu^2-a^2\right)+4b^2c^2(c-a)x^{2c}\right)+y'(x)\left(3(a-1)ax+4b^2c^2x^{2c+1}-4c^2\nu^2+1\right)+3(1-a)x^2y''(x)+x^3y^{(3)}(x)$

✗ **Mathematica** : cpu = 0.232764 (sec), leaf count = 0 , could not solve

```
DSolve[(a*(-a^2 + 4*c^2*nu^2) + 4*b^2*c^2*(-a + c)*x^(2*c))*y[x] + (1 - 4*c^2*nu^2 + 3*(-
1 + a)*a*x + 4*b^2*c^2*x^(1 + 2*c))*Derivative[1][y][x] + 3*(1 - a)*x^2*Derivative[2][y][x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , exception

```
time expired
```

2.1516 ODE No. 1516

$$x^3y^{(3)}(x)+(x+3)x^2y''(x)+5(x-6)xy'(x)+(4x+30)y(x)=0$$

✗ **Mathematica** : cpu = 300.042 (sec), leaf count = 0 , timed out

```
$Aborted
```

✓ **Maple** : cpu = 0.497 (sec), leaf count = 188

$$\left\{y(x)=\frac{e^{-x}\_C3\left(x^8+28\,x^7+450\,x^6+5100\,x^5+42900\,x^4+267120\,x^3+1179360\,x^2+3326400\,x+4536000\right)}{}\right.$$

2.1517 ODE No. 1517

$$x^3y^{(3)}(x) - 2x^3 + x^2y''(x) + 2xy'(x) - y(x) + \log(x) = 0$$

✓ **Mathematica** : cpu = 0.448828 (sec), leaf count = 1656

$$\left\{\left\{y(x) \to c_3x^{\text{Root}[\#1^3-2\#1^2+3\#1-1\&,3]} + c_2x^{\text{Root}[\#1^3-2\#1^2+3\#1-1\&,2]} + c_1x^{\text{Root}[\#1^3-2\#1^2+3\#1-1\&,1]} + \frac{(-2447}{}\right.\right.$$

✓ **Maple** : cpu = 0.531 (sec), leaf count = 866

$$\left\{y(x) = -\int -\frac{\sqrt[3]{44+12\sqrt{69}}\left(3\sqrt{69}\sqrt[3]{44+12\sqrt{69}} - 11\sqrt[3]{44+12\sqrt{69}} + 100\right)\left(x^{\frac{(11-3\sqrt{69})(44+12\sqrt{69})^{\frac{2}{3}}}{1200} + \frac{\sqrt[3]{44+12}}{12}}\right.}{13800\,x^3}\right.$$

2.1518 ODE No. 1518

$$x(x^2+1)\,y^{(3)}(x) + 3(2x^2+1)\,y''(x) - 12y(x) = 0$$

✓ **Mathematica** : cpu = 0.26825 (sec), leaf count = 96

$$\left\{\left\{y(x) \to \frac{4c_1x^3 + 2c_2\sqrt{x^2+1}x^2 + 3c_3x^2 + 3c_3\sqrt{x^2+1}x^2\log(x) - 3c_3\sqrt{x^2+1}x^2\log\left(\sqrt{x^2+1}+1\right) + 2c_1x + c}{6x}\right.\right.$$

✓ **Maple** : cpu = 0.483 (sec), leaf count = 60

$$\left\{y(x) = \frac{1}{x}\left(3\,Artanh\left(\frac{1}{\sqrt{x^2+1}}\right)\sqrt{x^2+1}\_C2\,x^2 + \_C1\,x^2\sqrt{x^2+1} + 2\_C3\,x^3 - 3\_C2\,x^2 + \_C3\,x - \_C2\right)\right.$$

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 = 0.0339189 (sec), leaf count = 58

$$\left\{\left\{y(x)\to\frac{1}{8}\left(2c_1\left(x^3-3x^2+3x+3\right)-(x-1)\left(4c_2\left(x^2-2x-1\right)+c_3\left(-3x^2+2x+1\right)\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.162 (sec), leaf count = 19

$$\left\{y(x)=\_C2\,x^3+\_C1\,x^2+\_C3\,x+\_C3\right\}$$

2.1520 ODE No. 1520

$$y''(x)\left(-6x(\text{a1}+\text{a2}+\text{a3})+3\text{a1a2}+3\text{a1a3}+3\text{a2a3}+9x^2\right)+2(x-\text{a1})(x-\text{a2})(x-\text{a3})y^{(3)}(x)-2\left(b+\left(n^2+n-3\right)\right.$$

✗ **Mathematica** : cpu = 73.1429 (sec), leaf count = 0 , DifferentialRoot result

$$\left\{\left\{y(x)\to\text{DifferentialRoot}\left(\{y,x\},\left\{-n(n+1)y(x)-2\left(xn^2+xn-3x+b\right)y'(x)+3\left(3x^2-2\text{a1}x-2\text{a2}x-2\text{a3}\right.\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.549 (sec), leaf count = 288

$$\left\{y(x)=-\_C2\,(x-a1)\left(HeunG\left(\frac{-a3+a1}{-a2+a1},\frac{\left(-n^2-n+3\right)a1-b}{-4\,a2+4\,a1},\frac{n}{2}+1,-\frac{n}{2}+\frac{1}{2},\frac{3}{2},\frac{1}{2},\frac{-x+a1}{-a2+a1}\right)\right)^2+\_\right.$$

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 = 0.0728402 (sec), leaf count = 29

$$\left\{\left\{y(x)\to x^2\left(c_3\left(x+\frac{1}{x}+\log^2(x)\right)+c_2\log(x)+c_1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.469 (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 = 0.0238132 (sec), leaf count = 42

$$\left\{\left\{y(x) \to \frac{1}{4}(2c_1 - c_2)\,x^2 + \frac{1}{2}c_2x^2\log(x) + c_3 - \frac{1}{36x}\right\}\right\}$$

✓ **Maple** : cpu = 0.046 (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 = 0.138987 (sec), leaf count = 46

$$\left\{\left\{y(x) \to \frac{1}{2}x\left(c_2x^2 - 2c_1\left(x^2-3x+1\right) - 2c_2x + c_3x + c_3x\log(x) + c_2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.475 (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 = 0.205933 (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 = 0.551 (sec), leaf count = 98

$$\left\{y(x) = x^2\left(\int 1e^{\frac{1}{6\,x^3}}\left(2\,x^3I_{1/6}(-1/6\,x^{-3}) - I_{\frac{1}{6}}\left(-\frac{1}{6\,x^3}\right) - I_{-\frac{5}{6}}\left(-\frac{1}{6\,x^3}\right)\right)x^{-\frac{11}{2}}\,dx\_C3 + \int 1e^{\frac{1}{6\,x^3}}\left(2\,x^3K_{1/6}(-\right.\right.\right.$$

2.1525 ODE No. 1525

$$ay(x) + x^6 y^{(3)}(x) + 6x^5 y''(x) = 0$$

✓ **Mathematica** : cpu = 0.519204 (sec), leaf count = 101

$$\left\{\left\{y(x) \to c_1 \left(-e^{\frac{\sqrt[3]{a}}{x}}\right) \left(\sqrt[3]{a} - 2x\right) + c_2 e^{\frac{(-1)^{2/3} \sqrt[3]{a}}{x}} \left(x - \frac{1}{2}(-1)^{2/3} \sqrt[3]{a}\right) + c_3 e^{-\frac{\sqrt[3]{-1}\sqrt[3]{a}}{x}} \left(\frac{1}{2}\sqrt[3]{-1}\sqrt[3]{a} + x\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.654 (sec), leaf count = 291

$$\left\{y(x) = \_C1 \left(-8\,x^3 + a\right)^4 e^{-\frac{1}{ax}\sqrt[3]{-a^4}} \left(2\,ax + \sqrt[3]{-a^4}\right)^{-3} \left(4\,a^2x^2 - 2\,x\sqrt[3]{-a^4}a + \left(-a^4\right)^{\frac{2}{3}}\right)^{-4} + \_C2 \left(-8\,x^3 + a\right)$$

2.1526 ODE No. 1526

$$\left(x^4 + 2x^2 + 2x + 1\right) x^2 y^{(3)}(x) - \left(2x^6 + 3x^4 - 6x^2 - 6x - 1\right) y''(x) + \left(x^6 - 6x^3 - 15x^2 - 12x - 2\right) y'(x) + \left(x^4 + 4x^3\right.$$

✗ **Mathematica** : cpu = 300.098 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.253 (sec), leaf count = 19

$$\left\{y(x) = \_C2\, e^{x^{-1}} + e^x(\_C3\, x + \_C1)\right\}$$

2.1527 ODE No. 1527

$$(x - a)^3(x - b)^3 y^{(3)}(x) - cy(x) = 0$$

✗ **Mathematica** : cpu = 135.711 (sec), leaf count = 0 , DifferentialRoot result

$$\left\{\left\{y(x) \to \text{DifferentialRoot}\left(\{y, x\}, \left\{(a - x)^3(b - x)^3 y^{(3)}(x) - cy(x) = 0, y(0) = c_1, y'(0) = c_2, y''(0) = c_3\right\}\right)(x)\right.\right.$$

✓ **Maple** : cpu = 0.589 (sec), leaf count = 437

$$\left\{y(x) = (x - a)^{-2\,\frac{b}{a-b}} (x - b)^{2\,\frac{a}{a-b}} \left((b - x)^{-\frac{RootOf\left(\_Z^3 + (-3\,a - 3\,b)\_Z^2 + \left(2\,a^2 + 8\,ab + 2\,b^2\right)\_Z - 4\,ba^2 - 4\,ab^2 - c, index=2\right)}{a-b}} (a - x)^{\frac{RootO}{}}\right.\right.$$

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 = 0.668773 (sec), leaf count = 56

$$\left\{\left\{y(x) \to -\frac{c_2 x}{\sqrt{2}} - \frac{\cot\left(\frac{x}{2}\right)(c_2\log(2(\cos(x)+1)) + 2c_1)}{\sqrt{2}} + c_3 + \cot\left(\frac{x}{2}\right)\sin^{-1}(\cos(x))\right\}\right\}$$

✓ **Maple** : cpu = 0.221 (sec), leaf count = 71

$$\left\{y(x) = \frac{1}{\sin(x)(\cos(x)-1)}\left((\sin(x))^2\ln\left(\frac{-\cos(x)+1}{\sin(x)}\right)\_C1 - \ln(\sin(x))(\sin(x))^2\_C1 + (\sin(x))^2\_C3 +\right.$$

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 = 0.0819821 (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[2][y]
```

✓ **Maple** : cpu = 0.094 (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 = 0.17762 (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][y][x]
```

✓ **Maple** : cpu = 0.26 (sec), leaf count = 113

$$\left\{y(x) = \_C1\left({}_2\mathrm{F}_1(-\frac{\nu}{2}, \frac{\nu}{2} + \frac{1}{2}; \frac{1}{2}; \frac{\cos(2x)}{2} + \frac{1}{2})\right)^2 + \_C2\,(\cos(2x) + 1)\left({}_2\mathrm{F}_1(1 + \frac{\nu}{2}, \frac{1}{2} - \frac{\nu}{2}; \frac{3}{2}; \frac{\cos(2x)}{2} + \frac{1}{2}\right.$$

2.1531 ODE No. 1531

$A(x)\left(f(x)y''(x)+g(x)y'(x)+h(x)y(x)\right)+f'(x)y''(x)+f(x)y^{(3)}(x)+g'(x)y'(x)+g(x)y''(x)+y(x)h'(x)+h(x)y'(x)$

✗ **Mathematica** : cpu = 0.0325232 (sec), leaf count = 0 , could not solve

```
DSolve[y[x]*Derivative[1][h][x] + h[x]*Derivative[1][y][x] + Derivative[1][g][x]*Derivative[
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x)=DESol\left(\left\{f(x)\frac{d^3}{dx^3}\_Y(x)+\left(\frac{d}{dx}f(x)+g(x)+A(x)\,f(x)\right)\frac{d^2}{dx^2}\_Y(x)+\left(\frac{d}{dx}g(x)+h(x)+A(x)\,g(x)\right.\right.\right.$$

2.1532 ODE No. 1532

$$ny(x)+y^{(3)}(x)+xy'(x)=0$$

✓ **Mathematica** : cpu = 0.0182151 (sec), leaf count = 103

$$\left\{\left\{y(x)\to\frac{c_2x\,{}_1F_2\left(\frac{n}{3}+\frac{1}{3};\frac{2}{3},\frac{4}{3};-\frac{x^3}{9}\right)}{3^{2/3}}+c_1\,{}_1F_2\left(\frac{n}{3};\frac{1}{3},\frac{2}{3};-\frac{x^3}{9}\right)+\frac{c_3x^2\,{}_1F_2\left(\frac{n}{3}+\frac{2}{3};\frac{4}{3},\frac{5}{3};-\frac{x^3}{9}\right)}{3\sqrt[3]{3}}\right\}\right\}$$

✓ **Maple** : cpu = 0.109 (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 = 0.0185908 (sec), leaf count = 106

$$\left\{\left\{y(x)\to\frac{1}{9}\left(3\sqrt[3]{-3}c_2x\,{}_1F_2\left(\frac{n}{3}+\frac{1}{3};\frac{2}{3},\frac{4}{3};\frac{x^3}{9}\right)+9c_1\,{}_1F_2\left(\frac{n}{3};\frac{1}{3},\frac{2}{3};\frac{x^3}{9}\right)+(-3)^{2/3}c_3x^2\,{}_1F_2\left(\frac{n}{3}+\frac{2}{3};\frac{4}{3},\frac{5}{3};\frac{x^3}{9}\right)\right)\right.\right.$$

✓ **Maple** : cpu = 0.113 (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 = 0.00423851 (sec), leaf count = 22

$$\{\{y(x) \to x(x(c_4x + c_3) + c_2) + c_1\}\}$$

✓ **Maple** : cpu = 0.028 (sec), leaf count = 21

$$\left\{y(x) = \frac{x^3\_C1}{6} + \frac{\_C2\,x^2}{2} + \_C3\,x + \_C4\right\}$$

2.1535 ODE No. 1535

$$-f(x) + y^{(4)}(x) + 4y(x) = 0$$

✓ **Mathematica** : cpu = 1.37595 (sec), leaf count = 168

$$\left\{\left\{y(x) \to e^{-x}\left(\cos(x)\left(\int_1^x \frac{1}{8}e^{K[1]}f(K[1])(\cos(K[1]) - \sin(K[1]))\,dK[1]\right) + e^{2x}\cos(x)\left(\int_1^x -\frac{1}{8}e^{-K[4]}f(K[4])(s\right.\right.\right.$$

✓ **Maple** : cpu = 0.024 (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 = 0.00589507 (sec), leaf count = 76

$$\left\{\left\{y(x) \to c_1e^{(-1)^{3/4}\sqrt[4]{\lambda}x} + c_2e^{-\sqrt[4]{-1}\sqrt[4]{\lambda}x} + c_3e^{-(-1)^{3/4}\sqrt[4]{\lambda}x} + c_4e^{\sqrt[4]{-1}\sqrt[4]{\lambda}x}\right\}\right\}$$

✓ **Maple** : cpu = 0.015 (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 = 1.00018 (sec), leaf count = 93

$$\left\{\left\{y(x) \to c_1 e^{\sqrt{6-2\sqrt{6}}x} + c_2 e^{-\sqrt{6-2\sqrt{6}}x} + c_3 e^{\sqrt{2\left(3+\sqrt{6}\right)}x} + c_4 e^{-\sqrt{2\left(3+\sqrt{6}\right)}x} + e^{x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.152 (sec), leaf count = 67

$$\left\{y(x) = \mathrm{e}^{x^2} + \_C1\,\mathrm{e}^{\sqrt{6-2\sqrt{6}}x} + \_C2\,\mathrm{e}^{\sqrt{6+2\sqrt{6}}x} + \_C3\,\mathrm{e}^{-\sqrt{6-2\sqrt{6}}x} + \_C4\,\mathrm{e}^{-\sqrt{6+2\sqrt{6}}x}\right\}$$

2.1538 ODE No. 1538

$$a^4 y(x) + 2a^2 y''(x) - \cosh(ax) + y^{(4)}(x) = 0$$

✓ **Mathematica** : cpu = 0.276456 (sec), leaf count = 41

$$\left\{\left\{y(x) \to \frac{\cosh(ax)}{4a^4} + (c_4 x + c_3)\sin(ax) + (c_2 x + c_1)\cos(ax)\right\}\right\}$$

✓ **Maple** : cpu = 0.537 (sec), leaf count = 51

$$\left\{y(x) = \frac{\mathrm{e}^{-ax} + (8\_C3\,x + 8\_C1)\,a^4\cos(ax) + (8\_C4\,x + 8\_C2)\,a^4\sin(ax) + \mathrm{e}^{ax}}{8\,a^4}\right\}$$

2.1539 ODE No. 1539

$$a^4\lambda y(x) + a^2(\lambda+1)y''(x) + y^{(4)}(x) = 0$$

✓ **Mathematica** : cpu = 0.00783641 (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 = 0.034 (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 = 0.429743 (sec), leaf count = 0 , DifferentialRoot result

$$\left\{\left\{y(x)\to \text{DifferentialRoot}\left(\{y,x\},\left\{\lambda y(x)+aby'(x)+a(xb-1)y''(x)+y^{(4)}(x)=0,y(0)=c_1,y'(0)=c_2,y''(0)\right.\right.\right.\right.$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x)=DESol\left(\left\{\lambda\_Y(x)+ab\frac{\mathrm{d}}{\mathrm{d}x}\_Y(x)+a(bx-1)\frac{\mathrm{d}^2}{\mathrm{d}x^2}\_Y(x)+\frac{\mathrm{d}^4}{\mathrm{d}x^4}\_Y(x)\right\},\{\_Y(x)\}\right)\right\}$$

2.1541 ODE No. 1541

$$y''(x)\left(ax^2+b\lambda+c\right)+y(x)\left(ax^2+\beta\lambda+\gamma\right)+y^{(4)}(x)=0$$

✗ **Mathematica** : cpu = 80.24 (sec), leaf count = 0 , DifferentialRoot result

$$\left\{\left\{y(x)\to \text{DifferentialRoot}\left(\{y,x\},\left\{\left(ax^2+\beta\lambda+\gamma\right)y(x)+\left(ax^2+c+b\lambda\right)y''(x)+y^{(4)}(x)=0,y(0)=c_1,y'(0)\right.\right.\right.\right.$$

✗ **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 = 0.0310001 (sec), leaf count = 0 , could not solve

```
DSolve[(d + c*(-g2/2 + 6*WeierstrassP[x, {g2, g3}]^2))*y[x] + b*WeierstrassPPrime[x, {g2, g3
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x)=DESol\left(\left\{\frac{\mathrm{d}^4}{\mathrm{d}x^4}\_Y(x)+a\,WeierstrassP(x,g2,g3)\frac{\mathrm{d}^2}{\mathrm{d}x^2}\_Y(x)+b\,WeierstrassPPrime(x,g2,g3)\frac{\mathrm{d}}{\mathrm{d}x}\_Y(\right.\right.\right.$$

2.1543 ODE No. 1543

$$-y''(x)\left(a+12k^2\text{sn}(z|x)^2\right)+y(x)\left(\alpha\text{sn}(z|x)^2+\beta\right)+by'(x)+y^{(4)}(x)=0$$

✗ **Mathematica** : cpu = 0.106543 (sec), leaf count = 0 , could not solve

```
DSolve[(beta + alpha*JacobiSN[z, x]^2)*y[x] + b*Derivative[1][y][x] - (a + 12*k^2*JacobiSN[z
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x)=DESol\left(\left\{\frac{\mathrm{d}^4}{\mathrm{d}x^4}\_Y(x)+\left(-12\,k^2(JacobiSN(z,x))^2-a\right)\frac{\mathrm{d}^2}{\mathrm{d}x^2}\_Y(x)+b\frac{\mathrm{d}}{\mathrm{d}x}\_Y(x)+\left(\alpha\,(JacobiSN(z,x)\right.\right.\right.$$

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 = 0.0161934 (sec), leaf count = 0 , could not solve

```
DSolve[10*Derivative[1][f][x]*Derivative[1][y][x] + y[x]*(3*f[x]^2 + 3*Derivative[2][f][x])
```

✓ **Maple** : cpu = 0.019 (sec), leaf count = 41

$$\left\{y(x)=\sum_{\_a=1}^{4}\mathrm{e}^{RootOf(\_Z^4+10\,f\,\_Z^2+10\,df\,\_Z+3\,f^2+3\,ddf,index=\_a)x}\_C\_a\right\}$$

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 = 0.200699 (sec), leaf count = 40

$$\left\{\left\{y(x)\to e^{-2x}\left(c_2x+c_3e^{3x}+c_4e^{3x}x+c_1\right)+\sin(2x)\right\}\right\}$$

✓ **Maple** : cpu = 0.143 (sec), leaf count = 27

$$\left\{y(x)=(\_C4\,x+\_C2)\,\mathrm{e}^{-2\,x}+\sin\left(2\,x\right)+(\_C3\,x+\_C1)\,\mathrm{e}^{x}\right\}$$

2.1546 ODE No. 1546

$$a^4x^4y(x) + 4a^3x^3y'(x) + 6a^2x^2y''(x) + 4axy^{(3)}(x) + y^{(4)}(x) = 0$$

✓ **Mathematica** : cpu = 0.741548 (sec), leaf count = 139

$$\left\{\left\{y(x) \to e^{-\frac{1}{2}x\left(ax+2\sqrt{-\left(\sqrt{6}-3\right)a}\right)}\left(c_2e^{2\sqrt{-\left(\sqrt{6}-3\right)}ax} + \frac{\sqrt{\frac{1}{2}-\frac{1}{\sqrt{6}}}e^{-\frac{\left(-3+\sqrt{3}+\sqrt{6}\right)ax}{\sqrt{-\left(\sqrt{6}-3\right)a}}}\left(c_4e^{\frac{2ax}{\sqrt{a-\sqrt{\frac{2}{3}}a}}} + c_3\right)}{\sqrt{a}} + c_1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.059 (sec), leaf count = 73

$$\left\{y(x) = e^{-\frac{ax^2}{2}}\left(\_C2\,e^{\sqrt{-a\left(\sqrt{6}-3\right)}x} + \_C4\,e^{\sqrt{\left(3+\sqrt{6}\right)ax}} + \_C1\,e^{-\sqrt{-a\left(\sqrt{6}-3\right)}x} + \_C3\,e^{-\sqrt{\left(3+\sqrt{6}\right)ax}}\right)\right\}$$

2.1547 ODE No. 1547

$$3y(x)\left(2g(x)f'(x) + 5f(x)g'(x) + 6f(x)^2g(x) + g''(x) + 3g(x)^2\right) + y''(x)\left(4f'(x) + 11f(x)^2 + 10g(x)\right) + y'(x)\left(f''(x\right.$$

✗ **Mathematica** : cpu = 0.0344159 (sec), leaf count = 0 , could not solve

```
DSolve[Derivative[1][y][x]*(6*f[x]^3 + 30*f[x]*g[x] + 7*f[x]*Derivative[1][f][x] + 10*Deriva
```

✓ **Maple** : cpu = 0.026 (sec), leaf count = 87

$$\left\{y(x) = \sum_{\_a=1}^{4} e^{RootOf\left(\_Z^4+6\,f\_Z^3+\left(11\,f^2+4\,df+10\,g\right)\_Z^2+\left(6\,f^3+7\,df\,f+30\,fg+ddf+10\,dg\right)\_Z+18\,f^2g+6\,df\,g+15\,dg\,f+9\,g^2+3\,ddg,in\right.}\right.$$

2.1548 ODE No. 1548

$$4y^{(4)}(x) - 12y^{(3)}(x) + 11y''(x) - 3y'(x) - 4\cos(x) = 0$$

✓ **Mathematica** : cpu = 0.0995761 (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 = 0.073 (sec), leaf count = 32

$$\left\{y(x) = 2\,\_C2\,e^{x/2} + \frac{2\,\_C3}{3}e^{\frac{3x}{2}} + e^x\,\_C1 + \frac{18\sin(x)}{65} - \frac{14\cos(x)}{65} + \_C4\right\}$$

2.1549 ODE No. 1549

$$xy^{(4)}(x) + 5y^{(3)}(x) - 24 = 0$$

✓ **Mathematica** : cpu = 0.0146287 (sec), leaf count = 34

$$\left\{\left\{y(x) \to c_4 x^2 - \frac{c_1}{24x^2} + c_3 x + c_2 + \frac{4x^3}{5}\right\}\right\}$$

✓ **Maple** : cpu = 0.026 (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

$$12x^3 y''(x) - (6x^2+1)\, y^{(3)}(x) - (9x^2-7)\, x^2 y'(x) + 2(x^2-3)\, x^3 y(x) + xy^{(4)}(x) = 0$$

✓ **Mathematica** : cpu = 5.2985 (sec), leaf count = 214

$$\left\{\left\{y(x) \to e^{\frac{x^2}{2}} \left(c_3 \int_1^x \frac{e^{\frac{K[1]^2}{2}} K[1] \left(\int \frac{e^{-\frac{1}{4}(1+\sqrt{5})K[1]^2} (K[1]^2)^{3/4} U\left(\frac{1}{20}\left(-5-9\sqrt{5}\right), -\frac{1}{2}, \frac{1}{2}\sqrt{5}K[1]^2\right)}{K[1]^{7/2}} \, dK[1] \right)}{\sqrt[4]{2}} \, dK[1] + c_4 \int_1^x \right.\right.\right.$$

✓ **Maple** : cpu = 2.543 (sec), leaf count = 157

$$\left\{y(x) = -\mathrm{e}^{x^2} \int 1 M_{\frac{9\sqrt{5}}{20}, \frac{3}{4}}\left(\frac{\sqrt{5}x^2}{2}\right) \mathrm{e}^{-\frac{x^2}{4}} x^{-\frac{3}{2}} \, \mathrm{d}x\_C3 - \mathrm{e}^{x^2} \int 1 W_{\frac{9\sqrt{5}}{20}, \frac{3}{4}}\left(\frac{\sqrt{5}x^2}{2}\right) \mathrm{e}^{-\frac{x^2}{4}} x^{-\frac{3}{2}} \, \mathrm{d}x\_C4 + \int 1 M_{\frac{9\sqrt{5}}{20}, \frac{3}{4}} \right.$$

2.1551 ODE No. 1551

$$-2(\nu^2x^2+6)\, y''(x) + \nu^2(\nu^2x^2+4)\, y(x) + x^2 y^{(4)}(x) = 0$$

✓ **Mathematica** : cpu = 0.483522 (sec), leaf count = 84

$$\left\{\left\{y(x) \to \frac{e^{-\nu x}\left(c_3\left(-\nu^2x^3+\nu^2-6\nu x^2+6\nu-15x+15\right) + e^{2\nu x}\left(c_4\left(-\nu^2x^3+\nu^2+6\nu x^2-6\nu-15x+15\right)+c_2\right)\right.}{x}\right.\right.$$

✓ **Maple** : cpu = 0.274 (sec), leaf count = 62

$$\left\{y(x) = \frac{(\_C4\,\nu^2x^3 + 6\,\_C4\,\nu\,x^2 + 15\,\_C4\,x + \_C2)\,e^{-\nu\,x} + e^{\nu\,x}(\_C3\,\nu^2x^3 - 6\,\_C3\,\nu\,x^2 + 15\,\_C3\,x + \_C1)}{x}\right.$$

2.1552 ODE No. 1552

$$ay(x) - bx^2 + x^2y^{(4)}(x) + 2xy^{(3)}(x) = 0$$

✗ **Mathematica** : cpu = 300. (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.076 (sec), leaf count = 89

$$\left\{y(x) = \frac{bx^2}{a} + \_C1\,\sqrt{x}J_1\left(2\,\sqrt[4]{-a}\sqrt{x}\right) + \_C2\,\sqrt{x}Y_1\left(2\,\sqrt[4]{-a}\sqrt{x}\right) + \_C3\,\sqrt{x}J_1\left(2\,\sqrt{-\sqrt{-a}}\sqrt{x}\right) + \_C4\,\sqrt{x}Y_1\left(2\right.\right.$$

2.1553 ODE No. 1553

$$x^2y^{(4)}(x) + 4xy^{(3)}(x) + 2y''(x) = 0$$

✓ **Mathematica** : cpu = 0.026486 (sec), leaf count = 29

$$\{\{y(x) \to (c_4 - c_1)\,x + (c_1x - c_2)\log(x) + c_3\}\}$$

✓ **Maple** : cpu = 0.012 (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 = 0.0260861 (sec), leaf count = 27

$$\left\{\left\{y(x) \to \frac{c_2}{2x} + c_4x - c_1\log(x) + c_3\right\}\right\}$$

✓ **Maple** : cpu = 0.013 (sec), leaf count = 18

$$\left\{y(x) = \_C1 + \_C2\,\ln(x) + \frac{\_C3}{x} + \_C4\,x\right\}$$

2.1555 ODE No. 1555

$$\lambda^2(-y(x)) + x^2 y^{(4)}(x) + 6xy^{(3)}(x) + 6y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0702512 (sec), leaf count = 156

$$\left\{\left\{y(x) \to c_4 G_{0,4}^{2,0}\left(\frac{\lambda^2 x^2}{16} \middle| \begin{array}{c} -\frac{1}{2}, \frac{1}{2}, 0, 0 \end{array}\right) + c_2 G_{0,4}^{2,0}\left(\frac{\lambda^2 x^2}{16} \middle| \begin{array}{c} 0, 0, -\frac{1}{2}, \frac{1}{2} \end{array}\right) + \frac{c_1\left(J_1\left(2\sqrt{\lambda}\sqrt{x}\right) + I_1\left(2\sqrt{\lambda}\sqrt{x}\right)\right)}{2\sqrt{\lambda}\sqrt{x}} - \frac{ic_3}{}\right.\right.$$

✓ **Maple** : cpu = 0.193 (sec), leaf count = 61

$$\left\{y(x) = 1\left(\_C2\, Y_1\left(2\sqrt{\lambda}\sqrt{x}\right) + \_C1\, J_1\left(2\sqrt{\lambda}\sqrt{x}\right) + \_C3\, J_1\left(2\sqrt{-\lambda}\sqrt{x}\right) + \_C4\, Y_1\left(2\sqrt{-\lambda}\sqrt{x}\right)\right)\frac{1}{\sqrt{x}}\right\}$$

2.1556 ODE No. 1556

$$x^2 y^{(4)}(x) + 8xy^{(3)}(x) + 12y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0256227 (sec), leaf count = 27

$$\left\{\left\{y(x) \to \frac{3c_2 x + c_1}{6x^2} + c_4 x + c_3\right\}\right\}$$

✓ **Maple** : cpu = 0.016 (sec), leaf count = 19

$$\left\{y(x) = \_C1 + \frac{\_C2}{x} + \_C3\, x + \frac{\_C4}{x^2}\right\}$$

2.1557 ODE No. 1557

$$\lambda^2(-y(x)) + x^2 y^{(4)}(x) + 8xy^{(3)}(x) + 12y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0731877 (sec), leaf count = 146

$$\left\{\left\{y(x) \to c_4 G_{0,4}^{2,0}\left(\frac{\lambda^2 x^2}{16} \middle| \begin{array}{c} -1, 0, -\frac{1}{2}, \frac{1}{2} \end{array}\right) + c_2 G_{0,4}^{2,0}\left(\frac{\lambda^2 x^2}{16} \middle| \begin{array}{c} -\frac{1}{2}, \frac{1}{2}, -1, 0 \end{array}\right) - \frac{3ic_1\left(I_2\left(2\sqrt{\lambda}\sqrt{x}\right) - J_2\left(2\sqrt{\lambda}\sqrt{x}\right)\right)}{4\lambda x}\right.\right.$$

✓ **Maple** : cpu = 0.146 (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 = 0.174233 (sec), leaf count = 222

$$\left\{\left\{y(x)\to i^{-n}2^{n-3\nu-3}b^{\nu-n}x^{\frac{\nu-n}{2}}\left(i^n4^\nu(4c_1\Gamma(n-\nu+1)-ic_2\Gamma(n-\nu+2))\,J_{n-\nu}\left(b\sqrt{x}\right)+i^n4^\nu(4c_1\Gamma(n-\nu+1)+\right.\right.\right.$$

✓ **Maple** : cpu = 0.2 (sec), leaf count = 67

$$\left\{y(x)=x^{-\frac{n}{2}+\frac{\nu}{2}}\left(K_{n-\nu}\left(b\sqrt{x}\right)\_C3+I_{n-\nu}\left(b\sqrt{x}\right)\_C1+Y_{n-\nu}\left(b\sqrt{x}\right)\_C4+J_{n-\nu}\left(b\sqrt{x}\right)\_C2\right)\right\}$$

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 = 0.311151 (sec), leaf count = 100

$$\left\{\left\{y(x)\to c_4G_{0,4}^{2,0}\left(\frac{a^4x^4}{256}\middle|\ 0,0,\tfrac{1}{2},\tfrac{1}{2}\right)+c_2G_{0,4}^{2,0}\left(\frac{a^4x^4}{256}\middle|\ \tfrac{1}{2},\tfrac{1}{2},0,0\right)+\frac{1}{8}ic_1(I_0(ax)-J_0(ax))+\frac{1}{2}c_3(J_0(ax)+I_0(a\right.\right.$$

✓ **Maple** : cpu = 0.191 (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 = 0.0287176 (sec), leaf count = 27

$$\left\{\left\{y(x)\to\frac{c_2}{2x}+c_4x-c_1\log(x)+c_3\right\}\right\}$$

✓ **Maple** : cpu = 0.014 (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 = 4.62015 (sec), leaf count = 310

$$\left\{\left\{y(x)\to\sqrt[8]{a}2^{-n-\frac{7}{2}}\sqrt{x}\left(2^{2n+1}\mathrm{ber}_{-n-\frac{1}{2}}(\sqrt[4]{a}x)\left(4c_2\cos\left(\frac{3}{8}\pi(2n+1)\right)\Gamma\left(\frac{1}{2}-n\right)-c_1\cos\left(\frac{3}{8}\pi(2n-3)\right)\Gamma\left(\frac{3}{2}\right.\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.288 (sec), leaf count = 69

$$\left\{y(x)=\sqrt{x}\left(Y_{n+\frac{1}{2}}\left(\sqrt{-\sqrt{-a}x}\right)\_C4+J_{n+\frac{1}{2}}\left(\sqrt{-\sqrt{-a}x}\right)\_C3+Y_{n+\frac{1}{2}}(\sqrt[4]{-a}x)\_C2+J_{n+\frac{1}{2}}(\sqrt[4]{-a}x)\_C1\right)\right\}$$

2.1562 ODE No. 1562

$$-\left(4n^2-1\right)x^2y''(x)+\left(4n^2-1\right)xy'(x)+x^4y^{(4)}(x)-4x^4y(x)+4x^3y^{(3)}(x)=0$$

✓ **Mathematica** : cpu = 1.21012 (sec), leaf count = 140

$$\left\{\left\{y(x)\to c_1\,{}_0F_3\left(;\frac{1}{2},1-\frac{n}{2},\frac{n}{2}+1;\frac{x^4}{64}\right)+\frac{1}{8}ic_2x^2\,{}_0F_3\left(;\frac{3}{2},\frac{3}{2}-\frac{n}{2},\frac{n}{2}+\frac{3}{2};\frac{x^4}{64}\right)+c_3\left(\frac{i}{2}\right)^{-n}\Gamma(1-n)^2\left(\mathrm{ber}_{-n}(x\right.\right.\right.$$

✓ **Maple** : cpu = 0.419 (sec), leaf count = 77

$$\left\{y(x)=\left(Y_n\left(\left(\frac{1}{2}-\frac{i}{2}\right)\sqrt{2}x\right)\_C3+\_C1\,J_n\left(\left(\frac{1}{2}-\frac{i}{2}\right)\sqrt{2}x\right)\right)J_n\left(\left(\frac{1}{2}+\frac{i}{2}\right)\sqrt{2}x\right)+Y_n\left(\left(\frac{1}{2}+\frac{i}{2}\right)\sqrt{2}x\right)\left(\right.\right.$$

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 = 2.2308 (sec), leaf count = 187

$$\left\{\left\{y(x)\to\frac{\sqrt[4]{-1}\left(x^2\left(c_2\,{}_0F_3\left(;\frac{3}{2},1-\frac{n}{2},\frac{n}{2}+1;\frac{x^4}{64}\right)+c_3\left(\frac{i}{8}\right)^{-n}x^{-2n}\,{}_0F_3\left(;1-n,1-\frac{n}{2},\frac{3}{2}-\frac{n}{2};\frac{x^4}{64}\right)+c_4\left(\frac{i}{8}\right)^{n}x^{2n}\,{}_0F\right.\right.}{2\sqrt{2}x}\right.\right.$$

✓ **Maple** : cpu = 0.317 (sec), leaf count = 87

$$\left\{y(x)=\frac{1}{x}\left(\_C4\,{}_0\mathrm{F}_3\left(;\frac{1}{2},-\frac{n}{2}+\frac{1}{2},\frac{n}{2}+\frac{1}{2};\frac{x^4}{64}\right)+\left({}_0\mathrm{F}_3\left(;\frac{3}{2},-\frac{n}{2}+1,\frac{n}{2}+1;\frac{x^4}{64}\right)\_C3+\_C2\left(\mathrm{bei}_{-n}(x)\right)^2+\left(\mathrm{be}\right.\right.\right.\right.$$

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 = 1.47867 (sec), leaf count = 196

$$\left\{\left\{y(x)\to\frac{\left(\frac{1}{32}+\frac{i}{32}\right)\left(8c_1x^2\,{}_0F_3\left(;\frac{1}{2},\frac{3}{2}-\frac{n}{2},\frac{n}{2}+\frac{3}{2};\frac{x^4}{64}\right)+i\left(c_2x^4\,{}_0F_3\left(;\frac{3}{2},2-\frac{n}{2},\frac{n}{2}+2;\frac{x^4}{64}\right)-8^{2-n}e^{-\frac{1}{2}i\pi n}x^{-2n}\left(c\right.\right.\right.}{x}\right.\right.$$

✓ **Maple** : cpu = 0.273 (sec), leaf count = 88

$$\left\{y(x)=\frac{1}{x}\left(\_C4\,x^2{}_0\mathrm{F}_3\left(;\frac{1}{2},\frac{n}{2}+\frac{3}{2},\frac{3}{2}-\frac{n}{2};\frac{x^4}{64}\right)+\_C3\,x^4{}_0\mathrm{F}_3\left(;\frac{3}{2},\frac{n}{2}+2,-\frac{n}{2}+2;\frac{x^4}{64}\right)+\_C2\left(\mathrm{bei}_{-n}(x)\right)^2+\left(\right.\right.\right.$$

2.1565 ODE No. 1565

$$\left(x\left(-\rho^2-\sigma^2+1\right)+16x^3\right)y'(x)+y(x)\left(\rho^2\sigma^2+8x^2\right)+\left(x^2\left(-\rho^2-\sigma^2+7\right)+4x^4\right)y''(x)+x^4y^{(4)}(x)+6x^3y^{(3)}(x)=0$$

✓ **Mathematica** : cpu = 0.603238 (sec), leaf count = 242

$$\left\{\left\{y(x)\to c_1x^{-\rho}\,{}_2F_3\left(\frac{1}{2}-\frac{\rho}{2},1-\frac{\rho}{2};1-\rho,-\frac{\rho}{2}-\frac{\sigma}{2}+1,-\frac{\rho}{2}+\frac{\sigma}{2}+1;-x^2\right)+c_3x^{-\sigma}\,{}_2F_3\left(\frac{1}{2}-\frac{\sigma}{2},1-\frac{\sigma}{2};1-\sigma,-\right.\right.\right.$$

✓ **Maple** : cpu = 0.463 (sec), leaf count = 71

$$\left\{y(x)=\left(Y_{\frac{\rho}{2}-\frac{\sigma}{2}}(x)\_C2+J_{\frac{\rho}{2}-\frac{\sigma}{2}}(x)\_C1\right)J_{\frac{\sigma}{2}+\frac{\rho}{2}}(x)+Y_{\frac{\sigma}{2}+\frac{\rho}{2}}(x)\left(Y_{\frac{\rho}{2}-\frac{\sigma}{2}}(x)\_C4+\_C3\,J_{\frac{\rho}{2}-\frac{\sigma}{2}}(x)\right)\right\}$$

2.1566 ODE No. 1566

$$\left(x\left(-2\mu^2-2\nu^2+1\right)+16x^3\right)y'(x)+y(x)\left(\left(\mu^2-\nu^2\right)^2+8x^2\right)+\left(x^2\left(-2\mu^2-2\nu^2+7\right)+4x^4\right)y''(x)+x^4y^{(4)}(x)+6x$$

