Kamke differential equations. Mathematica 12.1 and Maple 2020

Nasser M. Abbasi

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2.1834 ODE No. 1834 900
2.1835 ODE No. 1835 900
2.1836 ODE No. 1836 901
2.1837 ODE No. 1837 901
2.1838 ODE No. 1838 901
2.1839 ODE No. 1839 902
2.1840 ODE No. 1840 902
2.1841 ODE No. 1841 902
2.1842 ODE No. 1842 903
2.1843 ODE No. 1843 903
2.1844 ODE No. 1844 904
2.1845 ODE No. 1845 904
2.1846 ODE No. 1846 904
2.1847 ODE No. 1847 905
2.1848 ODE No. 1848 905
2.1849 ODE No. 1849 905
2.1850 ODE No. 1850 906
2.1851 ODE No. 1851 906
2.1852 ODE No. 1852 906
2.1853 ODE No. 1853 907
2.1854 ODE No. 1854 907
2.1855 ODE No. 1855 907
2.1856 ODE No. 1856 908
2.1857 ODE No. 1857 908
2.1858 ODE No. 1858 908
2.1859 ODE No. 1859 909
2.1860 ODE No. 1860 909
2.1861 ODE No. 1861 909
2.1862 ODE No. 1862 910
2.1863 ODE No. 1863 910
2.1864 ODE No. 1864 910
2.1865 ODE No. 1865 911
2.1866 ODE No. 1866 911
2.1867 ODE No. 1867 911
2.1868 ODE No. 1868 912
2.1869 ODE No. 1869 912
2.1870 ODE No. 1870 912
2.1871 ODE No. 1871 913
2.1872 ODE No. 1872 913
2.1873 ODE No. 1873 913

2.1874 ODE No. 1874 914
2.1875 ODE No. 1875 914
2.1876 ODE No. 1876 914
2.1877 ODE No. 1877 915
2.1878 ODE No. 1878 915
2.1879 ODE No. 1879 915
2.1880 ODE No. 1880 916
2.1881 ODE No. 1881 916
2.1882 ODE No. 1882 916
2.1883 ODE No. 1883 917
2.1884 ODE No. 1884 917
2.1885 ODE No. 1885 917
2.1886 ODE No. 1886 918
2.1887 ODE No. 1887 918
2.1888 ODE No. 1888 918
2.1889 ODE No. 1889 919
2.1890 ODE No. 1890 919
2.1891 ODE No. 1891 919
2.1892 ODE No. 1892 920
2.1893 ODE No. 1893 920
2.1894 ODE No. 1894 921
2.1895 ODE No. 1895 921
2.1896 ODE No. 1896 921
2.1897 ODE No. 1897 922
2.1898 ODE No. 1898 922
2.1899 ODE No. 1899 922
2.1900 ODE No. 1900 923
2.1901 ODE No. 1901 923
2.1902 ODE No. 1902 923
2.1903 ODE No. 1903 924
2.1904 ODE No. 1904 924
2.1905 ODE No. 1905 924
2.1906 ODE No. 1906 925
2.1907 ODE No. 1907 925
2.1908 ODE No. 1908 925
2.1909 ODE No. 1909 926
2.1910 ODE No. 1910 926
2.1911 ODE No. 1911 926
2.1912 ODE No. 1912 927
2.1913 ODE No. 1913 927
2.1914 ODE No. 1914 927

2.1915 ODE No. 1915 929
2.1916 ODE No. 1916 929
2.1917 ODE No. 1917 929
2.1918 ODE No. 1918 930
2.1919 ODE No. 1919 930
2.1920 ODE No. 1920 930
2.1921 ODE No. 1921 931
2.1922 ODE No. 1922 931
2.1923 ODE No. 1923 931
2.1924 ODE No. 1924 932
2.1925 ODE No. 1925 932
2.1926 ODE No. 1926 932
2.1927 ODE No. 1927 933
2.1928 ODE No. 1928 933
2.1929 ODE No. 1929 933
2.1930 ODE No. 1930 934
2.1931 ODE No. 1931 934
2.1932 ODE No. 1932 935
2.1933 ODE No. 1933 935
2.1934 ODE No. 1934 935
2.1935 ODE No. 1935 936
2.1936 ODE No. 1936 936
2.1937 ODE No. 1937 936
2.1938 ODE No. 1938 937
2.1939 ODE No. 1939 937
2.1940 ODE No. 1940 937

3 Appendix **938**

1 Introduction and summary of results

This report gives the result of solving the 1,940 differential equations from Kamke book in Mathematica 12.1 and Maple 2020 on windows 10, 64 bit OS. PC with 64 GB RAM, using Intel I7-8086K at 4GHz.

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

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

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

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

Table 1 below summarizes the performance of each CAS system

system	% solved	mean CPU (sec)	result mean leaf size	total CPU (minutes)	total leaf size
Mathematica	84.33	1.99	2656.71	54.34	4346371
Maple	91.96	0.75	206.42	22.41	368251

Table 1: Summary of final results

Table 2 summarizes the Kamke equations used

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

Table 2: Kamke equation numbering

The following summarizes which equations are solved by each system

Not solved by Mathematica 47, 48, 49, 50, 55, 56, 74, 79, 82, 87, 110, 121, 188, 202, 203, 205, 206, 219, 234, 237, 250, 253, 265, 266, 269, 331, 340, 367, 370, 394, 395, 413, 427, 428, 451, 460, 461, 465, 480, 482, 485, 489, 503, 506, 507, 510, 524, 531, 532, 537, 562, 572, 575, 576, 638, 639, 640, 730, 743, 746, 752, 759, 769, 807, 835, 837, 854, 855, 862, 885, 889, 894, 909, 916, 917, 919, 953, 996, 1015, 1019, 1026, 1028, 1029, 1030, 1031, 1032, 1038, 1072, 1073, 1074, 1075, 1076, 1077, 1081, 1082, 1083, 1099, 1126, 1157, 1205, 1212, 1216, 1236, 1278, 1306, 1323, 1362, 1403, 1407, 1408, 1419, 1439, 1440, 1441, 1443, 1444, 1450, 1457, 1458, 1459, 1460, 1461, 1462, 1463, 1473, 1474, 1476, 1482, 1484, 1489, 1500, 1507, 1515, 1520, 1531, 1540, 1541, 1542, 1543, 1544, 1547, 1552, 1569, 1572, 1576, 1581, 1586, 1590, 1593, 1595, 1596, 1598, 1599, 1601, 1603, 1605, 1606, 1608, 1609, 1611, 1612, 1613, 1614, 1615, 1616, 1617, 1618, 1619, 1622, 1623, 1624, 1625, 1626, 1627, 1628, 1629, 1631, 1633, 1634, 1636, 1637, 1639, 1642, 1643, 1644, 1645, 1648, 1649, 1652, 1658, 1659, 1660, 1662, 1663, 1664, 1665, 1666, 1667, 1672, 1673, 1675, 1677, 1678, 1680, 1681, 1682, 1684, 1685, 1686, 1690, 1691, 1692, 1693, 1695, 1696, 1702, 1704, 1708, 1709, 1710, 1713, 1717, 1719, 1720, 1721, 1729, 1732, 1734, 1735, 1737, 1738, 1739, 1742, 1746, 1751, 1757, 1761, 1762, 1777, 1779, 1780, 1788, 1789, 1797, 1798, 1801, 1802, 1806, 1807, 1809, 1811, 1815, 1816, 1817, 1818, 1819, 1820, 1821, 1823, 1825, 1827, 1831, 1832, 1833, 1834, 1836, 1837, 1838, 1839, 1840, 1841, 1844, 1845, 1850, 1851, 1853, 1854, 1855, 1875, 1880, 1885, 1890, 1905, 1911, 1912, 1915, 1918, 1919, 1920, 1921, 1922, 1925, 1926, 1927, 1928, 1929, 1932, 1933, 1934, 1935, 1936, 1937, 1939, 1940

Not solved by Maple 47, 48, 49, 50, 55, 56, 74, 79, 82, 87, 110, 121, 202, 203, 205, 206, 219, 234, 237, 250, 253, 265, 269, 340, 367, 368, 370, 383, 395, 448, 452, 460, 461, 480, 482, 485, 503, 506, 507, 510, 531, 543, 572, 575, 576, 708, 733, 789, 790, 835, 837, 885, 894, 912, 920, 1015, 1019, 1026, 1028, 1030, 1031, 1038, 1072, 1073, 1075, 1076, 1077, 1081, 1157, 1205, 1212, 1216, 1234, 1236, 1278, 1408, 1439, 1440, 1441, 1443, 1457, 1458, 1459, 1460, 1461, 1462, 1463, 1473, 1474, 1476, 1484, 1489, 1510, 1515, 1531, 1540, 1541, 1542, 1543, 1581, 1582, 1586, 1593, 1595, 1596, 1598, 1599, 1606, 1608, 1609, 1617, 1619, 1623, 1625, 1628, 1634, 1642, 1643, 1645, 1649, 1675, 1685, 1698, 1702, 1704, 1705, 1706, 1721, 1729, 1732, 1734, 1735, 1737, 1738, 1739, 1751, 1757, 1761, 1788, 1789, 1797, 1801, 1802, 1807, 1811, 1835, 1851, 1854, 1855, 1890, 1905, 1921, 1922, 1927, 1928, 1940

Solved by Mathematica but not by Maple 368, 383, 448, 452, 543, 708, 733, 789, 790, 912, 920, 1234, 1510, 1582, 1698, 1705, 1706, 1835

Solved by Maple but not by Mathematica 188, 266, 331, 394, 413, 427, 428, 451, 465, 489, 524, 532, 537, 562, 638, 639, 640, 730, 743, 746, 752, 759, 769, 807, 854, 855, 862, 889, 909, 916, 917, 919, 953, 996, 1029, 1032, 1074, 1082, 1083, 1099, 1126, 1306, 1323, 1362, 1403, 1407, 1419, 1444, 1450, 1482, 1500, 1507, 1520, 1544, 1547, 1552, 1569, 1572, 1576, 1590, 1601, 1603, 1605, 1611, 1612, 1613, 1614, 1615, 1616, 1618, 1622, 1624, 1626, 1627, 1629, 1631, 1633, 1636, 1637, 1639, 1644, 1648, 1652, 1658, 1659, 1660, 1662, 1663, 1664, 1665, 1666, 1667, 1672, 1673, 1677, 1678, 1680, 1681, 1682, 1684, 1686, 1690, 1691, 1692, 1693, 1695, 1696, 1708, 1709, 1710, 1713, 1717, 1719, 1720, 1742, 1746, 1762, 1777, 1779, 1780, 1798, 1806, 1809, 1815, 1816, 1817, 1818, 1819, 1820, 1821, 1823, 1825, 1827, 1831, 1832, 1833, 1834, 1836, 1837, 1838, 1839, 1840, 1841, 1844, 1845, 1850, 1853, 1875, 1880, 1885, 1911, 1912, 1915, 1918, 1919, 1920, 1925, 1926, 1929, 1932, 1933, 1934, 1935, 1936, 1937, 1939

Solved by both Maple and Mathematica 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 51, 52, 53, 54, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 75, 76, 77, 78, 80, 81, 83, 84, 85, 86, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 204, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 235, 236, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 251, 252, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 267, 268, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 332, 333, 334, 335, 336, 337, 338, 339, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 369, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 449, 450, 453, 454, 455, 456, 457, 458, 459, 462, 463, 464, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 481, 483, 484, 486, 487, 488, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 504, 505, 508, 509, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 525, 526, 527, 528, 529, 530, 533, 534, 535, 536, 538, 539, 540, 541, 542, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 563, 564, 565, 566, 567, 568, 569, 570, 571, 573, 574, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 731, 732, 734, 735, 736, 737, 738, 739, 740, 741, 742, 744, 745, 747, 748, 749, 750, 751, 753, 754, 755, 756, 757, 758, 760, 761, 762, 763, 764, 765, 766, 767, 768, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 836, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 856, 857, 858, 859, 860, 861, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 886, 887, 888, 890, 891, 892, 893, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 910, 911, 913, 914, 915, 918, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 997, 998, 999, 1000, 1001, 1002, 1003, 1004, 1005, 1006, 1007, 1008, 1009, 1010, 1011, 1012, 1013, 1014, 1016, 1017, 1018, 1020, 1021, 1022, 1023, 1024, 1025, 1027, 1033, 1034, 1035, 1036, 1037, 1039, 1040, 1041, 1042, 1043, 1044, 1045, 1046, 1047, 1048, 1049, 1050, 1051, 1052, 1053, 1054, 1055, 1056, 1057, 1058, 1059, 1060, 1061, 1062, 1063, 1064, 1065, 1066, 1067, 1068, 1069, 1070, 1071, 1078, 1079, 1080, 1084, 1085, 1086, 1087, 1088, 1089, 1090, 1091, 1092, 1093, 1094, 1095, 1096, 1097, 1098, 1100, 1101, 1102, 1103, 1104, 1105, 1106, 1107, 1108, 1109, 1110, 1111, 1112, 1113, 1114, 1115, 1116, 1117, 1118, 1119, 1120, 1121, 1122, 1123, 1124, 1125, 1127, 1128, 1129, 1130, 1131, 1132, 1133, 1134, 1135, 1136, 1137, 1138, 1139, 1140, 1141, 1142, 1143, 1144, 1145, 1146, 1147, 1148, 1149, 1150, 1151, 1152, 1153, 1154, 1155, 1156, 1158, 1159, 1160, 1161, 1162, 1163, 1164, 1165, 1166, 1167, 1168, 1169, 1170, 1171, 1172, 1173, 1174, 1175, 1176, 1177, 1178, 1179, 1180, 1181, 1182, 1183, 1184, 1185, 1186, 1187, 1188, 1189, 1190, 1191, 1192, 1193, 1194, 1195, 1196, 1197, 1198, 1199, 1200, 1201, 1202, 1203, 1204, 1206, 1207, 1208, 1209, 1210, 1211, 1213, 1214, 1215, 1217, 1218, 1219, 1220, 1221, 1222, 1223, 1224, 1225, 1226, 1227, 1228, 1229, 1230, 1231, 1232, 1233, 1235, 1237, 1238, 1239, 1240, 1241, 1242, 1243, 1244, 1245, 1246, 1247, 1248, 1249, 1250, 1251, 1252, 1253, 1254, 1255, 1256, 1257, 1258, 1259, 1260, 1261, 1262, 1263, 1264, 1265, 1266, 1267, 1268, 1269, 1270, 1271, 1272, 1273, 1274, 1275, 1276, 1277, 1279, 1280, 1281, 1282, 1283, 1284, 1285, 1286, 1287, 1288, 1289, 1290, 1291, 1292, 1293, 1294, 1295, 1296, 1297, 1298, 1299, 1300, 1301, 1302, 1303, 1304, 1305, 1307, 1308, 1309, 1310, 1311, 1312, 1313, 1314, 1315, 1316, 1317, 1318, 1319, 1320, 1321, 1322, 1324, 1325, 1326, 1327, 1328, 1329, 1330, 1331, 1332, 1333, 1334, 1335, 1336, 1337, 1338, 1339, 1340, 1341, 1342, 1343, 1344, 1345, 1346, 1347, 1348, 1349, 1350, 1351, 1352, 1353, 1354, 1355, 1356, 1357, 1358, 1359, 1360, 1361, 1363, 1364, 1365, 1366, 1367, 1368, 1369, 1370, 1371, 1372, 1373, 1374, 1375, 1376, 1377, 1378, 1379, 1380, 1381, 1382, 1383, 1384, 1385, 1386, 1387, 1388, 1389, 1390, 1391, 1392, 1393, 1394, 1395, 1396, 1397, 1398, 1399, 1400, 1401, 1402, 1404, 1405, 1406, 1409, 1410, 1411, 1412, 1413, 1414, 1415, 1416, 1417, 1418, 1420, 1421, 1422, 1423, 1424, 1425, 1426, 1427, 1428, 1429, 1430, 1431, 1432, 1433, 1434, 1435, 1436, 1437, 1438, 1442, 1445, 1446, 1447, 1448, 1449, 1451, 1452, 1453, 1454, 1455, 1456, 1464, 1465, 1466, 1467, 1468, 1469, 1470, 1471, 1472, 1475, 1477, 1478, 1479, 1480, 1481, 1483, 1485, 1486, 1487, 1488, 1490, 1491, 1492, 1493, 1494, 1495, 1496, 1497, 1498, 1499, 1501, 1502, 1503, 1504, 1505, 1506, 1508, 1509, 1511, 1512, 1513, 1514, 1516, 1517, 1518, 1519, 1521, 1522, 1523, 1524, 1525, 1526, 1527, 1528, 1529, 1530, 1532, 1533, 1534, 1535, 1536, 1537, 1538, 1539, 1545, 1546, 1548, 1549, 1550, 1551, 1553, 1554, 1555, 1556, 1557, 1558, 1559, 1560, 1561, 1562, 1563, 1564, 1565, 1566, 1567, 1568, 1570, 1571, 1573, 1574, 1575, 1577, 1578, 1579, 1580, 1583, 1584, 1585, 1587, 1588, 1589, 1591, 1592, 1594, 1597, 1600, 1602, 1604, 1607, 1610, 1620, 1621, 1630, 1632, 1635, 1638, 1640, 1641, 1646, 1647, 1650, 1651, 1653, 1654, 1655, 1656, 1657, 1661, 1668, 1669, 1670, 1671, 1674, 1676, 1679, 1683, 1687, 1688, 1689, 1694, 1697, 1699, 1700, 1701, 1703, 1707, 1711, 1712, 1714, 1715, 1716, 1718, 1722, 1723, 1724, 1725, 1726, 1727, 1728, 1730, 1731, 1733, 1736, 1740, 1741, 1743, 1744, 1745, 1747, 1748, 1749, 1750, 1752, 1753, 1754, 1755, 1756, 1758, 1759, 1760, 1763, 1764, 1765, 1766, 1767, 1768, 1769, 1770, 1771, 1772, 1773, 1774, 1775, 1776, 1778, 1781, 1782, 1783, 1784, 1785, 1786, 1787, 1790, 1791, 1792, 1793, 1794, 1795, 1796, 1799, 1800, 1803, 1804, 1805, 1808, 1810, 1812, 1813, 1814, 1822, 1824, 1826, 1828, 1829, 1830, 1842, 1843, 1846, 1847, 1848, 1849, 1852, 1856, 1857, 1858, 1859, 1860, 1861, 1862, 1863, 1864, 1865, 1866, 1867, 1868, 1869, 1870, 1871, 1872, 1873, 1874, 1876, 1877, 1878, 1879, 1881, 1882, 1883, 1884, 1886, 1887, 1888, 1889, 1891, 1892, 1893, 1894, 1895, 1896, 1897, 1898, 1899, 1900, 1901, 1902, 1903, 1904, 1906, 1907, 1908, 1909, 1910, 1913, 1914, 1916, 1917, 1923, 1924, 1930, 1931, 1938

Both systems unable to solve 47, 48, 49, 50, 55, 56, 74, 79, 82, 87, 110, 121, 202, 203, 205, 206, 219, 234, 237, 250, 253, 265, 269, 340, 367, 370, 395, 460, 461, 480, 482, 485, 503, 506, 507, 510, 531, 572, 575, 576, 835, 837, 885, 894, 1015, 1019, 1026, 1028, 1030, 1031, 1038, 1072, 1073, 1075, 1076, 1077, 1081, 1157, 1205, 1212, 1216, 1236, 1278, 1408, 1439, 1440, 1441, 1443, 1457, 1458, 1459, 1460, 1461, 1462, 1463, 1473, 1474, 1476, 1484, 1489, 1515, 1531, 1540, 1541, 1542, 1543, 1581, 1586, 1593, 1595, 1596, 1598, 1599, 1606, 1608, 1609, 1617, 1619, 1623, 1625, 1628, 1634, 1642, 1643, 1645, 1649, 1675, 1685, 1702, 1704, 1721, 1729, 1732, 1734, 1735, 1737, 1738, 1739, 1751, 1757, 1761, 1788, 1789, 1797, 1801, 1802, 1807, 1811, 1851, 1854, 1855, 1890, 1905, 1921, 1922, 1927, 1928, 1940

2 Problems table lookup

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

Table 3: Breakdown of results for each Kamke differential equation

	Mathematica			Maple			
#	solved	cpu	leaf	solved	cpu	leaf	note on solution
Kamke 1	✓	0.422	1117	✓	0.055	1089	Linear first order, To Do
Kamke 2	✓	0.037	34	✓	0.019	25	Linear first order, integrating factor $y'(x) + ay(x) = f(x)$
Kamke 3	✓	0.056	40	✓	0.071	37	Linear first order, integrating factor $y'(x) + ay(x) = f(x)$
Kamke 4	✓	0.013	30	✓	0.005	18	Linear first order, integrating factor $y'(x) + g(x)y(x) = f(x)$
Kamke 5	✓	0.383	39	✓	0.112	21	Linear first order, integrating factor $y'(x) + g(x)y(x) = f(x)$
Kamke 6	✓	0.02	18	✓	0.023	15	Linear first order, integrating factor $y'(x) + g(x)y(x) = f(x)$
Kamke 7	✓	0.032	23	✓	0.006	13	Linear first order, integrating factor $y'(x) + g(x)y(x) = f(x)$
Kamke 8	✓	0.018	17	✓	0.01	13	Linear first order, integrating factor $y'(x) + g(x)y(x) = f(x)$
Kamke 9	✓	0.015	19	✓	0.014	14	Linear first order, integrating factor $y'(x) + g(x)y(x) = f(x)$

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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 10	✓	0.013	18	✓	0.011	15	Linear first order, integrating factor $y'(x) + g(x)y(x) = f(x)$
Kamke 11	✓	0.019	66	✓	0.021	24	Linear first order, integrating factor $y'(x) + g(x)y(x) = f(x)$
Kamke 12	✓	0.073	34	✓	0.047	8	Non-linear first order, Riccati, separable $y'(x) + y^2(x) = 1$
Kamke 13	✓	0.076	79	✓	0.194	79	Non-linear first order, Riccati, transform to second order Airy ODE using $y = -\frac{u'(x)}{uR(x)}$
Kamke 14	✓	0.085	254	✓	0.087	187	Non-linear first order, Riccati, transform to second order Airy ODE using $y = -\frac{u'(x)}{uR(x)}$
Kamke 15	✓	0.068	25	✓	0.172	33	Non-linear first order, Riccati, transform to separable first order
Kamke 16	✓	0.037	186	✓	0.088	49	Non-linear first order, Riccati, transform to first order separable using $y = y_p + \frac{1}{u}$
Kamke 17	✓	0.056	34	✓	0.097	24	Non-linear first order, Riccati, transform to second order standard ODE using $y = -\frac{u'(x)}{uR(x)}$

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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 18	✓	0.074	50	✓	0.051	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	✓	0.055	14	✓	0.039	16	Non-linear first order, Riccati, transform to first order separable
Kamke 20	✓	0.077	49	✓	0.054	34	Non-linear first order, Riccati, transform to Bernoulli first order non-linear first order then solve Bernoulli
Kamke 21	✓	0.321	7	✓	0.129	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	✓	0.434	113	✓	0.397	128	Non-linear first order, Riccati, transform to first order ODE solved using integrating factor using transformtion $y = y_p + \frac{1}{u}$
Kamke 23	✓	0.064	43	✓	0.038	23	Non-linear first order, Riccati, Separable
Kamke 24	✓	0.099	277	✓	0.06	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	✓	0.331	1835	✓	0.272	348	Non-linear first order, Riccati. 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 26	✓	0.186	68	✓	0.064	45	Non-Linear first order, Riccati, transform to second order standard ODE using $y=-\frac{u'(x)}{uR(x)}$
Kamke 27	✓	0.221	120	✓	0.154	72	Non-linear first order, Riccati, transform to Bernoulli first order non-linear first order then solve Bernoulli
Kamke 28	✓	0.114	96	✓	0.077	51	Non-linear first order, Riccati, transform to Bernoulli first order non-linear first order then solve Bernoulli
Kamke 29	✓	0.072	39	✓	0.011	19	Non-linear first order, Bernoulli
Kamke 30	✓	0.153	230	✓	0.061	54	Non-Linear first order, Riccati, transform to second order Bessel like ODE using $y=-\frac{u'(x)}{uR(x)}$, solution uses Bessel functions
Kamke 31	✓	0.127	21	✓	0.044	23	Non-Linear first order, Riccati, separable
Kamke 32	✓	0.3	34	✓	0.239	28	Non-Linear first order, Riccati, has particular solution, solution using $y=y_p+\frac{1}{u}$ leads to first order solved using integrating factor
Kamke 33	✓	0.333	160	✓	0.393	58	Non-Linear first order, Riccati. Complicated algebra, will do later
Kamke 34	✓	0.09	54	✓	0.024	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	✓	0.113	61	✓	0.043	35	Non-Linear first order, Riccati. Transform to second order ODE using $y(x) = -\frac{u'(x)}{u(x)R(x)}$
Kamke 36	✓	0.259	195	✓	0.073	62	Non-Linear first order of Abel first kind with None constant invariant. Transform to a reverse Riccati then Solve the resulting second order Airy ODE, and transform solution back. Lots of algebra involved. Hardest ODE so far
Kamke 37	✓	0.75	78	✓	0.074	50	To Do
Kamke 38	✓	0.156	99	✓	0.022	34	Non-Linear first order. smart transformation makes it proper Abel first kind
Kamke 39	✓	0.121	54	✓	0.013	30	To Do
Kamke 40	✓	0.319	185	✓	0.051	48	To Do
Kamke 41	✓	0.158	103	✓	0.199	103	To Do
Kamke 42	✓	0.835	485	✓	0.019	40	To Do
Kamke 43	✓	5.871	490	✓	1.206	373	To Do
Kamke 44	✓	0.073	72	✓	0.017	53	Non-Linear first order Bernoulli. Solved using standard method of solving Bernoulli.
Kamke 45	✓	0.533	133	✓	0.101	123	To Do
Kamke 46	✓	0.281	228	✓	0.085	956	To Do
Kamke 47	✗	0	0	✗	0	0	To Do

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#	Mathematica			Maple			note on solution
	solved	cpu	leaf	solved	cpu	leaf	
Kamke 48	✗	0	0	✗	0	0	To Do
Kamke 49	✗	0	0	✗	0	0	To Do
Kamke 50	✗	0	0	✗	0	0	To Do
Kamke 51	✓	1.471	355	✓	0.157	237	To Do
Kamke 52	✓	0.221	117	✓	0.326	61	To Do
Kamke 53	✓	0.391	96	✓	0.13	281	To Do
Kamke 54	✓	0.306	74	✓	0.152	38	To Do
Kamke 55	✗	0	0	✗	0	0	To Do
Kamke 56	✗	0	0	✗	0	0	To Do
Kamke 57	✓	0.053	26	✓	0.063	31	To Do
Kamke 58	✓	0.219	118	✓	0.065	68	To Do
Kamke 59	✓	0.222	96	✓	0.061	26	To Do
Kamke 60	✓	0.111	173	✓	0.016	29	Non-Linear first order, separable.
Kamke 61	✓	0.191	75	✓	0.01	50	To Do
Kamke 62	✓	2.545	44	✓	0.283	34	Non-Linear first order, special transformation makes it exact differential.
Kamke 63	✓	0.118	48	✓	5.646	35	To Do
Kamke 64	✓	0.291	269	✓	0.076	124	To Do
Kamke 65	✓	0.961	312	✓	0.044	47	To Do
Kamke 66	✓	0.153	67	✓	0.089	40	To Do
Kamke 67	✓	0.118	14	✓	0.015	51	To Do
Kamke 68	✓	0.686	373	✓	0.049	77	To Do
Kamke 69	✓	7.734	1163	✓	0.116	111	To Do
Kamke 70	✓	12.671	81	✓	0.124	113	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 71	✓	2.769	2237	✓	0.095	113	To Do
Kamke 72	✓	0.159	89	✓	0.012	64	To Do
Kamke 73	✓	1.307	733	✓	0.239	91	To Do
Kamke 74	✗	0	0	✗	0	0	To Do
Kamke 75	✓	0.138	20	✓	0.116	20	Non-Linear first order, Separable
Kamke 76	✓	0.129	116	✓	0.036	41	Non-Linear first order, Separable, integral requires the tangent half-angle substitution (Weierstrass substitution)
Kamke 77	✓	0.278	124	✓	0.056	54	Non-Linear first order, transform to Separable, becomes same as problem 76 above. Transform back after soluion.
Kamke 78	✓	0.63	1317	✓	0.076	89	Non-Linear first order, transform to Separable, integral requires the tangent half-angle substitution (Weierstrass substitution). Kamke calls this d'Alembertsche differential equation
Kamke 79	✗	0	0	✗	0	0	To Do
Kamke 80	✓	0.057	72	✓	1.051	41	To Do
Kamke 81	✓	1.338	220	✓	1.052	78	To Do
Kamke 82	✗	0	0	✗	0	0	To Do
Kamke 83	✓	0.342	69	✓	0.297	44	To Do
Kamke 84	✓	0.183	248	✓	0.032	37	To Do

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#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 85	✓	0.34	238	✓	0.348	153	To Do
Kamke 86	✓	0.442	184	✓	0.395	52	To Do
Kamke 87	✗	0	0	✗	0	0	To Do
Kamke 88	✓	0.473	2831	✓	0.184	256	Non-Linear first order, Riccati, Solved using $y = -\frac{u'}{uR(x)}$ substitution. Convert to second order Bessel ODE
Kamke 89	✓	0.012	42	✓	0.02	56	Linear first order, separable. Integration tricky. requires tangent half-angle substitution
Kamke 90	✓	0.012	24	✓	0.011	17	Linear first order, separable. integrating factor
Kamke 91	✓	0.012	15	✓	0.006	11	To Do
Kamke 92	✓	0.012	15	✓	0.005	12	Linear first order, separable. integrating factor
Kamke 93	✓	0.031	16	✓	0.012	12	To Do
Kamke 94	✓	0.017	25	✓	0.009	23	Linear first order, separable. integrating factor
Kamke 95	✓	0.07	32	✓	0.054	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	✓	0.058	33	✓	0.034	11	Non-Linear first order, Riccati, but it is separable, so easy to solve by direct integration

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#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 97	✓	0.103	46	✓	0.031	25	Non-Linear first order, Riccati, smart substitution transfer it to separable first order, so easy to solve by direct integration
Kamke 98	✓	0.166	442	✓	0.053	38	To Do
Kamke 99	✓	0.156	244	✓	0.091	171	To Do
Kamke 100	✓	0.076	157	✓	0.054	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	✓	0.072	18	✓	0.01	16	Non-Linear first order, Bernoulli, standard method of solving Bernoulli
Kamke 102	✓	0.08	36	✓	0.037	22	Non-Linear first order, Riccati, but transformed using smart substitution $y = xv$ to separable first order which is easily solved
Kamke 103	✓	0.147	90	✓	0.029	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	✓	0.111	43	✓	0.046	63	Non-Linear first order, Riccati, conversion using smart transformation to separable first order

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 105	✓	0.214	473	✓	0.196	844	To Do
Kamke 106	✓	0.191	40	✓	0.045	41	To Do
Kamke 107	✓	0.322	1415	✓	0.2	174	To Do
Kamke 108	✓	0.066	15	✓	0.013	13	Non-Linear first order, Bernoulli, standard method of solving Bernoulli, leads to first order separable
Kamke 109	✓	0.069	17	✓	0.012	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	✓	0.364	55	✓	0.136	54	To Do
Kamke 112	✓	0.09	13	✓	0.033	27	Non-Linear first order, smart transformation $y(x) = xv(x)$ makes it separable
Kamke 113	✓	0.097	16	✓	0.021	33	Non-Linear first order, very similar to 112. Smart transformation $y(x) = xv(x)$ makes it separable
Kamke 114	✓	0.089	12	✓	2.852	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	✓	0.247	221	✓	0.172	49	Non-Linear first order, Smart transformation $y(x) = xv(x)$ makes it separable
Kamke 116	✓	0.346	121	✓	0.184	86	To Do
Kamke 117	✓	0.152	21	✓	0.094	20	To Do
Kamke 118	✓	0.064	13	✓	0.047	8	To Do
Kamke 119	✓	0.089	17	✓	0.055	14	To Do
Kamke 120	✓	0.096	20	✓	0.143	17	To Do
Kamke 121	✗	0	0	✗	0	0	To Do
Kamke 122	✓	0.27	21	✓	0.337	16	To Do
Kamke 123	✓	0.105	19	✓	0.046	44	To Do
Kamke 124	✓	0.086	16	✓	0.024	12	To Do
Kamke 125	✓	0.172	16	✓	0.049	14	To Do
Kamke 126	✓	0.155	115	✓	0.018	29	To Do
Kamke 127	✓	0.232	186	✓	0.091	39	To Do
Kamke 128	✓	3.193	41	✓	0.21	33	To Do
Kamke 129	✓	0.164	44	✓	0.027	33	To Do
Kamke 130	✓	0.008	21	✓	0.008	15	To Do
Kamke 131	✓	0.174	21	✓	0.158	31	To Do
Kamke 132	✓	0.08	115	✓	0.03	153	To Do
Kamke 133	✓	0.008	27	✓	0.009	16	To Do
Kamke 134	✓	0.017	27	✓	0.008	17	To Do
Kamke 135	✓	0.008	14	✓	0.005	11	To Do
Kamke 136	✓	0.069	28	✓	0.015	18	To Do
Kamke 137	✓	0.068	16	✓	0.011	14	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 138	✓	0.061	13	✓	0.031	11	To Do
Kamke 139	✓	0.199	821	✓	0.114	219	To Do
Kamke 140	✓	0.075	17	✓	0.037	20	To Do
Kamke 141	✓	0.121	67	✓	0.052	51	To Do
Kamke 142	✓	0.177	122	✓	0.067	52	To Do
Kamke 143	✓	0.09	51	✓	0.046	41	To Do
Kamke 144	✓	0.218	1787	✓	0.095	219	To Do
Kamke 145	✓	0.476	267	✓	0.085	117	To Do
Kamke 146	✓	0.646	78	✓	0.134	84	To Do
Kamke 147	✓	0.634	343	✓	0.16	178	To Do
Kamke 148	✓	0.012	30	✓	0.008	16	To Do
Kamke 149	✓	0.012	27	✓	0.009	20	To Do
Kamke 150	✓	0.01	30	✓	0.005	23	To Do
Kamke 151	✓	0.484	203	✓	0.037	85	To Do
Kamke 152	✓	0.354	40	✓	0.64	159	To Do
Kamke 153	✓	0.014	21	✓	0.011	20	To Do
Kamke 154	✓	0.013	26	✓	0.009	19	To Do
Kamke 155	✓	0.124	46	✓	0.07	14	To Do
Kamke 156	✓	0.075	21	✓	0.017	20	To Do
Kamke 157	✓	0.174	158	✓	0.168	231	To Do
Kamke 158	✓	0.142	31	✓	0.014	22	To Do
Kamke 159	✓	0.089	22	✓	0.104	13	To Do
Kamke 160	✓	0.113	27	✓	0.022	21	To Do
Kamke 161	✓	0.014	53	✓	0.011	27	To Do
Kamke 162	✓	0.421	133	✓	0.152	58	To Do

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Table 3 – continued from previous page

#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 163	✓	0.093	43	✓	0.048	27	To Do
Kamke 164	✓	0.125	131	✓	0.149	100	To Do
Kamke 165	✓	0.112	22	✓	0.019	17	To Do
Kamke 166	✓	0.136	71	✓	0.112	97	To Do
Kamke 167	✓	0.078	35	✓	0.029	20	To Do
Kamke 168	✓	0.176	234	✓	0.123	140	To Do
Kamke 169	✓	1.886	149	✓	0.128	153	To Do
Kamke 170	✓	0.075	43	✓	0.014	23	To Do
Kamke 171	✓	0.067	17	✓	0.01	15	To Do
Kamke 172	✓	0.077	35	✓	0.201	26	To Do
Kamke 173	✓	0.086	29	✓	0.037	27	To Do
Kamke 174	✓	0.008	17	✓	0.003	13	To Do
Kamke 175	✓	0.018	24	✓	0.015	20	To Do
Kamke 176	✓	0.181	82	✓	0.073	30	To Do
Kamke 177	✓	0.104	22	✓	0.021	17	To Do
Kamke 178	✓	0.144	49	✓	0.079	61	To Do
Kamke 179	✓	0.555	2833	✓	0.108	112	To Do
Kamke 180	✓	0.282	132	✓	0.055	58	To Do
Kamke 181	✓	0.085	347	✓	0.054	28	To Do
Kamke 182	✓	0.199	96	✓	0.101	18	To Do
Kamke 183	✓	0.014	22	✓	0.008	18	To Do
Kamke 184	✓	1.096	704	✓	0.328	493	To Do
Kamke 185	✓	0.373	123	✓	0.033	63	To Do
Kamke 186	✓	0.208	19	✓	0.036	17	To Do
Kamke 187	✓	0.202	328	✓	0.057	60	To Do

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#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 188	✗	0	0	✓	0.023	32	To Do
Kamke 189	✓	0.343	91	✓	0.266	60	To Do
Kamke 190	✓	0.096	173	✓	0.006	29	To Do
Kamke 191	✓	0.113	39	✓	0.016	16	To Do
Kamke 192	✓	0.665	168	✓	0.014	36	To Do
Kamke 193	✓	0.014	16	✓	0.006	14	To Do
Kamke 194	✓	0.166	98	✓	0.021	23	To Do
Kamke 195	✓	0.147	27	✓	0.089	28	To Do
Kamke 196	✓	0.204	53	✓	0.106	29	To Do
Kamke 197	✓	0.106	98	✓	0.09	237	To Do
Kamke 198	✓	0.02	15	✓	0.012	13	To Do
Kamke 199	✓	0.203	15	✓	0.142	102	To Do
Kamke 200	✓	0.109	77	✓	0.053	53	To Do
Kamke 201	✓	0.134	39	✓	0.038	23	To Do
Kamke 202	✗	0	0	✗	0	0	To Do
Kamke 203	✗	0	0	✗	0	0	To Do
Kamke 204	✓	0.075	70	✓	0.217	92	To Do
Kamke 205	✗	0	0	✗	0	0	To Do
Kamke 206	✗	0	0	✗	0	0	To Do
Kamke 207	✓	0.084	47	✓	0.016	37	To Do
Kamke 208	✓	0.208	118	✓	0.05	106	To Do
Kamke 209	✓	0.105	84	✓	0.01	21	To Do
Kamke 210	✓	0.074	47	✓	0.016	33	To Do
Kamke 211	✓	0.203	41	✓	0.03	31	To Do
Kamke 212	✓	0.369	95	✓	0.098	30	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 213	✓	0.099	71	✓	0.541	66	To Do
Kamke 214	✓	0.105	78	✓	0.135	48	To Do
Kamke 215	✓	0.122	80	✓	0.16	51	To Do
Kamke 216	✓	0.1	82	✓	0.151	51	To Do
Kamke 217	✓	0.018	29	✓	0.028	23	To Do
Kamke 218	✓	0.159	257	✓	0.144	57	To Do
Kamke 219	✗	0	0	✗	0	0	To Do
Kamke 220	✓	0.074	57	✓	0.018	43	To Do
Kamke 221	✓	0.018	35	✓	0.046	21	To Do
Kamke 222	✓	0.055	65	✓	0.049	32	To Do
Kamke 223	✓	0.022	55	✓	0.129	51	To Do
Kamke 224	✓	0.017	29	✓	0.045	35	To Do
Kamke 225	✓	0.016	33	✓	0.042	20	To Do
Kamke 226	✓	0.016	35	✓	0.038	21	To Do
Kamke 227	✓	0.013	107	✓	0.143	33	To Do
Kamke 228	✓	0.25	3357	✓	0.342	271	To Do
Kamke 229	✓	0.015	121	✓	0.143	32	To Do
Kamke 230	✓	0.16	98	✓	0.036	100	To Do
Kamke 231	✓	1.897	252	✓	0.185	178	To Do
Kamke 232	✓	0.07	56	✓	0.013	39	To Do
Kamke 233	✓	0.165	38	✓	0.021	30	To Do
Kamke 234	✗	0	0	✗	0	0	To Do
Kamke 235	✓	0.06	40	✓	0.044	30	To Do
Kamke 236	✓	0.12	114	✓	0.052	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	✓	0.235	192	✓	0.055	93	To Do
Kamke 239	✓	0.11	54	✓	0.141	59	To Do
Kamke 240	✓	0.095	41	✓	0.018	34	To Do
Kamke 241	✓	0.09	41	✓	0.011	33	To Do
Kamke 242	✓	0.076	60	✓	0.012	39	To Do
Kamke 243	✓	11.544	487	✓	0.111	391	To Do
Kamke 244	✓	11.483	484	✓	0.095	391	To Do
Kamke 245	✓	0.412	1453	✓	2.141	31	To Do
Kamke 246	✓	0.132	80	✓	0.053	63	To Do
Kamke 247	✓	11.406	693	✓	0.181	517	To Do
Kamke 248	✓	0.165	106	✓	0.016	75	To Do
Kamke 249	✓	3.365	115	✓	0.182	202	To Do
Kamke 250	✗	0	0	✗	0	0	To Do
Kamke 251	✓	0.121	60	✓	0.015	51	To Do
Kamke 252	✓	11.015	819	✓	0.597	1338	To Do
Kamke 253	✗	0	0	✗	0	0	To Do
Kamke 254	✓	0.124	99	✓	0.022	59	To Do
Kamke 255	✓	3.279	30	✓	0.179	74	To Do
Kamke 256	✓	0.017	21	✓	0.046	31	To Do
Kamke 257	✓	0.368	39	✓	0.081	98	To Do
Kamke 258	✓	0.098	43	✓	0.018	33	To Do
Kamke 259	✓	0.236	50	✓	0.021	51	To Do
Kamke 260	✓	0.114	80	✓	0.023	59	To Do
Kamke 261	✓	0.713	32	✓	0.102	18	To Do
Kamke 262	✓	0.156	101	✓	0.232	65	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 263	✓	0.085	181	✓	0.115	179	To Do
Kamke 264	✓	0.377	680	✓	0.536	37	To Do
Kamke 265	✗	0	0	✗	0	0	To Do
Kamke 266	✗	0	0	✓	1.454	65	To Do
Kamke 267	✓	0.273	36	✓	0.024	32	To Do
Kamke 268	✓	0.157	146	✓	0.053	118	To Do
Kamke 269	✗	0	0	✗	0	0	To Do
Kamke 270	✓	0.125	327	✓	0.026	319	To Do
Kamke 271	✓	0.262	370	✓	0.163	352	To Do
Kamke 272	✓	0.116	42	✓	0.119	43	To Do
Kamke 273	✓	0.164	297	✓	0.023	401	To Do
Kamke 274	✓	0.166	411	✓	0.031	657	To Do
Kamke 275	✓	0.111	18	✓	0.067	30	To Do
Kamke 276	✓	0.138	61	✓	0.049	47	To Do
Kamke 277	✓	0.109	53	✓	0.278	41	To Do
Kamke 278	✓	0.172	39	✓	0.042	28	To Do
Kamke 279	✓	0.615	107	✓	0.119	116	To Do
Kamke 280	✓	0.122	21	✓	0.046	24	To Do
Kamke 281	✓	0.182	75	✓	0.049	55	To Do
Kamke 282	✓	0.214	2129	✓	0.292	71	To Do
Kamke 283	✓	0.337	477	✓	0.059	407	To Do
Kamke 284	✓	0.104	59	✓	0.097	21	To Do
Kamke 285	✓	0.158	402	✓	0.064	432	To Do
Kamke 286	✓	0.24	3501	✓	1.16	1337	To Do
Kamke 287	✓	1.47	77	✓	0.064	56	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 288	✓	0.208	534	✓	0.03	579	To Do
Kamke 289	✓	0.182	115	✓	0.028	115	To Do
Kamke 290	✓	0.452	831	✓	0.099	1388	To Do
Kamke 291	✓	0.85	39	✓	0.125	50	To Do
Kamke 292	✓	36.117	1716	✓	0.035	115	To Do
Kamke 293	✓	0.169	661	✓	0.27	35	To Do
Kamke 294	✓	0.227	71	✓	0.068	112	To Do
Kamke 295	✓	0.193	31	✓	0.15	29	To Do
Kamke 296	✓	0.496	102	✓	0.563	135	To Do
Kamke 297	✓	0.15	216	✓	0.322	29	To Do
Kamke 298	✓	0.093	72	✓	0.014	73	To Do
Kamke 299	✓	0.109	371	✓	0.167	276	To Do
Kamke 300	✓	0.081	99	✓	0.017	83	To Do
Kamke 301	✓	0.126	64	✓	0.174	25	To Do
Kamke 302	✓	0.094	70	✓	0.112	133	To Do
Kamke 303	✓	0.109	25	✓	0.149	34	To Do
Kamke 304	✓	0.339	44	✓	0.207	44	To Do
Kamke 305	✓	0.18	1277	✓	0.015	21	To Do
Kamke 306	✓	0.136	201	✓	0.27	231	To Do
Kamke 307	✓	0.216	149	✓	0.032	125	To Do
Kamke 308	✓	0.008	55	✓	0.012	37	To Do
Kamke 309	✓	0.098	151	✓	0.028	113	To Do
Kamke 310	✓	0.171	159	✓	0.084	125	To Do
Kamke 311	✓	0.216	2201	✓	0.077	50	To Do
Kamke 312	✓	0.609	204	✓	1.06	240	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 313	✓	0.323	537	✓	0.174	748	To Do
Kamke 314	✓	0.14	188	✓	0.041	158	To Do
Kamke 315	✓	0.302	368	✓	0.072	376	To Do
Kamke 316	✓	0.131	48	✓	0.043	53	To Do
Kamke 317	✓	0.323	23	✓	0.103	29	To Do
Kamke 318	✓	0.222	4284	✓	0.015	28	To Do
Kamke 319	✓	0.148	302	✓	0.025	35	To Do
Kamke 320	✓	0.117	76	✓	0.073	78	To Do
Kamke 321	✓	0.33	47	✓	0.143	42	To Do
Kamke 322	✓	0.275	2077	✓	0.022	29	To Do
Kamke 323	✓	0.251	463	✓	0.094	630	To Do
Kamke 324	✓	0.115	723	✓	0.097	815	To Do
Kamke 325	✓	0.187	139	✓	0.541	124	To Do
Kamke 326	✓	3.126	13289	✓	0.408	160	To Do
Kamke 327	✓	0.338	669	✓	0.128	583	To Do
Kamke 328	✓	0.24	42	✓	0.165	33	To Do
Kamke 329	✓	0.666	102	✓	0.316	71	To Do
Kamke 330	✓	0.103	52	✓	0.03	22	To Do
Kamke 331	✗	0	0	✓	0.185	78	To Do
Kamke 332	✓	0.208	34	✓	0.012	33	To Do
Kamke 333	✓	0.307	72	✓	0.076	32	To Do
Kamke 334	✓	0.1	39	✓	0.023	19	To Do
Kamke 335	✓	0.136	75	✓	0.01	50	To Do
Kamke 336	✓	0.25	53	✓	0.027	41	To Do
Kamke 337	✓	0.215	161	✓	0.061	28	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 338	✓	72.682	17681	✓	0.547	128	To Do
Kamke 339	✓	0.337	27	✓	0.138	27	To Do
Kamke 340	✗	0	0	✗	0	0	To Do
Kamke 341	✓	0.232	33	✓	0.055	33	To Do
Kamke 342	✓	0.526	163	✓	0.039	17	To Do
Kamke 343	✓	0.125	35	✓	0.063	27	To Do
Kamke 344	✓	0.17	23	✓	0.028	19	To Do
Kamke 345	✓	0.159	35	✓	0.071	36	To Do
Kamke 346	✓	0.366	24	✓	0.214	19	To Do
Kamke 347	✓	0.292	32	✓	0.135	12	To Do
Kamke 348	✓	0.17	17	✓	0.079	15	To Do
Kamke 349	✓	0.22	15	✓	0.029	17	To Do
Kamke 350	✓	0.55	53	✓	0.772	226	To Do
Kamke 351	✓	0.468	61	✓	0.383	55	To Do
Kamke 352	✓	0.521	43	✓	0.345	33	To Do
Kamke 353	✓	0.077	14	✓	0.069	12	To Do
Kamke 354	✓	0.169	145	✓	0.054	108	To Do
Kamke 355	✓	0.158	17	✓	0.083	15	To Do
Kamke 356	✓	0.225	21	✓	0.089	19	To Do
Kamke 357	✓	0.505	35	✓	0.499	13	To Do
Kamke 358	✓	0.143	29	✓	0.081	11	To Do
Kamke 359	✓	0.302	45	✓	0.05	28	To Do
Kamke 360	✓	4.297	369	✓	0.273	48	To Do
Kamke 361	✓	0.631	31	✓	0.174	22	To Do
Kamke 362	✓	0.318	23	✓	0.207	23	To Do

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#	Mathematica			Maple			note on solution
	solved	cpu	leaf	solved	cpu	leaf	
Kamke 363	✓	0.343	33	✓	0.066	35	To Do
Kamke 364	✓	0.423	31	✓	0.086	23	To Do
Kamke 365	✓	0.349	156	✓	0.289	42	To Do
Kamke 366	✓	0.264	91	✓	0.074	45	To Do
Kamke 367	✗	0	0	✗	0	0	To Do
Kamke 368	✓	1.256	795	✗	0	0	To Do
Kamke 369	✓	0.078	107	✓	0.103	68	To Do
Kamke 370	✗	0	0	✗	0	0	To Do
Kamke 371	✓	0.041	37	✓	0.059	20	To Do
Kamke 372	✓	0.003	27	✓	0.041	232	To Do
Kamke 373	✓	0.296	185	✓	0.186	49	To Do
Kamke 374	✓	0.07	73	✓	0.026	85	To Do
Kamke 375	✓	0.03	71	✓	0.023	49	To Do
Kamke 376	✓	0.237	110	✓	0.499	219	To Do
Kamke 377	✓	0.003	19	✓	0.013	24	To Do
Kamke 378	✓	0.003	18	✓	0.015	20	To Do
Kamke 379	✓	0.003	18	✓	0.014	22	To Do
Kamke 380	✓	0.384	1757	✓	0.037	619	To Do
Kamke 381	✓	0.384	1757	✓	0.029	579	To Do
Kamke 382	✓	0.172	201	✓	0.025	146	To Do
Kamke 383	✓	5.204	1118	✗	0	0	To Do
Kamke 384	✓	1.292	183	✓	0.022	50	To Do
Kamke 385	✓	0.681	6217	✓	0.505	169	To Do
Kamke 386	✓	0.172	119	✓	0.743	27	To Do
Kamke 387	✓	1.174	190	✓	1.509	115	To Do

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#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 388	✓	0.497	53	✓	0.193	223	To Do
Kamke 389	✓	0.064	57	✓	2.411	71	To Do
Kamke 390	✓	1.514	142	✓	1.137	281	To Do
Kamke 391	✓	0.007	29	✓	0.075	22	To Do
Kamke 392	✓	0.197	27	✓	1.759	50	To Do
Kamke 393	✓	0.085	31	✓	0.351	77	To Do
Kamke 394	✗	0	0	✓	10.447	109	To Do
Kamke 395	✗	0	0	✗	0	0	To Do
Kamke 396	✓	0.045	29	✓	0.043	20	To Do
Kamke 397	✓	0.411	143	✓	0.802	128	To Do
Kamke 398	✓	1.281	258	✓	2.519	137	To Do
Kamke 399	✓	0.003	20	✓	0.015	22	To Do
Kamke 400	✓	0.252	135	✓	0.339	74	To Do
Kamke 401	✓	0.301	1093	✓	0.128	580	To Do
Kamke 402	✓	5.098	1211	✓	0.243	101	To Do
Kamke 403	✓	0.237	116	✓	3.179	197	To Do
Kamke 404	✓	2.408	795	✓	0.527	389	To Do
Kamke 405	✓	0.843	53	✓	0.607	378	To Do
Kamke 406	✓	0.623	49	✓	0.21	262	To Do
Kamke 407	✓	0.023	51	✓	0.052	39	To Do
Kamke 408	✓	0.149	97	✓	0.117	73	To Do
Kamke 409	✓	30.549	66	✓	0.218	63	To Do
Kamke 410	✓	30.708	80	✓	0.24	64	To Do
Kamke 411	✓	0.136	99	✓	0.117	65	To Do
Kamke 412	✓	0.394	3229	✓	0.195	146	To Do

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#	Mathematica			Maple			note on solution
	solved	cpu	leaf	solved	cpu	leaf	
Kamke 413	✗	0	0	✓	0.289	269	To Do
Kamke 414	✓	0.089	107	✓	0.293	269	To Do
Kamke 415	✓	0.311	25	✓	0.554	95	To Do
Kamke 416	✓	1.204	383	✓	0.155	136	To Do
Kamke 417	✓	0.343	48	✓	0.026	35	To Do
Kamke 418	✓	0.623	220	✓	0.093	42	To Do
Kamke 419	✓	1.052	9073	✓	0.059	109	To Do
Kamke 420	✓	0.281	777	✓	0.189	689	To Do
Kamke 421	✓	0.037	27	✓	0.054	32	To Do
Kamke 422	✓	0.072	81	✓	0.062	30	To Do
Kamke 423	✓	0.075	59	✓	0.06	44	To Do
Kamke 424	✓	0.478	223	✓	0.333	193	To Do
Kamke 425	✓	0.199	59	✓	0.029	45	To Do
Kamke 426	✓	0.393	40	✓	0.029	51	To Do
Kamke 427	✗	0	0	✓	0.033	60	To Do
Kamke 428	✗	0	0	✓	0.128	66	To Do
Kamke 429	✓	0.03	26	✓	0.092	72	To Do
Kamke 430	✓	238.665	478	✓	1.861	1602	To Do
Kamke 431	✓	0.045	81	✓	0.343	62	To Do
Kamke 432	✓	1.116	64	✓	7.237	242	To Do
Kamke 433	✓	1.14	22	✓	0.405	34	To Do
Kamke 434	✓	0.038	27	✓	0.033	7	To Do
Kamke 435	✓	0.062	61	✓	0.544	22	To Do
Kamke 436	✓	0.052	26	✓	7.527	61	To Do
Kamke 437	✓	0.325	47	✓	0.077	36	To Do

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#	Mathematica			Maple			note on solution
	solved	cpu	leaf	solved	cpu	leaf	
Kamke 438	✓	0.01	21	✓	0.04	17	To Do
Kamke 439	✓	0.035	49	✓	0.102	33	To Do
Kamke 440	✓	0.01	19	✓	0.036	15	To Do
Kamke 441	✓	0.081	65	✓	4.88	83	To Do
Kamke 442	✓	0.012	28	✓	0.04	21	To Do
Kamke 443	✓	2.678	10121	✓	6.924	221	To Do
Kamke 444	✓	0.38	75	✓	4.902	120	To Do
Kamke 445	✓	0.058	49	✓	0.043	35	To Do
Kamke 446	✓	0.325	95	✓	0.038	57	To Do
Kamke 447	✓	0.01	89	✓	0.091	33	To Do
Kamke 448	✓	0.093	349	✗	0	0	To Do
Kamke 449	✓	0.013	27	✓	0.038	23	To Do
Kamke 450	✓	0.313	26	✓	0.647	51	To Do
Kamke 451	✗	0	0	✓	0.14	78	To Do
Kamke 452	✓	0.016	23	✗	0	0	To Do
Kamke 453	✓	0.557	327	✓	3.111	229	To Do
Kamke 454	✓	0.377	241	✓	0.219	106	To Do
Kamke 455	✓	0.871	123	✓	0.61	66	To Do
Kamke 456	✓	0.122	421	✓	0.731	33	To Do
Kamke 457	✓	0.243	118	✓	3.827	45	To Do
Kamke 458	✓	0.021	120	✓	0.154	90	To Do
Kamke 459	✓	2.635	271	✓	0.949	65	To Do
Kamke 460	✗	0	0	✗	0	0	To Do
Kamke 461	✗	0	0	✗	0	0	To Do
Kamke 462	✓	0.021	43	✓	0.086	27	To Do

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#	Mathematica			Maple			note on solution
	solved	cpu	leaf	solved	cpu	leaf	
Kamke 463	✓	0.03	47	✓	0.205	50	To Do
Kamke 464	✓	0.091	52	✓	1.348	70	To Do
Kamke 465	✗	0	0	✓	0.15	210	To Do
Kamke 466	✓	1.787	433	✓	1.161	71	To Do
Kamke 467	✓	0.262	226	✓	0.135	148	To Do
Kamke 468	✓	3.463	609	✓	0.167	181	To Do
Kamke 469	✓	0.265	157	✓	0.321	264	To Do
Kamke 470	✓	0.239	143	✓	0.653	87	To Do
Kamke 471	✓	0.008	47	✓	0.036	33	To Do
Kamke 472	✓	0.532	269	✓	1.28	121	To Do
Kamke 473	✓	0.308	165	✓	1.549	71	To Do
Kamke 474	✓	0.161	135	✓	1.702	152	To Do
Kamke 475	✓	0.099	57	✓	1.365	67	To Do
Kamke 476	✓	0.234	143	✓	0.666	87	To Do
Kamke 477	✓	0.214	146	✓	0.643	622	To Do
Kamke 478	✓	0.312	223	✓	0.318	88	To Do
Kamke 479	✓	7.04	552	✓	0.338	929	To Do
Kamke 480	✗	0	0	✗	0	0	To Do
Kamke 481	✓	0.012	49	✓	0.041	35	To Do
Kamke 482	✗	0	0	✗	0	0	To Do
Kamke 483	✓	0.195	71	✓	0.054	103	To Do
Kamke 484	✓	0.162	81	✓	0.051	115	To Do
Kamke 485	✗	0	0	✗	0	0	To Do
Kamke 486	✓	0.052	117	✓	0.29	54	To Do
Kamke 487	✓	0.28	157	✓	0.585	100	To Do