✓ **Mathematica** : cpu = 0.713563 (sec), leaf count = 237

$$\left\{\left\{y(x)\to x^{-\mu-\nu}\left(c_1\,{}_2F_3\left(-\frac{\mu}{2}-\frac{\nu}{2}+\frac{1}{2},-\frac{\mu}{2}-\frac{\nu}{2}+1;1-\mu,1-\nu,-\mu-\nu+1;-x^2\right)+c_2x^{2\mu}\,{}_2F_3\left(\frac{\mu}{2}-\frac{\nu}{2}+\frac{1}{2},\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.417 (sec), leaf count = 35

$$\{y(x)=(Y_\mu(x)\_C2+\_C1\,J_\mu(x))\,J_\nu(x)+Y_\nu(x)(Y_\mu(x)\_C4+\_C3\,J_\mu(x))\}$$

2.1567 ODE No. 1567

$$x^4y^{(4)}(x) + 8x^3y^{(3)}(x) + 12x^2y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0285576 (sec), leaf count = 27

$$\left\{\left\{y(x) \to \frac{3c_2x + c_1}{6x^2} + c_4x + c_3\right\}\right\}$$

✓ **Maple** : cpu = 0.016 (sec), leaf count = 19

$$\left\{y(x) = \_C1 + \frac{\_C2}{x} + \_C3\,x + \frac{\_C4}{x^2}\right\}$$

2.1568 ODE No. 1568

$$ay(x) + x^4y^{(4)}(x) + 8x^3y^{(3)}(x) + 12x^2y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0133497 (sec), leaf count = 116

$$\left\{\left\{y(x) \to \frac{c_1x^{-\frac{1}{2}\sqrt{5-4\sqrt{1-a}}} + c_2x^{\frac{1}{2}\sqrt{5-4\sqrt{1-a}}} + c_3x^{-\frac{1}{2}\sqrt{4\sqrt{1-a}+5}} + c_4x^{\frac{1}{2}\sqrt{4\sqrt{1-a}+5}}}{\sqrt{x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.035 (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

$$xy'(x)\left((2a-1)\mathrm{C0} + 4b^2\mathrm{B0}c^2x^{2c}\right) + (6-4a)x^3y^{(3)}(x) + x^2y''(x)\left(\mathrm{A0} + 4b^2c^2x^{2c}\right) + y(x)\left(4b^2c^2\mathrm{D0}x^{2c} + \mathrm{E0}\right) + x^4y^{(4)}($$

✗ **Mathematica** : cpu = 303.182 (sec), leaf count = 0 , timed out

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✓ **Maple** : cpu = 0.566 (sec), leaf count = 63

$$\{y(x) = x^a((J_\mu(x^cb)\_C2 + Y_\mu(x^cb)\_C3)\,J_\nu(x^cb) + Y_\nu(x^cb)(\_C4\,Y_\mu(x^cb) + J_\mu(x^cb)\_C1))\}$$

2.1570 ODE No. 1570

$y(x)\left(\left(a^2-c^2\nu^2\right)\left(a^2+4ac-c^2\nu^2+4c^2\right)-b^4c^4x^{4c}\right)+x^2\left(2a^2+4(a+c-1)^2+4(a-1)(c-1)-2c^2\nu^2-1\right)y''($

✓ **Mathematica** : cpu = 0.161469 (sec), leaf count = 213

$$\left\{\left\{y(x)\to b^{a/c}(-1)^{\frac{a-c\nu}{4c}}2^{-\frac{2a}{c}-\nu-3}\left(x^{4c}\right)^{\frac{a}{4c}}\left(4^\nu(4c_1\Gamma(1-\nu)-ic_2\Gamma(2-\nu))\,J_{-\nu}\left(b\sqrt[4]{x^{4c}}\right)+4^\nu(4c_1\Gamma(1-\nu)+ic_2\Gamma(2\right.\right.\right.$$

✓ **Maple** : cpu = 0.102 (sec), leaf count = 49

$$\{y(x)=x^a(Y_\nu(ibx^c)\_C4+Y_\nu(x^cb)\_C2+J_\nu(ibx^c)\_C3+J_\nu(x^cb)\_C1)\}$$

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 = 0.0972163 (sec), leaf count = 389

$$\left\{\left\{y(x)\to c_1\,{}_0F_3\left(;1-\frac{v}{2},1-\frac{v}{2\nu},-\frac{v}{2\nu}-\frac{v}{2}+1;\frac{b^4v^4x^{2/v}}{256\nu^4}\right)+c_2\left(\frac{i}{16}\right)^v v^{2v}b^{2v}\nu^{-2v}\left(x^{2/v}\right)^{v/2}{}_0F_3\left(;\frac{v}{2}+1,1-\right.\right.\right.$$

✓ **Maple** : cpu = 0.251 (sec), leaf count = 143

$$\left\{y(x)=\sqrt{x}\left(J_{(\lfloor\nu^{-1}\rfloor)^{-1}}\left(\frac{1}{\lfloor\nu^{-1}\rfloor}\sqrt{\frac{b^2}{\nu^2}}x^{\frac{\lfloor\nu^{-1}\rfloor}{2}}\right)\_C1+Y_{(\lfloor\nu^{-1}\rfloor)^{-1}}\left(\frac{1}{\lfloor\nu^{-1}\rfloor}\sqrt{-\frac{b^2}{\nu^2}}x^{\frac{\lfloor\nu^{-1}\rfloor}{2}}\right)\_C4+J_{(\lfloor\nu^{-1}\rfloor)^{-1}}\left(\frac{1}{\lfloor\nu^{-1}\rfloor}\right.\right.\right.$$

2.1572 ODE No. 1572

$\left(-2\left(x^2-1\right)\left(\mu(\mu+1)+\nu(\nu+1)\right)+24x^3-8\right)y''(x)-6x(\mu(\mu+1)+\nu(\nu+1)-2)y'(x)+((\mu(\mu+1)-\nu(\nu+1))^2-$

✗ **Mathematica** : cpu = 95.475 (sec), leaf count = 0 , DifferentialRoot result

$$\left\{\left\{y(x)\to \text{DifferentialRoot}\left(\{y,x\},\left\{(\mu-\nu-1)(\mu-\nu+1)(\mu+\nu)(\mu+\nu+2)y(x)-6x\left(\mu^2+\mu+\nu^2+\nu-2\right)y\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.487 (sec), leaf count = 35

$$\{y(x)=(LegendreQ(\mu,x)\_C2+\_C1\ LegendreP(\mu,x))\ LegendreP(\nu,x)+LegendreQ(\nu,x)\ (LegendreQ(\mu,x)\_C$$

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 = 0.0623466 (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*(2 + E
```

✓ **Maple** : cpu = 0.053 (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

$$y(x)\left(a^4 \sin^4(x) - 3\right) + y^{(4)}(x) \sin^4(x) + 2y^{(3)}(x) \sin^3(x) \cos(x) + \left(\sin^2(x) - 3\right) \sin^2(x) y''(x) + \left(2\sin^2(x) + 3\right) \sin(x) c$$

✗ **Mathematica** : cpu = 0.222165 (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] + Sin[x
3 + Sin[x]^2)*Derivative[2][y][x] + 2*Cos[x]*Sin[x]^3*Derivative[3][y][x] + Sin[x]^4*Derivat
```

✓ **Maple** : cpu = 0.902 (sec), leaf count = 252

$$\left\{ y(x) = \left({}_2F_1\left(\frac{3}{4} - \frac{1}{4}\sqrt{-4\sqrt{-(a-1)(a+1)(a^2+1)} + 5}, \frac{3}{4} + \frac{1}{4}\sqrt{-4\sqrt{-(a-1)(a+1)(a^2+1)} + 5}; \frac{1}{2}; (\cos\right.\right.$$

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 = 0.0691642 (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*Derivative
```

✓ **Maple** : cpu = 0.508 (sec), leaf count = 638

$$\left\{ y(x) = \frac{1}{48\,\left(e^{2\,ix} - 1\right)^4 \sin(x)} \left(12\,f\left(e^{2\,ix} - 3/2\,e^{4\,ix} + e^{6\,ix} - 1/4\,e^{8\,ix} - 1/4\right) \left(x^2 + \frac{20}{3}\right) x \ln\left(1 - e^{ix}\right) + 80\,if\left(e\right.\right.\right.$$

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 = 0.249435 (sec), leaf count = 0 , could not solve

```
DSolve[2*Derivative[1][f][x]*(-(a^2*Derivative[1][y][x]) + Derivative[3][y][x]) + f[x]*(a^4*
```

✓ **Maple** : cpu = 0.032 (sec), leaf count = 67

$$\left\{y(x)=\_C1\,\mathrm{e}^{ax}+\_C2\,\mathrm{e}^{-ax}+\_C3\,\mathrm{e}^{\frac{x}{f}\left(-df+\sqrt{a^2f^2+df^2}\right)}+\_C4\,\mathrm{e}^{-\frac{x}{f}\left(df+\sqrt{a^2f^2+df^2}\right)}\right\}$$

2.1577 ODE No. 1577

$$f''(x)y''(x)+2y^{(3)}(x)f'(x)+f(x)y^{(4)}(x)=0$$

✓ **Mathematica** : cpu = 1.2502 (sec), leaf count = 39

$$\left\{\left\{y(x)\to\int_1^x\left(\int_1^{K[2]}\frac{c_2K[1]+c_1}{f(K[1])}\,dK[1]\right)dK[2]+c_4x+c_3\right\}\right\}$$

✓ **Maple** : cpu = 0.012 (sec), leaf count = 21

$$\left\{y(x)=\frac{x^3\_C1}{6}+\frac{\_C2\,x^2}{2}+\_C3\,x+\_C4\right\}$$

2.1578 ODE No. 1578

$$a^4y(x)-\lambda(ax-b)\left(y''(x)-a^2y(x)\right)-2a^2y''(x)+y^{(4)}(x)=0$$

✗ **Mathematica** : cpu = 300.03 (sec), leaf count = 0 , timed out

```
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```

✓ **Maple** : cpu = 1.365 (sec), leaf count = 89

$$\left\{y(x)=\mathrm{e}^{ax}\left(\int\mathrm{e}^{-2\,ax}\left(\int\mathrm{e}^{ax}\left(\_C4\,\mathrm{Bi}\left(-\frac{\lambda\,(ax-b)+a^2}{a\lambda}\sqrt[3]{-a\lambda}\right)+\_C3\,\mathrm{Ai}\left(-\frac{\lambda\,(ax-b)+a^2}{a\lambda}\sqrt[3]{-a\lambda}\right)\right)\mathrm{d}x+\right.\right.\right.$$

2.1579 ODE No. 1579

$$-ax - b\sin(x) - c\cos(x) + y^{(n)}(x) + 2y^{(3)}(x) + y'(x) = 0$$

✓ **Mathematica** : cpu = 0.77106 (sec), leaf count = 80

$$\left\{\left\{y(x) \to \frac{1}{16}\left(8ax^2 + \sin(x)\left(-6bx + c\left(13 - 2x^2\right) + 16(c_2x + c_1 + c_4)\right) + \cos(x)\left(b\left(2x^2 - 9\right) - 2(5cx + 8(c_4x -\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.452 (sec), leaf count = 69

$$\left\{y(x) = \frac{\left(bx^2 + (-4\,c - 8\_C4)\,x - 6\,b - 8\_C2 + 8\_C3\right)\cos(x)}{8} + \frac{\left(-cx^2 + (-4\,b + 8\_C3)\,x + 6\,c + 8\_C1 +\right.}{8}\right.$$

2.1580 ODE No. 1580

$$y^{(6)}(x) + y(x) - \sin\left(\frac{x}{2}\right)\sin\left(\frac{3x}{2}\right) = 0$$

✓ **Mathematica** : cpu = 1.04165 (sec), leaf count = 111

$$\left\{\left\{y(x) \to c_4e^{-\frac{\sqrt{3}x}{2}}\sin\left(\frac{x}{2}\right) + c_6e^{\frac{\sqrt{3}x}{2}}\sin\left(\frac{x}{2}\right) + c_5\sin(x) + e^{-\frac{\sqrt{3}x}{2}}\left(c_1e^{\sqrt{3}x} + c_3\right)\cos\left(\frac{x}{2}\right) + \left(c_2 + \frac{1}{4}\right)\cos(x) + \frac{1}{1}\right.\right.$$

✓ **Maple** : cpu = 0.819 (sec), leaf count = 147

$$\left\{y(x) = \frac{1}{504}(504\_C3\ \cos(x/2) + 504\_C4\ \sin(x/2))\,\mathrm{e}^{-\frac{\sqrt{3}x}{2}} + \frac{1}{504}(504\_C5\ \cos(x/2) + 504\_C6\ \sin(x/2))\,\mathrm{e}^{\right.$$

2.1581 ODE No. 1581

$$-axy(x) - b + y^{(5)}(x) = 0$$

✗ **Mathematica** : cpu = 0.185937 (sec), leaf count = 0 , DifferentialRoot result

$$\left\{\left\{y(x) \to \text{DifferentialRoot}\left(\{y, x\}, \left\{-b - xay(x) + y^{(5)}(x) = 0, y(0) = c_1, y'(0) = c_2, y''(0) = c_3, y^{(3)}(0) = c_4, y^{(\right.\right.\right.\right.$$

✗ **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 = 0.698094 (sec), leaf count = 528

$$\left\{\left\{y(x) \to \nu^{-\frac{16}{\nu+4}}\left(\frac{\nu+4}{\nu}\right)^{-\frac{16}{\nu+4}} a^{\frac{1}{\nu+4}}(x^{\nu})^{\frac{1}{\nu}}\left(a^{\frac{1}{\nu+4}}(x^{\nu})^{\frac{1}{\nu}}\left(a^{\frac{1}{\nu+4}}(x^{\nu})^{\frac{1}{\nu}}\left(c_5 a^{\frac{1}{\nu+4}}(x^{\nu})^{\frac{1}{\nu}}\ {}_1F_4\left(1;\frac{\nu}{\nu+4}+\frac{5}{\nu+4},\frac{\nu}{\nu+4}\right.\right.\right.\right.\right.\right.$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x) = DESol\left(\left\{\frac{d^5}{dx^5}\_Y(x) + ax^{\nu}\frac{d}{dx}\_Y(x) + a\nu\, x^{\nu-1}\_Y(x)\right\}, \{\_Y(x)\}\right)\right\}$$

2.1583 ODE No. 1583

$$ay^{(4)}(x) - f(x) + y^{(5)}(x) = 0$$

✗ **Mathematica** : cpu = 300.035 (sec), leaf count = 0 , timed out

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✓ **Maple** : cpu = 0.036 (sec), leaf count = 40

$$\left\{y(x) = \frac{\_C3\, x^2}{2} + \frac{\_C2\, x^3}{6} + \frac{e^{-ax}\_C1}{a^4} + \frac{fx^4}{24\, a} + \_C4\, x + \_C5\right\}$$

2.1584 ODE No. 1584

$$axy(x) - 5my^{(4)}(x) + xy^{(5)}(x) = 0$$

✓ **Mathematica** : cpu = 3.07114 (sec), leaf count = 207

$$\left\{\left\{y(x) \to \frac{1}{625}x\left(x\left(5a^{3/5}c_4 x\, {}_0F_4\left(;\frac{6}{5},\frac{7}{5},\frac{8}{5},\frac{4}{5}-m;-\frac{ax^5}{3125}\right) + 25a^{2/5}c_3\, {}_0F_4\left(;\frac{4}{5},\frac{6}{5},\frac{7}{5},\frac{3}{5}-m;-\frac{ax^5}{3125}\right) + c_5 5^{-5}\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.266 (sec), leaf count = 118

$$\left\{y(x) = \_C1\ {}_0F_4(\ ;\frac{2}{5},\frac{3}{5},\frac{4}{5},\frac{1}{5}-m;-\frac{x^5a}{3125}) + \_C2\ x\,{}_0F_4(\ ;\frac{3}{5},\frac{4}{5},\frac{6}{5},\frac{2}{5}-m;-\frac{x^5a}{3125}) + \_C3\ x^2{}_0F_4(\ ;\frac{4}{5},\frac{6}{5},\frac{7}{5},\frac{3}{5}\right.$$

2.1585 ODE No. 1585

$$xy(x)\left(ay'(x)+by''(x)+cy^{(3)}(x)+ey^{(4)}(x)\right)=0$$

✓ **Mathematica** : cpu = 0.242699 (sec), leaf count = 214

$$\left\{\{y(x)\to 0\},\left\{y(x)\to \frac{c_1 e^{x\text{Root}\left[\#1^3+\frac{\#1^2c}{e}+\frac{\#1b}{e}+\frac{a}{e}\&,1\right]}}{\text{Root}\left[\#1^3+\frac{\#1^2c}{e}+\frac{\#1b}{e}+\frac{a}{e}\&,1\right]}+\frac{c_2 e^{x\text{Root}\left[\#1^3+\frac{\#1^2c}{e}+\frac{\#1b}{e}+\frac{a}{e}\&,2\right]}}{\text{Root}\left[\#1^3+\frac{\#1^2c}{e}+\frac{\#1b}{e}+\frac{a}{e}\&,2\right]}+\frac{c_3 e^{x\text{Root}\left[\#\right.}}{\text{Root}\left[\#1^3+\right.}\right.\right.$$

✓ **Maple** : cpu = 0.039 (sec), leaf count = 679

$$\left\{y(x)=0,y(x)=\_C4\,e^{\frac{x}{6e}\left(\left(12\sqrt{3}\sqrt{27a^2e^2+(-18abc+4b^3)e+4ac^3-b^2c^2}e-108ae^2+36bce-8c^3\right)^{\frac{2}{3}}-2c\sqrt[3]{12\sqrt{3}\sqrt{27a^2e^2+(-18abc}}\right.}\right.$$

2.1586 ODE No. 1586

$$-y^{(4)}(x)(x(aA(5)-A(4))+A(5))-y^{(3)}(x)(x(aA(4)-A(3))+A(4))-(x(aA(3)-A(2))+A(3))y''(x)-(x(aA(2)-A($$

✗ **Mathematica** : cpu = 0 (sec), leaf count = 0 , crash

```
Kernel Crash
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x)=\int DESol\left(\left\{-\frac{(axA_2-xA_1+A_2)\_Y(x)}{x}-\frac{(axA_3-xA_2+A_3)\frac{\mathrm{d}}{\mathrm{d}x}\_Y(x)}{x}-\frac{(axA_4-xA_3+A_4)\frac{\mathrm{d}^2}{\mathrm{d}x^2}\_}{x}\right.\right.\right.$$

2.1587 ODE No. 1587

$$x^n\frac{\partial^{2n}y(x)}{\partial x^{2n}}-ay(x)=0$$

✓ **Mathematica** : cpu = 0.419444 (sec), leaf count = 492

$$\left\{\left\{y(x)\to\frac{(-1)^{4/5}a^{9/5}c_1x^9\,{}_0F_9\left(;\frac{6}{5},\frac{7}{5},\frac{8}{5},\frac{9}{5},2,\frac{11}{5},\frac{12}{5},\frac{13}{5},\frac{14}{5};\frac{ax^5}{9765625}\right)}{3814697265625}+\frac{(-1)^{3/5}a^{8/5}c_3x^8\,{}_0F_9\left(;\frac{4}{5},\frac{6}{5},\frac{7}{5},\frac{8}{5},\frac{9}{5},2,\frac{11}{5},\right.}{152587890625}\right.\right.$$

✓ **Maple** : cpu = 0.522 (sec), leaf count = 174

$$\left\{y(x)=x^{\frac{5}{2}}\left(\_C1\,I_5\left(2\,a^{1/10}\sqrt{x}\right)+\_C7\,Y_5\left(2\,ie^{\frac{i}{5}\pi}a^{\frac{1}{10}}\sqrt{x}\right)+\_C3\,I_5\left(2\,e^{i/5\pi}a^{1/10}\sqrt{x}\right)+\_C5\,I_5\left(2\,e^{3/5\,i\pi}a^{1/10}\sqrt{\right.\right.\right.$$

2.1588 ODE No. 1588

$$x^{10}y^{(5)}(x) - ay(x) = 0$$

✓ **Mathematica** : cpu = 13.6404 (sec), leaf count = 103

$$\left\{\left\{y(x)\to x^4\left(c_1e^{-\frac{\sqrt[5]{a}}{x}}+c_2e^{\frac{\sqrt[5]{-1}\sqrt[5]{a}}{x}}+c_3e^{-\frac{(-1)^{2/5}\sqrt[5]{a}}{x}}+c_4e^{\frac{(-1)^{3/5}\sqrt[5]{a}}{x}}+c_5e^{-\frac{(-1)^{4/5}\sqrt[5]{a}}{x}}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.174 (sec), leaf count = 90

$$\left\{y(x) = \_C1\, {}_0\mathrm{F}_4(\ ;\ \frac{6}{5},\frac{7}{5},\frac{8}{5},\frac{9}{5};\ -\frac{a}{3125\,x^5}) + \_C2\, x\, {}_0\mathrm{F}_4(\ ;\ \frac{4}{5},\frac{6}{5},\frac{7}{5},\frac{8}{5};\ -\frac{a}{3125\,x^5}) + \_C3\, x^2\, {}_0\mathrm{F}_4(\ ;\ \frac{3}{5},\frac{4}{5},\frac{6}{5},\frac{7}{5};\ -\right.$$

2.1589 ODE No. 1589

$$x^{11/2}y^{(11)}(x) - ay(x) = 0$$

✓ **Mathematica** : cpu = 0.0475445 (sec), leaf count = 662

$$\left\{\left\{y(x)\to \frac{4}{121}(-1)^{2/11}a^{2/11}c_2x\, {}_0F_{10}\left(;-\frac{7}{11},-\frac{5}{11},-\frac{3}{11},-\frac{1}{11},\frac{1}{11},\frac{3}{11},\frac{5}{11},\frac{7}{11},\frac{9}{11},\frac{13}{11};\frac{2048ax^{11/2}}{285311670611}\right)+\frac{64(-1}{}\right.\right.$$

✓ **Maple** : cpu = 9.182 (sec), leaf count = 4379

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 = 2.682 (sec), leaf count = 553

$$\left\{y(x) = \mathit{ODESolStruc}\left(\mathrm{e}^{\int -4\frac{\left((-b-\_f/4)\mathrm{e}^{\left(\int \_g(\_f)\,\mathrm{d}\_f+\_C1\right)(a-b)}+a+\_f/4\right)\_g(\_f)}{\mathrm{e}^{\left(\int \_g(\_f)\,\mathrm{d}\_f+\_C1\right)(a-b)}-1}\,\mathrm{d}\_f+\_C2}, [\left\{\frac{1}{(\_g(\_f))^2}\left(\left(\frac{\mathrm{d}^3}{\mathrm{d}\_f^3}\_g(\_f)\right.\right.\right.\right.\right.$$

2.1591 ODE No. 1591

$$y''(x) - y(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.0398476 (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 = 0.028 (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 = 0.0278159 (sec), leaf count = 14

$$\{\{y(x)\to \wp(x+c_1;0,c_2)\}\}$$

✓ **Maple** : cpu = 0.014 (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 = 0.185706 (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 = 0.530118 (sec), leaf count = 200

$$\left\{\left\{y(x) \to \left(\text{Root}\left[4\#1^3 - 4\#1^2 + c_1\&, 2\right] - \text{Root}\left[4\#1^3 - 4\#1^2 + c_1\&, 3\right]\right) \text{sn}\left(\sqrt{-\left(x + c_2\right)^2 \left(\text{Root}\left[4\#1^3 - 4\#\right.\right.}\right.\right.\right.$$

✓ **Maple** : cpu = 0.119 (sec), leaf count = 59

$$\left\{\int^{y(x)} \frac{1}{\sqrt{4\_a^3 - 4\_a^2 + \_C1}} d\_a - x - \_C2 = 0, \int^{y(x)} -\frac{1}{\sqrt{4\_a^3 - 4\_a^2 + \_C1}} d\_a - x - \_C2 = 0\right\}$$

2.1595 ODE No. 1595

$$ay(x)^2 + bx + c + y''(x) = 0$$

✗ **Mathematica** : cpu = 0.386586 (sec), leaf count = 0 , could not solve

```
DSolve[c + b*x + a*y[x]^2 + Derivative[2][y][x] == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(diff(y(x),x),x)+a*y(x)^2+b*x+c=0,y(x))
```

2.1596 ODE No. 1596

$$a + y''(x) - 2y(x)^3 - xy(x) = 0$$

✗ **Mathematica** : cpu = 1.18434 (sec), leaf count = 0 , could not solve

```
DSolve[a - x*y[x] - 2*y[x]^3 + Derivative[2][y][x] == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(diff(y(x),x),x)-2*y(x)^3-x*y(x)+a=0,y(x))
```

2.1597 ODE No. 1597

$$y''(x) - ay(x)^3 = 0$$

✓ **Mathematica** : cpu = 2.20871 (sec), leaf count = 131

$$\left\{\left\{y(x)\to -\frac{i\sqrt[4]{2}\,\mathrm{sn}\left(-\frac{(1-i)\sqrt{\sqrt{a}\sqrt{c_1}(x+c_2)^2}}{2^{3/4}}\middle|-1\right)}{\sqrt{\frac{i\sqrt{a}}{\sqrt{c_1}}}}\right\},\left\{y(x)\to \frac{i\sqrt[4]{2}\,\mathrm{sn}\left(-\frac{(1-i)\sqrt{\sqrt{a}\sqrt{c_1}(x+c_2)^2}}{2^{3/4}}\middle|-1\right)}{\sqrt{\frac{i\sqrt{a}}{\sqrt{c_1}}}}\right\}\right\}$$

✓ **Maple** : cpu = 0.03 (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 = 3.74682 (sec), leaf count = 0 , could not solve

```
DSolve[-b + 2*a*b*x*y[x] - 2*a^2*y[x]^3 + Derivative[2][y][x] == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(diff(y(x),x),x)-2*a^2*y(x)^3+2*a*b*x*y(x)-b=0,y(x))
```

2.1599 ODE No. 1599

$$ay(x)^3 + bxy(x) + cy(x) + d + y''(x) = 0$$

✗ **Mathematica** : cpu = 3.34061 (sec), leaf count = 0 , could not solve

```
DSolve[d + c*y[x] + b*x*y[x] + a*y[x]^3 + Derivative[2][y][x] == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(diff(y(x),x),x)+d+b*x*y(x)+c*y(x)+a*y(x)^3=0,y(x))
```

2.1600 ODE No. 1600

$$ay(x)^3 + by(x)^2 + cy(x) + d + y''(x) = 0$$

✓ **Mathematica** : cpu = 2.44658 (sec), leaf count = 869

$$\text{Solve}\left[-\frac{24F\left(\sin^{-1}\left(\sqrt{\frac{(\text{Root}[3a\#1^4+4b\#1^3+6c\#1^2+12d\#1-6c_1\&,2]-\text{Root}[3a\#1^4+4b\#1^3+6c\#1^2+12d\#1-6c_1\&,4])(\text{Root}[3a\#1^4\cdots}{(\text{Root}[3a\#1^4+4b\#1^3+6c\#1^2+12d\#1-6c_1\&,1]-\text{Root}[3a\#1^4+4b\#1^3+6c\#1^2+12d\#1-6c_1\&,4])(\text{Root}[3a\#1^4\cdots}}\right.\right.}{}\right.$$

✓ **Maple** : cpu = 0.102 (sec), leaf count = 89

$$\left\{\int^{y(x)} -6\frac{1}{\sqrt{-18\,a\_a^4 - 24\,b\_a^3 - 36\,c\_a^2 - 72\,d\_a + 36\_C1}}d\_a - x - \_C2 = 0, \int^{y(x)} 6\frac{}{\sqrt{-18\,a\_a^4 - 24\,b\cdots}}\right.$$

2.1601 ODE No. 1601

$$ax^r y(x)^n + y''(x) = 0$$

✗ **Mathematica** : cpu = 0.0379402 (sec), leaf count = 0 , could not solve

```
DSolve[a*x^r*y[x]^n + Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 2.958 (sec), leaf count = 151

$$\left\{y(x) = ODESolStruc\left(\_a\,e^{\int -\_b(\_a)\,d\_a + \_C1}, \left[\left\{\frac{d}{d\_a}\_b(\_a) = \frac{(\_b(\_a))^2\left(a\_b(\_a)(n-1)^2\_a^n + (r+2)(\cdots\right.}{(r+2)^2\cdots}\right.\right.\right.\right.$$

2.1602 ODE No. 1602

$$(n+1)a^{2n}y(x)^{2n+1} + y''(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 123.928 (sec), leaf count = 45

$$\text{Solve}\left[(c_2+x)^2 = \left(\int_1^{y(x)} \frac{1}{\sqrt{a^{2n}\left(-K[1]^{2n+2}\right) + K[1]^2 + c_1}}\,dK[1]\right)^2, y(x)\right]$$

✓ **Maple** : cpu = 0.29 (sec), leaf count = 73

$$\left\{\int^{y(x)} \frac{1}{\sqrt{-\_a^{2\,n+2}a^{2\,n} + \_a^2 + \_C1}}d\_a - x - \_C2 = 0, \int^{y(x)} -\frac{1}{\sqrt{-\_a^{2\,n+2}a^{2\,n} + \_a^2 + \_C1}}d\_a - x - \_C\cdots\right.$$

2.1603 ODE No. 1603

$$y''(x) - \frac{1}{(ay(x)^2 + bxy(x) + cx^2 + dy(x) + ex + k)^{3/2}} = 0$$

✗ **Mathematica** : cpu = 60.6681 (sec), leaf count = 0 , could not solve

```
DSolve[-(k + e*x + c*x^2 + d*y[x] + b*x*y[x] + a*y[x]^2)^(-3/2) + Derivative[2][y][x] == 0,
```

✓ **Maple** : cpu = 37.867 (sec), leaf count = 8411

2.1604 ODE No. 1604

$$y''(x) - e^{y(x)} = 0$$

✓ **Mathematica** : cpu = 0.0667631 (sec), leaf count = 32

$$\left\{\left\{y(x) \to \log\left(-\frac{1}{2}c_1 \text{sech}^2\left(\frac{1}{2}\sqrt{c_1 (c_2 + x)^2}\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.437 (sec), leaf count = 23

$$\left\{y(x) = \ln\left(\frac{1}{2\_C1^2}\left(\left(\tan\left(\frac{\_C2 + x}{2\_C1}\right)\right)^2 + 1\right)\right)\right\}$$

2.1605 ODE No. 1605

$$ae^x\sqrt{y(x)} + y''(x) = 0$$

✗ **Mathematica** : cpu = 0.527791 (sec), leaf count = 0 , could not solve

```
DSolve[a*E^x*Sqrt[y[x]] + Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 1.438 (sec), leaf count = 107

$$\left\{y(x) = ODESolStruc\left(\frac{\_a}{e^{-2\int \_b(\_a)\,d\_a - 2\_C1}}, [\left\{\frac{d}{d\_a}\_b(\_a) = (\_b(\_a))^2 (\sqrt{\_a}\_b(\_a)\,a + 4\_a\_b(\_a) + 4)\right.\right.$$

2.1606 ODE No. 1606

$$y''(x) + e^x \sin(y(x)) = 0$$

✗ **Mathematica** : cpu = 1.13631 (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 = 0.123044 (sec), leaf count = 79

$$\left\{\left\{y(x) \to -2\text{am}\left(\frac{1}{2}\sqrt{(2a+c_1)(x+c_2)^2}|\frac{4a}{2a+c_1}\right)\right\}, \left\{y(x) \to 2\text{am}\left(\frac{1}{2}\sqrt{(2a+c_1)(x+c_2)^2}|\frac{4a}{2a+c_1}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.128 (sec), leaf count = 49

$$\left\{\int^{y(x)} \frac{1}{\sqrt{2\,a\cos(\_a) + \_C1}} d\_a - x - \_C2 = 0, \int^{y(x)} -\frac{1}{\sqrt{2\,a\cos(\_a) + \_C1}} d\_a - x - \_C2 = 0\right\}$$

2.1608 ODE No. 1608

$$a^2 \sin(y(x)) - b\sin(x) + y''(x) = 0$$

✗ **Mathematica** : cpu = 0.054876 (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 = 0.0358078 (sec), leaf count = 0 , could not solve

```
DSolve[-(b*f[x]) + a^2*Sin[y[x]] + Derivative[2][y][x] == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(diff(y(x),x),x)+a^2*sin(y(x))-b*f(x)=0,y(x))
```

2.1610 ODE No. 1610

$$y''(x) - \frac{h\left(\frac{y(x)}{\sqrt{x}}\right)}{x^{3/2}} = 0$$

✗ **Mathematica** : cpu = 300.135 (sec), leaf count = 0 , timed out

```
$Aborted
```

✓ **Maple** : cpu = 0.292 (sec), leaf count = 92

$$\left\{y(x) = RootOf\left(-\ln(x) - 2\int^{\_Z} \frac{1}{\sqrt{\_C1 + 8\int h(\_g)\,\mathrm{d}\_g + \_g^2}} d\_g + 2\_C2\right)\sqrt{x}, y(x) = RootOf\left(-\ln(x\right.\right.$$

2.1611 ODE No. 1611

$$y''(x) - 3y'(x) - y(x)^2 - 2y(x) = 0$$

✗ **Mathematica** : cpu = 5.32995 (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 = 0.58 (sec), leaf count = 57

$$\left\{y(x) = ODESolStruc\left(\_a, [\left\{\left(\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a)\right)\_b(\_a) - 3\_b(\_a) - \_a^2 - 2\_a = 0\right\}, \left\{\_a = y(x), \_b(\_a) =\right.\right.\right.$$

2.1612 ODE No. 1612

$$y''(x) - 7y'(x) - y(x)^{3/2} + 12y(x) = 0$$

✗ **Mathematica** : cpu = 22.2157 (sec), leaf count = 0 , could not solve

```
DSolve[12*y[x] - y[x]^(3/2) - 7*Derivative[1][y][x] + Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 1.341 (sec), leaf count = 57

$$\left\{y(x) = \mathit{ODESolStruc}\left(\_a, [\left\{\left(\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a)\right)\_b(\_a) - 7\_b(\_a) - \_a^{\frac{3}{2}} + 12\_a = 0\right\}, \left\{\_a = y(x), \_b(\_a)\right.\right.\right.$$

2.1613 ODE No. 1613

$$6a^2y(x) + 5ay'(x) + y''(x) - 6y(x)^2 = 0$$

✗ **Mathematica** : cpu = 2.06754 (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], x]
```

✓ **Maple** : cpu = 0.026 (sec), leaf count = 27

$$\left\{y(x) = \mathit{WeierstrassP}\left(-\frac{\mathrm{e}^{-ax}}{a} + \_C1, 0, \_C2\right)\left(\mathrm{e}^{-ax}\right)^2\right\}$$

2.1614 ODE No. 1614

$$2a^2y(x) + 3ay'(x) + y''(x) - 2y(x)^3 = 0$$

✗ **Mathematica** : cpu = 1.49488 (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], x]
```

✓ **Maple** : cpu = 0.082 (sec), leaf count = 33

$$\left\{y(x) = \frac{\_C2}{\mathrm{e}^{ax}}\mathit{JacobiSN}\left(\left(-\frac{1}{a}\sqrt{-\mathrm{e}^{-2\,ax}} + \_C1\right)\_C2, i\right)\right\}$$

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 = 119.188 (sec), leaf count = 0 , could not solve

```
DSolve[(-2*(1 + n)*(2 + n)*y[x]*(-1 + y[x]^(n/(1 + n))))/n^2 - ((4 + 3*n)*Derivative[1][y][x
```

✓ **Maple** : cpu = 4.639 (sec), leaf count = 91

$$\left\{y(x) = ODESolStruc\left(\_a, [\left\{\frac{1}{n^2}\left(-2\,(n+2)\,(n+1)\,\_a\,\_a^{\frac{n}{n+1}} + \left(\frac{d}{d\_a}\_b(\_a)\right)\_b(\_a)\,n^2 + \left(-3\,n^2-4\,n\right)\_\right.\right.\right.\right.$$

2.1616 ODE No. 1616

$$\frac{1}{4}\left(a^2-1\right)y(x)+ay'(x)+by(x)^n+y''(x)=0$$

✗ **Mathematica** : cpu = 26.2867 (sec), leaf count = 0 , could not solve

```
DSolve[((-1 + a^2)*y[x])/4 + b*y[x]^n + a*Derivative[1][y][x] + Derivative[2][y][x] == 0, y[
```

✓ **Maple** : cpu = 1.328 (sec), leaf count = 63

$$\left\{y(x) = ODESolStruc\left(\_a, [\left\{\left(\frac{d}{d\_a}\_b(\_a)\right)\_b(\_a) + a\_b(\_a) + b\_a^n + \frac{\_a\,a^2}{4} - \frac{\_a}{4} = 0\right\}, \left\{\_a = y(x), \_\right.\right.\right.$$

2.1617 ODE No. 1617

$$ay'(x)+bx^ry(x)^n+y''(x)=0$$

✗ **Mathematica** : cpu = 0.0471746 (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 = 30.5157 (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 = 1.735 (sec), leaf count = 56

$$\left\{y(x) = ODESolStruc\left(\_a, \left[\left\{\left(\frac{d}{d\_a}\_b(\_a)\right)\_b(\_a) + a\_b(\_a) + be^{-\_a} - 2\,a = 0\right\}, \left\{\_a = y(x), \_b(\_a) =\right.\right.\right.$$

2.1619 ODE No. 1619

$$ay'(x) + f(x)\sin(y(x)) + y''(x) = 0$$

✗ **Mathematica** : cpu = 0.0577456 (sec), leaf count = 0 , could not solve

```
DSolve[f[x]*Sin[y[x]] + a*Derivative[1][y][x] + Derivative[2][y][x] == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(diff(y(x),x),x)+a*diff(y(x),x)+f(x)*sin(y(x))=0,y(x))
```

2.1620 ODE No. 1620

$$y''(x) + y(x)y'(x) - y(x)^3 = 0$$

✗ **Mathematica** : cpu = 122.317 (sec), leaf count = 0 , could not solve

```
DSolve[-y[x]^3 + y[x]*Derivative[1][y][x] + Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 0.119 (sec), leaf count = 291

$$\left\{\int^{y(x)} 2\left(\frac{\_a^4}{\sqrt[3]{\_a^6 + 2\,\_C1 + 2\sqrt{\_C1\,\_a^6 + \_C1^2}}} - \_a^2 + \sqrt[3]{\_a^6 + 2\,\_C1 + 2\sqrt{\_C1\,\_a^6 + \_C1^2}}\right)^{-1} d\_a$$

2.1621 ODE No. 1621

$$ay(x) + y''(x) + y(x)y'(x) - y(x)^3 = 0$$

✗ **Mathematica** : cpu = 100.134 (sec), leaf count = 0 , could not solve

```
DSolve[a*y[x] - y[x]^3 + y[x]*Derivative[1][y][x] + Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 1.744 (sec), leaf count = 1088

$$\left\{ \int^{y(x)} \frac{1}{-63\_a^2 + 63\,a} \left(\frac{\left(-\frac{1}{2} + \frac{i}{2}\sqrt{3}\right)^3}{2} \left(126\,\frac{1}{-\_a^6 + 3\,a\_a^4 - 3\_a^2a^2 + 80\_C1^3 + a^3} \sqrt[3]{-4\,(-\_a^2 + a)^3\,(-\_\right.\right.\right.$$

2.1622 ODE No. 1622

$$2a^2y(x) + (3a + y(x))y'(x) + ay(x)^2 + y''(x) - y(x)^3 = 0$$

✗ **Mathematica** : cpu = 26.3234 (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[2][y][
```

✓ **Maple** : cpu = 0.629 (sec), leaf count = 817

$$\left\{ y(x) = \frac{1}{e^{ax}} RootOf\left(\int^{\_Z} \frac{1}{-\_f^6 + \_C1^2} \left(-\left(-1\left(-\_C1\,\_f^{12} + 2\_C1^3\_f^6 + (-\_f^6 + \_C1^2)^{\frac{5}{2}} - \_C1^5 \right) (-\right.\right.\right.\right.$$

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 = 0.481471 (sec), leaf count = 0 , could not solve

```
DSolve[f[x]*y[x]^2 - y[x]^3 + y[x]*(2*f[x]^2 + Derivative[1][f][x]) + (3*f[x] + y[x])*Deriva
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(diff(y(x),x),x)+(y(x)+3*f(x))*diff(y(x),x)-y(x)^3+f(x)*y(x)^2+y(x)*(diff(f(x),x)
```

2.1624 ODE No. 1624

$$y(x)\left(af(x)^2-\frac{f''(x)}{f(x)}+3f'(x)+\frac{3f'(x)^2}{f(x)^2}\right)+bf(x)^3-\left(\frac{f'(x)}{f(x)}+f(x)\right)(3y'(x)+y(x)^2)+y''(x)+y(x)y'(x)-y(x)^3$$

✗ **Mathematica** : cpu = 1.62153 (sec), leaf count = 0 , could not solve

```
DSolve[b*f[x]^3 - y[x]^3 + y[x]*Derivative[1][y][x] - (f[x] + Derivative[1][f][x]/f[x])*(y[x
```

✓ **Maple** : cpu = 1.923 (sec), leaf count = 131

$$\left\{y(x)=ODESolStruc\left(f\left(RootOf\left(\int\_b(\_a)\,\mathrm{d}\_a+\_C1-\int^{\_Z}f(\_f)\,d\_f\right)\right)\_a,[\left\{\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a)=(\_b(\_a\right.\right.\right.$$

2.1625 ODE No. 1625

$$y'(x)\left(y(x)-\frac{3f'(x)}{2f(x)}\right)-\frac{y(x)^2f'(x)}{2f(x)}+y(x)\left(-\frac{f''(x)}{2f(x)}+\frac{f'(x)^2}{f(x)^2}+f(x)\right)+y''(x)-y(x)^3=0$$

✗ **Mathematica** : cpu = 1.0482 (sec), leaf count = 0 , could not solve

```
DSolve[-y[x]^3 - (y[x]^2*Derivative[1][f][x])/(2*f[x]) + (y[x] - (3*Derivative[1][f][x])/(2*
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(diff(y(x),x),x)+(y(x)-3/2*diff(f(x),x)/f(x))*diff(y(x),x)-y(x)^3-1/2*diff(f(x),x
diff(diff(f(x),x),x))/f(x)*y(x)=0,y(x))
```

2.1626 ODE No. 1626

$$y(x)f'(x)+f(x)y'(x)+y''(x)+2y(x)y'(x)=0$$

✗ **Mathematica** : cpu = 41.153 (sec), leaf count = 0 , could not solve

```
DSolve[y[x]*Derivative[1][f][x] + f[x]*Derivative[1][y][x] + 2*y[x]*Derivative[1][y][x] + De
```

✓ **Maple** : cpu = 0.24 (sec), leaf count = 48

$$\left\{y(x)=ODESolStruc\left(\_b(\_a),[\left\{\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a)=-f(\_a)\_b(\_a)-(\_b(\_a))^2-\_C1\right\},\{\_a=x,\_b(\_a)=\right.\right.$$

2.1627 ODE No. 1627

$$f(x)\left(y'(x)+y(x)^2\right)-g(x)+y''(x)+2y(x)y'(x)=0$$

✗ **Mathematica** : cpu = 0.314133 (sec), leaf count = 0 , could not solve

```
DSolve[-g[x] + 2*y[x]*Derivative[1][y][x] + f[x]*(y[x]^2 + Derivative[1][y][x]) + Derivative
```

✓ **Maple** : cpu = 0.905 (sec), leaf count = 58

$$\left\{y(x)=ODESolStruc\left(\_b(\_a),[\left\{-\int \mathrm{e}^{\int f(\_a)\,\mathrm{d}\_a}g(\_a)\,\mathrm{d}\_a+\left((\_b(\_a))^2+\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a)\right)\mathrm{e}^{\int f(\_a)\,\mathrm{d}\_a}+\_C\right.\right.\right.$$

2.1628 ODE No. 1628

$$f(x)y(x)-g(x)+y''(x)+3y(x)y'(x)+y(x)^3=0$$

✗ **Mathematica** : cpu = 5.64861 (sec), leaf count = 0 , could not solve

```
DSolve[-g[x] + f[x]*y[x] + y[x]^3 + 3*y[x]*Derivative[1][y][x] + Derivative[2][y][x] == 0, y
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x)=\frac{\frac{\mathrm{d}}{\mathrm{d}x}DESol\left(\left\{-g(x)\_Y(x)+f(x)\frac{\mathrm{d}}{\mathrm{d}x}\_Y(x)+\frac{\mathrm{d}^3}{\mathrm{d}x^3}\_Y(x)\right\},\{\_Y(x)\}\right)}{DESol\left(\left\{-g(x)\_Y(x)+f(x)\frac{\mathrm{d}}{\mathrm{d}x}\_Y(x)+\frac{\mathrm{d}^3}{\mathrm{d}x^3}\_Y(x)\right\},\{\_Y(x)\}\right)}\right\}$$

2.1629 ODE No. 1629

$$(f(x)+3y(x))y'(x)+f(x)y(x)^2+y''(x)+y(x)^3=0$$

✗ **Mathematica** : cpu = 0.0374327 (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] == 0
```

✓ **Maple** : cpu = 0.041 (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 = 11.5533 (sec), leaf count = 1670

$$\left\{\left\{y(x) \to \frac{\sqrt{b}\sqrt{\frac{e^{-2ax}}{b}}\sqrt{c_1}\left(-i^{\frac{\sqrt{4a^3-3b}}{a^{3/2}}}2^{\frac{3\sqrt{4a^6-3a^3b}}{2a^3}+\frac{1}{2}}3^{\frac{1}{2}\left(\frac{\sqrt{4a^3-3b}}{a^{3/2}}-1\right)}a^{\frac{\sqrt{4a^6-3a^3b}}{a^3}}b^{\frac{1}{2}\left(\frac{\sqrt{4a^3-3b}}{a^{3/2}}-1\right)}\left(2a^3 - \sqrt{4a^3-3b}a^3\right.\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.702 (sec), leaf count = 783

$$\left\{\int^{y(x)} -6\,a^2\left(-12\_a\,a^3 - 9\_a^2a^2 + \left(RootOf\left(2\,K_{1/2\,\frac{4\,a^3-3\,b}{\sqrt{4\,a^4-3\,aba}}}\left(-1/2\,\frac{\_Z}{a^2}\right)\_C1\,a^2 + 3\,K_{1/2\,\frac{4\,a^3-3\,b}{\sqrt{4\,a^4-3\,aba}}}\left(-1/\right.\right.\right.\right.\right.\right.$$

2.1631 ODE No. 1631

$$-(f(x) + 3y(x))y'(x) + f(x)y(x)^2 + y''(x) + y(x)^3 = 0$$

✗ **Mathematica** : cpu = 0.0336617 (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] == 0
```

✓ **Maple** : cpu = 0.053 (sec), leaf count = 38

$$\left\{y(x) = \frac{-\int \_C1\, e^{\int f(x)\,dx}\,dx - \_C2}{\iint \_C1\, e^{\int f(x)\,dx}\,dx\,dx + \_C2\,x + 1}\right\}$$

2.1632 ODE No. 1632

$$y''(x) - 2ay(x)y'(x) = 0$$

✓ **Mathematica** : cpu = 0.0628497 (sec), leaf count = 34

$$\left\{\left\{y(x) \to \frac{\sqrt{c_1}\tan\left(\sqrt{a}\sqrt{c_1}(c_2 + x)\right)}{\sqrt{a}}\right\}\right\}$$

✓ **Maple** : cpu = 0.108 (sec), leaf count = 23

$$\left\{y(x) = \frac{1}{a}\tan\left(\sqrt{\_C1\,a}(\_C2 + x)\right)\sqrt{\_C1\,a}\right\}$$

2.1633 ODE No. 1633

$$ay(x)y'(x) + by(x)^3 + y''(x) = 0$$

✗ **Mathematica** : cpu = 39.1933 (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 = 0.327 (sec), leaf count = 97

$$\left\{ \int^{y(x)} \left(RootOf\left(-2\,a\_a^2 Artanh\left(\frac{\_a^2 a + 4\_Z}{\sqrt{\_a^4 \left(a^2 - 8\,b\right)}} \right) + \_C1\,\sqrt{\_a^4 \left(a^2 - 8\,b\right)} - \ln\left(\_a^4 b + \_Z\,\_a^2 a + 2\,\_Z^2\right.\right.\right.$$

2.1634 ODE No. 1634

$$y'(x)h(x, y(x)) + j(x, y(x)) + y''(x) = 0$$

✗ **Mathematica** : cpu = 0.164093 (sec), leaf count = 0 , could not solve

```
DSolve[j[x, y[x]] + h[x, y[x]]*Derivative[1][y][x] + Derivative[2][y][x] == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(diff(y(x),x),x)+h(x,y(x))*diff(y(x),x)+j(x,y(x))=0,y(x))
```

2.1635 ODE No. 1635

$$ay'(x)^2 + by(x) + y''(x) = 0$$

✗ **Mathematica** : cpu = 101.17 (sec), leaf count = 0 , could not solve

```
DSolve[b*y[x] + a*Derivative[1][y][x]^2 + Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 0.195 (sec), leaf count = 79

$$\left\{ \int^{y(x)} -2\,\frac{a}{\sqrt{4\,\mathrm{e}^{-2\,\_a\,a}\,\_C1\,a^2 - 4\,\_a\,ab + 2\,b}} d\_a - x - \_C2 = 0, \int^{y(x)} 2\,\frac{a}{\sqrt{4\,\mathrm{e}^{-2\,\_a\,a}\,\_C1\,a^2 - 4\,\_a\,ab + 2\,b}} d\_a\right.$$

2.1636 ODE No. 1636

$$ay'(x)\,|y'(x)| + by'(x) + cy(x) + y''(x) = 0$$

✗ **Mathematica** : cpu = 36.0775 (sec), leaf count = 0 , could not solve

```
DSolve[c*y[x] + b*Derivative[1][y][x] + a*Abs[Derivative[1][y][x]]*Derivative[1][y][x] + Der
```

✓ **Maple** : cpu = 1.023 (sec), leaf count = 59

$$\left\{y(x) = ODESolStruc\left(\_a, [\left\{\left(\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a)\right)\_b(\_a) + a\_b(\_a)\,|\_b(\_a)| + \_b(\_a)\,b + c\_a = 0\right\}, \left\{\_a = y(\right.\right.\right.$$

2.1637 ODE No. 1637

$$ay'(x)^2 + by'(x) + cy(x) + y''(x) = 0$$

✗ **Mathematica** : cpu = 29.7811 (sec), leaf count = 0 , could not solve

```
DSolve[c*y[x] + b*Derivative[1][y][x] + a*Derivative[1][y][x]^2 + Derivative[2][y][x] == 0,
```

✓ **Maple** : cpu = 0.581 (sec), leaf count = 58

$$\left\{y(x) = ODESolStruc\left(\_a, [\left\{\left(\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a)\right)\_b(\_a) + a(\_b(\_a))^2 + \_b(\_a)\,b + c\_a = 0\right\}, \left\{\_a = y(x), \_b\right.\right.\right.$$

2.1638 ODE No. 1638

$$ay'(x)^2 + b\sin(y(x)) + y''(x) = 0$$

✗ **Mathematica** : cpu = 100.121 (sec), leaf count = 0 , could not solve

```
DSolve[b*Sin[y[x]] + a*Derivative[1][y][x]^2 + Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 0.199 (sec), leaf count = 115

$$\left\{\int^{y(x)}(-4\,a^2-1)\frac{1}{\sqrt{16\,(a^2+1/4)^2\,\_C1\,\mathrm{e}^{-2\_a\,a} - 16\,(a^2+1/4)\,(a\sin(\_a) - 1/2\,\cos(\_a))\,b}}d\_a - x - \_C2 =\right.$$

2.1639 ODE No. 1639

$$ay'(x)\left|y'(x)\right|+b\sin(y(x))+y''(x)=0$$

✗ **Mathematica** : cpu = 41.09 (sec), leaf count = 0 , could not solve

```
DSolve[b*Sin[y[x]] + a*Abs[Derivative[1][y][x]]*Derivative[1][y][x] + Derivative[2][y][x] ==
```

✓ **Maple** : cpu = 3.523 (sec), leaf count = 56

$$\left\{y(x)=ODESolStruc\left(\_a,[\left\{\left(\frac{d}{d\_a}\_b(\_a)\right)\_b(\_a)+a\_b(\_a)\left|\_b(\_a)\right|+b\sin\left(\_a\right)=0\right\},\left\{\_a=y(x),\_l\right.\right.\right.$$

2.1640 ODE No. 1640

$$ay(x)y'(x)^2+by(x)+y''(x)=0$$

✗ **Mathematica** : cpu = 200.148 (sec), leaf count = 0 , could not solve

```
DSolve[b*y[x] + a*y[x]*Derivative[1][y][x]^2 + Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 0.2 (sec), leaf count = 70

$$\left\{\int^{y(x)}a\frac{1}{\sqrt{a\left(e^{-\_a^2a}\_C1\,a-b\right)}}d\_a-x-\_C2=0,\int^{y(x)}-a\frac{1}{\sqrt{a\left(e^{-\_a^2a}\_C1\,a-b\right)}}d\_a-x-\_C2=0\right\}$$

2.1641 ODE No. 1641

$$g(x)y'(x)+h(y(x))y'(x)^2+y''(x)=0$$

✓ **Mathematica** : cpu = 2.06907 (sec), leaf count = 57

$$\left\{\left\{y(x)\to\text{InverseFunction}\left[\int_1^{\#1}e^{-\int_1^{K[4]}-h(K[1])\,dK[1]}\,dK[4]\&\right]\left[\int_1^x c_1\left(-e^{-\int_1^{K[5]}g(K[2])\,dK[2]}\right)\,dK[5]+c_2\right]\right\}\right\}$$

✓ **Maple** : cpu = 0.053 (sec), leaf count = 29

$$\left\{\int^{y(x)}e^{\int h(\_b)\,d\_b}d\_b-\_C1\int e^{-\int g(x)\,dx}\,dx-\_C2=0\right\}$$

2.1642 ODE No. 1642

$$f(x)h(y(x)) + g(x)y'(x) - \frac{j(y(x))y'(x)^2}{h(y(x))} + y''(x) = 0$$

✗ **Mathematica** : cpu = 1.02903 (sec), leaf count = 0 , could not solve

```
DSolve[f[x]*h[y[x]] + g[x]*Derivative[1][y][x] - (j[y[x]]*Derivative[1][y][x]^2)/h[y[x]] + D
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(diff(y(x),x),x)-j(y(x))/h(y(x))*diff(y(x),x)^2+g(x)*diff(y(x),x)+f(x)*h(y(x))=0,
```

2.1643 ODE No. 1643

$$f(x)y'(x) + g(x)j(y(x)) + h(y(x))y'(x)^2 + y''(x) = 0$$

✗ **Mathematica** : cpu = 0.385942 (sec), leaf count = 0 , could not solve

```
DSolve[g[x]*j[y[x]] + f[x]*Derivative[1][y][x] + h[y[x]]*Derivative[1][y][x]^2 + Derivative[
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve((1-D(j)(y(x)))/j(y(x))*diff(y(x),x)^2+f(x)*diff(y(x),x)+diff(diff(y(x),x),x)+g(x)*j(y
```

2.1644 ODE No. 1644

$$h(y(x))y'(x)^2 + j(y(x))y'(x) + k(y(x)) + y''(x) = 0$$

✗ **Mathematica** : cpu = 51.1569 (sec), leaf count = 0 , could not solve

```
DSolve[k[y[x]] + j[y[x]]*Derivative[1][y][x] + h[y[x]]*Derivative[1][y][x]^2 + Derivative[2]
```

✓ **Maple** : cpu = 0.556 (sec), leaf count = 56

$$\left\{y(x) = ODESolStruc\left(\_a, [\left\{\left(\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a)\right)\_b(\_a) + h(\_a)\left(\_b(\_a)\right)^2 + \_b(\_a) + k(\_a) = 0\right\}, \left\{\_a = y(\right.\right.\right.$$

2.1645 ODE No. 1645

$$\left(y'(x)^2 + 1\right)\left(y'(x)h(x, y(x)) + j(x, y(x))\right) + y''(x) = 0$$

✗ **Mathematica** : cpu = 0.153304 (sec), leaf count = 0 , could not solve

```
DSolve[(j[x, y[x]] + h[x, y[x]]*Derivative[1][y][x])*(1 + Derivative[1][y][x]^2) + Derivativ
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(diff(y(x),x),x)+(diff(y(x),x)^2+1)*(h(x,y(x))*diff(y(x),x)+j(x,y(x)))=0,y(x))
```

2.1646 ODE No. 1646

$$ay(x)\left(y'(x)^2+1\right)^2+y''(x)=0$$

✓ **Mathematica** : cpu = 10.8255 (sec), leaf count = 262

$$\left\{\left\{y(x)\to \text{InverseFunction}\left[-\frac{\sqrt{\frac{\#1^2(-a)+2c_1+1}{2c_1+1}}\sqrt{2\#1^2a-4c_1}E\left(\sin^{-1}\left(\sqrt{\frac{a}{2c_1+1}}\#1\right)|1+\frac{1}{2c_1}\right)}{\sqrt{\frac{a}{2c_1+1}}\sqrt{\#1^2(-a)+2c_1+1}\sqrt{2-\frac{\#1^2a}{c_1}}}\&\right][c_2+x]\right\},\left\{\right.$$

✓ **Maple** : cpu = 0.174 (sec), leaf count = 94

$$\left\{\int^{y(x)}a\left(\_a^2+2\_C1\right)\frac{1}{\sqrt{-a\left(\_a^2+2\_C1\right)\left(-1+a\left(\_a^2+2\_C1\right)\right)}}d\_a-x-\_C2=0,\int^{y(x)}-a\left(\_a^2+2\_\right.$$

2.1647 ODE No. 1647

$$y''(x)-a\left(xy'(x)-y(x)\right)^r=0$$

✓ **Mathematica** : cpu = 52.1782 (sec), leaf count = 59

$$\left\{\left\{y(x)\to x\left(\int_1^x\left(\frac{1}{2}aK[2]^{2r}-\frac{1}{2}arK[2]^{2r}+c_1K[2]^{2r-2}\right)^{\frac{1}{1-r}}dK[2]+c_2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.559 (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

$$y''(x)-kx^ay(x)^by'(x)^c=0$$

✗ **Mathematica** : cpu = 0.0848738 (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 = 1.788 (sec), leaf count = 205

$$\left\{y(x)=ODESolStruc\left(\_a\,\mathrm{e}^{\int-\_b(\_a)\,\mathrm{d}\_a+\_C1},[\left\{\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a)=\frac{(\_b(\_a))^2}{(a-c+2)^2}\left(-k\_a^b\_b(\_a)\,(b+c-1)^2\left(-\frac{(a\right.\right.\right.\right.$$

2.1649 ODE No. 1649

$$h(x,y(x))\left(y'(x)-\frac{y(x)}{x}\right)^{a}+y''(x)=0$$

✗ **Mathematica** : cpu = 2.82468 (sec), leaf count = 0 , could not solve

```
DSolve[h[x, y[x]]*(-(y[x]/x) + Derivative[1][y][x])^a + Derivative[2][y][x] == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(diff(y(x),x),x)+(diff(y(x),x)-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 = 0.0222216 (sec), leaf count = 19

$$\left\{\left\{y(x)\to\frac{\cosh\left(ax+c_1\right)}{a}+c_2\right\}\right\}$$

✓ **Maple** : cpu = 0.288 (sec), leaf count = 16

$$\left\{y(x)=\frac{\cosh\left(a(x+\_C1)\right)}{a}+\_C2\right\}$$

2.1651 ODE No. 1651

$$a\left(-\sqrt{y'(x)^2+1}\right)-b+y''(x)=0$$

✓ **Mathematica** : cpu = 0.279715 (sec), leaf count = 414

$$\left\{\left\{y(x)\to\frac{a\text{InverseFunction}\left[\frac{\frac{b\tan^{-1}\left(\frac{\#1b}{\sqrt{\#1^2+1}\sqrt{a^2-b^2}}\right)}{\sqrt{a^2-b^2}}-\frac{b\tan^{-1}\left(\frac{\#1a}{\sqrt{a^2-b^2}}\right)}{\sqrt{a^2-b^2}}+\sinh^{-1}(\#1)}{a}\&\right]\left[c_1+x\right]^2-b\sqrt{\text{InverseFuncti}}}{a^2\sqrt{\text{Inv}}}\right.\right.$$

✓ **Maple** : cpu = 0.185 (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 = 0.854337 (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 = 0.329 (sec), leaf count = 36

$$\left\{y(x) = \mathrm{e}^{\int RootOf\left(x - \int^{-Z}\left(a\sqrt{\_f^2+b} - \_f^2\right)^{-1}d\_f + \_C1\right)\mathrm{d}x + \_C2}\right\}$$

2.1653 ODE No. 1653

$$y''(x) - a\left(y'(x)^2 + 1\right)^{3/2} = 0$$

✓ **Mathematica** : cpu = 0.0685451 (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 = 0.143 (sec), leaf count = 41

$$\left\{y(x) = \frac{1}{a}\left(\left(-1 + (x + \_C1)^2 a^2\right)\sqrt{-\left(-1 + (x + \_C1)^2 a^2\right)^{-1}} + \_C2\, a\right)\right\}$$

2.1654 ODE No. 1654

$$y''(x) - 2ax\left(y'(x)^2 + 1\right)^{3/2} = 0$$

✓ **Mathematica** : cpu = 0.308214 (sec), leaf count = 308

$$\left\{\left\{y(x) \to c_2 - \frac{\sqrt{\frac{ax^2+c_1-1}{c_1-1}}\sqrt{\frac{ax^2+c_1+1}{c_1+1}}\left(F\left(i\sinh^{-1}\left(x\sqrt{\frac{a}{c_1+1}}\right)|\frac{c_1+1}{c_1-1}\right) + (c_1 - 1)\,E\left(i\sinh^{-1}\left(x\sqrt{\frac{a}{c_1+1}}\right)|\frac{c_1+1}{c_1-1}\right)\right)}{\sqrt{\frac{a}{c_1+1}}\sqrt{a^2x^4 + 2ac_1x^2 + c_1^2 - 1}}\right.\right.$$

✓ **Maple** : cpu = 0.194 (sec), leaf count = 38

$$\left\{y(x) = \int\sqrt{-\left(-1 + (x^2 + 2\_C1)^2 a^2\right)^{-1}}a\left(x^2 + 2\_C1\right)\,\mathrm{d}x + \_C2\right\}$$

2.1655 ODE No. 1655

$$y''(x) - ay(x)\left(y'(x)^2 + 1\right)^{3/2} = 0$$

✓ **Mathematica** : cpu = 0.889312 (sec), leaf count = 350

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[-\frac{\sqrt{\frac{\#1^2 a + 2c_1 - 2}{c_1 - 1}}\sqrt{\frac{\#1^2 a + 2c_1 + 2}{c_1 + 1}}\left(F\left(i \sinh^{-1}\left(\sqrt{\frac{a}{2c_1+2}}\#1\right) | \frac{c_1+1}{c_1-1}\right) + (c_1 - 1)\, E\left(i \sinh^{-1}\right.\right.}{\sqrt{\frac{a}{2c_1+2}}\sqrt{\#1^4 a^2 + 4\#1^2 a c_1 + 4c_1^2 - 4}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.231 (sec), leaf count = 84

$$\left\{\int^{y(x)} a\left(\_a^2 + 2\_C1\right)\frac{1}{\sqrt{4 - a^2\left(\_a^2 + 2\_C1\right)^2}}d\_a - x - \_C2 = 0, \int^{y(x)} -a\left(\_a^2 + 2\_C1\right)\frac{1}{\sqrt{4 - a^2\left(\_a^2 \right.}}\right.$$

2.1656 ODE No. 1656

$$y''(x) - a\left(y'(x)^2 + 1\right)^{3/2}(bx + c + y(x)) = 0$$

✗ **Mathematica** : cpu = 100.324 (sec), leaf count = 0 , could not solve

```
DSolve[-(a*(c + b*x + y[x])*(1 + Derivative[1][y][x]^2)^(3/2)) + Derivative[2][y][x] == 0, y
```

✓ **Maple** : cpu = 0.804 (sec), leaf count = 771

$$\left\{y(x) = -bx + RootOf\left(-x + \int^{\_Z}\frac{1}{\left(\_f^4 a^2 + 4\_f^3 a^2 c + 4\_f^2 a^2 c^2 - 4\_C1\_f^2 a^2 - 8\_C1\_f a^2 c + 4\_C1^2 a^2\right.}\right.\right.$$

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 = 0.153641 (sec), leaf count = 33

$$\left\{\left\{y(x) \to \sqrt{2}e^{c_1}\tan\left(2\sqrt{2}e^{3c_1}(c_2 + x)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.281 (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 = 0.120271 (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 = 0.146 (sec), leaf count = 115

$$\left\{y(x) = ODESolStruc\left(-\frac{a\left(\int \_b(\_a)\,\mathrm{d}\_a + \_C1\right) - \_a\,b}{b}, [\left\{\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a) = -h\left(\frac{-a\_b(\_a) + b}{\_b\,(\_a)\,b}, \_a\,b\right)(\_b(\right.\right.\right.$$

2.1659 ODE No. 1659

$$y''(x) - y(x)h\left(x, \frac{y'(x)}{y(x)}\right) = 0$$

✗ **Mathematica** : cpu = 10.5225 (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 = 0.097 (sec), leaf count = 60

$$\left\{y(x) = ODESolStruc\left(\mathrm{e}^{\int \_b(\_a)\,\mathrm{d}\_a + \_C1}, [\left\{\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a) = -(\_b(\_a))^2 + h(\_a, \_b(\_a))\right\}, \left\{\_a = x, \_b(\_a\right.\right.\right.$$

2.1660 ODE No. 1660

$$y''(x) - x^{n-2}h(x^{-n}y(x), x^{1-n}y'(x)) = 0$$

✗ **Mathematica** : cpu = 4.43017 (sec), leaf count = 0 , could not solve

```
DSolve[-(x^(-2 + n)*h[y[x]/x^n, x^(1 - n)*Derivative[1][y][x]]) + Derivative[2][y][x] == 0,
```

✓ **Maple** : cpu = 0.86 (sec), leaf count = 125

$$\left\{y(x) = ODESolStruc\left(\frac{\_a}{\mathrm{e}^{-\left(\int \_b(\_a)\,\mathrm{d}\_a + \_C1\right)n}}, [\left\{\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a) = (\_b(\_a))^2\left(-\_b(\_a)\,h\left(\_a, \frac{\_b(\_a)\,\_a\,n + 1}{\_b\,(\_a)}\right.\right.\right.\right.\right.$$

2.1661 ODE No. 1661

$$8y''(x) + 9y'(x)^4 = 0$$

✓ **Mathematica** : cpu = 0.0305166 (sec), leaf count = 90

$$\left\{\left\{y(x) \to c_2 - \frac{1}{3}\sqrt[3]{-\frac{1}{3}}(9x - 8c_1)^{2/3}\right\}, \left\{y(x) \to \frac{(9x - 8c_1)^{2/3}}{3\sqrt[3]{3}} + c_2\right\}, \left\{y(x) \to \frac{1}{9}\left((-3)^{2/3}(9x - 8c_1)^{2/3} + 9c\right.\right.\right.$$

✓ **Maple** : cpu = 0.089 (sec), leaf count = 51

$$\left\{y(x) = (x + \_C1)^{\frac{2}{3}} + \_C2, y(x) = \frac{i\sqrt{3} - 1}{2}(x + \_C1)^{\frac{2}{3}} + \_C2, y(x) = -\frac{i\sqrt{3} + 1}{2}(x + \_C1)^{\frac{2}{3}} + \_C2\right\}$$

2.1662 ODE No. 1662

$$ay''(x) + cy(x) + h(y'(x)) = 0$$

✗ **Mathematica** : cpu = 1.43018 (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 = 0.401 (sec), leaf count = 56

$$\left\{y(x) = ODESolStruc\left(\_a, [\left\{\left(\frac{d}{d\_a}\_b(\_a)\right)\_b(\_a) + \frac{h(\_b(\_a)) + c\_a}{a} = 0\right\}, \left\{\_a = y(x), \_b(\_a) = \frac{d}{dx}y\right.\right.\right.$$

2.1663 ODE No. 1663

$$-xy(x)^n + xy''(x) + 2y'(x) = 0$$

✗ **Mathematica** : cpu = 0.0337631 (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 = 0.948 (sec), leaf count = 125

$$\left\{y(x) = ODESolStruc\left(\_a\, e^{\int -\_b(\_a)\, d\_a + \_C1}, [\left\{\frac{d}{d\_a}\_b(\_a) = -\frac{\left(\_b(\_a)(n-1)^2\_a^n + 2\_a(n-3)\_b(\_a\right.}{4}\right.\right.\right.$$

2.1664 ODE No. 1664

$$ax^m y(x)^n + xy''(x) + 2y'(x) = 0$$

✗ **Mathematica** : cpu = 0.542318 (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 = 3.003 (sec), leaf count = 155

$$\left\{y(x) = ODESolStruc\left(\_a\, e^{\int \_b(\_a)\, d\_a + \_C1}, [\left\{\frac{d}{d\_a}\_b(\_a) = \frac{\left(a\_b(\_a)\,(n-1)^2\,\_a^n + (m+1)\,(\_a\,(m-n\right.}{(m+1)}\right.\right.\right.$$

2.1665 ODE No. 1665

$$xy''(x) + 2y'(x) + xe^{y(x)} = 0$$

✗ **Mathematica** : cpu = 0.368311 (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 = 0.605 (sec), leaf count = 84

$$\left\{y(x) = ODESolStruc\left(\_a - 2\int \_b(\_a)\, d\_a - 2\_C1, [\left\{\frac{d}{d\_a}\_b(\_a) = (e^{-\_a} - 2)\,(\_b(\_a))^3 + (\_b(\_a))^2\right\}\right.\right.$$

2.1666 ODE No. 1666

$$ay'(x) + bxe^{y(x)} + xy''(x) = 0$$

✗ **Mathematica** : cpu = 0.60389 (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 = 0.973 (sec), leaf count = 93

$$\left\{y(x) = ODESolStruc\left(\_a - 2\int \_b(\_a)\, d\_a - 2\_C1, [\left\{\frac{d}{d\_a}\_b(\_a) = (be^{-\_a} - 2\,a + 2)\,(\_b(\_a))^3 + (a-1\right.\right.\right.$$

2.1667 ODE No. 1667

$$bx^{5-2a}e^{y(x)} + ay'(x) + xy''(x) = 0$$

✗ **Mathematica** : cpu = 0.809544 (sec), leaf count = 0 , could not solve

```
DSolve[b*E^y[x]*x^(5 - 2*a) + a*Derivative[1][y][x] + x*Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 1.575 (sec), leaf count = 121

$$\left\{ y(x) = ODESolStruc\left((2\,a-6) \int \_b(\_a)\ \mathrm{d}\_a + 2\_C1\,a + \_a - 6\_C1, [\left\{ \frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a) = \left(b\mathrm{e}^{-\_a} + 2\,a^2 - 8\,a \right.\right.\right.$$

2.1668 ODE No. 1668

$$xy''(x) - (1 - y(x))y'(x) = 0$$

✓ **Mathematica** : cpu = 0.0715427 (sec), leaf count = 46

$$\left\{ \left\{ y(x) \to 2 - \sqrt{2}\sqrt{c_1+2}\tanh\left(\frac{\sqrt{c_1+2}(2c_2 - \log(x))}{\sqrt{2}} \right) \right\} \right\}$$

✓ **Maple** : cpu = 0.172 (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 = 137.104 (sec), leaf count = 74

$$\text{Solve}\left[\int_1^x -\frac{c_1e^{K[2]} + K[2] + 1}{c_1e^{K[2]}K[2] + 2K[2]^2 + K[2]}\,dK[2] + c_2 = \int_1^{y(x)} -\frac{x}{c_1e^{xK[1]} + 2xK[1] + 1}\,dK[1], y(x) \right]$$

✓ **Maple** : cpu = 0.129 (sec), leaf count = 32

$$\left\{ y(x) = \frac{1}{x}RootOf\left(-\ln(x) + \_C2 + \int^{\_Z} -\left(\mathrm{e}^{\_f}\_C1 - 2\_f - 1 \right)^{-1} d\_f \right) \right\}$$

2.1670 ODE No. 1670

$$a(xy'(x) - y(x))^2 - b + xy''(x) = 0$$

✓ **Mathematica** : cpu = 83.969 (sec), leaf count = 49

$$\left\{\left\{y(x) \to x\left(\int_1^x \frac{\sqrt{-\frac{b}{a}}\tan\left(\frac{bK[2]}{\sqrt{-\frac{b}{a}}} + c_1\right)}{K[2]^2} dK[2] + c_2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.414 (sec), leaf count = 35

$$\left\{y(x) = \left(\int \frac{i}{x^2}\tan\left(-i\sqrt{a}\sqrt{b}x + \_C1\right)\sqrt{b}\frac{1}{\sqrt{a}}\,\mathrm{d}x + \_C2\right)x\right\}$$

2.1671 ODE No. 1671

$$2xy''(x) + y'(x)^3 + y'(x) = 0$$

✓ **Mathematica** : cpu = 0.0359265 (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 = 0.095 (sec), leaf count = 35

$$\left\{y(x) = -2\frac{\sqrt{\_C1\,x - 1}}{\_C1} + \_C2, y(x) = 2\frac{\sqrt{\_C1\,x - 1}}{\_C1} + \_C2\right\}$$

2.1672 ODE No. 1672

$$x^2y''(x) - a(y(x)^n - y(x)) = 0$$

✗ **Mathematica** : cpu = 18.6872 (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 = 0.997 (sec), leaf count = 65

$$\left\{y(x) = ODESolStruc\left(\_a, [\left\{\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a) = (\_b(\_a))^2\left(\_a\,\_b(\_a)\,a - \_a^n\,\_b(\_a)\,a - 1\right)\right\}, \left\{\_a = y(x), \_\right.\right.\right.$$

2.1673 ODE No. 1673

$$a\left(e^{y(x)}-1\right)+x^2y''(x)=0$$

✗ **Mathematica** : cpu = 31.399 (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 = 0.814 (sec), leaf count = 60

$$\left\{y(x)=ODESolStruc\left(\_a,[\left\{\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a)=(\_b(\_a))^2\left(-1+a(\mathrm{e}^{-\_a}-1)\_b(\_a)\right)\right\},\left\{\_a=y(x),\_b(\_a)=\right.\right.\right.$$

2.1674 ODE No. 1674

$$y(x)\left(a(a+b)+b^2c^2x^{2b}\right)-x(2a+b-1)y'(x)+x^2y''(x)=0$$

✓ **Mathematica** : cpu = 0.0619403 (sec), leaf count = 69

$$\left\{\left\{y(x)\to 2^{-\frac{a+b}{b}}c^{a/b}\left(x^{2b}\right)^{\frac{a}{2b}}\left(c_2\sin\left(c\sqrt{x^{2b}}\right)+2c_1\cos\left(c\sqrt{x^{2b}}\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.084 (sec), leaf count = 25

$$\left\{y(x)=x^a\left(\cos\left(x^bc\right)\_C2+\sin\left(x^bc\right)\_C1\right)\right\}$$

2.1675 ODE No. 1675

$$x^k\left(-h\left(x^ky(x),ky(x)+xy'(x)\right)\right)+(a+1)xy'(x)+x^2y''(x)=0$$

✗ **Mathematica** : cpu = 3.49729 (sec), leaf count = 0 , could not solve

```
DSolve[-(x^k*h[x^k*y[x], k*y[x] + x*Derivative[1][y][x]]) + (1 + a)*x*Derivative[1][y][x] +
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(x^2*diff(diff(y(x),x),x)+(a+1)*x*diff(y(x),x)-x^k*h(x^k*y(x),x*diff(y(x),x)+k*y(x))=0
```

2.1676 ODE No. 1676

$$a(xy'(x)-y(x))^2-bx^2+x^2y''(x)=0$$

✓ **Mathematica** : cpu = 51.7305 (sec), leaf count = 117

$$\left\{\left\{y(x)\to x\left(c_2+\int_1^x\frac{i\sqrt{b}\left(Y_1\left(-i\sqrt{a}\sqrt{b}K[2]\right)-c_1J_1\left(i\sqrt{a}\sqrt{b}K[2]\right)\right)}{\sqrt{a}K[2]\left(c_1J_0\left(i\sqrt{a}\sqrt{b}K[2]\right)+Y_0\left(-i\sqrt{a}\sqrt{b}K[2]\right)\right)}dK[2]\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.29 (sec), leaf count = 72

$$\left\{y(x)=\left(\int-\frac{1}{ax}\sqrt{-ab}\left(\_C1\,Y_1\left(\sqrt{-ab}x\right)+J_1\left(\sqrt{-ab}x\right)\right)\left(\_C1\,Y_0\left(\sqrt{-ab}x\right)+J_0\left(\sqrt{-ab}x\right)\right)^{-1}\mathrm{d}x+\_C2\right)x$$

2.1677 ODE No. 1677

$$ay(x)y'(x)^2+bx+x^2y''(x)=0$$

✗ **Mathematica** : cpu = 104.751 (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 = 1.937 (sec), leaf count = 101

$$\left\{y(x)=ODESolStruc\left(\_a\,\mathrm{e}^{\int\_b(\_a)\,\mathrm{d}\_a+\_C1},[\left\{\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a)=\left(a\_a^3+b\right)(\_b(\_a))^3+\left(2\_a^2a+1\right)(\_b(\_a)\right.\right.\right.$$

2.1678 ODE No. 1678

$$x^2y''(x)-\sqrt{ax^2y'(x)^2+by(x)^2}=0$$

✗ **Mathematica** : cpu = 1.57424 (sec), leaf count = 0 , could not solve

```
DSolve[-Sqrt[b*y[x]^2 + a*x^2*Derivative[1][y][x]^2] + x^2*Derivative[2][y][x] == 0, y[x], x
```

✓ **Maple** : cpu = 0.289 (sec), leaf count = 60

$$\left\{y(x)-\mathrm{e}^{\int^{\ln(x)}RootOf\left(\int^{\_Z}-y(x)\left(\_a^2y(x)-\_a\,y(x)-\sqrt{(y(x))^2(\_a^2a+b)}\right)^{-1}d\_a-\_b+\_C1\right)d\_b+\_C2}=0\right\}$$

2.1679 ODE No. 1679

$$\left(x^2+1\right)y''(x)+y'(x)^2+1=0$$

✓ **Mathematica** : cpu = 0.084783 (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 = 0.157 (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

$$x^4\left(-y'(x)^2\right)+4x^2y''(x)+4y(x)=0$$

✗ **Mathematica** : cpu = 11.5159 (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 = 0.626 (sec), leaf count = 103

$$\left\{y(x)=ODESolStruc\left(\frac{\_a}{\left(e^{\int\_b(\_a)\,d\_a+\_C1}\right)^2},[\left\{\frac{d}{d\_a}\_b(\_a)=\left(-\_a^2+7\_a\right)(\_b(\_a))^3+(\_a-5)\,(\_b(\_a\right.\right.\right.$$

2.1681 ODE No. 1681

$$ay(x)^3+9x^2y''(x)+2y(x)=0$$

✗ **Mathematica** : cpu = 3.53749 (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 = 0.06 (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

$$x^3 (y''(x) + y(x)y'(x) - y(x)^3) + 12xy(x) + 24 = 0$$

✗ **Mathematica** : cpu = 22.71 (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]) == 0,
```

✓ **Maple** : cpu = 0.641 (sec), leaf count = 94

$$\left\{y(x) = ODESolStruc\left(\_a\, e^{\int -\_b(\_a)\, d\_a + \_C1}, [\left\{\frac{d}{d\_a}\_b(\_a) = -((\_a^3 + \_a^2 - 14\_a - 24)\_b(\_a) + \_a - 3\right.\right.$$

2.1683 ODE No. 1683

$$x^3 y''(x) - a(xy'(x) - y(x))^2 = 0$$

✓ **Mathematica** : cpu = 0.0768538 (sec), leaf count = 25

$$\left\{\left\{y(x) \to -\frac{x \log\left(-\frac{a(c_2 x + c_1)}{x}\right)}{a}\right\}\right\}$$

✓ **Maple** : cpu = 0.062 (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

$$xy(x)\left(a - 2x^2 y(x)^2 + 3xy(x)\right) + b + 2x^3 y''(x) + x^2(2xy(x) + 9)y'(x) = 0$$

✗ **Mathematica** : cpu = 62.4747 (sec), leaf count = 0 , could not solve

```
DSolve[b + x*y[x]*(a + 3*x*y[x] - 2*x^2*y[x]^2) + x^2*(9 + 2*x*y[x])*Derivative[1][y][x] + 2
```

✓ **Maple** : cpu = 1.661 (sec), leaf count = 100

$$\left\{y(x) = ODESolStruc\left(\_a\, e^{\int -\_b(\_a)\, d\_a + \_C1}, [\left\{\frac{d}{d\_a}\_b(\_a) = \frac{((-2\_a^3 + \_a^2 + (a-5)\_a + b)\_b(\_a) - 2}{2}\right.\right.$$

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 = 5.59981 (sec), leaf count = 0 , could not solve

```
DSolve[b + a*x*y[x] - (-12*x^2 + k*x^(-1 + k))*(y[x]^2 + 3*Derivative[1][y][x]) + 2*(4*x^3 -
y[x]^3 + y[x]*Derivative[1][y][x] + Derivative[2][y][x]) == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(2*(-x^k+4*x^3)*(diff(diff(y(x),x),x)+y(x)*diff(y(x),x)-y(x)^3)-(k*x^(k-
1)-12*x^2)*(3*diff(y(x),x)+y(x)^2)+a*x*y(x)+b=0,y(x))
```