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#	Mathematica			Maple			note on solution
	solved	cpu	leaf	solved	cpu	leaf	
Kamke 488	✓	0.309	85	✓	0.69	111	To Do
Kamke 489	✗	0	0	✓	3.863	1101	To Do
Kamke 490	✓	0.423	70	✓	0.682	145	To Do
Kamke 491	✓	0.747	79	✓	0.933	195	To Do
Kamke 492	✓	0.096	97	✓	1.348	122	To Do
Kamke 493	✓	7.081	553	✓	1.255	111	To Do
Kamke 494	✓	0.112	49	✓	0.217	161	To Do
Kamke 495	✓	0.147	83	✓	2.266	61	To Do
Kamke 496	✓	18.318	17831	✓	0.473	130	To Do
Kamke 497	✓	0.158	76	✓	0.722	203	To Do
Kamke 498	✓	0.081	107	✓	0.763	99	To Do
Kamke 499	✓	0.364	212	✓	0.238	189	To Do
Kamke 500	✓	0.977	100	✓	1.035	220	To Do
Kamke 501	✓	21.185	913	✓	6.934	215	To Do
Kamke 502	✓	1.17	100	✓	0.669	195	To Do
Kamke 503	✗	0	0	✗	0	0	To Do
Kamke 504	✓	0.36	51	✓	1.09	247	To Do
Kamke 505	✓	0.11	73	✓	0.048	52	To Do
Kamke 506	✗	0	0	✗	0	0	To Do
Kamke 507	✗	0	0	✗	0	0	To Do
Kamke 508	✓	2.073	88	✓	3.458	60	To Do
Kamke 509	✓	0.283	34	✓	1.246	212	To Do
Kamke 510	✗	0	0	✗	0	0	To Do
Kamke 511	✓	1.321	229	✓	8.44	199	To Do
Kamke 512	✓	4.947	713	✓	6.143	135	To Do

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#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 513	✓	0.079	81	✓	4.842	1134	To Do
Kamke 514	✓	9.588	605	✓	0.703	87	To Do
Kamke 515	✓	1.74	1922	✓	1.444	113	To Do
Kamke 516	✓	0.442	253	✓	2.997	72	To Do
Kamke 517	✓	0.458	283	✓	3.031	157	To Do
Kamke 518	✓	0.51	236	✓	0.786	126	To Do
Kamke 519	✓	0.606	353	✓	2.348	197	To Do
Kamke 520	✓	184.965	1590	✓	0.192	249	To Do
Kamke 521	✓	0.003	14	✓	0.023	33	To Do
Kamke 522	✓	0.003	20	✓	0.03	44	To Do
Kamke 523	✓	145.347	392	✓	0.116	231	To Do
Kamke 524	✗	0	0	✓	0.095	243	To Do
Kamke 525	✓	0.068	135	✓	0.139	122	To Do
Kamke 526	✓	0.078	45	✓	0.09	32	To Do
Kamke 527	✓	0.015	20	✓	0.773	43	To Do
Kamke 528	✓	0.615	398	✓	0.334	86	To Do
Kamke 529	✓	38.505	1758	✓	0.148	1251	To Do
Kamke 530	✓	7.88	648	✓	0.099	424	To Do
Kamke 531	✗	0	0	✗	0	0	To Do
Kamke 532	✗	0	0	✓	0.293	874	To Do
Kamke 533	✓	0.018	40	✓	0.042	76	To Do
Kamke 534	✓	0.049	114	✓	0.134	84	To Do
Kamke 535	✓	0.036	49	✓	0.127	51	To Do
Kamke 536	✓	0.011	64	✓	0.149	52	To Do
Kamke 537	✗	0	0	✓	5.886	250	To Do

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#	Mathematica			Maple			note on solution
	solved	cpu	leaf	solved	cpu	leaf	
Kamke 538	✓	9.273	110	✓	1.213	1625	To Do
Kamke 539	✓	0.027	45	✓	0.059	32	To Do
Kamke 540	✓	0.029	69	✓	0.164	109	To Do
Kamke 541	✓	0.03	39	✓	0.519	103	To Do
Kamke 542	✓	0.029	20	✓	0.508	107	To Do
Kamke 543	✓	0.023	55	✗	0	0	To Do
Kamke 544	✓	0.075	22	✓	0.994	4201	To Do
Kamke 545	✓	0.69	323	✓	0.23	144	To Do
Kamke 546	✓	0.029	113	✓	0.122	171	To Do
Kamke 547	✓	2.118	490	✓	0.444	118	To Do
Kamke 548	✓	0.992	479	✓	0.844	250	To Do
Kamke 549	✓	0.233	216	✓	0.526	553	To Do
Kamke 550	✓	0.718	488	✓	0.762	60	To Do
Kamke 551	✓	0.125	86	✓	1.402	55	To Do
Kamke 552	✓	0.033	41	✓	0.384	43	To Do
Kamke 553	✓	0.254	52	✓	0.416	36	To Do
Kamke 554	✓	0.096	49	✓	1.385	32	To Do
Kamke 555	✓	0.33	119	✓	0.09	15	To Do
Kamke 556	✓	4.484	60	✓	0.463	581	To Do
Kamke 557	✓	0.029	39	✓	0.203	74	To Do
Kamke 558	✓	0.591	327	✓	0.275	223	To Do
Kamke 559	✓	0.304	212	✓	0.382	215	To Do
Kamke 560	✓	13.75	110	✓	1.16	1120	To Do
Kamke 561	✓	1.665	2138	✓	3.048	50	To Do
Kamke 562	✗	0	0	✓	0.463	3306	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 563	✓	0.136	59	✓	0.606	66	To Do
Kamke 564	✓	0.055	28	✓	0.116	32	To Do
Kamke 565	✓	0.017	25	✓	0.303	17	To Do
Kamke 566	✓	0.031	31	✓	0.069	16	To Do
Kamke 567	✓	0.042	42	✓	0.081	18	To Do
Kamke 568	✓	0.052	28	✓	0.219	32	To Do
Kamke 569	✓	0.089	59	✓	0.676	147	To Do
Kamke 570	✓	1.469	51	✓	0.09	30	To Do
Kamke 571	✓	0.094	116	✓	2.505	169	To Do
Kamke 572	✗	0	0	✗	0	0	To Do
Kamke 573	✓	0.022	42	✓	0.09	24	To Do
Kamke 574	✓	0.025	102	✓	0.131	41	To Do
Kamke 575	✗	0	0	✗	0	0	To Do
Kamke 576	✗	0	0	✗	0	0	To Do
Kamke 577	✓	0.273	243	✓	0.102	28	To Do
Kamke 578	✓	0.161	100	✓	0.12	22	To Do
Kamke 579	✓	0.248	514	✓	0.18	35	To Do
Kamke 580	✓	0.249	203	✓	0.221	31	To Do
Kamke 581	✓	0.234	144	✓	0.216	32	To Do
Kamke 582	✓	0.259	142	✓	0.28	30	To Do
Kamke 583	✓	0.217	126	✓	0.209	31	To Do
Kamke 584	✓	0.285	115	✓	0.244	35	To Do
Kamke 585	✓	0.21	205	✓	2.681	120	To Do
Kamke 586	✓	0.538	975	✓	0.356	39	To Do
Kamke 587	✓	0.224	123	✓	0.224	29	To Do

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#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 588	✓	0.193	113	✓	0.247	53	To Do
Kamke 589	✓	0.227	245	✓	0.441	38	To Do
Kamke 590	✓	0.228	94	✓	0.207	28	To Do
Kamke 591	✓	0.456	253	✓	0.565	108	To Do
Kamke 592	✓	0.493	241	✓	0.262	33	To Do
Kamke 593	✓	0.386	221	✓	0.391	35	To Do
Kamke 594	✓	0.34	236	✓	0.351	67	To Do
Kamke 595	✓	0.325	204	✓	0.302	72	To Do
Kamke 596	✓	0.255	156	✓	0.194	26	To Do
Kamke 597	✓	0.359	130	✓	0.601	37	To Do
Kamke 598	✓	0.162	37	✓	0.086	29	To Do
Kamke 599	✓	0.154	95	✓	0.144	57	To Do
Kamke 600	✓	0.266	246	✓	0.351	38	To Do
Kamke 601	✓	0.24	190	✓	0.207	61	To Do
Kamke 602	✓	0.539	167	✓	0.384	33	To Do
Kamke 603	✓	0.316	117	✓	0.24	27	To Do
Kamke 604	✓	0.378	143	✓	0.176	30	To Do
Kamke 605	✓	0.45	145	✓	0.295	29	To Do
Kamke 606	✓	0.567	361	✓	0.759	34	To Do
Kamke 607	✓	0.225	121	✓	0.121	22	To Do
Kamke 608	✓	0.41	274	✓	0.351	40	To Do
Kamke 609	✓	0.262	117	✓	0.32	22	To Do
Kamke 610	✓	0.079	25	✓	0.079	20	To Do
Kamke 611	✓	0.27	191	✓	0.14	28	To Do
Kamke 612	✓	0.355	199	✓	0.207	27	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 613	✓	0.287	226	✓	0.174	23	To Do
Kamke 614	✓	0.373	177	✓	0.482	60	To Do
Kamke 615	✓	0.272	77	✓	0.192	26	To Do
Kamke 616	✓	0.491	177	✓	0.143	26	To Do
Kamke 617	✓	0.951	615	✓	0.527	47	To Do
Kamke 618	✓	0.205	25	✓	1.332	34	To Do
Kamke 619	✓	0.674	330	✓	0.532	81	To Do
Kamke 620	✓	0.762	210	✓	0.492	37	To Do
Kamke 621	✓	0.058	445	✓	1.143	59	To Do
Kamke 622	✓	0.23	140	✓	0.443	77	To Do
Kamke 623	✓	0.138	77	✓	0.85	49	To Do
Kamke 624	✓	29.419	9837	✓	113.177	46	To Do
Kamke 625	✓	0.287	56	✓	0.305	53	To Do
Kamke 626	✓	0.15	88	✓	1.107	115	To Do
Kamke 627	✓	0.841	25	✓	0.378	35	To Do
Kamke 628	✓	0.158	38	✓	0.424	23	To Do
Kamke 629	✓	0.85	47	✓	0.279	62	To Do
Kamke 630	✓	0.35	101	✓	1.156	98	To Do
Kamke 631	✓	0.177	38	✓	0.427	23	To Do
Kamke 632	✓	0.142	65	✓	1.093	54	To Do
Kamke 633	✓	0.157	85	✓	2.969	52	To Do
Kamke 634	✓	0.204	33	✓	0.523	26	To Do
Kamke 635	✓	0.165	33	✓	0.417	22	To Do
Kamke 636	✓	0.104	24	✓	0.793	19	To Do
Kamke 637	✓	11.766	59	✓	0.346	84	To Do

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#	Mathematica			Maple			note on solution
	solved	cpu	leaf	solved	cpu	leaf	
Kamke 638	✗	0	0	✓	0.36	35	To Do
Kamke 639	✗	0	0	✓	0.381	50	To Do
Kamke 640	✗	0	0	✓	0.442	47	To Do
Kamke 641	✓	0.199	35	✓	0.455	26	To Do
Kamke 642	✓	0.163	105	✓	0.414	286	To Do
Kamke 643	✓	0.167	31	✓	0.44	22	To Do
Kamke 644	✓	0.338	34	✓	0.742	27	To Do
Kamke 645	✓	0.085	20	✓	0.629	14	To Do
Kamke 646	✓	0.283	35	✓	0.62	23	To Do
Kamke 647	✓	0.361	115	✓	0.492	460	To Do
Kamke 648	✓	0.502	128	✓	1.187	41	To Do
Kamke 649	✓	0.25	37	✓	0.495	27	To Do
Kamke 650	✓	0.383	109	✓	0.491	28	To Do
Kamke 651	✓	0.092	16	✓	0.237	13	To Do
Kamke 652	✓	1.223	101	✓	0.269	27	To Do
Kamke 653	✓	0.5	94	✓	0.441	24	To Do
Kamke 654	✓	0.272	37	✓	0.631	23	To Do
Kamke 655	✓	15.308	82	✓	2.632	66	To Do
Kamke 656	✓	0.089	20	✓	0.222	15	To Do
Kamke 657	✓	0.245	37	✓	0.39	26	To Do
Kamke 658	✓	0.409	41	✓	0.616	28	To Do
Kamke 659	✓	0.679	164	✓	0.672	41	To Do
Kamke 660	✓	0.394	109	✓	0.46	29	To Do
Kamke 661	✓	0.633	164	✓	0.492	39	To Do
Kamke 662	✓	0.247	37	✓	0.485	26	To Do

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#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 663	✓	1.526	101	✓	0.251	27	To Do
Kamke 664	✓	0.544	94	✓	0.393	25	To Do
Kamke 665	✓	0.436	41	✓	1.067	28	To Do
Kamke 666	✓	0.141	29	✓	0.821	24	To Do
Kamke 667	✓	0.908	90	✓	0.709	82	To Do
Kamke 668	✓	0.577	78	✓	1.809	58	To Do
Kamke 669	✓	0.711	264	✓	0.505	72	To Do
Kamke 670	✓	0.484	62	✓	0.467	70	To Do
Kamke 671	✓	0.347	192	✓	0.298	237	To Do
Kamke 672	✓	1.904	4512	✓	0.327	36	To Do
Kamke 673	✓	0.293	23	✓	0.45	17	To Do
Kamke 674	✓	0.586	91	✓	0.637	27	To Do
Kamke 675	✓	0.317	48	✓	0.232	37	To Do
Kamke 676	✓	0.433	144	✓	0.763	43	To Do
Kamke 677	✓	0.173	80	✓	0.25	48	To Do
Kamke 678	✓	0.288	101	✓	0.656	37	To Do
Kamke 679	✓	0.146	59	✓	0.201	37	To Do
Kamke 680	✓	0.713	89	✓	0.615	28	To Do
Kamke 681	✓	0.195	84	✓	0.258	45	To Do
Kamke 682	✓	0.232	39	✓	0.367	28	To Do
Kamke 683	✓	1.074	84	✓	0.368	114	To Do
Kamke 684	✓	0.101	20	✓	6.488	30	To Do
Kamke 685	✓	0.137	87	✓	0.289	48	To Do
Kamke 686	✓	11.76	68	✓	0.301	85	To Do
Kamke 687	✓	0.153	130	✓	0.303	39	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 688	✓	0.351	82	✓	0.22	42	To Do
Kamke 689	✓	0.329	60	✓	0.184	25	To Do
Kamke 690	✓	0.515	105	✓	0.657	40	To Do
Kamke 691	✓	0.287	21	✓	0.636	17	To Do
Kamke 692	✓	0.101	20	✓	5.813	30	To Do
Kamke 693	✓	0.303	146	✓	0.338	40	To Do
Kamke 694	✓	0.406	66	✓	0.688	30	To Do
Kamke 695	✓	0.212	34	✓	0.162	39	To Do
Kamke 696	✓	0.91	51	✓	0.275	32	To Do
Kamke 697	✓	0.26	114	✓	0.28	40	To Do
Kamke 698	✓	0.253	108	✓	0.265	34	To Do
Kamke 699	✓	0.337	101	✓	0.66	36	To Do
Kamke 700	✓	0.146	76	✓	0.205	62	To Do
Kamke 701	✓	1.813	88	✓	8.244	71	To Do
Kamke 702	✓	2.524	37	✓	0.24	35	To Do
Kamke 703	✓	0.44	101	✓	0.612	44	To Do
Kamke 704	✓	8.186	66	✓	0.283	38	To Do
Kamke 705	✓	0.138	30	✓	0.767	24	To Do
Kamke 706	✓	36.171	610	✓	1.133	65	To Do
Kamke 707	✓	4.91	1391	✓	0.988	105	To Do
Kamke 708	✓	0.347	89	✗	0	0	To Do
Kamke 709	✓	2.77	217	✓	0.358	39	To Do
Kamke 710	✓	1.157	38	✓	5.291	31	To Do
Kamke 711	✓	0.186	28	✓	0.274	31	To Do
Kamke 712	✓	0.446	105	✓	0.668	38	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 713	✓	0.091	649	✓	0.656	86	To Do
Kamke 714	✓	1.35	162	✓	0.362	96	To Do
Kamke 715	✓	0.472	104	✓	0.686	39	To Do
Kamke 716	✓	2.693	133	✓	0.442	37	To Do
Kamke 717	✓	0.554	106	✓	0.684	33	To Do
Kamke 718	✓	0.271	127	✓	0.184	44	To Do
Kamke 719	✓	0.365	49	✓	0.338	34	To Do
Kamke 720	✓	2.935	314	✓	0.264	48	To Do
Kamke 721	✓	0.106	27	✓	0.127	19	To Do
Kamke 722	✓	20.549	490	✓	1.11	70	To Do
Kamke 723	✓	0.209	663	✓	0.253	856	To Do
Kamke 724	✓	13.98	422	✓	0.092	18	To Do
Kamke 725	✓	0.317	19	✓	1.03	25	To Do
Kamke 726	✓	0.059	625	✓	0.546	83	To Do
Kamke 727	✓	0.43	29	✓	0.392	25	To Do
Kamke 728	✓	0.35	72	✓	1.191	50	To Do
Kamke 729	✓	0.291	327	✓	0.292	404	To Do
Kamke 730	✗	0	0	✓	1.75	41	To Do
Kamke 731	✓	0.35	47	✓	0.29	42	To Do
Kamke 732	✓	0.678	116	✓	0.665	43	To Do
Kamke 733	✓	12.358	73	✗	0	0	To Do
Kamke 734	✓	0.246	37	✓	0.298	39	To Do
Kamke 735	✓	11.491	573	✓	0.216	78	To Do
Kamke 736	✓	0.209	31	✓	0.188	43	To Do
Kamke 737	✓	0.025	36	✓	0.246	29	To Do

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#	Mathematica			Maple			note on solution
	solved	cpu	leaf	solved	cpu	leaf	
Kamke 738	✓	0.468	1347	✓	0.869	1054	To Do
Kamke 739	✓	0.291	39	✓	0.275	35	To Do
Kamke 740	✓	0.111	74	✓	0.221	72	To Do
Kamke 741	✓	2.109	175	✓	1.548	246	To Do
Kamke 742	✓	3.079	3913	✓	1.654	239	To Do
Kamke 743	✗	0	0	✓	0.483	296	To Do
Kamke 744	✓	0.157	510	✓	0.329	621	To Do
Kamke 745	✓	11.368	546	✓	0.275	78	To Do
Kamke 746	✗	0	0	✓	0.443	232	To Do
Kamke 747	✓	2.871	88	✓	0.31	75	To Do
Kamke 748	✓	0.308	285	✓	0.278	404	To Do
Kamke 749	✓	0.148	126	✓	0.25	192	To Do
Kamke 750	✓	0.329	72	✓	1.254	49	To Do
Kamke 751	✓	0.169	30	✓	0.299	26	To Do
Kamke 752	✗	0	0	✓	1.881	723	To Do
Kamke 753	✓	0.164	41	✓	0.313	38	To Do
Kamke 754	✓	0.11	47	✓	0.127	26	To Do
Kamke 755	✓	0.279	2633	✓	0.24	44	To Do
Kamke 756	✓	0.144	95	✓	0.112	37	To Do
Kamke 757	✓	0.026	36	✓	0.209	26	To Do
Kamke 758	✓	0.776	459	✓	0.385	41	To Do
Kamke 759	✗	0	0	✓	0.621	305	To Do
Kamke 760	✓	0.974	112	✓	2.979	136	To Do
Kamke 761	✓	0.022	33	✓	0.217	18	To Do
Kamke 762	✓	0.162	26	✓	0.251	22	To Do

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#	Mathematica			Maple			note on solution
	solved	cpu	leaf	solved	cpu	leaf	
Kamke 763	✓	0.139	22	✓	0.282	14	To Do
Kamke 764	✓	0.158	50	✓	0.294	36	To Do
Kamke 765	✓	0.343	138	✓	0.464	106	To Do
Kamke 766	✓	0.308	129	✓	0.327	89	To Do
Kamke 767	✓	0.025	38	✓	0.211	26	To Do
Kamke 768	✓	1.027	66	✓	0.161	26	To Do
Kamke 769	✗	0	0	✓	0.537	251	To Do
Kamke 770	✓	0.209	705	✓	0.165	1105	To Do
Kamke 771	✓	0.031	46	✓	0.472	84	To Do
Kamke 772	✓	0.144	21	✓	0.297	18	To Do
Kamke 773	✓	0.152	61	✓	1.102	48	To Do
Kamke 774	✓	0.027	45	✓	0.348	51	To Do
Kamke 775	✓	0.156	943	✓	0.228	44	To Do
Kamke 776	✓	0.368	133	✓	0.294	96	To Do
Kamke 777	✓	0.205	39	✓	0.392	51	To Do
Kamke 778	✓	0.14	95	✓	0.106	37	To Do
Kamke 779	✓	0.138	57	✓	0.255	50	To Do
Kamke 780	✓	0.135	15	✓	0.825	27	To Do
Kamke 781	✓	0.473	82	✓	1.228	61	To Do
Kamke 782	✓	3.96	115	✓	2.435	96	To Do
Kamke 783	✓	4.024	88	✓	0.242	75	To Do
Kamke 784	✓	19.743	27	✓	8.236	24	To Do
Kamke 785	✓	7.448	29	✓	46.047	24	To Do
Kamke 786	✓	3.704	61	✓	0.273	33	To Do
Kamke 787	✓	19.007	488	✓	1.281	191	To Do

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Table 3 – continued from previous page

#	Mathematica			Maple			note on solution
	solved	cpu	leaf	solved	cpu	leaf	
Kamke 788	✓	24.838	348	✓	0.279	108	To Do
Kamke 789	✓	58.397	120	✗	0	0	To Do
Kamke 790	✓	81.899	127	✗	0	0	To Do
Kamke 791	✓	7.099	110	✓	8.148	306	To Do
Kamke 792	✓	2.727	157	✓	0.726	112	To Do
Kamke 793	✓	9.959	399	✓	0.3	32	To Do
Kamke 794	✓	0.19	67	✓	1.075	32	To Do
Kamke 795	✓	0.359	111	✓	0.13	37	To Do
Kamke 796	✓	12.136	102	✓	3.665	143	To Do
Kamke 797	✓	1.861	349	✓	0.597	168	To Do
Kamke 798	✓	0.582	27	✓	0.361	30	To Do
Kamke 799	✓	1.105	126	✓	0.429	147	To Do
Kamke 800	✓	0.348	128	✓	0.121	41	To Do
Kamke 801	✓	0.31	126	✓	0.174	63	To Do
Kamke 802	✓	0.121	101	✓	0.249	27	To Do
Kamke 803	✓	0.301	637	✓	0.994	65	To Do
Kamke 804	✓	0.61	43	✓	0.983	38	To Do
Kamke 805	✓	0.161	37	✓	1.074	42	To Do
Kamke 806	✓	0.417	22	✓	0.606	22	To Do
Kamke 807	✗	0	0	✓	0.684	43	To Do
Kamke 808	✓	1.41	149	✓	0.134	45	To Do
Kamke 809	✓	0.285	128	✓	0.128	41	To Do
Kamke 810	✓	0.104	40	✓	0.042	16	To Do
Kamke 811	✓	1.75	33	✓	2.413	32	To Do
Kamke 812	✓	0.367	78	✓	0.476	30	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 813	✓	0.548	93	✓	0.852	40	To Do
Kamke 814	✓	0.139	72	✓	0.115	38	To Do
Kamke 815	✓	13.352	99	✓	2.956	168	To Do
Kamke 816	✓	0.216	74	✓	0.795	190	To Do
Kamke 817	✓	0.543	63	✓	0.79	27	To Do
Kamke 818	✓	0.184	34	✓	0.244	34	To Do
Kamke 819	✓	0.28	65	✓	0.468	30	To Do
Kamke 820	✓	0.522	63	✓	0.783	27	To Do
Kamke 821	✓	0.207	2093	✓	0.188	27	To Do
Kamke 822	✓	0.288	32	✓	0.144	25	To Do
Kamke 823	✓	0.404	39	✓	0.35	38	To Do
Kamke 824	✓	0.194	68	✓	1.25	61	To Do
Kamke 825	✓	0.398	148	✓	0.262	48	To Do
Kamke 826	✓	0.547	70	✓	2.256	51	To Do
Kamke 827	✓	0.255	221	✓	0.446	49	To Do
Kamke 828	✓	0.393	56	✓	0.896	54	To Do
Kamke 829	✓	0.415	74	✓	0.523	34	To Do
Kamke 830	✓	0.444	37	✓	0.373	38	To Do
Kamke 831	✓	2.941	145	✓	0.35	35	To Do
Kamke 832	✓	2.195	2497	✓	0.237	31	To Do
Kamke 833	✓	0.246	221	✓	0.436	49	To Do
Kamke 834	✓	0.63	90	✓	2.606	60	To Do
Kamke 835	✗	0	0	✗	0	0	To Do
Kamke 836	✓	9.564	379	✓	1.131	73	To Do
Kamke 837	✗	0	0	✗	0	0	To Do

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Table 3 – continued from previous page

#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 838	✓	0.149	31	✓	0.154	25	To Do
Kamke 839	✓	0.262	28	✓	0.222	19	To Do
Kamke 840	✓	0.273	30	✓	0.179	19	To Do
Kamke 841	✓	1.024	236	✓	0.548	97	To Do
Kamke 842	✓	0.206	186	✓	0.149	43	To Do
Kamke 843	✓	0.195	198	✓	0.167	43	To Do
Kamke 844	✓	10.482	386	✓	1.039	97	To Do
Kamke 845	✓	3.125	266	✓	0.255	44	To Do
Kamke 846	✓	0.881	365	✓	0.341	40	To Do
Kamke 847	✓	0.792	103	✓	0.468	34	To Do
Kamke 848	✓	0.182	157	✓	0.572	27	To Do
Kamke 849	✓	0.733	102	✓	0.529	33	To Do
Kamke 850	✓	0.222	1485	✓	1.357	32	To Do
Kamke 851	✓	0.338	145	✓	0.322	42	To Do
Kamke 852	✓	0.335	145	✓	0.322	42	To Do
Kamke 853	✓	0.215	76	✓	0.12	63	To Do
Kamke 854	✗	0	0	✓	0.941	51	To Do
Kamke 855	✗	0	0	✓	0.946	51	To Do
Kamke 856	✓	0.617	103	✓	0.533	65	To Do
Kamke 857	✓	0.655	107	✓	0.493	32	To Do
Kamke 858	✓	0.334	145	✓	0.296	42	To Do
Kamke 859	✓	0.824	105	✓	0.386	63	To Do
Kamke 860	✓	0.36	33	✓	1.783	29	To Do
Kamke 861	✓	1.456	158	✓	0.274	26	To Do
Kamke 862	✗	0	0	✓	0.346	27	To Do

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Table 3 – continued from previous page

#	Mathematica			Maple			note on solution
	solved	cpu	leaf	solved	cpu	leaf	
Kamke 863	✓	0.169	30	✓	12.839	38	To Do
Kamke 864	✓	0.284	137	✓	0.145	162	To Do
Kamke 865	✓	0.304	87	✓	0.865	23	To Do
Kamke 866	✓	0.649	117	✓	0.522	37	To Do
Kamke 867	✓	0.184	77	✓	0.257	30	To Do
Kamke 868	✓	0.153	79	✓	0.213	28	To Do
Kamke 869	✓	0.032	42	✓	0.245	37	To Do
Kamke 870	✓	1.486	35	✓	0.822	30	To Do
Kamke 871	✓	0.229	22	✓	0.115	26	To Do
Kamke 872	✓	0.045	215	✓	0.125	49	To Do
Kamke 873	✓	0.491	53	✓	0.328	50	To Do
Kamke 874	✓	0.216	101	✓	0.158	40	To Do
Kamke 875	✓	0.239	497	✓	0.453	73	To Do
Kamke 876	✓	0.19	135	✓	0.151	41	To Do
Kamke 877	✓	0.159	49	✓	0.114	73	To Do
Kamke 878	✓	0.344	130	✓	19.054	75	To Do
Kamke 879	✓	0.313	239	✓	0.477	55	To Do
Kamke 880	✓	0.409	131	✓	0.234	41	To Do
Kamke 881	✓	0.161	75	✓	0.118	77	To Do
Kamke 882	✓	0.226	119	✓	0.163	41	To Do
Kamke 883	✓	1.133	164	✓	1.094	352	To Do
Kamke 884	✓	0.543	71	✓	1.041	107	To Do
Kamke 885	✗	0	0	✗	0	0	To Do
Kamke 886	✓	0.169	82	✓	0.133	42	To Do
Kamke 887	✓	0.225	106	✓	0.152	72	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 888	✓	0.153	78	✓	0.168	79	To Do
Kamke 889	✗	0	0	✓	1.159	49	To Do
Kamke 890	✓	0.172	103	✓	0.9	34	To Do
Kamke 891	✓	0.167	135	✓	0.165	56	To Do
Kamke 892	✓	2.077	1283	✓	2.487	40	To Do
Kamke 893	✓	0.161	80	✓	0.109	41	To Do
Kamke 894	✗	0	0	✗	0	0	To Do
Kamke 895	✓	0.214	81	✓	0.169	79	To Do
Kamke 896	✓	0.274	106	✓	0.795	63	To Do
Kamke 897	✓	0.202	79	✓	0.175	87	To Do
Kamke 898	✓	0.18	106	✓	0.125	87	To Do
Kamke 899	✓	0.189	106	✓	0.138	47	To Do
Kamke 900	✓	0.168	381	✓	0.246	48	To Do
Kamke 901	✓	0.52	33	✓	1.353	30	To Do
Kamke 902	✓	0.191	295	✓	0.394	183	To Do
Kamke 903	✓	0.11	19	✓	0.21	48	To Do
Kamke 904	✓	0.096	23	✓	0.203	64	To Do
Kamke 905	✓	0.215	85	✓	0.117	46	To Do
Kamke 906	✓	0.121	326	✓	0.323	37	To Do
Kamke 907	✓	0.232	22	✓	0.286	20	To Do
Kamke 908	✓	1.128	1269	✓	0.54	1742	To Do
Kamke 909	✗	0	0	✓	1.097	84	To Do
Kamke 910	✓	0.184	98	✓	0.109	42	To Do
Kamke 911	✓	0.716	106	✓	1.2	30	To Do
Kamke 912	✓	1.291	201	✗	0	0	To Do

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Table 3 – continued from previous page

#	Mathematica			Maple			note on solution
	solved	cpu	leaf	solved	cpu	leaf	
Kamke 913	✓	0.78	716	✓	0.236	43	To Do
Kamke 914	✓	1.232	401	✓	2.659	71	To Do
Kamke 915	✓	0.851	724	✓	0.23	43	To Do
Kamke 916	✗	0	0	✓	1.006	73	To Do
Kamke 917	✗	0	0	✓	0.977	38	To Do
Kamke 918	✓	0.461	720	✓	1.14	41	To Do
Kamke 919	✗	0	0	✓	0.283	61	To Do
Kamke 920	✓	0.403	301	✗	0	0	To Do
Kamke 921	✓	0.238	92	✓	0.579	30	To Do
Kamke 922	✓	1.156	882	✓	0.351	47	To Do
Kamke 923	✓	1.379	432	✓	0.552	36	To Do
Kamke 924	✓	0.249	80	✓	0.334	46	To Do
Kamke 925	✓	2.037	228	✓	0.472	38	To Do
Kamke 926	✓	0.19	128	✓	0.168	67	To Do
Kamke 927	✓	0.546	112	✓	0.23	68	To Do
Kamke 928	✓	1.193	23	✓	0.453	20	To Do
Kamke 929	✓	0.826	683	✓	0.199	42	To Do
Kamke 930	✓	1.451	39	✓	0.537	36	To Do
Kamke 931	✓	0.173	80	✓	0.086	73	To Do
Kamke 932	✓	4.762	4323	✓	0.266	54	To Do
Kamke 933	✓	0.234	99	✓	0.127	39	To Do
Kamke 934	✓	0.28	102	✓	0.243	39	To Do
Kamke 935	✓	30.104	248	✓	0.922	55	To Do
Kamke 936	✓	0.259	99	✓	0.248	39	To Do
Kamke 937	✓	0.261	124	✓	0.155	79	To Do

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#	Mathematica			Maple			note on solution
	solved	cpu	leaf	solved	cpu	leaf	
Kamke 938	✓	0.226	108	✓	0.14	39	To Do
Kamke 939	✓	0.539	136	✓	0.207	70	To Do
Kamke 940	✓	0.204	80	✓	0.118	63	To Do
Kamke 941	✓	0.459	53	✓	0.17	35	To Do
Kamke 942	✓	4.64	349	✓	0.792	43	To Do
Kamke 943	✓	0.511	53	✓	0.155	40	To Do
Kamke 944	✓	1.638	233	✓	0.227	47	To Do
Kamke 945	✓	1.292	213	✓	0.229	41	To Do
Kamke 946	✓	0.724	150	✓	0.178	85	To Do
Kamke 947	✓	0.399	30	✓	0.382	44	To Do
Kamke 948	✓	0.582	39	✓	0.386	68	To Do
Kamke 949	✓	0.209	76	✓	0.12	81	To Do
Kamke 950	✓	0.49	141	✓	0.227	42	To Do
Kamke 951	✓	0.395	140	✓	0.221	41	To Do
Kamke 952	✓	0.347	341	✓	0.527	62	To Do
Kamke 953	✗	0	0	✓	1.082	145	To Do
Kamke 954	✓	0.357	115	✓	0.177	53	To Do
Kamke 955	✓	0.322	112	✓	0.143	101	To Do
Kamke 956	✓	1.177	28	✓	0.491	79	To Do
Kamke 957	✓	1.16	28	✓	0.455	79	To Do
Kamke 958	✓	0.355	82	✓	0.128	40	To Do
Kamke 959	✓	0.226	20	✓	0.353	15	To Do
Kamke 960	✓	0.172	14	✓	0.372	11	To Do
Kamke 961	✓	5.388	813	✓	0.553	45	To Do
Kamke 962	✓	4.786	1191	✓	1.257	79	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 963	✓	0.458	108	✓	0.257	39	To Do
Kamke 964	✓	4.342	264	✓	2.414	80	To Do
Kamke 965	✓	0.283	29	✓	0.434	26	To Do
Kamke 966	✓	0.733	292	✓	0.81	50	To Do
Kamke 967	✓	0.487	151	✓	0.236	91	To Do
Kamke 968	✓	0.353	30	✓	0.597	22	To Do
Kamke 969	✓	0.239	19	✓	0.666	15	To Do
Kamke 970	✓	0.598	66	✓	0.808	181	To Do
Kamke 971	✓	0.205	157	✓	1.2	86	To Do
Kamke 972	✓	0.024	32	✓	0.226	27	To Do
Kamke 973	✓	0.36	146	✓	1.173	134	To Do
Kamke 974	✓	0.084	39	✓	0.091	57	To Do
Kamke 975	✓	0.087	47	✓	0.082	59	To Do
Kamke 976	✓	0.164	101	✓	1.179	59	To Do
Kamke 977	✓	0.356	139	✓	0.828	122	To Do
Kamke 978	✓	0.143	60	✓	0.887	71	To Do
Kamke 979	✓	0.102	37	✓	0.21	57	To Do
Kamke 980	✓	0.118	43	✓	0.041	35	To Do
Kamke 981	✓	0.147	49	✓	0.046	41	To Do
Kamke 982	✓	0.354	132	✓	1.261	145	To Do
Kamke 983	✓	0.503	238	✓	1.48	188	To Do
Kamke 984	✓	6.333	428	✓	1.402	40	To Do
Kamke 985	✓	0.329	103	✓	0.15	43	To Do
Kamke 986	✓	0.116	44	✓	0.062	36	To Do
Kamke 987	✓	0.156	41	✓	0.235	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 988	✓	0.194	107	✓	0.169	29	To Do
Kamke 989	✓	0.16	56	✓	0.263	29	To Do
Kamke 990	✓	0.205	58	✓	1.428	44	To Do
Kamke 991	✓	0.175	104	✓	0.178	29	To Do
Kamke 992	✓	0.121	43	✓	0.22	25	To Do
Kamke 993	✓	1.436	73	✓	0.164	35	To Do
Kamke 994	✓	0.21	198	✓	0.164	43	To Do
Kamke 995	✓	0.175	17	✓	0.099	14	To Do
Kamke 996	✗	0	0	✓	0.127	15	To Do
Kamke 997	✓	0.116	18	✓	0.063	16	To Do
Kamke 998	✓	0.483	27	✓	0.398	27	To Do
Kamke 999	✓	0.186	24	✓	0.154	36	To Do
Kamke 1000	✓	0.994	351	✓	0.194	19	To Do
Kamke 1001	✓	0.003	12	✓	0.003	9	Linear second order, homogeneous, constant coefficient. First problem. Direct integration
Kamke 1002	✓	0.004	16	✓	0.003	13	Linear second order, homogeneous, constant coefficient. Direct method
Kamke 1003	✓	0.104	45	✓	0.079	26	Linear second order, Non-homogeneous, constant coefficient. variation of parameters
Kamke 1004	✓	0.093	47	✓	0.06	27	Linear second order, Non-homogeneous, constant coefficient. variation of parameters

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1005	✓	0.427	1163	✓	0.109	82	Linear second order, Non-homogeneous, constant coefficient. variation of parameters
Kamke 1006	✓	0.004	20	✓	0.01	15	Linear second order, homogeneous, constant coefficient
Kamke 1007	✓	0.094	135	✓	0.02	26	Linear second order, Non-homogeneous, constant coefficient. variation of parameters
Kamke 1008	✓	0.034	48	✓	0.147	41	To Do
Kamke 1009	✓	0.004	28	✓	0.027	21	To Do
Kamke 1010	✓	0.005	46	✓	0.054	31	Linear second order, homogeneous, variable coefficient. Airy ODE with plus sign, series solution
Kamke 1011	✓	0.005	33	✓	0.05	17	Linear second order, homogeneous, variable coefficient. power series solution
Kamke 1012	✓	0.007	47	✓	0.49	29	To Do
Kamke 1013	✓	0.011	43	✓	0.067	22	To Do
Kamke 1014	✓	0.023	170	✓	1.077	63	To Do
Kamke 1015	✗	0	0	✗	0	0	To Do
Kamke 1016	✓	0.109	312	✓	2.377	91	To Do
Kamke 1017	✓	0.019	46	✓	0.042	17	To Do
Kamke 1018	✓	0.016	55	✓	0.52	39	To Do
Kamke 1019	✗	0	0	✗	0	0	To Do
Kamke 1020	✓	0.568	180	✓	1.243	58	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1021	✓	0.024	44	✓	1.376	39	To Do
Kamke 1022	✓	0.019	28	✓	2.273	21	To Do
Kamke 1023	✓	0.009	44	✓	2.24	29	To Do
Kamke 1024	✓	0.131	84	✓	0.448	30	To Do
Kamke 1025	✓	0.912	615	✓	0.988	102	To Do
Kamke 1026	✗	0	0	✗	0	0	To Do
Kamke 1027	✓	0.754	235	✓	3.557	69	To Do
Kamke 1028	✗	0	0	✗	0	0	To Do
Kamke 1029	✗	0	0	✓	0.281	22	To Do
Kamke 1030	✗	0	0	✗	0	0	To Do
Kamke 1031	✗	0	0	✗	0	0	To Do
Kamke 1032	✗	0	0	✓	0.252	48	To Do
Kamke 1033	✓	0.013	37	✓	0.051	27	Linear second order, homogeneous, variable coefficient. smart substitution turns it to second order with constant coefficient
Kamke 1034	✓	0.009	20	✓	0.052	15	Linear second order, homogeneous, variable coefficient. smart substitution turns it to second order with constant coefficient
Kamke 1035	✓	0.005	58	✓	0.077	41	To Do
Kamke 1036	✓	0.131	209	✓	0.214	124	To Do
Kamke 1037	✓	0.024	101	✓	0.426	64	To Do
Kamke 1038	✗	0	0	✗	0	0	To Do
Kamke 1039	✓	0.01	47	✓	0.034	25	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1040	✓	0.042	53	✓	0.065	33	To Do
Kamke 1041	✓	0.009	55	✓	0.343	41	To Do
Kamke 1042	✓	0.007	61	✓	0.334	41	To Do
Kamke 1043	✓	0.111	69	✓	0.511	42	Linear second order, homogeneous, variable coefficient. power series solution
Kamke 1044	✓	0.006	39	✓	0.33	35	To Do
Kamke 1045	✓	0.038	39	✓	0.036	21	To Do
Kamke 1046	✓	0.006	31	✓	0.345	31	To Do
Kamke 1047	✓	0.01	27	✓	0.05	16	Linear second order, homogeneous, variable coefficient. power series solution
Kamke 1048	✓	0.009	45	✓	0.348	37	To Do
Kamke 1049	✓	0.053	109	✓	0.275	66	To Do
Kamke 1050	✓	0.009	23	✓	0.049	14	To Do
Kamke 1051	✓	0.019	44	✓	0.057	27	To Do
Kamke 1052	✓	0.014	78	✓	0.411	58	To Do
Kamke 1053	✓	0.024	57	✓	0.092	35	To Do
Kamke 1054	✓	0.038	172	✓	0.121	98	To Do
Kamke 1055	✓	0.139	421	✓	0.451	262	To Do
Kamke 1056	✓	0.04	41	✓	0.091	48	To Do
Kamke 1057	✓	0.049	56	✓	0.866	50	To Do
Kamke 1058	✓	0.053	56	✓	2.211	29	To Do
Kamke 1059	✓	0.053	39	✓	0.106	56	To Do
Kamke 1060	✓	0.026	83	✓	2.393	81	To Do
Kamke 1061	✓	0.07	70	✓	0.133	28	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1062	✓	0.025	35	✓	0.047	19	To Do
Kamke 1063	✓	0.051	28	✓	0.26	34	To Do
Kamke 1064	✓	0.464	1400	✓	0.36	125	To Do
Kamke 1065	✓	0.146	114	✓	0.977	60	To Do
Kamke 1066	✓	0.026	18	✓	0.178	15	To Do
Kamke 1067	✓	0.023	21	✓	0.038	17	To Do
Kamke 1068	✓	0.115	20	✓	1.13	45	To Do
Kamke 1069	✓	0.027	19	✓	0.333	15	To Do
Kamke 1070	✓	0.255	143	✓	0.68	60	To Do
Kamke 1071	✓	0.062	44	✓	0.289	24	To Do
Kamke 1072	✗	0	0	✗	0	0	To Do
Kamke 1073	✗	0	0	✗	0	0	To Do
Kamke 1074	✗	0	0	✓	0.1	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	✓	0.036	76	✓	0.075	33	To Do
Kamke 1079	✓	0.203	315	✓	0.092	37	To Do
Kamke 1080	✓	0.054	49	✓	0.871	74	To Do
Kamke 1081	✗	0	0	✗	0	0	To Do
Kamke 1082	✗	0	0	✓	0.371	74	To Do
Kamke 1083	✗	0	0	✓	0.245	31	To Do
Kamke 1084	✓	0.152	36	✓	0.178	20	To Do
Kamke 1085	✓	0.154	32	✓	0.195	24	To Do
Kamke 1086	✓	0.005	42	✓	0.023	29	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1087	✓	0.007	36	✓	0.513	33	To Do
Kamke 1088	✓	0.071	180	✓	0.534	31	To Do
Kamke 1089	✓	0.038	99	✓	0.109	58	To Do
Kamke 1090	✓	0.032	50	✓	0.089	40	To Do
Kamke 1091	✓	0.023	41	✓	0.119	35	To Do
Kamke 1092	✓	0.071	72	✓	0.146	29	To Do
Kamke 1093	✓	0.008	13	✓	0.007	10	To Do
Kamke 1094	✓	0.018	41	✓	0.009	29	To Do
Kamke 1095	✓	0.007	30	✓	0.027	23	To Do
Kamke 1096	✓	0.009	61	✓	0.406	39	To Do
Kamke 1097	✓	0.02	46	✓	0.008	31	To Do
Kamke 1098	✓	0.007	41	✓	0.035	27	To Do
Kamke 1099	✗	0	0	✓	0.33	25	To Do
Kamke 1100	✓	0.016	44	✓	0.059	23	Linear second order, non-homogeneous, variable coefficient. Singularity, Frobenius series solution and also using smart transformation. Variation of parameters.
Kamke 1101	✓	0.02	52	✓	0.084	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	✓	0.006	42	✓	0.208	33	Linear second order, homogeneous, variable coefficient. Use smart transformation to convert to Emden-Fowler then use Power series solution
Kamke 1103	✓	0.021	64	✓	0.008	33	To Do
Kamke 1104	✓	0.029	104	✓	0.054	41	To Do
Kamke 1105	✓	0.015	64	✓	0.075	39	To Do
Kamke 1106	✓	0.039	441	✓	0.799	71	To Do
Kamke 1107	✓	0.023	40	✓	0.323	30	To Do
Kamke 1108	✓	0.028	37	✓	0.31	26	To Do
Kamke 1109	✓	0.132	45	✓	0.109	33	To Do
Kamke 1110	✓	0.034	36	✓	0.114	23	To Do
Kamke 1111	✓	0.019	20	✓	0.047	13	Linear second order, homogeneous, variable coefficient. Solved using Laplace transform instead of series method
Kamke 1112	✓	0.023	30	✓	0.053	22	To Do
Kamke 1113	✓	0.013	24	✓	0.254	17	To Do
Kamke 1114	✓	0.038	39	✓	0.079	34	To Do
Kamke 1115	✓	0.05	76	✓	2.98	47	To Do
Kamke 1116	✓	0.045	43	✓	0.303	31	To Do
Kamke 1117	✓	0.071	107	✓	0.349	82	To Do
Kamke 1118	✓	0.065	51	✓	0.374	39	To Do
Kamke 1119	✓	0.122	77	✓	0.106	20	To Do
Kamke 1120	✓	0.043	168	✓	0.449	109	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1121	✓	0.189	41	✓	0.053	23	To Do
Kamke 1122	✓	0.201	57	✓	0.849	28	To Do
Kamke 1123	✓	0.011	91	✓	0.147	45	To Do
Kamke 1124	✓	0.065	65	✓	0.378	29	To Do
Kamke 1125	✓	0.107	84	✓	0.064	36	To Do
Kamke 1126	✗	0	0	✓	0.061	19	To Do
Kamke 1127	✓	0.029	36	✓	0.092	21	To Do
Kamke 1128	✓	0.021	40	✓	0.403	32	To Do
Kamke 1129	✓	0.061	42	✓	0.057	30	To Do
Kamke 1130	✓	0.009	46	✓	0.081	31	To Do
Kamke 1131	✓	0.01	58	✓	0.425	33	To Do
Kamke 1132	✓	0.008	48	✓	0.417	29	To Do
Kamke 1133	✓	0.056	52	✓	0.272	37	To Do
Kamke 1134	✓	0.075	78	✓	0.122	21	To Do
Kamke 1135	✓	0.008	27	✓	0.037	17	To Do
Kamke 1136	✓	0.019	30	✓	0.059	16	To Do
Kamke 1137	✓	0.074	74	✓	0.142	25	To Do
Kamke 1138	✓	0.023	38	✓	0.258	26	To Do
Kamke 1139	✓	0.01	74	✓	0.37	37	To Do
Kamke 1140	✓	0.037	190	✓	0.098	66	To Do
Kamke 1141	✓	0.119	79	✓	0.066	55	To Do
Kamke 1142	✓	0.037	108	✓	0.885	53	To Do
Kamke 1143	✓	0.026	93	✓	0.545	57	To Do
Kamke 1144	✓	0.028	88	✓	0.448	60	To Do
Kamke 1145	✓	0.262	386	✓	0.492	248	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1146	✓	0.006	18	✓	0.009	15	To Do
Kamke 1147	✓	0.006	18	✓	0.009	15	To Do
Kamke 1148	✓	0.008	77	✓	0.054	35	To Do
Kamke 1149	✓	0.048	212	✓	0.012	45	To Do
Kamke 1150	✓	0.007	53	✓	0.161	27	To Do
Kamke 1151	✓	0.012	129	✓	0.192	43	To Do
Kamke 1152	✓	0.014	114	✓	0.369	53	To Do
Kamke 1153	✓	0.023	56	✓	0.067	31	To Do
Kamke 1154	✓	0.015	88	✓	0.318	57	To Do
Kamke 1155	✓	0.038	225	✓	0.194	67	To Do
Kamke 1156	✓	0.085	32	✓	0.197	71	To Do
Kamke 1157	✗	0	0	✗	0	0	To Do
Kamke 1158	✓	0.163	43	✓	1.285	178	To Do
Kamke 1159	✓	0.007	24	✓	0.131	19	To Do
Kamke 1160	✓	0.007	30	✓	0.012	23	To Do
Kamke 1161	✓	0.037	78	✓	0.01	31	To Do
Kamke 1162	✓	0.042	18	✓	0.01	15	To Do
Kamke 1163	✓	0.114	72	✓	0.059	49	To Do
Kamke 1164	✓	0.016	30	✓	0.025	23	To Do
Kamke 1165	✓	0.094	26	✓	0.04	19	To Do
Kamke 1166	✓	0.011	23	✓	0.012	21	To Do
Kamke 1167	✓	0.061	326	✓	0.188	63	To Do
Kamke 1168	✓	0.007	15	✓	0.009	11	To Do
Kamke 1169	✓	0.055	236	✓	0.197	49	To Do
Kamke 1170	✓	0.016	58	✓	0.214	43	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1171	✓	0.041	142	✓	0.363	49	To Do
Kamke 1172	✓	0.063	158	✓	0.141	47	To Do
Kamke 1173	✓	0.113	74	✓	0.509	37	To Do
Kamke 1174	✓	0.009	33	✓	0.078	25	To Do
Kamke 1175	✓	0.209	38	✓	0.147	29	To Do
Kamke 1176	✓	0.015	33	✓	0.053	15	To Do
Kamke 1177	✓	0.791	141	✓	0.278	34	To Do
Kamke 1178	✓	0.038	74	✓	0.054	23	To Do
Kamke 1179	✓	0.018	38	✓	0.083	19	To Do
Kamke 1180	✓	0.065	75	✓	0.067	49	To Do
Kamke 1181	✓	0.048	37	✓	0.044	25	To Do
Kamke 1182	✓	0.012	24	✓	0.013	20	To Do
Kamke 1183	✓	0.009	27	✓	0.09	22	To Do
Kamke 1184	✓	0.007	38	✓	0.08	25	To Do
Kamke 1185	✓	0.031	67	✓	0.026	33	To Do
Kamke 1186	✓	0.014	42	✓	0.077	36	To Do
Kamke 1187	✓	0.011	99	✓	0.079	53	To Do
Kamke 1188	✓	0.156	266	✓	0.47	114	To Do
Kamke 1189	✓	0.058	445	✓	0.197	79	To Do
Kamke 1190	✓	0.024	122	✓	0.293	38	To Do
Kamke 1191	✓	0.008	110	✓	0.041	23	To Do
Kamke 1192	✓	0.078	40	✓	0.9	51	To Do
Kamke 1193	✓	0.213	44	✓	0.058	38	To Do
Kamke 1194	✓	0.107	65	✓	0.067	48	To Do
Kamke 1195	✓	0.023	80	✓	0.351	93	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1196	✓	0.028	37	✓	0.056	31	To Do
Kamke 1197	✓	0.014	78	✓	0.235	43	To Do
Kamke 1198	✓	0.039	41	✓	0.061	37	To Do
Kamke 1199	✓	0.015	41	✓	0.047	35	To Do
Kamke 1200	✓	0.016	62	✓	0.068	27	To Do
Kamke 1201	✓	0.118	44	✓	0.043	34	To Do
Kamke 1202	✓	0.012	22	✓	0.054	14	To Do
Kamke 1203	✓	0.015	124	✓	0.073	28	To Do
Kamke 1204	✓	0.018	132	✓	0.094	35	To Do
Kamke 1205	✗	0	0	✗	0	0	To Do
Kamke 1206	✓	0.09	120	✓	0.146	76	To Do
Kamke 1207	✓	0.091	294	✓	0.485	110	To Do
Kamke 1208	✓	0.045	59	✓	0.063	35	To Do
Kamke 1209	✓	0.016	67	✓	0.075	40	To Do
Kamke 1210	✓	0.206	252	✓	0.462	81	To Do
Kamke 1211	✓	0.044	68	✓	0.085	36	To Do
Kamke 1212	✗	0	0	✗	0	0	To Do
Kamke 1213	✓	0.084	54	✓	0.168	53	To Do
Kamke 1214	✓	0.222	260	✓	0.733	71	To Do
Kamke 1215	✓	0.116	664	✓	0.867	148	To Do
Kamke 1216	✗	0	0	✗	0	0	To Do
Kamke 1217	✓	0.101	30	✓	0.059	24	To Do
Kamke 1218	✓	0.102	38	✓	0.061	30	To Do
Kamke 1219	✓	0.109	218	✓	0.28	69	To Do
Kamke 1220	✓	0.043	98	✓	0.078	40	To Do

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#	Mathematica			Maple			note on solution
	solved	cpu	leaf	solved	cpu	leaf	
Kamke 1221	✓	0.026	42	✓	0.052	35	To Do
Kamke 1222	✓	0.015	30	✓	0.071	23	To Do
Kamke 1223	✓	0.015	25	✓	0.074	19	To Do
Kamke 1224	✓	0.014	30	✓	0.085	23	To Do
Kamke 1225	✓	0.021	29	✓	0.054	23	To Do
Kamke 1226	✓	0.011	30	✓	0.223	25	To Do
Kamke 1227	✓	0.025	21	✓	0.042	16	To Do
Kamke 1228	✓	0.012	82	✓	0.446	53	To Do
Kamke 1229	✓	0.029	48	✓	0.094	31	To Do
Kamke 1230	✓	0.018	82	✓	0.473	36	To Do
Kamke 1231	✓	0.058	58	✓	0.278	52	To Do
Kamke 1232	✓	8.117	6628	✓	0.419	409	To Do
Kamke 1233	✓	0.545	6628	✓	0.334	409	To Do
Kamke 1234	✓	0.061	48	✗	0	0	To Do
Kamke 1235	✓	0.036	97	✓	0.115	45	To Do
Kamke 1236	✗	0	0	✗	0	0	To Do
Kamke 1237	✓	0.012	30	✓	0.041	20	To Do
Kamke 1238	✓	0.018	36	✓	0.112	26	To Do
Kamke 1239	✓	0.01	46	✓	0.249	35	To Do
Kamke 1240	✓	0.013	18	✓	0.225	15	To Do
Kamke 1241	✓	0.014	30	✓	0.222	24	To Do
Kamke 1242	✓	0.221	68	✓	0.082	41	To Do
Kamke 1243	✓	0.024	45	✓	0.061	21	To Do
Kamke 1244	✓	0.02	42	✓	0.297	27	To Do
Kamke 1245	✓	0.016	42	✓	0.306	27	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1246	✓	0.015	42	✓	0.504	28	To Do
Kamke 1247	✓	0.166	128	✓	0.063	27	To Do
Kamke 1248	✓	0.252	238	✓	1.224	134	To Do
Kamke 1249	✓	0.127	193	✓	0.358	134	To Do
Kamke 1250	✓	0.042	41	✓	0.045	41	To Do
Kamke 1251	✓	0.027	25	✓	0.054	20	To Do
Kamke 1252	✓	0.11	151	✓	0.379	124	To Do
Kamke 1253	✓	0.02	34	✓	0.038	16	To Do
Kamke 1254	✓	0.151	69	✓	0.085	42	To Do
Kamke 1255	✓	0.66	360	✓	0.043	42	To Do
Kamke 1256	✓	0.017	26	✓	0.761	51	To Do
Kamke 1257	✓	0.031	33	✓	0.634	27	To Do
Kamke 1258	✓	0.121	146	✓	0.296	110	To Do
Kamke 1259	✓	0.099	120	✓	0.312	92	To Do
Kamke 1260	✓	0.223	65	✓	1.168	77	To Do
Kamke 1261	✓	0.451	148	✓	1.103	105	To Do
Kamke 1262	✓	0.268	88	✓	1.148	53	To Do
Kamke 1263	✓	0.423	276	✓	0.385	52	To Do
Kamke 1264	✓	0.057	23	✓	0.056	19	To Do
Kamke 1265	✓	0.037	64	✓	2.692	93	To Do
Kamke 1266	✓	0.022	22	✓	0.01	19	To Do
Kamke 1267	✓	0.395	166	✓	0.864	41	To Do
Kamke 1268	✓	0.106	50	✓	1.058	39	To Do
Kamke 1269	✓	0.069	60	✓	0.632	40	To Do
Kamke 1270	✓	1.869	58	✓	1.366	46	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1271	✓	0.01	27	✓	0.008	14	To Do
Kamke 1272	✓	0.01	32	✓	0.042	23	To Do
Kamke 1273	✓	0.013	20	✓	0.259	17	To Do
Kamke 1274	✓	0.034	38	✓	0.009	19	To Do
Kamke 1275	✓	0.028	120	✓	0.695	53	To Do
Kamke 1276	✓	0.029	55	✓	0.287	31	To Do
Kamke 1277	✓	0.022	51	✓	0.293	27	To Do
Kamke 1278	✗	0	0	✗	0	0	To Do
Kamke 1279	✓	0.119	74	✓	0.321	32	To Do
Kamke 1280	✓	0.049	52	✓	0.17	40	To Do
Kamke 1281	✓	0.016	28	✓	0.181	15	To Do
Kamke 1282	✓	0.018	39	✓	0.066	21	To Do
Kamke 1283	✓	0.069	90	✓	0.167	48	To Do
Kamke 1284	✓	0.033	47	✓	0.094	41	To Do
Kamke 1285	✓	1.195	269	✓	0.238	52	To Do
Kamke 1286	✓	0.098	101	✓	0.094	32	To Do
Kamke 1287	✓	0.015	83	✓	0.047	27	To Do
Kamke 1288	✓	0.025	47	✓	0.047	21	To Do
Kamke 1289	✓	0.117	53	✓	0.304	33	To Do
Kamke 1290	✓	0.116	103	✓	0.076	29	To Do
Kamke 1291	✓	0.064	92	✓	0.309	50	To Do
Kamke 1292	✓	0.039	42	✓	0.132	31	To Do
Kamke 1293	✓	0.254	44	✓	0.343	33	To Do
Kamke 1294	✓	0.059	44	✓	0.404	33	To Do
Kamke 1295	✓	0.184	310	✓	0.543	106	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1296	✓	0.361	356	✓	0.606	150	To Do
Kamke 1297	✓	0.026	52	✓	0.175	63	To Do
Kamke 1298	✓	0.055	162	✓	0.444	124	To Do
Kamke 1299	✓	0.016	19	✓	0.044	27	To Do
Kamke 1300	✓	0.011	41	✓	0.088	31	To Do
Kamke 1301	✓	0.025	31	✓	0.044	19	To Do
Kamke 1302	✓	0.063	243	✓	0.312	98	To Do
Kamke 1303	✓	5.19	498	✓	0.784	501	To Do
Kamke 1304	✓	0.051	50	✓	0.055	38	To Do
Kamke 1305	✓	0.077	47	✓	0.124	44	To Do
Kamke 1306	✗	0	0	✓	1.13	69	To Do
Kamke 1307	✓	0.114	54	✓	0.074	36	To Do
Kamke 1308	✓	0.014	41	✓	0.052	40	To Do
Kamke 1309	✓	0.095	84	✓	0.271	85	To Do
Kamke 1310	✓	0.017	31	✓	0.091	20	To Do
Kamke 1311	✓	0.099	63	✓	0.849	52	To Do
Kamke 1312	✓	0.017	32	✓	0.041	19	To Do
Kamke 1313	✓	0.157	87	✓	0.493	35	To Do
Kamke 1314	✓	0.143	87	✓	0.477	33	To Do
Kamke 1315	✓	0.021	44	✓	0.11	45	To Do
Kamke 1316	✓	0.072	38	✓	0.163	18	To Do
Kamke 1317	✓	0.088	38	✓	0.264	13	To Do
Kamke 1318	✓	0.21	172	✓	0.617	122	To Do
Kamke 1319	✓	0.051	60	✓	0.305	31	To Do
Kamke 1320	✓	0.072	21	✓	0.064	17	To Do