2.1686 ODE No. 1686

$$a^2y(x)^n+x^4y''(x)=0$$

✗ **Mathematica** : cpu = 0.0336719 (sec), leaf count = 0 , could not solve

```
DSolve[a^2*y[x]^n + x^4*Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 1.169 (sec), leaf count = 128

$$\left\{y(x)=ODESolStruc\left(\_a\,e^{\int\_b(\_a)\,d\_a+\_C1},[\left\{\frac{d}{d\_a}\_b(\_a)=\frac{\left(a^2\_b(\_a)\,(n-1)^2\,\_a^n-2\,\_a\,(n-3)\,\_b(\_a\right.}{4}\right.\right.\right.$$

2.1687 ODE No. 1687

$$x^4y''(x)-x\left(x^2+2y(x)\right)y'(x)+4y(x)^2=0$$

✓ **Mathematica** : cpu = 0.0696013 (sec), leaf count = 83

$$\left\{\left\{y(x)\to\frac{x^2\left(\left(1-i\sqrt{-c_1-1}\right)x^{2i\sqrt{-c_1-1}}+\left(1+i\sqrt{-c_1-1}\right)c_2\right)}{c_2+x^{2i\sqrt{-c_1-1}}}\right\}\right\}$$

✓ **Maple** : cpu = 0.135 (sec), leaf count = 21

$$\{y(x)=x^2(\tanh(\_C1\,(\_C2-\ln(x)))\,\_C1+1)\}$$

2.1688 ODE No. 1688

$$x^4y''(x) - x^2y'(x)\left(y'(x) + x\right) + 4y(x)^2 = 0$$

✗ **Mathematica** : cpu = 300.001 (sec), leaf count = 0 , timed out

```
$Aborted
```

✓ **Maple** : cpu = 0.118 (sec), leaf count = 32

$$\left\{y(x) = \mathit{RootOf}\left(-\ln(x) + \_C2 - \int^{\_Z}\left(e^{\_f}\_C1 + 4\_f + 2\right)^{-1} d\_f\right)x^2\right\}$$

2.1689 ODE No. 1689

$$x^4y''(x) + \left(xy'(x) - y(x)\right)^3 = 0$$

✓ **Mathematica** : cpu = 0.683331 (sec), leaf count = 259

$$\left\{\left\{y(x) \to -ix\log\left(-\frac{\sqrt{-8ic_1x^2 - \sinh(2c_2) - \cosh(2c_2)} + i\sinh(c_2) + i\cosh(c_2)}{4c_1x}\right)\right\}, \left\{y(x) \to -ix\log\left(\frac{-\sqrt{}}{}\right.\right.$$

✓ **Maple** : cpu = 0.164 (sec), leaf count = 37

$$\left\{y(x) = \left(-\arctan\left(\frac{1}{\sqrt{\_C1\,x^2 - 1}}\right) + \_C2\right)x, y(x) = \left(\arctan\left(\frac{1}{\sqrt{\_C1\,x^2 - 1}}\right) + \_C2\right)x\right\}$$

2.1690 ODE No. 1690

$$\sqrt{x}y''(x) - y(x)^{3/2} = 0$$

✗ **Mathematica** : cpu = 22.542 (sec), leaf count = 0 , could not solve

```
DSolve[-y[x]^(3/2) + Sqrt[x]*Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 0.908 (sec), leaf count = 99

$$\left\{y(x) = \mathit{ODESolStruc}\left(\frac{\_a}{\left(e^{\int \_b(\_a)\,d\_a + \_C1}\right)^3}, \left[\left\{\frac{d}{d\_a}\_b(\_a) = -(\_b(\_a))^3\,\_a^{\frac{3}{2}} + 12\,(\_b(\_a))^3\,\_a - 7\,(\_b(\right.\right.\right.$$

2.1691 ODE No. 1691

$$y''(x)\left(ax^2+bx+c\right)^{3/2}-f\left(\frac{y(x)}{\sqrt{ax^2+bx+c}}\right)=0$$

✗ **Mathematica** : cpu = 61.3411 (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] == 0, y[
```

✓ **Maple** : cpu = 1.253 (sec), leaf count = 254

$$\left\{y(x)=RootOf\left(-2\int^{\_Z}\frac{a}{\sqrt{4\_C1\,a^2-4\,c\_g^2a+b^2\_g^2+8\int F\left(\_g\right)\mathrm{d}\_g}}d\_g\sqrt{4\,ca-b^2}-2\,a\arctan\left(\frac{2\,a}{\sqrt{4\,c}}\right.\right.\right.$$

2.1692 ODE No. 1692

$$x^{\frac{n}{n+1}}y''(x)-y(x)^{\frac{2n+1}{n+1}}=0$$

✗ **Mathematica** : cpu = 0.0823165 (sec), leaf count = 0 , could not solve

```
DSolve[-y[x]^((1 + 2*n)/(1 + n)) + x^(n/(1 + n))*Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 4.051 (sec), leaf count = 156

$$\left\{y(x)=ODESolStruc\left(\_a\left(e^{\frac{\left(\int\_b(\_a)\,\mathrm{d}\_a+\_C1\right)(n+2)}{n}}\right)^{-1},[\left\{\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a)=2\,\frac{\left(\_b(\_a)\right)^2}{n^2}\left(-1/2\,\_a^{\frac{2\,n+1}{n+1}}\_b(\_a)\,n^2\right.\right.\right.\right.$$

2.1693 ODE No. 1693

$$-h\big(y(x),f(x)y'(x)\big)+f(x)f'(x)y'(x)+f(x)^2y''(x)=0$$

✗ **Mathematica** : cpu = 1.05138 (sec), leaf count = 0 , could not solve

```
DSolve[-h[y[x], f[x]*Derivative[1][y][x]] + f[x]*Derivative[1][f][x]*Derivative[1][y][x] + f
```

✓ **Maple** : cpu = 0.31 (sec), leaf count = 68

$$\left\{y(x)=ODESolStruc\left(\_a,[\left\{\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a)=-h\left(\_a,\left(\_b(\_a)\right)^{-1}\right)\left(\_b(\_a)\right)^3\right\},\left\{\_a=y(x),\_b(\_a)=\frac{}{f\left(x\right.}\right.\right.\right.$$

2.1694 ODE No. 1694

$$y(x)y''(x) - a = 0$$

✓ **Mathematica** : cpu = 0.198753 (sec), leaf count = 111

$$\left\{\left\{y(x) \to \exp\left(-\frac{c_1 + 2a\mathrm{erf}^{-1}\left(-i\sqrt{\frac{2}{\pi}}\sqrt{ae^{\frac{c_1}{a}}\left(c_2+x\right)^2}\right)^2}{2a}\right)\right\}, \left\{y(x) \to \exp\left(-\frac{c_1 + 2a\mathrm{erf}^{-1}\left(i\sqrt{\frac{2}{\pi}}\sqrt{ae^{\frac{c_1}{a}}\left(c\right.\right.\right.}{2a}\right.\right.$$

✓ **Maple** : cpu = 0.146 (sec), leaf count = 54

$$\left\{\int^{y(x)} \frac{1}{\sqrt{2\ln(\_a)\,a - 2\_C1\,a}} d\_a - x - \_C2 = 0, \int^{y(x)} -\frac{1}{\sqrt{-2\,a\,(\_C1 - \ln(\_a))}} d\_a - x - \_C2 = 0\right\}$$

2.1695 ODE No. 1695

$$y(x)y''(x) - ax = 0$$

✗ **Mathematica** : cpu = 25.5162 (sec), leaf count = 0 , could not solve

```
DSolve[-(a*x) + y[x]*Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 0.662 (sec), leaf count = 103

$$\left\{y(x) = ODESolStruc\left(\_a\left(e^{\int -\_b(\_a)\,\mathrm{d}\_a + \_C1}\right)^{\frac{3}{2}}, [\left\{\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a) = \frac{(3\_a^2 - 4\,a)\,(\_b(\_a))^3}{4\_a} + 2\,(\_b(\_a))^2\right\},\right.\right.$$

2.1696 ODE No. 1696

$$y(x)y''(x) - ax^2 = 0$$

✗ **Mathematica** : cpu = 24.2305 (sec), leaf count = 0 , could not solve

```
DSolve[-(a*x^2) + y[x]*Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 0.544 (sec), leaf count = 100

$$\left\{y(x) = ODESolStruc\left(\_a\left(e^{\int -\_b(\_a)\,\mathrm{d}\_a + \_C1}\right)^{2}, [\left\{\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a) = \frac{(2\_a^2 - a)\,(\_b(\_a))^3}{\_a} + 3\,(\_b(\_a))^2\right\}, \left\{\right.\right.\right.$$

2.1697 ODE No. 1697

$$-a + y(x)y''(x) + y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.0655535 (sec), leaf count = 68

$$\left\{\left\{y(x)\to -\frac{\sqrt{a^2 (c_2+x)^2 - e^{2c_1}}}{\sqrt{a}}\right\},\left\{y(x)\to \frac{\sqrt{a^2 (c_2+x)^2 - e^{2c_1}}}{\sqrt{a}}\right\}\right\}$$

✓ **Maple** : cpu = 0.051 (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 = 0.0420965 (sec), leaf count = 63

$$\left\{\left\{y(x)\to -\sqrt{\frac{ax^3}{3} + bx^2 + c_2x + 2c_1}\right\},\left\{y(x)\to \sqrt{\frac{ax^3}{3} + bx^2 + c_2x + 2c_1}\right\}\right\}$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(diff(y(x),x),x)*y(x)+y(x)^2-a*x-b=0,y(x))
```

2.1699 ODE No. 1699

$$y(x)y''(x) + y'(x)^2 - y'(x) = 0$$

✓ **Mathematica** : cpu = 0.0377213 (sec), leaf count = 32

$$\left\{\left\{y(x)\to -c_1\left(W\left(-\frac{e^{-\frac{c_1+c_2+x}{c_1}}}{c_1}\right)+1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.112 (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 = 0.0837369 (sec), leaf count = 44

$$\left\{\left\{y(x)\to -e^{-c_1}\sinh\left(e^{c_1}(c_2+x)\right)\right\},\left\{y(x)\to e^{-c_1}\sinh\left(e^{c_1}(c_2+x)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.392 (sec), leaf count = 86

$$\left\{y(x)=\frac{1}{2}\left(-\_C1\left(\mathrm{e}^{\frac{x}{\_C1}}\right)^2\left(\mathrm{e}^{\frac{\_C2}{\_C1}}\right)^2+\_C1\right)\left(\mathrm{e}^{\frac{\_C2}{\_C1}}\right)^{-1}\left(\mathrm{e}^{\frac{x}{\_C1}}\right)^{-1},y(x)=\frac{1}{2}\left(\_C1\left(\mathrm{e}^{\frac{x}{\_C1}}\right)^2\left(\mathrm{e}^{\frac{\_C2}{\_C1}}\right)^2-\_C1\right)\right.$$

2.1701 ODE No. 1701

$$y(x)y''(x) - y'(x)^2 - 1 = 0$$

✓ **Mathematica** : cpu = 0.193117 (sec), leaf count = 79

$$\left\{\left\{y(x)\to\frac{1}{2}e^{-e^{c_1}(c_2+x)}\left(e^{2e^{c_1}(c_2+x)-2c_1}+1\right)\right\},\left\{y(x)\to\frac{1}{2}e^{-e^{c_1}(c_2+x)}\left(e^{2e^{c_1}(c_2+x)}+e^{-2c_1}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.354 (sec), leaf count = 42

$$\left\{y(x)=\frac{\_C1}{2}\left(\left(\mathrm{e}^{\frac{\_C2}{\_C1}}\right)^2\left(\mathrm{e}^{\frac{x}{\_C1}}\right)^2+1\right)\left(\mathrm{e}^{\frac{\_C2}{\_C1}}\right)^{-1}\left(\mathrm{e}^{\frac{x}{\_C1}}\right)^{-1}\right\}$$

2.1702 ODE No. 1702

$$e^{2x}\left(ay(x)^4+b\right)+e^xy(x)\left(cy(x)^2+d\right)+y(x)y''(x)-y'(x)^2=0$$

✗ **Mathematica** : cpu = 7.58852 (sec), leaf count = 0 , could not solve

```
DSolve[E^x*y[x]*(d + c*y[x]^2) + E^(2*x)*(b + a*y[x]^4) - Derivative[1][y][x]^2 + y[x]*Deriv
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(diff(y(x),x),x)*y(x)-diff(y(x),x)^2+exp(x)*y(x)*(c*y(x)^2+d)+exp(2*x)*(b+a*y(x)^
```

2.1703 ODE No. 1703

$$y(x)y''(x) - y'(x)^2 + y(x)^2(-\log(y(x))) = 0$$

✓ **Mathematica** : cpu = 0.097759 (sec), leaf count = 63

$$\left\{\left\{y(x) \to e^{\frac{1}{2}\left(e^{c_2+x} - c_1 e^{-c_2-x}\right)}\right\}, \left\{y(x) \to e^{\frac{1}{2}\left(e^{-c_2-x} - c_1 e^{c_2+x}\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.081 (sec), leaf count = 21

$$\left\{y(x) = \mathrm{e}^{\frac{\mathrm{e}^{-2x}\_C1\,\mathrm{e}^{x}}{2}}\,\mathrm{e}^{-\frac{\_C2\,\mathrm{e}^{x}}{2}}\right\}$$

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 = 43.62 (sec), leaf count = 0 , could not solve

```
DSolve[f[x]*y[x]^3 - Derivative[1][y][x] - Derivative[1][y][x]^2 + y[x]^2*(-(Derivative[1][f
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(diff(y(x),x),x)*y(x)-diff(y(x),x)^2-diff(y(x),x)+f(x)*y(x)^3+y(x)^2*(diff(diff(f
diff(f(x),x)^2/f(x)^2)=0,y(x))
```

2.1705 ODE No. 1705

$$-y(x)f'(x) + f(x)y'(x) + y(x)y''(x) - y'(x)^2 - y(x)^3 = 0$$

✗ **Mathematica** : cpu = 0.253147 (sec), leaf count = 0 , could not solve

```
DSolve[-y[x]^3 - y[x]*Derivative[1][f][x] + f[x]*Derivative[1][y][x] - Derivative[1][y][x]^2
```

✗ **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 = 0.512556 (sec), leaf count = 0 , could not solve

```
DSolve[f[x]*y[x]^3 - y[x]^4 + Derivative[1][f][x]*Derivative[1][y][x] - Derivative[1][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(f(x),x)*diff(y(x),x)-diff(diff(f(x),x),
y(x)^4=0,y(x))
```

2.1707 ODE No. 1707

$$ay(x)y'(x) + by(x)^2 + y(x)y''(x) - y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.0763933 (sec), leaf count = 28

$$\left\{\left\{y(x) \to c_2 e^{-\frac{c_1 e^{-ax}+bx}{a}}\right\}\right\}$$

✓ **Maple** : cpu = 0.09 (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 = 46.1334 (sec), leaf count = 0 , could not solve

```
DSolve[-2*a*y[x]^2 + b*y[x]^3 + a*y[x]*Derivative[1][y][x] - Derivative[1][y][x]^2 + y[x]*De
```

✓ **Maple** : cpu = 1.063 (sec), leaf count = 73

$$\left\{y(x) = ODESolStruc\left(\_a, [\left\{\left(\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a)\right)\_b(\_a) - \frac{(\_b(\_a))^2 - \_a\,\_b(\_a)\,a - b\_a^3 + 2\_a^2 a}{\_a} = 0\right\}, \left\{\right.\right.\right.$$

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 = 61.1682 (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] - Derivative
```

✓ **Maple** : cpu = 2.107 (sec), leaf count = 84

$$\left\{ y(x) = ODESolStruc\left(\_a, [\left\{ \left(\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a) \right) \_b(\_a) - \frac{2\,b^2\_a^3 - 2\,\_a^2a^2 + \_a\,\_b(\_a)\,a + (\_b(\_a))^2 - \_a}{\_a} \right.\right.\right.$$

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 = 107.493 (sec), leaf count = 0 , could not solve

```
DSolve[-(y[x]*(1 + y[x])*(-a^2 + b^2*y[x]^2)) + (-1 + a*y[x])*Derivative[1][y][x] - Derivati
```

✓ **Maple** : cpu = 3.097 (sec), leaf count = 91

$$\left\{ y(x) = ODESolStruc\left(\_a, [\left\{ \left(\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a) \right) \_b(\_a) - \frac{\_a^4b^2 + b^2\_a^3 - \_a^2a^2 - \_a\,\_b(\_a)\,a - \_a\,a^2 + (\_}{\_a} \right.\right.\right.$$

2.1711 ODE No. 1711

$$y(x)^2\log(y(x))\left(\cos^2(x) - n^2\cot^2(x)\right) + y(x)y''(x) - y'(x)^2 + y(x)y'(x)(\tan(x)+\cot(x)) = 0$$

✗ **Mathematica** : cpu = 300.004 (sec), leaf count = 0 , timed out

```
$Aborted
```

✓ **Maple** : cpu = 0.57 (sec), leaf count = 81

$$\left\{ y(x) = 1\mathrm{e}^{\frac{J_n(\sin(x))\_C1}{\sin(x)\left(J_{n+1}(\sin(x))Y_n(\sin(x)) - Y_{n+1}(\sin(x))J_n(\sin(x))\right)}} \left(\mathrm{e}^{\frac{Y_n(\sin(x))\_C2}{\sin(x)\left(J_{n+1}(\sin(x))Y_n(\sin(x)) - Y_{n+1}(\sin(x))J_n(\sin(x))\right)}} \right)^{-1} \right\}$$

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 = 10.7921 (sec), leaf count = 57

$$\left\{\left\{y(x)\to c_2\exp\left(\int_1^x e^{\int_1^{K[3]} f(K[1])\,dK[1]}\left(\int_1^{K[3]} g(K[2])e^{-\int_1^{K[2]} f(K[1])\,dK[1]}\,dK[2]+c_1\right)dK[3]\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.104 (sec), leaf count = 61

$$\left\{y(x)=\frac{\_C2}{\mathrm{e}^{\_C1\int \mathrm{e}^{\int f(x)\,\mathrm{d}x}\,\mathrm{d}x}}\mathrm{e}^{\int \mathrm{e}^{\int f(x)\,\mathrm{d}x}\,\mathrm{d}x\int \frac{g(x)}{\mathrm{e}^{\int f(x)\,\mathrm{d}x}}\,\mathrm{d}x}\left(\mathrm{e}^{\int \frac{\int \mathrm{e}^{\int f(x)\,\mathrm{d}x}\,\mathrm{d}x g(x)}{\mathrm{e}^{\int f(x)\,\mathrm{d}x}}\,\mathrm{d}x}\right)^{-1}\right\}$$

2.1713 ODE No. 1713

$$-y(x)\left(g'(x)-y(x)^2f'(x)\right)+y'(x)\left(f(x)y(x)^2+g(x)\right)+y(x)y''(x)-y'(x)^2=0$$

✗ **Mathematica** : cpu = 21.0355 (sec), leaf count = 0 , could not solve

```
DSolve[-(y[x]*(-(y[x]^2*Derivative[1][f][x]) + Derivative[1][g][x])) + (g[x] + f[x]*y[x]^2)*
```

✓ **Maple** : cpu = 0.336 (sec), leaf count = 54

$$\left\{y(x)=ODESolStruc\left(\_b(\_a),[\left\{\frac{\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a)+f(\_a)\left(\_b(\_a)\right)^2+\_C1\,\_b(\_a)-g(\_a)}{\_b\left(\_a\right)}=0\right\},\{\_a=x,\_$$

2.1714 ODE No. 1714

$$y(x)y''(x)+3y(x)y'(x)-3y'(x)^2-y(x)^2=0$$

✓ **Mathematica** : cpu = 0.0665372 (sec), leaf count = 25

$$\left\{\left\{y(x)\to\frac{c_2e^x}{\sqrt{1-2e^{c_1+x}}}\right\}\right\}$$

✓ **Maple** : cpu = 0.072 (sec), leaf count = 68

$$\left\{y(x)=\frac{\sqrt{2}}{2\,\mathrm{e}^x\_C1-2\_C2}\sqrt{(\mathrm{e}^x\_C1-\_C2)\,\mathrm{e}^{2\,x}},y(x)=-\frac{\sqrt{2}}{2\,\mathrm{e}^x\_C1-2\_C2}\sqrt{(\mathrm{e}^x\_C1-\_C2)\,\mathrm{e}^{2\,x}}\right\}$$

2.1715 ODE No. 1715

$$y(x)y''(x) - ay'(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.0344143 (sec), leaf count = 26

$$\left\{\left\{y(x) \to c_2(-ax - c_1 + x)^{\frac{1}{1-a}}\right\}\right\}$$

✓ **Maple** : cpu = 0.055 (sec), leaf count = 25

$$\left\{y(x) = \left(\frac{1}{(1-a)\,(\_C1\,x + \_C2)}\right)^{(a-1)^{-1}}\right\}$$

2.1716 ODE No. 1716

$$a\left(y'(x)^2 + 1\right) + y(x)y''(x) = 0$$

✓ **Mathematica** : cpu = 0.687776 (sec), leaf count = 172

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[-\frac{\#1\sqrt{1 - e^{2c_1}\#1^{-2a}}\,{}_2F_1\left(\frac{1}{2}, -\frac{1}{2a}; 1 - \frac{1}{2a}; e^{2c_1}\#1^{-2a}\right)}{\sqrt{e^{2c_1}\#1^{-2a} - 1}}\&\right][c_2 + x]\right\}, \left\{y(x) \to \text{Invers}\right.$$

✓ **Maple** : cpu = 0.266 (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 = 1.95708 (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 = 0.333 (sec), leaf count = 107

$$\left\{\int^{y(x)} (2\,a + 3)\_a^{2\,a} \frac{1}{\sqrt{-(2\,a + 3)\_a^{2\,a}\,(2\_a^{2\,a+3}b - \_C1)}} d\_a - x - \_C2 = 0, \int^{y(x)} (-2\,a - 3)\_a^{2\,a} \frac{}{\sqrt{-(2}}\right.$$

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 = 1.6379 (sec), leaf count = 396

$$\left\{\left\{y(x) \to \left(-\frac{\exp\left(-\frac{x\left(b\sqrt{b^2-4(a+1)c}-2(a+1)c+b^2\right)}{\sqrt{b^2-4(a+1)c}+b}\right)\left(b^2\left(de^{\frac{1}{2}x\left(\sqrt{b^2-4(a+1)c}+b\right)} - cc_2\exp\left(\frac{x\left(b\sqrt{b^2-4(a+1)c}-4(a+1)\right.}{\sqrt{b^2-4(a+1)c}+b}\right.\right.\right.}{}\right.\right.\right.$$

✓ **Maple** : cpu = 0.317 (sec), leaf count = 133

$$\left\{y(x) = e^{-\frac{x}{2a+2}\sqrt{(-4a-4)c+b^2}}e^{-\frac{bx}{2a+2}}\left(\left((-4a-4)c^3+b^2c^2\right)\left(de^{\frac{x}{2}\left(b+\sqrt{(-4a-4)c+b^2}\right)}\sqrt{(-4a-4)c+b^2}+(a+1)\right.\right.\right.$$

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 = 41.97 (sec), leaf count = 0 , could not solve

```
DSolve[g[x]*y[x]^2 + f[x]*y[x]*Derivative[1][y][x] + a*Derivative[1][y][x]^2 + y[x]*Derivati
```

✓ **Maple** : cpu = 0.592 (sec), leaf count = 70

$$\left\{y(x) = ODESolStruc\left(e^{\int \_b(\_a)\,d\_a + \_C1}, \left[\left\{\frac{d}{d\_a}\_b(\_a) = (-a-1)\left(\_b(\_a)\right)^2 - f(\_a)\_b(\_a) - g(\_a)\right\}, \left\{\right.\right.\right.\right.$$

2.1720 ODE No. 1720

$$ay'(x)^2 + by(x)^2y'(x) + cy(x)^4 + y(x)y''(x) = 0$$

✗ **Mathematica** : cpu = 93.5773 (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]*Derivative[2
```

✓ **Maple** : cpu = 0.376 (sec), leaf count = 173

$$\left\{\int^{y(x)}(2a+4)\left(\tan\left(RootOf\left(2\_Z\,b\_a^2 - 2\ln(\_a)\,a\sqrt{4\_a^4ac - \_a^4b^2 + 8c\_a^4} - \sqrt{4\_a^4ac - \_a^4b^2 + 8\right.\right.\right.\right.$$

2.1721 ODE No. 1721

$$-\frac{ay(x)^3 f'(x)}{a+2}+\frac{af(x)^2 y(x)^4}{(a+2)^2}-\frac{(a-1)y'(x)^2}{a}-f(x)y(x)^2 y'(x)+y(x)y''(x)=0$$

✗ **Mathematica** : cpu = 1.07766 (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]^2*De
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+2)^2*f
a/(a+2)*diff(f(x),x)*y(x)^3=0,y(x))
```

2.1722 ODE No. 1722

$$-2ay(x)\left(y'(x)^2+1\right)^{3/2}+y(x)y''(x)-y'(x)^2-1=0$$

✓ **Mathematica** : cpu = 2.11769 (sec), leaf count = 797

$$\left\{\left\{y(x)\to \text{InverseFunction}\left[-\frac{\left(\left(4c_1a^2+\sqrt{8c_1a^2+1}+1\right)E\left(i\sinh^{-1}\left(\sqrt{2}\sqrt{\frac{a^2}{-4c_1a^2+\sqrt{8c_1a^2+1}-1}}\#1\right)|\frac{4c_1a^2-\sqrt{8c_1}}{4c_1a^2+\sqrt{8c_1}}\right.\right.}{2c}\right.\right.\right.$$

✓ **Maple** : cpu = 0.423 (sec), leaf count = 98

$$\left\{\int^{y(x)}(\_a^2a+\_C1)\frac{1}{\sqrt{-a^2\_a^4-2\_C1\_a^2a-\_C1^2+\_a^2}}d\_a-x-\_C2=0,\int^{y(x)}-(\_a^2a+\_C1)\frac{}{\sqrt{-}}\right.$$

2.1723 ODE No. 1723

$$(y(x)+x)y''(x)+y'(x)^2-y'(x)=0$$

✓ **Mathematica** : cpu = 0.898577 (sec), leaf count = 227

$$\left\{\left\{y(x)\to -\frac{e^{-2c_1}\sqrt{e^{2c_1}\left(4e^{c_1}(x-c_2)+1\right)}}{\sqrt{2}}+\frac{e^{-c_1}}{2}-2c_2+x\right\},\left\{y(x)\to \frac{e^{-2c_1}\sqrt{e^{2c_1}\left(4e^{c_1}(x-c_2)+1\right)}}{\sqrt{2}}+\frac{e^{-c_1}}{2}\right.\right.$$

✓ **Maple** : cpu = 0.129 (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 = 0.237498 (sec), leaf count = 24

$$\left\{\left\{y(x) \to -\frac{e^{-c_1}}{c_2 + x} - c_2\right\}\right\}$$

✓ **Maple** : cpu = 0.662 (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 = 0.368263 (sec), leaf count = 59

$$\left\{\left\{y(x) \to -\sqrt{e^{2c_1} - (c_2 + x)^2} - c_2\right\}, \left\{y(x) \to \sqrt{e^{2c_1} - (c_2 + x)^2} - c_2\right\}\right\}$$

✓ **Maple** : cpu = 0.638 (sec), leaf count = 105

$$\left\{y(x) = x + RootOf\left(-x + \int^{\_Z} (\_C1^2\_f^2 - 1)\left(\_C1\sqrt{-\_C1^2\_f^2 + 2}\_f - \_C1^2\_f^2 + 2\right)^{-1} d\_f + \_C2\right)\right.$$

2.1726 ODE No. 1726

$$(x - y(x))y''(x) - h\left(y'(x)\right) = 0$$

✓ **Mathematica** : cpu = 0.768678 (sec), leaf count = 73

$$\text{Solve}\left[\left\{x = \int \frac{\exp\left(-\int_1^{\text{K\$1349989}} \frac{K[3]-1}{h(K[3])}\,dK[3] - c_1\right)}{h(\text{K\$1349989})}\,d\text{K\$1349989} + c_2, x = \exp\left(-\int_1^{\text{K\$1349989}} \frac{K[3]-1}{h(K[3])}\,dK[3]\right.\right.\right.$$

✓ **Maple** : cpu = 0.125 (sec), leaf count = 39

$$\left\{y(x) = x + RootOf\left(-x + \int^{\_Z}\left(-1 + RootOf\left(\int^{\_Z} \frac{\_a - 1}{h(\_a)} d\_a + \ln(-\_g) + \_C1\right)\right)^{-1} d\_g + \_C2\right)\right\}$$

2.1727 ODE No. 1727

$$2y(x)y''(x) + y'(x)^2 + 1 = 0$$

✓ **Mathematica** : cpu = 0.190244 (sec), leaf count = 129

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[e^{2c_1}\tan^{-1}\left(\frac{\sqrt{\#1}}{\sqrt{e^{2c_1}-\#1}}\right) - \sqrt{\#1}\sqrt{e^{2c_1}-\#1}\&\right][c_2+x]\right\}, \left\{y(x) \to \text{InverseFunc}\right.\right.$$

✓ **Maple** : cpu = 0.441 (sec), leaf count = 823

$$\left\{y(x) = \frac{\left(-RootOf\left((\tan(\_Z))^2 \_C1^2 \_Z^2 - 4(\tan(\_Z))^2 \_C1 \_C2 \_Z - 4(\tan(\_Z))^2 \_C1\, x \_Z + 4(\tan(\right.\right.}{}\right.$$

2.1728 ODE No. 1728

$$a + 2y(x)y''(x) - y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.00675934 (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 = 0.039 (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 = 0.0239998 (sec), leaf count = 0 , could not solve

```
DSolve[a + f[x]*y[x]^2 - Derivative[1][y][x]^2 + 2*y[x]*Derivative[2][y][x] == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(2*diff(diff(y(x),x),x)*y(x)-diff(y(x),x)^2+f(x)*y(x)^2+a=0,y(x))
```

2.1730 ODE No. 1730

$$2y(x)y''(x) - y'(x)^2 - 8y(x)^3 = 0$$

✓ **Mathematica** : cpu = 0.510248 (sec), leaf count = 77

$$\left\{\left\{y(x) \to -\frac{1}{2}i\sqrt{c_1}\text{ns}\left(\left(-\frac{1}{2}+\frac{i}{2}\right)\sqrt[4]{c_1}(x+c_2)\middle| -1\right)^2\right\},\left\{y(x) \to -\frac{1}{2}i\sqrt{c_1}\text{ns}\left(\left(-\frac{1}{2}+\frac{i}{2}\right)\sqrt[4]{c_1}(x+c_2)\middle| -1\right)^2\right.$$

✓ **Maple** : cpu = 0.104 (sec), leaf count = 53

$$\left\{\int^{y(x)}\frac{1}{\sqrt{4\_a^3+\_C1\_a}}d\_a - x - \_C2 = 0, \int^{y(x)} -\frac{1}{\sqrt{4\_a^3+\_C1\_a}}d\_a - x - \_C2 = 0\right\}$$

2.1731 ODE No. 1731

$$2y(x)y''(x) - y'(x)^2 - 8y(x)^3 - 4y(x)^2 = 0$$

✓ **Mathematica** : cpu = 1.44049 (sec), leaf count = 351

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[-\frac{i\#1\sqrt{\frac{2c_1}{\#1-\#1\sqrt{1-c_1}}+4}\sqrt{\frac{c_1}{\#1\sqrt{1-c_1}+\#1}+2}F\left(i\sinh^{-1}\left(\frac{\sqrt{\frac{c_1}{2\sqrt{1-c_1}+2}}}{\sqrt{\#1}}\right)|\frac{\sqrt{1-c_1}+1}{1-\sqrt{1-c_1}}\right)}{\sqrt{\frac{c_1}{\sqrt{1-c_1}+1}}\sqrt{4\#1^2+4\#1+c_1}}\&\right.\right.$$

✓ **Maple** : cpu = 0.106 (sec), leaf count = 61

$$\left\{\int^{y(x)}\frac{1}{\sqrt{4\_a^3+\_a\_C1+4\_a^2}}d\_a - x - \_C2 = 0, \int^{y(x)} -\frac{1}{\sqrt{(4\_a^2+\_C1+4\_a)\_a}}d\_a - x - \_C2 =\right.$$

2.1732 ODE No. 1732

$$2y(x)y''(x) - y'(x)^2 - 4(2y(x)+x)y(x)^2 = 0$$

✗ **Mathematica** : cpu = 1.65054 (sec), leaf count = 0 , could not solve

```
DSolve[-4*y[x]^2*(x + 2*y[x]) - Derivative[1][y][x]^2 + 2*y[x]*Derivative[2][y][x] == 0, y[x
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(2*diff(diff(y(x),x),x)*y(x)-diff(y(x),x)^2-4*(x+2*y(x))*y(x)^2=0,y(x))
```

2.1733 ODE No. 1733

$$y(x)^2(ay(x)+b)+2y(x)y''(x)-y'(x)^2=0$$

✓ **Mathematica** : cpu = 2.78749 (sec), leaf count = 437

$$\left\{\left\{y(x)\to \text{InverseFunction}\left[-\frac{i\sqrt{2}\#1^{3/2}\sqrt{\frac{4c_1}{\#1\left(\sqrt{2ac_1+b^2}-b\right)}+2}\sqrt{1-\frac{2c_1}{\#1\left(\sqrt{2ac_1+b^2}+b\right)}}F\left(i\sinh^{-1}\left(\frac{\sqrt{2}\sqrt{\frac{c_1}{\sqrt{b^2+2ac_1}}}}{\sqrt{\#1}}\right.\right.}{\sqrt{\frac{c_1}{\sqrt{2ac_1+b^2}-b}}\sqrt{-\#1\left(\#1^2a+2\#1b-2c_1\right)}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.109 (sec), leaf count = 71

$$\left\{\int^{y(x)}-2\frac{1}{\sqrt{-2\,a\_a^3-4\,b\_a^2+4\_a\_C1}}d\_a-x-\_C2=0,\int^{y(x)}2\frac{1}{\sqrt{-2\,a\_a^3-4\,b\_a^2+4\_a\_C1}}d\_a-\right.$$

2.1734 ODE No. 1734

$$ay(x)^3+2y(x)y''(x)-y'(x)^2+2xy(x)^2+1=0$$

✗ **Mathematica** : cpu = 2.83352 (sec), leaf count = 0 , could not solve

```
DSolve[1 + 2*x*y[x]^2 + a*y[x]^3 - Derivative[1][y][x]^2 + 2*y[x]*Derivative[2][y][x] == 0,
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(2*diff(diff(y(x),x),x)*y(x)-diff(y(x),x)^2+1+2*x*y(x)^2+a*y(x)^3=0,y(x))
```

2.1735 ODE No. 1735

$$y(x)^2(ay(x)+bx)+2y(x)y''(x)-y'(x)^2=0$$

✗ **Mathematica** : cpu = 1.22459 (sec), leaf count = 0 , could not solve

```
DSolve[y[x]^2*(b*x + a*y[x]) - Derivative[1][y][x]^2 + 2*y[x]*Derivative[2][y][x] == 0, y[x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(2*diff(diff(y(x),x),x)*y(x)-diff(y(x),x)^2+(a*y(x)+b*x)*y(x)^2=0,y(x))
```

2.1736 ODE No. 1736

$$2y(x)y''(x) - y'(x)^2 - 3y(x)^4 = 0$$

✓ **Mathematica** : cpu = 8.8039 (sec), leaf count = 285

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[-\frac{2i\#1^{3/2}\sqrt{(-1)^{5/6}\left(\frac{\sqrt[3]{-c_1}}{\#1}-1\right)}\sqrt{\frac{(-c_1)^{2/3}}{\#1^2}+\frac{\sqrt[3]{-c_1}}{\#1}+1}F\left(\sin^{-1}\left(\frac{\sqrt{-\frac{i\sqrt[3]{-c_1}}{\#1}-(-1)^{5/6}}}{\sqrt[4]{3}}\right.\right.}{\sqrt[4]{3}\sqrt[3]{-c_1}\sqrt{\#1^3+c_1}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.105 (sec), leaf count = 49

$$\left\{\int^{y(x)}\frac{1}{\sqrt{\_a^4+\_C1\,\_a}}d\_a - x - \_C2 = 0, \int^{y(x)}-\frac{1}{\sqrt{\_a^4+\_C1\,\_a}}d\_a - x - \_C2 = 0\right\}$$

2.1737 ODE No. 1737

$$-4(a+x^2)\,y(x)^2 + b + 2y(x)y''(x) - y'(x)^2 - 3y(x)^4 - 8xy(x)^3 = 0$$

✗ **Mathematica** : cpu = 1.32394 (sec), leaf count = 0 , could not solve

```
DSolve[b - 4*(a + x^2)*y[x]^2 - 8*x*y[x]^3 - 3*y[x]^4 - Derivative[1][y][x]^2 + 2*y[x]*Deriv
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(2*diff(diff(y(x),x),x)*y(x)-diff(y(x),x)^2+b-4*(x^2+a)*y(x)^2-8*x*y(x)^3-
3*y(x)^4=0,y(x))
```

2.1738 ODE No. 1738

$$2y(x)^2\left(f'(x)+f(x)^2\right) + 3f(x)y(x)y'(x) + 2y(x)y''(x) - y'(x)^2 - 8y(x)^3 = 0$$

✗ **Mathematica** : cpu = 0.574788 (sec), leaf count = 0 , could not solve

```
DSolve[-8*y[x]^3 + 2*y[x]^2*(f[x]^2 + Derivative[1][f][x]) + 3*f[x]*y[x]*Derivative[1][y][x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(2*diff(diff(y(x),x),x)*y(x)-diff(y(x),x)^2+3*f(x)*y(x)*diff(y(x),x)+2*(f(x)^2+diff(f(
8*y(x)^3=0,y(x))
```

2.1739 ODE No. 1739

$$f(x)y(x)^2 + 2y(x)y''(x) + 4y(x)^2y'(x) - y'(x)^2 + y(x)^4 + 1 = 0$$

✗ **Mathematica** : cpu = 0.0684135 (sec), leaf count = 0 , could not solve

```
DSolve[1 + f[x]*y[x]^2 + y[x]^4 + 4*y[x]^2*Derivative[1][y][x] - Derivative[1][y][x]^2 + 2*y
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(2*diff(diff(y(x),x),x)*y(x)-diff(y(x),x)^2+4*y(x)^2*diff(y(x),x)+1+f(x)*y(x)^2+y(x)^4
```

2.1740 ODE No. 1740

$$2y(x)y''(x) - 3y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.0273388 (sec), leaf count = 16

$$\left\{\left\{y(x)\to \frac{c_2}{(2c_1+x)^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.037 (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 = 0.0982089 (sec), leaf count = 17

$$\left\{\left\{y(x)\to c_2\sec^2(2c_1+x)\right\}\right\}$$

✓ **Maple** : cpu = 0.089 (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 = 11.2731 (sec), leaf count = 0 , could not solve

```
DSolve[f[x]*y[x]^2 - 3*Derivative[1][y][x]^2 + 2*y[x]*Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 0.203 (sec), leaf count = 60

$$\left\{y(x) = ODESolStruc\left(e^{\int -\_b(\_a)\,d\_a + \_C1}, [\left\{\frac{d}{d\_a}\_b(\_a) = \frac{(\_b(\_a))^2}{2} - \frac{f(\_a)}{2}\right\}, \left\{\_a = x, \_b(\_a) = \frac{\frac{d}{dx}y(x}{y(x)}\right.\right.\right.$$

2.1743 ODE No. 1743

$$y(x)^2\left(ay(x)^3 + 1\right) + 2y(x)y''(x) - 6y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 23.1781 (sec), leaf count = 2761

$$\left\{\text{Solve}\left[\frac{4\left(F\left(\sin^{-1}\left(\sqrt{\frac{(\text{Root}[4c_1\#1^4+4a\#1^3+1\&,2]-\text{Root}[4c_1\#1^4+4a\#1^3+1\&,4])(\text{Root}[4c_1\#1^4+4a\#1^3+1\&,1]-y(x))}{(\text{Root}[4c_1\#1^4+4a\#1^3+1\&,1]-\text{Root}[4c_1\#1^4+4a\#1^3+1\&,4])(\text{Root}[4c_1\#1^4+4a\#1^3+1\&,2]-y(x))}}\right)\right| - \frac{(R}{(R}\right.\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.12 (sec), leaf count = 71

$$\left\{\int^{y(x)} -2\frac{1}{\sqrt{4\_C1\,\_a^4 + 4\,a\,\_a^3 + 1}\,\_a}d\_a - x - \_C2 = 0, \int^{y(x)} 2\frac{1}{\sqrt{4\_C1\,\_a^4 + 4\,a\,\_a^3 + 1}\,\_a}d\_a - x - \right.$$

2.1744 ODE No. 1744

$$2y(x)y''(x) - y'(x)^2\left(y'(x)^2 + 1\right) = 0$$

✓ **Mathematica** : cpu = 1.01177 (sec), leaf count = 173

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[-ie^{-c_1}\left(\sqrt{\#1}\sqrt{\#1e^{2c_1} - 1} - e^{-c_1}\log\left(\sqrt{\#1}e^{2c_1} + e^{c_1}\sqrt{\#1e^{2c_1} - 1}\right)\right)\&\right][c_2 + x]\right\},\right.$$

✓ **Maple** : cpu = 0.42 (sec), leaf count = 823

$$\left\{y(x) = \frac{\left(-RootOf\left((\tan(\_Z))^2\_C1^2\_Z^2 - 4(\tan(\_Z))^2\_C1\,\_C2\,\_Z - 4(\tan(\_Z))^2\_C1\,x\_Z + 4(\tan(\right.\right.}{}\right.$$

2.1745 ODE No. 1745

$$2(y(x)-a)y''(x)+y'(x)^2+1=0$$

✓ **Mathematica** : cpu = 0.325389 (sec), leaf count = 204

$$\left\{\left\{y(x)\to \text{InverseFunction}\left[-\sqrt{2}\left(\frac{1}{2}\sqrt{a-\#1}\sqrt{e^{2c_1}-2(a-\#1)}-\frac{e^{2c_1}\tan^{-1}\left(\frac{\sqrt{2}\sqrt{a-\#1}}{\sqrt{e^{2c_1}-2(a-\#1)}}\right)}{2\sqrt{2}}\right)\&\right][c_2+x]\right.$$

✓ **Maple** : cpu = 0.617 (sec), leaf count = 117

$$\left\{-\frac{\_C1}{2}\arctan\left(1\left(y(x)-a-\frac{\_C1}{2}\right)\frac{1}{\sqrt{-(-y(x)+a)(a+\_C1-y(x))}}\right)-x-\_C2+\sqrt{-(-y(x)+a)(a\right.$$

2.1746 ODE No. 1746

$$-ax^2-bx-c+3y(x)y''(x)-2y'(x)^2=0$$

✗ **Mathematica** : cpu = 0.0410882 (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[x], x
```