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Table 3 – continued from previous page

#	Mathematica			Maple			note on solution
	solved	cpu	leaf	solved	cpu	leaf	
Kamke 1321	✓	0.02	18	✓	0.048	15	To Do
Kamke 1322	✓	0.027	44	✓	0.052	44	To Do
Kamke 1323	✗	0	0	✓	0.045	17	To Do
Kamke 1324	✓	0.027	25	✓	0.051	18	To Do
Kamke 1325	✓	0.198	52	✓	0.648	86	To Do
Kamke 1326	✓	0.018	29	✓	0.049	22	To Do
Kamke 1327	✓	0.14	104	✓	1.524	81	To Do
Kamke 1328	✓	0.017	36	✓	0.049	27	To Do
Kamke 1329	✓	0.606	67	✓	2.505	64	To Do
Kamke 1330	✓	3.494	1175	✓	2.894	1147	To Do
Kamke 1331	✓	0.035	55	✓	0.072	19	To Do
Kamke 1332	✓	0.019	26	✓	0.045	17	To Do
Kamke 1333	✓	0.076	70	✓	0.624	45	To Do
Kamke 1334	✓	0.149	114	✓	0.505	89	To Do
Kamke 1335	✓	0.233	893	✓	0.264	57	To Do
Kamke 1336	✓	0.037	70	✓	0.059	42	To Do
Kamke 1337	✓	0.058	62	✓	0.178	27	To Do
Kamke 1338	✓	0.045	40	✓	0.055	27	To Do
Kamke 1339	✓	0.199	66	✓	0.656	76	To Do
Kamke 1340	✓	0.027	32	✓	0.049	20	To Do
Kamke 1341	✓	62.039	2924	✓	0.858	201	To Do
Kamke 1342	✓	0.08	52	✓	0.074	31	To Do
Kamke 1343	✓	0.177	73	✓	0.325	58	To Do
Kamke 1344	✓	0.48	173	✓	0.398	23	To Do
Kamke 1345	✓	0.051	52	✓	0.069	25	To Do

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#	Mathematica			Maple			note on solution
	solved	cpu	leaf	solved	cpu	leaf	
Kamke 1346	✓	0.082	37	✓	0.117	25	To Do
Kamke 1347	✓	0.083	31	✓	0.08	19	To Do
Kamke 1348	✓	0.366	34	✓	2.386	73	To Do
Kamke 1349	✓	0.103	76	✓	0.219	85	To Do
Kamke 1350	✓	0.011	25	✓	0.049	21	To Do
Kamke 1351	✓	0.016	50	✓	0.057	24	To Do
Kamke 1352	✓	0.013	89	✓	0.084	43	To Do
Kamke 1353	✓	0.864	119	✓	0.436	66	To Do
Kamke 1354	✓	0.253	108	✓	0.776	33	To Do
Kamke 1355	✓	0.258	51	✓	0.364	30	To Do
Kamke 1356	✓	0.229	90	✓	0.456	29	To Do
Kamke 1357	✓	0.511	288	✓	0.543	97	To Do
Kamke 1358	✓	0.05	89	✓	0.116	20	To Do
Kamke 1359	✓	0.082	86	✓	0.646	57	To Do
Kamke 1360	✓	0.074	68	✓	0.631	47	To Do
Kamke 1361	✓	0.377	38	✓	0.049	33	To Do
Kamke 1362	✗	0	0	✓	2.184	109	To Do
Kamke 1363	✓	0.575	236	✓	0.565	161	To Do
Kamke 1364	✓	0.122	42	✓	0.303	25	To Do
Kamke 1365	✓	0.077	104	✓	0.137	59	To Do
Kamke 1366	✓	0.019	31	✓	0.061	17	To Do
Kamke 1367	✓	0.231	229	✓	1.327	88	To Do
Kamke 1368	✓	0.022	106	✓	0.334	71	To Do
Kamke 1369	✓	0.086	106	✓	0.134	55	To Do
Kamke 1370	✓	0.022	53	✓	0.077	19	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1371	✓	0.017	48	✓	0.261	37	To Do
Kamke 1372	✓	0.264	202	✓	2.259	110	To Do
Kamke 1373	✓	0.22	113	✓	1.312	84	To Do
Kamke 1374	✓	0.024	32	✓	0.257	23	To Do
Kamke 1375	✓	0.033	54	✓	0.277	29	To Do
Kamke 1376	✓	0.034	69	✓	0.173	73	To Do
Kamke 1377	✓	0.193	163	✓	0.252	83	To Do
Kamke 1378	✓	0.038	65	✓	0.06	48	To Do
Kamke 1379	✓	0.059	99	✓	0.075	59	To Do
Kamke 1380	✓	0.204	132	✓	0.194	67	To Do
Kamke 1381	✓	0.25	589	✓	0.616	175	To Do
Kamke 1382	✓	0.481	154	✓	0.303	104	To Do
Kamke 1383	✓	0.122	50	✓	0.224	39	To Do
Kamke 1384	✓	0.027	110	✓	0.38	73	To Do
Kamke 1385	✓	0.015	78	✓	0.142	55	To Do
Kamke 1386	✓	0.071	108	✓	0.075	58	To Do
Kamke 1387	✓	0.026	50	✓	0.049	28	To Do
Kamke 1388	✓	0.239	235	✓	0.418	76	To Do
Kamke 1389	✓	0.293	217	✓	0.425	68	To Do
Kamke 1390	✓	0.029	41	✓	0.054	25	To Do
Kamke 1391	✓	0.048	27	✓	0.045	20	To Do
Kamke 1392	✓	69.354	1763961	✓	0.672	561	To Do
Kamke 1393	✓	16.308	413606	✓	0.653	299	To Do
Kamke 1394	✓	0.034	115	✓	0.263	79	To Do
Kamke 1395	✓	0.067	59	✓	0.072	39	To Do

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#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 1396	✓	0.903	211	✓	0.282	178	To Do
Kamke 1397	✓	0.05	38	✓	0.243	27	To Do
Kamke 1398	✓	0.131	72	✓	0.869	69	To Do
Kamke 1399	✓	0.034	72	✓	0.07	34	To Do
Kamke 1400	✓	0.088	60	✓	0.088	35	To Do
Kamke 1401	✓	0.009	93	✓	0.099	45	To Do
Kamke 1402	✓	0.784	86	✓	2.627	58	To Do
Kamke 1403	✗	0	0	✓	2.764	298	To Do
Kamke 1404	✓	0.015	33	✓	0.065	19	To Do
Kamke 1405	✓	0.047	77	✓	0.139	42	To Do
Kamke 1406	✓	1.559	258	✓	0.208	44	To Do
Kamke 1407	✗	0	0	✓	3.998	2603	To Do
Kamke 1408	✗	0	0	✗	0	0	To Do
Kamke 1409	✓	0.017	43	✓	0.07	39	To Do
Kamke 1410	✓	0.09	481	✓	2.284	253	To Do
Kamke 1411	✓	0.282	42	✓	0.049	27	To Do
Kamke 1412	✓	0.011	29	✓	0.039	23	To Do
Kamke 1413	✓	0.045	16	✓	0.105	12	To Do
Kamke 1414	✓	0.78	231	✓	2.059	97	To Do
Kamke 1415	✓	0.64	273	✓	0.595	36	To Do
Kamke 1416	✓	0.144	46	✓	0.666	26	To Do
Kamke 1417	✓	0.124	52	✓	0.243	31	To Do
Kamke 1418	✓	0.116	15	✓	3.459	58	To Do
Kamke 1419	✗	0	0	✓	0.608	12	To Do
Kamke 1420	✓	0.376	134	✓	2.495	123	To Do

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#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 1421	✓	0.141	81	✓	0.149	27	To Do
Kamke 1422	✓	0.077	58	✓	0.705	50	To Do
Kamke 1423	✓	0.054	70	✓	2.31	132	To Do
Kamke 1424	✓	0.188	90	✓	2.179	120	To Do
Kamke 1425	✓	0.658	236	✓	2.643	91	To Do
Kamke 1426	✓	4.526	4128	✓	2.636	549	To Do
Kamke 1427	✓	0.759	129	✓	1.82	179	To Do
Kamke 1428	✓	0.336	104	✓	2.491	183	To Do
Kamke 1429	✓	0.037	51	✓	0.065	25	To Do
Kamke 1430	✓	0.36	22	✓	1.214	85	To Do
Kamke 1431	✓	0.145	80	✓	0.478	30	To Do
Kamke 1432	✓	0.059	37	✓	0.07	22	To Do
Kamke 1433	✓	0.128	46	✓	0.128	28	To Do
Kamke 1434	✓	66.638	1596424	✓	2.995	517	To Do
Kamke 1435	✓	0.121	70	✓	0.502	38	To Do
Kamke 1436	✓	0.462	42	✓	2.26	113	To Do
Kamke 1437	✓	0.24	42	✓	0.433	29	To Do
Kamke 1438	✓	0.848	615	✓	0.966	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	✓	0.051	46	✓	0.071	30	To Do
Kamke 1443	✗	0	0	✗	0	0	To Do
Kamke 1444	✗	0	0	✓	0.038	37	To Do
Kamke 1445	✓	0.144	24	✓	0.448	20	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1446	✓	0.04	33	✓	0.062	22	To Do
Kamke 1447	✓	0.039	29	✓	0.061	20	To Do
Kamke 1448	✓	0.192	149	✓	0.219	77	To Do
Kamke 1449	✓	0.008	53	✓	0.032	47	To Do
Kamke 1450	✗	0	0	✓	0.221	1616	To Do
Kamke 1451	✓	0.014	168	✓	0.5	114	To Do
Kamke 1452	✓	0.005	54	✓	0.007	35	To Do
Kamke 1453	✓	1.021	128	✓	0.249	122	To Do
Kamke 1454	✓	0.006	79	✓	0.047	55	To Do
Kamke 1455	✓	0.02	127	✓	0.333	71	To Do
Kamke 1456	✓	0.024	183	✓	0.361	73	To Do
Kamke 1457	✗	0	0	✗	0	0	To Do
Kamke 1458	✗	0	0	✗	0	0	To Do
Kamke 1459	✗	0	0	✗	0	0	To Do
Kamke 1460	✗	0	0	✗	0	0	To Do
Kamke 1461	✗	0	0	✗	0	0	To Do
Kamke 1462	✗	0	0	✗	0	0	To Do
Kamke 1463	✗	0	0	✗	0	0	To Do
Kamke 1464	✓	0.005	34	✓	0.006	27	To Do
Kamke 1465	✓	0.083	95	✓	0.086	113	To Do
Kamke 1466	✓	0.008	46	✓	0.018	27	To Do
Kamke 1467	✓	0.004	84	✓	0.127	590	To Do
Kamke 1468	✓	0.057	57	✓	0.357	59	To Do
Kamke 1469	✓	0.012	72	✓	0.05	37	To Do
Kamke 1470	✓	2.473	64	✓	0.167	36	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1471	✓	0.079	84	✓	0.329	36	To Do
Kamke 1472	✓	0.095	88	✓	0.397	33	To Do
Kamke 1473	✗	0	0	✗	0	0	To Do
Kamke 1474	✗	0	0	✗	0	0	To Do
Kamke 1475	✓	0.024	38	✓	0.017	23	To Do
Kamke 1476	✗	0	0	✗	0	0	To Do
Kamke 1477	✓	0.129	48	✓	0.043	41	To Do
Kamke 1478	✓	0.024	104	✓	0.11	48	To Do
Kamke 1479	✓	0.108	153	✓	0.209	92	To Do
Kamke 1480	✓	0.173	93	✓	0.227	35	To Do
Kamke 1481	✓	0.374	432	✓	0.151	44	To Do
Kamke 1482	✗	0	0	✓	0.267	1616	To Do
Kamke 1483	✓	0.114	112	✓	0.239	37	To Do
Kamke 1484	✗	0	0	✗	0	0	To Do
Kamke 1485	✓	0.16	64	✓	0.281	51	To Do
Kamke 1486	✓	0.292	65	✓	0.199	51	To Do
Kamke 1487	✓	0.649	87	✓	0.589	38	To Do
Kamke 1488	✓	0.4	102	✓	0.67	135	To Do
Kamke 1489	✗	0	0	✗	0	0	To Do
Kamke 1490	✓	0.025	33	✓	0.046	18	To Do
Kamke 1491	✓	0.032	102	✓	0.258	88	To Do
Kamke 1492	✓	0.273	43	✓	0.285	39	To Do
Kamke 1493	✓	1.108	2585	✓	0.306	1033	To Do
Kamke 1494	✓	0.018	43	✓	0.125	32	To Do
Kamke 1495	✓	0.006	24	✓	0.01	16	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1496	✓	0.193	63	✓	0.046	57	To Do
Kamke 1497	✓	0.363	135	✓	0.246	77	To Do
Kamke 1498	✓	8.488	584	✓	0.254	53	To Do
Kamke 1499	✓	0.191	97	✓	0.185	25	To Do
Kamke 1500	✗	0	0	✓	0.195	55	To Do
Kamke 1501	✓	0.157	86	✓	0.188	37	To Do
Kamke 1502	✓	0.071	98	✓	0.684	104	To Do
Kamke 1503	✓	0.392	258	✓	0.13	67	To Do
Kamke 1504	✓	0.102	43	✓	0.143	18	To Do
Kamke 1505	✓	60.287	115	✓	0.996	79	To Do
Kamke 1506	✓	0.272	150	✓	0.521	43	To Do
Kamke 1507	✗	0	0	✓	1.737	1210	To Do
Kamke 1508	✓	0.618	143	✓	0.139	81	To Do
Kamke 1509	✓	0.008	34	✓	0.043	29	To Do
Kamke 1510	✓	0.035	102	✗	0	0	To Do
Kamke 1511	✓	0.048	51	✓	0.049	49	To Do
Kamke 1512	✓	0.03	29	✓	0.01	18	To Do
Kamke 1513	✓	0.072	25	✓	0.172	18	To Do
Kamke 1514	✓	0.534	102	✓	0.675	135	To Do
Kamke 1515	✗	0	0	✗	0	0	To Do
Kamke 1516	✓	260.423	15142	✓	0.337	188	To Do
Kamke 1517	✓	0.278	30686	✓	0.348	866	To Do
Kamke 1518	✓	0.229	104	✓	0.343	60	To Do
Kamke 1519	✓	0.021	65	✓	0.106	19	To Do
Kamke 1520	✗	0	0	✓	2.532	272	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1521	✓	0.047	35	✓	0.319	28	To Do
Kamke 1522	✓	0.013	44	✓	0.17	34	To Do
Kamke 1523	✓	0.262	74	✓	0.344	23	To Do
Kamke 1524	✓	0.153	96	✓	0.645	98	To Do
Kamke 1525	✓	0.326	102	✓	0.47	287	To Do
Kamke 1526	✓	130.133	27	✓	0.188	19	To Do
Kamke 1527	✓	130.113	165	✓	0.611	437	To Do
Kamke 1528	✓	0.841	72	✓	0.392	74	To Do
Kamke 1529	✓	0.078	47	✓	0.167	25	To Do
Kamke 1530	✓	0.078	35	✓	0.803	113	To Do
Kamke 1531	✗	0	0	✗	0	0	To Do
Kamke 1532	✓	0.011	103	✓	0.095	58	To Do
Kamke 1533	✓	0.012	113	✓	0.11	58	To Do
Kamke 1534	✓	0.003	24	✓	0.115	21	To Do
Kamke 1535	✓	0.321	223	✓	0.014	36	To Do
Kamke 1536	✓	0.004	76	✓	0.012	50	To Do
Kamke 1537	✓	0.925	1722	✓	0.112	67	To Do
Kamke 1538	✓	0.16	66	✓	0.371	49	To Do
Kamke 1539	✓	0.005	44	✓	0.037	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	✓	0.013	41	To Do
Kamke 1545	✓	0.598	40	✓	0.093	27	To Do

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#	Mathematica			Maple			note on solution
	solved	cpu	leaf	solved	cpu	leaf	
Kamke 1546	✓	0.498	300	✓	0.061	73	To Do
Kamke 1547	✗	0	0	✓	0.013	87	To Do
Kamke 1548	✓	0.075	50	✓	0.19	32	To Do
Kamke 1549	✓	0.011	34	✓	0.171	26	To Do
Kamke 1550	✓	2.893	270	✓	5.928	157	To Do
Kamke 1551	✓	0.292	110	✓	0.212	62	To Do
Kamke 1552	✗	0	0	✓	0.05	89	To Do
Kamke 1553	✓	0.007	29	✓	0.008	17	To Do
Kamke 1554	✓	0.008	29	✓	0.011	18	To Do
Kamke 1555	✓	0.045	156	✓	0.448	61	To Do
Kamke 1556	✓	0.008	30	✓	0.012	19	To Do
Kamke 1557	✓	0.049	146	✓	0.089	61	To Do
Kamke 1558	✓	0.117	319	✓	0.19	67	To Do
Kamke 1559	✓	0.2	100	✓	0.122	33	To Do
Kamke 1560	✓	0.006	29	✓	0.01	18	To Do
Kamke 1561	✓	2.916	400	✓	0.212	69	To Do
Kamke 1562	✓	0.809	140	✓	0.289	77	To Do
Kamke 1563	✓	1.48	232	✓	0.251	87	To Do
Kamke 1564	✓	0.989	230	✓	0.227	88	To Do
Kamke 1565	✓	0.375	242	✓	0.427	71	To Do
Kamke 1566	✓	0.448	238	✓	0.368	35	To Do
Kamke 1567	✓	0.007	30	✓	0.011	19	To Do
Kamke 1568	✓	0.009	122	✓	0.064	89	To Do
Kamke 1569	✗	0	0	✓	0.645	63	To Do
Kamke 1570	✓	0.098	470	✓	0.114	49	To Do

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#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 1571	✓	0.059	390	✓	2.208	143	To Do
Kamke 1572	✗	0	0	✓	0.659	35	To Do
Kamke 1573	✓	0.047	77	✓	0.163	41	To Do
Kamke 1574	✓	0.134	270	✓	1.268	252	To Do
Kamke 1575	✓	7.176	138	✓	0.767	638	To Do
Kamke 1576	✗	0	0	✓	0.124	67	To Do
Kamke 1577	✓	0.058	46	✓	0.11	21	To Do
Kamke 1578	✓	42.642	141	✓	0.647	89	To Do
Kamke 1579	✓	0.818	80	✓	0.978	69	To Do
Kamke 1580	✓	2.121	234	✓	0.612	154	To Do
Kamke 1581	✗	0	0	✗	0	0	To Do
Kamke 1582	✓	0.11	787	✗	0	0	To Do
Kamke 1583	✓	0.087	92	✓	0.314	40	To Do
Kamke 1584	✓	2.073	216	✓	0.187	118	To Do
Kamke 1585	✓	0.153	214	✓	0.161	679	To Do
Kamke 1586	✗	0	0	✗	0	0	To Do
Kamke 1587	✓	0.263	492	✓	0.348	154	To Do
Kamke 1588	✓	10.131	114	✓	0.127	90	To Do
Kamke 1589	✓	0.031	670	✓	8.269	4022	To Do
Kamke 1590	✗	0	0	✓	3.457	553	To Do
Kamke 1591	✓	0.03	26	✓	0.044	12	To Do
Kamke 1592	✓	0.021	14	✓	0.044	10	To Do
Kamke 1593	✗	0	0	✗	0	0	To Do
Kamke 1594	✓	0.322	373	✓	0.17	59	To Do
Kamke 1595	✗	0	0	✗	0	0	To Do

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#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 1596	✗	0	0	✗	0	0	To Do
Kamke 1597	✓	1.706	242	✓	0.078	21	To Do
Kamke 1598	✗	0	0	✗	0	0	To Do
Kamke 1599	✗	0	0	✗	0	0	To Do
Kamke 1600	✓	1.515	1017	✓	0.167	89	To Do
Kamke 1601	✗	0	0	✓	4.38	151	To Do
Kamke 1602	✓	0.118	47	✓	0.732	73	To Do
Kamke 1603	✗	0	0	✓	31.087	7543	To Do
Kamke 1604	✓	0.04	34	✓	1.542	23	To Do
Kamke 1605	✗	0	0	✓	4.166	104	To Do
Kamke 1606	✗	0	0	✗	0	0	To Do
Kamke 1607	✓	0.082	79	✓	0.379	49	To Do
Kamke 1608	✗	0	0	✗	0	0	To Do
Kamke 1609	✗	0	0	✗	0	0	To Do
Kamke 1610	✓	2.654	754	✓	0.755	92	To Do
Kamke 1611	✗	0	0	✓	0.647	57	To Do
Kamke 1612	✗	0	0	✓	4.173	57	To Do
Kamke 1613	✗	0	0	✓	0.094	27	To Do
Kamke 1614	✗	0	0	✓	0.487	33	To Do
Kamke 1615	✗	0	0	✓	12.922	91	To Do
Kamke 1616	✗	0	0	✓	0.806	63	To Do
Kamke 1617	✗	0	0	✗	0	0	To Do
Kamke 1618	✗	0	0	✓	0.915	56	To Do
Kamke 1619	✗	0	0	✗	0	0	To Do
Kamke 1620	✓	3.082	492	✓	0.322	291	To Do

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#	Mathematica			Maple			note on solution
	solved	cpu	leaf	solved	cpu	leaf	
Kamke 1621	✓	8.612	990	✓	3.976	108	To Do
Kamke 1622	✗	0	0	✓	1.328	817	To Do
Kamke 1623	✗	0	0	✗	0	0	To Do
Kamke 1624	✗	0	0	✓	1.872	131	To Do
Kamke 1625	✗	0	0	✗	0	0	To Do
Kamke 1626	✗	0	0	✓	0.454	48	To Do
Kamke 1627	✗	0	0	✓	0.991	58	To Do
Kamke 1628	✗	0	0	✗	0	0	To Do
Kamke 1629	✗	0	0	✓	0.173	38	To Do
Kamke 1630	✓	7.193	3227	✓	0.946	783	To Do
Kamke 1631	✗	0	0	✓	0.303	38	To Do
Kamke 1632	✓	0.048	46	✓	0.45	23	To Do
Kamke 1633	✗	0	0	✓	1.227	97	To Do
Kamke 1634	✗	0	0	✗	0	0	To Do
Kamke 1635	✓	0.538	104	✓	0.659	79	To Do
Kamke 1636	✗	0	0	✓	6.476	59	To Do
Kamke 1637	✗	0	0	✓	0.772	58	To Do
Kamke 1638	✓	3.98	146	✓	0.402	115	To Do
Kamke 1639	✗	0	0	✓	3.682	56	To Do
Kamke 1640	✓	0.441	96	✓	0.765	70	To Do
Kamke 1641	✓	0.049	61	✓	0.1	29	To Do
Kamke 1642	✗	0	0	✗	0	0	To Do
Kamke 1643	✗	0	0	✗	0	0	To Do
Kamke 1644	✗	0	0	✓	0.66	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	✓	10.604	262	✓	0.433	94	To Do
Kamke 1647	✓	0.403	91	✓	3.466	60	To Do
Kamke 1648	✗	0	0	✓	2.028	205	To Do
Kamke 1649	✗	0	0	✗	0	0	To Do
Kamke 1650	✓	0.097	30	✓	0.913	16	To Do
Kamke 1651	✓	0.311	414	✓	0.577	31	To Do
Kamke 1652	✗	0	0	✓	1.034	36	To Do
Kamke 1653	✓	0.14	75	✓	0.507	41	To Do
Kamke 1654	✓	0.438	308	✓	0.505	38	To Do
Kamke 1655	✓	0.8	350	✓	0.476	84	To Do
Kamke 1656	✓	39.106	9706	✓	1.445	771	To Do
Kamke 1657	✓	0.329	192	✓	0.656	35	To Do
Kamke 1658	✗	0	0	✓	0.255	115	To Do
Kamke 1659	✗	0	0	✓	0.151	60	To Do
Kamke 1660	✗	0	0	✓	0.951	125	To Do
Kamke 1661	✓	0.064	92	✓	0.307	51	To Do
Kamke 1662	✗	0	0	✓	0.589	56	To Do
Kamke 1663	✗	0	0	✓	1.118	125	To Do
Kamke 1664	✗	0	0	✓	4.555	155	To Do
Kamke 1665	✗	0	0	✓	0.624	84	To Do
Kamke 1666	✗	0	0	✓	1.125	93	To Do
Kamke 1667	✗	0	0	✓	1.446	121	To Do
Kamke 1668	✓	0.051	60	✓	0.488	24	To Do
Kamke 1669	✓	0.418	160	✓	0.39	32	To Do
Kamke 1670	✓	6.63	51	✓	2.748	35	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1671	✓	0.097	59	✓	0.279	35	To Do
Kamke 1672	✗	0	0	✓	1.104	65	To Do
Kamke 1673	✗	0	0	✓	0.859	60	To Do
Kamke 1674	✓	0.039	106	✓	0.398	25	To Do
Kamke 1675	✗	0	0	✗	0	0	To Do
Kamke 1676	✓	0.29	134	✓	0.504	72	To Do
Kamke 1677	✗	0	0	✓	1.629	101	To Do
Kamke 1678	✗	0	0	✓	0.931	60	To Do
Kamke 1679	✓	0.153	33	✓	0.33	27	To Do
Kamke 1680	✗	0	0	✓	0.75	103	To Do
Kamke 1681	✗	0	0	✓	0.191	31	To Do
Kamke 1682	✗	0	0	✓	1.024	94	To Do
Kamke 1683	✓	0.065	26	✓	0.351	23	To Do
Kamke 1684	✗	0	0	✓	1.4	100	To Do
Kamke 1685	✗	0	0	✗	0	0	To Do
Kamke 1686	✗	0	0	✓	1.418	128	To Do
Kamke 1687	✓	0.067	262	✓	0.463	21	To Do
Kamke 1688	✓	0.489	189	✓	0.376	32	To Do
Kamke 1689	✓	0.247	104	✓	0.367	37	To Do
Kamke 1690	✗	0	0	✓	3.892	99	To Do
Kamke 1691	✗	0	0	✓	1.861	254	To Do
Kamke 1692	✗	0	0	✓	17.604	156	To Do
Kamke 1693	✗	0	0	✓	0.342	68	To Do
Kamke 1694	✓	0.119	115	✓	0.697	54	To Do
Kamke 1695	✗	0	0	✓	0.86	103	To Do

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#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 1696	✗	0	0	✓	0.68	100	To Do
Kamke 1697	✓	0.167	94	✓	0.188	39	To Do
Kamke 1698	✓	0.029	72	✗	0	0	To Do
Kamke 1699	✓	0.11	40	✓	0.405	33	To Do
Kamke 1700	✓	0.154	44	✓	2.933	86	To Do
Kamke 1701	✓	0.185	80	✓	1.773	42	To Do
Kamke 1702	✗	0	0	✗	0	0	To Do
Kamke 1703	✓	0.335	77	✓	0.338	21	To Do
Kamke 1704	✗	0	0	✗	0	0	To Do
Kamke 1705	✓	0.263	252	✗	0	0	To Do
Kamke 1706	✓	0.479	308	✗	0	0	To Do
Kamke 1707	✓	0.056	31	✓	0.421	39	To Do
Kamke 1708	✗	0	0	✓	1.116	73	To Do
Kamke 1709	✗	0	0	✓	1.759	84	To Do
Kamke 1710	✗	0	0	✓	2.37	91	To Do
Kamke 1711	✓	22.138	9987	✓	1.574	81	To Do
Kamke 1712	✓	0.059	75	✓	0.399	61	To Do
Kamke 1713	✗	0	0	✓	0.546	54	To Do
Kamke 1714	✓	0.121	25	✓	0.403	68	To Do
Kamke 1715	✓	0.107	26	✓	0.37	25	To Do
Kamke 1716	✓	0.526	172	✓	1.245	68	To Do
Kamke 1717	✗	0	0	✓	1.371	107	To Do
Kamke 1718	✓	1.173	744	✓	0.972	133	To Do
Kamke 1719	✗	0	0	✓	0.844	70	To Do
Kamke 1720	✗	0	0	✓	2.924	173	To Do

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#	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	✓	1.364	697	✓	0.666	98	To Do
Kamke 1723	✓	0.733	130	✓	0.384	16	To Do
Kamke 1724	✓	0.339	38	✓	3.693	21	To Do
Kamke 1725	✓	1.72	75	✓	3.479	105	To Do
Kamke 1726	✓	0.275	77	✓	0.449	39	To Do
Kamke 1727	✓	0.346	166	✓	1.069	823	To Do
Kamke 1728	✓	0.004	31	✓	0.191	24	To Do
Kamke 1729	✗	0	0	✗	0	0	To Do
Kamke 1730	✓	0.74	135	✓	0.257	53	To Do
Kamke 1731	✓	0.968	351	✓	0.182	61	To Do
Kamke 1732	✗	0	0	✗	0	0	To Do
Kamke 1733	✓	1.825	437	✓	0.214	71	To Do
Kamke 1734	✗	0	0	✗	0	0	To Do
Kamke 1735	✗	0	0	✗	0	0	To Do
Kamke 1736	✓	6.285	129	✓	0.291	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	✓	0.089	16	✓	0.23	13	To Do
Kamke 1741	✓	0.104	17	✓	0.393	34	To Do
Kamke 1742	✗	0	0	✓	0.317	60	To Do
Kamke 1743	✓	17.788	2761	✓	0.219	71	To Do
Kamke 1744	✓	0.533	155	✓	1.03	823	To Do
Kamke 1745	✓	0.669	251	✓	1.424	117	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1746	✗	0	0	✓	1.181	207	To Do
Kamke 1747	✓	0.091	20	✓	0.089	17	To Do
Kamke 1748	✓	0.21	43	✓	0.538	67	To Do
Kamke 1749	✓	0.457	153	✓	1.408	57	To Do
Kamke 1750	✓	3.142	2281	✓	0.875	87	To Do
Kamke 1751	✗	0	0	✗	0	0	To Do
Kamke 1752	✓	0.156	26	✓	0.486	33	To Do
Kamke 1753	✓	0.49	43	✓	0.547	147	To Do
Kamke 1754	✓	0.11	17	✓	0.31	15	To Do
Kamke 1755	✓	5.287	716	✓	1.007	418	To Do
Kamke 1756	✓	0.601	211	✓	0.653	75	To Do
Kamke 1757	✗	0	0	✗	0	0	To Do
Kamke 1758	✓	0.303	36	✓	0.437	42	To Do
Kamke 1759	✓	0.122	18	✓	0.095	31	To Do
Kamke 1760	✓	0.078	108	✓	0.49	106	To Do
Kamke 1761	✗	0	0	✗	0	0	To Do
Kamke 1762	✗	0	0	✓	1.019	108	To Do
Kamke 1763	✓	0.212	40	✓	0.354	148	To Do
Kamke 1764	✓	0.049	52	✓	0.482	18	To Do
Kamke 1765	✓	0.228	34	✓	0.288	27	To Do
Kamke 1766	✓	0.134	21	✓	0.225	64	To Do
Kamke 1767	✓	0.246	55	✓	0.932	50	To Do
Kamke 1768	✓	0.036	53	✓	0.245	43	To Do
Kamke 1769	✓	0.133	18	✓	0.229	21	To Do
Kamke 1770	✓	0.634	28	✓	0.319	26	To Do

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#	Mathematica			Maple			note on solution
	solved	cpu	leaf	solved	cpu	leaf	
Kamke 1771	✓	0.097	21	✓	0.944	22	To Do
Kamke 1772	✓	0.542	37	✓	0.546	35	To Do
Kamke 1773	✓	0.324	44	✓	0.088	30	To Do
Kamke 1774	✓	1.2	92	✓	0.914	136	To Do
Kamke 1775	✓	0.103	29	✓	0.295	31	To Do
Kamke 1776	✓	6.696	1743	✓	0.62	49	To Do
Kamke 1777	✗	0	0	✓	0.721	79	To Do
Kamke 1778	✓	0.184	65	✓	4.185	245	To Do
Kamke 1779	✗	0	0	✓	3.522	117	To Do
Kamke 1780	✗	0	0	✓	3.84	156	To Do
Kamke 1781	✓	0.176	46	✓	0.256	11	To Do
Kamke 1782	✓	0.157	93	✓	0.24	33	To Do
Kamke 1783	✓	1.032	26	✓	0.385	23	To Do
Kamke 1784	✓	0.258	74	✓	2.132	82	To Do
Kamke 1785	✓	0.319	95	✓	0.861	83	To Do
Kamke 1786	✓	0.06	53	✓	1.088	42	To Do
Kamke 1787	✓	0.841	170	✓	1.471	80	To Do
Kamke 1788	✗	0	0	✗	0	0	To Do
Kamke 1789	✗	0	0	✗	0	0	To Do
Kamke 1790	✓	0.586	186	✓	1.339	119	To Do
Kamke 1791	✓	0.664	168	✓	1.458	90	To Do
Kamke 1792	✓	0.997	226	✓	3.834	194	To Do
Kamke 1793	✓	0.122	83	✓	0.272	40	To Do
Kamke 1794	✓	0.14	69	✓	0.29	46	To Do
Kamke 1795	✓	0.232	116	✓	9.478	529	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1796	✓	0.242	363	✓	1.084	51	To Do
Kamke 1797	✗	0	0	✗	0	0	To Do
Kamke 1798	✗	0	0	✓	0.276	166	To Do
Kamke 1799	✓	1.444	88	✓	0.495	46	To Do
Kamke 1800	✓	0.467	84	✓	0.213	60	To Do
Kamke 1801	✗	0	0	✗	0	0	To Do
Kamke 1802	✗	0	0	✗	0	0	To Do
Kamke 1803	✓	18.739	10387	✓	2.299	115620	To Do
Kamke 1804	✓	2.403	415	✓	0.101	31	To Do
Kamke 1805	✓	0.315	438	✓	0.236	34	To Do
Kamke 1806	✗	0	0	✓	7.063	733	To Do
Kamke 1807	✗	0	0	✗	0	0	To Do
Kamke 1808	✓	0.972	124	✓	0.341	72	To Do
Kamke 1809	✗	0	0	✓	2.358	336	To Do
Kamke 1810	✓	0.074	1677	✓	0.542	91	To Do
Kamke 1811	✗	0	0	✗	0	0	To Do
Kamke 1812	✓	0.252	29	✓	0.269	19	To Do
Kamke 1813	✓	26.451	176	✓	0.944	138	To Do
Kamke 1814	✓	0.342	120	✓	0.81	87	To Do
Kamke 1815	✗	0	0	✓	0.795	71	To Do
Kamke 1816	✗	0	0	✓	1.753	46	To Do
Kamke 1817	✗	0	0	✓	1.223	40	To Do
Kamke 1818	✗	0	0	✓	0.93	66	To Do
Kamke 1819	✗	0	0	✓	0.355	42	To Do
Kamke 1820	✗	0	0	✓	1.332	88	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1821	✗	0	0	✓	2.853	54	To Do
Kamke 1822	✓	0.834	371	✓	7.146	293	To Do
Kamke 1823	✗	0	0	✓	0.752	289	To Do
Kamke 1824	✓	0.659	347	✓	1.071	96	To Do
Kamke 1825	✗	0	0	✓	1.146	49	To Do
Kamke 1826	✓	0.593	201	✓	1.428	173	To Do
Kamke 1827	✗	0	0	✓	19.836	81	To Do
Kamke 1828	✓	0.007	32	✓	1.424	59	To Do
Kamke 1829	✓	0.005	24	✓	2.731	36	To Do
Kamke 1830	✓	0.022	24	✓	1.432	308	To Do
Kamke 1831	✗	0	0	✓	3.775	163	To Do
Kamke 1832	✗	0	0	✓	3.276	117	To Do
Kamke 1833	✗	0	0	✓	7.275	162	To Do
Kamke 1834	✗	0	0	✓	1.007	92	To Do
Kamke 1835	✓	0.077	143	✗	0	0	To Do
Kamke 1836	✗	0	0	✓	1.715	116	To Do
Kamke 1837	✗	0	0	✓	0.744	95	To Do
Kamke 1838	✗	0	0	✓	0.816	73	To Do
Kamke 1839	✗	0	0	✓	1.006	116	To Do
Kamke 1840	✗	0	0	✓	1.031	129	To Do
Kamke 1841	✗	0	0	✓	0.731	60	To Do
Kamke 1842	✓	0.153	286	✓	1.368	190	To Do
Kamke 1843	✓	2.008	409	✓	0.596	77	To Do
Kamke 1844	✗	0	0	✓	0.738	22	To Do
Kamke 1845	✗	0	0	✓	0.813	17	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1846	✓	0.032	51	✓	0.044	28	To Do
Kamke 1847	✓	0.174	95	✓	1.056	49	To Do
Kamke 1848	✓	0.397	187	✓	3.541	789	To Do
Kamke 1849	✓	0.556	426	✓	0.523	197	To Do
Kamke 1850	✗	0	0	✓	1.661	164	To Do
Kamke 1851	✗	0	0	✗	0	0	To Do
Kamke 1852	✓	0.099	28	✓	0.812	28	To Do
Kamke 1853	✗	0	0	✓	3.56	110	To Do
Kamke 1854	✗	0	0	✗	0	0	To Do
Kamke 1855	✗	0	0	✗	0	0	To Do
Kamke 1856	✓	0.007	22	✓	0.1	19	To Do
Kamke 1857	✓	0.01	39	✓	0.042	35	To Do
Kamke 1858	✓	0.007	182	✓	0.047	64	To Do
Kamke 1859	✓	0.004	51	✓	0.036	37	To Do
Kamke 1860	✓	0.03	696	✓	0.185	177	To Do
Kamke 1861	✓	0.01	183	✓	0.244	152	To Do
Kamke 1862	✓	0.012	52	✓	0.037	39	To Do
Kamke 1863	✓	0.005	84	✓	0.033	35	To Do
Kamke 1864	✓	0.008	59	✓	0.037	44	To Do
Kamke 1865	✓	0.721	2062	✓	0.242	224	To Do
Kamke 1866	✓	0.036	132	✓	0.037	39	To Do
Kamke 1867	✓	0.084	124	✓	0.036	42	To Do
Kamke 1868	✓	0.078	162	✓	0.116	64	To Do
Kamke 1869	✓	0.095	118	✓	0.088	51	To Do
Kamke 1870	✓	0.132	122	✓	0.194	47	To Do

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#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1871	✓	0.307	180	✓	0.101	62	To Do
Kamke 1872	✓	0.108	162	✓	0.092	65	To Do
Kamke 1873	✓	0.087	322	✓	0.093	52	To Do
Kamke 1874	✓	0.007	115	✓	0.741	57	To Do
Kamke 1875	✗	0	0	✓	1.922	2601	To Do
Kamke 1876	✓	0.016	39	✓	0.308	18	To Do
Kamke 1877	✓	0.004	31	✓	0.033	31	To Do
Kamke 1878	✓	0.009	39	✓	0.152	39	To Do
Kamke 1879	✓	0.023	58	✓	0.048	54	To Do
Kamke 1880	✗	0	0	✓	0.074	23	To Do
Kamke 1881	✓	0.009	44	✓	0.03	48	To Do
Kamke 1882	✓	1.537	928	✓	0.07	99	To Do
Kamke 1883	✓	0.866	602	✓	0.126	80	To Do
Kamke 1884	✓	0.401	224	✓	0.184	69	To Do
Kamke 1885	✗	0	0	✓	0.218	47	To Do
Kamke 1886	✓	0.015	115	✓	0.186	49	To Do
Kamke 1887	✓	0.332	5748	✓	0.249	360	To Do
Kamke 1888	✓	9.054	15664	✓	0.315	457	To Do
Kamke 1889	✓	0.197	554	✓	0.046	60	To Do
Kamke 1890	✗	0	0	✗	0	0	To Do
Kamke 1891	✓	0.878	742	✓	0.047	64	To Do
Kamke 1892	✓	0.25	4815	✓	0.182	463	To Do
Kamke 1893	✓	0.438	5546	✓	0.84	1579	To Do
Kamke 1894	✓	0.429	3386	✓	0.635	1056	To Do
Kamke 1895	✓	0.29	7517	✓	0.198	1008	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 1896	✓	0.469	1132	✓	0.053	67	To Do
Kamke 1897	✓	0.206	280	✓	0.296	90	To Do
Kamke 1898	✓	0.025	420	✓	0.195	71	To Do
Kamke 1899	✓	0.007	112	✓	0.235	52	To Do
Kamke 1900	✓	0.007	94	✓	0.24	50	To Do
Kamke 1901	✓	0.007	105	✓	0.199	43	To Do
Kamke 1902	✓	0.016	226	✓	0.188	51	To Do
Kamke 1903	✓	0.059	1304	✓	0.235	299	To Do
Kamke 1904	✓	0.043	1445	✓	0.079	257	To Do
Kamke 1905	✗	0	0	✗	0	0	To Do
Kamke 1906	✓	0.039	278	✓	0.069	120	To Do
Kamke 1907	✓	0.009	179	✓	0.06	66	To Do
Kamke 1908	✓	0.081	25202	✓	0.323	1285	To Do
Kamke 1909	✓	0.038	1630	✓	16.392	33085	To Do
Kamke 1910	✓	0.006	39	✓	0.253	37	To Do
Kamke 1911	✗	0	0	✓	0.215	308	To Do
Kamke 1912	✗	0	0	✓	1.153	2788	To Do
Kamke 1913	✓	0.02	64	✓	0.342	57	To Do
Kamke 1914	✓	0.239	204	✓	1.461	92	To Do
Kamke 1915	✗	0	0	✓	7.549	147	To Do
Kamke 1916	✓	0.312	557	✓	3.299	180	To Do
Kamke 1917	✓	209.692	3406	✓	1.614	108	To Do
Kamke 1918	✗	0	0	✓	2.128	182	To Do
Kamke 1919	✗	0	0	✓	4.391	200	To Do
Kamke 1920	✗	0	0	✓	4.421	202	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 1921	✗	0	0	✗	0	0	To Do
Kamke 1922	✗	0	0	✗	0	0	To Do
Kamke 1923	✓	0.009	53	✓	0.068	35	To Do
Kamke 1924	✓	0.055	191	✓	0.679	180	To Do
Kamke 1925	✗	0	0	✓	0.357	194	To Do
Kamke 1926	✗	0	0	✓	0.268	96	To Do
Kamke 1927	✗	0	0	✗	0	0	To Do
Kamke 1928	✗	0	0	✗	0	0	To Do
Kamke 1929	✗	0	0	✓	11.667	116	To Do
Kamke 1930	✓	0.031	308	✓	0.084	45	To Do
Kamke 1931	✓	3.938	10101	✓	1.405	1117	To Do
Kamke 1932	✗	0	0	✓	3.804	383	To Do
Kamke 1933	✗	0	0	✓	2.724	17738	To Do
Kamke 1934	✗	0	0	✓	1.915	377	To Do
Kamke 1935	✗	0	0	✓	8.43	741	To Do
Kamke 1936	✗	0	0	✓	1.534	704	To Do
Kamke 1937	✗	0	0	✓	1.718	240	To Do
Kamke 1938	✓	0.007	137	✓	0.194	101	To Do
Kamke 1939	✗	0	0	✓	4.342	899	To Do
Kamke 1940	✗	0	0	✗	0	0	To Do

2.1 ODE No. 1

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

✓ **Mathematica** : cpu = 0.422277 (sec), leaf count = 1117

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

✓ **Maple** : cpu = 0.055 (sec), leaf count = 1089

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

Hand solution

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

To Do.

2.2 ODE No. 2

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

✓ **Mathematica** : cpu = 0.0374303 (sec), leaf count = 34

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

✓ **Maple** : cpu = 0.019 (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 = 0.0559886 (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 = 0.071 (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}

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

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

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

2.4 ODE No. 4

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

✓ **Mathematica** : cpu = 0.0133891 (sec), leaf count = 30

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

✓ **Maple** : cpu = 0.005 (sec), leaf count = 18

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

Hand solution

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

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

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

Integrating both sides

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

2.5 ODE No. 5

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

✓ **Mathematica** : cpu = 0.382991 (sec), leaf count = 39

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

✓ **Maple** : cpu = 0.112 (sec), leaf count = 21

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

Hand solution

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

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

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

Integrating both sides

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

2.6 ODE No. 6

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

✓ **Mathematica** : cpu = 0.0198008 (sec), leaf count = 18

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

✓ **Maple** : cpu = 0.023 (sec), leaf count = 15

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

Hand solution

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

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

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

Integrating

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

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 = 0.0324698 (sec), leaf count = 23

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

✓ **Maple** : cpu = 0.006 (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

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

2.8 ODE No. 8

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

✓ **Mathematica** : cpu = 0.018491 (sec), leaf count = 17

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

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

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

Hand solution

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

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

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

Integrating both sides

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

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

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

2.9 ODE No. 9

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

✓ **Mathematica** : cpu = 0.0152005 (sec), leaf count = 19

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

✓ **Maple** : cpu = 0.014 (sec), leaf count = 14

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

Hand solution

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

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 $dx = xdr$, 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 $\int e^r \cos\left(r\right) dr$, $\int udv = uv - \int vdu$, 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 = 0.0132074 (sec), leaf count = 18

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

✓ **Maple** : cpu = 0.011 (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 = 0.0188026 (sec), leaf count = 66

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

✓ **Maple** : cpu = 0.021 (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 = 0.0730206 (sec), leaf count = 34

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

✓ **Maple** : cpu = 0.047 (sec), leaf count = 8

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

Hand solution

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

This is separable. Hence

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

Integrating

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

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

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

Therefore

$$y = \tanh(x + C) \qquad (2)$$

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 = 0.0763833 (sec), leaf count = 79

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

✓ **Maple** : cpu = 0.194 (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

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

So we have new second order ODE

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

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

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

Therefore the solution to (3) is

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

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

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

Therefore since $u' = yu$ then

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

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

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

Reference: Airy function

2.14 ODE No. 14

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

✓ **Mathematica** : cpu = 0.085408 (sec), leaf count = 254

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

✓ **Maple** : cpu = 0.087 (sec), leaf count = 187

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

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

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

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

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

✓ **Mathematica** : cpu = 0.0677863 (sec), leaf count = 25

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

✓ **Maple** : cpu = 0.172 (sec), leaf count = 33

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

Hand solution

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

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 = 0.0372842 (sec), leaf count = 186

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

✓ **Maple** : cpu = 0.088 (sec), leaf count = 49

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

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

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

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 = 0.0557088 (sec), leaf count = 34

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

✓ **Maple** : cpu = 0.097 (sec), leaf count = 24

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

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

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

Hence

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

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

$$u(x) = c_1 e^{4x} + c_2 e^{-x}$$

And

$$u'(x) = c_1 4e^{4x} - c_2 e^{-x}$$

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

$$\begin{aligned}y(x)&=\frac{-c_1 4e^{4x}+c_2e^{-x}}{c_1e^{4x}+c_2e^{-x}}\\&=\frac{-\frac{c_1}{c_2}4e^{4x}+e^{-x}}{\frac{c_1}{c_2}e^{4x}+e^{-x}}\end{aligned}$$

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

$$y(x)=\frac{-4C_1e^{4x}+e^{-x}}{C_1e^{4x}+e^{-x}}$$

Dividing by e^{-x}

$$y(x)=\frac{-4C_1e^{5x}+1}{C_1e^{5x}+1}$$

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

$$\begin{aligned}y(x)&=\frac{4C_2e^{5x}+1}{-C_2e^{5x}+1}\\&=-\frac{4C_2e^{5x}+1}{C_2e^{5x}-1}\end{aligned}$$

2.18 ODE No. 18

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

✓ **Mathematica** : cpu = 0.074026 (sec), leaf count = 50

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

✓ **Maple** : cpu = 0.051 (sec), leaf count = 39

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

Hand solution

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

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

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

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

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

Hence

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

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

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

Integrating both sides

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

But

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

Hence

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

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

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

Or

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

2.19 ODE No. 19

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

✓ **Mathematica** : cpu = 0.0549314 (sec), leaf count = 14

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

✓ **Maple** : cpu = 0.039 (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

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

✓ **Mathematica** : cpu = 0.0774186 (sec), leaf count = 49

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

✓ **Maple** : cpu = 0.054 (sec), leaf count = 34

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

Hand solution

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

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

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

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

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

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

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

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

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

Integrating

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

Therefore

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

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

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

2.21 ODE No. 21

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

✓ **Mathematica** : cpu = 0.320812 (sec), leaf count = 7

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

✓ **Maple** : cpu = 0.129 (sec), leaf count = 25

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

Hand solution

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

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

$$y_p = \sin(x)$$

Therefore

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

Equating this to (1) gives

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

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

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

Integrating both sides

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

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

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

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

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

2.22 ODE No. 22

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

✓ **Mathematica** : cpu = 0.434147 (sec), leaf count = 113

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

✓ **Maple** : cpu = 0.397 (sec), leaf count = 128

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

Hand solution

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

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

$$y_p = \tan(x)$$

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

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

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

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

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

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

Equating this to (1) gives

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

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

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

Hence

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

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

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

And

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

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

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

Integrating both sides

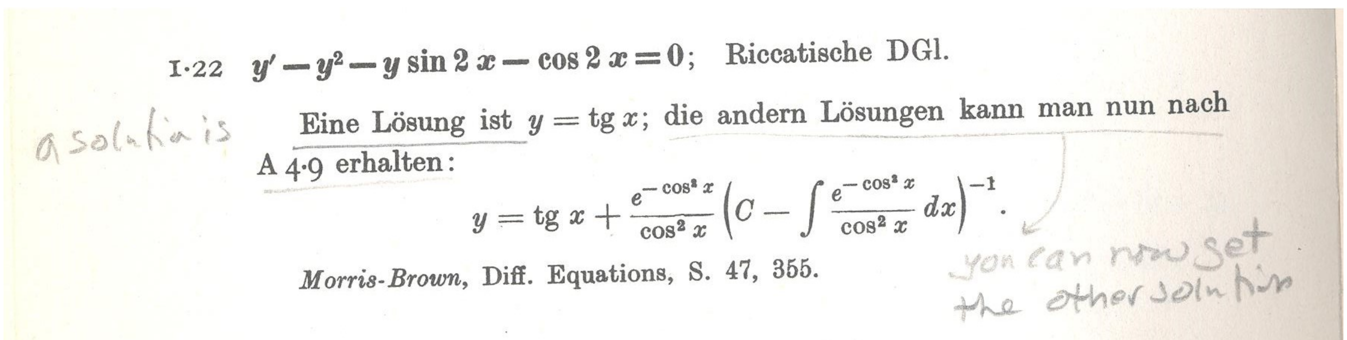
$$
\begin{aligned}
\frac{1}{\cos^2 x}e^{-\cos^2 x}u &= -\int\frac{e^{-\cos^2 x}}{\cos^2 x}dx + C\\
u &= \cos^2 x e^{\cos^2 x}\left(C - \int\frac{e^{-\cos^2 x}}{\cos^2 x}dx\right)
\end{aligned}
$$

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

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

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

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



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

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

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

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

you can now set the other solution

2.23 ODE No. 23

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

✓ **Mathematica** : cpu = 0.0635142 (sec), leaf count = 43

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

✓ **Maple** : cpu = 0.038 (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 = 0.0993527 (sec), leaf count = 277

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

✓ **Maple** : cpu = 0.06 (sec), leaf count = 201

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

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 = 0.331444 (sec), leaf count = 1835

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

✓ **Maple** : cpu = 0.272 (sec), leaf count = 348

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

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 = 0.185805 (sec), leaf count = 68

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

✓ **Maple** : cpu = 0.064 (sec), leaf count = 45

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

Hand solution

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

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

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

Comparing to (1) results in

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

Hence

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

This is second order ODE with constant coefficient. Solution is

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

Therefore

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

And therefore the solution is

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

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

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

Verification

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

2.27 ODE No. 27

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

✓ **Mathematica** : cpu = 0.22138 (sec), leaf count = 120

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

✓ **Maple** : cpu = 0.154 (sec), leaf count = 72

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

Hand solution

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

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

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

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

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

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

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

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

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

But

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

Therefore

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

Hence

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

Since $u = y - x$ then

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

Verification

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

2.28 ODE No. 28

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

✓ **Mathematica** : cpu = 0.114073 (sec), leaf count = 96

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

✓ **Maple** : cpu = 0.077 (sec), leaf count = 51

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

Hand solution

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

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

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

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

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

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

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

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

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

Integrating both sides gives

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

$\int xe^{-\frac{x^4}{4}}dx = \frac{\sqrt{\pi}}{2}\operatorname{erf}\left(\frac{x^2}{2}\right)$, 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 = 0.071972 (sec), leaf count = 39

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

✓ **Maple** : cpu = 0.011 (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 = 0.152642 (sec), leaf count = 230

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

✓ **Maple** : cpu = 0.061 (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

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

Hence

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

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

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

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

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

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

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

For $n = 1$

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

For $n = 2$

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

For $n = 3$

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

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

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

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

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

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

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

But

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

Hence

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

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

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

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

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

Or

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

Verification

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

2.31 ODE No. 31

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

✓ **Mathematica** : cpu = 0.126606 (sec), leaf count = 21

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

✓ **Maple** : cpu = 0.044 (sec), leaf count = 23

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

Hand solution

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

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

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

Integrating

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

Or

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

Verification

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

2.32 ODE No. 32

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

✓ **Mathematica** : cpu = 0.299935 (sec), leaf count = 34

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

✓ **Maple** : cpu = 0.239 (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

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

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

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

Hence

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

Equating this to RHS of (1) gives

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

Hence

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

Or

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

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

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

Integrating both sides

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

Hence

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

Therefore

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

Let $3C = C_1$

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

Verification

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

2.33 ODE No. 33

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

✓ **Mathematica** : cpu = 0.333181 (sec), leaf count = 160

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

✓ **Maple** : cpu = 0.393 (sec), leaf count = 58

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

Hand solution

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

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

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

To do.