✓ **Maple** : cpu = 0.621 (sec), leaf count = 207

$$\left\{y(x)=RootOf\left(-2\int^{\_Z}\frac{b}{\sqrt{4\_f^{4/3}\_C1\,b^2-36\,c\_f^2a+9\,b^2\_f^2-2}}d\_f\sqrt{4\,ca-b^2}-2\,b\arctan\left(\frac{2\,ax+b}{\sqrt{4\,ca-b^2}}\right.\right.\right.$$

2.1747 ODE No. 1747

$$3y(x)y''(x)-5y'(x)^2=0$$

✓ **Mathematica** : cpu = 0.0275343 (sec), leaf count = 20

$$\left\{\left\{y(x)\to\frac{c_2}{(3c_1+2x)^{3/2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.02 (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 = 0.0995195 (sec), leaf count = 43

$$\left\{\left\{y(x) \to \frac{(c_1^2x^2 + 2c_2c_1^2x + c_2^2c_1^2 - 64)^2}{256c_1^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.139 (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 = 0.558868 (sec), leaf count = 181

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[-\frac{4\sqrt{\frac{4\#1^{3/2}}{c_1}+1}\sqrt{\#1^{3/2}c_1+4\#1^3}\,{}_2F_1\left(\frac{1}{6},\frac{1}{2};\frac{7}{6};-\frac{4\#1^{3/2}}{c_1}\right)}{4\#1^2+\sqrt{\#1}c_1}\&\right][c_2+x]\right\}, \left\{y(x) \to \text{I}\right.$$

✓ **Maple** : cpu = 0.342 (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 = 4.73423 (sec), leaf count = 2281

$$\left\{\text{Solve}\left[-\frac{4F\left(\sin^{-1}\left(\sqrt{\frac{(\text{Root}[a\#1^4+3b\#1^2-3c_1\#1-3c\&,2]-\text{Root}[a\#1^4+3b\#1^2-3c_1\#1-3c\&,4])\left(\text{Root}[a\#1^4+3b\#1^2-3c_1\#1-3c\&\right.}{(\text{Root}[a\#1^4+3b\#1^2-3c_1\#1-3c\&,1]-\text{Root}[a\#1^4+3b\#1^2-3c_1\#1-3c\&,4])\left(\text{Root}[a\#1^4+3b\#1^2-3c_1\#1-3c\&\right.}}\right.\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.405 (sec), leaf count = 87

$$\left\{\int^{y(x)} -3\frac{1}{\sqrt{9\_C1\_a^{3/2}-3a\_a^3-9b\_a^2+9c\_a}}d\_a - x - \_C2 = 0, \int^{y(x)} 3\frac{1}{\sqrt{9\_C1\_a^{3/2}-3a\_a^3-9$$

2.1751 ODE No. 1751

$$y'(x)\left(6y(x)^2-\frac{2y(x)f'(x)}{f(x)}\right)+f(x)y(x)+g(x)y(x)^2+4y(x)y''(x)-2y(x)^2y'(x)-3y'(x)^2+y(x)^4=0$$

✗ **Mathematica** : cpu = 0.743193 (sec), leaf count = 0 , could not solve

```
DSolve[f[x]*y[x] + g[x]*y[x]^2 + y[x]^4 - 2*y[x]^2*Derivative[1][y][x] + (6*y[x]^2 - (2*y[x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(4*diff(diff(y(x),x),x)*y(x)-3*diff(y(x),x)^2+(6*y(x)^2-2*diff(f(x),x)*y(x)/f(x))*diff
2*y(x)^2*diff(y(x),x)+g(x)*y(x)^2+f(x)*y(x)=0,y(x))
```

2.1752 ODE No. 1752

$$ay(x)^2+4y(x)y''(x)-5y'(x)^2=0$$

✓ **Mathematica** : cpu = 0.133849 (sec), leaf count = 26

$$\left\{\left\{y(x)\to c_2\operatorname{sech}^4\left(\frac{1}{4}\sqrt{a}(x-4c_1)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.124 (sec), leaf count = 33

$$\left\{y(x)=16\frac{\left(e^{1/4\sqrt{a}x}\right)^4a^2}{\left(e^{1/2\sqrt{a}x}\_C1-\_C2\right)^4}\right\}$$

2.1753 ODE No. 1753

$$12y(x)y''(x)-15y'(x)^2+8y(x)^3=0$$

✓ **Mathematica** : cpu = 0.336843 (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 = 0.146 (sec), leaf count = 147

$$\left\{-12\,\frac{y(x)\left(8\sqrt{y(x)}-\_C1\right)\sqrt{8\,y(x)-\_C1\,\sqrt{y(x)}}}{\sqrt{-24\,(y(x))^3+3\,\_C1\,(y(x))^{5/2}\_C1\,\sqrt{\sqrt{y(x)}\left(8\sqrt{y(x)}-\_C1\right)}}}-x-\_C2=0,12\,\frac{y(x)\left(\right.}{\sqrt{-24\,(y(x))^3+}}\right.$$

2.1754 ODE No. 1754

$$ny(x)y''(x)-(n-1)y'(x)^2=0$$

✓ **Mathematica** : cpu = 0.0336092 (sec), leaf count = 17

$$\{\{y(x)\to c_2(x-c_1n)^n\}\}$$

✓ **Maple** : cpu = 0.044 (sec), leaf count = 15

$$\left\{y(x)=\left(\frac{\_C1\,x+\_C2}{n}\right)^n\right\}$$

2.1755 ODE No. 1755

$$ay(x)y''(x)+by'(x)^2+\mathrm{c0}+\mathrm{c1}y(x)+\mathrm{c2}y(x)^2+\mathrm{c3}y(x)^3+\mathrm{c4}y(x)^4=0$$

✗ **Mathematica** : cpu = 104.294 (sec), leaf count = 0 , could not solve

```
DSolve[c0 + c1*y[x] + c2*y[x]^2 + c3*y[x]^3 + c4*y[x]^4 + b*Derivative[1][y][x]^2 + a*y[x]*D
```

✓ **Maple** : cpu = 0.357 (sec), leaf count = 418

$$\left\{\int^{y(x)}(2\,a+b)\,(3\,a+2\,b)\,(a+b)\,(a+2\,b)\,b\_a^{2\,\frac{b}{a}}\frac{}{\sqrt{-36\,\left(2/3\,(a+2\,b)\,(a+b)\,(a+b/2)\,bc3\,\_a^{\frac{3\,a+2\,b}{a}}+\left(c2\,(a\right.\right.}}\right.$$

2.1756 ODE No. 1756

$$ay(x)y''(x)+by'(x)^2-\frac{y(x)y'(x)}{\sqrt{c^2+x^2}}=0$$

✓ **Mathematica** : cpu = 0.336652 (sec), leaf count = 111

$$\left\{\left\{y(x)\to c_2\left(-a^2\left(x\left(\sqrt{c^2+x^2}+x\right)^{\frac{1}{a}}+c_1\right)+a\left(\sqrt{c^2+x^2}+x\right)^{\frac{1}{a}}\left(\sqrt{c^2+x^2}-bx\right)+b\sqrt{c^2+x^2}\left(\sqrt{c^2+x^2}\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.152 (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 = 0.962743 (sec), leaf count = 0 , could not solve

```
DSolve[f[x]^2*y[x]^4 + (2 + a)*f[x]*y[x]^2*Derivative[1][y][x] + a*y[x]^3*Derivative[1][y][x
1 + a)*Derivative[1][y][x]^2 + a*y[x]*Derivative[2][y][x] == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(a*y(x)*diff(diff(y(x),x),x)-(a-1)*diff(y(x),x)^2+(a+2)*f(x)*y(x)^2*diff(y(x),x)+f(x)^
```

2.1758 ODE No. 1758

$$y''(x)(ay(x)+b)+cy'(x)^2=0$$

✓ **Mathematica** : cpu = 0.060012 (sec), leaf count = 31

$$\left\{\left\{y(x)\to\frac{(c_1(a+c)\,(c_2+x))^{\frac{a}{a+c}}-b}{a}\right\}\right\}$$

✓ **Maple** : cpu = 0.066 (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 = 0.0360472 (sec), leaf count = 18

$$\left\{\left\{y(x)\to c_2\sqrt{c_1+x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.034 (sec), leaf count = 31

$$\left\{y(x)=\sqrt{\_C1\ x^2+2\_C2},y(x)=-\sqrt{\_C1\ x^2+2\_C2}\right\}$$

2.1760 ODE No. 1760

$$ay(x)y'(x) + f(x) + xy(x)y''(x) + xy'(x)^2 = 0$$

✗ **Mathematica** : cpu = 300.103 (sec), leaf count = 0 , timed out

```
$Aborted
```

✓ **Maple** : cpu = 0.084 (sec), leaf count = 114

$$\left\{y(x) = \frac{\sqrt{2}}{a-1}\sqrt{(a-1)\left(x^{1-a}\int\frac{x^a f(x)}{x}\,\mathrm{d}x + x^{1-a}\_C1 - \int f(x)\,\mathrm{d}x - \_C2\right)}, y(x) = -\frac{\sqrt{2}}{a-1}\sqrt{(a-1)\left(x^{1-a}\right.}\right.$$

2.1761 ODE No. 1761

$$x\left(ay(x)^4 + d\right) + y(x)\left(by(x)^2 + c\right) + xy(x)y''(x) - xy'(x)^2 + y(x)y'(x) = 0$$

✗ **Mathematica** : cpu = 1.60151 (sec), leaf count = 0 , could not solve

```
DSolve[y[x]*(c + b*y[x]^2) + x*(d + a*y[x]^4) + y[x]*Derivative[1][y][x] - x*Derivative[1][y
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(x*y(x)*diff(diff(y(x),x),x)-x*diff(y(x),x)^2+y(x)*diff(y(x),x)+x*(d+a*y(x)^4)+y(x)*(c
```

2.1762 ODE No. 1762

$$ay(x)y'(x) + bxy(x)^3 + xy(x)y''(x) - xy'(x)^2 = 0$$

✗ **Mathematica** : cpu = 52.6879 (sec), leaf count = 0 , could not solve

```
DSolve[b*x*y[x]^3 + a*y[x]*Derivative[1][y][x] - x*Derivative[1][y][x]^2 + x*y[x]*Derivative
```

✓ **Maple** : cpu = 0.944 (sec), leaf count = 108

$$\left\{y(x) = ODESolStruc\left(\frac{\_a}{\left(\mathrm{e}^{\int \_b(\_a)\,\mathrm{d}\_a + \_C1}\right)^2}, [\left\{\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a) = -2\,\frac{\_b(\_a)\left(1/2 + \_a^2(-1/2\,\_a\,b + a - 1)\,(\_\right.}{\_a}\right.\right.\right.$$

2.1763 ODE No. 1763

$$ay(x)y'(x) + xy(x)y''(x) + 2xy'(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.150382 (sec), leaf count = 33

$$\left\{\left\{y(x)\to c_2x^{-a/3}\sqrt[3]{3x-(a-1)c_1x^a}\right\}\right\}$$

✓ **Maple** : cpu = 0.06 (sec), leaf count = 148

$$\left\{y(x)=\frac{\sqrt[3]{3}}{(a-1)\,x^a}\sqrt[3]{(\_C2\ (a-1)\,x^a-\_C1\ x)\,(x^a)^2\,(a-1)^2}, y(x)=\frac{\sqrt[3]{3}(i\sqrt{3}-1)}{(2\,a-2)\,x^a}\sqrt[3]{(\_C2\ (a-1)\,x^a-\_C1\right.$$

2.1764 ODE No. 1764

$$xy(x)y''(x) - 2xy'(x)^2 + (y(x)+1)y'(x) = 0$$

✓ **Mathematica** : cpu = 0.0655657 (sec), leaf count = 37

$$\left\{\left\{y(x)\to\frac{\tan\left(\frac{\sqrt{c_1}(\log(x)-c_2)}{\sqrt{2}}\right)}{\sqrt{2}\sqrt{c_1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.197 (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 = 0.130718 (sec), leaf count = 24

$$\left\{\left\{y(x)\to\frac{c_2x^a}{(a-1)c_1x^a+x}\right\}\right\}$$

✓ **Maple** : cpu = 0.036 (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 = 0.046669 (sec), leaf count = 21

$$\left\{\left\{y(x) \to \frac{c_2 x}{\sqrt[3]{c_1 x^3 + 1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.042 (sec), leaf count = 64

$$\left\{y(x) = x \frac{1}{\sqrt[3]{-3\_C2\, x^3 + \_C1}}, y(x) = \frac{(i\sqrt{3}-1)\, x}{2} \frac{1}{\sqrt[3]{-3\_C2\, x^3 + \_C1}}, y(x) = -\frac{(i\sqrt{3}+1)\, x}{2} \frac{1}{\sqrt[3]{-3\_C2\, x^3 +}}\right.$$

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 = 0.0830954 (sec), leaf count = 54

$$\left\{\left\{y(x) \to c_2 e^{\frac{\sqrt{b^2-x^2}}{a}} \left(a\sqrt{b^2 - x^2} - c_1\right)^{\frac{c_1}{a^2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.373 (sec), leaf count = 50

$$\left\{y(x) = \_C2\, e^{\int -x\sqrt{b^2-x^2}\left(\_C1\, \sqrt{b^2-x^2}+a(b^2-x^2)\right)^{-1} dx}\right\}$$

2.1768 ODE No. 1768

$$x(y(x) + x)y''(x) + xy'(x)^2 + (x - y(x))y'(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 0.119078 (sec), leaf count = 79

$$\left\{\left\{y(x) \to -x - \sqrt{-e^{2c_2}\left(x^2 - 1\right) + (1 - 2ic_1)\, x^2}\right\}, \left\{y(x) \to -x + \sqrt{-e^{2c_2}\left(x^2 - 1\right) + (1 - 2ic_1)\, x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.063 (sec), leaf count = 43

$$\left\{y(x) = -x - \sqrt{(-\_C2 + 1)\, x^2 + \_C1}, y(x) = -x + \sqrt{(-\_C2 + 1)\, x^2 + \_C1}\right\}$$

2.1769 ODE No. 1769

$$2xy(x)y''(x) - xy'(x)^2 + y(x)y'(x) = 0$$

✓ **Mathematica** : cpu = 0.047453 (sec), leaf count = 18

$$\left\{\left\{y(x) \to c_2\left(c_1 + \sqrt{x}\right)^2\right\}\right\}$$

✓ **Maple** : cpu = 0.043 (sec), leaf count = 21

$$\left\{y(x) = \_C1\sqrt{x}\_C2 + \_C1^2 x + \frac{\_C2^2}{4}\right\}$$

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 = 0.812049 (sec), leaf count = 22

$$\left\{\left\{y(x) \to \frac{1}{c_2x^2 - c_1x - 1} + 1\right\}\right\}$$

✓ **Maple** : cpu = 0.067 (sec), leaf count = 26

$$\left\{y(x) = \frac{x(\_C1\,x - \_C2)}{\_C1\,x^2 - \_C2\,x - 1}\right\}$$

2.1771 ODE No. 1771

$$x^2(y(x)+x)y''(x) - \left(xy'(x) - y(x)\right)^2 = 0$$

✓ **Mathematica** : cpu = 0.0846265 (sec), leaf count = 20

$$\left\{\left\{y(x) \to x\left(c_2e^{\frac{c_1}{x}} - 1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.201 (sec), leaf count = 22

$$\left\{y(x) = -\frac{x}{\_C1}\left(-e^{\frac{\_C2}{x}}e^{-1} + \_C1\right)\right\}$$

2.1772 ODE No. 1772

$$a\left(xy'(x)-y(x)\right)^2+x^2(x-y(x))y''(x)=0$$

✓ **Mathematica** : cpu = 0.988975 (sec), leaf count = 36

$$\left\{\left\{y(x)\to x\left(\left(-\frac{(a-1)\left((-1)^a c_1+c_2 x\right)}{x}\right)^{\frac{1}{1-a}}+1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.164 (sec), leaf count = 37

$$\left\{\left(x^a y(x)-x^{a+1}\right)(x-y(x))^{-a}-x(a-1)\_C2+\_C1=0\right\}$$

2.1773 ODE No. 1773

$$2x^2y(x)y''(x)+x^2\left(-\left(y'(x)^2+1\right)\right)+y(x)^2=0$$

✓ **Mathematica** : cpu = 0.195362 (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 = 0.045 (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 = 1.42609 (sec), leaf count = 92

$$\left\{\left\{y(x)\to c_2 x^{-\frac{a\left(\sqrt{\frac{a^2-2a(c+2d)-4bd+c^2}{a^2}}-1\right)+c}{2(a+b)}}\left(x^{\sqrt{\frac{a^2-2a(c+2d)-4bd+c^2}{a^2}}}+c_1\right)^{\frac{a}{a+b}}\right\}\right\}$$

✓ **Maple** : cpu = 0.303 (sec), leaf count = 136

$$\left\{y(x)=x^{-\frac{1}{2a+2b}\sqrt{(-4a-4b)d+(a-c)^2}}x^{\frac{a}{2a+2b}}x^{-\frac{c}{2a+2b}}\left(\frac{a^2+(-2c-4d)a-4db+c^2}{(a+b)^2}\left(x^{\frac{1}{a}\sqrt{(-4a-4b)d+(a-c)^2}}\_C1-\right.\right.$$

2.1775 ODE No. 1775

$$-a(x+2)y(x)^2 + x(x+1)^2y(x)y''(x) - x(x+1)^2y'(x)^2 + 2(x+1)^2y(x)y'(x) = 0$$

✓ **Mathematica** : cpu = 0.135141 (sec), leaf count = 24

$$\left\{\left\{y(x) \to c_2(x+1)^a e^{-\frac{a+c_1}{x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.11 (sec), leaf count = 31

$$\left\{y(x) = \frac{(1+x)^a}{\_C1\, e^a} e^{\frac{-\_C2}{x}} \left(e^{\frac{a}{x}}\right)^{-1}\right\}$$

2.1776 ODE No. 1776

$$8\left(1-x^3\right)y(x)y''(x) - 4\left(1-x^3\right)y'(x)^2 - 12x^2y(x)y'(x) + 3xy(x)^2 = 0$$

✗ **Mathematica** : cpu = 299.997 (sec), leaf count = 0 , timed out

```
$Aborted
```

✓ **Maple** : cpu = 0.35 (sec), leaf count = 49

$$\left\{y(x) = \frac{x}{\_C1}\left(\_C1\, LegendreQ\left(-\frac{1}{6}, \frac{1}{3}, \sqrt{-(x-1)\left(x^2+x+1\right)}\right) + \frac{\_C2}{2} LegendreP\left(-\frac{1}{6}, \frac{1}{3}, \sqrt{-(x-1)\left(x^2+\right.}\right.\right.$$

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 = 49.4385 (sec), leaf count = 0 , could not solve

```
DSolve[f3[x]*y[x]^2 + f2[x]*y[x]*Derivative[1][y][x] + f1[x]*Derivative[1][y][x]^2 + f0[x]*y
```

✓ **Maple** : cpu = 0.714 (sec), leaf count = 79

$$\left\{y(x) = ODESolStruc\left(e^{\int -b(\_a)\,d\_a + \_C1}, [\left\{\frac{d}{d\_a}\_b(\_a) = \frac{(-f0(\_a) - f1(\_a))(\_b(\_a))^2 - f2(\_a)\_b(\_a)}{f0(\_a)}\right.\right.\right.$$

2.1778 ODE No. 1778

$$y(x)^2 y''(x) - a = 0$$

✓ **Mathematica** : cpu = 0.963815 (sec), leaf count = 75

$$\text{Solve}\left[\frac{\left(\sqrt{c_1}y(x)\sqrt{c_1-\frac{2a}{y(x)}}+a\log\left(y(x)\left(\sqrt{c_1}\sqrt{c_1-\frac{2a}{y(x)}}+c_1\right)-a\right)\right)^2}{c_1^3}=(c_2+x)^2, y(x)\right]$$

✓ **Maple** : cpu = 0.562 (sec), leaf count = 245

$$\left\{y(x)=\frac{\_C1\left(\_C1\,a+\mathrm{e}^{RootOf\left(csgn(\_C1^{-1})\_C1^4a^2-2\_Z\_C1^3a\mathrm{e}^{\_Z}-(\mathrm{e}^{\_Z})^2csgn(\_C1^{-1})\_C1^2-2\,\mathrm{e}^{\_Z}csgn(\_C1^{-1})\_C2-2\right.}\right.}{2\,\mathrm{e}^{RootOf\left(csgn(\_C1^{-1})\_C1^4a^2-2\_Z\_C1^3a\mathrm{e}^{\_Z}-(\mathrm{e}^{\_Z})^2csgn(\_C1^{-1})\_C1^2-2\,\mathrm{e}^{\_Z}csgn(\_C1^{-1})\_C2-2\,\mathrm{e}^{\_Z}csg\right.}}\right.$$

2.1779 ODE No. 1779

$$ax + y(x)^2 y''(x) + y(x)y'(x)^2 = 0$$

✗ **Mathematica** : cpu = 3.64357 (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 = 0.585 (sec), leaf count = 112

$$\left\{\ln(x)-\int^{\frac{y(x)}{x}}\frac{\_g^2}{2\_g^3+2\,a}\left(\sqrt[3]{\frac{a}{\_g^3}}\sqrt{3}\tan\left(RootOf\left(-2\_Z\sqrt{3}+\ln\left(\frac{(\tan(\_Z))^2+1}{3+2\sqrt{3}\tan(\_Z)+(\tan(\_Z))^2}\right)+6\right.\right.\right.\right.$$

2.1780 ODE No. 1780

$$-ax - b + y(x)^2 y''(x) + y(x)y'(x)^2 = 0$$

✗ **Mathematica** : cpu = 0.523804 (sec), leaf count = 0 , could not solve

```
DSolve[-b - a*x + y[x]*Derivative[1][y][x]^2 + y[x]^2*Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 0.639 (sec), leaf count = 160

$$\left\{\frac{b\ln(ax+b)}{a}-\int^{\frac{y(x)}{ax+b}}-\frac{\_g^2b\sqrt{3}}{6\_g^3a^2-6}\left(-3\tan\left(RootOf\left(6\,b^2\int\frac{\_g^2}{\_g^3a^2-1}\left(-\frac{a}{\_g^3b^3}\right)^{2/3}\mathrm{d}\_g-2\_Z\sqrt{3}+\ln\left(\right.\right.\right.\right.\right.\right.$$

2.1781 ODE No. 1781

$$\left(y(x)^2+1\right)y''(x)+(1-2y(x))y'(x)^2=0$$

✓ **Mathematica** : cpu = 0.0842105 (sec), leaf count = 14

$$\{\{y(x)\to \tan (\log (c_1(c_2+x)))\}\}$$

✓ **Maple** : cpu = 0.062 (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 = 0.0902467 (sec), leaf count = 93

$$\left\{\left\{y(x)\to -\frac{ic_1(c_2+x)}{\sqrt{c_1^2x^2+2c_2c_1^2x+c_2^2c_1^2-1}}\right\},\left\{y(x)\to \frac{ic_1(c_2+x)}{\sqrt{c_1^2x^2+2c_2c_1^2x+c_2^2c_1^2-1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.056 (sec), leaf count = 33

$$\left\{y(x)=\sqrt{-\left(\_C1^2x^2+2\_C1\,\_C2\,x+\_C2^2-1\right)^{-1}}(\_C1\,x+\_C2)\right\}$$

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 = 1.46611 (sec), leaf count = 24

$$\text{Solve}\left[y(x)^2+x=c_2e^{e^{-c_1y(x)}},y(x)\right]$$

✓ **Maple** : cpu = 0.189 (sec), leaf count = 23

$$\left\{\frac{-\_C1\,y(x)+\ln\left(x+(y(x))^2\right)+\_C2+2}{y\,(x)}=0\right\}$$

2.1784 ODE No. 1784

$$(x^2 + y(x)^2)\, y''(x) - (xy'(x) - y(x))\, (y'(x)^2 + 1) = 0$$

✓ **Mathematica** : cpu = 0.296303 (sec), leaf count = 72

$$\text{Solve}\left[\log(x) + \frac{1}{2}\left(i\cot(c_1)\left(\log\left(1 - \frac{iy(x)}{x}\right) - \log\left(1 + \frac{iy(x)}{x}\right)\right) + \log\left(1 - \frac{iy(x)}{x}\right) + \log\left(1 + \frac{iy(x)}{x}\right)\right) = c_2$$

✓ **Maple** : cpu = 0.643 (sec), leaf count = 82

$$\left\{y(x) = \tan\left(\mathit{RootOf}\left(-\left(e^{\frac{i\_C1\_Z}{-1+\_C1}}\right)^2\left(e^{\frac{i\_Z}{-1+\_C1}}\right)^2\left(e^{\frac{\_C2\_C1}{-1+\_C1}}\right)^2\left(x^{\frac{\_C1}{-1+\_C1}}\right)^2 + (\cos(\_Z))^2\left(e^{\frac{\_C2}{-1+\_C1}}\right)^2\left(x^{(-1+\_C1}\right.\right.\right.\right.$$

2.1785 ODE No. 1785

$$(x^2 + y(x)^2)\, y''(x) - 2(xy'(x) - y(x))\, (y'(x)^2 + 1) = 0$$

✓ **Mathematica** : cpu = 0.381029 (sec), leaf count = 95

$$\left\{\left\{y(x) \to \frac{1}{2}\left(-\sqrt{4x\,(e^{c_2} - x) + e^{2c_2}\cot^2(c_1)} - e^{c_2}\cot(c_1)\right)\right\}, \left\{y(x) \to \frac{1}{2}\left(\sqrt{4x\,(e^{c_2} - x) + e^{2c_2}\cot^2(c_1)} - e^{c_2}\right.\right.\right.$$

✓ **Maple** : cpu = 0.421 (sec), leaf count = 83

$$\left\{y(x) = \frac{1}{2\_C2}\left(\_C1 + 1 + \sqrt{\_C1^2 + (4\,i\_C2\,x + 2)\_C1 - 4\_C2^2x^2 - 4\,i\_C2\,x + 1}\right), y(x) = \frac{1}{2\_C2}\left(\_C\right.\right.$$

2.1786 ODE No. 1786

$$f(x)(1 - y(x))y(x)y'(x) + 2(1 - y(x))y(x)y''(x) - (1 - 2y(x))y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 1.05519 (sec), leaf count = 87

$$\left\{\left\{y(x) \to \frac{1}{4}\exp\left(-i\left(\int_1^x c_1\left(-e^{-\int_1^{K[3]}\frac{1}{2}f(K[1])\,dK[1]}\right)dK[3] + c_2\right)\right)\left(1 + \exp\left(i\left(\int_1^x c_1\left(-e^{-\int_1^{K[3]}\frac{1}{2}f(K[1])\,dK[1]}\right.\right.\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.218 (sec), leaf count = 42

$$\left\{y(x) = \frac{1}{8\_C2}\left(2\,e^{\_C1\int e^{-1/2\int f(x)\,dx}dx}\_C2 + 1\right)^2\left(e^{\_C1\int e^{-\frac{\int f(x)\,dx}{2}}dx}\right)^{-1}\right\}$$

2.1787 ODE No. 1787

$$h(y(x)) + 2(1 - y(x))y(x)y''(x) - (1 - 3y(x))y'(x)^2 = 0$$

✗ **Mathematica** : cpu = 100.254 (sec), leaf count = 0 , could not solve

```
DSolve[h[y[x]] - (1 - 3*y[x])*Derivative[1][y][x]^2 + 2*(1 - y[x])*y[x]*Derivative[2][y][x]
```

✓ **Maple** : cpu = 0.315 (sec), leaf count = 80

$$\left\{\int^{y(x)} \frac{1}{\_b-1}\frac{1}{\sqrt{\_b\left(\_C1+\int\frac{h(\_b)}{(\_b-1)^3\_b^2}\,\mathrm{d}\_b\right)}}d\_b - x - \_C2 = 0, \int^{y(x)} -\frac{1}{\_b-1}\frac{1}{\sqrt{\_b\left(\_C1+\int\frac{h(\_b)}{(\_b-1)^3\_b^2}\right.}}$$

2.1788 ODE No. 1788

$$-4(1-y(x))y(x)^2\left(-f'(x) - f(x)^2 - g'(x) + g(x)^2\right)+4y(x)y'(x)(f(x)y(x)+g(x))-2(1-y(x))y(x)y''(x)+(1-3y(x$$

✗ **Mathematica** : cpu = 1.68295 (sec), leaf count = 0 , could not solve

```
DSolve[-4*(1 - y[x])*y[x]^2*(-f[x]^2 + g[x]^2 - Derivative[1][f][x] - Derivative[1][g][x]) +
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{\sqrt{y(x)} - 2\,\frac{\frac{\partial}{\partial x}DESol\left(\left\{-1/4\,\mathrm{e}^{-2\int f(x)\,\mathrm{d}x+2\int g(x)\,\mathrm{d}x}\_C1^2\_Y(x) - 2\,g(x)\,\frac{\mathrm{d}}{\mathrm{d}x}\_Y(x) + \frac{\mathrm{d}^2}{\mathrm{d}x^2}\_Y(x)\right\},\right.}{DESol\left(\left\{-1/4\,\mathrm{e}^{-2\int f(x)\,\mathrm{d}x+2\int g(x)\,\mathrm{d}x}\_C1^2\_Y(x) - 2\,g(x)\,\frac{\mathrm{d}}{\mathrm{d}x}\_Y(x) + \frac{\mathrm{d}^2}{\mathrm{d}x^2}\_Y(x)\right\},\{\_Y(x)\}\right)\mathrm{e}}$$

2.1789 ODE No. 1789

$$4y(x)^2(1-y(x))\left(-f'(x) + f(x)^2 - g'(x) - g(x)^2\right)-4y(x)y'(x)(f(x)y(x)+g(x))+(1-y(x))^3\left(\mathrm{f0}(x)^2y(x)^2 - \mathrm{f1}(x)^2\right.$$

✗ **Mathematica** : cpu = 11.0732 (sec), leaf count = 0 , could not solve

```
DSolve[(1 - y[x])^3*(-f1[x]^2 + f0[x]^2*y[x]^2) + 4*(1 - y[x])*y[x]^2*(f[x]^2 - g[x]^2 - Der
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(-2*y(x)*(1-y(x))*diff(diff(y(x),x),x)+(1-3*y(x))*diff(y(x),x)^2-4*y(x)*diff(y(x),x)*(
y(x))^3*(f0(x)^2*y(x)^2-f1(x)^2)+4*y(x)^2*(1-y(x))*(f(x)^2-g(x)^2-diff(g(x),x)-
diff(f(x),x))=0,y(x))
```

2.1790 ODE No. 1790

$$-h(y(x)) + 3(1 - y(x))y(x)y''(x) - 2(1 - 2y(x))y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 23.7993 (sec), leaf count = 182

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[\int_1^{\#1} -\frac{1}{(1-K[2])^{2/3}K[2]^{2/3}\sqrt{2\int_1^{K[2]} -\frac{h(K[1])\exp\left(-2\left(\frac{2}{3}\log(1-K[1])+\frac{2}{3}\log(K[1])\right)\right)}{3(K[1]-1)K[1]}\,dK[1]$$

✓ **Maple** : cpu = 0.287 (sec), leaf count = 119

$$\left\{\int^{y(x)} -\frac{\sqrt{9}}{3}\frac{1}{\sqrt{\_b\left(\_C1 - \frac{2}{3}\int \frac{h(\_b)}{\_b\,(\_b-1)}\left(\_b^2-\_b\right)^{-\frac{4}{3}} \mathrm{d}\_b\right)}\sqrt[3]{\_b\,(\_b-1)}\,(\_b-1)} d\_b - x - \_C2 = 0, \int^{y(}$$

2.1791 ODE No. 1791

$$-h(y(x)) + (1 - y(x))y''(x) - 3(1 - 2y(x))y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 23.8626 (sec), leaf count = 164

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[\int_1^{\#1} -\frac{e^{\frac{1}{2}(12-12K[2])}}{(K[2]-1)^3\sqrt{2\int_1^{K[2]} -\frac{h(K[1])\exp(-2(6(K[1]-1)+3\log(K[1]-1)))}{K[1]-1}\,dK[1] + c_1}}\,dK[2]$$

✓ **Maple** : cpu = 0.41 (sec), leaf count = 90

$$\left\{\int^{y(x)} \frac{1}{(\_b-1)^3\left(\mathrm{e}^{\_b}\right)^6}\frac{1}{\sqrt{-2\int \frac{h(\_b)}{\left(\mathrm{e}^{\_b}\right)^{12}(\_b-1)^7}\,\mathrm{d}\_b + \_C1}} d\_b - x - \_C2 = 0, \int^{y(x)} -\frac{1}{(\_b-1)^3\left(\mathrm{e}^{\_b}\right)^6}\frac{}{\sqrt{-2\int}}$$

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 = 27.9638 (sec), leaf count = 222

$$\left\{\left\{y(x)\to \text{InverseFunction}\left[\int_1^{\#1}-\frac{K[2]^{-\frac{c}{a}}(1-K[2])^{\frac{1}{2}\left(\frac{2b}{a}+\frac{2c}{a}\right)}}{\sqrt{2\int_1^{K[2]}-\frac{h(K[1])\exp\left(-\frac{2(c\log(K[1])-(b+c)\log(1-K[1]))}{a}\right)}{a(K[1]-1)K[1]}dK[1]+c_1}}dK[2]\&\right][c_2+$$

✓ **Maple** : cpu = 1.03 (sec), leaf count = 194

$$\left\{\int^{y(x)}a\frac{1}{\sqrt{a\left(\_C1\,a-2\int\frac{h(\_b)}{\_b\,(\_b-1)}\left((\_b-1)^{\frac{b}{a}}\right)^2\left((\_b-1)^{\frac{c}{a}}\right)^2\left(\_b^{\frac{c}{a}}\right)^{-2}\mathrm{d}\_b\right)}}\left(\_b^{\frac{c}{a}}\right)^{-1}\left((\_b-1)^{\frac{-b-c}{a}}\right)^{-1}d\_$$

2.1793 ODE No. 1793

$$a(y(x)-1)y(x)y''(x)-(a-1)(2y(x)-1)y'(x)^2+f(x)(y(x)-1)y(x)y'(x)=0$$

✓ **Mathematica** : cpu = 1.43171 (sec), leaf count = 113

$$\left\{\left\{y(x)\to \text{InverseFunction}\left[-\frac{a(1-\#1)^{-1/a}(-(\#1-1)\#1)^{\frac{1}{a}}\left((a+1)\,{}_2F_1\left(-\frac{1}{a},\frac{1}{a};1+\frac{1}{a};\#1\right)+\#1\,{}_2F_1\left(1+\frac{1}{a},\right.\right.}{a+1}\right.\right.\right.$$

✓ **Maple** : cpu = 0.073 (sec), leaf count = 40

$$\left\{\_C1\,\mathrm{e}^{-\frac{fx}{a}}-\_C2+\int^{y(x)}\frac{\sqrt[a]{\_a\,(\_a-1)}}{\_a\,(\_a-1)}d\_a=0\right\}$$

2.1794 ODE No. 1794

$$ab(y(x)-1)y(x)y''(x)+y'(x)^2(-((2ab-a-b)y(x)+(1-a)b))+f(x)(y(x)-1)y(x)y'(x)=0$$

✓ **Mathematica** : cpu = 1.32666 (sec), leaf count = 98

$$\left\{\left\{y(x)\to \text{InverseFunction}\left[-\frac{a\#1^{\frac{1}{a}}\left((a+1)\,{}_2F_1\left(\frac{1}{a},-\frac{1}{b};1+\frac{1}{a};\#1\right)+\#1\,{}_2F_1\left(1+\frac{1}{a},\frac{b-1}{b};2+\frac{1}{a};\#1\right)\right)}{a+1}\&\right]\left[\int_1^x c_1\right.\right.\right.$$

✓ **Maple** : cpu = 0.099 (sec), leaf count = 46

$$\left\{\_C1\,\mathrm{e}^{-\frac{fx}{ab}}-\_C2+\int^{y(x)}\frac{\sqrt[a]{\_a}\,\sqrt[b]{\_a-1}}{\_a\,(\_a-1)}d\_a=0\right\}$$

2.1795 ODE No. 1795

$$xy(x)^2y''(x)-a=0$$

✓ **Mathematica** : cpu = 0.341001 (sec), leaf count = 103

$$\text{Solve}\left[2\sqrt{2}\sqrt{-\frac{y(x)\,(ax+c_1y(x))}{x^2}}+\frac{\sqrt{2}a\tan^{-1}\left(\frac{ax+2c_1y(x)}{2\sqrt{c_1}x\sqrt{-\frac{y(x)(ax+c_1y(x))}{x^2}}}\right)}{\sqrt{c_1}}+\frac{4c_1}{x}+4c_1c_2=0,y(x)\right]$$

✓ **Maple** : cpu = 1.237 (sec), leaf count = 529

$$\left\{y(x)=\frac{\left(9\_C1\,a+\mathrm{e}^{RootOf\left(243\,csgn(\_C1^{-1})\_C1^4a^2x-54\_Z\,\mathrm{e}^{\_Z}ax\_C1^3-3\,(\mathrm{e}^{\_Z})^2csgn(\_C1^{-1})\_C1^2x-6\,\mathrm{e}^{\_Z}csgn(\_C1^{-1})\_C\right.}\right.}{2\,\mathrm{e}^{RootOf\left(243\,csgn(\_C1^{-1})\_C1^4a^2x-54\_Z\,\mathrm{e}^{\_Z}ax\_C1^3-3\,(\mathrm{e}^{\_Z})^2csgn(\_C1^{-1})\_C1^2x-6\,\mathrm{e}^{\_Z}csgn(\_C1^{-1})\_C\right.}}\right.$$

2.1796 ODE No. 1796

$$(a^2-x^2)\,(a^2-y(x)^2)\,y''(x)+(a^2-x^2)\,y(x)y'(x)^2-x\,(a^2-y(x)^2)\,y'(x)=0$$

✓ **Mathematica** : cpu = 0.341461 (sec), leaf count = 65

$$\left\{\left\{y(x)\to\frac{1}{2}e^{c_2}\left(\sqrt{x^2-a^2}+x\right)^{-c_1}+\frac{1}{2}a^2e^{-c_2}\left(\sqrt{x^2-a^2}+x\right)^{c_1}\right\}\right\}$$

✓ **Maple** : cpu = 0.256 (sec), leaf count = 51

$$\left\{y(x)=\frac{1}{2\_C2}\left(\left(\left(x+\sqrt{-a^2+x^2}\right)^{-\_C1}\right)^2\_C2^2+a^2\right)\left(\left(x+\sqrt{-a^2+x^2}\right)^{-\_C1}\right)^{-1}\right\}$$

2.1797 ODE No. 1797

$(y(x)-1)^3 \left(ay(x)^2+b\right)+cxy(x)^2(y(x)-1)+dx^2y(x)^2(y(x)+1)+2x^2y(x)(y(x)-1)y''(x)-x^2(3y(x)-1)y'(x)^2+2xy$

✗ **Mathematica** : cpu = 14.7708 (sec), leaf count = 0 , could not solve

```
DSolve[c*x*(-1 + y[x])*y[x]^2 + d*x^2*y[x]^2*(1 + y[x]) + (-1 + y[x])^3*(b + a*y[x]^2) + 2*x
1 + y[x])*y[x]*Derivative[1][y][x] - x^2*(-1 + 3*y[x])*Derivative[1][y][x]^2 + 2*x^2*(-
1 + y[x])*y[x]*Derivative[2][y][x] == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(2*x^2*y(x)*(-1+y(x))*diff(diff(y(x),x),x)-x^2*(3*y(x)-1)*diff(y(x),x)^2+2*x*y(x)*(-
1+y(x))*diff(y(x),x)+(a*y(x)^2+b)*(-1+y(x))^3+c*x*y(x)^2*(-1+y(x))+d*x^2*y(x)^2*(1+y(x))=0,y
```