2.34 ODE No. 34

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

✓ **Mathematica** : cpu = 0.090378 (sec), leaf count = 54

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

✓ **Maple** : cpu = 0.024 (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 = 0.113114 (sec), leaf count = 61

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

✓ **Maple** : cpu = 0.043 (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 = 0.258517 (sec), leaf count = 195

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

✓ **Maple** : cpu = 0.073 (sec), leaf count = 62

$$\left\{y(x) = 2\,\frac{a}{a^2x^2 + 2\,\mathit{RootOf}\left(\text{Bi}\left(\_Z\right)\sqrt[3]{-2\,a^2}\_\mathit{C1}\,x + \sqrt[3]{-2\,a^2}x\text{Ai}\left(\_Z\right) + 2\,\text{Bi}^{(1)}\left(\_Z\right)\_\mathit{C1} + 2\,\text{Ai}^{(1)}\left(\_Z\right)\right)\sqrt[3]{-2 \cdots}}\right.$$

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

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

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

2.37 ODE No. 37

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

✓ **Mathematica** : cpu = 0.750152 (sec), leaf count = 78

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

✓ **Maple** : cpu = 0.074 (sec), leaf count = 50

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

2.38 ODE No. 38

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

✓ **Mathematica** : cpu = 0.155898 (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 = 0.022 (sec), leaf count = 34

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

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 = 0.120713 (sec), leaf count = 54

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

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

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

2.40 ODE No. 40

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

✓ **Mathematica** : cpu = 0.318768 (sec), leaf count = 185

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

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

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

2.41 ODE No. 41

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

✓ **Mathematica** : cpu = 0.158074 (sec), leaf count = 103

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

✓ **Maple** : cpu = 0.199 (sec), leaf count = 103

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

2.42 ODE No. 42

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

✓ **Mathematica** : cpu = 0.834854 (sec), leaf count = 485

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

✓ **Maple** : cpu = 0.019 (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 = 5.87091 (sec), leaf count = 490

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

✓ **Maple** : cpu = 1.206 (sec), leaf count = 373

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

2.44 ODE No. 44

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

✓ **Mathematica** : cpu = 0.0725068 (sec), leaf count = 72

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

✓ **Maple** : cpu = 0.017 (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 $e^{-4\int x dx} = e^{-2x^2}$ hence

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

Integrating

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

Therefore

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

Hence

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

Or

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

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 = 0.533342 (sec), leaf count = 133

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

✓ **Maple** : cpu = 0.101 (sec), leaf count = 123

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

2.46 ODE No. 46

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

✓ **Mathematica** : cpu = 0.281457 (sec), leaf count = 228

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

✓ **Maple** : cpu = 0.085 (sec), leaf count = 956

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

2.47 ODE No. 47

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

✗ **Mathematica** : cpu = 28.3552 (sec), leaf count = 0 , could not solve

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

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

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

2.48 ODE No. 48

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

✗ **Mathematica** : cpu = 30.6726 (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

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

✗ **Mathematica** : cpu = 25.5965 (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 = 300.071 (sec), leaf count = 0 , timed out

```
$Aborted
```

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

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

2.51 ODE No. 51

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

✓ **Mathematica** : cpu = 1.47128 (sec), leaf count = 355

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

✓ **Maple** : cpu = 0.157 (sec), leaf count = 237

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

2.52 ODE No. 52

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

✓ **Mathematica** : cpu = 0.221024 (sec), leaf count = 117

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

✓ **Maple** : cpu = 0.326 (sec), leaf count = 61

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

2.53 ODE No. 53

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

✓ **Mathematica** : cpu = 0.390661 (sec), leaf count = 96

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

✓ **Maple** : cpu = 0.13 (sec), leaf count = 281

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

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 = 0.30637 (sec), leaf count = 74

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

✓ **Maple** : cpu = 0.152 (sec), leaf count = 38

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

2.55 ODE No. 55

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

✗ **Mathematica** : cpu = 3.81804 (sec), leaf count = 0 , could not solve

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

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

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

2.56 ODE No. 56

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

✗ **Mathematica** : cpu = 1.5264 (sec), leaf count = 0 , could not solve

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

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

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

2.57 ODE No. 57

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

✓ **Mathematica** : cpu = 0.0529504 (sec), leaf count = 26

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

✓ **Maple** : cpu = 0.063 (sec), leaf count = 31

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

2.58 ODE No. 58

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

✓ **Mathematica** : cpu = 0.218594 (sec), leaf count = 118

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

✓ **Maple** : cpu = 0.065 (sec), leaf count = 68

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

2.59 ODE No. 59

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

✓ **Mathematica** : cpu = 0.221991 (sec), leaf count = 96

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

✓ **Maple** : cpu = 0.061 (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 = 0.111424 (sec), leaf count = 173

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

✓ **Maple** : cpu = 0.016 (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 = 0.191237 (sec), leaf count = 75

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

✓ **Maple** : cpu = 0.01 (sec), leaf count = 50

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

2.62 ODE No. 62

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

✓ **Mathematica** : cpu = 2.54494 (sec), leaf count = 44

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

✓ **Maple** : cpu = 0.283 (sec), leaf count = 34

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

Hand solution

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

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

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

Hence

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

Hence

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

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

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

Therefore (2) is exact. Let

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

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

$$\frac{\partial U}{\partial x} = x(1+u^2) \tag{3}$$
$$\frac{\partial U}{\partial u} = x^2 u + \frac{1}{\sqrt{1-u^2}} \tag{4}$$

From (3)

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

From (4)

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

Therefore

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

From (5) we find

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

Since $dU = 0$ then

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

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

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

Hence

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

2.63 ODE No. 63

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

✓ **Mathematica** : cpu = 0.118269 (sec), leaf count = 48

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

✓ **Maple** : cpu = 5.646 (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 = 0.29055 (sec), leaf count = 269

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

✓ **Maple** : cpu = 0.076 (sec), leaf count = 124

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

2.65 ODE No. 65

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

✓ **Mathematica** : cpu = 0.961161 (sec), leaf count = 312

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

✓ **Maple** : cpu = 0.044 (sec), leaf count = 47

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

2.66 ODE No. 66

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

✓ **Mathematica** : cpu = 0.152548 (sec), leaf count = 67

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

✓ **Maple** : cpu = 0.089 (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 = 0.118444 (sec), leaf count = 14

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

✓ **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 = 0.685628 (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 = 0.049 (sec), leaf count = 77

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

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 = 7.7341 (sec), leaf count = 1163

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

✓ **Maple** : cpu = 0.116 (sec), leaf count = 111

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

2.70 ODE No. 70

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

✓ **Mathematica** : cpu = 12.671 (sec), leaf count = 81

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[\int_1^{\#1} \sqrt{\text{b4}K[1]^4 + \text{b3}K[1]^3 + \text{b2}K[1]^2 + \text{b1}K[1] + \text{b0}}dK[1]\&\right]\left[\int_1^x \sqrt{\text{a4}K[2]^4 + \text{a3}K\right.\right.\right.$$

✓ **Maple** : cpu = 0.124 (sec), leaf count = 113

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

2.71 ODE No. 71

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

✓ **Mathematica** : cpu = 2.76922 (sec), leaf count = 2237

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

✓ **Maple** : cpu = 0.095 (sec), leaf count = 113

$$\left\{\int^{y(x)} \frac{1}{\sqrt{\_a^4 b4 + \_a^3 b3 + \_a^2 b2 + \_a\, b1 + b0}}d\_a + \int^x -\sqrt{\frac{b4\ (y(x))^4 + b3\ (y(x))^3 + b2\ (y(x))^2 + b1\, y(}{\_a^4 a4 + \_a^3 a3 + \_a^2 a2 + \_a\, a1 + a0}}\right.$$

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 = 0.159416 (sec), leaf count = 89

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

✓ **Maple** : cpu = 0.012 (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 = 1.30684 (sec), leaf count = 733

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

✓ **Maple** : cpu = 0.239 (sec), leaf count = 91

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

2.74 ODE No. 74

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

✗ **Mathematica** : cpu = 2.11003 (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 = 0.137958 (sec), leaf count = 20

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

✓ **Maple** : cpu = 0.116 (sec), leaf count = 20

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

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 = 0.128788 (sec), leaf count = 116

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

✓ **Maple** : cpu = 0.036 (sec), leaf count = 41

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

Hand solution

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

This is separable.

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

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

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

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

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

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

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

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

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

Going back to (1)

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

Verification

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

2.77 ODE No. 77

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

✓ **Mathematica** : cpu = 0.277764 (sec), leaf count = 124

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

✓ **Maple** : cpu = 0.056 (sec), leaf count = 54

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

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 = 0.630003 (sec), leaf count = 1317

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

✓ **Maple** : cpu = 0.076 (sec), leaf count = 89

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

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

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

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

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

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

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

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

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

Back to (1), therefore after integrating both sides

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

Let

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

Then

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

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

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

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

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

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

Verification

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

2.79 ODE No. 79

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

✗ **Mathematica** : cpu = 24.7148 (sec), leaf count = 0 , could not solve

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

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

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

2.80 ODE No. 80

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

✓ **Mathematica** : cpu = 0.0570775 (sec), leaf count = 72

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

✓ **Maple** : cpu = 1.051 (sec), leaf count = 41

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

2.81 ODE No. 81

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

✓ **Mathematica** : cpu = 1.33772 (sec), leaf count = 220

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

✓ **Maple** : cpu = 1.052 (sec), leaf count = 78

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

2.82 ODE No. 82

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

✗ **Mathematica** : cpu = 47.286 (sec), leaf count = 0 , could not solve

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

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

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

2.83 ODE No. 83

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

✓ **Mathematica** : cpu = 0.341707 (sec), leaf count = 69

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

✓ **Maple** : cpu = 0.297 (sec), leaf count = 44

$$\left\{y(x)=-i\mathit{RootOf}\left(-\mathit{Erf}\left(\frac{(-x+\_Z)\sqrt{2}}{2}\right)\sqrt{\pi}-\mathit{Erf}\left(\frac{\sqrt{2}(x+\_Z)}{2}\right)\sqrt{\pi}+\sqrt{2}\_\mathit{C1}\right)\right\}$$

2.84 ODE No. 84

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

✓ **Mathematica** : cpu = 0.183263 (sec), leaf count = 248

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

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

$$\left\{y(x)=\frac{\mathit{RootOf}\left(\int^{\_Z}(f(\_a\,b)\,b+a)^{-1}\,d\_ab-x+\_\mathit{C1}\right)b-ax}{b}\right\}$$

2.85 ODE No. 85

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

✓ **Mathematica** : cpu = 0.340444 (sec), leaf count = 238

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

✓ **Maple** : cpu = 0.348 (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

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

✓ **Mathematica** : cpu = 0.441786 (sec), leaf count = 184

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

✓ **Maple** : cpu = 0.395 (sec), leaf count = 52

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

2.87 ODE No. 87

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

✗ **Mathematica** : cpu = 12.1509 (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 = 0.47301 (sec), leaf count = 2831

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

✓ **Maple** : cpu = 0.184 (sec), leaf count = 256

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

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

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

But

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

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

Verification

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

2.89 ODE No. 89

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

✓ **Mathematica** : cpu = 0.0119913 (sec), leaf count = 42

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

✓ **Maple** : cpu = 0.02 (sec), leaf count = 56

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

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

$$\begin{aligned}
\int \frac{\sqrt{a^2 - x^2}}{x} dx &= \int \frac{\sqrt{a^2 - a^2\sin^2 u}}{a\sin u} a\cos(u)\,du \\
&= \int \frac{a\sqrt{1 - \sin^2 u}}{a\sin u} a\cos(u)\,du \\
&= a\int \frac{\cos u}{\sin u}\cos(u)\,du \\
&= a\int \frac{\cos^2 u}{\sin u} du \\
&= a\int \frac{1 - \sin^2 u}{\sin u} du \\
&= a\left(\int \frac{1}{\sin u} du - \int \sin u du\right) \\
&= a\left(\int \frac{1}{\sin u} du + \cos u\right)
\end{aligned} \tag{1}$$

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 = 0.012451 (sec), leaf count = 24

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

✓ **Maple** : cpu = 0.011 (sec), leaf count = 17

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

Hand solution

$$xy' + y = x\sin x$$

Linear first order, exact, separable. $y' + \frac{y}{x} = \sin x$, integrating factor $\mu = e^{\int \frac{1}{x}dx} = x$, hence

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

Using integration by parts. $\int udv = uv - \int vdu$. Let $u = x, dv = \sin x$, hence $du = 1, v = -\cos x$, therefore

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

Hence

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

Verification

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

2.91 ODE No. 91

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

✓ **Mathematica** : cpu = 0.0120513 (sec), leaf count = 15

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

✓ **Maple** : cpu = 0.006 (sec), leaf count = 11

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

2.92 ODE No. 92

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

✓ **Mathematica** : cpu = 0.012318 (sec), leaf count = 15

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

✓ **Maple** : cpu = 0.005 (sec), leaf count = 12

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

Hand solution

$$xy' - y = x^2 \sin x$$

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

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

Verification

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

2.93 ODE No. 93

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

✓ **Mathematica** : cpu = 0.031399 (sec), leaf count = 16

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

✓ **Maple** : cpu = 0.012 (sec), leaf count = 12

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

2.94 ODE No. 94

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

✓ **Mathematica** : cpu = 0.0173539 (sec), leaf count = 25

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

✓ **Maple** : cpu = 0.009 (sec), leaf count = 23

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

Hand solution

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

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

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

If $a = -n$ then

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

If $a \neq -n$ then

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

Verification

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

2.95 ODE No. 95

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

✓ **Mathematica** : cpu = 0.069669 (sec), leaf count = 32

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

✓ **Maple** : cpu = 0.054 (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 = 0.057777 (sec), leaf count = 33

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

✓ **Maple** : cpu = 0.034 (sec), leaf count = 11

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

Hand solution

$$xy' - y^2 + 1 = 0$$

This is Riccati first order non-linear. But it is separable. Hence

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

Hence

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

Integrating

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

Verification

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

2.97 ODE No. 97

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

✓ **Mathematica** : cpu = 0.102646 (sec), leaf count = 46

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

✓ **Maple** : cpu = 0.031 (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

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

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 = 0.166358 (sec), leaf count = 442

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

✓ **Maple** : cpu = 0.053 (sec), leaf count = 38

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

2.99 ODE No. 99

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

✓ **Mathematica** : cpu = 0.155888 (sec), leaf count = 244

$$\left\{\left\{y(x) \to -\frac{\sqrt{-a}\sqrt{c}x^{\beta/2}\left(-2J_{\frac{b}{\beta}-1}\left(\frac{2\sqrt{-a}\sqrt{c}x^{\beta/2}}{\beta}\right) + c_1 J_{1-\frac{b}{\beta}}\left(\frac{2\sqrt{-a}\sqrt{c}x^{\beta/2}}{\beta}\right) - c_1 J_{-\frac{b+\beta}{\beta}}\left(\frac{2\sqrt{-a}\sqrt{c}x^{\beta/2}}{\beta}\right)\right) - bc_1 J_{-\frac{b}{\beta}}\left(\right.}{2a\left(J_{\frac{b}{\beta}}\left(\frac{2\sqrt{-a}\sqrt{c}x^{\beta/2}}{\beta}\right) + c_1 J_{-\frac{b}{\beta}}\left(\frac{2\sqrt{-a}\sqrt{c}x^{\beta/2}}{\beta}\right)\right)}\right.\right.$$

✓ **Maple** : cpu = 0.091 (sec), leaf count = 171

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

2.100 ODE No. 100

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

✓ **Mathematica** : cpu = 0.0763474 (sec), leaf count = 157

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

✓ **Maple** : cpu = 0.054 (sec), leaf count = 59

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

Hand solution

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

This is Riccati first order non-linear. Let $y = -\frac{u'}{uR} = \frac{u'}{u}$, hence $y' = \frac{u''}{u} - \frac{(u')^2}{u^2}$. Equating this to RHS of the above gives

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

This is linear second order, an Emden Fowler ODE, with removal singularity. Solved using power series method. The solution is

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

But

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

And

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

Therefore,

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

Which is simplified to

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

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

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

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

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

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 = 0.0719045 (sec), leaf count = 18

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

✓ **Maple** : cpu = 0.01 (sec), leaf count = 16

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

Hand solution

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

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

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

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

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

Integrating factor is $e^{\int \frac{1}{x} dx} = x$ and the above becomes

$$d(xu) = x$$

Integrating

$$\begin{aligned} xu &= \frac{x^2}{2} + C \\ u &= \frac{x}{2} + \frac{C}{x} \\ &= \frac{x^2 + 2C}{2x} \end{aligned}$$

Hence

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

Verification

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

2.102 ODE No. 102

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

✓ **Mathematica** : cpu = 0.0800671 (sec), leaf count = 36

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

✓ **Maple** : cpu = 0.037 (sec), leaf count = 22

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

Hand solution

$$xy' + xy^2 - y - ax^3 = 0$$

This is Riccati non-linear first order. But using the transformation $y = xv$ it is transformed to easily solved ODE

$$y' = v + xv'$$

Therefore the ODE becomes

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

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

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

✓ **Mathematica** : cpu = 0.146602 (sec), leaf count = 90

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

✓ **Maple** : cpu = 0.029 (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

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

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

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

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 = 0.111434 (sec), leaf count = 43

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

✓ **Maple** : cpu = 0.046 (sec), leaf count = 63

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

Hand solution

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

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

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 = 0.213506 (sec), leaf count = 473

$$\left\{\left\{y(x) \to \frac{c_1\left(i\sqrt{a}e^{-i\sqrt{a}\sqrt{c}x}\left(b(-\sqrt{c}) - i\sqrt{a}d\right)U\left(1 - \frac{-\sqrt{c}b - i\sqrt{a}d}{2\sqrt{c}}, b+1, 2i\sqrt{a}\sqrt{c}x\right) - i\sqrt{a}\sqrt{c}e^{-i\sqrt{a}\sqrt{c}x}U\left(-\frac{-\sqrt{c}b-}{2\sqrt{}}\right.\right.}{a\left(c_1e^{-i\sqrt{a}\sqrt{c}x}U\left(-\frac{-\sqrt{c}b - i\sqrt{a}d}{2\sqrt{c}}, b, 2i\sqrt{}\right.\right.}\right.\right.$$

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

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

2.106 ODE No. 106

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

✓ **Mathematica** : cpu = 0.191325 (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 = 0.045 (sec), leaf count = 41

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

2.107 ODE No. 107

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

✓ **Mathematica** : cpu = 0.321924 (sec), leaf count = 1415

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

✓ **Maple** : cpu = 0.2 (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

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

✓ **Mathematica** : cpu = 0.0658281 (sec), leaf count = 15

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

✓ **Maple** : cpu = 0.013 (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 = 0.0693812 (sec), leaf count = 17

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

✓ **Maple** : cpu = 0.012 (sec), leaf count = 15

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

Hand solution

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

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

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

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

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

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

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

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

Integrating

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

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 = 11.5782 (sec), leaf count = 0 , could not solve

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

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

```
dsolve(x*diff(y(x),x)+f(x)*(y(x)^2-x^2) = 0,y(x))
```

Hand solution

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

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

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

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

Hence

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

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

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

Integrating

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

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

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

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 = 0.363933 (sec), leaf count = 55

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

✓ **Maple** : cpu = 0.136 (sec), leaf count = 54

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

2.112 ODE No. 112

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

✓ **Mathematica** : cpu = 0.0903801 (sec), leaf count = 13

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

✓ **Maple** : cpu = 0.033 (sec), leaf count = 27

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

Hand solution

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

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

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

Separable.

$$\frac{dv}{\sqrt{1+v^2}} = \frac{1}{x}dx$$

Integrating

$$\begin{aligned}\operatorname{arcsinh}(v) &= \ln x + C \\ v &= \sinh(\ln x + C)\end{aligned}$$

Since $y = xv$ then

$$y = x\sinh(\ln x + C)$$

Verification

```
ode:=x*diff(y(x),x)=sqrt(x^2+y(x)^2)+y(x);
y0:=x*sinh(ln(x)+_C1);
odetest(y(x)=y0,ode) assuming x>= 0;
0
```

2.113 ODE No. 113

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

✓ **Mathematica** : cpu = 0.0965685 (sec), leaf count = 16

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

✓ **Maple** : cpu = 0.021 (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 = 0.0894469 (sec), leaf count = 12

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

✓ **Maple** : cpu = 2.852 (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 = 0.247022 (sec), leaf count = 221

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

✓ **Maple** : cpu = 0.172 (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 $\frac{y}{x} = z$

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

Solving for z (quadratic formula, some conditions apply), one of the solutions is

$$z = \frac{4Cx^2 + 4C^2 + x^4 + 4}{4Cx^2 + 4C^2 + x^4 - 4}$$

Hence

$$y = x\frac{4Cx^2 + 4C^2 + x^4 + 4}{4Cx^2 + 4C^2 + x^4 - 4}$$

Need to work on verification. Kamke gives the final solution as

$$y = x\frac{-2Cx^2 + C^2 + x^4 + 4}{-2Cx^2 + C^2 + x^4 - 4}$$

I am not sure where my error now is. Need to look at this again.

2.116 ODE No. 116

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

✓ **Mathematica** : cpu = 0.346476 (sec), leaf count = 121

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

✓ **Maple** : cpu = 0.184 (sec), leaf count = 86

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

2.117 ODE No. 117

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

✓ **Mathematica** : cpu = 0.15212 (sec), leaf count = 21

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

✓ **Maple** : cpu = 0.094 (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 = 0.0635375 (sec), leaf count = 13

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

✓ **Maple** : cpu = 0.047 (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 = 0.0893537 (sec), leaf count = 17

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

✓ **Maple** : cpu = 0.055 (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 = 0.0964107 (sec), leaf count = 20

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

✓ **Maple** : cpu = 0.143 (sec), leaf count = 17

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

2.121 ODE No. 121

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

✗ **Mathematica** : cpu = 1.91185 (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 = 0.270323 (sec), leaf count = 21

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

✓ **Maple** : cpu = 0.337 (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 = 0.10476 (sec), leaf count = 19

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

✓ **Maple** : cpu = 0.046 (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 = 0.0857231 (sec), leaf count = 16

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

✓ **Maple** : cpu = 0.024 (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 = 0.172197 (sec), leaf count = 16

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

✓ **Maple** : cpu = 0.049 (sec), leaf count = 14

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

2.126 ODE No. 126

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

✓ **Mathematica** : cpu = 0.155067 (sec), leaf count = 115

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

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

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

2.127 ODE No. 127

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

✓ **Mathematica** : cpu = 0.232468 (sec), leaf count = 186

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

✓ **Maple** : cpu = 0.091 (sec), leaf count = 39

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

2.128 ODE No. 128

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

✓ **Mathematica** : cpu = 3.19309 (sec), leaf count = 41

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

✓ **Maple** : cpu = 0.21 (sec), leaf count = 33

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

2.129 ODE No. 129

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

✓ **Mathematica** : cpu = 0.164196 (sec), leaf count = 44

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

✓ **Maple** : cpu = 0.027 (sec), leaf count = 33

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

2.130 ODE No. 130

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

✓ **Mathematica** : cpu = 0.008491 (sec), leaf count = 21

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

✓ **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 = 0.173899 (sec), leaf count = 21

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

✓ **Maple** : cpu = 0.158 (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 = 0.0797806 (sec), leaf count = 115

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

✓ **Maple** : cpu = 0.03 (sec), leaf count = 153

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

2.133 ODE No. 133

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

✓ **Mathematica** : cpu = 0.0082283 (sec), leaf count = 27

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

✓ **Maple** : cpu = 0.009 (sec), leaf count = 16

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

2.134 ODE No. 134

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

✓ **Mathematica** : cpu = 0.0169135 (sec), leaf count = 27

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

✓ **Maple** : cpu = 0.008 (sec), leaf count = 17

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

2.135 ODE No. 135

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

✓ **Mathematica** : cpu = 0.008273 (sec), leaf count = 14

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

✓ **Maple** : cpu = 0.005 (sec), leaf count = 11

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

2.136 ODE No. 136

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

✓ **Mathematica** : cpu = 0.0685315 (sec), leaf count = 28

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

✓ **Maple** : cpu = 0.015 (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 = 0.0683438 (sec), leaf count = 16

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

✓ **Maple** : cpu = 0.011 (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 = 0.0613242 (sec), leaf count = 13

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

✓ **Maple** : cpu = 0.031 (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 = 0.199361 (sec), leaf count = 821

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

✓ **Maple** : cpu = 0.114 (sec), leaf count = 219

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

2.140 ODE No. 140

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

✓ **Mathematica** : cpu = 0.0750675 (sec), leaf count = 17

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

✓ **Maple** : cpu = 0.037 (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 = 0.121063 (sec), leaf count = 67

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

✓ **Maple** : cpu = 0.052 (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

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

✓ **Mathematica** : cpu = 0.1767 (sec), leaf count = 122

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

✓ **Maple** : cpu = 0.067 (sec), leaf count = 52

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

2.143 ODE No. 143

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

✓ **Mathematica** : cpu = 0.0896426 (sec), leaf count = 51

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

✓ **Maple** : cpu = 0.046 (sec), leaf count = 41

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

2.144 ODE No. 144

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

✓ **Mathematica** : cpu = 0.217838 (sec), leaf count = 1787

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

✓ **Maple** : cpu = 0.095 (sec), leaf count = 219

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

2.145 ODE No. 145

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

✓ **Mathematica** : cpu = 0.476071 (sec), leaf count = 267

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

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

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

2.146 ODE No. 146

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

✓ **Mathematica** : cpu = 0.645525 (sec), leaf count = 78

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

✓ **Maple** : cpu = 0.134 (sec), leaf count = 84

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

2.147 ODE No. 147

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

✓ **Mathematica** : cpu = 0.634131 (sec), leaf count = 343

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

✓ **Maple** : cpu = 0.16 (sec), leaf count = 178

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

2.148 ODE No. 148

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

✓ **Mathematica** : cpu = 0.012339 (sec), leaf count = 30

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

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

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

2.149 ODE No. 149

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

✓ **Mathematica** : cpu = 0.0121073 (sec), leaf count = 27

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

✓ **Maple** : cpu = 0.009 (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 = 0.010418 (sec), leaf count = 30

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

✓ **Maple** : cpu = 0.005 (sec), leaf count = 23

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

2.151 ODE No. 151

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

✓ **Mathematica** : cpu = 0.48398 (sec), leaf count = 203

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

✓ **Maple** : cpu = 0.037 (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

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

✓ **Mathematica** : cpu = 0.353822 (sec), leaf count = 40

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

✓ **Maple** : cpu = 0.64 (sec), leaf count = 159

$$\left\{y(x) = \frac{1}{2}\arctan\left(6\,\frac{\sqrt{x^2+1}\left(\sqrt{x^2+1}x^2 + \sqrt{x^2+1} + 3\,\_C1\right)}{(6\,\_C1\,x^2 + 6\,\_C1)\sqrt{x^2+1} + x^6 + 3\,x^4 + 12\,x^2 + 9\,\_C1^2 + 10}, \left((-6\,\_C1\,x^2 - 6\,\_C1\right)\right.\right.$$

2.153 ODE No. 153

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

✓ **Mathematica** : cpu = 0.0136053 (sec), leaf count = 21

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

✓ **Maple** : cpu = 0.011 (sec), leaf count = 20

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

2.154 ODE No. 154

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

✓ **Mathematica** : cpu = 0.0132678 (sec), leaf count = 26

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

✓ **Maple** : cpu = 0.009 (sec), leaf count = 19

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

2.155 ODE No. 155

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

✓ **Mathematica** : cpu = 0.123744 (sec), leaf count = 46

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

✓ **Maple** : cpu = 0.07 (sec), leaf count = 14

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

2.156 ODE No. 156

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

✓ **Mathematica** : cpu = 0.0751822 (sec), leaf count = 21

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

✓ **Maple** : cpu = 0.017 (sec), leaf count = 20

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

2.157 ODE No. 157

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

✓ **Mathematica** : cpu = 0.173873 (sec), leaf count = 158

$$\left\{\left\{y(x) \to \frac{(x^2-1)\left(c_1\left(ax(x^2-1)^{\frac{a}{2}-1}P_{a-1}(x) + (x^2-1)^{\frac{a}{2}-1}(aP_a(x) - axP_{a-1}(x))\right) + ax(x^2-1)^{\frac{a}{2}-1}Q_{a-1}(\right.}{a\left((x^2-1)^{a/2}Q_{a-1}(x) + c_1(x^2-1)^{a/2}P_{a-1}(x)\right)}\right.\right.$$

✓ **Maple** : cpu = 0.168 (sec), leaf count = 231

$$\left\{y(x) = \frac{1}{4\,a\,(1+x)}\left(8\left((a-1/2)\,x - a/2 + 1/2\right)(1+x)\,\_C1\ \mathit{HeunC}\left(0, -2\,a+1, 0, 0, a^2 - a + 1/2, 2\,(1+x)^{-1}\right.\right.\right.$$

2.158 ODE No. 158

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

✓ **Mathematica** : cpu = 0.141665 (sec), leaf count = 31

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

✓ **Maple** : cpu = 0.014 (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 = 0.0890791 (sec), leaf count = 22

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

✓ **Maple** : cpu = 0.104 (sec), leaf count = 13

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

2.160 ODE No. 160

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

✓ **Mathematica** : cpu = 0.112763 (sec), leaf count = 27

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

✓ **Maple** : cpu = 0.022 (sec), leaf count = 21

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

2.161 ODE No. 161

$$\left(x^2-5x+6\right)y'(x)+x^2+3xy(x)-8y(x)=0$$

✓ **Mathematica** : cpu = 0.0144766 (sec), leaf count = 53

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

✓ **Maple** : cpu = 0.011 (sec), leaf count = 27

$$\left\{y(x)=\frac{1}{(x-2)^2(x-3)}\left(-\frac{x^4}{4}+\frac{2x^3}{3}+\_C1\right)\right\}$$

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 = 0.42141 (sec), leaf count = 133

$$\left\{\left\{y(x)\to -\frac{-ak-bk+2kx}{2(k+1)}+\frac{1}{2}\sqrt{\frac{-a^2k^2+2abk^2-b^2k^2}{(k+1)^2}}\tan\left(\frac{(k+1)\sqrt{\frac{-a^2k^2+2abk^2-b^2k^2}{(k+1)^2}}(\log(x-b)-\log(x-}{2(a-b)}\right.\right.\right.$$

✓ **Maple** : cpu = 0.152 (sec), leaf count = 58

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

2.163 ODE No. 163

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

✓ **Mathematica** : cpu = 0.0928981 (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 = 27

$$\left\{y(x) = -i\tan\left(\left(2\,ia - \_C1\,\sqrt{x}\right)\frac{1}{\sqrt{x}}\right)\sqrt{x}a\right\}$$

2.164 ODE No. 164

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

✓ **Mathematica** : cpu = 0.125241 (sec), leaf count = 131

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

✓ **Maple** : cpu = 0.149 (sec), leaf count = 100

$$\left\{y(x) = \left(-x\left(\_C1 - 2\sqrt{-\frac{a^2}{x}}\right)\cos\left(2\sqrt{-\frac{a^2}{x}}\right) - 2\sin\left(2\sqrt{-\frac{a^2}{x}}\right)\left(\_C1\sqrt{-\frac{a^2}{x}} + 1/2\right)x\right)\left(2\cos\left(2\sqrt{-\right.\right.\right.$$

2.165 ODE No. 165

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

✓ **Mathematica** : cpu = 0.111632 (sec), leaf count = 22

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

✓ **Maple** : cpu = 0.019 (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 = 0.13584 (sec), leaf count = 71

$$\left\{\left\{y(x)\to \frac{2x\left(-G_{2,2}^{2,0}\left(x\left|\begin{array}{c}-\frac{1}{2},\frac{1}{2}\\ -1,0\end{array}\right.\right)+\frac{c_1(E(x)-K(x))}{\pi x}\right)}{G_{2,2}^{2,0}\left(x\left|\begin{array}{c}\frac{1}{2},\frac{3}{2}\\ 0,0\end{array}\right.\right)+\frac{2c_1E(x)}{\pi}}\right\}\right\}$$

✓ **Maple** : cpu = 0.112 (sec), leaf count = 97

$$\left\{y(x)=\frac{x}{2\,x-2}\left(\mathit{LegendreQ}\left(-\frac{1}{2},1,\frac{2-x}{x}\right)\_C1-\mathit{LegendreQ}\left(\frac{1}{2},1,\frac{2-x}{x}\right)\_C1+\mathit{LegendreP}\left(-\frac{1}{2},1,\frac{2-x}{x}\right.\right.$$

2.167 ODE No. 167

$$3x^2y'(x)-x^2-3xy(x)-7y(x)^2=0$$

✓ **Mathematica** : cpu = 0.0777042 (sec), leaf count = 35

$$\left\{\left\{y(x)\to \frac{x\tan\left(\frac{1}{3}\left(\sqrt{7}\log(x)+3\sqrt{7}c_1\right)\right)}{\sqrt{7}}\right\}\right\}$$

✓ **Maple** : cpu = 0.029 (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

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

✓ **Mathematica** : cpu = 0.176383 (sec), leaf count = 234

$$\left\{\left\{y(x)\to \frac{3\left(x^2-4\right)\left(c_1\left(\frac{xP_{-\frac{1}{6}}^{\frac{1}{3}}\left(\frac{x}{2}\right)}{6(x^2-4)^{11/12}}+\frac{\sqrt[12]{x^2-4}\left(\frac{1}{2}P_{\frac{5}{6}}^{\frac{1}{3}}\left(\frac{x}{2}\right)-\frac{5}{12}xP_{-\frac{1}{6}}^{\frac{1}{3}}\left(\frac{x}{2}\right)\right)}{2\left(\frac{x^2}{4}-1\right)}\right)+\frac{xQ_{-\frac{1}{6}}^{\frac{1}{3}}\left(\frac{x}{2}\right)}{6(x^2-4)^{11/12}}+\frac{\sqrt[12]{x^2-4}\left(\frac{1}{2}Q_{\frac{5}{6}}^{\frac{1}{3}}\left(\frac{x}{2}\right)-\frac{5}{12}xQ^{\frac{1}{3}}_{-}\right.}{2\left(\frac{x^2}{4}-1\right)}}{\sqrt[12]{x^2-4}Q_{-\frac{1}{6}}^{\frac{1}{3}}\left(\frac{x}{2}\right)+c_1\sqrt[12]{x^2-4}P_{-\frac{1}{6}}^{\frac{1}{3}}\left(\frac{x}{2}\right)}\right.\right.$$

✓ **Maple** : cpu = 0.123 (sec), leaf count = 140

$$\left\{y(x) = -3\,(x+2)\left(HeunC\left(0, 4/3, -1/3, 0, \frac{25}{36}, 4\,(x+2)^{-1}\right)\_C1 - 1/3\,(-x/4-1/2)^{4/3}\,HeunC\left(0, -4/3, -1\right.\right.\right.$$

2.169 ODE No. 169

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

✓ **Mathematica** : cpu = 1.88647 (sec), leaf count = 149

$$\text{Solve}\left[-\frac{c}{\sqrt{-a(ax+b)^2}} = \frac{2\exp\left(\frac{1}{2}\left(-\frac{c}{\sqrt{-a(ax+b)^2}} - \frac{\left(-a(ax+b)^2\right)^{3/2}}{ay(x)(ax+b)^3}\right)^2\right)}{\sqrt{2\pi}\,\text{erfi}\left(\frac{-\frac{c}{\sqrt{-a(ax+b)^2}} - \frac{\left(-a(ax+b)^2\right)^{3/2}}{ay(x)(ax+b)^3}}{\sqrt{2}}\right) + 2c_1}, y(x)\right]$$

✓ **Maple** : cpu = 0.128 (sec), leaf count = 153

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

2.170 ODE No. 170

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

✓ **Mathematica** : cpu = 0.0747732 (sec), leaf count = 43

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

✓ **Maple** : cpu = 0.014 (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 = 0.0669753 (sec), leaf count = 17

$$\left\{\left\{y(x)\to \frac{x^2}{1+c_1x}\right\}\right\}$$

✓ **Maple** : cpu = 0.01 (sec), leaf count = 15

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

2.172 ODE No. 172

$$x^3y'(x) + x^4\left(-y(x)^2\right) + x^2y(x) + 20 = 0$$

✓ **Mathematica** : cpu = 0.0767786 (sec), leaf count = 35

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

✓ **Maple** : cpu = 0.201 (sec), leaf count = 26

$$\left\{y(x) = \frac{5\,x^9+4\,\_C1}{\left(-x^9+\_C1\right)x^2}\right\}$$

2.173 ODE No. 173

$$x^3y'(x) + x^6\left(-y(x)^2\right) - (2x-3)x^2y(x) + 3 = 0$$

✓ **Mathematica** : cpu = 0.0859405 (sec), leaf count = 29

$$\left\{\left\{y(x)\to -\frac{3}{x^3}+\frac{1}{x^3\left(\frac{1}{4}+c_1e^{4x}\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.037 (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

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

✓ **Mathematica** : cpu = 0.0081898 (sec), leaf count = 17

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

✓ **Maple** : cpu = 0.003 (sec), leaf count = 13

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

2.175 ODE No. 175

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

✓ **Mathematica** : cpu = 0.0179409 (sec), leaf count = 24

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

✓ **Maple** : cpu = 0.015 (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 = 0.181387 (sec), leaf count = 82

$$\left\{\left\{y(x)\to\frac{x\left(-2xG_{2,2}^{2,0}\left(x^2\middle|\begin{array}{c}-\frac{1}{2},\frac{1}{2}\\-1,0\end{array}\right)+\frac{2c_1(E(x^2)-K(x^2))}{\pi x}\right)}{G_{2,2}^{2,0}\left(x^2\middle|\begin{array}{c}\frac{1}{2},\frac{3}{2}\\0,0\end{array}\right)+\frac{2c_1E(x^2)}{\pi}}\right\}\right\}$$

✓ **Maple** : cpu = 0.073 (sec), leaf count = 30

$$\left\{y(x)=\frac{\_C1\ EllipticCE(x)+EllipticE(x)-EllipticK(x)}{\_C1\ EllipticCE\,(x)-\_C1\ EllipticCK\,(x)+EllipticE\,(x)}\right\}$$

2.177 ODE No. 177

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

✓ **Mathematica** : cpu = 0.104475 (sec), leaf count = 22

$$\left\{\left\{y(x)\to -\frac{x^2}{c_1x-1-c_1}\right\}\right\}$$

✓ **Maple** : cpu = 0.021 (sec), leaf count = 17

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

2.178 ODE No. 178

$$2\left(x^2-1\right)xy'(x)+2\left(x^2-1\right)y(x)^2-\left(3x^2-5\right)y(x)+x^2-3=0$$

✓ **Mathematica** : cpu = 0.144119 (sec), leaf count = 49

$$\left\{\left\{y(x)\to 1+\frac{\sqrt{x}}{\sqrt{1-x^2}\left(2\sqrt{x}\,{}_2F_1\left(\frac{1}{4},\frac{1}{2};\frac{5}{4};x^2\right)+c_1\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.079 (sec), leaf count = 61

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

2.179 ODE No. 179

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

✓ **Mathematica** : cpu = 0.555459 (sec), leaf count = 2833

$$\left\{\left\{y(x)\to\frac{3\left(x^2-1\right)\left(c_1\left(\frac{e^{\int_1^x \text{Root}\left[125K[1]^8-164K[1]^6+70K[1]^4-20K[1]^2+\left(1296K[1]^{12}-5184K[1]^{10}+7776K[1]^8-5184K[1]^6+1296K[1]^4\right)\#1^4+(\right.}}{}\right.\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.108 (sec), leaf count = 112

$$\left\{y(x)=35\,\frac{1}{\sqrt[3]{x}\left(8\,x^{2/3}{}_2\mathrm{F}_1(5/6,7/6;\,4/3;\,x^2)\_C1+8\,{}_2\mathrm{F}_1(1/2,5/6;\,2/3;\,x^2)\right)}\left(\_C1\left(\frac{8\,x^2}{7}-\frac{16}{35}\right){}_2\mathrm{F}_1(5/6,7/6;\right.\right.$$

2.180 ODE No. 180

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

✓ **Mathematica** : cpu = 0.281941 (sec), leaf count = 132

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

✓ **Maple** : cpu = 0.055 (sec), leaf count = 58

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

2.181 ODE No. 181

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

✓ **Mathematica** : cpu = 0.0846795 (sec), leaf count = 347

$$\Bigg\{\Bigg\{y(x) \to -\frac{\frac{i\sqrt{\frac{2}{\pi}}c_1\sinh\left(\frac{\sqrt{-a}}{x}\right)}{\sqrt{-\frac{i\sqrt{-a}}{x}}} + \frac{i\sqrt{-a}\Bigg(-\frac{2\sqrt{\frac{2}{\pi}}\left(i\sinh\left(\frac{\sqrt{-a}}{x}\right) + \frac{i\sqrt{-a}x\cosh\left(\frac{\sqrt{-a}}{x}\right)}{a}\right)}{\sqrt{-\frac{i\sqrt{-a}}{x}}} - \frac{\sqrt{\frac{2}{\pi}}c_1\cosh\left(\frac{\sqrt{-a}}{x}\right)}{\sqrt{-\frac{i\sqrt{-a}}{x}}} + \frac{\sqrt{\frac{2}{\pi}}c_1\Bigg(-\frac{\sqrt{-a}x\sinh\left(\frac{\sqrt{-a}}{x}\right)}{a} -}{\sqrt{-\frac{i\sqrt{-a}}{x}}}}{x}}{2x\left(\frac{\sqrt{\frac{2}{\pi}}\cosh\left(\frac{\sqrt{-a}}{x}\right)}{\sqrt{-\frac{i\sqrt{-a}}{x}}} - \frac{i\sqrt{\frac{2}{\pi}}c_1\sinh\left(\frac{\sqrt{-a}}{x}\right)}{\sqrt{-\frac{i\sqrt{-a}}{x}}}\right)}$$

✓ **Maple** : cpu = 0.054 (sec), leaf count = 28

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

2.182 ODE No. 182

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

✓ **Mathematica** : cpu = 0.198841 (sec), leaf count = 96

$$\left\{\left\{y(x)\to -\frac{\left(x^3-1\right)\left(\frac{x^4}{\left(1-x^3\right)^{5/3}}+\frac{x}{\left(1-x^3\right)^{2/3}}+\frac{2c_1x^2}{\left(1-x^3\right)^{5/3}}\right)}{2\left(\frac{x^2}{2\left(1-x^3\right)^{2/3}}+\frac{c_1}{\left(1-x^3\right)^{2/3}}\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.101 (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 = 0.0144586 (sec), leaf count = 22

$$\left\{\left\{y(x)\to\frac{c_1x^2}{\sqrt[3]{1-2x^3}}\right\}\right\}$$

✓ **Maple** : cpu = 0.008 (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 = 1.09594 (sec), leaf count = 704

$$\left\{\left\{y(x)\to -\frac{-\frac{2a\sqrt{ax^2+bx+c}\exp\left(-\frac{\sqrt{4ac-b^2}\sqrt{1-\frac{4A}{b^2-4ac}}\tan^{-1}\left(\frac{2ax+b}{\sqrt{4ac-b^2}}\right)}{\sqrt{b^2-4ac}}\right)}{\left(b^2-4ac\right)\left(\frac{(2ax+b)^2}{4ac-b^2}+1\right)}+\frac{(2ax+b)\exp\left(-\frac{\sqrt{4ac-b^2}\sqrt{1-\frac{4A}{b^2-4ac}}\tan^{-1}\left(\frac{2ax+b}{\sqrt{4ac-b^2}}\right)}{\sqrt{b^2-4ac}}\right.}{2\sqrt{b^2-4ac}\sqrt{1-\frac{4A}{b^2-4ac}}\sqrt{ax^2+bx+c}}}{-\frac{\sqrt{ax^2+bx+c}\exp\left(-\frac{\sqrt{4ac-b^2}\sqrt{1-\frac{4A}{b^2-4ac}}\tan^{-1}\left(\frac{2ax+b}{\sqrt{4ac-b^2}}\right)}{\sqrt{b^2-4ac}}\right)}{\sqrt{b^2-4ac}\sqrt{1-\frac{4A}{b^2-4ac}}}}\right.\right.$$

✓ **Maple** : cpu = 0.328 (sec), leaf count = 493

$$\left\{ y(x) = 2\frac{a}{\sqrt{-4\,ac+b^2}\left(2\,ax+b+i\sqrt{4\,ac-b^2}\right)\left(i\sqrt{4\,ac-b^2}-2\,ax-b\right)}\left(\left(i\sqrt{\frac{-4\,ac+b^2-4\,A}{a^2}}a\sqrt{4\,ac-b^2}\right.\right.\right.$$

2.185 ODE No. 185

$$x^7y'(x)+5x^3y(x)^2+2\left(x^2+1\right)y(x)^3=0$$

✓ **Mathematica** : cpu = 0.373123 (sec), leaf count = 123

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

✓ **Maple** : cpu = 0.033 (sec), leaf count = 63

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

2.186 ODE No. 186

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

✓ **Mathematica** : cpu = 0.208014 (sec), leaf count = 19

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

✓ **Maple** : cpu = 0.036 (sec), leaf count = 17

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

2.187 ODE No. 187

$$-ay(x)^2 - bx^{2n-2} + x^n y'(x) = 0$$

✓ **Mathematica** : cpu = 0.202499 (sec), leaf count = 328

$$\left\{\left\{y(x) \to -\frac{x^n\left(\frac{1}{2}\sqrt{a}\sqrt{b}\left(\sqrt{\frac{(n-1)^2}{ab}-4}-\frac{n-1}{\sqrt{a}\sqrt{b}}\right)x^{\frac{1}{2}\sqrt{a}\sqrt{b}\left(\sqrt{\frac{(n-1)^2}{ab}-4}-\frac{n-1}{\sqrt{a}\sqrt{b}}\right)-1}+\frac{1}{2}\sqrt{a}\sqrt{b}c_1\left(-\frac{n-1}{\sqrt{a}\sqrt{b}}-\sqrt{\frac{(n-1)^2}{ab}\cdots}\right.\right.}{a\left(x^{\frac{1}{2}\sqrt{a}\sqrt{b}\left(\sqrt{\frac{(n-1)^2}{ab}-4}-\frac{n-1}{\sqrt{a}\sqrt{b}}\right)}+c_1x^{\frac{1}{2}\sqrt{a}\sqrt{b}\left(-\frac{n-1}{\sqrt{a}\sqrt{b}}-\sqrt{\frac{(n-1)^2}{ab}-4}\right)}\right)}\right.\right.$$

✓ **Maple** : cpu = 0.057 (sec), leaf count = 60

$$\left\{y(x) = \frac{x^{n-1}}{2a}\left(-\tan\left(\frac{-\ln(x)+\_C1}{2}\sqrt{4ab-n^2+2n-1}\right)\sqrt{4ab-n^2+2n-1}+n-1\right)\right\}$$

2.188 ODE No. 188

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

✗ **Mathematica** : cpu = 14.0018 (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 = 0.023 (sec), leaf count = 32

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

2.189 ODE No. 189

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

✓ **Mathematica** : cpu = 0.342692 (sec), leaf count = 91

$$\text{Solve}\left[\int_1^{\left(\frac{ax^{-(m+1)n}}{b}\right)^{\frac{1}{n}}y(x)}\frac{1}{K[1]^n-\left(\frac{b^{1-n}(m+1)^n}{a}\right)^{\frac{1}{n}}K[1]+1}dK[1] = bx^{m+1}\log(x)\left(\frac{ax^{-(m+1)n}}{b}\right)^{\frac{1}{n}}+c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.266 (sec), leaf count = 60

$$\left\{\int_{\_b}^{y(x)}-\frac{x^{mn}x^n}{x^n\left(x^mxb-(m+1)\_a\right)x^{mn}+a\_a^nx^mx}d\_a+\ln(x)-\_C1=0\right\}$$

2.190 ODE No. 190

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

✓ **Mathematica** : cpu = 0.0955185 (sec), leaf count = 173

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

✓ **Maple** : cpu = 0.006 (sec), leaf count = 29

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

2.191 ODE No. 191

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

✓ **Mathematica** : cpu = 0.113162 (sec), leaf count = 39

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

✓ **Maple** : cpu = 0.016 (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 = 0.664911 (sec), leaf count = 168

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

✓ **Maple** : cpu = 0.014 (sec), leaf count = 36

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

2.193 ODE No. 193

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

✓ **Mathematica** : cpu = 0.0135474 (sec), leaf count = 16

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

✓ **Maple** : cpu = 0.006 (sec), leaf count = 14

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

2.194 ODE No. 194

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

✓ **Mathematica** : cpu = 0.16626 (sec), leaf count = 98

$$\left\{\left\{y(x)\to-\frac{x\left(\frac{e^{\frac{\log^2(x)}{2}}\log^3(x)}{2x}+\frac{e^{\frac{\log^2(x)}{2}}\log(x)}{x}+\frac{c_1e^{\frac{\log^2(x)}{2}}\log(x)}{x}\right)}{\frac{1}{2}e^{\frac{\log^2(x)}{2}}\log^2(x)+c_1e^{\frac{\log^2(x)}{2}}}\right\}\right\}$$

✓ **Maple** : cpu = 0.021 (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 = 0.147124 (sec), leaf count = 27

$$\left\{\left\{y(x)\to-4\csc(x)+\frac{\csc(x)}{\frac{1}{5}+c_1e^{5x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.089 (sec), leaf count = 28

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

2.196 ODE No. 196

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

✓ **Mathematica** : cpu = 0.204179 (sec), leaf count = 53

$$\left\{\left\{y(x) \to e^{-2\tanh^{-1}\left(\tan\left(\frac{x}{2}\right)\right)}\left(\sin(x) + 4\log\left(\cos\left(\frac{x}{2}\right) - \sin\left(\frac{x}{2}\right)\right)\right) + c_1 e^{-2\tanh^{-1}\left(\tan\left(\frac{x}{2}\right)\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.106 (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 = 0.106088 (sec), leaf count = 98

$$\left\{\left\{y(x) \to \frac{1}{\sqrt[3]{-\sin(x) - 2\sin(x)\cos^2(x) + c_1\cos^3(x)}}\right\}, \left\{y(x) \to -\frac{\sqrt[3]{-1}}{\sqrt[3]{-\sin(x) - 2\sin(x)\cos^2(x) + c_1\cos^3(x)}}\right\}$$

✓ **Maple** : cpu = 0.09 (sec), leaf count = 237

$$\left\{y(x) = \frac{1}{\_C1\ (\sin(x))^4 + 2\cos(x)(\sin(x))^3 - 2\_C1\ (\sin(x))^2 - 3\cos(x)\sin(x) + \_C1}\sqrt[3]{\cos(x)\left(\_C1\ (\sin\right.}$$

2.198 ODE No. 198

$$\sin(x)\cos(x)y'(x) - y(x) - \sin^3(x) = 0$$

✓ **Mathematica** : cpu = 0.0199205 (sec), leaf count = 15

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

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

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

2.199 ODE No. 199

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

✓ **Mathematica** : cpu = 0.203055 (sec), leaf count = 15

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

✓ **Maple** : cpu = 0.142 (sec), leaf count = 102

$$\left\{y(x) = \frac{1}{2}\arctan\left(2\frac{\_C1\,(\sin(4x) + 2\sin(2x))}{-\_C1^2\cos(4x) + \_C1^2 + 4\cos(2x) + \cos(4x) + 3}, \frac{\_C1^2\cos(4x) - \_C1^2 + 4\cos(2x)}{\_C1^2\cos(4x) - \_C1^2 - 4\cos(2x)}\right.\right.$$

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 = 0.10867 (sec), leaf count = 77

$$\left\{\left\{y(x) \to \frac{\frac{1}{2}aAx^2 - \frac{1}{2}aAx\sin(2x) - \frac{1}{4}aA\cos(2x) + Acx^2}{a\cos(2x) - a - 2b} + \frac{c_1}{a\cos(2x) - a - 2b}\right\}\right\}$$

✓ **Maple** : cpu = 0.053 (sec), leaf count = 53

$$\left\{y(x) = \frac{-Aa\cos(2x) - 2Axa\sin(2x) + 2x^2(a + 2c)A - 8\_C1}{4a\cos(2x) - 4a - 8b}\right\}$$

2.201 ODE No. 201

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

✓ **Mathematica** : cpu = 0.134355 (sec), leaf count = 39

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

✓ **Maple** : cpu = 0.038 (sec), leaf count = 23

$$\left\{y(x) = i\tan\left(-i\int\sqrt{f(x)}\,dx + \_C1\right)\sqrt{f(x)}\right\}$$

2.202 ODE No. 202

$$f(x)y'(x) + g(x)\mathrm{tg}(y(x)) + h(x) = 0$$

✗ **Mathematica** : cpu = 20.3533 (sec), leaf count = 0 , could not solve

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

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

```
dsolve(f(x)*diff(y(x),x)+g(x)*tg(y(x))+h(x) = 0,y(x))
```

2.203 ODE No. 203

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

✗ **Mathematica** : cpu = 2.08955 (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 = 0.0749835 (sec), leaf count = 70

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

✓ **Maple** : cpu = 0.217 (sec), leaf count = 92

$$\left\{y(x) = \mathit{RootOf}\left(\_Z^2 - e^{\mathit{RootOf}\left(x^2\left(\left(\tanh\left(\frac{2\_C1+\_Z+2\ln(x)}{2a}\sqrt{(a-2)(a+2)}\right)\right)^2 a^2 - 4\left(\tanh\left(1/2\frac{\sqrt{(a-2)(a+2)}(2\_C1+\_Z+2\ln(x))}{a}\right)\right.\right.\right.}\right.\right.$$

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 = 16.0191 (sec), leaf count = 0 , could not solve

```
DSolve[((-1 + a^2)*x)/4 + b*x^n + a*y[x] + y[x]*Derivative[1][y][x] == 0, y[x], x]
```

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

```
dsolve(y(x)*diff(y(x),x)+a*y(x)+1/4*(a^2-1)*x+b*x^n = 0,y(x))
```

2.206 ODE No. 206

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

✗ **Mathematica** : cpu = 26.1093 (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 = 0.0840009 (sec), leaf count = 47

$$\left\{\left\{y(x)\to -\sqrt{-4x^2+c_1e^{-2x}}\right\},\left\{y(x)\to \sqrt{-4x^2+c_1e^{-2x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.016 (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 = 0.207979 (sec), leaf count = 118

$$\left\{\left\{y(x)\to -\frac{\sqrt{4a^2c_1e^{-2ax}+4ab\cos(c+x)+c_1e^{-2ax}+2b\sin(c+x)}}{\sqrt{4a^2+1}}\right\},\left\{y(x)\to \frac{\sqrt{4a^2c_1e^{-2ax}+4ab\cos(c+x}}{\sqrt{4a^2}}\right.\right.$$

✓ **Maple** : cpu = 0.05 (sec), leaf count = 106

$$\left\{y(x)=\frac{1}{4\,a^2+1}\sqrt{16\,\left(a^2+1/4\right)^2\_C1\,e^{-2\,ax}+16\,\left(a^2+1/4\right)\left(a\cos\left(x+c\right)+1/2\,\sin\left(x+c\right)\right)b},y(x)=-\frac{1}{4\,a^2+}\right.$$

2.209 ODE No. 209

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

✓ **Mathematica** : cpu = 0.104542 (sec), leaf count = 84

$$\left\{\left\{y(x) \to -\frac{\sqrt{a^2x^2 + 2a^2c_1x + a^2c_1{}^2 - b}}{\sqrt{a}}\right\}, \left\{y(x) \to \frac{\sqrt{a^2x^2 + 2a^2c_1x + a^2c_1{}^2 - b}}{\sqrt{a}}\right\}\right\}$$

✓ **Maple** : cpu = 0.01 (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 = 0.0735028 (sec), leaf count = 47

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

✓ **Maple** : cpu = 0.016 (sec), leaf count = 33

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

2.211 ODE No. 211

$$y(x)y'(x) - xe^{\frac{x}{y(x)}} = 0$$

✓ **Mathematica** : cpu = 0.203383 (sec), leaf count = 41

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

✓ **Maple** : cpu = 0.03 (sec), leaf count = 31

$$\left\{y(x) = \mathit{RootOf}\left(-\int^{\_Z} \frac{\_a}{-\_a^2 + \mathrm{e}^{\_a^{-1}}} d\_a + \ln(x) + \_C1\right) x\right\}$$

2.212 ODE No. 212

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

✓ **Mathematica** : cpu = 0.369098 (sec), leaf count = 95

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

✓ **Maple** : cpu = 0.098 (sec), leaf count = 30

$$\left\{\int_{\_b}^{y(x)}\frac{\_a}{f\left(\_a^2+x^2\right)}\,\mathrm{d}\_a+\int g(x)\,\mathrm{d}x-\_C1=0\right\}$$

2.213 ODE No. 213

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

✓ **Mathematica** : cpu = 0.0993342 (sec), leaf count = 71

$$\text{Solve}\left[\frac{1}{2}\log\left(\frac{x^2-y(x)^2+(x-3)y(x)-x-1}{(x-1)^2}\right)+\log(1-x)=\frac{\tanh^{-1}\left(\frac{y(x)+2x-1}{\sqrt{5}(y(x)+1)}\right)}{\sqrt{5}}+c_1,y(x)\right]$$

✓ **Maple** : cpu = 0.541 (sec), leaf count = 66

$$\left\{-\frac{1}{2}\ln\left(\frac{(y(x))^2+(-x+3)\,y(x)-x^2+x+1}{(x-1)^2}\right)-\frac{\sqrt{5}}{5}Artanh\left(\frac{(-2\,y(x)-3+x)\sqrt{5}}{5\,x-5}\right)-\ln(x-1)-\_C1=0\right.$$

2.214 ODE No. 214

$$(y(x)+x-1)y'(x)-y(x)+2x+3=0$$

✓ **Mathematica** : cpu = 0.105227 (sec), leaf count = 78

$$\text{Solve}\left[2\sqrt{2}\tan^{-1}\left(\frac{-y(x)+2x+3}{\sqrt{2}(y(x)+x-1)}\right)=2\log\left(\frac{6x^2+3y(x)^2-10y(x)+8x+11}{(3x+2)^2}\right)+4\log(3x+2)+3c_1,y(x)\right]$$

✓ **Maple** : cpu = 0.135 (sec), leaf count = 48

$$\left\{y(x)=\frac{5}{3}+\frac{(-3\,x-2)\sqrt{2}\tan\left(RootOf\left(\sqrt{2}\ln\left(2\left((\tan(\_Z))^2+1\right)(3\,x+2)^2\right)+2\sqrt{2}\_C1-2\_Z\right)\right)}{3}\right\}$$

2.215 ODE No. 215

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

✓ **Mathematica** : cpu = 0.121931 (sec), leaf count = 80

$$\text{Solve}\left[6\sqrt{3}\tan^{-1}\left(\frac{4-3y(x)}{\sqrt{3}(y(x)+2x-2)}\right)=3\log\left(\frac{3x^2+3y(x)^2+3(x-3)y(x)-6x+7}{(1-3x)^2}\right)+6\log(3x-1)+2c_1,\right.$$

✓ **Maple** : cpu = 0.16 (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 = 0.0999229 (sec), leaf count = 82

$$\text{Solve}\left[6\sqrt{3}\tan^{-1}\left(\frac{3y(x)+1}{\sqrt{3}(-y(x)+2x-1)}\right)=3\log\left(\frac{3x^2+3y(x)^2-3(x-1)y(x)-3x+1}{(1-3x)^2}\right)+6\log(3x-1)+2c\right.$$

✓ **Maple** : cpu = 0.151 (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 = 0.0184409 (sec), leaf count = 29

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

✓ **Maple** : cpu = 0.028 (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 = 0.159466 (sec), leaf count = 257

$$\left\{\left\{y(x)\to x^2+\frac{1}{-\frac{1}{2x^2}-\frac{\frac{1}{2}-\frac{i}{2}}{\sqrt{2}x^2\sqrt{x^2\cosh\left(\frac{2c_1}{9}\right)+x^2\sinh\left(\frac{2c_1}{9}\right)-i}}}\right\},\left\{y(x)\to x^2+\frac{1}{-\frac{1}{2x^2}+\frac{\frac{1}{2}-\frac{i}{2}}{\sqrt{2}x^2\sqrt{x^2\cosh\left(\frac{2c_1}{9}\right)+x^2\sinh\left(\frac{2c_1}{9}\right.}}}\right.\right.$$

✓ **Maple** : cpu = 0.144 (sec), leaf count = 57

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

2.219 ODE No. 219

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

✗ **Mathematica** : cpu = 300.507 (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 = 0.0735687 (sec), leaf count = 57