2.1798 ODE No. 1798

$$x^3y(x)^2y''(x)+(y(x)+x)\left(xy'(x)-y(x)\right)^3=0$$

✗ **Mathematica** : cpu = 38.4158 (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] == 0, y
```

✓ **Maple** : cpu = 0.263 (sec), leaf count = 166

$$\left\{y(x)=RootOf\left(-2\ln(x)-\int^{\_Z}1\left(i\sqrt{3}Y_{i\sqrt{3}}\left(2\sqrt{\_f}\right)\_C1\sqrt{\_f}+i\sqrt{3}J_{i\sqrt{3}}\left(2\sqrt{\_f}\right)\sqrt{\_f}+Y_{i\sqrt{3}}\left(2\sqrt{\_f}\right)\_C\right.\right.\right.$$

2.1799 ODE No. 1799

$$y(x)^3y''(x)-a=0$$

✓ **Mathematica** : cpu = 1.91147 (sec), leaf count = 58

$$\left\{\left\{y(x)\to-\frac{\sqrt{a+c_1^2\left(c_2+x\right)^2}}{\sqrt{c_1}}\right\},\left\{y(x)\to\frac{\sqrt{a+c_1^2\left(c_2+x\right)^2}}{\sqrt{c_1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.155 (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 = 0.511434 (sec), leaf count = 78

$$\left\{\left\{y(x)\to -\frac{\sqrt{-2c_1x-2c_2c_1-1}}{\sqrt{2}\sqrt{c_1\left(c_2+x\right)}}\right\},\left\{y(x)\to \frac{\sqrt{-2c_1x-2c_2c_1-1}}{\sqrt{2}\sqrt{c_1\left(c_2+x\right)}}\right\}\right\}$$

✓ **Maple** : cpu = 0.056 (sec), leaf count = 60

$$\left\{y(x)=\frac{1}{2\_C1\,x+2\_C2}\sqrt{-4\left(\_C1\,x+\_C2\right)\left(\_C1\,x+\_C2+1/2\right)},y(x)=-\frac{1}{2\_C1\,x+2\_C2}\sqrt{-4\left(\_C1\right.}$$

2.1801 ODE No. 1801

$$-a^2xy(x)^2+2y(x)^3y''(x)+y(x)^4-1=0$$

✗ **Mathematica** : cpu = 47.3858 (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 = 0.355291 (sec), leaf count = 0 , could not solve

```
DSolve[-c - b*x - a*x^2 + y[x]^2*Derivative[1][y][x]^2 + 2*y[x]^3*Derivative[2][y][x] == 0,
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(2*y(x)^3*diff(diff(y(x),x),x)+y(x)^2*diff(y(x),x)^2-a*x^2-b*x-c=0,y(x))
```

2.1803 ODE No. 1803

$$-\mathrm{a0}(a-y(x))^2(b-y(x))^2(c-y(x))^2-\mathrm{a2}(a-y(x))^2(c-y(x))^2-\mathrm{a3}(a-y(x))^2(b-y(x))^2+2(a-y(x))(b-y(x))(c-y(x)$$

✓ **Mathematica** : cpu = 21.1675 (sec), leaf count = 9968

$$\left\{\text{Solve}\left[\frac{2F\left(\sin^{-1}\left(\sqrt{\frac{(\text{Root}[\mathrm{a0}\#1^4+(-a\mathrm{a0}-b\mathrm{a0}-c\mathrm{a0}-c_1)\#1^3+(-\mathrm{a1}-\mathrm{a2}-\mathrm{a3}+a\mathrm{a0}b+a\mathrm{a0}c+\mathrm{a0}bc+ac_1+bc_1+cc_1)\#1^2+(a\mathrm{a2}+c\mathrm{a2}+a\mathrm{a3}+}{(\text{Root}[\mathrm{a0}\#1^4+(-a\mathrm{a0}-b\mathrm{a0}-c\mathrm{a0}-c_1)\#1^3+(-\mathrm{a1}-\mathrm{a2}-\mathrm{a3}+a\mathrm{a0}b+a\mathrm{a0}c+\mathrm{a0}bc+ac_1+bc_1+cc_1)\#1^2+(a\mathrm{a2}+c\mathrm{a2}+a\mathrm{a3}+}}\right.\right.}{}\right.\right.$$

✓ **Maple** : cpu = 2.592 (sec), leaf count = 115620

result too large to display

2.1804 ODE No. 1804

$$y''(x)\left(-ay(x)-b+4y(x)^3\right)-\left(6y(x)^2-\frac{a}{2}\right)y'(x)^2=0$$

✓ **Mathematica** : cpu = 3.13136 (sec), leaf count = 415

$$\text{Solve}\left[\frac{2\sqrt{\frac{y(x)-\text{Root}\left[4\#1^3-\#1a-b\&,1\right]}{\text{Root}\left[4\#1^3-\#1a-b\&,3\right]-\text{Root}\left[4\#1^3-\#1a-b\&,1\right]}}\sqrt{\frac{y(x)-\text{Root}\left[4\#1^3-\#1a-b\&,2\right]}{\text{Root}\left[4\#1^3-\#1a-b\&,3\right]-\text{Root}\left[4\#1^3-\#1a-b\&,2\right]}}\left(y(x)-\text{Root}\left[4\#1\right.\right.}{c_1\sqrt{2ay(x)+2b-8y(x)^3}\sqrt{}}\right.$$

✓ **Maple** : cpu = 0.038 (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 = 2.64674 (sec), leaf count = 436

$$\text{Solve}\left[\frac{2\sqrt{\frac{\text{Root}\left[4\#1^3-\#1a-b\&,1\right]-y(x)}{\text{Root}\left[4\#1^3-\#1a-b\&,1\right]-\text{Root}\left[4\#1^3-\#1a-b\&,3\right]}}\sqrt{\frac{\text{Root}\left[4\#1^3-\#1a-b\&,2\right]-y(x)}{\text{Root}\left[4\#1^3-\#1a-b\&,2\right]-\text{Root}\left[4\#1^3-\#1a-b\&,3\right]}}\left(y(x)-\text{Root}\left[4\#1\right.\right.}{\sqrt{ay(x)+b-4y(x)^3}\sqrt{\frac{}{\text{Ro}}}}\right.$$

✓ **Maple** : cpu = 0.05 (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

$$-f(x)((y(x)-1)y(x)(y(x)-x))^{3/2}+2(1-y(x))\left(x^2-2xy(x)+y(x)\right)y(x)y'(x)-2(1-x)x(1-y(x))(x-y(x))y(x)y'$$

✗ **Mathematica** : cpu = 21.579 (sec), leaf count = 0 , could not solve

```
DSolve[-((1 - y[x])^2*y[x]^2) - f[x]*((-1 + y[x])*y[x]*(-x + y[x]))^(3/2) + 2*(1 - y[x])*y[x
```

✓ **Maple** : cpu = 5.29 (sec), leaf count = 819

$$\left\{-\frac{\_C1}{2}\,eval\left(eval\left(\int \frac{1}{x-1}e^{\int \frac{1}{x(x-1)}EllipticE\left(\sqrt{x}\right)\left(EllipticK\left(\sqrt{x}\right)\right)^{-1}dx}\int 1\int \frac{1}{(x-y)^2\,y\,(-1+y)}\sqrt{-xy^2+y^3+xy-\right.\right.\right.$$

2.1807 ODE No. 1807

$$a(1-y(x))^2(x-y(x))^2y(x)^2+bx(1-y(x))^2(x-y(x))^2-c(1-x)(x-y(x))^2y(x)^2-d(1-x)x(1-y(x))^2y(x)^2+2(1-x)^2$$

✗ **Mathematica** : cpu = 28.6783 (sec), leaf count = 0 , could not solve

```
DSolve[b*x*(1 - y[x])^2*(x - y[x])^2 - d*(1 - x)*x*(1 - y[x])^2*y[x]^2 - c*(1 - x)*(x - y[x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(2*x^2*y(x)*(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(
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

$$b\sqrt{(1-y(x)^2)\left(1-a^2y(x)^2\right)}y'(x)^2+\left(y(x)^2-1\right)\left(a^2y(x)^2-1\right)y''(x)+y(x)\left(-2a^2y(x)^2+a^2+1\right)y'(x)^2=0$$

✓ **Mathematica** : cpu = 104.67 (sec), leaf count = 155

$$\text{Solve}\left[2\left(\log\left(bc_1\sqrt{1-y(x)^2}\sqrt{1-a^2y(x)^2}+\sqrt{y(x)^2-1}\sqrt{a^2y(x)^2-1}\exp\left(\frac{b\sqrt{1-y(x)^2}\sqrt{1-a^2y(x)^2}F\left(\sin^{-}\right.}{\sqrt{y(x)^2-1}\sqrt{a^2y(x)^2-}}\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.146 (sec), leaf count = 72

$$\left\{\int^{y(x)}e^{\int \frac{1}{(\_b^2-1)(\_b^2a^2-1)}\left(-2\_b^3a^2+\_b\,a^2+b\sqrt{(\_b^2-1)(\_b^2a^2-1)}+\_b\right)d\_b}d\_b-\_C1\,x-\_C2=0\right\}$$

2.1809 ODE No. 1809

$$y''(x)\left(ax^2+2bx+c+y(x)^2\right)^2+dy(x)=0$$

✗ **Mathematica** : cpu = 45.6153 (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 = 0.776 (sec), leaf count = 336

$$\left\{y(x)=RootOf\left(-\int^{\_Z}\frac{a}{-\_f^4ac+\_f^4b^2+\_C1\,\_f^2a^2-c\_f^2a+b^2\_f^2+\_C1\,a^2+d}\sqrt{(\_f^2+1)\left(-\_f^4ac\right.}\right.\right.$$

2.1810 ODE No. 1810

$$\sqrt{y(x)}y''(x)-a=0$$

✓ **Mathematica** : cpu = 0.110895 (sec), leaf count = 1881

$$\left\{\left\{y(x)\to\frac{288c_1c_2^2a^4+288x^2c_1a^4+576xc_1c_2a^4+\left(\frac{10368x^4a^8+10368c_2^4a^8+41472xc_2^3a^8+62208x^2c_2^2a^8+41472x^3c_2a^8+48\sqrt{\frac{(x-}{}}}{a^6}\right.}{16a^4\sqrt[3]{\frac{10368x^4a^8}{}}}\right.\right.$$

✓ **Maple** : cpu = 0.139 (sec), leaf count = 91

$$\left\{\frac{1}{12\,a^2}\left(-3\_C1\,\sqrt{4\,a\sqrt{y\,(x)}-\_C1}-\left(4\,a\sqrt{y\,(x)}-\_C1\right)^{\frac{3}{2}}\right)-x-\_C2=0,\frac{1}{12\,a^2}\left(3\_C1\,\sqrt{4\,a\sqrt{y\,(x)}-\_\right.\right.$$

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 = 300.024 (sec), leaf count = 0 , timed out

```
$Aborted
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , exception

```
time expired
```

2.1812 ODE No. 1812

$$y(x)y''(x)(1-\log(y(x)))+y'(x)^2(\log(y(x))+1)=0$$

✓ **Mathematica** : cpu = 0.0291534 (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 = 0.042 (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 = 103.128 (sec), leaf count = 0 , could not solve

```
DSolve[A*(c + a*Sin[y[x]]^2)*y[x] + a*Cos[y[x]]*Sin[y[x]]*Derivative[1][y][x]^2 + (b + a*Sin
```

✓ **Maple** : cpu = 0.424 (sec), leaf count = 138

$$\left\{\int^{y(x)}\sqrt{2}\left(b+a(\sin(\_a))^2\right)\frac{1}{\sqrt{-\left(Aa(\sin(\_a))^2-2\,Aa\_a\cos(\_a)\sin(\_a)+\_a^2(a+2\,c)\,A-2\,\_C1\right)\left(b+\right.}}\right.$$

2.1814 ODE No. 1814

$$ah(y(x))y'(x)^2+h(y(x))y''(x)+j(y(x))=0$$

✓ **Mathematica** : cpu = 13.8179 (sec), leaf count = 116

$$\left\{\left\{y(x)\to\text{InverseFunction}\left[\int_1^{\#1}-\frac{e^{aK[2]}}{\sqrt{2\int_1^{K[2]}-\frac{e^{2aK[1]}j(K[1])}{h(K[1])}dK[1]+c_1}}dK[2]\&\right][c_2+x]\right\},\left\{y(x)\to\text{InverseFu}\right.\right.$$

✓ **Maple** : cpu = 0.207 (sec), leaf count = 87

$$\left\{\int^{y(x)}\frac{1}{(h(\_b))^{-a}}\frac{1}{\sqrt{-2\int\frac{((h(\_b))^a)^2}{h(\_b)}\mathrm{d}\_b+\_C1}}d\_b-x-\_C2=0,\int^{y(x)}-\frac{1}{(h(\_b))^{-a}}\frac{1}{\sqrt{-2\int 2\frac{((h(\_b))^a)^2}{h(\_b)}\mathrm{d}\_}}\right.$$

2.1815 ODE No. 1815

$$h(y(x))^2\left(-j\left(x,\frac{y'(x)}{h(y(x))}\right)\right)+h(y(x))y''(x)-h(y(x))y'(x)^2=0$$

✗ **Mathematica** : cpu = 1.28705 (sec), leaf count = 0 , could not solve

```
DSolve[-(h[y[x]]^2*j[x, Derivative[1][y][x]/h[y[x]]]) - h[y[x]]*Derivative[1][y][x]^2 + h[y[
```

✓ **Maple** : cpu = 0.882 (sec), leaf count = 71

$$\left\{y(x)=ODESolStruc\left(RootOf\left(\int \_b(\_a)\,\mathrm{d}\_a+\_C1-\int^{\_Z}(h(\_f))^{-1}\,d\_f\right),[\left\{\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a)=1\right\},\left\{\_a=\right.\right.\right.$$

2.1816 ODE No. 1816

$$x^2(-y(x))y'(x)+y'(x)y''(x)-xy(x)^2=0$$

✗ **Mathematica** : cpu = 65.5847 (sec), leaf count = 0 , could not solve

```
DSolve[-(x*y[x]^2) - x^2*y[x]*Derivative[1][y][x] + Derivative[1][y][x]*Derivative[2][y][x]
```

✓ **Maple** : cpu = 1.231 (sec), leaf count = 46

$$\left\{y(x)=ODESolStruc\left(\_b(\_a),[\left\{-(\_b(\_a))^2\_a^2+\left(\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a)\right)^2+\_C1=0\right\},\{\_a=x,\_b(\_a)=y(x\right.\right.$$

2.1817 ODE No. 1817

$$4y'(x)^2+\left(xy'(x)-y(x)\right)y''(x)=0$$

✗ **Mathematica** : cpu = 17.2392 (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] == 0, y
```

✓ **Maple** : cpu = 0.295 (sec), leaf count = 40

$$\left\{y(x)=\mathrm{e}^{\int^{\ln(x)}\mathrm{e}^{RootOf\left(\ln\left(\mathrm{e}^{\_Z}-1\right)\mathrm{e}^{\_Z}+\_C1\,\mathrm{e}^{\_Z}-\_Z\,\mathrm{e}^{\_Z}-\_b\,\mathrm{e}^{\_Z}+2\right)}-1d\_b+\_C2}\right\}$$

2.1818 ODE No. 1818

$$(xy'(x) - y(x))\, y''(x) - \left(y'(x)^2 + 1\right)^2 = 0$$

✗ **Mathematica** : cpu = 1.55603 (sec), leaf count = 0 , could not solve

```
DSolve[-(1 + Derivative[1][y][x]^2)^2 + (-y[x] + x*Derivative[1][y][x])*Derivative[2][y][x]
```

✓ **Maple** : cpu = 0.443 (sec), leaf count = 66

$$\left\{ y(x) = \mathit{RootOf}\left(-\ln(x) + \int^{\_Z} \frac{-\_f + \mathit{RootOf}\left(-\_C1 \tan\left(\_Z^{-1}\right)\_Z + \_f\_C1 \tan\left(\_Z^{-1}\right) + \_C1\_Z\_f}{\_f^2 + 1} \right.\right.$$

2.1819 ODE No. 1819

$$ax^3y'(x)y''(x) + by(x)^2 = 0$$

✗ **Mathematica** : cpu = 90.7957 (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 = 0.072 (sec), leaf count = 42

$$\left\{ y(x) = e^{\int^{\ln(x)} \mathit{RootOf}\left(-\int^{\_Z} \frac{\_a\, a}{\_a\_a^3 - \_a^2 a + b} d\_a - \_b + \_C1\right) d\_b + \_C2} \right\}$$

2.1820 ODE No. 1820

$$y''(x)\left(\mathrm{f1}(x)y'(x) + \mathrm{f2}(x)y(x)\right) + \mathrm{f3}(x)y'(x)^2 + \mathrm{f4}(x)y(x)y'(x) + \mathrm{f5}(x)y(x)^2 = 0$$

✗ **Mathematica** : cpu = 310.11 (sec), leaf count = 0 , timed out

```
$Aborted
```

✓ **Maple** : cpu = 1.211 (sec), leaf count = 88

$$\left\{ y(x) = \mathit{ODESolStruc}\left(e^{\int \_b(\_a)\, d\_a + \_C1}, \left[\left\{ \frac{d}{d\_a}\_b(\_a) = \frac{-(\_b(\_a))^3 \mathit{f1} + (-\mathit{f2} - \mathit{f3})(\_b(\_a))^2 - \mathit{f4}(\_a)\ \_}{\_b(\_a)\mathit{f1} + \mathit{f2}} \right.\right.\right.$$

2.1821 ODE No. 1821

$$(x^2 + 2y(x)^2 y'(x))\, y''(x) + 2y(x)y'(x)^3 + 3xy'(x) + y(x) = 0$$

✗ **Mathematica** : cpu = 42.6353 (sec), leaf count = 0 , could not solve

```
DSolve[y[x] + 3*x*Derivative[1][y][x] + 2*y[x]*Derivative[1][y][x]^3 + (x^2 + 2*y[x]^2*Deriv
```

✓ **Maple** : cpu = 2.023 (sec), leaf count = 54

$$\left\{y(x) = ODESolStruc\left(\_b(\_a)\,, [\left\{(\_b(\_a))^2 \left(\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a)\right)^2 + \_a^2 \frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a) + \_a\,\_b(\_a) + \_C1 = 0\right\}\right.\right.$$

2.1822 ODE No. 1822

$$(y'(x)^2 + y(x)^2)\, y''(x) + y(x)^3 = 0$$

✓ **Mathematica** : cpu = 1.12368 (sec), leaf count = 369

$$\left\{\left\{y(x)\to \frac{c_2 \exp\left(-\frac{\tan^{-1}\left(\frac{1+2\text{InverseFunction}\left[\frac{\left(\sqrt{3}-i\right)\tan^{-1}\left(\frac{\#1}{\sqrt{\frac{1}{2}\left(1-i\sqrt{3}\right)}}\right)}{\sqrt{6\left(1-i\sqrt{3}\right)}}+\cdots\right.}{\sqrt{3}}\right.}{2\sqrt{3}}\right.}{\sqrt[4]{\text{InverseFunction}\left[\frac{\left(\sqrt{3}-i\right)\tan^{-1}\left(\frac{\#1}{\sqrt{\frac{1}{2}\left(1-i\sqrt{3}\right)}}\right)}{\sqrt{6\left(1-i\sqrt{3}\right)}}+\frac{\left(\sqrt{3}+i\right)\tan^{-1}\left(\frac{\#1}{\sqrt{\frac{1}{2}\left(1+i\sqrt{3}\right)}}\right)}{\sqrt{6\left(1+i\sqrt{3}\right)}}\&\right][c_1-x]^4+\text{InverseFun}\cdots}}\right.\right.$$

✓ **Maple** : cpu = 1.39 (sec), leaf count = 291

$$\left\{y(x)=\left(\_C1+\tan\left(\sqrt{3}x\right)\right)^{\left(2\_C1^2+2\right)^{-1}}\_C2\left(\_C1+\tan\left(\sqrt{3}x\right)\right)^{\frac{\_C1^2}{2\_C1^2+2}}\left(1+\left(\tan\left(\sqrt{3}x\right)\right)^2\right)^{-\frac{\_C1^2}{4\_C1^2+4}}\left(1\cdots\right.\right.$$

2.1823 ODE No. 1823

$$y''(x)\left(a(xy'(x)-y(x))+y'(x)^2\right)-b=0$$

✗ **Mathematica** : cpu = 0.177073 (sec), leaf count = 0 , could not solve

```
DSolve[-b + (Derivative[1][y][x]^2 + a*(-y[x] + x*Derivative[1][y][x]))*Derivative[2][y][x]
```

✓ **Maple** : cpu = 0.446 (sec), leaf count = 289

$$\left\{y(x)=-\frac{ax^2}{4}+RootOf\left(-x-\int^{\_Z}\frac{1}{a^2\_f^2-4\_f\,b+2\_C1}\sqrt{\left(a^2\_f^2-4\_f\,b+2\_C1\right)\left(a\_f+\sqrt{4\_f\,b-2\right.}}\right.\right.$$

2.1824 ODE No. 1824

$$y''(x)\left(a\sqrt{y'(x)^2+1}-xy'(x)\right)-y'(x)^2-1=0$$

✓ **Mathematica** : cpu = 0.3778 (sec), leaf count = 347

$$\left\{\left\{y(x)\to\frac{-2\sqrt{x^2\left(a^2+c_1^2-x^2\right)}+c_1x\log\left(-c_1\left(\sqrt{x^2\left(a^2+c_1^2-x^2\right)}+c_1x\right)+a^2(-x)+ax^2\right)+c_1x\log\left(c_1\left(\right.\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.899 (sec), leaf count = 96

$$\left\{y(x)=\int\frac{1}{a^3-ax^2}\left(-\_C1\,a^2-x\sqrt{a^2\left(\_C1^2+a^2-x^2\right)}\right)dx+\_C2,y(x)=\int\frac{1}{a^3-ax^2}\left(-\_C1\,a^2+x\sqrt{a^2\right.\right.$$

2.1825 ODE No. 1825

$$f(x)+y''(x)h(y'(x))+j(y(x))y'(x)=0$$

✗ **Mathematica** : cpu = 0.0465295 (sec), leaf count = 0 , could not solve

```
DSolve[f[x] + j[y[x]]*Derivative[1][y][x] + h[Derivative[1][y][x]]*Derivative[2][y][x] == 0,
```

✓ **Maple** : cpu = 0.993 (sec), leaf count = 49

$$\left\{y(x)=ODESolStruc\left(\_f(\_b),[\left\{\int^{\_f(\_b)}1d\_a+\int^{\frac{d}{d\_b}\_f(\_b)}h(\_a)\,d\_a+\_b\,f+\_C1=0\right\},\{\_b=x,\_f(\right.\right.$$

2.1826 ODE No. 1826

$$-ay(x) - b + y''(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.827523 (sec), leaf count = 119

$$\left\{\text{Solve}\left[\frac{(ay(x)+b)^2\,{}_2F_1\left(\frac{1}{2},\frac{2}{3};\frac{5}{3};-\frac{4(b+ay(x))^{3/2}}{3ac_1}\right)^2}{a^2c_1} = (c_2+x)^2, y(x)\right], \text{Solve}\left[\frac{(ay(x)+b)^2\,{}_2F_1\left(\frac{1}{2},\frac{2}{3};\frac{5}{3};\frac{4(b+ay(x)}{3ac_1}\right.}{a^2c_1}\right.\right.$$

✓ **Maple** : cpu = 0.414 (sec), leaf count = 173

$$\left\{\int^{y(x)} \sqrt{3}a\frac{1}{\sqrt{a\left(4\_a\sqrt{\_a\,a+b}a+4\sqrt{\_a\,a+b}b-\_C1\right)}}d\_a - x - \_C2 = 0, \int^{y(x)} -3\frac{a}{\sqrt{-12\,a\left((\_a\,a+b)^{3/}\right.}}\right.$$

2.1827 ODE No. 1827

$$a^2y''(x)^2 - 2axy''(x) + y'(x) = 0$$

✗ **Mathematica** : cpu = 1.05244 (sec), leaf count = 0 , could not solve

```
DSolve[Derivative[1][y][x] - 2*a*x*Derivative[2][y][x] + a^2*Derivative[2][y][x]^2 == 0, y[x
```

✓ **Maple** : cpu = 13.97 (sec), leaf count = 81

$$\left\{y(x) = \int RootOf\left(-\int_{\_g}^{\_Z}\left(x\sqrt{x^2-\_f}-x^2+2\,a\_f\right)^{-1}\mathrm{d}\_f+\_C1\right)\mathrm{d}x+\_C2, y(x) = \int RootOf\left(-\int_{\_g}^{\_Z}\right.\right.$$

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 = 0.0108039 (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 = 0.676 (sec), leaf count = 59

$$\left\{y(x) = \frac{\_C1\,x^2}{2} + \_C2\,x + \_C1^2 + \_C2^2, y(x) = \frac{x}{2}\left(\_C1 + \frac{Arcsinh(x)}{4}\right)\sqrt{x^2+1} - \frac{3\,x^2}{16} + \_C1^2 + \frac{\_C1\,A}{}\right.$$

2.1829 ODE No. 1829

$$3x^2y''(x)^2 + 4y'(x)^2 - 2(3xy'(x) + y(x))\,y''(x) = 0$$

✓ **Mathematica** : cpu = 0.00699581 (sec), leaf count = 24

$$\left\{\left\{y(x) \to \frac{c_1^2x^2}{c_2} + c_1x + c_2\right\}\right\}$$

✓ **Maple** : cpu = 0.451 (sec), leaf count = 32

$$\left\{y(x) = x^{\frac{2\sqrt{3}}{3}}\_C1\,x, y(x) = \frac{\_C1^2x^2}{\_C2} + \_C1\,x + \_C2\right\}$$

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 = 0.0283471 (sec), leaf count = 24

$$\left\{\left\{y(x) \to \frac{c_1^2x^3}{c_2} + c_1x + c_2\right\}\right\}$$

✓ **Maple** : cpu = 0.635 (sec), leaf count = 304

$$\left\{y(x) = \frac{27\_C1\,\sqrt{5}\sqrt{4}x}{4}\left((9\,x - 1)\,\sqrt{9} + 9\,\sqrt{9\,x^2 - 2\,x}\right)^{-\frac{2\sqrt{9}}{9}}\left((9\,x - 1)\,\sqrt{9} + 9\,\sqrt{9\,x^2 - 2\,x}\right)^{-\frac{5\sqrt{9}}{18}}\sqrt{1\left(\frac{4}{5} + \sqrt{1\right.}}\right.$$

2.1831 ODE No. 1831

$y(x)(xF(0,2)+xF(2,0))y''(x)+xF(2,2)y''(x)^2+xF(1,1)y''(x)+y'(x)\left((xF(1,2) + xF(2,1))y''(x) + y(x)(xF(0,1\right.$

✗ **Mathematica** : cpu = 299.998 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 1.186 (sec), leaf count = 163

$$\left\{y(x) = ODESolStruc\left(\mathrm{e}^{\int \_b(\_a)\,\mathrm{d}\_a + \_C1}, [\left\{\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a) = \frac{1}{2\,(F_{2,2})\,(\_a)}\left(\sqrt{\left(((F_{2,1})\,(\_a))^2 + 2\,(F_{2,1})\,(\_a)\,(F\right.}\right.\right.\right.$$

2.1832 ODE No. 1832

$$y(x)y''(x)^2 - ae^{2x} = 0$$

✗ **Mathematica** : cpu = 0.733566 (sec), leaf count = 0 , could not solve

```
DSolve[-(a*E^(2*x)) + y[x]*Derivative[2][y][x]^2 == 0, y[x], x]
```

✓ **Maple** : cpu = 1.023 (sec), leaf count = 117

$$\left\{y(x) = ODESolStruc\left(\_a\left(e^{-\frac{2\int \_b(\_a)\,d\_a}{3} - \frac{2\_C1}{3}}\right)^{-1}, [\left\{\frac{d}{d\_a}\_b(\_a) = -\frac{(\_b(\_a))^3}{9\_a}(-4\_a^2 + 9\sqrt{\_a\,a}) + \frac{4(\_\right.\right.\right.$$

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 = 300.043 (sec), leaf count = 0 , timed out

```
$Aborted
```

✓ **Maple** : cpu = 3.854 (sec), leaf count = 145

$$\left\{y(x) = \_C1, y(x) = b\left(e^{\frac{-\_C2+x}{b}\sqrt{\_C1^2a^2-1}} - \_C1\right)\frac{1}{\sqrt{\_C1^2a^2-1}}, y(x) = \frac{b}{a}\tan\left(\frac{\_C1 - x}{ab}\sqrt{a^2}\right)\frac{}{\sqrt{\left(\tan\left(\frac{\_C1}{a}\right.\right.}}\right.$$

2.1834 ODE No. 1834

$$\left(x^2y(x)y''(x) + x^2\left(-y'(x)^2\right) + y(x)^2\right)^2 - 4xy(x)\left(xy'(x) - y(x)\right)^3 = 0$$

✗ **Mathematica** : cpu = 17.2533 (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]^2 + x
```

✓ **Maple** : cpu = 0.509 (sec), leaf count = 82

$$\left\{y(x) = ODESolStruc\left(e^{\int \_b(\_a)\,d\_a + \_C1}, [\left\{\frac{d}{d\_a}\_b(\_a) = \frac{1}{\_a^2}\left(-2\sqrt{\_a\,(\_a\_b(\_a) - 1)}\_b(\_a)\_a + 2\sqrt{\right.\right.\right.\right.$$

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 = 0.129005 (sec), leaf count = 131

$$\left\{\left\{y(x)\to\frac{1}{4}\left(-\frac{8c_1^3}{\sqrt[3]{3\sqrt{3}\sqrt{c_1^9c_2^9\left(27c_1c_2-64\right)}-27c_1^5c_2^5}}+\frac{c_1^2}{c_2}-\frac{2\sqrt[3]{\sqrt{3}\sqrt{c_1^9c_2^9\left(27c_1c_2-64\right)}-9c_1^5c_2^5}}{3^{2/3}c_2^3}\right)x^2+c_1x+c\right.\right.$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , exception

```
time expired
```

2.1836 ODE No. 1836

$$\sqrt{ay''(x)^2+by'(x)^2}+cy(x)y''(x)+dy'(x)^2=0$$

✗ **Mathematica** : cpu = 15.5048 (sec), leaf count = 0 , could not solve

```
DSolve[d*Derivative[1][y][x]^2 + c*y[x]*Derivative[2][y][x] + Sqrt[b*Derivative[1][y][x]^2 +
```

✓ **Maple** : cpu = 0.507 (sec), leaf count = 100

$$\left\{y(x)=ODESolStruc\left(\_a,[\left\{\frac{\_b(\_a)}{-c^2\_a^2+a}\left(\left(\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a)\right)\left(-c^2\_a^2+a\right)-\_a\,cd\_b(\_a)+\sqrt{\left(\_b\left(\_a\right)\right)^2ad^2}\right.\right.\right.\right.$$

2.1837 ODE No. 1837

$$y^{(3)}(x)-a^2\left(y'(x)^5+2y'(x)^3+y'(x)\right)=0$$

✗ **Mathematica** : cpu = 10.9462 (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)) + Deri
```

✓ **Maple** : cpu = 0.378 (sec), leaf count = 95

$$\left\{y(x)=\int RootOf\left(-3\int^{\_Z}\frac{1}{\sqrt{3\,a^2\_f^6+9\_f^4a^2+9\,a^2\_f^2+9\_C1}}d\_f+x+\_C2\right)\mathrm{d}x+\_C3,y(x)=\int R\right.$$

2.1838 ODE No. 1838

$$y^{(3)}(x) + y(x)y''(x) - y'(x)^2 + 1 = 0$$

✗ **Mathematica** : cpu = 0.0360516 (sec), leaf count = 0 , could not solve

```
DSolve[1 - Derivative[1][y][x]^2 + y[x]*Derivative[2][y][x] + Derivative[3][y][x] == 0, y[x]
```

✓ **Maple** : cpu = 0.635 (sec), leaf count = 73

$$\left\{ y(x) = ODESolStruc\left(\_a, [\left\{ \left(\frac{d^2}{d\_a^2}\_b(\_a)\right)(\_b(\_a))^2 + \left(\frac{d}{d\_a}\_b(\_a)\right)^2 \_b(\_a) + \left(\frac{d}{d\_a}\_b(\_a)\right)\_b(\_\right.\right.\right.$$

2.1839 ODE No. 1839

$$y^{(3)}(x) - y(x)y''(x) + y'(x)^2 = 0$$

✗ **Mathematica** : cpu = 0.0327052 (sec), leaf count = 0 , could not solve

```
DSolve[Derivative[1][y][x]^2 - y[x]*Derivative[2][y][x] + Derivative[3][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 0.905 (sec), leaf count = 116

$$\left\{ y(x) = ODESolStruc\left(e^{\int \_g(\_f)\, d\_f + \_C2}, [\left\{ \frac{d}{d\_f}\_g(\_f) = 6\,\frac{(\_g(\_f)\,\_f + 1)\,(1/6 + (\_f - 1/6)\,\_g(\_f))\,\_g(\_}{\_f}\right.\right.\right.$$

2.1840 ODE No. 1840

$$ay(x)y''(x) + y^{(3)}(x) = 0$$

✗ **Mathematica** : cpu = 0.0297313 (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 = 0.991 (sec), leaf count = 129

$$\left\{ y(x) = ODESolStruc\left(e^{\int \_g(\_f)\, d\_f + \_C2}, [\left\{ \frac{d}{d\_f}\_g(\_f) = \frac{\_g(\_f)\left(6\,(\_g(\_f))^2\,\_f^2 + 2\,(\_g(\_f))^2\,\_f\,a + 7\,\_\right.}{\_f}\right.\right.\right.$$

2.1841 ODE No. 1841

$$-f(x)+x^2y^{(3)}(x)+xy''(x)+(2xy(x)-1)y'(x)+y(x)^2=0$$

✗ **Mathematica** : cpu = 0.0947741 (sec), leaf count = 0 , could not solve

```
DSolve[-f[x] + y[x]^2 + (-1 + 2*x*y[x])*Derivative[1][y][x] + x*Derivative[2][y][x] + x^2*De
```

✓ **Maple** : cpu = 0.595 (sec), leaf count = 60

$$\left\{y(x)=ODESolStruc\left(\_b(\_a)\,,[\left\{-\_a^2\frac{\mathrm{d}^2}{\mathrm{d}\_a^2}\_b(\_a)+\_a\,(\_b(\_a))^2-\_a\,\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a)-\int f(\_a)\,\mathrm{d}\_a+\_C\right.\right.\right.$$

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 = 0.181175 (sec), leaf count = 282

$$\left\{\left\{y(x)\to\frac{2\left(c_3\left(J_{\frac{\sqrt{c_2+2}}{\sqrt{2}}}\left(-\frac{1}{2}ix\sqrt{c_1}\right)-\frac{1}{4}i\sqrt{c_1}x\left(J_{\frac{\sqrt{c_2+2}}{\sqrt{2}}-1}\left(-\frac{1}{2}ix\sqrt{c_1}\right)-J_{\frac{\sqrt{c_2+2}}{\sqrt{2}}+1}\left(-\frac{1}{2}ix\sqrt{c_1}\right)\right)\right)+Y_{\frac{\sqrt{c_2+2}}{\sqrt{2}}}\left(-\frac{1}{2}i\right.\right.}{c_3J_{\frac{\sqrt{c_2+2}}{\sqrt{2}}}\left(-\frac{1}{2}ix\sqrt{c_1}\right)+Y_{\frac{\sqrt{c_2+2}}{\sqrt{2}}}\left(-\frac{1}{2}ix\right.}\right.\right.$$

✓ **Maple** : cpu = 0.696 (sec), leaf count = 190

$$\left\{\ln(x)+2\int^{y(x)}\left(2\left(RootOf\left(-2\,Y_{1/2\,\sqrt{4+\_C1}}\left(1/2\,\sqrt{2}\_Z\right)\sqrt{4+\_C1}\_C2+2\,Y_{1/2\,\sqrt{4+\_C1}}\left(1/2\,\sqrt{2}\_Z\right)\_C2\right.\right.\right.\right.$$

2.1843 ODE No. 1843

$$y^{(3)}(x)y(x)+y(x)^3y'(x)-y'(x)y''(x)=0$$

✓ **Mathematica** : cpu = 3.10559 (sec), leaf count = 409

$$\left\{\left\{y(x)\to\text{InverseFunction}\left[-\frac{2i\sqrt{\frac{\#1^2}{2\left(\sqrt{c_2^2-c_1}-c_2\right)}+1}\sqrt{1-\frac{\#1^2}{2\left(c_2+\sqrt{c_2^2-c_1}\right)}}F\left(i\sinh^{-1}\left(\frac{\sqrt{\frac{1}{\sqrt{c_2^2-c_1}-c_2}}\#1}{\sqrt{2}}\right)|\frac{c_2-\sqrt{c_2^2}}{c_2+\sqrt{c_2^2}}\right.}{\sqrt{\frac{1}{\sqrt{c_2^2-c_1}-c_2}}\sqrt{-\frac{\#1^4}{2}+2\#1^2c_2-2c_1}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.335 (sec), leaf count = 77

$$\left\{\int^{y(x)}-2\,\frac{1}{\sqrt{-\_a^4+4\_C2\,\_a^2-4\_C2^2+4\_C1}}d\_a-x-\_C3=0,\int^{y(x)}2\,\frac{1}{\sqrt{-\_a^4+4\_C2\,\_a^2-4\_C\right.$$

2.1844 ODE No. 1844

$$4y(x)^2y^{(3)}(x)+15y'(x)^3-18y(x)y'(x)y''(x)=0$$

✗ **Mathematica** : cpu = 0.0801678 (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*y[x]^2
```

✓ **Maple** : cpu = 0.346 (sec), leaf count = 17

$$\left\{y(x)=\frac{\_C3}{\left(-4+(\_C2+x)^2\_C1\right)^2}\right\}$$

2.1845 ODE No. 1845

$$9y(x)^2y^{(3)}(x)+40y'(x)^3-45y(x)y'(x)y''(x)=0$$

✗ **Mathematica** : cpu = 0.0792066 (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*y[x]^2
```

✓ **Maple** : cpu = 0.277 (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 = 0.0453472 (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 = 0.014 (sec), leaf count = 28

$$\left\{y(x)=\_C1,y(x)=\_C1+\_C2\,e^{\frac{\sqrt{6}x}{2}}+\_C3\,e^{-\frac{\sqrt{6}x}{2}}\right\}$$

2.1847 ODE No. 1847

$$y^{(3)}(x)\left(y'(x)^2+1\right)-3y'(x)y''(x)^2=0$$

✓ **Mathematica** : cpu = 0.129962 (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 = 0.331 (sec), leaf count = 49

$$\left\{y(x)=-\sqrt{-\_C2^2-2\_C2\,x-x^2+\_C1}+\_C3,y(x)=\sqrt{-\_C2^2-2\_C2\,x-x^2+\_C1}+\_C3\right\}$$

2.1848 ODE No. 1848

$$y^{(3)}(x)\left(y'(x)^2+1\right)-y''(x)^2\left(a+3y'(x)\right)=0$$

✗ **Mathematica** : cpu = 299.997 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 1.273 (sec), leaf count = 789

$$\left\{y(x)=\int\frac{\sin\left(RootOf\left(e^{2a\_Z}\_C1^2\_C2^2a^4+2e^{2a\_Z}\_C1^2\_C2\,a^4x+e^{2a\_Z}\_C1^2a^4x^2+2e^{2a\_Z}\_C1^2\_C2\right.\right.}{\cos\left(RootOf\left(e^{2a\_Z}\_C1^2\_C2^2a^4+2e^{2a\_Z}\_C1^2\_C2\,a^4x+e^{2a\_Z}\_C1^2a^4x^2+2e^{2a\_Z}\_C1^2\_C2\right.\right.}\right.$$

2.1849 ODE No. 1849

$$y^{(3)}(x)y''(x)-a\sqrt{b^2y''(x)^2+1}=0$$

✓ **Mathematica** : cpu = 0.697025 (sec), leaf count = 415

$$\left\{\left\{y(x)\to\frac{6a^2b^5c_3x+6a^2b^5c_2+\left(a^2b^4x^2+2ab^4c_1x+b^4c_1^2-1\right)^{3/2}+3\sqrt{a^2b^4x^2+2ab^4c_1x+b^4c_1^2-1}-3b^2c_1\,\mathrm{lo}}{}\right.\right.$$

✓ **Maple** : cpu = 0.233 (sec), leaf count = 197

$$\left\{y(x)=\_C2\,x+\int\frac{1}{2b}\left(-1\ln\left(\sqrt{(-1+b^2(x+\_C1)a)(1+b^2(x+\_C1)a)}+(x+\_C1)b^4a^2\frac{1}{\sqrt{a^2b^4}}\right)\frac{1}{\sqrt{a^2b}}\right.\right.$$

2.1850 ODE No. 1850

$$y^{(4)}(x)y'(x) - y^{(3)}(x)y''(x) + y^{(3)}(x)y'(x)^3 = 0$$

✗ **Mathematica** : cpu = 0.0937963 (sec), leaf count = 0 , could not solve

```
DSolve[Derivative[1][y][x]^3*Derivative[3][y][x] - Derivative[2][y][x]*Derivative[3][y][x] +
```

✓ **Maple** : cpu = 1.667 (sec), leaf count = 164

$$\left\{y(x) = ODESolStruc\left(\int \frac{\_j(\_h)}{e^{\int \_j(\_h)\,d\_h + \_C2}\,\_h}\,d\_h + \_C3, [\left\{\frac{d}{d\_h}\_j(\_h) = \frac{\_j(\_h)\left(12\,(\_j(\_h))^2\,\_h^2 + 3\,\_\right.}{}\right.\right.\right.$$

2.1851 ODE No. 1851

$$y'(x)^3\left(f'(x)y'(x) + f(x)y''(x)\right) - y''(x)\left(f''(x)y'(x) + 2f'(x)y''(x) + f(x)y^{(3)}(x)\right) + y'(x)\left(f^{(3)}(x)y'(x) + 3f''(x)y\right.$$

✗ **Mathematica** : cpu = 0.903801 (sec), leaf count = 0 , could not solve

```
DSolve[2*q[x]*Sin[y[x]]*Derivative[1][y][x]^2 + Derivative[1][y][x]^3*(Derivative[1][f][x]*D
(Derivative[1][q][x]*Derivative[1][y][x]) + q[x]*Derivative[2][y][x]) - Derivative[2][y][x]*
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(y(x),x)*(diff(diff(diff(f(x),x),x),x)*diff(y(x),x)+3*diff(diff(f(x),x),x)*diff(d
diff(diff(y(x),x),x)*f*diff(diff(diff(y(x),x),x),x)+diff(y(x),x)^3*(diff(f(x),x)*diff(y(x),x
diff(q(x),x)*diff(y(x),x))*cos(y(x))=0,y(x))
```

2.1852 ODE No. 1852

$$3y^{(4)}(x)y''(x) - 5y^{(3)}(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.0365921 (sec), leaf count = 28

$$\left\{\left\{y(x) \to c_2\left(-\sqrt{3c_1 + 2x}\right) + c_4 x + c_3\right\}\right\}$$

✓ **Maple** : cpu = 0.257 (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 = 0.078877 (sec), leaf count = 0 , could not solve

```
DSolve[40*Derivative[3][y][x]^3 - 45*Derivative[2][y][x]*Derivative[3][y][x]*Derivative[4][y
```

✓ **Maple** : cpu = 0.875 (sec), leaf count = 110

$$\left\{y(x) = \iint RootOf\left(-\int^{\_Z}\left(RootOf\left(-20\ln(\_f) + \int^{\_Z}\_k\left(e^{RootOf(81\_k^2 e^{\_Z} - 40\,e^{\_Z}\ln(2) - 20\,e^{\_Z}\ln(5) + 20\,e^{\_Z}\ln(\right.\right.\right.\right.$$

2.1854 ODE No. 1854

$$y^{(n)}(x) - f\left(\frac{\partial^{n-1}y(x)}{\partial x^{n-1}}\right) = 0$$

✗ **Mathematica** : cpu = 0.0216056 (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 = 0.00322288 (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 = 0.00570724 (sec), leaf count = 22

$$\{\{x(t) \to c_1 e^{at}, y(t) \to bt + c_2\}\}$$

✓ **Maple** : cpu = 0.067 (sec), leaf count = 19

$$\{\{x(t) = \_C1\, e^{at}, y(t) = bt + \_C2\}\}$$

2.1857 ODE No. 1857

$$\{x'(t) = ay(t), y'(t) = -ax(t)\}$$

✓ **Mathematica** : cpu = 0.128531 (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 = 0.05 (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 = 0.0416904 (sec), leaf count = 158

$$\left\{\left\{x(t) \to \frac{e^{-\sqrt{a}\sqrt{b}t}\left(\sqrt{b}c_1\left(e^{2\sqrt{a}\sqrt{b}t}+1\right)+\sqrt{a}c_2\left(e^{2\sqrt{a}\sqrt{b}t}-1\right)\right)}{2\sqrt{b}}, y(t) \to \frac{e^{-\sqrt{a}\sqrt{b}t}\left(\sqrt{b}c_1\left(e^{2\sqrt{a}\sqrt{b}t}-1\right)+\sqrt{a}c_2\left(e\right.\right.}{2\sqrt{a}}\right.\right.$$

✓ **Maple** : cpu = 0.059 (sec), leaf count = 65

$$\left\{\left\{x(t) = \_C1 \, e^{\sqrt{a}\sqrt{b}t} + \_C2 \, e^{-\sqrt{a}\sqrt{b}t}, y(t) = -1\sqrt{b}\left(\_C2 \, e^{-\sqrt{a}\sqrt{b}t} - \_C1 \, e^{\sqrt{a}\sqrt{b}t}\right)\frac{1}{\sqrt{a}}\right\}\right\}$$

2.1859 ODE No. 1859

$$\{x'(t) = ax(t) - y(t), y'(t) = ay(t) + x(t)\}$$

✓ **Mathematica** : cpu = 0.00616993 (sec), leaf count = 43

$$\{\{x(t) \to e^{at}(c_1 \cos(t) - c_2 \sin(t)), y(t) \to e^{at}(c_1 \sin(t) + c_2 \cos(t))\}\}$$

✓ **Maple** : cpu = 0.041 (sec), leaf count = 37

$$\{\{x(t) = e^{at}(\_C1 \sin(t) + \_C2 \cos(t)), y(t) = e^{at}(\sin(t)\_C2 - \cos(t)\_C1)\}\}$$

2.1860 ODE No. 1860

$$\{x'(t) = ax(t) + by(t), y'(t) = by(t) + cx(t)\}$$

✓ **Mathematica** : cpu = 0.0517421 (sec), leaf count = 362

$$\left\{\left\{x(t) \to \frac{e^{\frac{1}{2}t\left(-\sqrt{a^2-2ab+b^2+4bc}+a+b\right)}\left(ac_1\left(e^{t\sqrt{a^2-2ab+b^2+4bc}}-1\right)+c_1\sqrt{a^2-2ab+b^2+4bc}\left(e^{t\sqrt{a^2-2ab+b^2+4bc}}+1\right.\right.}{2\sqrt{a^2-2ab+b(b+4c)}}\right.\right.$$

✓ **Maple** : cpu = 0.083 (sec), leaf count = 177

$$\left\{\left\{x(t) = \_C1\,e^{\frac{t}{2}\left(a+b+\sqrt{b^2+(-2\,a+4\,c)b+a^2}\right)} + \_C2\,e^{\frac{t}{2}\left(a+b-\sqrt{b^2+(-2\,a+4\,c)b+a^2}\right)}, y(t) = \frac{1}{2\,b}\left(-\_C2\left(a-b+\sqrt{b^2+\right.\right.\right.\right.$$

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 = 0.0138732 (sec), leaf count = 145

$$\left\{\left\{x(t) \to e^{\frac{t(a\alpha+b\beta)}{a^2+b^2}}\left(c_2\sin\left(\frac{t(a\beta-\alpha b)}{a^2+b^2}\right)+c_1\cos\left(\frac{t(a\beta-\alpha b)}{a^2+b^2}\right)\right), y(t) \to e^{\frac{t(a\alpha+b\beta)}{a^2+b^2}}\left(c_2\cos\left(\frac{t(a\beta-\alpha b)}{a^2+b^2}\right)-c_1\,\mathrm{s}\right.\right.\right.$$

✓ **Maple** : cpu = 0.116 (sec), leaf count = 152

$$\left\{\left\{x(t) = \_C1\,e^{\frac{t((i\beta+\alpha)a-(i\alpha-\beta)b)}{a^2+b^2}} + \_C2\,e^{-\frac{((i\beta-\alpha)a-(i\alpha+\beta)b)t}{a^2+b^2}}, y(t) = i\left(\_C1\,e^{\frac{t((i\beta+\alpha)a-(i\alpha-\beta)b)}{a^2+b^2}} - \_C2\,e^{-\frac{((i\beta-\alpha)a-(i\alpha+}{a^2+b^2}}\right.\right.\right.$$

2.1862 ODE No. 1862

$$\{x'(t) = -y(t), y'(t) = 2x(t) + 2y(t)\}$$

✓ **Mathematica** : cpu = 0.102335 (sec), leaf count = 46

$$\{\{x(t) \to e^t(c_1\cos(t) - (c_1 + c_2)\sin(t)), y(t) \to e^t(2c_1\sin(t) + c_2(\sin(t) + \cos(t)))\}\}$$

✓ **Maple** : cpu = 0.042 (sec), leaf count = 39

$$\{\{x(t) = e^t(\sin(t)\,\_C1 + \cos(t)\,\_C2), y(t) = -((\_C1 + \_C2)\cos(t) + \sin(t)(\_C1 - \_C2))\,e^t\}\}$$

2.1863 ODE No. 1863

$$\{x'(t) + 3x(t) + 4y(t) = 0, 2x(t) + y'(t) + 5y(t) = 0\}$$

✓ **Mathematica** : cpu = 0.0122483 (sec), leaf count = 72

$$\left\{\left\{x(t) \to \frac{1}{3}e^{-7t}\left(c_1\left(2e^{6t}+1\right) - 2c_2\left(e^{6t}-1\right)\right), y(t) \to \frac{1}{3}e^{-7t}\left(c_2\left(e^{6t}+2\right) - c_1\left(e^{6t}-1\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.04 (sec), leaf count = 35

$$\left\{\left\{x(t) = \_C1\,\mathrm{e}^{-7\,t} + \_C2\,\mathrm{e}^{-t}, y(t) = \_C1\,\mathrm{e}^{-7\,t} - \frac{\_C2\,\mathrm{e}^{-t}}{2}\right\}\right\}$$

2.1864 ODE No. 1864

$$\{x'(t) = -5x(t) - 2y(t), y'(t) = x(t) - 7y(t)\}$$

✓ **Mathematica** : cpu = 0.0213692 (sec), leaf count = 52

$$\{\{x(t) \to e^{-6t}((c_1 - 2c_2)\sin(t) + c_1\cos(t)), y(t) \to e^{-6t}((c_1 - c_2)\sin(t) + c_2\cos(t))\}\}$$

✓ **Maple** : cpu = 0.043 (sec), leaf count = 44

$$\left\{\left\{x(t) = \mathrm{e}^{-6\,t}(\sin(t)\,\_C1 + \cos(t)\,\_C2), y(t) = -\frac{((\_C1 - \_C2)\cos(t) - \sin(t)(\_C1 + \_C2))\,\mathrm{e}^{-6\,t}}{2}\right\}\right\}$$

2.1865 ODE No. 1865

$$\{x'(t) = \mathrm{a1}x(t) + \mathrm{b1}y(t) + \mathrm{c1}, y'(t) = \mathrm{a2}x(t) + \mathrm{b2}y(t) + \mathrm{c2}\}$$

✓ **Mathematica** : cpu = 1.32434 (sec), leaf count = 926

$$\left\{\left\{x(t) \to \frac{2e^{-\frac{1}{2}\left(\mathrm{a1}+\mathrm{b2}+\sqrt{\mathrm{a1}^2-2\mathrm{b2}\mathrm{a1}+\mathrm{b2}^2+4\mathrm{a2}\mathrm{b1}}\right)t}\left(\mathrm{a1}e^{(\mathrm{a1}+\mathrm{b2})t}\left(-1+e^{\sqrt{\mathrm{a1}^2-2\mathrm{b2}\mathrm{a1}+\mathrm{b2}^2+4\mathrm{a2}\mathrm{b1}}t}\right)c_1\mathrm{b2}^2 + 2\sqrt{\mathrm{a1}^2 - 2\mathrm{b2}\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.142 (sec), leaf count = 224

$$\left\{\left\{x(t) = \mathrm{e}^{\frac{t}{2}\left(a1+b2+\sqrt{a1^2-2\,a1\,b2+4\,b1\,a2+b2^2}\right)}\_C2 + \mathrm{e}^{\frac{t}{2}\left(a1+b2-\sqrt{a1^2-2\,a1\,b2+4\,b1\,a2+b2^2}\right)}\_C1 + \frac{c2\,b1 - c1\,b2}{a1\,b2 - b1\,a2}, y\right.\right.$$

2.1866 ODE No. 1866

$$\{x'(t) + 2y(t) = 3t, y'(t) - 2x(t) = 4\}$$

✓ **Mathematica** : cpu = 0.0301934 (sec), leaf count = 47

$$\left\{\left\{x(t) \to -c_2 \sin(2t) + c_1 \cos(2t) - \frac{5}{4}, y(t) \to c_1 \sin(2t) + c_2 \cos(2t) + \frac{3t}{2}\right\}\right\}$$

✓ **Maple** : cpu = 0.039 (sec), leaf count = 39

$$\left\{\left\{x(t) = \sin(2t)\_C2 + \cos(2t)\_C1 - \frac{5}{4}, y(t) = -\cos(2t)\_C2 + \sin(2t)\_C1 + \frac{3t}{2}\right\}\right\}$$

2.1867 ODE No. 1867

$$\{-t^2 + x'(t) + y(t) + 6t + 1 = 0, y'(t) - x(t) = -3t^2 + 3t + 1\}$$

✓ **Mathematica** : cpu = 0.0891795 (sec), leaf count = 45

$$\{\{x(t) \to -c_2 \sin(t) + c_1 \cos(t) + 3t^2 - t - 13, y(t) \to c_1 \sin(t) + c_2 \cos(t) + (t - 12)t\}\}$$

✓ **Maple** : cpu = 0.039 (sec), leaf count = 42

$$\{\{x(t) = \sin(t)\_C2 + \cos(t)\_C1 + 3t^2 - t - 13, y(t) = t^2 - \cos(t)\_C2 + \sin(t)\_C1 - 12t\}\}$$

2.1868 ODE No. 1868

$$\{x'(t) + 3x(t) - y(t) = e^{2t}, x(t) + y'(t) + 5y(t) = e^t\}$$

✓ **Mathematica** : cpu = 0.0491326 (sec), leaf count = 76

$$\left\{\left\{x(t) \to e^{-4t}(c_1(t+1) + c_2 t) + \frac{e^t}{25} + \frac{7e^{2t}}{36}, y(t) \to e^{-4t}(c_2 - (c_1 + c_2)t) + \frac{4e^t}{25} - \frac{e^{2t}}{36}\right\}\right\}$$

✓ **Maple** : cpu = 0.077 (sec), leaf count = 64

$$\left\{\left\{x(t) = e^{-4t}\_C2 + e^{-4t}t\_C1 + \frac{e^t}{25} + \frac{7e^{2t}}{36}, y(t) = -\frac{e^{2t}}{36} - e^{-4t}\_C2 - e^{-4t}t\_C1 + e^{-4t}\_C1 + \frac{4e^t}{25}\right\}\right\}$$

2.1869 ODE No. 1869

$$\{x'(t)+2x(t)+y'(t)+y(t)=t+e^{2t},x'(t)-x(t)+y'(t)+3y(t)=e^t-1\}$$

✓ **Mathematica** : cpu = 0.245968 (sec), leaf count = 84

$$\left\{\left\{x(t)\to\frac{5}{72}c_1e^{-7t/5}+\frac{3t}{7}-\frac{e^t}{6}+\frac{5e^{2t}}{17}-\frac{1}{49},y(t)\to\frac{5}{48}c_1e^{-7t/5}+\frac{t}{7}+\frac{e^t}{4}-\frac{e^{2t}}{17}-\frac{26}{49}\right\}\right\}$$

✓ **Maple** : cpu = 0.064 (sec), leaf count = 51

$$\left\{\left\{x(t)=\frac{3t}{7}-\frac{1}{49}-\frac{e^t}{6}+\frac{5e^{2t}}{17}+e^{-\frac{7t}{5}}\_C1,y(t)=-\frac{e^{2t}}{17}+\frac{t}{7}-\frac{26}{49}+\frac{e^t}{4}+\frac{3\_C1}{2}e^{-\frac{7t}{5}}\right\}\right\}$$

2.1870 ODE No. 1870

$$\{x'(t)+y'(t)-y(t)=e^t,2x'(t)+y'(t)+2y(t)=\cos(t)\}$$

✓ **Mathematica** : cpu = 0.316786 (sec), leaf count = 71

$$\left\{\left\{x(t)\to-\frac{3}{4}c_2e^{4t}+c_1+\frac{3c_2}{4}+e^t+\frac{5\sin(t)}{17}-\frac{3\cos(t)}{17},y(t)\to c_2e^{4t}-\frac{2e^t}{3}-\frac{\sin(t)}{17}+\frac{4\cos(t)}{17}\right\}\right\}$$

✓ **Maple** : cpu = 0.113 (sec), leaf count = 47

$$\left\{\left\{x(t)=\frac{\_C1\,e^{4t}}{4}+\frac{5\sin(t)}{17}-\frac{3\cos(t)}{17}+e^t+\_C2,y(t)=-\frac{\_C1\,e^{4t}}{3}+\frac{4\cos(t)}{17}-\frac{\sin(t)}{17}-\frac{2e^t}{3}\right\}\right\}$$

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 = 0.176437 (sec), leaf count = 79

$$\left\{\left\{x(t)\to-(c_1+c_2)e^{-4t}\sin(t)+c_1e^{-4t}\cos(t)+\frac{31e^t}{26}-\frac{93}{17},y(t)\to(2c_1+c_2)e^{-4t}\sin(t)+c_2e^{-4t}\cos(t)-\frac{2e^t}{13}-\right.\right.$$

✓ **Maple** : cpu = 0.082 (sec), leaf count = 62

$$\left\{\left\{x(t)=e^{-4t}\sin(t)\_C2+e^{-4t}\cos(t)\_C1-\frac{93}{17}+\frac{31e^t}{26},y(t)=\frac{((-221\_C1-221\_C2)\cos(t)+221\sin(t)}{221}\right.\right.$$

2.1872 ODE No. 1872

$$\left\{4x'(t)+11x(t)+9y'(t)+31y(t)=e^t,3x'(t)+8x(t)+7y'(t)+24y(t)=e^{2t}\right\}$$

✓ **Mathematica** : cpu = 0.0627716 (sec), leaf count = 76

$$\left\{\left\{x(t)\to -e^{-4t}(c_1(t-1)+c_2t)+\frac{31e^t}{25}-\frac{49e^{2t}}{36},y(t)\to e^{-4t}((c_1+c_2)t+c_2)-\frac{11e^t}{25}+\frac{19e^{2t}}{36}\right\}\right\}$$

✓ **Maple** : cpu = 0.069 (sec), leaf count = 65

$$\left\{\left\{x(t)=\mathrm{e}^{-4t}\_C2+\mathrm{e}^{-4t}t\_C1+\frac{31\,\mathrm{e}^t}{25}-\frac{49\,\mathrm{e}^{2t}}{36},y(t)=\frac{19\,\mathrm{e}^{2t}}{36}-\mathrm{e}^{-4t}\_C2-\mathrm{e}^{-4t}t\_C1-\mathrm{e}^{-4t}\_C1-\frac{11\,\mathrm{e}^t}{25}\right\}\right\}$$

2.1873 ODE No. 1873

$$\left\{4x'(t)+44x(t)+9y'(t)+49y(t)=t,3x'(t)+34x(t)+7y'(t)+38y(t)=e^t\right\}$$

✓ **Mathematica** : cpu = 0.0480411 (sec), leaf count = 104

$$\left\{\left\{x(t)\to \frac{1}{5}(4c_1-c_2)\,e^{-t}+\frac{1}{5}(c_1+c_2)\,e^{-6t}+\frac{1}{9}(57t-56)-\frac{29e^t}{7},y(t)\to \frac{1}{5}(c_2-4c_1)\,e^{-t}+\frac{4}{5}(c_1+c_2)\,e^{-6t}+\frac{1}{9}\right.\right.$$

✓ **Maple** : cpu = 0.068 (sec), leaf count = 52

$$\left\{\left\{x(t)=\_C2\,\mathrm{e}^{-t}+\mathrm{e}^{-6t}\_C1-\frac{29\,\mathrm{e}^t}{7}+\frac{19\,t}{3}-\frac{56}{9},y(t)=-\_C2\,\mathrm{e}^{-t}+4\,\mathrm{e}^{-6t}\_C1+\frac{24\,\mathrm{e}^t}{7}+\frac{55}{9}-\frac{17\,t}{3}\right\}\right\}$$

2.1874 ODE No. 1874

$$\left\{x'(t)=f(t)x(t)+g(t)y(t),y'(t)=f(t)y(t)-g(t)x(t)\right\}$$

✓ **Mathematica** : cpu = 0.140816 (sec), leaf count = 105

$$\left\{\left\{x(t)\to e^{\text{Integrate}[f(K[2]),\{K[2],1,t\},\text{Assumptions}\to\text{True}]}(c_2\sin(\text{Integrate}[g(K[1]),\{K[1],1,t\},\text{Assumptions}\to\text{True}])\right.\right.$$

✓ **Maple** : cpu = 0.481 (sec), leaf count = 57

$$\left\{\left\{x(t)=\mathrm{e}^{\int\tan\left(\_C1-\int g(t)\,\mathrm{d}t\right)g(t)+f(t)\,\mathrm{d}t}\_C2,y(t)=\tan\left(\_C1-\int g(t)\,\mathrm{d}t\right)\mathrm{e}^{\int\tan\left(\_C1-\int g(t)\,\mathrm{d}t\right)g(t)+f(t)\,\mathrm{d}t}\_C2\right\}\right\}$$

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 = 0.00731036 (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]) + Deriv
```

✓ **Maple** : cpu = 1.347 (sec), leaf count = 1447

$$\left\{\left\{x(t)=1\left(-\int\frac{\left(\frac{d}{dt}f(t)\right)g(t)-f(t)\left(\frac{d}{dt}g(t)-f(t)\left(bh(t)-g(t)\,d\right)\right)}{\left(f\left(t\right)\right)^{2}}\mathrm{e}^{\frac{\int f(t)\,dt}{2}\left(-\sqrt{-da+bc}\sqrt{\frac{-a^{2}+2\,da-4\,bc-d^{2}}{da-bc}}+a+d\right)}\,dt\mathrm{e}\right.\right.$$

2.1876 ODE No. 1876

$$\left\{x'(t)=x(t)\cos(t),y'(t)=x(t)e^{-\sin(t)}\right\}$$

✓ **Mathematica** : cpu = 0.108987 (sec), leaf count = 41

$$\left\{\left\{x(t)\to c_1e^{\sin(t)},y(t)\to c_1\text{Integrate}\left[e^{\sin(K[1])-\sin(K[1])},\{K[1],1,t\},\text{Assumptions}\to\text{True}\right]+c_2\right\}\right\}$$

✓ **Maple** : cpu = 0.142 (sec), leaf count = 18

$$\left\{\left\{x(t)=\_C2\,\mathrm{e}^{\sin(t)},y(t)=\_C2\,t+\_C1\right\}\right\}$$

2.1877 ODE No. 1877

$$\{tx'(t)+y(t)=0,x(t)+ty'(t)=0\}$$

✓ **Mathematica** : cpu = 0.00598242 (sec), leaf count = 31

$$\left\{\left\{x(t)\to c_1t+\frac{c_2}{t},y(t)\to\frac{c_2}{t}-c_1t\right\}\right\}$$

✓ **Maple** : cpu = 0.038 (sec), leaf count = 31

$$\left\{\left\{x(t)=\frac{\_C2\,t^2+\_C1}{t},y(t)=\frac{-\_C2\,t^2+\_C1}{t}\right\}\right\}$$

2.1878 ODE No. 1878

$$\{tx'(t) + 2x(t) = t, -(t+2)x(t) + ty'(t) - ty(t) = -t\}$$

✓ **Mathematica** : cpu = 0.012617 (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 = 0.063 (sec), leaf count = 39

$$\left\{\left\{x(t) = \frac{t}{3} + \frac{\_C2}{t^2}, y(t) = \frac{3\_C1\, e^t t^2 - t^3 - 3\_C2}{3\, t^2}\right\}\right\}$$

2.1879 ODE No. 1879

$$\{tx'(t) + 2(x(t) - y(t)) = t, x(t) + ty'(t) + 5y(t) = t^2\}$$

✓ **Mathematica** : cpu = 0.134691 (sec), leaf count = 58

$$\left\{\left\{x(t) \to \frac{c_1}{t^4} + \frac{c_2}{t^3} + \frac{1}{30}t(2t+9), y(t) \to -\frac{30c_2 t + 60c_1 - 8t^6 + 3t^5}{60t^4}\right\}\right\}$$

✓ **Maple** : cpu = 0.057 (sec), leaf count = 54

$$\left\{\left\{x(t) = \frac{2\, t^6 + 9\, t^5 + 30\_C1\, t + 30\_C2}{30\, t^4}, y(t) = \frac{8\, t^6 - 3\, t^5 - 30\_C1\, t - 60\_C2}{60\, t^4}\right\}\right\}$$

2.1880 ODE No. 1880

$$\{t^2(1-\sin(t))x'(t) = t^2 y(t) + tx(t)(1 - 2\sin(t)), t^2(1-\sin(t))y'(t) = x(t)(t\cos(t) - \sin(t)) + ty(t)(1 - t\cos(t))$$

✗ **Mathematica** : cpu = 0.0297208 (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*(1 - S
```

✓ **Maple** : cpu = 0.084 (sec), leaf count = 23

$$\{\{x(t) = t(\_C1\, t + \_C2), y(t) = \sin(t)\_C2 + \_C1\, t\}\}$$

2.1881 ODE No. 1881

$$\{x'(t)+y'(t)+y(t)=f(t),x''(t)+x(t)+y''(t)+y'(t)+y(t)=g(t)\}$$

✓ **Mathematica** : cpu = 0.0642006 (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 = 0.03 (sec), leaf count = 48

$$\left\{\left\{x(t)=-\frac{d}{dt}f(t)+g(t)-f(t)-\frac{d^2}{dt^2}f(t)+\frac{d}{dt}g(t),y(t)=f(t)+\frac{d^2}{dt^2}f(t)-\frac{d}{dt}g(t)\right\}\right\}$$

2.1882 ODE No. 1882

$$\{2x'(t)-3x(t)+y'(t)=0,x''(t)+y'(t)-2y(t)=e^{2t}\}$$

✓ **Mathematica** : cpu = 0.507106 (sec), leaf count = 199

$$\left\{\left\{x(t)\to \frac{1}{276}e^{t/2}\left(23e^{t/2}(6c_1+2c_2+4c_3+3e^t)-2\sqrt{23}(9c_1-11c_2+2c_3)\sin\left(\frac{\sqrt{23}t}{2}\right)+46(3c_1-c_2-2c_3)\,\mathrm{c}\right.\right.\right.$$

✓ **Maple** : cpu = 0.086 (sec), leaf count = 99

$$\left\{\left\{x(t)=\frac{e^{2t}}{4}+\_C1\,e^t+\_C2\,e^{\frac{t}{2}}\cos\left(\frac{\sqrt{23}t}{2}\right)+\_C3\,e^{\frac{t}{2}}\sin\left(\frac{\sqrt{23}t}{2}\right),y(t)=-\frac{7}{4}e^{\frac{t}{2}}\left(\frac{\_C3\sqrt{23}}{7}+\_C2\right)\cos\right.\right.$$

2.1883 ODE No. 1883

$$\{x'(t)+x(t)-y'(t)=2t,x''(t)-9x(t)+y'(t)+3y(t)=\sin(2t)\}$$

✓ **Mathematica** : cpu = 0.556642 (sec), leaf count = 170

$$\left\{\left\{x(t)\to \frac{1}{16}e^{-3t}(e^{4t}(c_1(20t+7)+c_2(4t+3)+3c_3(1-4t))+9c_1-3(c_2+c_3)+32e^{3t}(t+2))-\frac{36}{325}\sin(2t)-\right.\right.$$

✓ **Maple** : cpu = 0.116 (sec), leaf count = 80

$$\left\{\left\{x(t)=-\frac{36\sin(2t)}{325}-\frac{2\cos(2t)}{325}+4+2t+\_C1\,e^t+\_C2\,e^{-3t}+\_C3\,te^t,y(t)=-\frac{37\sin(2t)}{325}+\frac{16\cos(2\right.\right.$$

2.1884 ODE No. 1884

$$\{x'(t) - x(t) + 2y(t) = 0, x''(t) - 2y'(t) = 2t - \cos(2t)\}$$

✓ **Mathematica** : cpu = 0.223118 (sec), leaf count = 116

$$\left\{\left\{x(t) \to 8c_1 e^{t/2} + 8c_2 e^{t/2} - c_2 - t^2 - 4t + \frac{1}{34}\sin(2t) + \frac{2}{17}\cos(2t) - 8, y(t) \to 2c_1 e^{t/2} + 2c_2 e^{t/2} - \frac{c_2}{2} - \frac{t^2}{2} - t\right.\right.$$

✓ **Maple** : cpu = 0.11 (sec), leaf count = 69

$$\left\{\left\{x(t) = 2\_C1\, e^{t/2} - t^2 + \frac{\sin(2t)}{34} + \frac{2\cos(2t)}{17} - 4t + \_C2, y(t) = \frac{\_C1}{2} e^{\frac{t}{2}} - t + \frac{\cos(2t)}{34} + \frac{9\sin(2t)}{68} + 2 -\right.\right.$$

2.1885 ODE No. 1885

$$\{tx'(t) - ty'(t) - 2y(t) = 0, tx''(t) + 2x'(t) + tx(t) = 0\}$$

✗ **Mathematica** : cpu = 0.0230926 (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*Derivative[
```

✓ **Maple** : cpu = 0.113 (sec), leaf count = 47

$$\left\{\left\{x(t) = \frac{\sin(t)\_C2 + \_C3\cos(t)}{t}, y(t) = \frac{(\_C3\,t + 2\_C2)\cos(t) + (\_C2\,t - 2\_C3)\sin(t) + \_C1}{t^2}\right\}\right\}$$

2.1886 ODE No. 1886

$$\{ay(t) + x''(t) = 0, y''(t) - a^2 y(t) = 0\}$$

✓ **Mathematica** : cpu = 0.0222069 (sec), leaf count = 103

$$\left\{\left\{x(t) \to \frac{c_4(2at + e^{-at} - e^{at})}{2a^2} - \frac{c_3 e^{-at}(e^{at} - 1)^2}{2a} + c_2 t + c_1, y(t) \to \frac{e^{-at}(ac_3(e^{2at} + 1) + c_4(e^{2at} - 1))}{2a}\right\}\right\}$$

✓ **Maple** : cpu = 0.08 (sec), leaf count = 49

$$\left\{\left\{x(t) = \frac{-\_C4\, e^{-at} - \_C3\, e^{at} + a(\_C1\,t + \_C2)}{a}, y(t) = \_C3\, e^{at} + \_C4\, e^{-at}\right\}\right\}$$

2.1887 ODE No. 1887

$$\{x''(t) = ax(t) + by(t), y''(t) = cx(t) + dy(t)\}$$

✓ **Mathematica** : cpu = 0.58561 (sec), leaf count = 5647

$$\left\{\left\{x(t) \to \frac{e^{-\frac{\left(\sqrt{a+d-\sqrt{a^2-2da+d^2+4bc}}+\sqrt{a+d+\sqrt{a^2-2da+d^2+4bc}}\right)t}{\sqrt{2}}}\left(\sqrt{a^2-2da+d^2+4bc}\sqrt{a+d-\sqrt{a^2-2da+d^2+4bc}\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.143 (sec), leaf count = 360

$$\left\{\left\{x(t) = \_C1\, e^{-\frac{t}{2}\sqrt{-2\sqrt{a^2-2\,da+4\,bc+d^2}+2\,a+2\,d}} + \_C2\, e^{\frac{t}{2}\sqrt{-2\sqrt{a^2-2\,da+4\,bc+d^2}+2\,a+2\,d}} + \_C3\, e^{-\frac{t}{2}\sqrt{2\sqrt{a^2-2\,da+4\,bc+}}}\right.\right.$$

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 = 25.9686 (sec), leaf count = 1

$Aborted

✓ **Maple** : cpu = 0.252 (sec), leaf count = 457

$$\left\{\left\{x(t) = \_C4\, e^{\frac{t}{2}\sqrt{2\sqrt{a1^2-2\,a1\,b2+4\,b1\,a2+b2^2}+2\,a1+2\,b2}} + \_C3\, e^{-\frac{t}{2}\sqrt{2\sqrt{a1^2-2\,a1\,b2+4\,b1\,a2+b2^2}+2\,a1+2\,b2}} + \_C2\, e^{\frac{t}{2}}\right.\right.$$

2.1889 ODE No. 1889

$$\{x''(t) + x(t) + y(t) = -5, -4x(t) + y''(t) - 3y(t) = -3\}$$

✓ **Mathematica** : cpu = 0.115173 (sec), leaf count = 151

$$\left\{\left\{x(t) \to \frac{1}{4}e^{-t}(2c_1(t+1) - 2c_2t + c_3t - c_4t + e^{2t}(-2c_1(t-1) - 2c_2(t-2) - c_3t - c_4t + c_4) - 4c_2 - c_4 + 72e^t)\right.\right.$$

✓ **Maple** : cpu = 0.056 (sec), leaf count = 60

$$\{\{x(t) = (\_C4\, t + \_C2)\, e^{-t} + 18 + (\_C3\, t + \_C1)\, e^t, y(t) = ((-2\,t+2)\,\_C4 - 2\,\_C2)\, e^{-t} - 23 + ((-2\,t-2)$$

2.1890 ODE No. 1890

$$\left\{x''(t)=c^2x(t)\left(3\cos^2(at+b)-1\right)+\frac{3}{2}c^2y(t)\sin(2abt),y''(t)=\frac{3}{2}c^2x(t)\sin(2abt)+c^2y(t)\left(3\sin^2(at+b)-1\right)\right\}$$

✗ **Mathematica** : cpu = 0.00986543 (sec), leaf count = 0 , could not solve

```
DSolve[{Derivative[2][x][t] == c^2*(-1 + 3*Cos[b + a*t]^2)*x[t] + (3*c^2*Sin[2*a*b*t]*y[t])/
1 + 3*Sin[b + a*t]^2)*y[t]}, {x[t], y[t]}, t]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{\left\{x(t)=DESol\left(\left\{\frac{d^4}{dt^4}\_Y(t)+\left(2\frac{\sin(atb)ab}{\cos(atb)}-2\frac{ab\cos(atb)}{\sin(atb)}\right)\frac{d^3}{dt^3}\_Y(t)+\left(2c^2+2\frac{(\sin(atb))^2b^2a^2}{(\cos(atb))^2}+2\frac{a^2}{}\right.\right.\right.\right.$$

2.1891 ODE No. 1891

$$\{x''(t)+6x(t)+7y(t)=0,3x(t)+y''(t)+2y(t)=2t\}$$

✓ **Mathematica** : cpu = 0.499303 (sec), leaf count = 200

$$\left\{\left\{x(t)\to\frac{1}{180}e^{-t}(27c_1e^{2t}+27c_2e^{2t}-63c_3e^{2t}-63c_4e^{2t}+42(c_2+c_4)e^t\sin(3t)+126(c_1+c_3)e^t\cos(3t)+27c_1\right.\right.$$

✓ **Maple** : cpu = 0.059 (sec), leaf count = 64

$$\left\{\left\{x(t)=\frac{14t}{9}+\_C1\,e^t+\_C2\,\cos(3t)+\_C3\,e^{-t}+\_C4\,\sin(3t),y(t)=-\_C1\,e^t+\frac{3\_C2\,\cos(3t)}{7}-\_C3\right.\right.$$

2.1892 ODE No. 1892

$$\{-ay'(t)+bx(t)+x''(t)=0,ax'(t)+by(t)+y''(t)=0\}$$

✓ **Mathematica** : cpu = 0.431233 (sec), leaf count = 3522

$$\left\{\left\{x(t)\to\frac{e^{-\frac{\left(\sqrt{-a^2-2b-\sqrt{a^4+4ba^2}}+\sqrt{-a^2-2b+\sqrt{a^4+4ba^2}}\right)t}{\sqrt{2}}}\left(\left(\sqrt{-a^2-2b-\sqrt{a^4+4ba^2}}e^{\frac{\left(\sqrt{-a^2-2b-\sqrt{a^4+4ba^2}}+2\sqrt{-a^2-2b+\sqrt{a^4}}\right.}{\sqrt{2}}}\right.\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.155 (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

$$\left\{-\mathrm{A0}y'(t)+\mathrm{a1}x''(t)+\mathrm{b1}x'(t)+\mathrm{c1}x(t)=\mathrm{B0}e^{i\omega t},\mathrm{A0}x'(t)+\mathrm{a2}y''(t)+\mathrm{b2}y'(t)+\mathrm{c2}y(t)=0\right\}$$

✗ **Mathematica** : cpu = 299.999 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 1.248 (sec), leaf count = 1579

$$\left\{\left\{x(t)=\frac{\left(a2\ a1\ \left(RootOf\left(a1\ a2\ \_Z^4+(a1\ b2+b1\ a2)\_Z^3+\left(A^2+a1\ c2+c1\ a2+b1\ b2\right)\_Z^2+(c2\ b1+\right.\right.\right.}{}\right.\right.$$

2.1894 ODE No. 1894

$$\left\{a\left(x'(t)-y'(t)\right)+\mathrm{b1}x(t)+x''(t)=\mathrm{c1}e^{i\omega t},a\left(y'(t)-x'(t)\right)+\mathrm{b2}y(t)+y''(t)=\mathrm{c2}e^{i\omega t}\right\}$$

✗ **Mathematica** : cpu = 300.001 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 1.013 (sec), leaf count = 1056

$$\left\{\left\{x(t)=\frac{\mathrm{e}^{i\omega t}\left(-c1\ \omega^2+ia(c1+c2)\,\omega+c1\ b2\right)}{\omega^4-2\,ia\omega^3+(-b1-b2)\,\omega^2+i\,(b1+b2)\,a\omega+b1\ b2}+\_C1\ \mathrm{e}^{RootOf\left(\_Z^4+2\,a\_Z^3+(b1+b2)\_Z^2+(ab1+b2\right.}\right.\right.$$

2.1895 ODE No. 1895

$$\left\{\mathrm{a11}x''(t)+\mathrm{a12}y''(t)+\mathrm{b11}x'(t)+\mathrm{b12}y'(t)+\mathrm{c11}x(t)+\mathrm{c12}y(t)=0,\mathrm{a21}x''(t)+\mathrm{a22}y''(t)+\mathrm{b21}x'(t)+\mathrm{b22}y'(t)+\right.$$

✓ **Mathematica** : cpu = 0.465105 (sec), leaf count = 6816

✓ **Maple** : cpu = 0.253 (sec), leaf count = 1008

$$\left\{\left\{x(t)=\sum_{\_a=1}^{4}\mathrm{e}^{RootOf\left((a22\ a11-a12\ a21)\_Z^4+(a11\ b22-a12\ b21-a21\ b12+a22\ b11)\_Z^3+(a11\ c22-a12\ c21-a21\ c12+a22\ c11+b\right.}\right.\right.$$

2.1896 ODE No. 1896

$$\left\{x''(t) - 2x'(t) - y'(t) + y(t) = 0, 2x'(t) - x(t) + y^{(3)}(t) - y''(t) = t\right\}$$

✓ **Mathematica** : cpu = 0.210477 (sec), leaf count = 246

$$\left\{\left\{x(t) \to \frac{1}{8}e^{-t}\left(e^{2t}\left(-2c_3t^2 + 2c_5t^2 + c_1\left(2t^2 - 6t + 7\right) + c_2\left(2t^2 + 6t + 1\right) - 2c_3t + 4c_4t - 2c_5t + c_3 - 2c_4 + c_5\right) +\right.\right.\right.$$

✓ **Maple** : cpu = 0.068 (sec), leaf count = 67

$$\left\{\left\{x(t) = -\frac{2\_C2\,e^{-t}}{3} + \frac{\left(-9\_C5\,t^2 - 6\_C4\,t - 3\_C3 - 18\_C5\right)e^{t}}{3} - t - 2, y(t) = \_C2\,e^{-t} - 2 + \left(\_C5\,t^3 \right.\right.\right.$$

2.1897 ODE No. 1897

$$\left\{x''(t) + y''(t) + y'(t) = \sinh(2t), 2x''(t) + y''(t) = 2t\right\}$$

✓ **Mathematica** : cpu = 0.119838 (sec), leaf count = 118

$$\left\{\left\{x(t) \to \frac{1}{48}\left(2\left(6\left(4c_2 + 2c_4 - 1\right)t + 24c_1 - 6c_4 + 4t^3 + 6t^2 + 3\right) - 6e^{-2t}\left(-2c_4 + 2t + 1\right) - 3e^{2t}\right), y(t) \to \frac{1}{8}e^{-2t}\left(\right.\right.\right.$$

✓ **Maple** : cpu = 0.174 (sec), leaf count = 86

$$\left\{\left\{x(t) = \frac{\left(-12\,t + 12\_C2 - 15\right)e^{-2\,t}}{48} + \frac{t^3}{6} + \frac{t^2}{4} + \_C3\,t + \_C4 - \frac{\cosh\left(2\,t\right)}{16} - \frac{\sinh\left(2\,t\right)}{16}, y(t) = \frac{\left(4\,t - 4\_C2 \right.}{8}\right.\right.$$

2.1898 ODE No. 1898

$$\left\{x''(t) - x'(t) + y'(t) = 0, x''(t) - x(t) + y''(t) = 0\right\}$$

✓ **Mathematica** : cpu = 0.0399679 (sec), leaf count = 246

$$\left\{\left\{x(t) \to -\frac{1}{10}e^{\frac{1}{2}\left(t-\sqrt{5}t\right)}\left(2c_1\left(\sqrt{5}e^{\sqrt{5}t} - 5e^{\frac{1}{2}\left(1+\sqrt{5}\right)t} - \sqrt{5}\right) - 2\sqrt{5}c_2\left(e^{\sqrt{5}t} - 1\right) + c_4\left(\left(5 + \sqrt{5}\right)e^{\sqrt{5}t} - 10e^{\frac{1}{2}\left(1\right.}\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.077 (sec), leaf count = 71

$$\left\{\left\{x(t) = \frac{\_C4\,\left(\sqrt{5} - 1\right)}{2}e^{-\frac{\left(\sqrt{5}-1\right)t}{2}} - \frac{\_C3\,\left(\sqrt{5} + 1\right)}{2}e^{\frac{\left(\sqrt{5}+1\right)t}{2}} + \_C1\,e^{t}, y(t) = \_C2 + \_C3\,e^{\frac{\left(\sqrt{5}+1\right)t}{2}} + \_C4\,e^{-\right.\right.$$

2.1899 ODE No. 1899

$$\{x'(t) = 2x(t), y'(t) = 3x(t) - 2y(t), z'(t) = 2y(t) + 3z(t)\}$$

✓ **Mathematica** : cpu = 0.0132144 (sec), leaf count = 93

$$\left\{\left\{x(t) \to c_1 e^{2t}, y(t) \to \frac{1}{4}e^{-2t}\left(3c_1\left(e^{4t} - 1\right) + 4c_2\right), z(t) \to \frac{1}{10}e^{-2t}\left(c_1\left(-15e^{4t} + 12e^{5t} + 3\right) + 4c_2\left(e^{5t} - 1\right) + 10c_3\right.\right.\right.$$

✓ **Maple** : cpu = 0.089 (sec), leaf count = 52

$$\left\{\left\{x(t) = \_C3\,e^{2t}, y(t) = \frac{3\_C3\,e^{2t}}{4} + e^{-2t}\_C2, z(t) = \_C1\,e^{3t} - \frac{3\_C3\,e^{2t}}{2} - \frac{2\,e^{-2t}\_C2}{5}\right\}\right\}$$

2.1900 ODE No. 1900

$$\{x'(t) = 4x(t), y'(t) = x(t) - 2y(t), z'(t) = x(t) - 4y(t) + z(t)\}$$

✓ **Mathematica** : cpu = 0.0106987 (sec), leaf count = 88

$$\left\{\left\{x(t) \to c_1 e^{4t}, y(t) \to \frac{1}{6}e^{-2t}\left(c_1\left(e^{6t} - 1\right) + 6c_2\right), z(t) \to \frac{1}{9}e^{-2t}\left(c_1\left(e^{3t} + e^{6t} - 2\right) - 12c_2\left(e^{3t} - 1\right) + 9c_3e^{3t}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.087 (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 = 0.0114733 (sec), leaf count = 93

$$\{\{x(t) \to (c_2 - c_3)\left(e^t - 1\right) + c_1, y(t) \to c_1\left(e^t - 1\right) + c_2\left(e^t t + 1\right) - c_3\left(e^t(t - 1) + 1\right), z(t) \to c_1\left(e^t - 1\right) + c_2\left(e^t(t\right.$$

✓ **Maple** : cpu = 0.076 (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 = 0.016187 (sec), leaf count = 109

$$\{\{x(t) \to (c_2 - c_3)\left(e^t - 1\right) + c_1, y(t) \to c_1\left(e^t - 1\right) + t\left((c_2 - c_3)\, e^t - 1\right) + c_3 e^t + c_2 - c_3 - 1, z(t) \to c_1\left(e^t - 1\right) -$$

✓ **Maple** : cpu = 0.07 (sec), leaf count = 51

$$\{\{x(t) = \_C2 + \_C3\, \mathrm{e}^t, y(t) = (\_C3\, t + \_C1)\, \mathrm{e}^t - t - \_C2 - 1, z(t) = ((t-1)\_C3 + \_C1)\, \mathrm{e}^t - t - \_C2 -$$

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 = 0.098757 (sec), leaf count = 736

$$\left\{\left\{x(t) \to \frac{e^{-it\sqrt{a^2+b^2+c^2}}\left(ab^2\left(c_1\left(1 + e^{2it\sqrt{a^2+b^2+c^2}}\right) - c_2\left(-1 + e^{it\sqrt{a^2+b^2+c^2}}\right)^2\right) + ac^2\left(c_1\left(1 + e^{2it\sqrt{a^2+b^2+c^2}}\right)\right.\right.}{2a\,(a^2 +}\right.\right.$$

✓ **Maple** : cpu = 0.163 (sec), leaf count = 299

$$\left\{\left\{x(t) = \_C1 + \_C2\, \sin\left(\sqrt{a^2+b^2+c^2}t\right) + \_C3\, \cos\left(\sqrt{a^2+b^2+c^2}t\right), y(t) = \frac{1}{b\,(b^2+c^2)}\left(\_C1\, b^3 + \left(\left(-\_\right.\right.\right.\right.\right.$$

2.1904 ODE No. 1904

$$\{x'(t) = cy(t) - bz(t), y'(t) = az(t) - cx(t), z'(t) = bx(t) - ay(t)\}$$

✓ **Mathematica** : cpu = 0.0729292 (sec), leaf count = 1084

$$\left\{\left\{x(t) \to \frac{e^{-\sqrt{-a^2-b^2-c^2}t}\left(2e^{\sqrt{-a^2-b^2-c^2}t}c_1a^2 + b^2\left(1 + e^{2\sqrt{-a^2-b^2-c^2}t}\right)c_1 + c^2\left(1 + e^{2\sqrt{-a^2-b^2-c^2}t}\right)c_1 - c\left(-1 + \right.\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.098 (sec), leaf count = 257

$$\left\{\left\{x(t) = \_C1 + \_C2\, \sin\left(\sqrt{a^2+b^2+c^2}t\right) + \_C3\, \cos\left(\sqrt{a^2+b^2+c^2}t\right), y(t) = \frac{1}{a\,(b^2+c^2)}\left(\left(-a^2b\_C3 + ac\right.\right.\right.\right.$$

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 = 0.00738651 (sec), leaf count = 0 , could not solve