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

✓ **Maple** : cpu = 0.018 (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 = 0.0181474 (sec), leaf count = 35

$$\left\{\left\{y(x)\to \frac{1}{2}(-x-1)+\frac{2}{3}\left(1+W\left(-e^{\frac{9x}{4}-1+c_1}\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.046 (sec), leaf count = 21

$$\left\{y(x)=-\frac{x}{2}+\frac{2}{3}\mathit{lambertW}\left(\frac{e^{-\frac{1}{4}}\_C1}{4}e^{\frac{9x}{4}}\right)+\frac{1}{6}\right\}$$

2.222 ODE No. 222

$$(2y(x)+x+7)y'(x)-y(x)+2x+4=0$$

✓ **Mathematica** : cpu = 0.0547639 (sec), leaf count = 65

$$\text{Solve}\left[2\log\left(\frac{4(x^2+y(x)^2+4y(x)+6x+13)}{5(x+3)^2}\right)+2\tan^{-1}\left(\frac{y(x)-2(x+2)}{2y(x)+x+7}\right)+4\log(x+3)+5c_1=0,y(x)\right]$$

✓ **Maple** : cpu = 0.049 (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 = 0.0217317 (sec), leaf count = 55

$$\left\{\left\{y(x)\to\frac{1}{2}\left(x-\sqrt{5x^2-4e^{c_1}}\right)\right\},\left\{y(x)\to\frac{1}{2}\left(x+\sqrt{5x^2-4e^{c_1}}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.129 (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 = 0.0174125 (sec), leaf count = 29

$$\left\{\left\{y(x) \to 3x - \frac{2}{5}\left(1 + W\left(-e^{\frac{25x}{4}-1+c_1}\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.045 (sec), leaf count = 35

$$\left\{y(x) = \frac{1}{5}e^{-lambertW\left(-\frac{e^{-1}}{2}e^{\frac{25\,x}{4}}e^{-\frac{25\_C1}{4}}\right)+\frac{25\,x}{4}-1-\frac{25\_C1}{4}} + 3\,x - \frac{2}{5}\right\}$$

2.225 ODE No. 225

$$(4y(x) + 2x + 3)y'(x) - 2y(x) - x - 1 = 0$$

✓ **Mathematica** : cpu = 0.015803 (sec), leaf count = 33

$$\left\{\left\{y(x) \to \frac{1}{4}(-2x - 3) + \frac{1}{8}(1 + W(-e^{8x-1+c_1}))\right\}\right\}$$

✓ **Maple** : cpu = 0.042 (sec), leaf count = 20

$$\left\{y(x) = -\frac{x}{2} + \frac{lambertW\left(e^{5}(e^{x})^{8}\_C1\right)}{8} - \frac{5}{8}\right\}$$

2.226 ODE No. 226

$$(4y(x) - 2x - 3)y'(x) + 2y(x) - x - 1 = 0$$

✓ **Mathematica** : cpu = 0.0163141 (sec), leaf count = 35

$$\left\{\left\{y(x) \to \frac{1}{4}(2x + 3) + \frac{1}{8}(-1 - W(-e^{8x-1+c_1}))\right\}\right\}$$

✓ **Maple** : cpu = 0.038 (sec), leaf count = 21

$$\left\{y(x) = \frac{x}{2} - \frac{lambertW\left(-e^{5}(e^{x})^{8}\_C1\right)}{8} + \frac{5}{8}\right\}$$

2.227 ODE No. 227

$$(4y(x) - 3x - 5)y'(x) - 3y(x) + 7x + 2 = 0$$

✓ **Mathematica** : cpu = 0.0131208 (sec), leaf count = 107

$$\left\{\left\{y(x) \to \frac{1}{4}(3x+5) - \frac{1}{2}i\sqrt{-2\left(-\frac{7x^2}{2} - 2x\right) - \frac{1}{4}(3x+5)^2 - 4c_1}\right\}, \left\{y(x) \to \frac{1}{4}(3x+5) + \frac{1}{2}i\sqrt{-2\left(-\frac{7x^2}{2} - 2\right.}\right.\right.$$

✓ **Maple** : cpu = 0.143 (sec), leaf count = 33

$$\left\{y(x) = \frac{1}{76\_C1}\left(-\sqrt{4 - 6859\left(x - \frac{7}{19}\right)^2 \_C1^2} + (57\,x + 95)\_C1\right)\right\}$$

2.228 ODE No. 228

$$(4y(x) + 11x - 11)y'(x) - 25y(x) - 8x + 62 = 0$$

✓ **Mathematica** : cpu = 0.24987 (sec), leaf count = 3357

$$\left\{\left\{y(x) \to \frac{\quad}{4\left(-\frac{\quad}{81(9x-1)\left(81\cosh\left(\frac{3c_1}{8}\right)x^2 + 81\sinh\left(\frac{3c_1}{8}\right)x^2 - 18\cosh\left(\frac{3c_1}{8}\right)x - 18\sinh\left(\frac{3c_1}{8}\right)x + \cosh\left(\frac{3c_1}{8}\right) + \sinh\left(\frac{3c_1}{8}\right) - 1\right)\sqrt[3]{-25828032}}\right.}\right.\right.$$

✓ **Maple** : cpu = 0.342 (sec), leaf count = 271

$$\left\{y(x) = \left((-76\,x + 28)\sqrt[3]{64 - 8748\,(9\,x-1)^2\_C1 + 108\sqrt{43046721}\sqrt{\left(-\frac{32}{177147} + (x - 1/9)^2\_C1\right)\_C1\,(x}}\right.\right.$$

2.229 ODE No. 229

$$(12y(x) - 5x - 8)y'(x) - 5y(x) + 2x + 3 = 0$$

✓ **Mathematica** : cpu = 0.0146681 (sec), leaf count = 121

$$\left\{\left\{y(x) \to \frac{1}{12}(5x+8) - \frac{i\sqrt{-24\left(-\frac{x^2}{12} - \frac{x}{4}\right) - \frac{1}{12}(5x+8)^2 - 12c_1}}{2\sqrt{3}}\right\}, \left\{y(x) \to \frac{1}{12}(5x+8) + \frac{i\sqrt{-24\left(-\frac{x^2}{12} - \frac{x}{4}\right.}}{}\right.\right.$$

✓ **Maple** : cpu = 0.143 (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 = 0.15964 (sec), leaf count = 98

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

✓ **Maple** : cpu = 0.036 (sec), leaf count = 100

$$\left\{y(x) = \frac{1}{a}\sqrt{e^{2\,\frac{bx}{a}}a\left(\_C1\,a - 2\int\left(e^{\frac{bx}{a}}\right)^2 f(x)\,dx\right)}\left(e^{2\,\frac{bx}{a}}\right)^{-1}, y(x) = -\frac{1}{a}\sqrt{e^{2\,\frac{bx}{a}}a\left(\_C1\,a - 2\int\left(e^{\frac{bx}{a}}\right)^2 f(x)\,d\right.}\right.$$

2.231 ODE No. 231

$$y'(x)(ay(x) + bx + c) + \alpha y(x) + \beta x + \gamma = 0$$

✓ **Mathematica** : cpu = 1.89708 (sec), leaf count = 252

$$\text{Solve}\left[\frac{(\alpha-b)^2\left(-\log\left(\frac{(ay(x)+bx+c)^2\left(-\frac{(\alpha(bx+c)-a(\beta x+\gamma))\left(a(\alpha-b)y(x)+a(\beta x+\gamma)+b^2(-x)-bc\right)}{(ay(x)+bx+c)^2}+a\beta-\alpha b\right)}{(\alpha(bx+c)-a(\beta x+\gamma))^2}\right)-\frac{2\tan^{-1}\left(\frac{\frac{2a(\beta x+\gamma)-2\alpha \ldots}{ay(x)+bx \ldots}}{(\alpha-b)\sqrt{\frac{4(\ldots}{(\ldots}}}\right.}{\sqrt{\frac{4(a\beta-\alpha b)}{(\alpha-b)^2}\ldots}}\right.}{2(a\beta-\alpha b)}\right.$$

✓ **Maple** : cpu = 0.185 (sec), leaf count = 178

$$\left\{y(x)=\frac{1}{-a\beta+b\alpha}\left(-b\gamma+\beta\,c+\frac{x(a\beta-b\alpha)+a\gamma-\alpha\,c}{2\,a}\left(\sqrt{4\,a\beta-\alpha^2-2\,b\alpha-b^2}\tan\left(\mathit{RootOf}\left(\sqrt{4\,a\beta-\alpha^2-\ldots}\right.\right.\right.\right.\right.$$

2.232 ODE No. 232

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

✓ **Mathematica** : cpu = 0.0699143 (sec), leaf count = 56

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

✓ **Maple** : cpu = 0.013 (sec), leaf count = 39

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

2.233 ODE No. 233

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

✓ **Mathematica** : cpu = 0.165436 (sec), leaf count = 38

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

✓ **Maple** : cpu = 0.021 (sec), leaf count = 30

$$\left\{y(x)=\sqrt{-2\,a\sin(x)+\_C1}\,x,y(x)=-\sqrt{-2\,a\sin(x)+\_C1}\,x\right\}$$

2.234 ODE No. 234

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

✗ **Mathematica** : cpu = 26.0071 (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 = 0.0600585 (sec), leaf count = 40

$$\text{Solve}\left[x = -\frac{ae^{-\frac{y(x)}{b}}\text{Ei}\left(\frac{y(x)}{b}\right)}{b} + c_1e^{-\frac{y(x)}{b}}, y(x)\right]$$

✓ **Maple** : cpu = 0.044 (sec), leaf count = 30

$$\left\{\_C1 + \left(-e^{\frac{y(x)}{b}}bx + aEi\left(1, -\frac{y(x)}{b}\right)\right)^{-1} = 0\right\}$$

2.236 ODE No. 236

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

✓ **Mathematica** : cpu = 0.12049 (sec), leaf count = 114

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

✓ **Maple** : cpu = 0.052 (sec), leaf count = 141

$$\left\{y(x) = \left(-(x+4)^{\frac{3}{2}}\sqrt{\frac{\_C1\ (x+4)-4}{x+4}}x - 16\sqrt{x} - 4x^{3/2}\right)\left(-(x+4)^{\frac{3}{2}}\sqrt{\frac{\_C1\ (x+4)-4}{x+4}} + 4\sqrt{x} + x^{\frac{3}{2}}\right)^{-1}\right.$$

2.237 ODE No. 237

$$x(a+y(x))y'(x)+by(x)+cx=0$$

✗ **Mathematica** : cpu = 5.70891 (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 = 0.234607 (sec), leaf count = 192

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

✓ **Maple** : cpu = 0.055 (sec), leaf count = 93

$$\left\{y(x)=\frac{1}{-a^2+\_C1}\left(-abx-\_C1\,x+\sqrt{\_C1\,\left(a+b\right)\left(ax^2+bx^2+a^2-\_C1\right)}\right),y(x)=\frac{1}{a^2-\_C1}\left(abx+\_C\cdots\right.\right.$$

2.239 ODE No. 239

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

✓ **Mathematica** : cpu = 0.109583 (sec), leaf count = 54

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

✓ **Maple** : cpu = 0.141 (sec), leaf count = 59

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

2.240 ODE No. 240

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

✓ **Mathematica** : cpu = 0.0949386 (sec), leaf count = 41

$$\left\{\left\{y(x) \to -\sqrt{-ax\log(x) + c_1x}\right\}, \left\{y(x) \to \sqrt{-ax\log(x) + c_1x}\right\}\right\}$$

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

$$\left\{y(x) = \sqrt{-ax\ln(x) + \_C1\,x}, y(x) = -\sqrt{-x\,(a\ln(x) - \_C1)}\right\}$$

2.241 ODE No. 241

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

✓ **Mathematica** : cpu = 0.0896696 (sec), leaf count = 41

$$\left\{\left\{y(x) \to -\sqrt{-ax^2 + c_1x}\right\}, \left\{y(x) \to \sqrt{-ax^2 + c_1x}\right\}\right\}$$

✓ **Maple** : cpu = 0.011 (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 = 0.0756692 (sec), leaf count = 60

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

✓ **Maple** : cpu = 0.012 (sec), leaf count = 39

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

2.243 ODE No. 243

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

✓ **Mathematica** : cpu = 11.5438 (sec), leaf count = 487

$$\left\{\left\{y(x)\to -\frac{\sqrt[3]{2}x}{\sqrt[3]{-27c_1{}^2x^2+\sqrt{108c_1{}^3x^3+\left(27c_1{}^2x-27c_1{}^2x^2\right)^2}+27c_1{}^2x}}+\frac{\sqrt[3]{-27c_1{}^2x^2+\sqrt{108c_1{}^3x^3+\left(27c_1{}^2x\right.}}}{3\sqrt[3]{2}c_1}\right.\right.$$

✓ **Maple** : cpu = 0.111 (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 = 11.4828 (sec), leaf count = 484

$$\left\{\left\{y(x)\to -\frac{\sqrt[3]{2}x}{\sqrt[3]{27c_1{}^2x^2+\sqrt{\left(27c_1{}^2x^2+27c_1{}^2x\right)^2-108c_1{}^3x^3}+27c_1{}^2x}}-\frac{\sqrt[3]{27c_1{}^2x^2+\sqrt{\left(27c_1{}^2x^2+27c_1{}^2x\right)^2-}}}{3\sqrt[3]{2}c_1}\right.\right.$$

✓ **Maple** : cpu = 0.095 (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

$$\left(4x^3+2xy(x)\right)y'(x)+112x^2y(x)+y(x)^2=0$$

✓ **Mathematica** : cpu = 0.411906 (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 = 2.141 (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 = 0.132207 (sec), leaf count = 80

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

✓ **Maple** : cpu = 0.053 (sec), leaf count = 63

$$\left\{y(x)=\frac{1}{6\_C1\,x}\left(-4\_C1\,x^2-\sqrt{-2\,x^4\_C1^2+6}\right),y(x)=\frac{1}{6\_C1\,x}\left(-4\_C1\,x^2+\sqrt{-2\,x^4\_C1^2+6}\right)\right\}$$

2.247 ODE No. 247

$$-7x^2+(3x+2)(y(x)-2x-1)y'(x)+xy(x)-y(x)^2-9x-3=0$$

✓ **Mathematica** : cpu = 11.4063 (sec), leaf count = 693

$$\left\{\left\{y(x)\to \frac{\sqrt[3]{1458x^3+2916x^2+\sqrt{4\left(-81x^2-108x-36\right)^3+\left(1458x^3+2916x^2+1944x-324e^{2c_1}x+432-2\right.}}}{6\sqrt[3]{2}}\right.\right.$$

✓ **Maple** : cpu = 0.181 (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

$$(x^2 + 6xy(x) + 3)\, y'(x) + 3y(x)^2 + 2xy(x) + 2x = 0$$

✓ **Mathematica** : cpu = 0.165492 (sec), leaf count = 106

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

✓ **Maple** : cpu = 0.016 (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

$$y'(x)\,(axy(x) + bx^n) + \alpha y(x)^3 + \beta y(x)^2 = 0$$

✓ **Mathematica** : cpu = 3.36538 (sec), leaf count = 115

$$\text{Solve}\left[\frac{(a(-n) + a + \alpha y(x))y(x)^{\frac{a-an}{\beta}-1}(\alpha y(x)+\beta)^{\frac{a(n-1)}{\beta}}}{a^2(n-1)^2(a(n-1)+\beta)} + \frac{x^{1-n}\exp\left(-\frac{a(n-1)(\log(y(x))-\log(\alpha y(x)+\beta))}{\beta}\right)}{ab(1-n)(n-1)} = c_1, y(x)\right.$$

✓ **Maple** : cpu = 0.182 (sec), leaf count = 202

$$\left\{y(x) = \beta\left(RootOf\left(-x^{1-n}\_Z^{\frac{a(n-1)}{\beta}}a^2\beta\,n + \_C1\,a^2bn^2 + x^{1-n}\_Z^{\frac{a(n-1)}{\beta}}a^2\beta - x^{1-n}\_Z^{\frac{a(n-1)}{\beta}}a\beta^2 - \_Z^{\frac{an-a+\beta}{\beta}}\beta\right.\right.\right.$$

2.250 ODE No. 250

$$y'(x)\,(ax + Ax^2 + by(x) + Bxy(x) + c) + Axy(x) + \alpha x - By(x)^2 + \beta y(x) + \gamma = 0$$

✗ **Mathematica** : cpu = 300.864 (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 = 0.12106 (sec), leaf count = 60

$$\left\{\left\{y(x)\to \frac{1}{x^2}-\frac{\sqrt{2x^3+c_1x^2+1}}{x^2}\right\},\left\{y(x)\to \frac{1}{x^2}+\frac{\sqrt{2x^3+c_1x^2+1}}{x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.015 (sec), leaf count = 51

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

2.252 ODE No. 252

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

✓ **Mathematica** : cpu = 11.0152 (sec), leaf count = 819

$$\left\{\left\{y(x)\to \frac{6xc_1-x}{6c_1-1}+\frac{\sqrt[3]{-1944{c_1}^2x^3+648c_1x^3-54x^3+1944{c_1}^2-648c_1+\sqrt{4\left(54x^2c_1-9x^2\right)^3+\left(-1944{c_1}^2\right.}}}{3\sqrt[3]{2}(6c_1-1)}\right.\right.$$

✓ **Maple** : cpu = 0.597 (sec), leaf count = 1338

$$\left\{y(x)=\left(\left(\left(-\_C1+80\right)x^7-160\,x^4+80\,x\right)\sqrt[3]{4}\sqrt[3]{\left(-80+\left(\_C1-80\right)x^6+160\,x^3\right)^2}\left(-\frac{1}{4}+\sqrt{\frac{-5\,x^6+}{-80+\left(\_C1-\right.}}\right.\right.\right.$$

2.253 ODE No. 253

$$\left(x^2y(x)-1\right)y'(x)+8xy(x)^2-8=0$$

✗ **Mathematica** : cpu = 11.9587 (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 = 0.123539 (sec), leaf count = 99

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

✓ **Maple** : cpu = 0.022 (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 = 3.27877 (sec), leaf count = 30

$$\left\{\left\{y(x) \to -\frac{3W\left(e^{-1+\frac{9c_1}{2^{2/3}}}x^{2/3}\right)}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.179 (sec), leaf count = 74

$$\left\{y(x) = -3\frac{lambertW\left(2/3\sqrt[3]{-1/8\,x^2}\_C1\right)}{x}, y(x) = -3\frac{lambertW\left(1/3\sqrt[3]{-1/8\,x^2}\_C1\,(-1+i\sqrt{3})\right)}{x}, y(x) = -\right.$$

2.256 ODE No. 256

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

✓ **Mathematica** : cpu = 0.0174098 (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 = 0.046 (sec), leaf count = 31

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

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 = 0.367587 (sec), leaf count = 39

$$\text{Solve}\left[2x^2+\frac{y(x)}{x}+\frac{x\left(-2\log\left(\frac{1}{1-xy(x)}\right)-2+c_1\right)}{y(x)}=0,y(x)\right]$$

✓ **Maple** : cpu = 0.081 (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

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

✓ **Mathematica** : cpu = 0.0977071 (sec), leaf count = 43

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

✓ **Maple** : cpu = 0.018 (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 = 0.235558 (sec), leaf count = 50

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

✓ **Maple** : cpu = 0.021 (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 = 0.114147 (sec), leaf count = 80

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

✓ **Maple** : cpu = 0.023 (sec), leaf count = 59

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

2.261 ODE No. 261

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

✓ **Mathematica** : cpu = 0.712931 (sec), leaf count = 32

$$\left\{\left\{y(x)\to-\frac{1}{2xW\left(\frac{e^{-1+\frac{9c_1}{2^{2/3}}}}{x^2}\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.102 (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

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

✓ **Mathematica** : cpu = 0.156353 (sec), leaf count = 101

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

✓ **Maple** : cpu = 0.232 (sec), leaf count = 65

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

2.263 ODE No. 263

$$3x^2y(x)^2 + 2x^3 + y(x)y'(x) + 7 = 0$$

✓ **Mathematica** : cpu = 0.0851859 (sec), leaf count = 181

$$\left\{\left\{y(x) \to -\sqrt{\frac{7\ 2^{2/3}e^{-2x^3}x\Gamma\left(\frac{1}{3},-2x^3\right)}{3\sqrt[3]{-x^3}} - \frac{2^{2/3}e^{-2x^3}x\Gamma\left(\frac{4}{3},-2x^3\right)}{3\sqrt[3]{-x^3}} + c_1e^{-2x^3}}\right\}, \left\{y(x) \to \sqrt{\frac{7\ 2^{2/3}e^{-2x^3}x\Gamma\left(\frac{1}{3},-\right.}{3\sqrt[3]{-x^3}}}\right.\right.$$

✓ **Maple** : cpu = 0.115 (sec), leaf count = 179

$$\left\{y(x) = -\frac{2^{\frac{2}{3}}\sqrt{3}}{18\,\Gamma(2/3)}\sqrt{-80\,\Gamma(2/3)\,\sqrt[3]{2}\,\sqrt[3]{-x^3}\left(\frac{9\,\Gamma(2/3)\,\sqrt[3]{2}\,\left(-3/2\,\mathrm{e}^{-2\,x^3}\_C1 + x\right)\sqrt[3]{-x^3}}{40} + \mathrm{e}^{-2\,x^3}x\left(\pi\sqrt{3} - 3/\right.\right.}\right.$$

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 = 0.376884 (sec), leaf count = 680

$$\left\{\left\{y(x) \to \text{Root}\left[81\#1^7e^{\frac{21c_1}{2}}x^{12} + 756\#1^6e^{\frac{21c_1}{2}}x^9 + 2646\#1^5e^{\frac{21c_1}{2}}x^6 + 4116\#1^4e^{\frac{21c_1}{2}}x^3 + 2401\#1^3e^{\frac{21c_1}{2}} - x^{3/2}\&\right.\right.\right.$$

✓ **Maple** : cpu = 0.536 (sec), leaf count = 37

$$\left\{y(x) = \frac{\left(\mathit{RootOf}\left(\_C1\,\_Z^{98} - 14\,\_C1\,\_Z^{77} + 49\,\_C1\,\_Z^{56} - 9\,x^7\right)\right)^{21} - 7}{3\,x^3}\right\}$$

2.265 ODE No. 265

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

✗ **Mathematica** : cpu = 287.648 (sec), leaf count = 0 , could not solve

```
DSolve[2*(1 + n)^2*x^(-1 + n)*(-1 + x^n^2*y[x]^2) + (-1 + x^(n*(1 + n))*y[x])*Derivative[1][
```

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

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

2.266 ODE No. 266

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

✗ **Mathematica** : cpu = 300.011 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 1.454 (sec), leaf count = 65

$$\left\{y(x)=\tan\left(RootOf\left(-\arctan(x)+\int^{-\arctan(x)+\_Z}\frac{1}{2a^2+\cos(2\_a)-1}\left(\sqrt{2}\sqrt{\frac{a^2}{\cos(2\_a)+1}}\sin(2\_a)-\mathrm{co}\right.\right.\right.\right.$$

2.267 ODE No. 267

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

✓ **Mathematica** : cpu = 0.272731 (sec), leaf count = 36

$$\left\{\left\{y(x)\to-\sqrt{2x+c_1}\csc(x)\right\},\left\{y(x)\to\sqrt{2x+c_1}\csc(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.024 (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 = 0.156886 (sec), leaf count = 146

$$\left\{\left\{y(x)\to-\exp\left(\int_1^x-\frac{g(K[1])}{f(K[1])}dK[1]\right)\sqrt{2\int_1^x-\frac{\exp\left(-2\int_1^{K[2]}-\frac{g(K[1])}{f(K[1])}dK[1]\right)h(K[2])}{f(K[2])}dK[2]+c_1}\right\},\left\{y(x)-\right.\right.$$

✓ **Maple** : cpu = 0.053 (sec), leaf count = 118

$$\left\{y(x)=\sqrt{\mathrm{e}^{2\int\frac{g(x)}{f(x)}\mathrm{d}x}\left(-2\int\frac{h(x)}{f(x)}\left(\mathrm{e}^{\int\frac{g(x)}{f(x)}\mathrm{d}x}\right)^2\mathrm{d}x+\_C1\right)}\left(\mathrm{e}^{2\int\frac{g(x)}{f(x)}\mathrm{d}x}\right)^{-1},y(x)=-\sqrt{\mathrm{e}^{2\int\frac{g(x)}{f(x)}\mathrm{d}x}\left(-2\int\frac{h(x)}{f(x)}\right.}\right.$$

2.269 ODE No. 269

$$-\mathrm{f0}(x)-\mathrm{f1}(x)y(x)-\mathrm{f2}(x)y(x)^2-\mathrm{f3}(x)y(x)^3+y'(x)(\mathrm{g0}(x)+\mathrm{g1}(x)y(x))=0$$

✗ **Mathematica** : cpu = 306.968 (sec), leaf count = 0 , timed out

```
$Aborted
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve((g1(x)*y(x)+g0(x))*diff(y(x),x)-f1(x)*y(x)-f2(x)*y(x)^2-f3(x)*y(x)^3-f0(x) = 0,y(x))
```

2.270 ODE No. 270

$$x^2+\left(y(x)^2-x\right)y'(x)-y(x)=0$$

✓ **Mathematica** : cpu = 0.124619 (sec), leaf count = 327

$$\left\{\left\{y(x)\to -\frac{3\sqrt[3]{2}x}{\sqrt[3]{27x^3+\sqrt{-2916x^3+\left(27x^3+81c_1\right)^2}+81c_1}}-\frac{\sqrt[3]{27x^3+\sqrt{-2916x^3+\left(27x^3+81c_1\right)^2}+81c_1}}{3\sqrt[3]{2}}\right\}\right.$$

✓ **Maple** : cpu = 0.026 (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 = 0.262278 (sec), leaf count = 370

$$\left\{\left\{y(x)\to\frac{\sqrt[3]{-4x^3+\sqrt{20x^6-8e^{3c_1}x^3+e^{6c_1}}+e^{3c_1}}}{\sqrt[3]{2}}-\frac{\sqrt[3]{2}x^2}{\sqrt[3]{-4x^3+\sqrt{20x^6-8e^{3c_1}x^3+e^{6c_1}}+e^{3c_1}}}\right\},\left\{y(x)\to\frac{}{2^2}\right.\right.$$

✓ **Maple** : cpu = 0.163 (sec), leaf count = 352

$$\left\{y(x)=\left(\frac{1}{2}\sqrt[3]{4-16\,x^3\_C1^{3/2}+4\sqrt{20\_C1^3x^6-8\,x^3\_C1^{3/2}+1}}-2\,\frac{\_C1\,x^2}{\sqrt[3]{4-16\,x^3\_C1^{3/2}+4\sqrt{20\_C1^3x^6-}}}\right.\right.$$

2.272 ODE No. 272

$$(x^2 + y(x)^2)\, y'(x) - y(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.116497 (sec), leaf count = 42

$$\text{Solve}\left[\log\left(\frac{y(x)}{x}\right) + \frac{2\tan^{-1}\left(\frac{\frac{2y(x)}{x}-1}{\sqrt{3}}\right)}{\sqrt{3}} = -\log(x) + c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.119 (sec), leaf count = 43

$$\left\{y(x) = \mathrm{e}^{\frac{2\sqrt{3}}{3} RootOf\left(-\sqrt{3}x\mathrm{e}^{\_C1}+3\tan(\_Z)x\mathrm{e}^{\_C1}+2\sqrt{3}\mathrm{e}^{2/3\sqrt{3}\_Z}\right)-\_C1}\right\}$$

2.273 ODE No. 273

$$(a + x^2 + y(x)^2)\, y'(x) + 2xy(x) = 0$$

✓ **Mathematica** : cpu = 0.164338 (sec), leaf count = 297

$$\left\{\left\{y(x) \to \frac{\sqrt[3]{\sqrt{2916\,(a+x^2)^3 + 6561c_1{}^2} + 81c_1}}{3\sqrt[3]{2}} - \frac{3\sqrt[3]{2}(a+x^2)}{\sqrt[3]{\sqrt{2916\,(a+x^2)^3 + 6561c_1{}^2} + 81c_1}}\right\}, \left\{y(x) \to \frac{}{2^{2/3}\sqrt[3]{\sqrt{}}}\right.\right.$$

✓ **Maple** : cpu = 0.023 (sec), leaf count = 401

$$\left\{y(x) = \frac{1}{4}\left(\left(i\left(-12\_C1 + 4\sqrt{4x^6 + 12ax^4 + 12a^2x^2 + 4a^3 + 9\_C1^2}\right)^{\frac{2}{3}} + 4ix^2 + 4ia\right)\sqrt{3} - \left(-12\_C1 + 4\right.\right.\right.$$

2.274 ODE No. 274

$$(a + x^2 + y(x)^2)\, y'(x) + b + x^2 + 2xy(x) = 0$$

✓ **Mathematica** : cpu = 0.165573 (sec), leaf count = 411

$$\left\{\left\{y(x) \to \frac{\sqrt[3]{\sqrt{2916\,(a+x^2)^3 + (-81bx - 27x^3 + 81c_1)^2} - 81bx - 27x^3 + 81c_1}}{3\sqrt[3]{2}} - \frac{}{\sqrt[3]{\sqrt{2916\,(a+x^2)^3 + (-81b}}}\right.\right.$$

✓ **Maple** : cpu = 0.031 (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 = 0.11129 (sec), leaf count = 18

$$\text{Solve}\left[y(x) - \tan^{-1}\left(\frac{x}{y(x)}\right) = c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.067 (sec), leaf count = 30

$$\left\{\_C1 + \frac{(ix + y(x))\,e^{-2\,iy(x)}}{2\,iy\,(x) + 2\,x} = 0\right\}$$

2.276 ODE No. 276

$$\left(y(x)^2 - x^2\right)y'(x) + 2xy(x) = 0$$

✓ **Mathematica** : cpu = 0.138369 (sec), leaf count = 61

$$\left\{\left\{y(x) \to \frac{1}{2}\left(e^{c_1} - \sqrt{-4x^2 + e^{2c_1}}\right)\right\}, \left\{y(x) \to \frac{1}{2}\left(\sqrt{-4x^2 + e^{2c_1}} + e^{c_1}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.049 (sec), leaf count = 47

$$\left\{y(x) = \frac{1}{2\_C1}\left(1 + \sqrt{-4\_C1^2x^2 + 1}\right), y(x) = \frac{1}{2\_C1}\left(1 - \sqrt{-4\_C1^2x^2 + 1}\right)\right\}$$

2.277 ODE No. 277

$$\left(x^4+y(x)^2\right)y'(x)-4x^3y(x)=0$$

✓ **Mathematica** : cpu = 0.109119 (sec), leaf count = 53

$$\left\{\left\{y(x)\to \frac{1}{2}\left(c_1-\sqrt{4x^4+c_1{}^2}\right)\right\},\left\{y(x)\to \frac{1}{2}\left(\sqrt{4x^4+c_1{}^2}+c_1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.278 (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 = 0.171733 (sec), leaf count = 39

$$\text{Solve}\left[-\frac{1}{32}e^{-4y(x)}\left(8y(x)^2+4y(x)+1\right)-e^{-4y(x)}\sin(x)=c_1,y(x)\right]$$

✓ **Maple** : cpu = 0.042 (sec), leaf count = 28

$$\left\{\frac{\left(-8\,(y(x))^2-4\,y(x)-32\,\sin(x)-1\right)\mathrm{e}^{-4\,y(x)}}{32}+\_C1=0\right\}$$

2.279 ODE No. 279

$$\left(y(x)^2+2y(x)+x\right)y'(x)+y(x)^2(y(x)+x)^2+y(x)(y(x)+1)=0$$

✓ **Mathematica** : cpu = 0.615031 (sec), leaf count = 107

$$\left\{\left\{y(x)\to \frac{-x^2-\sqrt{(x^2-c_1x-1)^2+4(x-c_1)}+c_1x+1}{2(x-c_1)}\right\},\left\{y(x)\to \frac{-x^2+\sqrt{(x^2-c_1x-1)^2+4(x-c_1)}+}{2(x-c_1)}\right.\right.$$

✓ **Maple** : cpu = 0.119 (sec), leaf count = 116

$$\left\{y(x)=\frac{1}{-2\_C1+4\,x}\left(-2\,x^2+\_C1\,x+\sqrt{4\,x^4-4\_C1\,x^3+\left(\_C1^2-8\right)x^2+(4\_C1+16)\,x-8\_C1+4+}\right.\right.$$

2.280 ODE No. 280

$$(y(x) + x)^2 y'(x) - a^2 = 0$$

✓ **Mathematica** : cpu = 0.121874 (sec), leaf count = 21

$$\text{Solve}\left[y(x) - a\tan^{-1}\left(\frac{y(x)+x}{a}\right) = c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.046 (sec), leaf count = 24

$$\{y(x) = a\mathit{RootOf}(\tan(\_Z)\,a - \_Z\,a + \_C1 - x) - \_C1\}$$

2.281 ODE No. 281

$$(-x^2 + 2xy(x) + y(x)^2)\,y'(x) + x^2 + 2xy(x) - y(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.181596 (sec), leaf count = 75

$$\left\{\left\{y(x) \to \frac{1}{2}\left(e^{c_1} - \sqrt{-4x^2 + 4e^{c_1}x + e^{2c_1}}\right)\right\}, \left\{y(x) \to \frac{1}{2}\left(\sqrt{-4x^2 + 4e^{c_1}x + e^{2c_1}} + e^{c_1}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.049 (sec), leaf count = 55

$$\left\{y(x) = \frac{1}{2\_C1}\left(1 + \sqrt{-4\_C1^2x^2 + 4\_C1\,x + 1}\right), y(x) = \frac{1}{2\_C1}\left(1 - \sqrt{-4\_C1^2x^2 + 4\_C1\,x + 1}\right)\right\}$$

2.282 ODE No. 282

$$(y(x) + 3x - 1)^2 y'(x) - (2y(x) - 1)(4y(x) + 6x - 3) = 0$$

✓ **Mathematica** : cpu = 0.21363 (sec), leaf count = 2129

$$\left\{\left\{y(x) \to \frac{1}{6}(12x + 4e^{c_1} + 1) - \frac{1}{6}\sqrt{36x^2 + 96e^{c_1}x - 12x - 16e^{c_1} + 16e^{2c_1} + 3\,2^{2/3}\sqrt[3]{-7776e^{c_1}x^5 + 6480e^{c_1}x^4 -}}\right.\right.$$

✓ **Maple** : cpu = 0.292 (sec), leaf count = 71

$$\left\{-\ln\left(\frac{-6\,y(x) + 4 - 6\,x}{6\,x - 1}\right) + 3\,\ln\left(\frac{-6\,y(x) + 3}{6\,x - 1}\right) - 3\,\ln\left(\frac{-6\,y(x) + 18\,x}{6\,x - 1}\right) - \ln(6\,x - 1) - \_C1 = 0\right\}$$

2.283 ODE No. 283

$$3(y(x)^2 - x^2)\, y'(x) + 2y(x)^3 - 6x(x+1)y(x) - 3e^x = 0$$

✓ **Mathematica** : cpu = 0.336903 (sec), leaf count = 477

$$\left\{\left\{y(x) \to -\frac{3\sqrt[3]{2}e^{2x}x^2}{\sqrt[3]{\sqrt{-2916e^{12x}x^6 + (-27e^{7x} + 27c_1e^{4x})^2} - 27e^{7x} + 27c_1e^{4x}}} - \frac{e^{-2x}\sqrt[3]{\sqrt{-2916e^{12x}x^6 + (-27e^{7x} +}}}{3\sqrt[3]{2}}\right.\right.$$

✓ **Maple** : cpu = 0.059 (sec), leaf count = 407

$$\left\{y(x) = \frac{1}{4\,e^{2\,x}}\left(-4\,x^2\left(1+i\sqrt{3}\right)\left(e^{2\,x}\right)^2 + \left(\left(4\,e^{3\,x} - 4\_C1 + 4\sqrt{-4\,x^6\left(e^{2\,x}\right)^2 + \left(e^{3\,x}\right)^2 - 2\,e^{3\,x}\_C1 + \_C1^2}\right)\right.\right.\right.$$

2.284 ODE No. 284

$$(x^2 + 4y(x)^2)\, y'(x) - xy(x) = 0$$

✓ **Mathematica** : cpu = 0.103978 (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 = 0.097 (sec), leaf count = 21

$$\left\{y(x) = e^{\frac{1}{2}\mathit{lambertW}\left(\frac{\left(e^{-\_C1}\right)^2x^2}{4}\right) - \_C1}\right\}$$

2.285 ODE No. 285

$$(3x^2 + 2xy(x) + 4y(x)^2)\, y'(x) + 2x^2 + 6xy(x) + y(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.1583 (sec), leaf count = 402

$$\left\{\left\{y(x) \to -\frac{33x^2}{2\ 2^{2/3}\sqrt[3]{54x^3 + \sqrt{3881196x^6 + (54x^3 + 432e^{3c_1})^2} + 432e^{3c_1}}} + \frac{\sqrt[3]{54x^3 + \sqrt{3881196x^6 + (54x^3 + 4}}}{12\sqrt[3]{2}}\right.\right.$$

✓ **Maple** : cpu = 0.064 (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

$$(2y(x) - 3x + 1)^2 y'(x) - (3y(x) - 2x - 4)^2 = 0$$

✓ **Mathematica** : cpu = 0.239643 (sec), leaf count = 3501

✓ **Maple** : cpu = 1.16 (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

$$(2y(x) - 4x + 1)^2 y'(x) - (y(x) - 2x)^2 = 0$$

✓ **Mathematica** : cpu = 1.46955 (sec), leaf count = 77

$$\text{Solve}\left[\frac{y(x)}{2} + \frac{1}{196}\left(14y(x) - \left(8 - 9\sqrt{2}\right)\log\left(-7y(x) + 14x + \sqrt{2} - 4\right) - \left(8 + 9\sqrt{2}\right)\log\left(7y(x) - 14x + \sqrt{2} + 4\right)\right.\right.$$

✓ **Maple** : cpu = 0.064 (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 = 0.20842 (sec), leaf count = 534

$$\left\{\left\{y(x)\to\frac{x^2}{4}-\frac{\sqrt[3]{-9x^6+108x^2+4\sqrt{3}\sqrt{-27x^8+207x^4-54c_1x^6+648c_1x^2+32+432c_1{}^2+144c_1}}}{4\ 3^{2/3}}+\frac{}{3\sqrt[3]{3}\sqrt[3]{}}\right.\right.$$

✓ **Maple** : cpu = 0.03 (sec), leaf count = 579

$$\left\{y(x)=-\frac{1}{24}\left(-6\,x^2\sqrt[3]{-324\,x^2-432\_C1+27\,x^6+12\,\sqrt{-81\,x^8-162\_C1\,x^6+621\,x^4+1944\_C1\,x^2+1296}}\right.\right.$$

2.289 ODE No. 289

$$a+(6y(x)-x)^2y'(x)-6y(x)^2+2xy(x)=0$$

✓ **Mathematica** : cpu = 0.181916 (sec), leaf count = 115

$$\left\{\left\{y(x)\to\frac{1}{6}\left(x+\sqrt[3]{-18ax-x^3+18c_1}\right)\right\},\left\{y(x)\to\frac{x}{6}-\frac{1}{12}\left(1-i\sqrt{3}\right)\sqrt[3]{-18ax-x^3+18c_1}\right\},\left\{y(x)\to\frac{x}{6}-\right.\right.$$

✓ **Maple** : cpu = 0.028 (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 = 0.452494 (sec), leaf count = 831

$$\left\{\left\{y(x)\to-\frac{bx}{a}+\frac{\sqrt[3]{-54b^3x^3+81abcx^3-27a^2dx^3+27a^2e^{3c_1}+\sqrt{4\left(9acx^2-9b^2x^2\right)^3+\left(-54b^3x^3+81abcx^3-\right.}}}{3\sqrt[3]{2}a}\right.\right.$$

✓ **Maple** : cpu = 0.099 (sec), leaf count = 1388

$$\left\{y(x) = \frac{1}{\_C1}\left(\frac{1}{2a}\sqrt[3]{-4\_C1^3a^2dx^3 + 12\,cx^3\_C1^3ba - 8\,b^3x^3\_C1^3 + 4\sqrt{\_C1^6a^2d^2x^6 - 6\_C1^6abcdx^6 + 4\_}}\right.\right.$$

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 = 0.849679 (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 = 0.125 (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 = 36.1171 (sec), leaf count = 1716

$$\text{Solve}\left[(\alpha b - a\beta)\text{RootSum}\left[-cy(x)^2\alpha^3 - b\#1y(x)^2\alpha^3 + a\beta\#1y(x)^2\alpha^2 + a\gamma y(x)^2\alpha^2 - 2b\beta\#1^2y(x)\alpha^2 - 2\beta c\#1y(\right.\right.$$

✓ **Maple** : cpu = 0.035 (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 = 0.169175 (sec), leaf count = 661

$$\left\{\left\{y(x)\to \text{Root}\left[-\frac{25\#1^2e^{\frac{65c_1}{2}}}{x^{26}}-\#1^{15}+\frac{65e^{\frac{65c_1}{2}}}{x^{25}}\&,1\right]\right\},\left\{y(x)\to \text{Root}\left[-\frac{25\#1^2e^{\frac{65c_1}{2}}}{x^{26}}-\#1^{15}+\frac{65e^{\frac{65c_1}{2}}}{x^{25}}\&,2\right]\right.$$

✓ **Maple** : cpu = 0.27 (sec), leaf count = 35

$$\left\{\ln(x)-\_C1-\frac{2}{65}\ln\left(\frac{5\left(y(x)\right)^2-13x}{x}\right)+\frac{6}{13}\ln\left(y(x)\frac{1}{\sqrt{x}}\right)=0\right\}$$

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 = 0.226574 (sec), leaf count = 71

$$\left\{\left\{y(x)\to \frac{1}{2}\left(c_1x-\sqrt{-4a+4x^2+c_1{}^2x^2}\right)\right\},\left\{y(x)\to \frac{1}{2}\left(\sqrt{-4a+4x^2+c_1{}^2x^2}+c_1x\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.068 (sec), leaf count = 112

$$\left\{\left(\left(y(x)\right)^{-2}-\left(-x^2+a\right)^{-1}\right)^{-1}=-x\sqrt{x^2-a}\frac{1}{\sqrt{\_C1+4\frac{a}{x^2-a}}}+\frac{x^2}{2}-\frac{a}{2},\left(\left(y(x)\right)^{-2}-\left(-x^2+a\right)^{-1}\right)^{-1}=x\sqrt{x\right.$$

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 = 0.192807 (sec), leaf count = 31

$$\text{Solve}\left[\frac{x}{y(x)}+\frac{y(x)}{x}+\log\left(\frac{y(x)}{x}\right)=-2\log(x)+c_1,y(x)\right]$$

✓ **Maple** : cpu = 0.15 (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

$$x\left(x^2y(x)+x^2+y(x)^2\right)y'(x)-2x^2y(x)^2+x^4-2y(x)^3=0$$

✓ **Mathematica** : cpu = 0.496439 (sec), leaf count = 102

$$\left\{\left\{y(x)\to -e^{-c_1}x^2-e^{-c_1}\sqrt{x^4-e^{c_1}x^4+e^{2c_1}x^2}\right\},\left\{y(x)\to e^{-c_1}\sqrt{x^4-e^{c_1}x^4+e^{2c_1}x^2}-e^{-c_1}x^2\right\}\right\}$$

✓ **Maple** : cpu = 0.563 (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

$$2x\left(5x^2+y(x)^2\right)y'(x)-x^2y(x)+y(x)^3=0$$

✓ **Mathematica** : cpu = 0.150092 (sec), leaf count = 216

$$\left\{\left\{y(x)\to \text{Root}\left[\frac{\#1^2e^{3c_1}}{x^{3/2}}-\#1^5+3e^{3c_1}\sqrt{x}\&,1\right]\right\},\left\{y(x)\to \text{Root}\left[\frac{\#1^2e^{3c_1}}{x^{3/2}}-\#1^5+3e^{3c_1}\sqrt{x}\&,2\right]\right\},\left\{y(x)\to\right.\right.$$

✓ **Maple** : cpu = 0.322 (sec), leaf count = 29

$$\left\{y(x)=\left(RootOf\left(x^9\_C1\,\_Z^{45}-\_Z^{18}-6\_Z^9-9\right)\right)^{\frac{9}{2}}x\right\}$$

2.298 ODE No. 298

$$3xy(x)^2y'(x)+y(x)^3-2x=0$$

✓ **Mathematica** : cpu = 0.0925387 (sec), leaf count = 72

$$\left\{\left\{y(x)\to\frac{\sqrt[3]{x^2+c_1}}{\sqrt[3]{x}}\right\},\left\{y(x)\to-\frac{\sqrt[3]{-1}\sqrt[3]{x^2+c_1}}{\sqrt[3]{x}}\right\},\left\{y(x)\to\frac{(-1)^{2/3}\sqrt[3]{x^2+c_1}}{\sqrt[3]{x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.014 (sec), leaf count = 73

$$\left\{y(x)=\frac{1}{x}\sqrt[3]{\left(x^2+\_C1\right)x^2},y(x)=\frac{-1+i\sqrt{3}}{2\,x}\sqrt[3]{\left(x^2+\_C1\right)x^2},y(x)=-\frac{1+i\sqrt{3}}{2\,x}\sqrt[3]{\left(x^2+\_C1\right)x^2}\right\}$$

2.299 ODE No. 299

$$\left(3xy(x)^2 - x^2\right) y'(x) + y(x)^3 - 2xy(x) = 0$$

✓ **Mathematica** : cpu = 0.108545 (sec), leaf count = 371

$$\left\{\left\{y(x)\to -\frac{\sqrt[3]{\frac{2}{3}}x^2}{\sqrt[3]{9c_1x^2+\sqrt{3}\sqrt{-4x^9+27c_1{}^2x^4}}}-\frac{\sqrt[3]{9c_1x^2+\sqrt{3}\sqrt{-4x^9+27c_1{}^2x^4}}}{\sqrt[3]{2}3^{2/3}x}\right\},\left\{y(x)\to \frac{(1+}{2^{2/3}\sqrt[3]{3}\sqrt[3]{9c_1x^2+}}\right.$$

✓ **Maple** : cpu = 0.167 (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 = 0.0806778 (sec), leaf count = 99

$$\left\{\left\{y(x)\to \frac{\sqrt[3]{-x^2+4c_1}}{2^{2/3}\sqrt[3]{x}}\right\},\left\{y(x)\to -\frac{\sqrt[3]{-1}\sqrt[3]{-x^2+4c_1}}{2^{2/3}\sqrt[3]{x}}\right\},\left\{y(x)\to \frac{(-1)^{2/3}\sqrt[3]{-x^2+4c_1}}{2^{2/3}\sqrt[3]{x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.017 (sec), leaf count = 83

$$\left\{y(x) = \frac{1}{2\,x}\sqrt[3]{-2\,\left(x^2-4\,\_C1\right)x^2}, y(x) = \frac{-1+i\sqrt{3}}{4\,x}\sqrt[3]{-2\,\left(x^2-4\,\_C1\right)x^2}, y(x) = -\frac{1+i\sqrt{3}}{4\,x}\sqrt[3]{-2\,\left(x^2-4\,\_C\right.}\right.$$

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 = 0.125698 (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 = 0.174 (sec), leaf count = 25

$$\left\{y(x) = \frac{1}{x}\mathrm{e}^{-\frac{1}{2}\mathit{lambertW}\left(6\,\frac{\mathrm{e}^{3\,\_C1}}{x^3}\right)+\frac{3\,\_C1}{2}}\right\}$$

2.302 ODE No. 302

$$\left(x^2y(x)^2+x\right)y'(x)+y(x)=0$$

✓ **Mathematica** : cpu = 0.0935685 (sec), leaf count = 70

$$\left\{\left\{y(x)\to\frac{c_1x-\sqrt{x}\sqrt{4+c_1{}^2x}}{2x}\right\},\left\{y(x)\to\frac{c_1x+\sqrt{x}\sqrt{4+c_1{}^2x}}{2x}\right\}\right\}$$

✓ **Maple** : cpu = 0.112 (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 = 0.109234 (sec), leaf count = 25

$$\text{Solve}\left[xy(x)-\frac{1}{xy(x)}-2\log(y(x))=c_1,y(x)\right]$$

✓ **Maple** : cpu = 0.149 (sec), leaf count = 34

$$\left\{y(x)=\frac{\mathrm{e}^{RootOf\left(-\mathrm{e}^{2\_Z}-2\,\mathrm{e}^{\_Z}\ln(x)+2\,\mathrm{e}^{\_Z}\_C1+2\_Z\,\mathrm{e}^{\_Z}+1\right)}}{x}\right\}$$

2.304 ODE No. 304

$$\left(10x^3y(x)^2+x^2y(x)+2x\right)y'(x)+5x^2y(x)^3+xy(x)^2=0$$

✓ **Mathematica** : cpu = 0.338503 (sec), leaf count = 44

$$\text{Solve}\left[y(x)\sqrt{5x^2y(x)^2+2}e^{\frac{\tan^{-1}\left(\sqrt{\frac{5}{2}}xy(x)\right)}{\sqrt{10}}}=c_1,y(x)\right]$$

✓ **Maple** : cpu = 0.207 (sec), leaf count = 44

$$\left\{y(x)=\frac{\sqrt{10}}{5\,x}\tan\left(RootOf\left(\sqrt{10}\ln\left(\frac{4\,(\tan(\_Z))^2\left((\tan(\_Z))^2+1\right)}{5\,x^2}\right)+2\sqrt{10}\_C1+2\_Z\right)\right)\right\}$$

2.305 ODE No. 305

$$x^2 + \left(y(x)^3 - 3x\right) y'(x) - 3y(x) = 0$$

✓ **Mathematica** : cpu = 0.180427 (sec), leaf count = 1277

$$\left\{\left\{y(x) \to -\frac{1}{2}\sqrt{\frac{16\sqrt[3]{2}\left(x^3+3c_1\right)}{\sqrt[3]{104976x^2-\sqrt{11019960576x^4-4\left(144x^3+432c_1\right)^3}}}+\frac{\sqrt[3]{104976x^2-\sqrt{11019960576x^4-4}}}{9\sqrt[3]{2}}}\right.\right.$$

✓ **Maple** : cpu = 0.015 (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 = 0.135852 (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 = 0.27 (sec), leaf count = 231

$$\left\{y(x) = x\frac{1}{\sqrt[3]{-\left(\_C1\,x^3-\sqrt{\_C1^2x^6+1}\right)x^3\_C1}}, y(x) = x\frac{1}{\sqrt[3]{-\left(\_C1\,x^3+\sqrt{\_C1^2x^6+1}\right)x^3\_C1}}, y(x) = 4\right.$$

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 = 0.21603 (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 = 0.032 (sec), leaf count = 125

$$\left\{y(x) = \sqrt{-x^2-a-\sqrt{4\,ax^2+a^2-4\_C1}}, y(x) = \sqrt{-x^2-a+\sqrt{4\,ax^2+a^2-4\_C1}}, y(x) = -\sqrt{-x^2-a-}\right.$$

2.308 ODE No. 308

$$2y(x)^3y'(x) + xy(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.0078348 (sec), leaf count = 55

$$\left\{\{y(x) \to 0\}, \left\{y(x) \to -\frac{\sqrt{-x^2+4c_1}}{\sqrt{2}}\right\}, \left\{y(x) \to \frac{\sqrt{-x^2+4c_1}}{\sqrt{2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.012 (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 = 0.0978775 (sec), leaf count = 151

$$\left\{\left\{y(x) \to -\frac{\sqrt{-1-\sqrt{4x^4+4x^2+1+8c_1}}}{\sqrt{2}}\right\}, \left\{y(x) \to \frac{\sqrt{-1-\sqrt{4x^4+4x^2+1+8c_1}}}{\sqrt{2}}\right\}, \left\{y(x) \to -\frac{\sqrt{-1+\sqrt{}}}{}\right.\right.$$

✓ **Maple** : cpu = 0.028 (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

$$\left(5x^2y(x) + 2y(x)^3\right)y'(x) + x^3 + 5xy(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.170671 (sec), leaf count = 159

$$\left\{\left\{y(x) \to -\frac{\sqrt{-5x^2-\sqrt{23x^4+2e^{4c_1}}}}{\sqrt{2}}\right\}, \left\{y(x) \to \frac{\sqrt{-5x^2-\sqrt{23x^4+2e^{4c_1}}}}{\sqrt{2}}\right\}, \left\{y(x) \to -\frac{\sqrt{-5x^2+\sqrt{23x^4+}}}{\sqrt{2}}\right.\right.$$

✓ **Maple** : cpu = 0.084 (sec), leaf count = 125

$$\left\{y(x) = -\frac{1}{2}\sqrt{-10\_C1\,x^2-2\sqrt{23\,x^4\_C1^2+2}}\frac{1}{\sqrt{\_C1}}, y(x) = \frac{1}{2}\sqrt{-10\_C1\,x^2-2\sqrt{23\,x^4\_C1^2+2}}\frac{1}{\sqrt{\_C1}}, y\right.$$

2.311 ODE No. 311

$$\left(6x^2y(x)+3x^3-3xy(x)^2+20y(x)^3\right)y'(x)+9x^2y(x)+4x^3+6xy(x)^2-y(x)^3=0$$

✓ **Mathematica** : cpu = 0.216491 (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 = 0.077 (sec), leaf count = 50

$$\left\{y(x)=\frac{RootOf\left(x^4\_C1^4+3\,x^3\_C1^3\_Z+3\_C1^2\_Z^2x^2-\_C1\,\_Z^3x+5\_Z^4-1\right)}{\_C1}\right\}$$

2.312 ODE No. 312

$$\left(y(x)y'(x)+x\right)\left(\frac{x^2}{a}+\frac{y(x)^2}{b}\right)+\frac{(a-b)\left(y(x)y'(x)-x\right)}{a+b}=0$$

✓ **Mathematica** : cpu = 0.609407 (sec), leaf count = 204

$$\left\{\left\{y(x)\to -\frac{\sqrt{b}\sqrt{2a^2W\left(\frac{c_1(a+b)e^{\frac{bx^2}{2a^2}-\frac{b}{2a}-\frac{x^2}{2b}-\frac{1}{2}}}{2a^3b^2}\right)+a^2+ab-ax^2-bx^2}}{\sqrt{a}\sqrt{a+b}}\right\},\left\{y(x)\to \frac{\sqrt{b}\sqrt{2a^2W\left(\frac{c_1(a+b)e^{\frac{bx^2}{2a^2}-}}{2a^3b^2}\right.}}{\sqrt{}}\right.\right.$$

✓ **Maple** : cpu = 1.06 (sec), leaf count = 240

$$\left\{y(x)=\frac{1}{a}\sqrt{a\left(e^{\frac{1}{2\,a^2b}\left(-2\,lambertW\left(1/2\,\frac{(a+b)e^{-1/2}}{a^2b}e^{-1/2\,\frac{x^2}{b}}e^{1/2\,\frac{bx^2}{a^2}}e^{-1/2\,\frac{b}{a}}\left(e^{\frac{\_C1}{ab}}\right)^{-1}\right)a^2b+(-x^2-b)a^2+(-b^2-2\_C1)a+b^2x^2\right)}\right.}\right.$$

2.313 ODE No. 313

$$y'(x)\left(3axy(x)^2+2ay(x)^3-bx^3+cx^2\right)-ay(x)^3+3bx^2y(x)+2bx^3+cy(x)^2=0$$

✓ **Mathematica** : cpu = 0.322853 (sec), leaf count = 537

$$\left\{\left\{y(x)\to\frac{\sqrt[3]{2}(3acx+3ac_1)}{3a\sqrt[3]{\sqrt{(27a^2bx^3+27a^2c_1x)^2+4(3acx+3ac_1)^3}+27a^2bx^3+27a^2c_1x}}-\frac{\sqrt[3]{\sqrt{(27a^2bx^3+27a^2c_1x)^2}}}{}\right.\right.$$

✓ **Maple** : cpu = 0.174 (sec), leaf count = 748

$$\left\{y(x)=\frac{1}{6\,a}\left((-12\,cx+12\_C1)\,a+\left(\left(-108\,bx^3+108\_C1\,x+12\sqrt{81\,ab^2x^6-162\_C1\,abx^4+12\,c^3x^3+8}\right.\right.\right.\right.$$

2.314 ODE No. 314

$$xy(x)^3y'(x)+y(x)^4-x\sin(x)=0$$

✓ **Mathematica** : cpu = 0.140275 (sec), leaf count = 188

$$\left\{\left\{y(x)\to-\frac{\sqrt[4]{16x^3\sin(x)-4x^4\cos(x)+48x^2\cos(x)-96x\sin(x)-96\cos(x)+c_1}}{x}\right\},\left\{y(x)\to-\frac{i\sqrt[4]{16x^3\sin(}}{}\right.\right.$$

✓ **Maple** : cpu = 0.041 (sec), leaf count = 158

$$\left\{y(x)=\frac{1}{x}\sqrt[4]{(-4\,x^4+48\,x^2-96)\cos(x)+(16\,x^3-96\,x)\sin(x)+\_C1},y(x)=\frac{-i}{x}\sqrt[4]{(-4\,x^4+48\,x^2-96)\cos(}\right.$$

2.315 ODE No. 315

$$\left(2xy(x)^3-x^4\right)y'(x)+2x^3y(x)-y(x)^4=0$$

✓ **Mathematica** : cpu = 0.302373 (sec), leaf count = 368

$$\left\{\left\{y(x)\to\frac{\sqrt[3]{\frac{2}{3}}e^{c_1}x}{\sqrt[3]{-9x^3+\sqrt{3}\sqrt{27x^6-4e^{3c_1}x^3}}}+\frac{\sqrt[3]{-9x^3+\sqrt{3}\sqrt{27x^6-4e^{3c_1}x^3}}}{\sqrt[3]{2}3^{2/3}}\right\},\left\{y(x)\to-\frac{(1+i\sqrt{3}}{2^{2/3}\sqrt[3]{3}\sqrt[3]{-9x^3+\sqrt{}}}\right.\right.$$