```
DSolve[{Derivative[1][x][t] == h[t]*y[t] - g[t]*z[t], Derivative[1][y][t] == -
(h[t]*x[t]) + f[t]*z[t], Derivative[1][z][t] == g[t]*x[t] - f[t]*y[t]}, {x[t], y[t], z[t]},
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{\left\{x(t) = DESol\left(\left\{\frac{d^3}{dt^3}\_Y(t) + \left(-2\frac{\left(\frac{d}{dt}h(t)\right)h(t)f(t)}{(g(t))^2 f(t) + (h(t))^2 f(t) + g(t)\frac{d}{dt}h(t) - h(t)\frac{d}{dt}g(t)} - 2\frac{}{(g(t))^2 f(t)}\right.\right.\right.\right.\right.$$

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 = 0.0555281 (sec), leaf count = 177

$$\left\{\left\{x(t) \to \frac{1}{3}e^t\left(\sqrt{3}(c_2 - c_3)\sin\left(\sqrt{3}t\right) + (2c_1 - c_2 - c_3)\cos\left(\sqrt{3}t\right) + c_1 + c_2 + c_3\right), y(t) \to \frac{1}{3}e^t\left(-\sqrt{3}(c_1 - c_3)\sin\right.\right.\right.$$

✓ **Maple** : cpu = 0.082 (sec), leaf count = 120

$$\left\{\left\{x(t) = e^t\left(\sin\left(\sqrt{3}t\right)\_C2 + \cos\left(\sqrt{3}t\right)\_C3 + \_C1\right), y(t) = \frac{e^t\left(\_C2\sqrt{3} - \_C3\right)\cos\left(\sqrt{3}t\right)}{2} + \frac{e^t\left(-\_C3\sqrt{3}\right.}{}\right.\right.$$

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 = 0.0135609 (sec), leaf count = 157

$$\{\{x(t) \to e^t\left(c_1\left(3 - 2e^{2t}\right) + 2\left(e^t - 1\right)\left(3c_2\left(3e^t + 5\right) - c_3\left(5e^t + 9\right)\right)\right), y(t) \to e^t\left(-2c_1\left(e^{2t} - 1\right) + c_2\left(3e^t + 18e^{2t} -\right.\right.$$

✓ **Maple** : cpu = 0.067 (sec), leaf count = 66

$$\left\{\left\{x(t) = \_C1\,e^{2t} + \_C2\,e^{3t} + \_C3\,e^t, y(t) = \frac{\_C1\,e^{2t}}{4} + \_C2\,e^{3t} + \frac{2\_C3\,e^t}{3}, z(t) = \frac{\_C1\,e^{2t}}{4} + \frac{3\_C2\,e^{3t}}{2} +\right.\right.$$

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 = 0.0472664 (sec), leaf count = 551

$$\left\{\left\{x(t) \to -36c_2\text{RootSum}\left[\#1^3 - 40\#1^2 + 1714\#1 + 1404\&, \frac{2\#1e^{\#1t} + e^{\#1t}}{3\#1^2 - 80\#1 + 1714}\&\right] + 4c_3\text{RootSum}\left[\#1^3 - 4\right.\right.\right.$$

✓ **Maple** : cpu = 0.726 (sec), leaf count = 1213

$$\left\{\left\{x(t) = \_C2\, e^{\frac{\left(\left(263474+18\sqrt{351406311}\right)^{\frac{2}{3}}+80\sqrt[3]{263474+18\sqrt{351406311}}-3542\right)t}{6\sqrt[3]{263474+18\sqrt{351406311}}}} \sin\left(\frac{\sqrt{3}t\left(\sqrt[3]{4}\sqrt[3]{\left(131737+9\sqrt{351406311}\right)^2}+\right.}{6\sqrt[3]{263474+18\sqrt{351406311}}}\right.\right.\right.$$

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 = 0.0634852 (sec), leaf count = 1630

$$\left\{\left\{x(t) \to -c_2\text{RootSum}\left[\#1^3 - a\#1^2 - b\#1^2 - c\#1^2 - \alpha^2\#1 - \beta^2\#1 - g^2\#1 + ab\#1 + ac\#1 + bc\#1 + a\alpha^2 +\right.\right.\right.$$

✓ **Maple** : cpu = 27.45 (sec), leaf count = 33085

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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 = 0.0105457 (sec), leaf count = 39

$$\left\{\left\{x(t) \to t(c_3t + 1), y(t) \to c_2t + c_3, z(t) \to c_1t + \frac{c_3}{t} + c_2\right\}\right\}$$

✓ **Maple** : cpu = 0.098 (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 = 0.0439959 (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 = 0.155 (sec), leaf count = 309

$$\left\{\left\{x(t) = \_C1 + \_C2\,\sin\left(\sqrt{a^2+b^2+c^2}\ln(t)\right) + \_C3\,\cos\left(\sqrt{a^2+b^2+c^2}\ln(t)\right), y(t) = \frac{1}{b(b^2+c^2)}\left(\_C1\,b^3\right.\right.\right.$$

2.1912 ODE No. 1912

$$\{x1'(t) = ax2(t) + bx3(t)\cos(ct) + bx4(t)\sin(ct), x2'(t) = -ax1(t) + bx3(t)\sin(ct) - bx4(t)\cos(ct), x3'(t) = ax4($$

✗ **Mathematica** : cpu = 0.0104836 (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], Derivative[1]
(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]*x1[t]) + b*Cos[c*t]*x2[t] - a*x3[t]}, {x[t], y[t], z[t]}, t]
```

✓ **Maple** : cpu = 2.662 (sec), leaf count = 2956

$$\left\{\left\{x1(t) = \_C2 + \_C3\,\sin(ct) + \_C4\,\cos(ct), x2(t) = -\cos(ct)\_C3 + \sin(ct)\_C4 + \_C1, x3(t) = \frac{(\cos(ct}{}\right.\right.$$

2.1913 ODE No. 1913

$$\{x'(t) = -x(t)(x(t) + y(t)), y'(t) = y(t)(x(t) + y(t))\}$$

✓ **Mathematica** : cpu = 0.0520064 (sec), leaf count = 52

$$\{\{y(t) \to -\sqrt{c_1}\cot\left(\sqrt{c_1}(t - c_2)\right), x(t) \to -\sqrt{c_1}\tan\left(\sqrt{c_1}(t - c_2)\right)\}\}$$

✓ **Maple** : cpu = 0.146 (sec), leaf count = 57

$$\left\{[\{x(t) = 0\}, \left\{y(t) = (\_C1 - t)^{-1}\right\}], [\left\{x(t) = \frac{1}{\_C1}\tanh\left(\frac{\_C2 + t}{\_C1}\right)\right\}, \left\{y(t) = \frac{-(x(t))^2 - \frac{d}{dt}x(t)}{x(t)}\right\}]\right\}$$

2.1914 ODE No. 1914

$$\left\{x'(t)=x(t)(ay(t)+b),y'(t)=y(t)(cx(t)+d)\right\}$$

✓ **Mathematica** : cpu = 0.700961 (sec), leaf count = 198

$$\left\{\left\{y(t)\to \frac{bW\left(\frac{a\text{InverseFunction}\left[\int_1^{\#1}\frac{1}{K[1]\left(W\left(\frac{ae^{\frac{cK[1]}{b}+\frac{c_1}{b}}K[1]^{\frac{d}{b}}}{b}\right)+1\right)}dK[1]\&\right][bt+c_2]^{\frac{d}{b}}\exp\left(\frac{c\text{InverseFunction}\left[\int_1^{\#1}\frac{1}{K[1]\left(W\left(\frac{ae^{\frac{cK[1]}{b}+}}{}\right.\right.}\right.}{b}\right.}{b}\right.}{a}\right.\right.$$

✓ **Maple** : cpu = 0.497 (sec), leaf count = 92

$$\left\{[\{x(t)=0\},\left\{y(t)=\_C1\,e^{dt}\right\}],[\left\{x(t)=RootOf\left(-\int^{\_Z}\frac{1}{\_a\,b}\left(lambertW\left(\frac{e^{-1}}{b}e^{\frac{c\_a}{b}}\_a^{\frac{d}{b}}e^{\frac{\_C1}{b}}\right)+1\right)^{-1}d\_a+\right.\right.\right.$$

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 = 300.058 (sec), leaf count = 0 , timed out

```
$Aborted
```

✓ **Maple** : cpu = 10.175 (sec), leaf count = 147

$$\left\{[\{x(t) = 0\}, \left\{y(t) = \frac{\beta}{\mathrm{e}^{-\beta t}\_C1\,\beta - qb}\right\}], [\left\{x(t) = ODESolStruc\left(\_b(\_a), [\left\{\left((\_b(\_a))^{\frac{-a-b}{a}} \frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a) - (\right.\right.\right.\right.\right.$$

2.1916 ODE No. 1916

$$\{x'(t) = h(a - x(t))(c - x(t) - y(t)), y'(t) = k(b - y(t))(c - x(t) - y(t))\}$$

✗ **Mathematica** : cpu = 250.042 (sec), leaf count = 0 , could not solve

```
DSolve[{Derivative[1][x][t] == h*(a - x[t])*(c - x[t] - y[t]), Derivative[1][y][t] == k*(b -
```

✓ **Maple** : cpu = 0.683 (sec), leaf count = 180

$$\left\{[\{x(t) = a\}, \left\{y(t) = \frac{(c-a)\,\mathrm{e}^{k(t+\_C1)(-c+a+b)} - b}{-1 + \mathrm{e}^{k(t+\_C1)(-c+a+b)}}\right\}], [\left\{x(t) = RootOf\left(-\int^{\_Z} \frac{1}{\_a - a}\left((\_a - a)^{-\frac{k}{h}} h\_a + (\_\right.\right.\right.\right.$$

2.1917 ODE No. 1917

$$\{x'(t) = y(t)^2 - \cos(x(t)), y'(t) = y(t)(-\sin(x(t)))\}$$

✗ **Mathematica** : cpu = 250.055 (sec), leaf count = 0 , could not solve

```
DSolve[{Derivative[1][x][t] == -Cos[x[t]] + y[t]^2, Derivative[1][y][t] == -(Sin[x[t]]*y[t])
```

✓ **Maple** : cpu = 0.932 (sec), leaf count = 109

$$\left\{[\left\{x(t) = RootOf\left(2\int^{\_Z}\left(\tan\left(RootOf\left(-3\sqrt{-(\cos(\_f))^2}\ln\left(9/4\frac{(\cos(\_f))^2}{(\cos(\_Z))^2}\right) + 3\_C1\sqrt{-(\cos(\_f))^2}\right.\right.\right.\right.\right.\right.$$

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 = 0.0972796 (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 = 1.995 (sec), leaf count = 182

$$\left\{ [\{x(t) = 0\}, \{y(t) = 0\}], [\left\{ x(t) = ODESolStruc\left(\_a, [\left\{ \left(\frac{d}{d\_a}\_b(\_a) \right) \_b(\_a) + \frac{1}{2\_a^2} \left(-4\_b(\_a)\_a^4 + 4 \right.\right.\right.\right.\right.$$

2.1919 ODE No. 1919

$$\{x'(t) = x(t)\left(-\left(x(t)^2 + y(t)^2\right)\right) + x(t) + y(t), y'(t) = -y(t)\left(x(t)^2 + y(t)^2\right) - x(t) + y(t)\}$$

✗ **Mathematica** : cpu = 0.119399 (sec), leaf count = 0 , could not solve

```
DSolve[{Derivative[1][x][t] == x[t] + y[t] - x[t]*(x[t]^2 + y[t]^2), Derivative[1][y][t] ==
x[t] + y[t] - y[t]*(x[t]^2 + y[t]^2)}, {x[t], y[t]}, t]
```

✓ **Maple** : cpu = 3.04 (sec), leaf count = 200

$$\left\{ [\{x(t) = 0\}, \{y(t) = 0\}], [\left\{ x(t) = ODESolStruc\left(\_a, [\left\{ \left(\frac{d}{d\_a}\_b(\_a) \right) \_b(\_a) + \frac{1}{2\_a^3} \left(-6\left(\_b(\_a)\right)^2 \_a^2 \right.\right.\right.\right.\right.$$

2.1920 ODE No. 1920

$$\{x'(t) = x(t)\left(x(t)^2 + y(t)^2 - 1\right) - y(t), y'(t) = y(t)\left(x(t)^2 + y(t)^2 - 1\right) + x(t)\}$$

✗ **Mathematica** : cpu = 0.0936452 (sec), leaf count = 0 , could not solve

```
DSolve[{Derivative[1][x][t] == -y[t] + x[t]*(-1 + x[t]^2 + y[t]^2), Derivative[1][y][t] == x
1 + x[t]^2 + y[t]^2)}, {x[t], y[t]}, t]
```

✓ **Maple** : cpu = 3.084 (sec), leaf count = 202

$$\left\{ [\{x(t) = 0\}, \{y(t) = 0\}], [\left\{ x(t) = ODESolStruc\left(\_a, [\left\{ \left(\frac{d}{d\_a}\_b(\_a) \right) \_b(\_a) + \frac{1}{2\_a^3} \left(-6\left(\_b(\_a)\right)^2 \_a^2 \right.\right.\right.\right.\right.$$

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 = 2.6456 (sec), leaf count = 0 , could not solve

```
DSolve[{Derivative[1][x][t] == -(y[t]*(x[t]^2 + y[t]^2)), Derivative[1][y][t] == Piecewise[{
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve({diff(x(t),t) = -y(t)*(x(t)^2+y(t)^2), diff(y(t),t) = piecewise(2*x(t) <= x(t)^2+y(t)
1/2*y(t)^2/x(t))*(x(t)^2+y(t)^2))})
```

2.1922 ODE No. 1922

$$\left\{x'(t)=\left(\begin{cases} \sin\left(\frac{1}{x(t)^2+y(t)^2}\right)x(t)\left(x(t)^2+y(t)^2-1\right) & x(t)^2+y(t)^2\neq 1 \\ 0 & \text{True} \end{cases}\right)-y(t),y'(t)=\left(\begin{cases} \sin\left(\frac{1}{x(t)^2-}\right. \end{cases}\right.$$

✗ **Mathematica** : cpu = 12.0507 (sec), leaf count = 0 , could not solve

```
DSolve[{Derivative[1][x][t] == Piecewise[{{Sin[(x[t]^2 + y[t]^2)^(-1)]*x[t]*(-
1 + x[t]^2 + y[t]^2), x[t]^2 + y[t]^2 != 1}}, 0] - y[t], Derivative[1][y][t] == Piecewise[{{
1)]*y[t]*(-1 + x[t]^2 + y[t]^2), x[t]^2 + y[t]^2 != 1}}, 0] + x[t]}, {x[t], y[t]}, t]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , exception

```
time expired
```

2.1923 ODE No. 1923

$$\left\{\left(t^2+1\right)x'(t)=y(t)-tx(t),\left(t^2+1\right)y'(t)=-x(t)-ty(t)\right\}$$

✓ **Mathematica** : cpu = 0.0136025 (sec), leaf count = 39

$$\left\{\left\{x(t)\to\frac{c_2t+c_1}{t^2+1},y(t)\to\frac{c_2-c_1t}{t^2+1}\right\}\right\}$$

✓ **Maple** : cpu = 0.044 (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

$$\left\{\left(-t^2+x(t)^2+y(t)^2\right)x'(t)=-2tx(t),\left(-t^2+x(t)^2+y(t)^2\right)y'(t)=-2ty(t)\right\}$$

✓ **Mathematica** : cpu = 0.0770166 (sec), leaf count = 179

$$\left\{\left\{y(t)\to-\frac{c_1\left(\sqrt{e^{2c_2}-4\left(c_1^2+1\right)t^2}-e^{c_2}\right)}{2\left(c_1^2+1\right)},x(t)\to\frac{e^{c_2}-\sqrt{e^{2c_2}-4\left(c_1^2+1\right)t^2}}{2\left(c_1^2+1\right)}\right\},\left\{y(t)\to\frac{c_1\left(\sqrt{e^{2c_2}-4\left(c_1^2+\right.\right.}}{2\left(c_1^2+\right.}\right.$$

✓ **Maple** : cpu = 0.359 (sec), leaf count = 180

$$\left\{[\{x(t)=0\},\left\{y(t)=\frac{1}{2\_C1}\left(1+\sqrt{-4\_C1^2t^2+1}\right),y(t)=\frac{1}{2\_C1}\left(1-\sqrt{-4\_C1^2t^2+1}\right)\right\}],[\left\{x(t)=\frac{1}{2\_C\right.$$

2.1925 ODE No. 1925

$$\left\{ay'(t)+tx'(t)-x(t)+y'(t)^2=0,x'(t)y'(t)+ty'(t)-y(t)=0\right\}$$

✗ **Mathematica** : cpu = 9.0936 (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 == 0,
y[t] + t*Derivative[1][y][t] + Derivative[1][x][t]*Derivative[1][y][t] == 0}, {x[t], y[t]},
```

✓ **Maple** : cpu = 0.308 (sec), leaf count = 194

$$\left\{[\left\{x(t)=-\frac{t^2}{3}\right\},\left\{y(t)=-\frac{t^3}{27a}\right\}],[\{x(t)=\_C1\,t+\_C2\},\left\{y(t)=-\frac{\left(\frac{d}{dt}x(t)+t\right)\left(\left(\frac{d}{dt}x(t)\right)^2+t\frac{d}{dt}x(t)-x(\right.}{a}\right.\right.$$

2.1926 ODE No. 1926

$$\left\{x(t)=f\left(x'(t),y'(t)\right)+tx'(t),y(t)=g\left(x'(t),y'(t)\right)+ty'(t)\right\}$$

✗ **Mathematica** : cpu = 0.00670303 (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[t] ==
```

✓ **Maple** : cpu = 0.174 (sec), leaf count = 96

$$\left\{[\left\{\int RootOf\left(t\frac{d}{dt}y(t)+g\left(\_Z,\frac{d}{dt}y(t)\right)-y(t)\right)\,dt+\_C1=tRootOf\left(t\frac{d}{dt}y(t)+g\left(\_Z,\frac{d}{dt}y(t)\right)-y(t)\right)+f\right.\right.$$

2.1927 ODE No. 1927

$$\left\{x''(t)=ae^{2x(t)}+e^{-2x(t)}\cos^2(y(t))-e^{-x(t)},y''(t)=e^{-2x(t)}\sin(y(t))\cos(y(t))-\tan(y(t))\sec^2(y(t))\right\}$$

✗ **Mathematica** : cpu = 0.0107559 (sec), leaf count = 0 , could not solve

```
DSolve[{Derivative[2][x][t] == -E^(-x[t]) + a*E^(2*x[t]) + Cos[y[t]]^2/E^(2*x[t]), Derivativ
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve({diff(diff(x(t),t),t) = a*exp(2*x(t))-exp(-x(t))+exp(-2*x(t))*cos(y(t))^2, diff(diff(
2*x(t))*sin(y(t))*cos(y(t))-sin(y(t))/cos(y(t))^3})
```

2.1928 ODE No. 1928

$$\left\{x''(t)=\frac{kx(t)}{(x(t)^2+y(t)^2)^{3/2}},y''(t)=\frac{ky(t)}{(x(t)^2+y(t)^2)^{3/2}}\right\}$$

✗ **Mathematica** : cpu = 0.00787225 (sec), leaf count = 0 , could not solve

```
DSolve[{Derivative[2][x][t] == (k*x[t])/(x[t]^2 + y[t]^2)^(3/2), Derivative[2][y][t] == (k*y
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , exception

```
time expired
```

2.1929 ODE No. 1929

$$\left\{x''(t)=-\frac{cy(t)x'(t)f\left(\sqrt{x'(t)^2+y'(t)^2}\right)}{\sqrt{x'(t)^2+y'(t)^2}},y''(t)=-\frac{cy(t)y'(t)f\left(\sqrt{x'(t)^2+y'(t)^2}\right)}{\sqrt{x'(t)^2+y'(t)^2}}-g\right\}$$

✗ **Mathematica** : cpu = 0.00960688 (sec), leaf count = 0 , could not solve

```
DSolve[{Derivative[2][x][t] == -((c*f[Sqrt[Derivative[1][x][t]^2 + Derivative[1][y][t]^2]]*y
g - (c*f[Sqrt[Derivative[1][x][t]^2 + Derivative[1][y][t]^2]]*y[t]*Derivative[1][y][t])/Sqrt
```

✓ **Maple** : cpu = 3.917 (sec), leaf count = 116

$$\left\{[\left\{y(t)=ODESolStruc\left(\_a,[\left\{\left(\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a)\right)\_b(\_a)+1\left(C(\_a)\,f\left(\sqrt{(\_b\,(\_a))^2}\right)\_b(\_a)+g\sqrt{(\_b\,(\_a)\right.\right.\right.\right.\right.$$

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 = 0.0525279 (sec), leaf count = 127

$$\{\{x(t) \to e^{t-c_3} + c_1, y(t) \to e^{2t-2c_3} + (c_1 + c_2)\, e^{t-c_3} + 2c_1 e^{t-c_3} \log\left(e^{t-c_3}\right) - c_1^2, z(t) \to e^{2t-2c_3} + (c_1 + c_2 - 1)\, e^{t-$$

✓ **Maple** : cpu = 0.055 (sec), leaf count = 45

$$\left\{[\{x(t) = \_C2 + \_C3\, \mathrm{e}^t\}, \left\{y(t) = \left(\int (x(t))^2 \mathrm{e}^{-t}\, \mathrm{d}t + \_C1\right) \mathrm{e}^t\right\}, \left\{z(t) = -\frac{\mathrm{d}}{\mathrm{d}t} x(t) + y(t)\right\}]\right\}$$

2.1931 ODE No. 1931

$$\{ax'(t) = (b - c)y(t)z(t), by'(t) = (c - a)x(t)z(t), cz'(t) = (a - b)x(t)y(t)\}$$

✓ **Mathematica** : cpu = 5.63777 (sec), leaf count = 1461

$$\left\{\left\{x(t) \to \frac{\sqrt{2} b \sqrt{a(a-c)}(c-b)c_1 \operatorname{sn}\left(\frac{\sqrt{2}\sqrt{a-c}\sqrt{b-c}\sqrt{c_2}(c_3-t)}{\sqrt{a}\sqrt{b}} \middle| -\frac{(a-b)bc_1}{(a-c)cc_2}\right)}{a(c-a)\sqrt{b(b-c)c_1}}, y(t) \to -\frac{\sqrt{2}\sqrt{-b(b-c)c_1\left(\operatorname{sn}\left(\frac{\sqrt{2}\sqrt{a-c}\right.\right.}}{\sqrt{b}}\right.\right.$$

✓ **Maple** : cpu = 0.861 (sec), leaf count = 1117

$$\left\{[\{x(t) = 0\}, \{y(t) = 0\}, \{z(t) = \_C1\}], [\{x(t) = 0\}, \{y(t) = \_C1\}, \{z(t) = 0\}], [\{x(t) = \_C1\}, \{y(t) = 0\}, \{\right.$$

2.1932 ODE No. 1932

$$\{x'(t) = x(t)(y(t) - z(t)), y'(t) = y(t)(z(t) - x(t)), z'(t) = z(t)(x(t) - y(t))\}$$

✗ **Mathematica** : cpu = 2.49971 (sec), leaf count = 0 , could not solve

```
DSolve[{Derivative[1][x][t] == x[t]*(y[t] - z[t]), Derivative[1][y][t] == y[t]*(-
x[t] + z[t]), Derivative[1][z][t] == (x[t] - y[t])*z[t]}, {x[t], y[t], z[t]}, t]
```

✓ **Maple** : cpu = 1.207 (sec), leaf count = 383

$$\left\{[\{x(t) = 0\}, \{y(t) = 0\}, \{z(t) = \_C1\}], [\{x(t) = 0\}, \left\{y(t) = \frac{\_C1\, \mathrm{e}^{\_C2\, \_C1}\, \mathrm{e}^{\_C1\, t}}{-1 + \mathrm{e}^{\_C2\, \_C1}\, \mathrm{e}^{\_C1\, t}}\right\}, \left\{z(t) = \frac{\frac{\mathrm{d}}{\mathrm{d}t} y(t)}{y(t)}\right\}], [\{x(t\right.$$

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 = 127.306 (sec), leaf count = 0 , could not solve

```
DSolve[{Derivative[1][x][t] + Derivative[1][y][t] == x[t]*y[t], Derivative[1][y][t] + Deriva
```

✓ **Maple** : cpu = 2.476 (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 = 76.1215 (sec), leaf count = 0 , could not solve

```
DSolve[{Derivative[1][x][t] == x[t]^2/2 - y[t]/24, Derivative[1][y][t] == 2*x[t]*y[t] - 3*z[
y[t]^2/6 + 3*x[t]*z[t]}, {x[t], y[t], z[t]}, t]
```

✓ **Maple** : cpu = 1.379 (sec), leaf count = 377

$$\left\{[\{y(t)=0\},\left\{x(t)=-2\left(-2\_C1+t\right)^{-1}\right\},\{z(t)=0\}],[\left\{y(t)=256\left(\_C1\,t+\_C2\right)^{-4}\right\},\left\{x(t)=\frac{1}{6\,y(t)}\left(-\surd\right.\right.\right.$$

2.1935 ODE No. 1935

$$\left\{x'(t)=x(t)\left(y(t)^2-z(t)^2\right),y'(t)=y(t)\left(z(t)^2-x(t)^2\right),z'(t)=z(t)\left(x(t)^2-y(t)^2\right)\right\}$$

✗ **Mathematica** : cpu = 0.0598652 (sec), leaf count = 0 , could not solve

```
DSolve[{Derivative[1][x][t] == x[t]*(y[t]^2 - z[t]^2), Derivative[1][y][t] == y[t]*(-
x[t]^2 + z[t]^2), Derivative[1][z][t] == (x[t]^2 - y[t]^2)*z[t]}, {x[t], y[t], z[t]}, t]
```

✓ **Maple** : cpu = 2.278 (sec), leaf count = 741

$$\left\{[\{x(t)=0\},\{y(t)=0\},\{z(t)=\_C1\}],[\{x(t)=0\},\left\{y(t)=\frac{1}{\left(e^{\_C2\,\_C1}\right)^2\left(e^{\_C1\,t}\right)^2-1}\sqrt{\left(\left(e^{\_C2\,\_C1}\right)^2\left(e^{\_C1\,t}\right.\right.}\right.\right.$$

2.1936 ODE No. 1936

$$\left\{x'(t) = x(t)\left(y(t)^2 - z(t)^2\right), y'(t) = -y(t)\left(x(t)^2 + z(t)^2\right), z'(t) = z(t)\left(x(t)^2 + y(t)^2\right)\right\}$$

✗ **Mathematica** : cpu = 0.0566234 (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 = 0.791 (sec), leaf count = 704

$$\left\{[\{x(t)=0\},\{y(t)=0\},\{z(t)=\_C1\}],[\{x(t)=0\},\left\{y(t)=\frac{1}{(\mathrm{e}^{\_C2\_C1})^2(\mathrm{e}^{\_C1\,t})^2-1}\sqrt{-(\mathrm{e}^{\_C1\,t})^4\_C1\,(\mathrm{e}\right.\right.$$

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 = 0.290524 (sec), leaf count = 0 , could not solve

```
DSolve[{Derivative[1][x][t] == x[t] + y[t] - x[t]*y[t]^2, Derivative[1][y][t] == -
x[t] - y[t] + x[t]^2*y[t], Derivative[1][z][t] == -x[t]^2 + y[t]^2}, {x[t], y[t], z[t]}, t]
```

✓ **Maple** : cpu = 0.799 (sec), leaf count = 240

$$\left\{[\{x(t)=0\},\{y(t)=0\},\{z(t)=\_C1\}],[\left\{x(t)=ODESolStruc\left(\_a,[\left\{\left(\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a)\right)\_b(\_a)+\frac{1}{2\_a^2}\left(-4\right.\right.\right.\right.\right.$$

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 = 0.0103403 (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 = 0.132 (sec), leaf count = 101

$$\left\{\left\{x(t)=\_C5\,\mathrm{e}^{t\sqrt{\frac{\mathrm{d}}{\mathrm{d}r}F(r)}\frac{1}{\sqrt{r}}}+\_C6\,\mathrm{e}^{-t\sqrt{\frac{\mathrm{d}}{\mathrm{d}r}F(r)}\frac{1}{\sqrt{r}}}, y(t)=\_C3\,\mathrm{e}^{t\sqrt{\frac{\mathrm{d}}{\mathrm{d}r}F(r)}\frac{1}{\sqrt{r}}}+\_C4\,\mathrm{e}^{-t\sqrt{\frac{\mathrm{d}}{\mathrm{d}r}F(r)}\frac{1}{\sqrt{r}}}, z(t)=\_C1\,\mathrm{e}^{t\sqrt{}}\right.\right.$$

2.1939 ODE No. 1939

$\{(x(t)-y(t))(x(t)-z(t))x'(t)=f(t),(y(t)-x(t))(y(t)-z(t))y'(t)=f(t),(z(t)-x(t))(z(t)-y(t))z'(t)=f(t$

✗ **Mathematica** : cpu = 0.0318653 (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] - z[t]
x[t] + z[t])*(-y[t] + z[t])*Derivative[1][z][t] == f[t]}, {x[t], y[t], z[t]}, t]
```

✓ **Maple** : cpu = 1.619 (sec), leaf count = 899

$$\left\{\left[\left\{x(t)=\int 3\frac{f(t)}{\_C1^3+11664\_C2^2-23328\_C2\int f(t)\,dt+11664\left(\int f(t)\,dt\right)^2}\left(\left(-i\sqrt{3}-1\right)\left(\left(\left(1+108\sqrt{\right.\right.\right.\right.\right.\right.\right.$$

2.1940 ODE No. 1940

$\{\mathrm{x1}'(t)\sin(\mathrm{x2}(t))=\mathrm{x4}(t)\sin(\mathrm{x3}(t))+\mathrm{x5}(t)\cos(\mathrm{x3}(t)),\mathrm{x2}'(t)=\mathrm{x4}(t)\cos(\mathrm{x3}(t))-\mathrm{x5}(t)\sin(\mathrm{x3}(t)),\mathrm{x1}'(t)\cos(\mathrm{x2}(t$

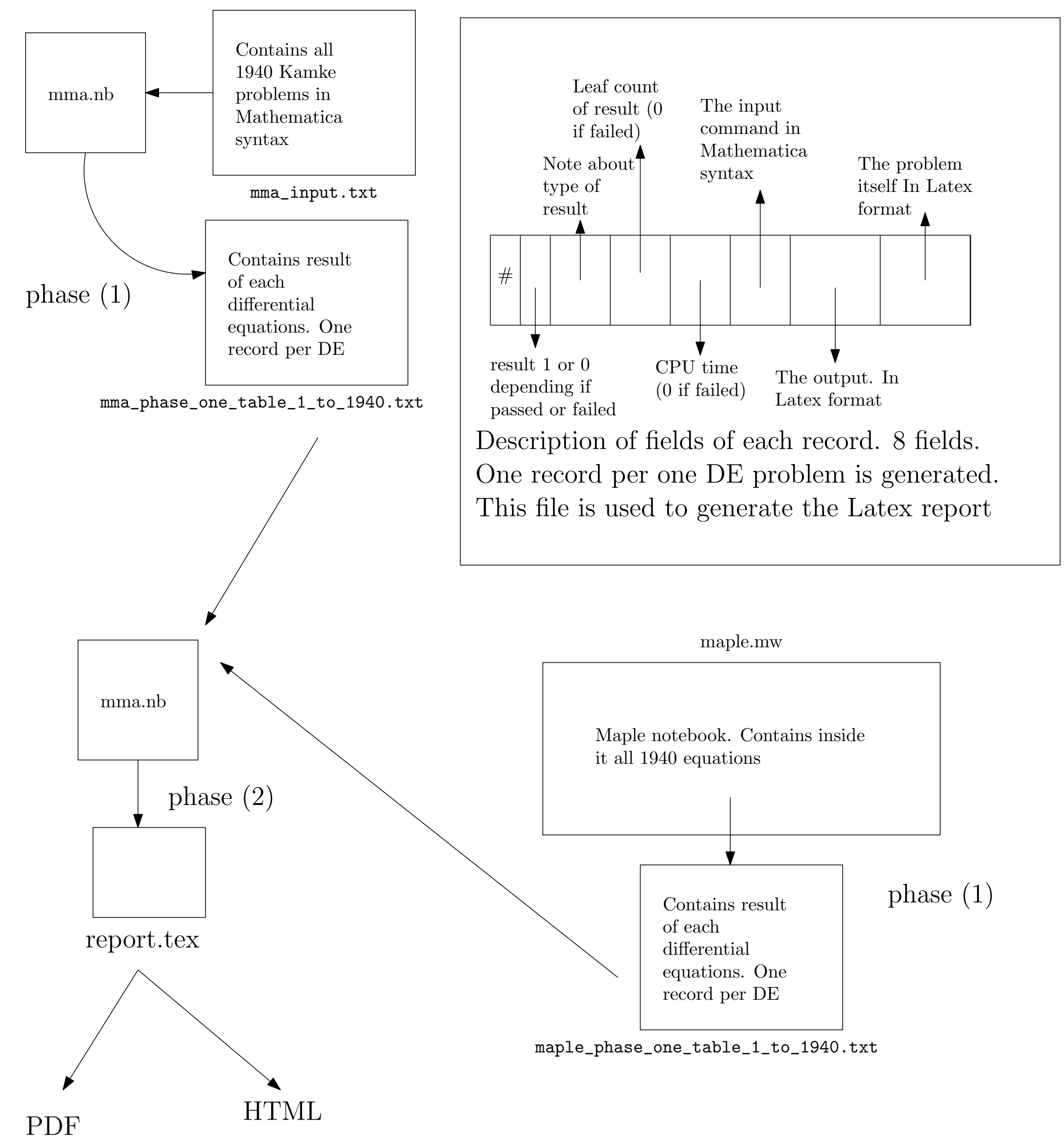
✗ **Mathematica** : cpu = 0.00941329 (sec), leaf count = 0 , could not solve

```
DSolve[{Sin[x2[t]]*Derivative[1][x1][t] == Sin[x3[t]]*x4[t] + Cos[x3[t]]*x5[t], Derivative[1
(a*(1 - lambda)*x5[t]) + Derivative[1][x4][t] == -(m*Cos[x3[t]]*Sin[x2[t]]), a*(1 - lambda)*
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , exception

```
time expired
```

3 Appendix



Kamke Differential equations build process

Nasser M. Abbasi (design.ipe)