✓ **Maple** : cpu = 0.072 (sec), leaf count = 376

$$\left\{y(x)=\frac{\sqrt[3]{12}}{6\_C1}\left(x\sqrt[3]{12}\_C1+\left(x\left(-9\_C1\,x^{2}+\sqrt{3}\sqrt{\frac{27\_C1^{3}x^{4}-4\,x}{\_C1}}\right)\_C1^{2}\right)^{\frac{2}{3}}\right)\frac{1}{\sqrt[3]{x\left(-9\_C1\,x^{2}+\sqrt{3}\right.}}\right.$$

2.316 ODE No. 316

$$\left(2xy(x)^{3}+y(x)\right)y'(x)+2y(x)^{2}=0$$

✓ **Mathematica** : cpu = 0.130987 (sec), leaf count = 48

$$\left\{\{y(x)\to 0\},\mathrm{Solve}\left[x=-\frac{1}{4}e^{-\frac{1}{2}y(x)^{2}}\mathrm{Ei}\left(\frac{y(x)^{2}}{2}\right)+c_{1}e^{-\frac{1}{2}y(x)^{2}},y(x)\right]\right\}$$

✓ **Maple** : cpu = 0.043 (sec), leaf count = 53

$$\left\{y(x)=0,y(x)=\sqrt{-2\,RootOf\left(\mathrm{e}^{\_Z}Ei\left(1,\_Z\right)+4\,\mathrm{e}^{\_Z}\_C1-4\,x\right)},y(x)=-\sqrt{-2\,RootOf\left(\mathrm{e}^{\_Z}Ei\left(1,\_Z\right)+4\,\mathrm{e}\right.}\right.$$

2.317 ODE No. 317

$$\left(x^{2}+2xy(x)^{3}+xy(x)\right)y'(x)+y(x)^{2}-xy(x)=0$$

✓ **Mathematica** : cpu = 0.323079 (sec), leaf count = 23

$$\mathrm{Solve}\left[y(x)^{2}-\frac{x}{y(x)}+\log(y(x))+\log(x)=c_{1},y(x)\right]$$

✓ **Maple** : cpu = 0.103 (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

$$(3xy(x)^3 - 4xy(x) + y(x))\, y'(x) + (y(x)^2 - 2)\, y(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.222283 (sec), leaf count = 4284

$$\left\{\{y(x)\to 0\},\left\{y(x)\to -\sqrt{\frac{4\sqrt[3]{2}x^2}{3\sqrt[3]{16x^6+24x^5-27c_1{}^2x^4+12x^4+2x^3+3\sqrt{3}\sqrt{-32c_1{}^2x^{10}-48c_1{}^2x^9+27c_1{}^4x^8-}}}}\right.\right.$$

✓ **Maple** : cpu = 0.015 (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

$$(7xy(x)^3 + y(x) - 5x)\, y'(x) + y(x)^4 - 5y(x) = 0$$

✓ **Mathematica** : cpu = 0.148077 (sec), leaf count = 302

$$\{\{y(x)\to \text{Root}[10\#1^7x-100\#1^4x+2\#1^5-25\#1^2+250\#1x-10c_1\&,1]\},\{y(x)\to \text{Root}[10\#1^7x-100\#1$$

✓ **Maple** : cpu = 0.025 (sec), leaf count = 35

$$\left\{x+\frac{2\,(y(x))^5-25\,(y(x))^2-10\_C1}{10\,\left((y(x))^3-5\right)^2 y(x)}=0\right\}$$

2.320 ODE No. 320

$$(x^2y(x)^3 + xy(x))\, y'(x) - 1 = 0$$

✓ **Mathematica** : cpu = 0.116521 (sec), leaf count = 76

$$\left\{\left\{y(x)\to -\frac{\sqrt{2xW\left(c_1e^{\frac{1}{2x}-1}\right)+2x-1}}{\sqrt{x}}\right\},\left\{y(x)\to \frac{\sqrt{2xW\left(c_1e^{\frac{1}{2x}-1}\right)+2x-1}}{\sqrt{x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.073 (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

$$\left(2x^2y(x)^3 + x^2y(x)^2 - 2x\right)y'(x) - 2y(x) - 1 = 0$$

✓ **Mathematica** : cpu = 0.329998 (sec), leaf count = 47

$$\text{Solve}\left[\frac{1}{64}\left(-4y(x)^2 + 4y(x) - 2\log(8y(x)+4) + 3\right) - \frac{1}{4x(2y(x)+1)} = c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.143 (sec), leaf count = 42

$$\left\{y(x) = \frac{e^{\mathit{RootOf}\left(x\left(e^{\_Z}\right)^3 - 4x\left(e^{\_Z}\right)^2 + 16\_C1\, x e^{\_Z} + 2\_Z\, x e^{\_Z} + 3x e^{\_Z} + 16\right)}}{2} - \frac{1}{2}\right\}$$

2.322 ODE No. 322

$$\left(10x^2y(x)^3 - 3y(x)^2 - 2\right)y'(x) + 5xy(x)^4 + x = 0$$

✓ **Mathematica** : cpu = 0.275024 (sec), leaf count = 2077

$$\left\{\left\{y(x) \to -\frac{1}{2}\sqrt{\frac{4\sqrt[3]{2}\left(5x^4 - 10c_1x^2 - 2\right)}{5x^2\sqrt[3]{2268x^2 - 216c_1 + \sqrt{\left(2160x^2 + 108\left(x^2 - 2c_1\right)\right)^2 - 4\left(60x^4 - 120c_1x^2 - 24\right)^3}}} + \frac{\sqrt[3]{2268x^2}}{}}\right.\right.$$

✓ **Maple** : cpu = 0.022 (sec), leaf count = 29

$$\left\{\frac{5x^2(y(x))^4}{2} - (y(x))^3 + \frac{x^2}{2} - 2y(x) + \_C1 = 0\right\}$$

2.323 ODE No. 323

$$xy'(x)\left(axy(x)^3 + c\right) + y(x)\left(bx^3y(x) + c\right) = 0$$

✓ **Mathematica** : cpu = 0.250908 (sec), leaf count = 463

$$\left\{\left\{y(x) \to \frac{\sqrt[3]{54a^2cx^2 + \sqrt{2916a^4c^2x^4 + 108a^3x^3\left(bx^3 - 2c_1x\right)^3}}}{3\sqrt[3]{2}ax} - \frac{\sqrt[3]{2}\left(bx^3 - 2c_1x\right)}{\sqrt[3]{54a^2cx^2 + \sqrt{2916a^4c^2x^4 + 108a^3x^3\left(bx^3 - \right.}}}\right.\right.$$

✓ **Maple** : cpu = 0.094 (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 = 0.115438 (sec), leaf count = 723

$$\left\{\left\{y(x)\to\frac{\left(2x^3-c_1x^2\right)^2}{6x^2\sqrt[3]{-8x^9-27x^4+12c_1x^8-6c_1{}^2x^7+c_1{}^3x^6+3\sqrt{3}\sqrt{16x^{13}+27x^8-24c_1x^{12}+12c_1{}^2x^{11}-2c_1{}^3x^{10}}}}\right.\right.$$

✓ **Maple** : cpu = 0.097 (sec), leaf count = 815

$$\left\{y(x)=\frac{1}{12\,x}\left(\left(2\_C1\,x-4\,x^2\right)\sqrt[3]{\left(\_C1^3x^2-6\_C1^2x^3+12\_C1\,x^4-8\,x^5+3\sqrt{-6\_C1^3x^2+36\_C1^2x^3-}\right.}\right.\right.$$

2.325 ODE No. 325

$$y(x)\left(y(x)^3-2x^3\right)y'(x)+x\left(2y(x)^3-x^3\right)=0$$

✓ **Mathematica** : cpu = 0.186556 (sec), leaf count = 139

$$\text{Solve}\left[\frac{1}{7}\text{RootSum}\left[\#1^4+\#1^3+3\#1^2+\#1+1\&,\frac{8\#1^3\log\left(\frac{y(x)}{x}-\#1\right)+9\#1^2\log\left(\frac{y(x)}{x}-\#1\right)+12\#1\log\left(\right.}{4\#1^3+3\#1^2+6\#1+1}\right.\right.$$

✓ **Maple** : cpu = 0.541 (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 = 3.12605 (sec), leaf count = 13289

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✓ **Maple** : cpu = 0.408 (sec), leaf count = 160

$$\left\{y(x)=\frac{x(\_C1\,x-bRootOf\left(b^2\_Z^4-2\,bx\_C1\,\_Z^3+\left(a^2x^2\_C1^2+b^2x^2\_C1^2+\_C1^2x^2-a^2\right)\_Z^2-2\,bx^3\_}{aRootOf\left(b^2\_Z^4-2\,bx\_C1\,\_Z^3+\left(a^2x^2\_C1^2+b^2x^2\_C1^2+\_C1^2x^2-a^2\right)\_Z^2-2\,bx^3\_C1^3\right.}\right.$$

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 = 0.338353 (sec), leaf count = 669

$$\left\{\left\{y(x)\to\frac{\sqrt[3]{27x^2+9c_1{}^2x^2+3\sqrt{3}\sqrt{27x^4-4c_1{}^3x^6-c_1{}^4x^4+18c_1{}^2x^4+4c_1{}^3x^2+2c_1{}^3}}}{3\sqrt[3]{2}x}-\frac{}{3x\sqrt[3]{27x^2+9c_1{}^2x^2+}}\right.\right.$$

✓ **Maple** : cpu = 0.128 (sec), leaf count = 583

$$\left\{y(x)=\frac{1}{12\_C1\,x}\left(\left(\left(-12\,ix^2\_C1-i\left(108\_C1^3x^2+12\sqrt{3}\sqrt{27\_C1^4x^2+18\_C1^2x^2+\left(4\,x^4-4\right)\_C1-x^2}\right.\right.\right.\right.\right.$$

2.328 ODE No. 328

$$ax^2y(x)^ny'(x)-2xy'(x)+y(x)=0$$

✓ **Mathematica** : cpu = 0.240216 (sec), leaf count = 42

$$\text{Solve}\left[\frac{n(\log(x)-\log\left(-axy(x)^n+n+2\right))}{n+2}-\frac{2n\log(y(x))}{n+2}=c_1,y(x)\right]$$

✓ **Maple** : cpu = 0.165 (sec), leaf count = 33

$$\left\{\frac{\left((y(x))^n\,ax-n-2\right)^n\left((y(x))^n\right)^2}{x^n}-\_C1=0\right\}$$

2.329 ODE No. 329

$$x^n y(x)^m \left(axy'(x) + by(x)\right) + \alpha xy'(x) + \beta y(x) = 0$$

✓ **Mathematica** : cpu = 0.666491 (sec), leaf count = 102

$$\text{Solve}\left[\frac{m((a\beta - \alpha b)\log\left(x^n y(x)^m (bm - an) - \alpha n + \beta m\right) + \beta\log(x)(bm - an))}{(bm - an)(\beta m - \alpha n)} + \frac{\alpha m \log(\beta m y(x) - \alpha n y(x))}{\beta m - \alpha n} = c$$

✓ **Maple** : cpu = 0.316 (sec), leaf count = 71

$$\left\{x^{\beta\, m(an - bm)}(x^n(an - bm)\,(y(x))^m - \beta\, m + \alpha\, n)^{-a\beta\, m + bm\alpha}\,((y(x))^m)^{\alpha\,(an - bm)} - \_C1 = 0\right\}$$

2.330 ODE No. 330

$$(f(y(x) + x) + 1)y'(x) + f(y(x) + x) = 0$$

✓ **Mathematica** : cpu = 0.103035 (sec), leaf count = 52

$$\text{Solve}\left[\int_1^{y(x)}\left(f(x + K[2]) - \int_1^x f'(K[1] + K[2])dK[1] + 1\right)dK[2] + \int_1^x f(K[1] + y(x))dK[1] = c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.03 (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 = 50.2979 (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 = 0.185 (sec), leaf count = 78

$$\left\{\frac{1}{q}\left((y(x))^{p+1}\,\mathit{LerchPhi}\left(-(y(x))^q\,(-1)^{csgn(i(y(x))^q)}, 1, \frac{p+1}{q}\right) - y(x)\,\mathit{LerchPhi}\left(-(y(x))^q\,(-1)^{csgn(i(y(x))^q)}, 1, q^-\right.\right.\right.$$

2.332 ODE No. 332

$$x\left(\sqrt{xy(x)}-1\right)y'(x)-y(x)\left(\sqrt{xy(x)}+1\right)=0$$

✓ **Mathematica** : cpu = 0.207804 (sec), leaf count = 34

$$\text{Solve}\left[\log(y(x))-\frac{y(x)\log(x)-\frac{2y(x)}{\sqrt{xy(x)}}}{y(x)}=c_1,y(x)\right]$$

✓ **Maple** : cpu = 0.012 (sec), leaf count = 33

$$\left\{-\left(1+\left(\_C1-\ln(x)+\frac{\ln(xy(x))}{2}\right)\sqrt{xy(x)}\right)\frac{1}{\sqrt{xy(x)}}=0\right\}$$

2.333 ODE No. 333

$$\left(2x^{5/2}y(x)^{3/2}+x^2y(x)-x\right)y'(x)-x^{3/2}y(x)^{5/2}+xy(x)^2-y(x)=0$$

✓ **Mathematica** : cpu = 0.307226 (sec), leaf count = 72

$$\text{Solve}\left[\frac{2\sqrt{xy(x)}\log(y(x))}{\sqrt{x}\sqrt{y(x)}}-\frac{\sqrt{xy(x)}\left(3x^{3/2}y(x)^{3/2}\log(x)+6xy(x)-2\right)}{3x^2y(x)^2}=c_1,y(x)\right]$$

✓ **Maple** : cpu = 0.076 (sec), leaf count = 32

$$\left\{\ln(y(x))+\frac{1}{3}(y(x))^{-\frac{3}{2}}x^{-\frac{3}{2}}-\frac{1}{\sqrt{x}}\frac{1}{\sqrt{y(x)}}-\frac{\ln(x)}{2}-\_C1=0\right\}$$

2.334 ODE No. 334

$$\left(\sqrt{y(x)+x}+1\right)y'(x)+1=0$$

✓ **Mathematica** : cpu = 0.100418 (sec), leaf count = 39

$$\left\{\left\{y(x)\to -2\sqrt{x+1+c_1}+2+c_1\right\},\left\{y(x)\to 2\sqrt{x+1+c_1}+2+c_1\right\}\right\}$$

✓ **Maple** : cpu = 0.023 (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 = 0.136411 (sec), leaf count = 75

$$\left\{\left\{y(x)\to \text{InverseFunction}\left[\frac{1}{2}\#1\sqrt{\#1^2-1}-\frac{1}{2}\log\left(\sqrt{\#1^2-1}+\#1\right)\&\right]\left[\frac{1}{2}\sqrt{x^2-1}x-\frac{1}{2}\log\left(\sqrt{x^2-1}+x\right)\right.\right.\right.$$

✓ **Maple** : cpu = 0.01 (sec), leaf count = 50

$$\left\{\_C1+x\sqrt{x^2-1}-\ln\left(x+\sqrt{x^2-1}\right)-y(x)\sqrt{(y(x))^2-1}+\ln\left(y(x)+\sqrt{(y(x))^2-1}\right)=0\right\}$$

2.336 ODE No. 336

$$\left(ax+\sqrt{y(x)^2+1}\right)y'(x)+ay(x)+\sqrt{x^2+1}=0$$

✓ **Mathematica** : cpu = 0.249528 (sec), leaf count = 53

$$\text{Solve}\left[axy(x)+\frac{1}{2}\sqrt{x^2+1}x+\frac{1}{2}\left(y(x)\sqrt{y(x)^2+1}+\sinh^{-1}(y(x))\right)+\frac{1}{2}\sinh^{-1}(x)=c_1,y(x)\right]$$

✓ **Maple** : cpu = 0.027 (sec), leaf count = 41

$$\left\{\frac{x}{2}\sqrt{x^2+1}+\frac{Arcsinh(x)}{2}+axy(x)+\frac{y(x)}{2}\sqrt{(y(x))^2+1}+\frac{Arcsinh(y(x))}{2}+\_C1=0\right\}$$

2.337 ODE No. 337

$$\left(\sqrt{x^2+y(x)^2}+x\right)y'(x)-y(x)=0$$

✓ **Mathematica** : cpu = 0.214697 (sec), leaf count = 161

$$\left\{\left\{y(x)\to -\sqrt{-2ix\cosh(c_1)-2ix\sinh(c_1)-\cosh(2c_1)-\sinh(2c_1)}\right\},\left\{y(x)\to \sqrt{-2ix\cosh(c_1)-2ix\sinh(c_1)-\right.\right.$$

✓ **Maple** : cpu = 0.061 (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 = 72.6815 (sec), leaf count = 17681

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✓ **Maple** : cpu = 0.547 (sec), leaf count = 128

$$\left\{y(x)=RootOf\left(-\ln(x)+\int^{\_Z}-\frac{1}{(\_a^2+1)\left(\_a^2\cos(2\alpha)+2\_a\sin(2\alpha)+\_a^2-\cos(2\alpha)+1\right)}\left(\_a^3\cos(2\alpha\right.\right.\right.$$

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 = 0.337253 (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 = 0.138 (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 = 85.773 (sec), leaf count = 0 , could not solve

```
DSolve[-(y[x]*(e2/((-a + x)^2 + y[x]^2)^(3/2) + e1/((a + x)^2 + y[x]^2)^(3/2))) + ((e2*(-
a + x))/((-a + x)^2 + y[x]^2)^(3/2) + (e1*(a + x))/((a + x)^2 + y[x]^2)^(3/2))*Derivative[1]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , exception

```
time expired
```

2.341 ODE No. 341

$$\left(xe^{y(x)}+e^x\right)y'(x)+e^xy(x)+e^{y(x)}=0$$

✓ **Mathematica** : cpu = 0.231724 (sec), leaf count = 33

$$\left\{\left\{y(x)\to c_1e^{-x}-W\left(xe^{-x+c_1e^{-x}}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.055 (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

$$x\left(2e^{-xy(x)}+3e^{xy(x)}\right)(xy'(x)+y(x))+1=0$$

✓ **Mathematica** : cpu = 0.525591 (sec), leaf count = 163

$$\left\{\left\{y(x)\to-\frac{\cosh^{-1}\left(\frac{1}{24}\left(-5\sqrt{24+\log^2\left(\frac{c_1}{x}\right)}-\log\left(\frac{c_1}{x}\right)\right)\right)}{x}\right\},\left\{y(x)\to\frac{\cosh^{-1}\left(\frac{1}{24}\left(-5\sqrt{24+\log^2\left(\frac{c_1}{x}\right)}-\log\left(\right.\right.\right.}{x}\right.\right.$$

✓ **Maple** : cpu = 0.039 (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 = 0.124695 (sec), leaf count = 35

$$\text{Solve}\left[x=e^{y(x)}\left(\text{Ei}(-y(x))-e^{-y(x)}\log(y(x))\right)+c_1e^{y(x)},y(x)\right]$$

✓ **Maple** : cpu = 0.063 (sec), leaf count = 27

$$\left\{y(x)=\mathrm{e}^{\mathit{RootOf}\left(-x-\_Z-\mathrm{e}^{\mathrm{e}^{-\_Z}}\mathit{Ei}(1,\mathrm{e}^{-\_Z})+\mathrm{e}^{\mathrm{e}^{-\_Z}}\_C1\right)}\right\}$$

2.344 ODE No. 344

$$y'(x)(\log(y(x)) + 2x - 1) - 2y(x) = 0$$

✓ **Mathematica** : cpu = 0.170154 (sec), leaf count = 23

$$\left\{\left\{y(x) \to -\frac{W\left(-2c_1 e^{-2x}\right)}{2c_1}\right\}\right\}$$

✓ **Maple** : cpu = 0.028 (sec), leaf count = 19

$$\left\{y(x) = e^{-\mathit{lambertW}\left(-2\,e^{-2\,x}\_C1\right)-2\,x}\right\}$$

2.345 ODE No. 345

$$xy'(x)\left(2x^2y(x)\log(y(x)) + 1\right) - 2y(x) = 0$$

✓ **Mathematica** : cpu = 0.159196 (sec), leaf count = 35

$$\text{Solve}\left[\frac{y(x)}{x^2} + 2\left(\frac{1}{2}y(x)^2\log(y(x)) - \frac{y(x)^2}{4}\right) = c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.071 (sec), leaf count = 36

$$\left\{y(x) = e^{\mathit{RootOf}\left(2\_Z\,x^2\left(e^{\_Z}\right)^2 - x^2\left(e^{\_Z}\right)^2 + 2\_C1\,x^2 + 2\,e^{\_Z}\right)}\right\}$$

2.346 ODE No. 346

$$xy'(x)(-ax + y(x) + y(x)\log(xy(x))) - y(x)(ax\log(xy(x)) + ax - y(x)) = 0$$

✓ **Mathematica** : cpu = 0.366181 (sec), leaf count = 24

$$\text{Solve}[ax\log(xy(x)) - y(x)\log(xy(x)) = c_1, y(x)]$$

✓ **Maple** : cpu = 0.214 (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 = 0.291876 (sec), leaf count = 32

$$\left\{\{y(x)\to 0\},\left\{y(x)\to 2\sin^{-1}\left(\frac{1}{4}c_1\left(\sin\left(\frac{x}{2}\right)+\cos\left(\frac{x}{2}\right)\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.135 (sec), leaf count = 12

$$\{y(x)=\arccos\left(\sin\left(x\right)\_C1+\_C1+1\right)\}$$

2.348 ODE No. 348

$$y'(x)(x\cos(y(x))+\sin(x))+\sin(y(x))+y(x)\cos(x)=0$$

✓ **Mathematica** : cpu = 0.170458 (sec), leaf count = 17

$$\mathrm{Solve}[x\sin(y(x))+y(x)\sin(x)=c_1,y(x)]$$

✓ **Maple** : cpu = 0.079 (sec), leaf count = 15

$$\{y(x)\sin\left(x\right)+x\sin\left(y(x)\right)+\_C1=0\}$$

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 = 0.219525 (sec), leaf count = 15

$$\left\{\left\{y(x)\to x\csc^{-1}(2(\log(x)+c_1))\right\}\right\}$$

✓ **Maple** : cpu = 0.029 (sec), leaf count = 17

$$\left\{y(x)=\arcsin\left(\left(2\ln\left(x\right)+2\_C1\right)^{-1}\right)x\right\}$$

2.350 ODE No. 350

$$y'(x)\cos(y(x)) - \sin(y(x)) - \cos(x)\sin^2(y(x)) = 0$$

✓ **Mathematica** : cpu = 0.550197 (sec), leaf count = 53

$$\left\{\left\{y(x)\to \csc^{-1}\left(\frac{1}{2}\left(-\sin(x)-\cos(x)-2c_1e^{-x}\right)\right)\right\},\left\{y(x)\to -\csc^{-1}\left(\frac{1}{2}\left(\sin(x)+\cos(x)+2c_1e^{-x}\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.772 (sec), leaf count = 226

$$\left\{y(x)=\arctan\left(-2\,\frac{\mathrm{e}^{x}}{\mathrm{e}^{x}\left(\cos\left(x\right)+\sin\left(x\right)\right)+2\_C1},\frac{\sqrt{16}}{4\_C1^2+4\,\mathrm{e}^{x}\left(\cos\left(x\right)+\sin\left(x\right)\right)\_C1+\left(\mathrm{e}^{x}\right)^2\left(2\,\cos\left(x\right)\sin\right.}\right.\right.$$

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 = 0.467968 (sec), leaf count = 61

$$\left\{\left\{y(x)\to -\cot^{-1}\left(\sqrt{e^{x^2}\left(-\sqrt{\pi}\mathrm{erf}(x)+4c_1\right)}\right)\right\},\left\{y(x)\to \cot^{-1}\left(\sqrt{e^{x^2}\left(-\sqrt{\pi}\mathrm{erf}(x)+4c_1\right)}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.383 (sec), leaf count = 55

$$\left\{y(x)=-\arcsin\left(\frac{1}{\sqrt{1-\sqrt{\pi}\,\mathit{Erf}\left(x\right)\mathrm{e}^{x^2}-2\_C1\,\mathrm{e}^{x^2}}}\right),y(x)=\arcsin\left(\frac{1}{\sqrt{1-\sqrt{\pi}\,\mathit{Erf}\left(x\right)\mathrm{e}^{x^2}-2\_C1\,\mathrm{e}^{x^2}}}\right)\right\}$$

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 = 0.520555 (sec), leaf count = 43

$$\mathrm{Solve}\left[4\sin(\alpha)\sin(x)\sin(y(x))-4\left(\frac{y(x)}{2}+\frac{1}{4}\sin(2y(x))\right)-2x-\sin(2x)=c_1,y(x)\right]$$

✓ **Maple** : cpu = 0.345 (sec), leaf count = 33

$$\left\{\frac{\left(-2\,\sin\left(\alpha\right)\sin\left(x\right)+\cos\left(y(x)\right)\right)\sin\left(y(x)\right)}{2}+\frac{\cos\left(x\right)\sin\left(x\right)}{2}+\frac{x}{2}+\_C1+\frac{y(x)}{2}=0\right\}$$

2.353 ODE No. 353

$$xy'(x)\cos(y(x)) + \sin(y(x)) = 0$$

✓ **Mathematica** : cpu = 0.0771004 (sec), leaf count = 14

$$\left\{\left\{y(x)\to \sin^{-1}\left(\frac{e^{c_1}}{x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.069 (sec), leaf count = 12

$$\left\{y(x) = \arcsin\left(\frac{1}{\_C1\, x}\right)\right\}$$

2.354 ODE No. 354

$$y'(x)(x\sin(y(x)) - 1) + \cos(y(x)) = 0$$

✓ **Mathematica** : cpu = 0.168906 (sec), leaf count = 145

$$\left\{\left\{y(x)\to -\cos^{-1}\left(\frac{c_1x-\sqrt{-x^2+1+c_1{}^2}}{1+c_1{}^2}\right)\right\},\left\{y(x)\to \cos^{-1}\left(\frac{c_1x-\sqrt{-x^2+1+c_1{}^2}}{1+c_1{}^2}\right)\right\},\left\{y(x)\to -\cos^{-1}\right.\right.$$

✓ **Maple** : cpu = 0.054 (sec), leaf count = 108

$$\left\{y(x) = \arctan\left(\frac{1}{\_C1^2+1}\left(-\_C1\sqrt{\_C1^2-x^2+1}+x\right),\frac{1}{\_C1^2+1}\left(\_C1\, x+\sqrt{\_C1^2-x^2+1}\right)\right), y(x) = a\right.$$

2.355 ODE No. 355

$$y'(x)(x\cos(y(x)) + \cos(x)) + \sin(y(x)) - y(x)\sin(x) = 0$$

✓ **Mathematica** : cpu = 0.158139 (sec), leaf count = 17

$$\text{Solve}[x\sin(y(x)) + y(x)\cos(x) = c_1, y(x)]$$

✓ **Maple** : cpu = 0.083 (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 = 0.225436 (sec), leaf count = 21

$$\text{Solve}\left[x^2\sin(y(x))+y(x)^2\sin(x)=c_1,y(x)\right]$$

✓ **Maple** : cpu = 0.089 (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 = 0.504764 (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 = 0.499 (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 = 0.14288 (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 = 0.081 (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 = 0.301929 (sec), leaf count = 45

$$\left\{\left\{y(x) \to \text{SinIntegral}^{(-1)}\left(-\frac{5}{3}\left(\frac{5\cos(x)}{4} + \frac{1}{12}\cos(3x) + \log\left(\sin\left(\frac{x}{2}\right)\right) - \log\left(\cos\left(\frac{x}{2}\right)\right)\right) + c_1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.05 (sec), leaf count = 28

$$\left\{\frac{3\,Si(y(x))}{5} + \_C1 + \ln\left(\csc\left(x\right) - \cot\left(x\right)\right) + \frac{\cos\left(3\,x\right)}{12} + \frac{5\,\cos\left(x\right)}{4} = 0\right\}$$

2.360 ODE No. 360

$$y'(x)\cos(ay(x)) - b(1 - c\cos(ay(x)))\sqrt{c\cos(ay(x)) + \cos^2(ay(x)) - 1} = 0$$

✓ **Mathematica** : cpu = 4.29684 (sec), leaf count = 369

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[-\frac{i(\cos(\#1a) + 1)\sqrt{\frac{2c\cos(\#1a)+\cos(2\#1a)-1}{(\cos(\#1a)+1)^2}}\sqrt{\frac{c\tan^2\left(\frac{\#1a}{2}\right)+\sqrt{c^2+4}+2}{\sqrt{c^2+4}+2}}\sqrt{1 - \frac{c\tan^2\left(\frac{\#1a}{2}\right)}{\sqrt{c^2+4}-2}}\left(\right.}{a\left(c^2 - 1\right)\sqrt{\frac{c}{4-2\sqrt{c^2+4}}}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.273 (sec), leaf count = 48

$$\left\{x + \_C1 + \int^{y(x)} 2\,\frac{\cos\left(\_a\,a\right)}{b\left(c\cos\left(\_a\,a\right) - 1\right)\sqrt{-2 + 2\,\cos\left(2\,\_a\,a\right) + 4\,c\cos\left(\_a\,a\right)}}d\_a = 0\right\}$$

2.361 ODE No. 361

$$y'(x)(-\sin(y(x)) + x\sin(xy(x)) + \cos(y(x) + x)) + y(x)\sin(xy(x)) + \cos(y(x) + x) + \cos(x) = 0$$

✓ **Mathematica** : cpu = 0.630828 (sec), leaf count = 31

$$\text{Solve}[\cos(y(x)) - \cos(xy(x)) + \sin(x)\cos(y(x)) + \cos(x)\sin(y(x)) + \sin(x) = c_1, y(x)]$$

✓ **Maple** : cpu = 0.174 (sec), leaf count = 22

$$\{-\cos\left(xy(x)\right) + \sin\left(x\right) + \sin\left(y(x) + x\right) + \cos\left(y(x)\right) + \_C1 = 0\}$$

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 = 0.318033 (sec), leaf count = 23

$$\text{Solve}[-4\log(y(x)) - \cos(xy(x)) - \log(x) = c_1, y(x)]$$

✓ **Maple** : cpu = 0.207 (sec), leaf count = 23

$$\left\{y(x) = \frac{1}{x} \mathit{RootOf}\left(-\_Z + \mathrm{e}^{-\frac{\cos(\_Z)}{4}} \_\mathit{C1}\, x^{\frac{3}{4}}\right)\right\}$$

2.363 ODE No. 363

$$(xy'(x) - y(x))\cos^2\left(\frac{y(x)}{x}\right) + x = 0$$

✓ **Mathematica** : cpu = 0.342501 (sec), leaf count = 33

$$\text{Solve}\left[\frac{y(x)}{2x} + \frac{1}{4}\sin\left(\frac{2y(x)}{x}\right) = -\log(x) + c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.066 (sec), leaf count = 35

$$\left\{-\frac{1}{2\,x}\left(\cos\left(\frac{y(x)}{x}\right)\sin\left(\frac{y(x)}{x}\right)x + y(x)\right) - \ln(x) - \_\mathit{C1} = 0\right\}$$

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 = 0.423044 (sec), leaf count = 31

$$\text{Solve}\left[-\log\left(\frac{y(x)}{x}\right) - \log\left(\cos\left(\frac{y(x)}{x}\right)\right) = 2\log(x) + c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.086 (sec), leaf count = 23

$$\left\{y(x) = \frac{\_\mathit{C1}}{\cos\left(\mathit{RootOf}\left(-\_Z\,\cos(\_Z)\,x^2 + \_\mathit{C1}\right)\right)x}\right\}$$

2.365 ODE No. 365

$$(y(x)f(x^2+y(x)^2)-x)\,y'(x)+xf(x^2+y(x)^2)+y(x)=0$$

✓ **Mathematica** : cpu = 0.349053 (sec), leaf count = 156

$$\text{Solve}\left[\int_1^{y(x)}\left(\frac{x-f(x^2+K[2]^2)\,K[2]}{x^2+K[2]^2}-\int_1^x\left(\frac{-2K[1]K[2]f'(K[1]^2+K[2]^2)-1}{K[1]^2+K[2]^2}-\frac{2(-f(K[1]^2+K[2]^2)\,K[1]}{(K[1]^2+K[2]^2)}\right.\right.\right.$$

✓ **Maple** : cpu = 0.289 (sec), leaf count = 42

$$\left\{y(x)=x\left(\tan\left(\mathit{RootOf}\left(-2\_Z-\int^{\frac{x^2\left((\tan(\_Z))^2+1\right)}{(\tan(\_Z))^2}}\frac{f(\_a)}{\_a}d\_a+2\_C1\right)\right)\right)^{-1}\right\}$$

2.366 ODE No. 366

$$f(ay(x)^2+x^2)\,(ay(x)y'(x)+x)-xy'(x)-y(x)=0$$

✓ **Mathematica** : cpu = 0.264422 (sec), leaf count = 91

$$\text{Solve}\left[\int_1^{y(x)}\left(x-af(x^2+aK[2]^2)\,K[2]-\int_1^x(1-2aK[1]K[2]f'(K[1]^2+aK[2]^2))\,dK[1]\right)dK[2]+\int_1^x(y(x)-\right.$$

✓ **Maple** : cpu = 0.074 (sec), leaf count = 45

$$\left\{-ax(y(x))^2\frac{1}{\sqrt{a^2\,(y\,(x))^2}}-\int^{-\frac{a(y(x))^2}{2}-\frac{x^2}{2}}f(-2\_a)\,d\_a+\_C1=0\right\}$$

2.367 ODE No. 367

$$f(x^cy(x))\,(bxy'(x)-a)-x^ay(x)^b\,(cy(x)+xy'(x))=0$$

✗ **Mathematica** : cpu = 11.3763 (sec), leaf count = 0 , could not solve

```
DSolve[-(x^a*y[x]^b*(c*y[x] + x*Derivative[1][y][x])) + f[x^c*y[x]]*(-a + b*x*Derivative[1][
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(f(x^c*y(x))*(b*x*diff(y(x),x)-a)-x^a*y(x)^b*(x*diff(y(x),x)+c*y(x)) = 0,y(x))
```

2.368 ODE No. 368

$$ay(x) + bx^2 + y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 1.2562 (sec), leaf count = 795

$$\left\{\text{Solve}\left[\int_1^x \left(\frac{2\sqrt{-bK[1]^2 - ay(x)}y(x)}{bK[1]^4 + ay(x)K[1]^2 + 4y(x)^2} + \frac{bK[1]^3 + ay(x)K[1]}{bK[1]^4 + ay(x)K[1]^2 + 4y(x)^2}\right) dK[1] + \int_1^{y(x)} \left(-\frac{\sqrt{-bx^2 -}}{bx^4 + aK[2]x}\right.\right.\right.$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , exception

```
time expired
```

2.369 ODE No. 369

$$-a^2 + y'(x)^2 + y(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.0780135 (sec), leaf count = 107

$$\left\{\left\{y(x) \to -\frac{a\tan(x - c_1)}{\sqrt{1 + \tan^2(x - c_1)}}\right\}, \left\{y(x) \to \frac{a\tan(x - c_1)}{\sqrt{1 + \tan^2(x - c_1)}}\right\}, \left\{y(x) \to -\frac{a\tan(x + c_1)}{\sqrt{1 + \tan^2(x + c_1)}}\right\}, \left\{y(x) \to\right.\right.$$

✓ **Maple** : cpu = 0.103 (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 = 13.2072 (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 = 0.0413158 (sec), leaf count = 37

$$\left\{\left\{y(x) \to 1 + \tan^2\left(\frac{-x + c_1}{2}\right)\right\}, \left\{y(x) \to 1 + \tan^2\left(\frac{x + c_1}{2}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.059 (sec), leaf count = 20

$$\left\{y(x) = 1, y(x) = \left(\tan\left(-\frac{x}{2} + \frac{\_C1}{2}\right)\right)^2 + 1\right\}$$

2.372 ODE No. 372

$$ay(x) + b + y'(x)^2 - 4y(x)^3 = 0$$

✓ **Mathematica** : cpu = 0.0031921 (sec), leaf count = 27

$$\{\{y(x) \to \wp(x - c_1; a, b)\}, \{y(x) \to \wp(x + c_1; a, b)\}\}$$

✓ **Maple** : cpu = 0.041 (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 = 0.295552 (sec), leaf count = 185

$$\left\{\left\{y(x) \to \exp\left(-\frac{1}{2}\sqrt{-e^{2iax-2c_1} - e^{2c_1-2iax} + 2}\right)\right\}, \left\{y(x) \to \exp\left(\frac{1}{2}\sqrt{-e^{2iax-2c_1} - e^{2c_1-2iax} + 2}\right)\right\}, \left\{y(x) \right.\right.$$

✓ **Maple** : cpu = 0.186 (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 = 0.0701045 (sec), leaf count = 73

$$\left\{\left\{y(x)\to \text{InverseFunction}\left[-\frac{\sqrt{\#1^2+1}}{\#1}-\frac{1}{\#1}+\sinh^{-1}(\#1)\&\right][-x+c_1]\right\},\left\{y(x)\to \text{InverseFunction}\left[-\frac{\sqrt{\#}}{}\right.\right.\right.$$

✓ **Maple** : cpu = 0.026 (sec), leaf count = 85

$$\left\{x-(y(x))^{-1}-\frac{1}{y(x)}\left((y(x))^2+1\right)^{\frac{3}{2}}+y(x)\sqrt{(y(x))^2+1}+\mathit{Arcsinh}(y(x))-\_\mathit{C1}=0,x+\frac{1}{y(x)}\left((y(x))^2+1\right)\right.$$

2.375 ODE No. 375

$$ay'(x) + bx + y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.0301193 (sec), leaf count = 71

$$\left\{\left\{y(x)\to \frac{1}{2}\left(-\frac{\left(a^2-4bx\right)^{3/2}}{6b}-ax\right)+c_1\right\},\left\{y(x)\to \frac{1}{2}\left(\frac{\left(a^2-4bx\right)^{3/2}}{6b}-ax\right)+c_1\right\}\right\}$$

✓ **Maple** : cpu = 0.023 (sec), leaf count = 49

$$\left\{y(x)=-\frac{ax}{2}-\frac{1}{12\,b}\left(a^2-4\,bx\right)^{\frac{3}{2}}+\_\mathit{C1},y(x)=-\frac{ax}{2}+\frac{1}{12\,b}\left(a^2-4\,bx\right)^{\frac{3}{2}}+\_\mathit{C1}\right\}$$

2.376 ODE No. 376

$$ay'(x) + by(x) + y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.236918 (sec), leaf count = 110

$$\left\{\left\{y(x)\to \text{InverseFunction}\left[-\frac{\sqrt{a^2-4\#1b}+a\log\left(a-\sqrt{a^2-4\#1b}\right)}{2b}\&\right]\left[\frac{x}{2}+c_1\right]\right\},\left\{y(x)\to \text{InverseFuncti}\right.\right.$$

✓ **Maple** : cpu = 0.499 (sec), leaf count = 219

$$\left\{y(x)=-\frac{1}{4\,b}\mathrm{e}^{\frac{1}{2\,a}\left(-2\,\mathit{alambertW}\left(2\,\frac{\mathrm{e}^{-1}}{a}\mathrm{e}^{-\frac{\_\mathit{C1}\,b}{a}}\frac{1}{\sqrt{-b^{-1}}}\left(\mathrm{e}^{\frac{bx}{a}}\right)^{-1}\right)-a\ln(-\frac{1}{4\,b})-2\,a+(-2\,x+2\_\mathit{C1})b\right)}\left(\mathrm{e}^{\frac{1}{2\,a}\left(-2\,\mathit{alambertW}\left(2\,\frac{\mathrm{e}^{-1}}{a}\mathrm{e}^{-\frac{\_C}{a}}\right.\right.}\right.\right.$$

2.377 ODE No. 377

$$y'(x)^2 + (x-2)y'(x) - y(x) + 1 = 0$$

✓ **Mathematica** : cpu = 0.0031212 (sec), leaf count = 19

$$\{\{y(x) \to c_1 x + 1 + c_1{}^2 - 2c_1\}\}$$

✓ **Maple** : cpu = 0.013 (sec), leaf count = 24

$$\left\{y(x) = -\frac{x^2}{4} + x, y(x) = 1 + \_C1^2 + (x-2)\_C1\right\}$$

2.378 ODE No. 378

$$(a+x)y'(x) + y'(x)^2 - y(x) = 0$$

✓ **Mathematica** : cpu = 0.003348 (sec), leaf count = 18

$$\{\{y(x) \to ac_1 + c_1 x + c_1{}^2\}\}$$

✓ **Maple** : cpu = 0.015 (sec), leaf count = 20

$$\left\{y(x) = \_C1\left(\_C1 + a + x\right), y(x) = -\frac{(x+a)^2}{4}\right\}$$

2.379 ODE No. 379

$$y'(x)^2 - (x+1)y'(x) + y(x) = 0$$

✓ **Mathematica** : cpu = 0.0034196 (sec), leaf count = 18

$$\{\{y(x) \to c_1 x - c_1{}^2 + c_1\}\}$$

✓ **Maple** : cpu = 0.014 (sec), leaf count = 22

$$\left\{y(x) = \_C1\left(-\_C1 + x + 1\right), y(x) = \frac{(1+x)^2}{4}\right\}$$

2.380 ODE No. 380

$$y'(x)^2 + 2xy'(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 0.384411 (sec), leaf count = 1757

$$\left\{\left\{y(x) \to -\frac{x^2}{4} - \frac{1}{4}\sqrt[3]{x^6 - 20\cosh(3c_1)x^3 - 20\sinh(3c_1)x^3 - 8\cosh(6c_1) - 8\sinh(6c_1) + 8\sqrt{-\cosh(3c_1)x^9 - \mathrm{si}}}\right.\right.$$

✓ **Maple** : cpu = 0.037 (sec), leaf count = 619

$$\left\{y(x) = \frac{1}{16}\left(i\sqrt{3}\left(6\_C1 - x^3 + 2\sqrt{-3\_C1\,x^3 + 9\_C1^2}\right)^{\frac{2}{3}} - i\sqrt{3}x^2 - \left(6\_C1 - x^3 + 2\sqrt{-3\_C1\,x^3 + 9\_C\right.\right.\right.$$

2.381 ODE No. 381

$$y'(x)^2 - 2xy'(x) + y(x) = 0$$

✓ **Mathematica** : cpu = 0.383598 (sec), leaf count = 1757

$$\left\{\left\{y(x) \to \frac{x^2}{4} + \frac{1}{4}\sqrt[3]{x^6 - 20\cosh(3c_1)x^3 - 20\sinh(3c_1)x^3 - 8\cosh(6c_1) - 8\sinh(6c_1) + 8\sqrt{-\cosh(3c_1)x^9 - \mathrm{sin}}}\right.\right.$$

✓ **Maple** : cpu = 0.029 (sec), leaf count = 579

$$\left\{y(x) = -\frac{1}{16}\left(i\sqrt{3}\left(-6\_C1 + x^3 + 2\sqrt{-3\_C1\,x^3 + 9\_C1^2}\right)^{\frac{2}{3}} - i\sqrt{3}x^2 - \left(-6\_C1 + x^3 + 2\sqrt{-3\_C1\,x^3 +}\right.\right.\right.$$

2.382 ODE No. 382

$$axy'(x) - bx^2 - c + y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.17248 (sec), leaf count = 201

$$\left\{\left\{y(x) \to \frac{1}{2}\left(\frac{1}{2}x\sqrt{a^2x^2 + 4bx^2 + 4c} + \frac{2c\log\left(\sqrt{a^2+4b}\sqrt{a^2x^2 + 4bx^2 + 4c} + a^2x + 4bx\right)}{\sqrt{a^2+4b}} - \frac{ax^2}{2}\right) + c_1\right\}, \left\{y(\right.\right.$$

✓ **Maple** : cpu = 0.025 (sec), leaf count = 146

$$\left\{y(x) = -\frac{x}{4}\sqrt{(a^2+4b)x^2 + 4c} - c\ln\left(\sqrt{a^2+4b}x + \sqrt{(a^2+4b)x^2 + 4c}\right)\frac{1}{\sqrt{a^2+4b}} - \frac{ax^2}{4} + \_C1, y(x) = \frac{x}{4}\right.$$

2.383 ODE No. 383

$$axy'(x) + by(x) + cx^2 + y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 5.2038 (sec), leaf count = 1118

$$\left\{\text{Solve}\left[\int_1^x \left(\frac{\sqrt{a^2K[1]^2 - 4cK[1]^2 - 4by(x)}y(x)}{cK[1]^4 + 2ay(x)K[1]^2 + by(x)K[1]^2 + 4y(x)^2} + \frac{cK[1]^3 + ay(x)K[1] + by(x)K[1]}{cK[1]^4 + 2ay(x)K[1]^2 + by(x)K[1]^2 + 4y(x)^2}\right) dK\right.\right.$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , exception

`time expired`

2.384 ODE No. 384

$$(ax+b)y'(x) - ay(x) + c + y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 1.29162 (sec), leaf count = 183

$$\left\{\left\{y(x) \to \frac{-2a^2bx - 2\sqrt{-a^4e^{2c_1}x^2 - 2a^4e^{2c_1}x + a^4\left(-e^{2c_1}\right)} + 2a^3x + a^3 - ab^2 + 4ac - ae^{2c_1}}{4a^2}\right\}, \left\{y(x) \to \frac{-2a^2}{}\right.\right.$$

✓ **Maple** : cpu = 0.022 (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 = 0.681114 (sec), leaf count = 6217

$$\left\{\left\{y(x) \to -x^3\left(\frac{1}{2}\sqrt{\frac{2\left(8e^{6c_1}x^{18} + e^{12c_1}x^{12}\right)}{9x^{24}\sqrt[3]{\frac{64\sqrt{e^{12c_1}x^{60} - 3e^{18c_1}x^{54} + 3e^{24c_1}x^{48} - e^{30c_1}x^{42}}}{x^{36}} + \frac{64e^{6c_1}}{x^6} + \frac{160e^{12c_1}}{x^{12}} - \frac{8e^{18c_1}}{x^{18}}}}} + \frac{1}{18}\sqrt[3]{\frac{64\sqrt{e^{12c_1}x}}{}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.505 (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 = 0.171979 (sec), leaf count = 119

$$\left\{\left\{y(x) \to \frac{1}{2}(\cosh(2c_1) + \sinh(2c_1))\left(-\sqrt{2}\sqrt{a}x^2 + 2\cosh(2c_1) + 2\sinh(2c_1)\right)\right\}, \left\{y(x) \to \frac{\sqrt{a}x^2\cosh(2c_1)}{\sqrt{2}} + \frac{\sqrt{a}$$

✓ **Maple** : cpu = 0.743 (sec), leaf count = 27

$$\left\{y(x) = -\frac{ax^4}{8}, y(x) = \_C1\ x^2 + 2\frac{\_C1^2}{a}\right\}$$

2.387 ODE No. 387

$$y'(x)^2 + e^x(y'(x) - y(x)) = 0$$

✓ **Mathematica** : cpu = 1.17375 (sec), leaf count = 190

$$\left\{\text{Solve}\left[\log(y(x)) - \frac{-e^{x/2}\sqrt{4y(x)+e^x} - \frac{4\sqrt{\frac{e^x}{y(x)}+4}y(x)^{3/2}\sinh^{-1}\left(\frac{e^{x/2}}{2\sqrt{y(x)}}\right)}{\sqrt{4y(x)+e^x}} + e^x}{2y(x)} = c_1, y(x)\right], \text{Solve}\left[\log(y(x)) - \frac{e^{x/}}{}\right.\right.$$

✓ **Maple** : cpu = 1.509 (sec), leaf count = 115

$$\left\{\ln(y(x)) - \frac{1}{2\,y(x)}\sqrt{e^{2\,x} + 4\,y(x)\,e^x} - 2\,\mathit{Artanh}\left(\sqrt{e^{2\,x} + 4\,y(x)\,e^x}\,e^{-x}\right) - \frac{e^x}{2\,y(x)} - \_C1 = 0, \ln(y(x)) + \frac{1}{2\,y(x}\right.$$

2.388 ODE No. 388

$$y'(x)^2 - 2y(x)y'(x) - 2x = 0$$

✓ **Mathematica** : cpu = 0.497327 (sec), leaf count = 53

$$\text{Solve}\left[\left\{x = \frac{\text{K\$317948}\sinh^{-1}(\text{K\$317948})}{2\sqrt{\text{K\$317948}^2+1}} + \frac{c_1\text{K\$317948}}{\sqrt{\text{K\$317948}^2+1}}, y(x) = \frac{\text{K\$317948}}{2} - \frac{x}{\text{K\$317948}}\right\}, \{y(x), \text{K\$3179}\right.$$

✓ **Maple** : cpu = 0.193 (sec), leaf count = 223

$$\left\{\left(\left(\frac{y(x)}{2} - \frac{1}{2}\sqrt{(y(x))^2 + 2\,x}\right)\mathit{Arcsinh}\left(-y(x) + \sqrt{(y(x))^2 + 2\,x}\right) + x\sqrt{2\,(y(x))^2 + 2\,x - 2\,y(x)\sqrt{(y(x))^2 +}}\right.\right.$$

2.389 ODE No. 389

$$y'(x)^2 - (4y(x)+1)y'(x) + y(x)(4y(x)+1) = 0$$

✓ **Mathematica** : cpu = 0.0636879 (sec), leaf count = 57

$$\left\{\left\{y(x) \to -\frac{1}{4}e^{x-4c_1}\left(-e^x + 2e^{2c_1}\right)\right\}, \left\{y(x) \to \frac{1}{4}e^{x+2c_1}\left(-2 + e^{x+2c_1}\right)\right\}\right\}$$

✓ **Maple** : cpu = 2.411 (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 = 1.5136 (sec), leaf count = 142

$$\mathrm{Solve}\left[\left\{x = e^{b\left(\frac{\log(\mathrm{K\$318599})}{b} - \frac{\log\left(b - a\mathrm{K\$318599}^2\right)}{2b}\right)}\left(\frac{\tan^{-1}\left(\frac{\sqrt{a}\mathrm{K\$318599}}{\sqrt{b - a\mathrm{K\$318599}^2}}\right)}{\sqrt{a}} - \frac{c\sqrt{b - a\mathrm{K\$318599}^2}}{b\mathrm{K\$318599}}\right) + c_1 e^{b\left(\frac{\log(\mathrm{K\$318599}}{b}\right.} \right.\right.$$

✓ **Maple** : cpu = 1.137 (sec), leaf count = 281

$$\left\{ y(x) = 2\,\frac{\mathrm{e}^{RootOf\left(\sqrt{a}\_C1\, b\mathrm{e}^{2\_Z} - a\mathrm{e}^{2\_Z}bx + \sqrt{a}\_C1\, b^2 - \mathrm{e}^{2\_Z}\_Z\, b - a\mathrm{e}^{2\_Z}c + ab^2x - \_Z\, b^2 + abc\right)}\left(-1/4\left(\mathrm{e}^{2\,RootOf\left(\sqrt{a}\_C1\, b\mathrm{e}^{2\_Z} - \right.}\right.\right.}{a^{3/2}\left(\mathrm{e}^{2\,RootOf\left(\sqrt{a}\_C1\right.}\right.} \right.$$

2.391 ODE No. 391

$$y'(x)(ay(x) + bx) + abxy(x) + y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.0070432 (sec), leaf count = 29

$$\left\{\left\{y(x) \to c_1 e^{-ax}\right\}, \left\{y(x) \to -\frac{bx^2}{2} + c_1\right\}\right\}$$

✓ **Maple** : cpu = 0.075 (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 = 0.197263 (sec), leaf count = 27

$$\left\{\left\{y(x)\to \frac{e^{\frac{c_1 x}{2}-\frac{c_1{}^2}{4}}}{a}\right\}\right\}$$

✓ **Maple** : cpu = 1.759 (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 = 0.0847473 (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 = 0.351 (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 = 88.2118 (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 = 10.447 (sec), leaf count = 109

$$\left\{y(x)=\tan\left(-\int\left(\mathrm{e}^{\int_a^x f(xp)\,\mathrm{d}xp}\right)^2\sqrt{\frac{g(x)-(f(x))^2}{\left(\mathrm{e}^{\int_a^x f(xp)\,\mathrm{d}xp}\right)^4}}\,\mathrm{d}x+\_C1\right)\sqrt{\mathrm{e}^{-2\int_a^x f(xp)\,\mathrm{d}xp}\left(\left(\left(\tan\left(-\int\left(\mathrm{e}^{\int_a^x f(xp)\,\mathrm{d}xp}\right)^2\right.\right.\right.\right.}\right.$$

2.395 ODE No. 395

$$2f(x)y(x)y'(x) + g(x)y(x)^2 + h(x) + y'(x)^2 = 0$$

✗ **Mathematica** : cpu = 28.9336 (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 = 0.0452319 (sec), leaf count = 29

$$\left\{\left\{y(x) \to \frac{1}{x - c_1}\right\}, \left\{y(x) \to c_1 e^{\frac{x^2}{2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.043 (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 = 0.411392 (sec), leaf count = 143

$$\left\{\text{Solve}\left[-\frac{x\sqrt{x^4y(x)+4}y(x)^{3/2}\sinh^{-1}\left(\frac{1}{2}x^2\sqrt{y(x)}\right)}{2\sqrt{x^2y(x)^3\left(x^4y(x)+4\right)}} - \frac{1}{4}\log(y(x)) = c_1, y(x)\right], \text{Solve}\left[\frac{xy(x)^{3/2}\sqrt{x^4y(x)+4}\sin}{2\sqrt{x^2y(x)^3\left(x^4\right.}}\right.\right.$$

✓ **Maple** : cpu = 0.802 (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 = 1.28095 (sec), leaf count = 258

$$\left\{\text{Solve}\left[-\frac{\left(x^2-4\sqrt[3]{y(x)}\right)^{3/2}y(x)^2\log(y(x))}{6\left(\left(x^2-4\sqrt[3]{y(x)}\right)y(x)^{4/3}\right)^{3/2}}+\frac{\sqrt{\left(x^2-4\sqrt[3]{y(x)}\right)y(x)^{4/3}}\log\left(\sqrt{x^2-4\sqrt[3]{y(x)}}+x\right)}{\sqrt{x^2-4\sqrt[3]{y(x)}}y(x)^{2/3}}+\frac{1}{6}\log(y(\right.\right.$$

✓ **Maple** : cpu = 2.519 (sec), leaf count = 137

$$\left\{\ln(x)+\frac{1}{6}\ln\left(64\frac{y(x)}{x^6}-1\right)-\frac{1}{6}\ln\left(16\left(\frac{y(x)}{x^6}\right)^{2/3}+4\sqrt[3]{\frac{y(x)}{x^6}}+1\right)-\frac{1}{6}\ln\left(4\sqrt[3]{\frac{y(x)}{x^6}}-1\right)+\frac{1}{6}\ln\left(\frac{y(x)}{x^6}\right)+\right.$$

2.399 ODE No. 399

$$2y'(x)^2 + (x-1)y'(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 0.0031209 (sec), leaf count = 20

$$\left\{\left\{y(x)\to c_1x+2c_1{}^2-c_1\right\}\right\}$$

✓ **Maple** : cpu = 0.015 (sec), leaf count = 22

$$\left\{y(x)=\_C1\,(2\_C1+x-1)\,,y(x)=-\frac{(x-1)^2}{8}\right\}$$

2.400 ODE No. 400

$$-2x^2y'(x) + 2y'(x)^2 + 3xy(x) = 0$$

✓ **Mathematica** : cpu = 0.252126 (sec), leaf count = 135

$$\left\{\text{Solve}\left[\frac{1}{3}\log(y(x))-\frac{2\sqrt{x^4-6xy(x)}\tanh^{-1}\left(\frac{x^{3/2}}{\sqrt{x^3-6y(x)}}\right)}{3\sqrt{x}\sqrt{x^3-6y(x)}}=c_1,y(x)\right],\text{Solve}\left[\frac{2\sqrt{x^4-6xy(x)}\tanh^{-1}\left(\frac{x^{3/2}}{\sqrt{x^3-6y}}\right.}{3\sqrt{x}\sqrt{x^3-6y(x)}}\right.\right.$$

✓ **Maple** : cpu = 0.339 (sec), leaf count = 74

$$\left\{y(x)=\frac{x^3}{6},y(x)=\frac{1}{3\_C1}\left(-\sqrt{-6\_C1\,xx}+3\right),y(x)=\frac{1}{3\_C1}\left(\sqrt{-6\_C1\,xx}+3\right),y(x)=-\frac{x}{3}\sqrt{-6\_C1\,x+\right.$$

2.401 ODE No. 401

$$3y'(x)^2 - 2xy'(x) + y(x) = 0$$

✓ **Mathematica** : cpu = 0.300854 (sec), leaf count = 1093

$$\{\{y(x) \to \text{Root}\left[-16e^{6c_1}x^6 + 3\#1^4x^4 + 144e^{6c_1}\#1x^4 - 24\#1^5x^2 - 378e^{6c_1}\#1^2x^2 + 243e^{12c_1} + 48\#1^6 + 216e^{6c_1}\right.$$

✓ **Maple** : cpu = 0.128 (sec), leaf count = 580

$$\left\{y(x) = -\frac{1}{48}\left(i\sqrt{3}\left(-54\_C1 + x^3 + 6\sqrt{-3\_C1\,x^3 + 81\_C1^2}\right)^{\frac{2}{3}} - i\sqrt{3}x^2 - \left(-54\_C1 + x^3 + 6\sqrt{-3\_C1\,x\right.\right.\right.$$

2.402 ODE No. 402

$$x^2 + 4xy'(x) + 3y'(x)^2 - y(x) = 0$$

✓ **Mathematica** : cpu = 5.09782 (sec), leaf count = 1211

$$\left\{\text{Solve}\left[\frac{1}{2}\left(\frac{\tanh^{-1}\left(\frac{1-3x}{2\sqrt{1-9y(x)}}\right)}{\sqrt{1-9y(x)}} + \log\left(-3x^2 + 2x - 12y(x) + 1\right) + \frac{9\tanh^{-1}\left(\frac{-2\sqrt{1-9y(x)}x+x+9y(x)}{\sqrt{-9y(x)-4\sqrt{1-9y(x)}+5}\sqrt{x^2+3y(x)}}\right)}{\sqrt{1-9y(x)}\sqrt{-9y(x) - 4\sqrt{1-9y(x)} + \right.\right.\right.$$

✓ **Maple** : cpu = 0.243 (sec), leaf count = 101

$$\left\{y(x) = -\frac{x^2}{3}, y(x) = \frac{-3\_C1^2x^2 - 2\sqrt{3}\_C1\,x + 3}{12\_C1^2}, y(x) = \frac{-3\_C1^2x^2 + 2\sqrt{3}\_C1\,x + 3}{12\_C1^2}, y(x) = -\frac{\sqrt{3}\_C1\,x}{6}\right.$$

2.403 ODE No. 403

$$ay'(x)^2 + by'(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 0.236715 (sec), leaf count = 116

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[\frac{\sqrt{4\#1a + b^2} + b\log\left(b - \sqrt{4\#1a + b^2}\right)}{2a}\&\right]\left[\frac{x}{2a} + c_1\right]\right\}, \left\{y(x) \to \text{InverseFunctio}\right.\right.$$

✓ **Maple** : cpu = 3.179 (sec), leaf count = 197

$$\left\{y(x)=\frac{1}{4a}\mathrm{e}^{-\frac{1}{2b}\left(2\,blambertW\left(2\frac{\mathrm{e}^{-1}}{b\sqrt{a^{-1}}}\mathrm{e}^{\frac{x}{b}}\left(\mathrm{e}^{-\frac{\_C1}{b}}\right)^{-1}\right)+b\ln\left(\frac{1}{4a}\right)+2\_C1+2b-2x\right)}\left(\mathrm{e}^{-\frac{1}{2b}\left(2\,blambertW\left(2\frac{\mathrm{e}^{-1}}{b\sqrt{a^{-1}}}\mathrm{e}^{\frac{x}{b}}\left(\mathrm{e}^{-\frac{\_C1}{b}}\right)^{-1}\right.\right.}\right.\right.$$

2.404 ODE No. 404

$$ay'(x)^2+bx^2y'(x)+cxy(x)=0$$

✓ **Mathematica** : cpu = 2.40845 (sec), leaf count = 795

$$\left\{\mathrm{Solve}\left[\int_1^x\left(\frac{(3b+2c)K[1]^2}{2\left(3bK[1]^3+cK[1]^3+9ay(x)\right)}+\frac{3\sqrt{K[1]\left(b^2K[1]^3-4acy(x)\right)}}{2\left(3bK[1]^3+cK[1]^3+9ay(x)\right)}\right)dK[1]+\int_1^{y(x)}\left(\frac{9\sqrt{x\left(b^2x\right.}}{2(3b+c)x^2\left(3b\right.}\right.\right.\right.$$

✓ **Maple** : cpu = 0.527 (sec), leaf count = 389

$$\left\{\int_{\_b}^x\left(-b\_a^2-\sqrt{\_a^4b^2-4\_a\,acy\,(x)}\right)\left(b\_a^3+\sqrt{\_a^4b^2-4\_a\,acy\,(x)}\_a+6\,ay(x)\right)^{-1}\mathrm{d}\_a+\int^{y(x)}-2\frac{}{bx^3}\right.$$

2.405 ODE No. 405

$$ay'(x)^2+y(x)y'(x)-x=0$$

✓ **Mathematica** : cpu = 0.842942 (sec), leaf count = 53

$$\mathrm{Solve}\left[\left\{x=\frac{a\mathrm{K\$348407}\sin^{-1}(\mathrm{K\$348407})}{\sqrt{1-\mathrm{K\$348407}^2}}+\frac{c_1\mathrm{K\$348407}}{\sqrt{1-\mathrm{K\$348407}^2}},y(x)=\frac{x}{\mathrm{K\$348407}}-a\mathrm{K\$348407}\right\},\{y(x),\mathrm{K\$348}\right.$$

✓ **Maple** : cpu = 0.607 (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 = 0.622743 (sec), leaf count = 49

$$\text{Solve}\left[\left\{x = \frac{a\text{K\$348736}\sinh^{-1}(\text{K\$348736})}{\sqrt{\text{K\$348736}^2+1}} + \frac{c_1\text{K\$348736}}{\sqrt{\text{K\$348736}^2+1}}, y(x) = a\text{K\$348736} - \frac{x}{\text{K\$348736}}\right\}, \{y(x), \text{K\$34}\right.$$

✓ **Maple** : cpu = 0.21 (sec), leaf count = 262

$$\left\{\left(-\frac{\sqrt{2}}{2}\left(y(x) + \sqrt{4\,ax + (y(x))^2}\right) Arcsinh\left(\frac{1}{2\,a}\left(y(x) + \sqrt{4\,ax + (y(x))^2}\right)\right) + x\sqrt{\frac{1}{a^2}\left(y(x)\sqrt{4\,ax + (y(x))^2}\right.}\right.\right.$$

2.407 ODE No. 407

$$xy'(x)^2 - y(x) = 0$$

✓ **Mathematica** : cpu = 0.0227999 (sec), leaf count = 51

$$\left\{\left\{y(x) \to \frac{1}{4}\left(4x - 4c_1\sqrt{x} + c_1{}^2\right)\right\}, \left\{y(x) \to \frac{1}{4}\left(4x + 4c_1\sqrt{x} + c_1{}^2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.052 (sec), leaf count = 39

$$\left\{y(x) = 0, y(x) = \frac{1}{x}\left(-x + \sqrt{\_C1\,x}\right)^2, y(x) = \frac{1}{x}\left(x + \sqrt{\_C1\,x}\right)^2\right\}$$

2.408 ODE No. 408

$$xy'(x)^2 - 2y(x) + x = 0$$

✓ **Mathematica** : cpu = 0.148725 (sec), leaf count = 97

$$\left\{\text{Solve}\left[-2\left(\frac{1}{1-\sqrt{\frac{2y(x)}{x}-1}} + \log\left(1-\sqrt{\frac{2y(x)}{x}-1}\right)\right) = \log(x) + c_1, y(x)\right], \text{Solve}\left[2\left(\frac{1}{\sqrt{\frac{2y(x)}{x}-1}+1} + \log\right.\right.\right.$$

✓ **Maple** : cpu = 0.117 (sec), leaf count = 73

$$\left\{y(x) = \left(\frac{1}{2}\left(lambertW\left(\frac{1}{\_C1}\sqrt{\_C1\,x}\right)+1\right)^2\left(lambertW\left(\frac{1}{\_C1}\sqrt{\_C1\,x}\right)\right)^{-2} + \frac{1}{2}\right)x, y(x) = \left(\frac{1}{2}\left(lamber\right.\right.\right.$$

2.409 ODE No. 409

$$xy'(x)^2 - 2y'(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 30.5494 (sec), leaf count = 66

$$\text{Solve}\left[\left\{x = \frac{y(\text{K\$349631}) + 2\text{K\$349631}}{\text{K\$349631}^2}, y(x) = e^{2(\log(\text{K\$349631}) - \log(1-\text{K\$349631}))}\left(-\frac{2}{\text{K\$349631}} - 2\log(\text{K\$349631})\right.\right.\right.$$

✓ **Maple** : cpu = 0.218 (sec), leaf count = 63

$$\left\{y(x) = x\mathrm{e}^{2\,RootOf\left(-x\mathrm{e}^{2\_Z} + 2\,x\mathrm{e}^{\_Z} + 2\,\mathrm{e}^{\_Z} + \_C1 - 2\_Z - x\right)} - 2\,\mathrm{e}^{RootOf\left(-x\mathrm{e}^{2\_Z} + 2\,x\mathrm{e}^{\_Z} + 2\,\mathrm{e}^{\_Z} + \_C1 - 2\_Z - x\right)}\right\}$$

2.410 ODE No. 410

$$xy'(x)^2 + 4y'(x) - 2y(x) = 0$$

✓ **Mathematica** : cpu = 30.7078 (sec), leaf count = 80

$$\text{Solve}\left[\left\{x = -\frac{2(2\text{K\$350139} - y(\text{K\$350139}))}{\text{K\$350139}^2}, y(x) = 4e^{-4\left(\frac{1}{2}\log(2-\text{K\$350139}) - \frac{\log(\text{K\$350139})}{2}\right)}\left(\frac{2}{\text{K\$350139}} + \log(\text{K\$350}\right.\right.\right.$$

✓ **Maple** : cpu = 0.24 (sec), leaf count = 64

$$\left\{y(x) = \frac{x\mathrm{e}^{2\,RootOf\left(-x\mathrm{e}^{2\_Z} + 4\,x\mathrm{e}^{\_Z} - 4\,\mathrm{e}^{\_Z} + \_C1 + 8\_Z - 4\,x\right)}}{2} + 2\,\mathrm{e}^{RootOf\left(-x\mathrm{e}^{2\_Z} + 4\,x\mathrm{e}^{\_Z} - 4\,\mathrm{e}^{\_Z} + \_C1 + 8\_Z - 4\,x\right)}\right\}$$

2.411 ODE No. 411

$$xy'(x)^2 + xy'(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 0.136418 (sec), leaf count = 99

$$\left\{\text{Solve}\left[\frac{1}{\sqrt{\frac{4y(x)}{x} + 1} - 1} - \log\left(1 - \sqrt{\frac{4y(x)}{x} + 1}\right) = \frac{\log(x)}{2} + c_1, y(x)\right], \text{Solve}\left[\frac{1}{\sqrt{\frac{4y(x)}{x} + 1} + 1} + \log\left(\sqrt{\frac{4y(x)}{x}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.117 (sec), leaf count = 65

$$\left\{y(x) = \frac{x}{4}\left(1 + 2\,lambertW\left(-1/2\,\frac{1}{\sqrt{\frac{\_C1}{x}}}\right)\right)\left(lambertW\left(-\frac{1}{2}\frac{1}{\sqrt{\frac{\_C1}{x}}}\right)\right)^{-2}, y(x) = \frac{x}{4}\left(1 + 2\,lambertW\left(1/\right.\right.\right.$$

2.412 ODE No. 412

$$a + xy'(x)^2 + y(x)y'(x) = 0$$

✓ **Mathematica** : cpu = 0.39402 (sec), leaf count = 3229

$$\left\{\left\{y(x) \to -\frac{1}{2}\sqrt{-\frac{16ax}{9} + \frac{\sqrt[3]{-131072a^6x^6 + 2560a^3e^{3c_1}x^3 + e^{6c_1} + \sqrt{-1073741824a^9e^{3c_1}x^9 + 3145728a^6e^{6c_1}x^6}}}{18\ 2^{2/3}ax}}\right.\right.$$

✓ **Maple** : cpu = 0.195 (sec), leaf count = 146

$$\left\{-\_C1\, x^2\left(\frac{1}{x}\left(-y(x) + \sqrt{(y(x))^2 - 4\,ax}\right)\right)^{\frac{3}{2}}\left(-y(x) + \sqrt{(y(x))^2 - 4\,ax}\right)^{-2} + x + \frac{4\,ax^2}{3}\left(-y(x) + \sqrt{(y(x))^2}\right.\right.$$

2.413 ODE No. 413

$$-x^2 + xy'(x)^2 + y(x)y'(x) = 0$$

✗ **Mathematica** : cpu = 300.977 (sec), leaf count = 0 , timed out

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✓ **Maple** : cpu = 0.289 (sec), leaf count = 269

$$\left\{\int_{\_b}^{x}\frac{1}{\_a}\left(-y(x) - \sqrt{4\_a^3 + (y(x))^2}\right)\left(\sqrt{4\_a^3 + (y(x))^2} + 4\,y(x)\right)^{-1}\mathrm{d}\_a + \int^{y(x)}\left(-2 + \left(-48\_f - 12\sqrt{4}\right.\right.\right.$$

2.414 ODE No. 414

$$x^3 + xy'(x)^2 + y(x)y'(x) = 0$$

✓ **Mathematica** : cpu = 0.0892483 (sec), leaf count = 107

$$\left\{\left\{y(x) \to x^2\text{InverseFunction}\left[\int_1^{\#1}\frac{1}{5K[1] + \sqrt{K[1]^2 - 4}}dK[1]\&\right]\left[\int_1^x -\frac{1}{2K[2]}dK[2] + c_1\right]\right\}, \left\{y(x) \to x^2\text{Inve}\right.\right.$$

✓ **Maple** : cpu = 0.293 (sec), leaf count = 269

$$\left\{\int_{\_b}^{x}\frac{1}{\_a}\left(-y(x) - \sqrt{-4\_a^4 + (y(x))^2}\right)\left(\sqrt{-4\_a^4 + (y(x))^2} + 5\,y(x)\right)^{-1}\mathrm{d}\_a + \int^{y(x)}\left(-2 + \left(80\_f + 16\sqrt{}\right.\right.\right.$$

2.415 ODE No. 415

$$y(x)y'(x) + xy'(x)^2 - y(x)^4 = 0$$

✓ **Mathematica** : cpu = 0.311479 (sec), leaf count = 25

$$\left\{\left\{y(x) \to \frac{2e^{\frac{c_1}{2}}}{-4x + e^{c_1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.554 (sec), leaf count = 95

$$\left\{y(x) = -\frac{1}{2}\frac{1}{\sqrt{-x}}, y(x) = \frac{1}{2}\frac{1}{\sqrt{-x}}, y(x) = -\frac{1}{2\,x}\sqrt{-x\left(\tanh\left(-\frac{\ln(x)}{2} + \frac{\_C1}{2}\right)\right)^2 + x}\left(\tanh\left(-\frac{\ln(x)}{2} + \frac{\_C1}{2}\right.\right.$$

2.416 ODE No. 416

$$xy'(x)^2 + (y(x) - 3x)y'(x) + y(x) = 0$$

✓ **Mathematica** : cpu = 1.20388 (sec), leaf count = 383

$$\left\{\text{Solve}\left[\frac{1}{8}\left(-\sqrt{\frac{\frac{y(x)}{x} - 9}{\frac{y(x)}{x} - 1}}\left(\frac{y(x)}{x} - 1\right) + \sqrt{\frac{y(x)}{x} - 9}\sqrt{\frac{y(x)}{x} - 1} - 3\log\left(\frac{y(x)}{x}\right) - \frac{10\sqrt{\frac{y(x)}{x} - 9}\sin^{-1}\left(\frac{\sqrt{9 - \frac{y(x)}{x}}}{2\sqrt{2}}\right)}{\sqrt{9 - \frac{y(x)}{x}}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.155 (sec), leaf count = 136

$$\left\{-\frac{\_C1}{x}\left(-y(x) + 5\,x + \sqrt{9\,x^2 - 10\,xy\,(x) + (y\,(x))^2}\right)\left(\frac{1}{x}\left(-y(x) + 3\,x + \sqrt{9\,x^2 - 10\,xy\,(x) + (y\,(x))^2}\right)\right)^{-\frac{3}{2}} +\right.$$

2.417 ODE No. 417

$$a + xy'(x)^2 - y(x)y'(x) = 0$$

✓ **Mathematica** : cpu = 0.343002 (sec), leaf count = 48

$$\left\{\left\{y(x) \to \frac{16a^2 + 4ax - 8ae^{\frac{c_1}{2}} + e^{c_1}}{2\left(-4a + e^{\frac{c_1}{2}}\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.026 (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 = 0.623174 (sec), leaf count = 220

$$\left\{ \text{Solve}\left[-\frac{-\frac{4a^{3/2}\sqrt{4-\frac{y(x)}{ax}}\sin^{-1}\left(\frac{\sqrt{\frac{y(x)}{x}}}{2\sqrt{a}}\right)}{\sqrt{\frac{y(x)}{x}-4a}} + \sqrt{\frac{y(x)}{x}}\sqrt{\frac{y(x)}{x}-4a} + \frac{y(x)}{x}}{4a} = \frac{\log(x)}{2} + c_1, y(x) \right], \text{Solve}\left[\frac{4a^{3/2}\sqrt{4-\frac{y(x)}{ax}}\sin^{-}}{\sqrt{\frac{y(x)}{x}-4}} \right.\right.$$

✓ **Maple** : cpu = 0.093 (sec), leaf count = 42

$$\left\{ y(x) = 0, y(x) = -ax\left(\mathit{lambertW}\left(-\frac{xe}{\_C1\ a}\right) - 1\right)^2 \left(\mathit{lambertW}\left(-\frac{xe}{\_C1\ a}\right)\right)^{-1} \right\}$$

2.419 ODE No. 419

$$xy'(x)^2 + 2y(x)y'(x) - x = 0$$

✓ **Mathematica** : cpu = 1.05168 (sec), leaf count = 9073

✓ **Maple** : cpu = 0.059 (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 = 0.281039 (sec), leaf count = 777

$$\left\{\left\{y(x)\to\frac{1}{4}a^2e^{-\frac{3c_1}{2}}x^2+\frac{1}{4}e^{-\frac{3c_1}{2}}\sqrt[3]{a^6x^6-20a^3e^{3c_1}x^3+8\sqrt{-a^9e^{3c_1}x^9+3a^6e^{6c_1}x^6-3a^3e^{9c_1}x^3+e^{12c_1}}-8e^{6c_1}-\right.\right.$$

✓ **Maple** : cpu = 0.189 (sec), leaf count = 689

$$\left\{y(x)=\frac{x}{12\_C1}\left(4\frac{x^2}{\sqrt[3]{-36\,a\_C1^2+8\,x^3+12\,\sqrt{a\left(9\,a\_C1^2-4\,x^3\right)}\_C1}}+2\,x+\sqrt[3]{-36\,a\_C1^2+8\,x^3+12\,\sqrt{\right.\right.$$

2.421 ODE No. 421

$$xy'(x)^2-2y(x)y'(x)-x=0$$

✓ **Mathematica** : cpu = 0.0373358 (sec), leaf count = 27

$$\{\{y(x)\to x\sinh(-\log(x)+c_1)\},\{y(x)\to x\sinh(\log(x)+c_1)\}\}$$

✓ **Maple** : cpu = 0.054 (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 = 0.0719883 (sec), leaf count = 81

$$\left\{\left\{y(x)\to-\frac{2\left(x+x\tanh^2\left(\frac{1}{2}(-\log(x)+c_1)\right)\right)}{-1+\tanh^2\left(\frac{1}{2}(-\log(x)+c_1)\right)}\right\},\left\{y(x)\to-\frac{2\left(x+x\tanh^2\left(\frac{1}{2}(\log(x)+c_1)\right)\right)}{-1+\tanh^2\left(\frac{1}{2}(\log(x)+c_1)\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.062 (sec), leaf count = 30

$$\left\{y(x)=-2\,x,y(x)=2\,x,y(x)=\frac{4\_C1^2+x^2}{2\_C1}\right\}$$

2.423 ODE No. 423

$$xy'(x)^2 - 2y(x)y'(x) + 2y(x) + x = 0$$

✓ **Mathematica** : cpu = 0.0745803 (sec), leaf count = 59

$$\left\{\left\{y(x) \to \frac{1}{2}\left(-2e^{-c_1}x^2 + 2x - e^{c_1}\right)\right\}, \left\{y(x) \to \frac{1}{2}\left(-e^{c_1}x^2 + 2x - 2e^{-c_1}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.06 (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 = 0.47817 (sec), leaf count = 223

$$\left\{\text{Solve}\left[\frac{-2a\tan^{-1}\left(\frac{ay(x)}{x\sqrt{4b-\frac{a^2y(x)^2}{x^2}}}\right) + (a+2)\left(2\tan^{-1}\left(\frac{(a+2)y(x)}{x\sqrt{4b-\frac{a^2y(x)^2}{x^2}}}\right) - i\log\left(\frac{(a+1)y(x)^2}{x^2}+b\right)\right)}{8(a+1)} = \frac{1}{2}i\log(x)\right.\right.$$

✓ **Maple** : cpu = 0.333 (sec), leaf count = 193

$$\left\{\frac{1}{x}\left(-\_C1\left(ay(x) - \sqrt{a^2\left(y(x)\right)^2 - 4\,bx^2}\right)\left(\frac{a}{2\,x^2}\left(-y(x)\left(a+1\right)\sqrt{a^2\left(y(x)\right)^2 - 4\,bx^2} + \left(a^2+a\right)\left(y(x)\right)^2 - 2\,b\right.\right.\right.\right.$$

2.425 ODE No. 425

$$(x+1)y'(x)^2 - (y(x)+x)y'(x) + y(x) = 0$$

✓ **Mathematica** : cpu = 0.198642 (sec), leaf count = 59

$$\left\{\left\{y(x) \to -\frac{e^{c_1}\left(-2x+e^{c_1}\right)}{2\left(2+e^{c_1}\right)}\right\}, \left\{y(x) \to -\frac{2e^{c_1}\left(-x+2e^{c_1}\right)}{1+2e^{c_1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.029 (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 = 0.393446 (sec), leaf count = 40

$$\left\{\left\{y(x) \to \frac{12x + 196 - 28e^{\frac{c_1}{2}} + e^{c_1}}{2\left(-12 + e^{\frac{c_1}{2}}\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.029 (sec), leaf count = 51

$$\left\{y(x) = \frac{9 + (3\,x+1)\,\_C1^2 - 6\,\_C1}{3\,\_C1}, y(x) = -2 - 2\sqrt{3\,x+1}, y(x) = -2 + 2\sqrt{3\,x+1}\right\}$$

2.427 ODE No. 427

$$(3x+5)y'(x)^2 - (3y(x)+x)y'(x) + y(x) = 0$$

✗ **Mathematica** : cpu = 300.057 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.033 (sec), leaf count = 60

$$\left\{y(x) = \frac{(3\,x+5)\,\_C1^2 - \_C1\,x}{3\,\_C1 - 1}, y(x) = \frac{x}{3} + \frac{10}{9} - \frac{2}{9}\sqrt{15\,x+25}, y(x) = \frac{x}{3} + \frac{10}{9} + \frac{2}{9}\sqrt{15\,x+25}\right\}$$

2.428 ODE No. 428

$$y'(x)(-ay(x)+bx+c) + axy'(x)^2 - by(x) = 0$$

✗ **Mathematica** : cpu = 300.014 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.128 (sec), leaf count = 66

$$\left\{y(x) = \frac{1}{a}\left(-bx + c - 2\sqrt{-bcx}\right), y(x) = \frac{1}{a}\left(-bx + c + 2\sqrt{-bcx}\right), y(x) = \frac{\_C1\,(\_C1\,ax + bx + c)}{\_C1\,a + b}\right\}$$

2.429 ODE No. 429

$$-y'(x)(ay(x)-a+bx-b)+axy'(x)^2+by(x)=0$$

✓ **Mathematica** : cpu = 0.0296383 (sec), leaf count = 26

$$\left\{\left\{y(x)\to \frac{c_1(a+b)}{-b+ac_1}+c_1x\right\}\right\}$$

✓ **Maple** : cpu = 0.092 (sec), leaf count = 72

$$\left\{y(x)=\frac{1}{a}\left(bx+a+b-2\sqrt{bx(a+b)}\right),y(x)=\frac{1}{a}\left(bx+a+b+2\sqrt{bx(a+b)}\right),y(x)=\frac{\_C1\,(\_C1\,ax-bx+a}{\_C1\,a-b}\right.$$

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 = 238.665 (sec), leaf count = 478

$$\text{Solve}\left[\left\{x=(\mathrm{b0}+\mathrm{b1K\$379019})\exp\left(\frac{(\mathrm{b1}(\mathrm{b0}-\mathrm{a1})+2\mathrm{a2b0})\tan^{-1}\left(\frac{\mathrm{a1}+2\mathrm{K\$379019}(\mathrm{a2}+\mathrm{b1})+\mathrm{b0}}{\sqrt{4\mathrm{a0}(\mathrm{a2}+\mathrm{b1})-\mathrm{a1}^2-2\mathrm{a1b0}-\mathrm{b0}^2}}\right)}{(\mathrm{a2}+\mathrm{b1})\sqrt{4\mathrm{a0}(\mathrm{a2}+\mathrm{b1})-\mathrm{a1}^2-2\mathrm{a1b0}-\mathrm{b0}^2}}-\frac{(2\mathrm{a2}+\mathrm{b1})}{}\right.\right.\right.$$

✓ **Maple** : cpu = 1.861 (sec), leaf count = 1602

$$\left\{\frac{1}{2\,a2\,x+2\,c2}\left(2\,e^{\frac{-2\,a2\,b0+b1\,(a1-b0)}{\sqrt{(4\,a2+4\,b1)a0-(a1+b0)^2}(a2+b1)}\arctan\left(\frac{(a2+b1)\sqrt{b1^2(y(x))^2+((2\,b1\,a1-4\,a2\,b0)x-4\,b0\,c2+2\,b1\,c1)y(x)+\left(-4\,a0\,a2+a1^2\right)x^2+}}{\sqrt{(4\,a2+4}}\right.}\right.\right.$$

2.431 ODE No. 431

$$x^2y'(x)^2 - y(x)^4 + y(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.045015 (sec), leaf count = 81

$$\left\{\left\{y(x) \to -\sqrt{1+\tan^2(-\log(x)+c_1)}\right\}, \left\{y(x) \to \sqrt{1+\tan^2(-\log(x)+c_1)}\right\}, \left\{y(x) \to -\sqrt{1+\tan^2(\log(x)+\right.\right.$$

✓ **Maple** : cpu = 0.343 (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 = 1.11605 (sec), leaf count = 64

$$\text{Solve}\left[\left\{y(x) = \frac{a^2+2a\text{K\$381664}x+\text{K\$381664}^2x^2+x^2}{2a}, x = -\frac{a\sinh^{-1}(\text{K\$381664})}{\sqrt{\text{K\$381664}^2+1}} + \frac{c_1}{\sqrt{\text{K\$381664}^2+1}}\right\}, \{y(x\right.$$

✓ **Maple** : cpu = 7.237 (sec), leaf count = 242

$$\left\{y(x) = \frac{1}{2\,a\left(\left(RootOf\left((Arcsinh(\_Z))^2a^2 - \_Z^2x^2 - 2\,Arcsinh(\_Z)\_C1\,a + \_C1^2 - x^2\right)\right)^2+1\right)}\left(-2\,aRoo\right.\right.$$

2.433 ODE No. 433

$$-4a - 4x^2 + (xy'(x) + y(x) + 2x)^2 - 4xy(x) = 0$$

✓ **Mathematica** : cpu = 1.13976 (sec), leaf count = 22

$$\left\{\left\{y(x) \to \frac{-a-2c_1x+c_1{}^2}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.405 (sec), leaf count = 34

$$\left\{y(x) = \frac{-x^2-a}{x}, y(x) = \_C1 + \frac{\_C1^2-4\,a}{4\,x}\right\}$$

2.434 ODE No. 434

$$x^2y'(x)^2 - x^2 - 2xy(x)y'(x) = 0$$

✓ **Mathematica** : cpu = 0.0379794 (sec), leaf count = 27

$$\{\{y(x) \to x\sinh(-\log(x) + c_1)\}, \{y(x) \to x\sinh(\log(x) + c_1)\}\}$$

✓ **Maple** : cpu = 0.033 (sec), leaf count = 7

$$\{y(x) = x + \_C1\}$$

2.435 ODE No. 435

$$x^2y'(x)^2 - 2xy(x)y'(x) + y(x)(y(x) + 1) - x = 0$$

✓ **Mathematica** : cpu = 0.0615501 (sec), leaf count = 61

$$\left\{\left\{y(x) \to \frac{1}{4}\left(4x + c_1{}^2x - 4ic_1\sqrt{x} - 4\right)\right\}, \left\{y(x) \to \frac{1}{4}\left(4x + c_1{}^2x + 4ic_1\sqrt{x} - 4\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.544 (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

$$x^2y'(x)^2 + \left(1 - x^2\right)y(x)^2 - x^4 - 2xy(x)y'(x) = 0$$

✓ **Mathematica** : cpu = 0.051786 (sec), leaf count = 26

$$\{\{y(x) \to -x\sinh(x - c_1)\}, \{y(x) \to x\sinh(x + c_1)\}\}$$

✓ **Maple** : cpu = 7.527 (sec), leaf count = 61

$$\left\{y(x) = -ix, y(x) = ix, y(x) = -\frac{x\left((\mathrm{e}^x)^2 - \_C1^2\right)}{2\,\mathrm{e}^x\_C1}, y(x) = \frac{x\left((\mathrm{e}^x)^2\_C1^2 - 1\right)}{2\,\mathrm{e}^x\_C1}\right\}$$

2.437 ODE No. 437

$$-(a+2xy(x))y'(x)+x^2y'(x)^2+y(x)^2=0$$

✓ **Mathematica** : cpu = 0.325157 (sec), leaf count = 47

$$\left\{\left\{y(x)\to\frac{x-2\sqrt{a}c_1}{4c_1{}^2}\right\},\left\{y(x)\to\frac{x+2\sqrt{a}c_1}{4c_1{}^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.077 (sec), leaf count = 36

$$\left\{y(x)=-\frac{a}{4\,x},y(x)=\_C1\,x-\sqrt{\_C1\,a},y(x)=\_C1\,x+\sqrt{\_C1\,a}\right\}$$

2.438 ODE No. 438

$$x^2y'(x)^2+3xy(x)y'(x)+2y(x)^2=0$$

✓ **Mathematica** : cpu = 0.0098568 (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 = 0.04 (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 = 0.0353339 (sec), leaf count = 49

$$\left\{\left\{y(x)\to c_1x^{\frac{1}{2}\left(-3-i\sqrt{3}\right)}\right\},\left\{y(x)\to c_1x^{\frac{1}{2}i\left(\sqrt{3}+3i\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.102 (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 = 0.0097352 (sec), leaf count = 19

$$\left\{\left\{y(x) \to \frac{c_1}{x^5}\right\}, \{y(x) \to c_1x\}\right\}$$

✓ **Maple** : cpu = 0.036 (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 = 0.0814584 (sec), leaf count = 65

$$\left\{\left\{y(x) \to -e^{-c_1}x\left(-x + 2\sqrt{2}e^{\frac{c_1}{2}}\right)\right\}, \left\{y(x) \to e^{\frac{c_1}{2}}x\left(-2\sqrt{2} + e^{\frac{c_1}{2}}x\right)\right\}\right\}$$

✓ **Maple** : cpu = 4.88 (sec), leaf count = 83

$$\left\{y(x) = -2, y(x) = \frac{1}{\_C1}\left(x^2 - 2\sqrt{2}\sqrt{\_C1\, x^2}\right), y(x) = \frac{1}{\_C1}\left(2\sqrt{2}\sqrt{\_C1\, x^2} + x^2\right), y(x) = \frac{x(-2\sqrt{2}\_C1 + x}{\_C1^2}\right.$$

2.442 ODE No. 442

$$x^2y'(x)^2 + \left(x^2y(x) + x^3 - 2xy(x)\right)y'(x) + (1 - x)\left(y(x)^2 - x^2y(x)\right) = 0$$

✓ **Mathematica** : cpu = 0.0124129 (sec), leaf count = 28

$$\left\{\left\{y(x) \to c_1e^{-x}x\right\}, \left\{y(x) \to -x^2 + c_1x\right\}\right\}$$

✓ **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

$$x(xy'(x)-y(x))^2-y'(x)=0$$

✓ **Mathematica** : cpu = 2.67761 (sec), leaf count = 10121

✓ **Maple** : cpu = 6.924 (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 = 0.380207 (sec), leaf count = 75

$$\left\{\left\{y(x)\to-\frac{\cosh(2c_1)-\sinh(2c_1)}{x\cosh(2c_1)+x\sinh(2c_1)-1}\right\},\left\{y(x)\to-\frac{\cosh(2c_1)-\sinh(2c_1)}{x\cosh(2c_1)+x\sinh(2c_1)+1}\right\}\right\}$$

✓ **Maple** : cpu = 4.902 (sec), leaf count = 120

$$\left\{y(x)=\frac{\sqrt{2}\_C1^3-2\,x\_C1^2}{-2\_C1^2+4\,x^2},y(x)=\frac{\_C1^2\left(\sqrt{2}\_C1+2\,x\right)}{2\_C1^2-4\,x^2},y(x)=4\,x,y(x)=-2\frac{\_C1^2\left(-\sqrt{2}\_C1+x\right)}{-2\_C1^2+x^2},y(x\right.$$

2.445 ODE No. 445

$$y'(x)\left(ax^2y(x)^3+b\right)+aby(x)^3+x^2y'(x)^2=0$$

✓ **Mathematica** : cpu = 0.0583082 (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 = 0.043 (sec), leaf count = 35

$$\left\{y(x)=\frac{1}{\sqrt{2\,ax+\_C1}},y(x)=-\frac{1}{\sqrt{2\,ax+\_C1}},y(x)=\frac{b}{x}+\_C1\right\}$$

2.446 ODE No. 446

$$(x^2+1)\, y'(x)^2 - 2xy(x)y'(x) + y(x)^2 - 1 = 0$$

✓ **Mathematica** : cpu = 0.324827 (sec), leaf count = 95

$$\left\{\left\{y(x)\to \frac{-x+x\cosh(2c_1)+x\sinh(2c_1)-2\cosh(c_1)-2\sinh(c_1)}{1+\cosh(2c_1)+\sinh(2c_1)}\right\},\left\{y(x)\to \frac{-x+x\cosh(2c_1)+x\sinh(2c_1)}{1+\cosh(2c_1)+}\right.\right.$$

✓ **Maple** : cpu = 0.038 (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

$$(x^2-1)\, y'(x)^2 - 1 = 0$$

✓ **Mathematica** : cpu = 0.0101585 (sec), leaf count = 89

$$\left\{\left\{y(x)\to \frac{1}{2}\log\left(1-\frac{x}{\sqrt{x^2-1}}\right)-\frac{1}{2}\log\left(\frac{x}{\sqrt{x^2-1}}+1\right)+c_1\right\},\left\{y(x)\to -\frac{1}{2}\log\left(1-\frac{x}{\sqrt{x^2-1}}\right)+\frac{1}{2}\log\left(\frac{}{\sqrt{x}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.091 (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

$$(x^2-1)\, y'(x)^2 - y(x)^2 + 1 = 0$$

✓ **Mathematica** : cpu = 0.0925097 (sec), leaf count = 349

$$\left\{\left\{y(x)\to -\frac{1}{2}e^{-c_1}\sqrt{2x^2+2e^{4c_1}x^2-2\sqrt{(x-1)(x+1)}x+2e^{4c_1}\sqrt{(x-1)(x+1)}x-1+2e^{2c_1}-e^{4c_1}}\right\},\left\{y(x)-\right.\right.$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , exception

```
time expired
```

2.449 ODE No. 449

$$\left(x^2-a^2\right)y'(x)^2+2xy(x)y'(x)+y(x)^2=0$$

✓ **Mathematica** : cpu = 0.0133786 (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 = 0.038 (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 = 0.312593 (sec), leaf count = 26

$$\left\{\left\{y(x)\to\frac{a^2-x^2+c_1{}^2}{2c_1}\right\}\right\}$$

✓ **Maple** : cpu = 0.647 (sec), leaf count = 51

$$\left\{y(x)=\sqrt{a^2-x^2},y(x)=-\sqrt{a^2-x^2},y(x)=\_C1\,x^2-\_C1\,a^2-\frac{1}{4\_C1}\right\}$$

2.451 ODE No. 451

$$\left(a+x^2\right)y'(x)^2+b-2xy(x)y'(x)+y(x)^2=0$$

✗ **Mathematica** : cpu = 300.324 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.14 (sec), leaf count = 78

$$\left\{y(x)=\frac{1}{a}\sqrt{-ab\left(x^2+a\right)},y(x)=-\frac{1}{a}\sqrt{-ab\left(x^2+a\right)},y(x)=\_C1\,x-\sqrt{-a\_C1^2-b},y(x)=\_C1\,x+\sqrt{-a\_C\right.$$

2.452 ODE No. 452

$$\left(2x^2+1\right)y'(x)^2+\left(x^2+2xy(x)+y(x)^2+2\right)y'(x)+2y(x)^2+1=0$$

✓ **Mathematica** : cpu = 0.0155775 (sec), leaf count = 23

$$\left\{\left\{y(x)\to\frac{-c_1x+1+c_1{}^2}{x+c_1}\right\}\right\}$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve((2*x^2+1)*diff(y(x),x)^2+(y(x)^2+2*x*y(x)+x^2+2)*diff(y(x),x)+2*y(x)^2+1 = 0,y(x))
```

2.453 ODE No. 453

$$\left(a^2-1\right)x^2y'(x)^2+a^2x^2+2xy(x)y'(x)-y(x)^2=0$$

✓ **Mathematica** : cpu = 0.557394 (sec), leaf count = 327

$$\left\{\text{Solve}\left[\frac{2i\tan^{-1}\left(\frac{y(x)}{x\sqrt{a^2-\frac{y(x)^2}{x^2}-1}}\right)+a\tanh^{-1}\left(\frac{-a^2-\frac{iy(x)}{x}+1}{a\sqrt{a^2-\frac{y(x)^2}{x^2}-1}}\right)-a\tanh^{-1}\left(\frac{-a^2+\frac{iy(x)}{x}+1}{a\sqrt{a^2-\frac{y(x)^2}{x^2}-1}}\right)+a\log\left(\frac{y(x)^2}{x^2}+1\right)\right.\right.$$
$$\overline{\qquad\qquad\qquad\qquad 2a^2-2 \qquad\qquad\qquad\qquad}$$

✓ **Maple** : cpu = 3.111 (sec), leaf count = 229

$$\left\{\frac{1}{2\,a}\left(-2\_C1\,a+2\,a\ln(x)+\ln\left(\frac{(y(x))^2+x^2}{x^2}\right)a-2\sqrt{-a^2}\arctan\left(\frac{a^2y(x)}{\sqrt{-a^2}x}\frac{1}{\sqrt{\frac{(y(x))^2+(-a^2+1)x^2}{x^2}}}\right)+2\ln\left(\frac{1}{x}\right.\right.\right.$$

2.454 ODE No. 454

$$ax^2y'(x)^2-(a-1)ax^2-2axy(x)y'(x)+y(x)^2=0$$

✓ **Mathematica** : cpu = 0.37691 (sec), leaf count = 241

$$\left\{\left\{y(x)\to-\frac{1}{2}\sqrt{a}e^{-c_1}x^{1-\sqrt{\frac{a-1}{a}}}\left(-x^{2\sqrt{\frac{a-1}{a}}}+e^{2c_1}\right)\right\},\left\{y(x)\to\frac{1}{2}\sqrt{a}e^{-c_1}x^{1-\sqrt{\frac{a-1}{a}}}\left(-x^{2\sqrt{\frac{a-1}{a}}}+e^{2c_1}\right)\right\},\left\{y(x)-\right.\right.$$

✓ **Maple** : cpu = 0.219 (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

$$a+x^3y'(x)^2+x^2y(x)y'(x)=0$$

✓ **Mathematica** : cpu = 0.871131 (sec), leaf count = 123

$$\left\{\left\{y(x)\to -\frac{e^{-\frac{c_1}{2}}\left(x+2ae^{c_1}\right)}{\sqrt{2}x}\right\},\left\{y(x)\to \frac{e^{-\frac{c_1}{2}}\left(x+2ae^{c_1}\right)}{\sqrt{2}x}\right\},\left\{y(x)\to -\frac{e^{-\frac{c_1}{2}}\left(2ax+e^{c_1}\right)}{\sqrt{2}x}\right\},\left\{y(x)\to \frac{e^{-\frac{c_1}{2}}\left(2a\right.}{\sqrt{}}\right.$$

✓ **Maple** : cpu = 0.61 (sec), leaf count = 66

$$\left\{y(x)=-2\,\frac{\sqrt{ax}}{x},y(x)=2\,\frac{\sqrt{ax}}{x},y(x)=\frac{\_C1^2+4\,ax}{2\,\_C1\,x},y(x)=\frac{x\_C1^2+4\,a}{2\,\_C1\,x}\right\}$$

2.456 ODE No. 456

$$2\left(1-x^2\right)y(x)y'(x)+x\left(x^2-1\right)y'(x)^2+xy(x)^2-x=0$$

✓ **Mathematica** : cpu = 0.122107 (sec), leaf count = 421

$$\left\{\left\{y(x)\to \frac{-x-x\tanh^2\left(\frac{1}{4}\left(-\frac{i\sqrt{x-1}\sqrt{x+1}\sqrt{(x-1)(x+1)}\tan^{-1}\left(\sqrt{x^2-1}\right)}{1-x}-\frac{i\sqrt{x-1}\sqrt{(x-1)(x+1)}\tan^{-1}\left(\sqrt{x^2-1}\right)}{\sqrt{x+1}}+2c_1\right)\right)}{-1+\tanh^2\left(\frac{1}{4}\left(-\frac{i\sqrt{x-1}\sqrt{x+1}\sqrt{(x-1)(x+1)}\tan^{-1}\left(\sqrt{x^2-1}\right)}{1-x}-\frac{i\sqrt{x-1}\sqrt{(x-1)(x+1)}\tan^{-1}\left(\sqrt{x^2-1}\right)}{\sqrt{x+1}}+2c_1\right)\right)}\right.\right.$$

✓ **Maple** : cpu = 0.731 (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

$$x^4y'(x)^2-xy'(x)-y(x)=0$$

✓ **Mathematica** : cpu = 0.243138 (sec), leaf count = 118

$$\left\{\text{Solve}\left[-\frac{x\sqrt{4x^2y(x)+1}\tanh^{-1}\left(\sqrt{4x^2y(x)+1}\right)}{\sqrt{4x^4y(x)+x^2}}-\frac{1}{2}\log(y(x))=c_1,y(x)\right],\text{Solve}\left[\frac{x\sqrt{4x^2y(x)+1}\tanh^{-1}\left(\sqrt{\right.\right.}{\sqrt{4x^4y(x)+}}\right.$$

✓ **Maple** : cpu = 3.827 (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 = 0.0205922 (sec), leaf count = 120

$$\left\{\left\{y(x)\to -\frac{x\sqrt{x^2-a^2}\tan^{-1}\left(\frac{\sqrt{x^2-a^2}}{a}\right)}{a\sqrt{x^4-a^2x^2}}+c_1\right\},\left\{y(x)\to \frac{x\sqrt{x^2-a^2}\tan^{-1}\left(\frac{\sqrt{x^2-a^2}}{a}\right)}{a\sqrt{x^4-a^2x^2}}+c_1\right\}\right\}$$

✓ **Maple** : cpu = 0.154 (sec), leaf count = 90

$$\left\{y(x)=-\ln\left(\frac{1}{x}\left(-2\,a^2+2\,\sqrt{-a^2}\sqrt{-a^2+x^2}\right)\right)\frac{1}{\sqrt{-a^2}}+\_C1,y(x)=\ln\left(\frac{1}{x}\left(-2\,a^2+2\,\sqrt{-a^2}\sqrt{-a^2+x^2}\right)\right)$$

2.459 ODE No. 459

$$-\left(y'(x)-1\right)^2+e^{-2x}y'(x)^2+e^{-2y(x)}=0$$

✓ **Mathematica** : cpu = 2.63538 (sec), leaf count = 271

$$\left\{\left\{y(x)\to\log\left(-\frac{e^{-c_1}(e^x+1)\left(-e^x+e^{x+2c_1}-1-e^{2c_1}\right)}{\sqrt{8e^x+4e^{2x}+4}}\right)\right\},\left\{y(x)\to\log\left(\frac{e^{-c_1}(e^x+1)\left(-e^x+e^{x+2c_1}-1-\right.}{\sqrt{8e^x+4e^{2x}+4}}\right.\right.$$

✓ **Maple** : cpu = 0.949 (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 = 48.7302 (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 = 300.056 (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 = 0.0209024 (sec), leaf count = 43

$$\left\{\left\{y(x)\to \left(\frac{3}{2}\right)^{2/3}(-x+c_1)^{2/3}\right\},\left\{y(x)\to \left(\frac{3}{2}\right)^{2/3}(x+c_1)^{2/3}\right\}\right\}$$

✓ **Maple** : cpu = 0.086 (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 = 0.030403 (sec), leaf count = 47

$$\left\{\left\{y(x)\to \left(\frac{3}{2}\right)^{2/3}\left(-e^x+c_1\right)^{2/3}\right\},\left\{y(x)\to \left(\frac{3}{2}\right)^{2/3}\left(e^x+c_1\right)^{2/3}\right\}\right\}$$

✓ **Maple** : cpu = 0.205 (sec), leaf count = 50

$$\left\{-\sqrt{y\left(x\right)\left(\mathrm{e}^{x}\right)^{2}}\frac{1}{\sqrt{y\left(x\right)}}+\frac{2}{3}(y(x))^{\frac{3}{2}}+\_C1=0, \sqrt{y\left(x\right)\left(\mathrm{e}^{x}\right)^{2}}\frac{1}{\sqrt{y\left(x\right)}}+\frac{2}{3}(y(x))^{\frac{3}{2}}+\_C1=0\right\}$$

2.464 ODE No. 464

$$y(x)y'(x)^2 + 2xy'(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 0.0905634 (sec), leaf count = 52

$$\left\{\left\{y(x) \to -e^{\frac{c_1}{2}}\sqrt{-2x + e^{c_1}}\right\}, \left\{y(x) \to e^{\frac{c_1}{2}}\sqrt{-2x + e^{c_1}}\right\}\right\}$$

✓ **Maple** : cpu = 1.348 (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 = 304.073 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.15 (sec), leaf count = 210

$$\left\{\_C1\,x\left(x + \sqrt{x^2 + 9\,(y\,(x))^2}\right)\left(\frac{1}{y\,(x)}\left(-x - \sqrt{x^2 + 9\,(y\,(x))^2}\right)\right)^{\frac{2}{7}}\left(x\sqrt{x^2 + 9\,(y\,(x))^2} + x^2 + (y(x))^2\right)^{-1} -$$

2.466 ODE No. 466

$$y(x)y'(x)^2 - 2xy'(x) + y(x) = 0$$

✓ **Mathematica** : cpu = 1.78653 (sec), leaf count = 433

$$\left\{\text{Solve}\left[-\frac{i\sqrt{\frac{y(x)^2}{x^2} - 1}\tan^{-1}\left(\sqrt{\frac{y(x)^2}{x^2} - 1}\right)}{\sqrt{\frac{y(x)}{x} - 1}\sqrt{\frac{y(x)}{x} + 1}} - i\sqrt{\frac{\frac{y(x)}{x} - 1}{\frac{y(x)}{x} + 1}}\left(\frac{y(x)}{x} + 1\right) + i\sqrt{\frac{y(x)}{x} - 1}\sqrt{\frac{y(x)}{x}} + 1 + \log\left(\frac{y(x)}{x}\right)\right.\right.$$

✓ **Maple** : cpu = 1.161 (sec), leaf count = 71

$$\left\{y(x) = x, y(x) = \sqrt{\_C1^2 - 2\,ix\_C1}, y(x) = \sqrt{\_C1^2 + 2\,ix\_C1}, y(x) = -x, y(x) = -\sqrt{\_C1^2 - 2\,ix\_C1}, y($$

2.467 ODE No. 467

$$y(x)y'(x)^2 - 4xy'(x) + y(x) = 0$$

✓ **Mathematica** : cpu = 0.262129 (sec), leaf count = 226

$$\left\{\left\{y(x) \to \sqrt{x^2 + \frac{2\,2^{2/3}x^4}{\sqrt[3]{32x^6 - 40c_1{}^3x^3 + \sqrt{-48c_1{}^9x^3 + 768c_1{}^6x^6 - 4096c_1{}^3x^9 + c_1{}^{12}} - c_1{}^6}} + \frac{}{\sqrt[3]{32x^6 - 40c_1{}^3x^3 +}}}\right.\right.$$

✓ **Maple** : cpu = 0.135 (sec), leaf count = 148

$$\left\{-\frac{\_C1\,x}{y(x)}\frac{1}{\sqrt[3]{\frac{1}{(y(x))^2}\left(8x^2 - 4(y(x))^2 - 4x\sqrt{4x^2 - (y(x))^2}\right)}}\frac{1}{\sqrt[3]{\frac{1}{y(x)}\left(2x - \sqrt{4x^2 - (y(x))^2}\right)}} + x = 0, -\frac{\_C1}{y(x}\right.$$

2.468 ODE No. 468

$$-4a^2xy'(x) + a^2y(x) + y(x)y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 3.46331 (sec), leaf count = 609

$$\left\{\text{Solve}\left[\frac{-4\left(\frac{y(x)^2}{x^2} - 4a^2\right)\tanh^{-1}\left(\frac{\sqrt{4a^2 - \frac{y(x)^2}{x^2}}}{2a}\right) + 2\left(\frac{y(x)^2}{x^2} - 4a^2\right)\tanh^{-1}\left(\frac{\sqrt{4a^2 - \frac{y(x)^2}{x^2}}}{a}\right) + \sqrt{2a - \frac{y(x)}{x}}\sqrt{4a^2 -}}{6\sqrt{2a - \frac{y(x)}{x}}}\right.\right.$$

✓ **Maple** : cpu = 0.167 (sec), leaf count = 181

$$\left\{-\frac{\_C1\,x}{ay(x)}\frac{1}{\sqrt[3]{\frac{a^2}{(y(x))^2}\left(2a^2x^2 + \sqrt{4a^2x^2 - (y(x))^2}ax - (y(x))^2\right)}}\frac{1}{\sqrt[3]{\frac{a}{y(x)}\left(2ax + \sqrt{4a^2x^2 - (y(x))^2}\right)}} + x = 0, -\right.$$

2.469 ODE No. 469

$$axy'(x) + by(x) + y(x)y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.265312 (sec), leaf count = 157

$$\left\{\text{Solve}\left[\frac{(a+2b)\log\left(-\sqrt{a^2-\frac{4by(x)^2}{x^2}}+a+2b\right)+a\log\left(\sqrt{a^2-\frac{4by(x)^2}{x^2}}+a\right)}{4(a+b)} = -\frac{\log(x)}{2}+c_1, y(x)\right], \text{Solve}\left[\frac{a}{-\right.\right.$$

✓ **Maple** : cpu = 0.321 (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 = 0.238876 (sec), leaf count = 143

$$\left\{\text{Solve}\left[\frac{1}{2}\log(y(x)) - \frac{\sqrt{4x^2y(x)^2+x^6}\tanh^{-1}\left(\frac{x^2}{\sqrt{x^4+4y(x)^2}}\right)}{2x\sqrt{x^4+4y(x)^2}} = c_1, y(x)\right], \text{Solve}\left[\frac{\sqrt{4x^2y(x)^2+x^6}\tanh^{-1}\left(\frac{}{\sqrt{x^4-}}\right.}{2x\sqrt{x^4+4y(x)^2}}\right.\right.$$

✓ **Maple** : cpu = 0.653 (sec), leaf count = 87

$$\left\{y(x) = -\frac{i}{2}x^2, y(x) = \frac{i}{2}x^2, y(x) = -\frac{1}{4}\sqrt{-4\_C1\,x^2+\_C1^2}, y(x) = \frac{1}{4}\sqrt{-4\_C1\,x^2+\_C1^2}, y(x) = -2\,\frac{\sqrt{\_C1}}{\_}\right.$$

2.471 ODE No. 471

$$y(x)y'(x)^2 - (y(x)-x)y'(x) - x = 0$$

✓ **Mathematica** : cpu = 0.0079863 (sec), leaf count = 47

$$\left\{\{y(x)\to x+c_1\}, \left\{y(x)\to -\sqrt{-x^2+2c_1}\right\}, \left\{y(x)\to \sqrt{-x^2+2c_1}\right\}\right\}$$

✓ **Maple** : cpu = 0.036 (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 = 0.531981 (sec), leaf count = 269

$$\left\{\left\{y(x) \to -\frac{2\sqrt{-\sqrt{3}x\cosh(c_1) - \sqrt{3}x\sinh(c_1) + \cosh(2c_1) + \sinh(2c_1)}}{\sqrt{3}} - \frac{\cosh(c_1)}{\sqrt{3}} - \frac{\sinh(c_1)}{\sqrt{3}}\right\}, \left\{y(x) \to \frac{2\sqrt{}}{}\right.\right.$$

✓ **Maple** : cpu = 1.28 (sec), leaf count = 121

$$\left\{\ln(x) - \mathit{Artanh}\left(\frac{y(x) + 2x}{2x}\frac{1}{\sqrt{\frac{(y(x))^2 + xy(x) + x^2}{x^2}}}\right) + \ln\left(\frac{y(x)}{x}\right) - \_C1 = 0, \ln(x) + \mathit{Artanh}\left(\frac{y(x) + 2x}{2x}\frac{}{\sqrt{\frac{(y(x)}{}}}\right.\right.$$

2.473 ODE No. 473

$$(y(x) - 2x)y'(x)^2 - 2(x - 1)y'(x) + y(x) - 2 = 0$$

✓ **Mathematica** : cpu = 0.30818 (sec), leaf count = 165

$$\left\{\left\{y(x) \to \frac{1}{2}\left(-\sqrt{-4e^{c_1}x + 4e^{c_1} - e^{2c_1}} + 4 - e^{c_1}\right)\right\}, \left\{y(x) \to \frac{1}{2}\left(\sqrt{-4e^{c_1}x + 4e^{c_1} - e^{2c_1}} + 4 - e^{c_1}\right)\right\}, \left\{y(x) \to\right.\right.$$

✓ **Maple** : cpu = 1.549 (sec), leaf count = 71

$$\left\{y(x) = 2 + \_C1 - \sqrt{\_C1\ (-\_C1 + 2x - 2)}, y(x) = 2 + \frac{\_C1}{2} - \frac{1}{2}\sqrt{\_C1\ (-\_C1 + 4x - 4)}, y(x) = (x - 1)\right.$$

2.474 ODE No. 474

$$2y(x)y'(x)^2 - (4x - 5)y'(x) + 2y(x) = 0$$

✓ **Mathematica** : cpu = 0.160649 (sec), leaf count = 135

$$\left\{\left\{y(x) \to -i\sqrt{2}e^{\frac{c_1}{2}}\sqrt{4x - 5 + 8e^{c_1}}\right\}, \left\{y(x) \to i\sqrt{2}e^{\frac{c_1}{2}}\sqrt{4x - 5 + 8e^{c_1}}\right\}, \left\{y(x) \to -\frac{1}{4}ie^{\frac{c_1}{2}}\sqrt{8x - 10 + e^{c_1}}\right\}, \left\{y\right.\right.$$

✓ **Maple** : cpu = 1.702 (sec), leaf count = 152

$$\left\{\ln\left(x - \frac{5}{4}\right) - \frac{1}{2}\ln\left(4\frac{y(x)}{4x - 5} - 1\right) - \frac{1}{2}\ln\left(4\frac{y(x)}{4x - 5} + 1\right) + \ln\left(\frac{y(x)}{4x - 5}\right) + \frac{1}{2}\ln\left(16\frac{(y(x))^2}{(4x - 5)^2} - 1\right) + \frac{\sqrt{4}}{2}\right.$$

2.475 ODE No. 475

$$4y(x)y'(x)^2 + 2xy'(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 0.0994952 (sec), leaf count = 57

$$\left\{\left\{y(x) \to -\frac{1}{2}e^{2c_1}\sqrt{-2x+e^{4c_1}}\right\},\left\{y(x) \to \frac{1}{2}e^{2c_1}\sqrt{-2x+e^{4c_1}}\right\}\right\}$$

✓ **Maple** : cpu = 1.365 (sec), leaf count = 67

$$\left\{y(x) = \sqrt{\_C1^2 - \_C1\ x}, y(x) = \sqrt{\_C1^2 + \_C1\ x}, y(x) = -\frac{i}{2}x, y(x) = \frac{i}{2}x, y(x) = -\sqrt{\_C1\ (x+\_C1)}, y(x$$

2.476 ODE No. 476

$$4x^3y'(x) - 4x^2y(x) + 9y(x)y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.234458 (sec), leaf count = 143

$$\left\{\text{Solve}\left[\frac{1}{2}\log(y(x)) - \frac{\sqrt{9x^2y(x)^2+x^6}\tanh^{-1}\left(\frac{x^2}{\sqrt{x^4+9y(x)^2}}\right)}{2x\sqrt{x^4+9y(x)^2}} = c_1, y(x)\right], \text{Solve}\left[\frac{\sqrt{9x^2y(x)^2+x^6}\tanh^{-1}\left(\frac{}{\sqrt{x^4}}\right.}{2x\sqrt{x^4+9y(x)^2}}\right.\right.$$

✓ **Maple** : cpu = 0.666 (sec), leaf count = 87

$$\left\{y(x) = -\frac{i}{3}x^2, y(x) = \frac{i}{3}x^2, y(x) = -\frac{1}{6}\sqrt{-4\_C1\ x^2 + \_C1^2}, y(x) = \frac{1}{6}\sqrt{-4\_C1\ x^2 + \_C1^2}, y(x) = -2\frac{\sqrt{\_C}}{\_}\right.$$

2.477 ODE No. 477

$$ay(x)y'(x)^2 + (2x-b)y'(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 0.214434 (sec), leaf count = 146

$$\left\{\left\{y(x) \to -\frac{e^{\frac{c_1}{2}}\sqrt{2b-4x+e^{c_1}}}{2\sqrt{a}}\right\},\left\{y(x) \to \frac{e^{\frac{c_1}{2}}\sqrt{2b-4x+e^{c_1}}}{2\sqrt{a}}\right\},\left\{y(x) \to -\sqrt{2}e^{\frac{c_1}{2}}\sqrt{2ae^{c_1}-b+2x}\right\},\left\{y(x)\right.\right.$$

✓ **Maple** : cpu = 0.643 (sec), leaf count = 622

$$\left\{\int_{\_b}^{x}\left(-4\_a+2\,b-2\sqrt{4\,a\,(y\,(x))^2+(b-2\_a)^2}\right)\left((-b+2\_a)\sqrt{4\,a\,(y\,(x))^2+(b-2\_a)^2}+4\,a(y(x))^2+(b\right.\right.$$

2.478 ODE No. 478

$$(y'(x)^2+1)(ay(x)+b)-c=0$$

✓ **Mathematica** : cpu = 0.31172 (sec), leaf count = 223

$$\left\{\left\{y(x)\to \text{InverseFunction}\left[\frac{\frac{c\sqrt{-ac}\sqrt{\frac{\#1a+b}{c}}\sin^{-1}\left(\frac{a\sqrt{-\#1a-b+c}}{\sqrt{-a}\sqrt{-ac}}\right)}{\sqrt{-a}}-(\#1a+b)\sqrt{-\#1a-b+c}}{a\sqrt{\#1a+b}}\&\right][-x+c_1]\right\},\left\{y(x)\right.\right.$$

✓ **Maple** : cpu = 0.318 (sec), leaf count = 88

$$\left\{x-\int^{y(x)}(\_a\,a+b)\frac{1}{\sqrt{-(\_a\,a+b)(\_a\,a+b-c)}}d\_a-\_C1=0,x-\int^{y(x)}-(\_a\,a+b)\frac{1}{\sqrt{-(\_a\,a+b)(\_a\,a\right.$$

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 = 7.04014 (sec), leaf count = 552

$$\text{Solve}\left[\left\{x=-\frac{-(\mathrm{b0}+\mathrm{K\$420713}(\mathrm{b1}+\mathrm{b2K\$420713}))\exp\left(\text{RootSum}\left[\#1^2\mathrm{a2}+\#1^2\mathrm{b1}+\#1^3\mathrm{b2}+\#1\mathrm{a1}+\#1\mathrm{b0}\right.\right.\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.338 (sec), leaf count = 929

$$\left\{x-\mathrm{e}^{\int\frac{1}{2\,b2\,y(x)+2\,a2\,x+2\,c2}\left(-a1\,x-b1\,y(x)-c1+\sqrt{-4\,a0\,a2\,x^2-4\,a0\,b2\,xy(x)+a1^2x^2+2\,a1\,b1\,xy(x)-4\,a2\,b0\,xy(x)-4\,b0\,b2\,(y(x))^2+b1^2(y(x))^2-4\,a0\,c2\,x+}\right.}\right.$$

2.480 ODE No. 480

$$\left(ay(x)-x^2\right)y'(x)^2+2xy(x)y'(x)^2-y(x)^2=0$$

✗ **Mathematica** : cpu = 26.5297 (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 = 0.0123275 (sec), leaf count = 49

$$\left\{\left\{y(x)\to\frac{c_1}{x}\right\},\left\{y(x)\to-\sqrt{-x^2+2c_1}\right\},\left\{y(x)\to\sqrt{-x^2+2c_1}\right\}\right\}$$

✓ **Maple** : cpu = 0.041 (sec), leaf count = 35

$$\left\{y(x)=\sqrt{-x^2+\_C1},y(x)=\frac{\_C1}{x},y(x)=-\sqrt{-x^2+\_C1}\right\}$$

2.482 ODE No. 482

$$\left(a+x^{22}-y(x)^2\right)y'(x)+xy(x)y'(x)^2-xy(x)=0$$

✗ **Mathematica** : cpu = 55.7697 (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 = 0.195032 (sec), leaf count = 71

$$\left\{\left\{y(x)\to e^{\frac{c_1}{2}}-\sqrt{-x^2+2e^{\frac{c_1}{2}}x}\right\},\left\{y(x)\to\sqrt{-x^2+2e^{\frac{c_1}{2}}x}+e^{\frac{c_1}{2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.054 (sec), leaf count = 103

$$\left\{y(x)=0,y(x)=RootOf\left(-2\ln(x)+\int^{\_Z}\frac{1}{\_a\left(\_a^2+1\right)}\left(-2\_a^2+\sqrt{2}\sqrt{\_a\left(\_a-1\right)^2}\right)d\_a+2\_C1\right)x,y($$

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 = 0.162016 (sec), leaf count = 81

$$\left\{\left\{y(x)\to -\sqrt{3x^2-2e^{\frac{c_1}{2}}x+2x-e^{\frac{c_1}{2}}}\right\},\left\{y(x)\to \sqrt{3x^2-2e^{\frac{c_1}{2}}x+2x-e^{\frac{c_1}{2}}}\right\}\right\}$$

✓ **Maple** : cpu = 0.051 (sec), leaf count = 115

$$\left\{y(x)=0,y(x)=RootOf\left(-2\ln(x)+\int^{\_Z}\frac{1}{\_a\left(\_a^2-4\_a+1\right)}\left(-2\_a^2+\sqrt{2}\sqrt{\_a\left(\_a+1\right)^2}+4\_a\right)d\_a\right.$$

2.485 ODE No. 485

$$-y'(x)\left(ay(x)^2+bx^2+c\right)+axy(x)y'(x)^2+bxy(x)=0$$

✗ **Mathematica** : cpu = 300.029 (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 = 0.0521716 (sec), leaf count = 117

$$\left\{\left\{y(x)\to -\sqrt{a^2-x^2-2c_1x-c_1{}^2}\right\},\left\{y(x)\to \sqrt{a^2-x^2-2c_1x-c_1{}^2}\right\},\left\{y(x)\to -\sqrt{a^2-x^2+2c_1x-c_1{}^2}\right\},\right.$$

✓ **Maple** : cpu = 0.29 (sec), leaf count = 54

$$\left\{y(x)=a,y(x)=\sqrt{-\_C1^2+2\_C1\,x+a^2-x^2},y(x)=-a,y(x)=-\sqrt{(a+x-\_C1)\,(\_C1+a-x)}\right\}$$

2.487 ODE No. 487

$$-6x^3y'(x) + 4x^2y(x) + y(x)^2y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.280401 (sec), leaf count = 157

$$\left\{\text{Solve}\left[\frac{3}{4}\log(y(x)) - \frac{\sqrt{9x^6-4x^2y(x)^3}\tanh^{-1}\left(\frac{3x^2}{\sqrt{9x^4-4y(x)^3}}\right)}{2x\sqrt{9x^4-4y(x)^3}} = c_1, y(x)\right], \text{Solve}\left[\frac{\sqrt{9x^6-4x^2y(x)^3}\tanh^{-1}\left(\right.}{2x\sqrt{9x^4-4y(x)^3}}\right.\right.$$

✓ **Maple** : cpu = 0.585 (sec), leaf count = 100

$$\left\{y(x) = \mathit{RootOf}\left(-\ln(x) + \int^{\_Z} -\frac{3}{4\_a\,(4\_a^3-9)}\left(4\_a^3 + 3\sqrt{-4\_a^3+9} - 9\right)d\_a + \_C1\right)x^{\frac{4}{3}}, y(x) = \right.$$

2.488 ODE No. 488

$$4a^2 - 4ay(x)y'(x) - 4ax + y(x)^2y'(x)^2 + y(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.309421 (sec), leaf count = 85

$$\left\{\left\{y(x) \to -\frac{\sqrt{-4a^2x^2+16a^3x-4ac_1x-c_1{}^2}}{2a}\right\}, \left\{y(x) \to \frac{\sqrt{-4a^2x^2+16a^3x-4ac_1x-c_1{}^2}}{2a}\right\}\right\}$$

✓ **Maple** : cpu = 0.69 (sec), leaf count = 111

$$\left\{y(x) = -2\sqrt{ax}, y(x) = 2\sqrt{ax}, y(x) = -\frac{1}{4a}\sqrt{-16a^4+32a^3x+(-16x^2+8\_C1)a^2+8\_C1\,ax-\_C1^2}, y(x\right.$$

2.489 ODE No. 489

$$ay(x)^2 + bx + c + y(x)^2y'(x)^2 + 2xy(x)y'(x) = 0$$

✗ **Mathematica** : cpu = 300.213 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 3.863 (sec), leaf count = 1101

$$\left\{y(x) = -\frac{\sqrt{16}}{2a(a+1)}\sqrt{a\left(a(a+1)^2\left(ax-\frac{b}{2}+x\right)^2 \mathit{RootOf}\left(-b\ln(2ax-b+2x) + 2\int^{\_Z} 1/4\frac{}{(a+1)(4\_a}\right.\right.}\right.$$

2.490 ODE No. 490

$$a - x^2 - 2xy(x)y'(x) + y(x)^2y'(x)^2 + 2y(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.423091 (sec), leaf count = 70

$$\left\{\left\{y(x) \to -\frac{\sqrt{-a - 2x^2 + 8c_1x - 4c_1{}^2}}{\sqrt{2}}\right\}, \left\{y(x) \to \frac{\sqrt{-a - 2x^2 + 8c_1x - 4c_1{}^2}}{\sqrt{2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.682 (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 = 0.746853 (sec), leaf count = 79

$$\left\{\left\{y(x) \to -\sqrt{-2ac_1x + ac_1{}^2 + b - x^2 + 2c_1x - c_1{}^2}\right\}, \left\{y(x) \to \sqrt{-2ac_1x + ac_1{}^2 + b - x^2 + 2c_1x - c_1{}^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.933 (sec), leaf count = 195

$$\left\{y(x) = \sqrt{-ax^2 + b}, y(x) = \frac{1}{a}\sqrt{a\left(-2x\sqrt{-a(b - \_C1)(a-1)} + (-x^2 + b)a - b + \_C1\right)}, y(x) = \frac{1}{a}\sqrt{a\left(2x\sqrt{}\right.}\right.$$

2.492 ODE No. 492

$$\left(y(x)^2 - a^2\right)y'(x)^2 + y(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.0960863 (sec), leaf count = 97

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[\sqrt{a^2 - \#1^2} - a\tanh^{-1}\left(\frac{\sqrt{a^2 - \#1^2}}{a}\right)\&\right][-x + c_1]\right\}, \left\{y(x) \to \text{InverseFunction}\left[\right.\right.\right.$$

✓ **Maple** : cpu = 1.348 (sec), leaf count = 122

$$\left\{x - \sqrt{a^2 - (y(x))^2} + a^2\ln\left(\frac{1}{y(x)}\left(2a^2 + 2\sqrt{a^2}\sqrt{a^2 - (y(x))^2}\right)\right)\frac{1}{\sqrt{a^2}} - \_C1 = 0, x + \sqrt{a^2 - (y(x))^2} - a^2\ln\right.$$

2.493 ODE No. 493

$$\left(a^2-2ax+y(x)^2\right)y'(x)^2+2ay(x)y'(x)+y(x)^2=0$$

✓ **Mathematica** : cpu = 7.08136 (sec), leaf count = 553

$$\left\{\text{Solve}\left[\left\{y(x)=\frac{-\sqrt{-a\text{K\$4089}^2\left(a\text{K\$4089}^2-2\text{K\$4089}^2x-2x\right)}-a\text{K\$4089}}{\text{K\$4089}^2+1},x=\frac{a\text{K\$4089}^2+a\text{K\$4089}^2\log^2(\right.\right.\right.$$

✓ **Maple** : cpu = 1.255 (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 = 0.111563 (sec), leaf count = 49

$$\left\{\left\{y(x)\to ac_1-\sqrt{-x^2+c_1{}^2}\right\},\left\{y(x)\to ac_1+\sqrt{-x^2+c_1{}^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.217 (sec), leaf count = 161

$$\left\{y(x)=\sqrt{a^2-1}x,y(x)=\mathit{RootOf}\left(-\ln(x)+\int^{\_Z}\frac{1}{(\_a^2+1)(\_a^2-a^2+1)}\left(-\_a^3+\_a\,a^2+\sqrt{\_a^2a^2-a^4+}\right.\right.\right.$$

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 = 0.146909 (sec), leaf count = 83

$$\left\{\text{Solve}\left[\sqrt{a-1}\tan^{-1}\left(\frac{y(x)}{x}\right)-\frac{1}{2}\log\left(\frac{y(x)^2}{x^2}+1\right)=\log(x)+c_1,y(x)\right],\text{Solve}\left[\sqrt{a-1}\tan^{-1}\left(\frac{y(x)}{x}\right)+\frac{1}{2}\log\left(\right.\right.\right.$$

✓ **Maple** : cpu = 2.266 (sec), leaf count = 61

$$\left\{y(x)=\tan\left(\mathit{RootOf}\left(-2\_Z\sqrt{a-1}-\ln\left(\frac{x^2}{(\cos(\_Z))^2}\right)+2\_C1\right)\right)x,y(x)=\tan\left(\mathit{RootOf}\left(2\_Z\sqrt{a-1}-\right.\right.\right.$$

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 = 18.3183 (sec), leaf count = 17831

Too large to display

✓ **Maple** : cpu = 0.473 (sec), leaf count = 130

$$\left\{y(x)=x-\sqrt{2}a, y(x)=x+\sqrt{2}a, y(x)=x+RootOf\left(-x+\int^{\_Z}-\frac{1}{2\_a^2-4\,a^2}\left(\_a^2-2\,a^2+\sqrt{-\_a^4+2\_a\right.\right.\right.$$

2.497 ODE No. 497

$$-x^2-2xy(x)y'(x)+3y(x)^2y'(x)^2+4y(x)^2=0$$

✓ **Mathematica** : cpu = 0.158235 (sec), leaf count = 76

$$\left\{\left\{y(x)\to-\frac{\sqrt{-3x^2-4ie^{3c_1}x+e^{6c_1}}}{\sqrt{3}}\right\},\left\{y(x)\to\frac{\sqrt{-3x^2-4ie^{3c_1}x+e^{6c_1}}}{\sqrt{3}}\right\}\right\}$$

✓ **Maple** : cpu = 0.722 (sec), leaf count = 203

$$\left\{\ln(x)-\frac{\sqrt{3}}{6}\sqrt{\frac{\left(\sqrt{3}x+3\,y(x)\right)\left(\sqrt{3}x-3\,y(x)\right)}{x^2}}+\frac{1}{2}\sqrt{\frac{x^2-3\,(y(x))^2}{x^2}}-Artanh\left(\frac{1}{2}\sqrt{\frac{x^2-3\,(y(x))^2}{x^2}}\right)+\frac{1}{2}\ln\left(\right.\right.$$

2.498 ODE No. 498

$$(3y(x)-2)y'(x)^2+4y(x)-4=0$$

✓ **Mathematica** : cpu = 0.080699 (sec), leaf count = 107

$$\left\{\left\{y(x)\to\text{InverseFunction}\left[-\sqrt{1-\#1}\sqrt{3\#1-2}-\frac{\sin^{-1}\left(\sqrt{3-3\#1}\right)}{\sqrt{3}}\&\right][-2x+c_1]\right\},\left\{y(x)\to\text{InverseFunct}\right.\right.$$

✓ **Maple** : cpu = 0.763 (sec), leaf count = 99

$$\left\{y(x)=1, y(x)=\frac{\sin\left(RootOf\left(-8\sqrt{3}\_C1\,\_Z+8\sqrt{3}x\_Z-(\cos(\_Z))^2+48\_C1^2-96\_C1\,x+48\,x^2+\_Z\right.\right.}{6}\right.$$

2.499 ODE No. 499

$$a^2\left(-x^2\right)-2a^2xy(x)y'(x)+\left(1-a^2\right)y(x)^2y'(x)^2+y(x)^2=0$$

✓ **Mathematica** : cpu = 0.363784 (sec), leaf count = 212

$$\left\{\left\{y(x)\to-\frac{\sqrt{a^6\left(-x^2\right)+3a^4x^2-3a^2x^2+2a^2xe^{a^2c_1-c_1}-2xe^{a^2c_1-c_1}+e^{2a^2c_1-2c_1}+x^2}}{\sqrt{a^6-3a^4+3a^2-1}}\right\},\left\{y(x)\to\frac{\sqrt{a^6\left(-x^2\right)}}{}\right.\right.$$

✓ **Maple** : cpu = 0.238 (sec), leaf count = 189

$$\left\{y(x)=\mathit{RootOf}\left(-\ln(x)+\int^{\_Z}\frac{\_a}{\left(\_a^2+1\right)\left(\_a^2a^2-\_a^2+a^2\right)}\left(-\_a^2a^2+\_a^2-a^2+\sqrt{\_a^2a^2-\_a^2+a^2}\right)d\right.\right.$$

2.500 ODE No. 500

$$(a-b)y(x)^2y'(x)^2-ab+ay(x)^2-bx^2-2bxy(x)y'(x)=0$$

✓ **Mathematica** : cpu = 0.977149 (sec), leaf count = 100

$$\left\{\left\{y(x)\to-\frac{\sqrt{-ab+ax^2-2ac_1x+ac_1{}^2+b^2-bx^2}}{\sqrt{b-a}}\right\},\left\{y(x)\to\frac{\sqrt{-ab+ax^2-2ac_1x+ac_1{}^2+b^2-bx^2}}{\sqrt{b-a}}\right\}\right\}$$

✓ **Maple** : cpu = 1.035 (sec), leaf count = 220

$$\left\{y(x)=\frac{1}{b}\sqrt{\left(-2\,x\sqrt{-ab\left(b-\_C1\right)}+\left(-x^2+\_C1+a\right)b-\_C1\,a\right)b},y(x)=\frac{1}{b}\sqrt{\left(2\,x\sqrt{-ab\left(b-\_C1\right)}+\left(-x^2\right.\right.}\right.$$

2.501 ODE No. 501

$$y'(x)^2\left(ay(x)^2+bx+c\right)-by(x)y'(x)+dy(x)^2=0$$

✓ **Mathematica** : cpu = 21.1847 (sec), leaf count = 913

$$\left\{\text{Solve}\left[\left[\left\{y(x)=\frac{b\text{K\$35670}-\sqrt{-\text{K\$35670}^2\left(-b^2+4a\text{K\$35670}^2xb+4dxb+4ac\text{K\$35670}^2+4cd\right)}}{2\left(a\text{K\$35670}^2+d\right)},x=\frac{-b^2c_1{}^2}{}\right.\right.\right.\right.$$

✓ **Maple** : cpu = 6.934 (sec), leaf count = 215

$$\left\{\left[x(\_T)=-\frac{1}{4\,bd}\left(\left(\ln\left(\frac{1}{\_T}\left(\sqrt{d}\sqrt{\_T^2a+d}+d\right)\right)\right)^2\sqrt{\_T^2a+d}b^2+\left(\left(2\,\ln(2)\,b^2+4\sqrt{d}\_C1\,b\right)\sqrt{\_T^2a\right.\right.\right.\right.$$

2.502 ODE No. 502

$$(ay(x)-bx)^2\left(a^2y'(x)^2+b^2\right)-c^2\left(ay'(x)+b\right)^2=0$$

✓ **Mathematica** : cpu = 1.16994 (sec), leaf count = 100

$$\left\{\left\{y(x)\to\frac{bc_1}{a}-\frac{\sqrt{b^2\left(-x^2\right)+2b^2c_1x-b^2{c_1}^2+c^2}}{a}\right\},\left\{y(x)\to\frac{\sqrt{b^2\left(-x^2\right)+2b^2c_1x-b^2{c_1}^2+c^2}}{a}+\frac{bc_1}{a}\right\}\right\}$$

✓ **Maple** : cpu = 0.669 (sec), leaf count = 195

$$\left\{y(x)=\frac{bx-\sqrt{2}c}{a},y(x)=\frac{bx+\sqrt{2}c}{a},y(x)=\frac{1}{a}\left(\mathit{RootOf}\left(-x+\int^{\_Z}\frac{a}{\left(2\_a^2a^2-4\,c^2\right)b}\left(-\_a^2a^2+2\,c^2+\sqrt{-a^2}\right.\right.\right.$$

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 = 300.045 (sec), leaf count = 0 , timed out

```
$Aborted
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve((b2*y(x)+a2*x+c2)^2*diff(y(x),x)^2+(a1*x+b1*y(x)+c1)*diff(y(x),x)+b0*y(x)+a0+c0=0,y(x
```

2.504 ODE No. 504

$$-\left(-a+x^3+y(x)^3\right)y'(x)+x^2y(x)+xy(x)^2y'(x)^2=0$$

✓ **Mathematica** : cpu = 0.359774 (sec), leaf count = 51

$$\left\{y(x)\to-\frac{\sqrt[3]{-\frac{1}{2}}\sqrt[3]{1+2c_1}\sqrt[3]{-a+2ac_1+2x^3}}{\sqrt[3]{-1+2c_1}}\right\}$$

✓ **Maple** : cpu = 1.09 (sec), leaf count = 247

$$\left\{\int_{\_b}^{y(x)}\_a^2\frac{1}{\sqrt{x^6+\left(-2\_a^3-2\,a\right)x^3+\left(-\_a^3+a\right)^2}}\,\mathrm{d}\_a-\frac{\ln(x)}{2}-\_C1=0,\int_{\_b}^{y(x)}\_a^2\frac{1}{\sqrt{x^6+\left(-2\_a^3-2\,a\right)}}\right.$$

2.505 ODE No. 505

$$-x^3 + xy(x)^2y'(x)^2 - 2y(x)^3y'(x) + 2xy(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.109809 (sec), leaf count = 73

$$\left\{\left\{y(x) \to -\sqrt{x^2 + 2c_1}\right\}, \left\{y(x) \to \sqrt{x^2 + 2c_1}\right\}, \left\{y(x) \to -\sqrt{x^2 + c_1x^4}\right\}, \left\{y(x) \to \sqrt{x^2 + c_1x^4}\right\}\right\}$$

✓ **Maple** : cpu = 0.048 (sec), leaf count = 52

$$\left\{y(x) = \sqrt{x^2 + \_C1}, y(x) = \sqrt{\_C1\, x^2 + 1}x, y(x) = -\sqrt{x^2 + \_C1}, y(x) = -\sqrt{\_C1\, x^2 + 1}x\right\}$$

2.506 ODE No. 506

$$2x^2(y(x) - x)y(x)^2y'(x) + x^2\left(xy(x)^2 - 1\right)y'(x)^2 - \left(x^2y(x) - 1\right)y(x)^2 = 0$$

✗ **Mathematica** : cpu = 55.5831 (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 = 43.9448 (sec), leaf count = 0 , could not solve

```
DSolve[y[x]^2*(-a^2 + y[x]^2) + 2*a^2*x*y[x]*Derivative[1][y][x] + (-(a^2*x^2) + y[x]^4)*Der
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve((y(x)^4-a^2*x^2)*diff(y(x),x)^2+2*a^2*x*y(x)*diff(y(x),x)+y(x)^2*(y(x)^2-
a^2)=0,y(x))
```

2.508 ODE No. 508

$$\left(x^2y(x)^2-x^2+y(x)^4\right)y'(x)^2+2xy(x)y'(x)-y(x)^2=0$$

✓ **Mathematica** : cpu = 2.07293 (sec), leaf count = 88

$$\text{Solve}\left[\frac{\sqrt{x^2+y(x)^2}y(x)\left(\log\left(\frac{x}{\sqrt{x^2+y(x)^2}}+1\right)-\log\left(1-\frac{x}{\sqrt{x^2+y(x)^2}}\right)\right)}{2x^2\sqrt{\frac{y(x)^2(x^2+y(x)^2)}{x^4}}}+y(x)=c_1,y(x)\right]$$

✓ **Maple** : cpu = 3.458 (sec), leaf count = 60

$$\left\{y(x)=-ix,y(x)=ix,y(x)=-\mathit{Artanh}\left(\mathit{RootOf}\left((\mathit{Artanh}(\_Z))^2\_Z^2-2\,\mathit{Artanh}(\_Z)\_\mathit{C1}\_Z^2+\_\mathit{C1}^2\_Z^2\right.\right.\right.$$

2.509 ODE No. 509

$$9\left(x^2-1\right)y(x)^4y'(x)^2-4x^2-6xy(x)^5y'(x)=0$$

✓ **Mathematica** : cpu = 0.282923 (sec), leaf count = 34

$$\left\{y(x)\to-\frac{\sqrt[3]{-\frac{1}{2}}\sqrt[3]{-4x^2+4+c_1{}^2}}{\sqrt[3]{c_1}}\right\}$$

✓ **Maple** : cpu = 1.246 (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

$$2x^3\left(y(x)^2-x^2\right)y(x)^3y'(x)+x^2\left(x^2y(x)^4-1\right)y'(x)^2-\left(x^4y(x)^2-1\right)y(x)^2=0$$

✗ **Mathematica** : cpu = 52.9511 (sec), leaf count = 0 , could not solve

```
DSolve[-(y[x]^2*(-1 + x^4*y[x]^2)) + 2*x^3*y[x]^3*(-x^2 + y[x]^2)*Derivative[1][y][x] + x^2*
1 + x^2*y[x]^4)*Derivative[1][y][x]^2 == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(x^2*(x^2*y(x)^4-1)*diff(y(x),x)^2+2*x^3*y(x)^3*(y(x)^2-x^2)*diff(y(x),x)-
y(x)^2*(x^4*y(x)^2-1)=0,y(x))
```

2.511 ODE No. 511

$$\left(a^2\sqrt{x^2+y(x)^2}-x^2\right)y'(x)^2+a^2\sqrt{x^2+y(x)^2}+2xy(x)y'(x)-y(x)^2=0$$

✓ **Mathematica** : cpu = 1.32095 (sec), leaf count = 229

$$\left\{\text{Solve}\left[\tan^{-1}\left(\frac{x}{y(x)}\right)-\frac{2\sqrt{a^2\left(x^2+y(x)^2\right)\left(\sqrt{x^2+y(x)^2}-a^2\right)}\tan^{-1}\left(\frac{\sqrt{\sqrt{x^2+y(x)^2}-a^2}}{a}\right)}{a\sqrt{x^2+y(x)^2}\sqrt{\sqrt{x^2+y(x)^2}-a^2}}=c_1,y(x)\right],\text{Solve}\left[\right.\right.$$

✓ **Maple** : cpu = 8.44 (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 = 4.94721 (sec), leaf count = 713

$$\left\{\text{Solve}\left[\tan^{-1}\left(\frac{x}{y(x)}\right)-\frac{i\sqrt{a\left(\left(x^2+y(x)^2\right)^{5/2}-a\left(x^2+y(x)^2\right)^3\right)}\left(\sqrt{2}\left(\log\left(\frac{a^{3/2}\left(3i\sqrt{2}a\sqrt{x^2+y(x)^2}+4\sqrt{a}\sqrt{\sqrt{x^2+y(}\right.}{4a\sqrt{x^2+y(x)^2}+}\right.\right.\right.}{}\right.\right.$$

✓ **Maple** : cpu = 6.143 (sec), leaf count = 135

$$\left\{y(x)=x\left(\tan\left(\mathit{RootOf}\left(-\_Z+\int^{\frac{x^2\left((\tan(\_Z))^2+1\right)}{(\tan(\_Z))^2}}-\frac{1}{2\_a^2\left(\_a\,a^2-1\right)}\sqrt{-\_a^{\frac{5}{2}}a\left(\sqrt{\_a}a-1\right)\left(\sqrt{\_a}a+1\right)}d\_a-\right.\right.\right.\right.$$

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 = 0.0790237 (sec), leaf count = 81

$$\left\{\left\{y(x) \to \tan^{-1}\left(2\left(-\frac{c_1{}^{3/2}}{\sqrt{x+c_1}} - \frac{\sqrt{c_1}x}{\sqrt{x+c_1}}\right)\right)\right\}, \left\{y(x) \to \tan^{-1}\left(2\left(\frac{c_1{}^{3/2}}{\sqrt{x+c_1}} + \frac{\sqrt{c_1}x}{\sqrt{x+c_1}}\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 4.842 (sec), leaf count = 1134

$$\left\{ [x(\_T) = \frac{1}{2\_T}\left(\left(\cos\left(\frac{1}{2}\arctan\left(\left(\_C1^2\_T^2 - 2\_T\_C1\sqrt[3]{\_C1^3\_T^3 + 54\_T\_C1 + 6\sqrt{3}\sqrt{\_C1^2\_T\right.\right.\right.\right.\right.\right.$$

2.514 ODE No. 514

$$y'(x)^2(a\cos(y(x)) + b) - c\cos(y(x)) + d = 0$$

✓ **Mathematica** : cpu = 9.58804 (sec), leaf count = 605

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[\frac{4\sin^2\left(\frac{\#1}{2}\right)\csc(\#1)\sqrt{a\cos(\#1)+b}\sqrt{\frac{\cot^2\left(\frac{\#1}{2}\right)(c-d)}{c+d}}\sqrt{\frac{\csc^2\left(\frac{\#1}{2}\right)(a+b)(d-c\cos(\#1))}{ad+bc}}\left(c(a\right.}{c(a}\right.\right.\right.$$

✓ **Maple** : cpu = 0.703 (sec), leaf count = 87

$$\left\{x - \int^{y(x)} (a\cos(\_a) + b)\frac{1}{\sqrt{(a\cos(\_a)+b)(c\cos(\_a)-d)}}d\_a - \_C1 = 0, x - \int^{y(x)} -(a\cos(\_a) + b)\frac{}{\sqrt{(a\cos\right.$$

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 = 1.74039 (sec), leaf count = 1922

$$\left\{\text{Solve}\left[\int_1^x\left(\frac{\sqrt{f\left(K[1]^2+y(x)^2\right)\left(K[1]^2+y(x)^2-f\left(K[1]^2+y(x)^2\right)\right)}K[1]}{f\left(K[1]^2+y(x)^2\right)\left(K[1]^2+y(x)^2\right)}-\frac{\sqrt{f\left(K[1]^2+y(x)^2\right)\left(K[1]^2+y(x\right.}}{f\left(K[1]^2+y(x)^2\right)\left(K[1]^2+y(x\right.}\right.\right.\right.$$

✓ **Maple** : cpu = 1.444 (sec), leaf count = 113

$$\left\{y(x)=x\left(\tan\left(\mathit{RootOf}\left(-\_Z+\int^{\frac{x^2\left((\tan(\_Z))^2+1\right)}{(\tan(\_Z))^2}}-\frac{1}{2\_a\left(f\left(\_a\right)-\_a\right)}\sqrt{-\left(f\left(\_a\right)-\_a\right)f\left(\_a\right)}d\_a+\_C1\right.\right.\right.\right.$$

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 = 0.442299 (sec), leaf count = 253

$$\left\{\text{Solve}\left[\int_1^{\frac{y(x)}{x}}\frac{f\left(\frac{1}{\sqrt{K[1]^2+1}}\right)K[1]^2+f\left(\frac{1}{\sqrt{K[1]^2+1}}\right)-1}{\sqrt{f\left(\frac{1}{\sqrt{K[1]^2+1}}\right)}(K[1]-i)(K[1]+i)\left(\sqrt{f\left(\frac{1}{\sqrt{K[1]^2+1}}\right)}K[1]+i\sqrt{f\left(\frac{1}{\sqrt{K[1]^2+1}}\right)-1}\right)}dK[1]=-\mathrm{lo}\right.\right.$$

✓ **Maple** : cpu = 2.997 (sec), leaf count = 72

$$\left\{y(x)=\mathit{RootOf}\left(-\ln(x)+\int^{\_Z}-\frac{1}{\_a^2+1}\left(\_a\,f\left(\frac{1}{\sqrt{\_a^2+1}}\right)-\sqrt{-\left(f\left(\frac{1}{\sqrt{\_a^2+1}}\right)\right)^2+f\left(\frac{1}{\sqrt{\_a^2+1}}\right)}\right.\right.\right.$$

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 = 0.457567 (sec), leaf count = 283

$$\left\{\text{Solve}\left[\int_1^{\frac{y(x)}{x}} \frac{f\left(\frac{K[1]}{\sqrt{K[1]^2+1}}\right) K[1]^2 + f\left(\frac{K[1]}{\sqrt{K[1]^2+1}}\right) - 1}{\sqrt{f\left(\frac{K[1]}{\sqrt{K[1]^2+1}}\right)}(K[1]-i)(K[1]+i)\left(\sqrt{f\left(\frac{K[1]}{\sqrt{K[1]^2+1}}\right)}K[1] + i\sqrt{f\left(\frac{K[1]}{\sqrt{K[1]^2+1}}\right) - 1}\right)} dK[1] = -\text{lo}\right.\right.$$

✓ **Maple** : cpu = 3.031 (sec), leaf count = 157

$$\left\{y(x) = \mathit{RootOf}\left(-\ln(x) + \int^{\_Z} -\frac{1}{\_a^2+1}\left(\_a\, f\left(\_a\frac{1}{\sqrt{\_a^2+1}}\right) - \sqrt{-\left(f\left(\_a\frac{1}{\sqrt{\_a^2+1}}\right)\right)^2 + f\left(\_a\frac{}{\sqrt{\_}}\right.}\right.\right.\right.$$

2.518 ODE No. 518

$$y'(x)^3 - (y(x)-a)^2(y(x)-b)^2 = 0$$

✓ **Mathematica** : cpu = 0.510286 (sec), leaf count = 236

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[-\frac{3\sqrt[3]{a-\#1}\left(\frac{\#1-b}{a-b}\right)^{2/3} {}_2F_1\left(\frac{1}{3},\frac{2}{3};\frac{4}{3};\frac{a-\#1}{a-b}\right)}{(b-\#1)^{2/3}}\&\right][x+c_1]\right\}, \left\{y(x) \to \text{InverseFunctio}\right.\right.$$

✓ **Maple** : cpu = 0.786 (sec), leaf count = 126

$$\left\{x - \int^{y(x)} \frac{1}{\sqrt[3]{(\_a-a)^2(-b+\_a)^2}} d\_a - \_C1 = 0, x - \int^{y(x)} 2\frac{1}{(-1+i\sqrt{3})\sqrt[3]{(-\_a+a)^2(b-\_a)^2}} d\_a - \_\right.$$

2.519 ODE No. 519

$$y'(x)^3 - f(x)\left(ay(x)^2 + by(x) + c\right)^2 = 0$$

✓ **Mathematica** : cpu = 0.605574 (sec), leaf count = 353

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[\frac{\sqrt[3]{2}(2\#1a+b)\left(\frac{a(\#1(\#1a+b)+c)}{4ac-b^2}\right)^{2/3} {}_2F_1\left(\frac{1}{2},\frac{2}{3};\frac{3}{2};\frac{(b+2a\#1)^2}{b^2-4ac}\right)}{a(\#1(\#1a+b)+c)^{2/3}}\&\right]\left[\int_1^x \sqrt[3]{f(K[1])}dK[\right.\right.\right.$$

✓ **Maple** : cpu = 2.348 (sec), leaf count = 197

$$\left\{\int^{y(x)} \left(\_a^2a + \_a\,b + c\right)^{-\frac{2}{3}} d\_a + \int^x -\sqrt[3]{f(\_a)\left(a\left(y(x)\right)^2 + by(x) + c\right)^2}\left(a(y(x))^2 + by(x) + c\right)^{-\frac{2}{3}} d\_a + \_C\right.$$

2.520 ODE No. 520

$$y'(x)^3 + y'(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 184.965 (sec), leaf count = 1590

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[-\frac{(27\#1^2+4)\left(27\#1^2 - 3\sqrt{81\#1^2+12}\#1 + 4\,{}_2F_1\left(\frac{2}{3},1;\frac{5}{3};\frac{1}{12}\left(\sqrt{81\#1^2+12}-9\right.\right.\right.}{48\sqrt[3]{3}\left(27\#1^2 - 3\sqrt{81\right.}\right.\right.\right.$$

✓ **Maple** : cpu = 0.192 (sec), leaf count = 249

$$\left\{x - \int^{y(x)} 6\frac{\sqrt[3]{108\_a + 12\sqrt{81\_a^2+12}}}{\left(108\_a + 12\sqrt{81\_a^2+12}\right)^{2/3} - 12} d\_a - \_C1 = 0, x - \int^{y(x)} -12\frac{}{\left(-1+i\sqrt{3}\right)\left(-\sqrt[3]{108\_a+12\right.}}\right.$$

2.521 ODE No. 521

$$y'(x)^3 + xy'(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 0.0027091 (sec), leaf count = 14

$$\left\{\left\{y(x) \to c_1x + c_1{}^3\right\}\right\}$$

✓ **Maple** : cpu = 0.023 (sec), leaf count = 33

$$\left\{y(x) = \_C1\,\left(\_C1^2 + x\right), y(x) = -\frac{2\,x}{9}\sqrt{-3\,x}, y(x) = \frac{2\,x}{9}\sqrt{-3\,x}\right\}$$

2.522 ODE No. 522

$$y'(x)^3 - (x+5)y'(x) + y(x) = 0$$

✓ **Mathematica** : cpu = 0.0028426 (sec), leaf count = 20

$$\{\{y(x) \to c_1 x - c_1{}^3 + 5c_1\}\}$$

✓ **Maple** : cpu = 0.03 (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 = 145.347 (sec), leaf count = 392

$$\left\{\left\{y(x) \to \int_1^x \left(\frac{\sqrt[3]{\frac{2}{3}}aK[1]}{\sqrt[3]{\sqrt{3}\sqrt{27K[1]^6 - 4a^3K[1]^3} - 9K[1]^3}} + \frac{\sqrt[3]{\sqrt{3}\sqrt{27K[1]^6 - 4a^3K[1]^3} - 9K[1]^3}}{\sqrt[3]{2}3^{2/3}}\right) dK[1] + c_1\right\}\right\}$$

✓ **Maple** : cpu = 0.116 (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 = 300.003 (sec), leaf count = 0 , timed out

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✓ **Maple** : cpu = 0.095 (sec), leaf count = 243

$$\left\{x - \int^{y(x)} 12\,\frac{\sqrt[3]{-108\,\_a^2 + 12\,\sqrt{81\,\_a^4 - 96\,\_a^3}}}{(-1+i\sqrt{3})\,(-108\,\_a^2 + 12\,\sqrt{81\,\_a^4 - 96\,\_a^3})^{2/3} + 12\,\_a\,(-1+i\sqrt{3})^2} d\_a - \_C1 = 0, x - \int\right.$$

2.525 ODE No. 525

$$-axy(x)y'(x) + 2ay(x)^2 + y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.0684063 (sec), leaf count = 135

$$\left\{\left\{y(x) \to c_1 \exp\left(\frac{1}{2}\left(\frac{ax^2}{2} + \frac{1}{2}\sqrt{a}x\sqrt{ax^2-8} - 4\log\left(\sqrt{a}\sqrt{ax^2-8}+ax\right)\right)\right)\right\}, \left\{y(x) \to c_1 \exp\left(\frac{1}{2}\left(\frac{ax^2}{2} - \frac{1}{2}\sqrt{\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.139 (sec), leaf count = 122

$$\left\{y(x) = \_C1\left(a^2 x \frac{1}{\sqrt{a^2}} + \sqrt{a^2x^2 - 8a}\right)^{-2\frac{a}{\sqrt{a^2}}} e^{\frac{x}{4}\left(ax+\sqrt{a^2x^2-8a}\right)}, y(x) = \_C1\left(a^2 x \frac{1}{\sqrt{a^2}} + \sqrt{a^2x^2 - 8a}\right)^{2\frac{a}{\sqrt{a^2}}} e\right.$$

2.526 ODE No. 526

$$-\left(x^2 + xy(x) + y(x)^2\right)y'(x)^2 + \left(x^3y(x) + x^2y(x)^2 + xy(x)^3\right)y'(x) - x^3y(x)^3 + y'(x)^3 = 0$$

✓ **Mathematica** : cpu = 0.0775332 (sec), leaf count = 45

$$\left\{\left\{y(x) \to \frac{1}{-x - c_1}\right\}, \left\{y(x) \to c_1 e^{\frac{x^2}{2}}\right\}, \left\{y(x) \to \frac{x^3}{3} + c_1\right\}\right\}$$

✓ **Maple** : cpu = 0.09 (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 = 0.0146118 (sec), leaf count = 20

$$\left\{\left\{y(x) \to \frac{1}{c_1\left(x - c_1^2\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.773 (sec), leaf count = 43

$$\left\{y(x) = \_C1\sqrt{\frac{\_C1^{10}}{\left(\_C1^4x - 1\right)^2}}, y(x) = -\frac{3\sqrt{3}}{2}x^{-\frac{3}{2}}, y(x) = \frac{3\sqrt{3}}{2}x^{-\frac{3}{2}}\right\}$$

2.528 ODE No. 528

$$abx + ay'(x)^2 + by(x) + y'(x)^3 = 0$$

✓ **Mathematica** : cpu = 0.615321 (sec), leaf count = 398

$$\text{Solve}\left[\left\{x = -\frac{-a\left(\frac{\sqrt[3]{2}a^2}{3\sqrt[3]{\sqrt{(-2a^3-27abx-27by(x))^2-4a^6}-2a^3-27abx-27by(x)}} + \frac{\sqrt[3]{\sqrt{(-2a^3-27abx-27by(x))^2-4a^6}-2a^3-27abx-27b}}{3\sqrt[3]{2}}\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.334 (sec), leaf count = 86

$$\left\{y(x) = -ax - \frac{\left(e^{RootOf\left(-2\,a^2\_Z-3\,e^{2\_Z}+8\,ae^{\_Z}+2\_C1\,b-5\,a^2-2\,bx\right)} - a\right)^2 e^{RootOf\left(-2\,a^2\_Z-3\,e^{2\_Z}+8\,ae^{\_Z}+2\_C1\,b-5\,a^2-\right.}}{b}\right.$$

2.529 ODE No. 529

$$y'(x)^3 + xy'(x)^2 - y(x) = 0$$

✓ **Mathematica** : cpu = 38.5045 (sec), leaf count = 1758

$$\left\{\left\{y(x) \to \frac{1}{2}\left(\frac{4\,2^{2/3}x^4}{3\left(-16x^3-72x^2-108x+216c_1+\sqrt{4\left(-4x^2-12x-9\right)^3+\left(-16x^3-72x^2-108x+216c_1+5\right.}\right.}\right.\right.\right.$$

✓ **Maple** : cpu = 0.148 (sec), leaf count = 1251

$$\left\{y(x) = 0, y(x) = \left(\left(-8\,x-6\right)\sqrt[3]{-36\,x^2-54\,x+108\_C1-8\,x^3+27+6\sqrt{-6\,\left(1+2\_C1\right)\left(4\,x^3+18\,x^2-27\right.}}\right.\right.$$

2.530 ODE No. 530

$$y'(x)^3 - y(x)y'(x)^2 + y(x)^2 = 0$$

✓ **Mathematica** : cpu = 7.8796 (sec), leaf count = 648

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[\int_1^{\#1} \frac{\sqrt[3]{2K[1]^3 - 27K[1]^2 + 3\sqrt{3}\sqrt{-K[1]^4(}}}{2\sqrt[3]{2}K[1]^2 + 2\sqrt[3]{2K[1]^3 - 27K[1]^2 + 3\sqrt{3}\sqrt{-K[1]^4(4K[1]-27)}}K[1] + 2^{2/3}\left(\right.}\right.\right.\right.$$

✓ **Maple** : cpu = 0.099 (sec), leaf count = 424

$$\left\{x - \int^{y(x)} -12 \frac{\sqrt[3]{-108\,\_a^2 + 8\,\_a^3 + 12\sqrt{-}}}{4\,i\,\_a^2\sqrt{3} - i\sqrt{3}\left(-108\,\_a^2 + 8\,\_a^3 + 12\sqrt{-12\,\_a^5 + 81\,\_a^4}\right)^{2/3} + 4\,\_a^2 - 4\,\_a\sqrt[3]{-108\,\_a^2 +}}\right.$$

2.531 ODE No. 531

$$-\left(x^2 + y(x)^4 + xy(x)^2\right)y'(x)^2 + \left(x^2y(x)^4 + x^3y(x)^2 + xy(x)^6\right)y'(x) - x^3y(x)^6 + y'(x)^2 = 0$$

✗ **Mathematica** : cpu = 60.2193 (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 = 300.006 (sec), leaf count = 0 , timed out

```
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```

✓ **Maple** : cpu = 0.293 (sec), leaf count = 874

$$\left\{x - \int^{y(x)} -12\sqrt[3]{6}a\sqrt[3]{12\sqrt{3}\sqrt{27\left(d+\_a\right)^2a^2 + 18\,c\left(\left(d+\_a\right)b + 2/9\,c^2\right)a + \left(-4\,d - 4\,\_a\right)b^3 - b^2c^2a} + (108\,a\right.$$

2.533 ODE No. 533

$$a + xy'(x)^3 - y(x)y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.0180585 (sec), leaf count = 40

$$\left\{\left\{y(x) \to \frac{3\left(\sqrt{a}x\right)^{2/3}}{2^{2/3}}\right\}, \left\{y(x) \to \frac{a + c_1{}^3 x}{c_1{}^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.042 (sec), leaf count = 76

$$\left\{y(x) = \frac{\_C1^3 x + a}{\_C1^2}, y(x) = \frac{3\sqrt[3]{2}}{2}\sqrt[3]{ax^2}, y(x) = \frac{3\sqrt[3]{2}(-1 + i\sqrt{3})}{4}\sqrt[3]{ax^2}, y(x) = -\frac{3\sqrt[3]{2}(1 + i\sqrt{3})}{4}\sqrt[3]{ax^2}\right\}$$

2.534 ODE No. 534

$$4xy'(x)^3 - 6y(x)y'(x)^2 + 3y(x) - x = 0$$

✓ **Mathematica** : cpu = 0.0487144 (sec), leaf count = 114

$$\left\{\left\{y(x) \to \frac{-\sqrt{2}\sqrt{3c_1{}^2x^2 + c_1x^3 + 3c_1{}^3x + c_1{}^4} - c_1{}^2}{3c_1}\right\}, \left\{y(x) \to \frac{\sqrt{2}\sqrt{3c_1{}^2x^2 + c_1x^3 + 3c_1{}^3x + c_1{}^4} - c_1{}^2}{3c_1}\right\}\right\}$$

✓ **Maple** : cpu = 0.134 (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 = 0.0356053 (sec), leaf count = 49

$$\left\{\left\{y(x) \to -\frac{(x + 3c_1)^{3/2}}{3\sqrt{c_1}}\right\}, \left\{y(x) \to \frac{(x + 3c_1)^{3/2}}{3\sqrt{c_1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.127 (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 = 0.0110458 (sec), leaf count = 64

$$\left\{\left\{y(x)\to -\frac{bx^2}{2}+c_1\right\},\left\{y(x)\to -\tan^{-1}\left(\frac{x}{\sqrt{a^2-x^2}}\right)+c_1\right\},\left\{y(x)\to \tan^{-1}\left(\frac{x}{\sqrt{a^2-x^2}}\right)+c_1\right\}\right\}$$

✓ **Maple** : cpu = 0.149 (sec), leaf count = 52

$$\left\{y(x)=-\frac{bx^2}{2}+\_C1,y(x)=-\arctan\left(x\frac{1}{\sqrt{a^2-x^2}}\right)+\_C1,y(x)=\arctan\left(x\frac{1}{\sqrt{a^2-x^2}}\right)+\_C1\right\}$$

2.537 ODE No. 537

$$x^3y'(x)^3-3x^2y(x)y'(x)^2+\left(x^6+3xy(x)^2\right)y'(x)-2x^5y(x)-y(x)^3=0$$

✗ **Mathematica** : cpu = 300.004 (sec), leaf count = 0 , timed out

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✓ **Maple** : cpu = 5.886 (sec), leaf count = 250

$$\left\{y(x)=RootOf\left(-\ln(x)+\int^{\_Z}\frac{2}{3\_a\left(27\_a^2+4\right)}\left(27\left(-4\frac{-9\_a+\sqrt{81\_a^2+12}}{\left(27\_a^2+4\right)\sqrt{81\_a^2+12}}\right)^{2/3}\_a^2-27\_a^2\sqrt[3]{-\right.\right.\right.$$

2.538 ODE No. 538

$$2\left(xy'(x)+y(x)\right)^3-y(x)y'(x)=0$$

✓ **Mathematica** : cpu = 9.27258 (sec), leaf count = 110

$$\left\{\left\{y(x)\to\frac{\int_1^x\frac{\text{InverseFunction}\left[-\frac{2\sqrt{\#1^2-8\#1^3}\tan^{-1}\left(\sqrt{8\#1-1}\right)}{\#1\sqrt{8\#1-1}}+\log(8\#1-1)+\log\left(1+\frac{1}{8\#1-1}\right)+\frac{3\sqrt{\#1^2-8\#1^3}}{\#1}\&\right][c_1+2\log(\text{K\$105714})]}{\text{K\$105714}}d\text{K}}{x}\right.\right.$$

✓ **Maple** : cpu = 1.213 (sec), leaf count = 1625

$$\left\{\int_{\_b}^{x}\left(-6^{\frac{2}{3}}\left(-9\left(-1/9\sqrt{3}\sqrt{\frac{27\_a\left(y(x)\right)^2-2y(x)}{\_a}}+y(x)\right)y(x)\_a^2\right)^{\frac{2}{3}}+6\_a\,y(x)\left(\sqrt[3]{6}\sqrt[3]{-9\left(-1/9\sqrt{3}\right.}\right.\right.\right.$$

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 = 0.0271125 (sec), leaf count = 45

$$\left\{\{y(x) \to c_1 e^x\}, \{y(x) \to -\cos(x) + c_1\}, \left\{y(x) \to -\log\left(\sin\left(\frac{x}{2}\right)\right) + \log\left(\cos\left(\frac{x}{2}\right)\right) + c_1\right\}\right\}$$

✓ **Maple** : cpu = 0.059 (sec), leaf count = 32

$$\{y(x) = \_C1\, e^x, y(x) = -\cos(x) + \_C1, y(x) = -\ln(\csc(x) - \cot(x)) + \_C1\}$$

2.540 ODE No. 540

$$2y(x)y'(x)^3 - y(x)y'(x)^2 + 2xy'(x) - x = 0$$

✓ **Mathematica** : cpu = 0.0291333 (sec), leaf count = 69

$$\left\{\left\{y(x) \to \frac{x}{2} + c_1\right\}, \left\{y(x) \to \frac{\left(3c_1 - 2ix^{3/2}\right)^{2/3}}{2^{2/3}}\right\}, \left\{y(x) \to \frac{\left(2ix^{3/2} + 3c_1\right)^{2/3}}{2^{2/3}}\right\}\right\}$$

✓ **Maple** : cpu = 0.164 (sec), leaf count = 109

$$\left\{x + \frac{\_C1\, x}{y(x)}\left(\frac{1}{y(x)}\left(-x - \sqrt{-xy(x)} + y(x)\right)\right)^{-\frac{2}{3}}\left(\frac{1}{y(x)}\left(\sqrt{-xy(x)} + y(x)\right)\right)^{-\frac{2}{3}} = 0, x + \frac{\_C1\, x}{y(x)}\left(\frac{1}{y(x)}\left(-x \right.\right.\right.$$

2.541 ODE No. 541

$$y(x)^2y'(x)^3 + 2xy'(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 0.0297353 (sec), leaf count = 39

$$\left\{\left\{y(x) \to -\sqrt{2c_1x + c_1{}^3}\right\}, \left\{y(x) \to \sqrt{2c_1x + c_1{}^3}\right\}\right\}$$

✓ **Maple** : cpu = 0.519 (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 = 0.029263 (sec), leaf count = 20

$$\left\{\left\{y(x) \to \sqrt{c_1x + 2c_1{}^3}\right\}\right\}$$

✓ **Maple** : cpu = 0.508 (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 = 0.0231632 (sec), leaf count = 55

$$\left\{\left\{y(x) \to -\sqrt{c_1x^2 + \frac{c_1}{1+c_1{}^2}}\right\}, \left\{y(x) \to \sqrt{c_1x^2 + \frac{c_1}{1+c_1{}^2}}\right\}\right\}$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(x*y(x)^2*diff(y(x),x)^3-y(x)^3*diff(y(x),x)^2+x*(x^2+1)*diff(y(x),x)-x^2*y(x)=0,y(x))
```

2.544 ODE No. 544

$$x^7y(x)^2y'(x)^3 + 3x^5y(x)^4y'(x) - \left(3x^6y(x)^3 - 1\right)y'(x)^2 - x^4y(x)^5 = 0$$

✓ **Mathematica** : cpu = 0.0746606 (sec), leaf count = 22

$$\left\{\left\{y(x) \to \sqrt[3]{c_1x^3 + c_1{}^{2/3}}\right\}\right\}$$

✓ **Maple** : cpu = 0.994 (sec), leaf count = 4201

$$\left\{\int_{\_b}^{x}\frac{1}{\_a}\left(\left(-1-i\sqrt{3}\right)\left(-108\left(y\left(x\right)\right)^6\_a^{12} + 12\sqrt{3}\sqrt{\frac{27\_a^6\left(y\left(x\right)\right)^3-4}{y\left(x\right)}}\left(y\left(x\right)\right)^5\_a^9 + 72\_a^6\left(y(x)\right)^3 - 8\right)^{\frac{2}{3}} +\right.\right.$$

2.545 ODE No. 545

$$y'(x)^4 - (y(x) - a)^3(y(x) - b)^2 = 0$$

✓ **Mathematica** : cpu = 0.690435 (sec), leaf count = 323

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[-\frac{4\sqrt[4]{a-\#1}\sqrt{\frac{\#1-b}{a-b}}\,{}_2F_1\left(\frac{1}{4},\frac{1}{2};\frac{5}{4};\frac{a-\#1}{a-b}\right)}{\sqrt{b-\#1}}\&\right]\left[-\sqrt[4]{-1}x+c_1\right]\right\},\left\{y(x) \to \text{InverseFun}\right.\right.$$

✓ **Maple** : cpu = 0.23 (sec), leaf count = 144

$$\left\{x - \int^{y(x)} \frac{1}{\sqrt[4]{(\_a-a)^3(-b+\_a)^2}}d\_a - \_C1 = 0, x - \int^{y(x)} -i\frac{1}{\sqrt[4]{-(-\_a+a)^3(b-\_a)^2}}d\_a - \_C1 = 0, x\right.$$

2.546 ODE No. 546

$$y'(x)^4 + 3(x-1)y'(x)^2 - 3(2y(x)-1)y'(x) + 3x = 0$$

✓ **Mathematica** : cpu = 0.0287476 (sec), leaf count = 113

$$\left\{\left\{y(x) \to \frac{1}{12}\left(-\sqrt{64x^3+48c_1{}^2x^2+12c_1{}^4x+c_1{}^6}-6c_1x+6-c_1{}^3+6c_1\right)\right\},\left\{y(x) \to \frac{1}{12}\left(\sqrt{64x^3+48c_1{}^2x^2+}\right.\right.\right.$$

✓ **Maple** : cpu = 0.122 (sec), leaf count = 171

$$\left\{y(x) = \left(\left(-6+\_C1^3+(6x-6)\_C1\right)\sqrt{\_C1^2+4x}-2\_C1^4+(-14x+6)\_C1^2+\left(\left(\_C1^2+4x\right)^{\frac{3}{2}}+6\right)\right.\right.$$

2.547 ODE No. 547

$$y'(x)^4 - 4y(x)\left(xy'(x) - 2y(x)\right)^2 = 0$$

✓ **Mathematica** : cpu = 2.11794 (sec), leaf count = 490

$$\left\{\text{Solve}\left[\frac{\sqrt{\left(x^2-4\sqrt{y(x)}\right)y(x)}\log\left(\sqrt{x^2-4\sqrt{y(x)}}+x\right)}{\sqrt{x^2-4\sqrt{y(x)}}\sqrt{y(x)}} - \frac{\sqrt{x^2-4\sqrt{y(x)}}\sqrt{y(x)}\log(y(x))}{4\sqrt{\left(x^2-4\sqrt{y(x)}\right)y(x)}} + \frac{1}{4}\log(y(x)) = c\right.\right.$$

✓ **Maple** : cpu = 0.444 (sec), leaf count = 118

$$\left\{ \left(\sqrt{x^2 - 4\sqrt{y(x)}} + x \right)^{\sqrt{x^2 y(x) - 4 (y(x))^{3/2}} \frac{1}{\sqrt{x^2 - 4\sqrt{y(x)}}} \frac{1}{\sqrt{y(x)}}} \sqrt{y(x)} \left(\left(\sqrt{x^2 - 4\sqrt{y(x)}} - x \right)^{\sqrt{x^2 y(x) - 4 (y(x))^{3/2}} \frac{}{\sqrt{x^2}}} \right.\right.$$

2.548 ODE No. 548

$$y'(x)^6 - (y(x) - a)^4 (y(x) - b)^3 = 0$$

✓ **Mathematica** : cpu = 0.991661 (sec), leaf count = 479

$$\left\{ \left\{ y(x) \to \text{InverseFunction}\left[-\frac{3 \sqrt[3]{a - \#1} \sqrt{\frac{\#1 - b}{a - b}} \, {}_2F_1\left(\frac{1}{3}, \frac{1}{2}; \frac{4}{3}; \frac{a - \#1}{a - b}\right)}{\sqrt{b - \#1}} \& \right] [c_1 - ix] \right\}, \left\{ y(x) \to \text{InverseFunction} \left[\right.\right.\right.$$

✓ **Maple** : cpu = 0.844 (sec), leaf count = 250

$$\left\{ x - \int^{y(x)} \frac{1}{\sqrt[6]{(\_a - a)^4 (-b + \_a)^3}} d\_a - \_C1 = 0, x - \int^{y(x)} \frac{-2\,i}{i - \sqrt{3}} \frac{1}{\sqrt[6]{-(-\_a + a)^4 (b - \_a)^3}} d\_a - \_C1 = \right.$$

2.549 ODE No. 549

$$x^2 \left(y'(x)^2 + 1\right)^3 - a^2 = 0$$

✓ **Mathematica** : cpu = 0.232741 (sec), leaf count = 216

$$\left\{ \left\{ y(x) \to -x \left(\frac{a^{2/3}}{x^{2/3}} - 1 \right)^{3/2} + c_1 \right\}, \left\{ y(x) \to x \left(\frac{a^{2/3}}{x^{2/3}} - 1 \right)^{3/2} + c_1 \right\}, \left\{ y(x) \to c_1 - x \left(-1 - \frac{i\left(\sqrt{3} - i\right) a^{2/3}}{2x^{2/3}} \right.\right.\right.$$

✓ **Maple** : cpu = 0.526 (sec), leaf count = 553

$$\left\{ y(x) = \sqrt{-\frac{1}{a^4} \left(a^2 x\right)^{\frac{4}{3}} \left(\left(a^2 x\right)^{\frac{2}{3}} - a^2 \right)} \left(a^2 - \left(a^2 x\right)^{\frac{2}{3}} \right) \left(a^2 x\right)^{-\frac{2}{3}} + \_C1, y(x) = \sqrt{-\frac{1}{a^4} \left(a^2 x\right)^{\frac{4}{3}} \left(\left(a^2 x\right)^{\frac{2}{3}} - a^2 \right)} \left(\left(a^2 \right.\right.\right.$$

2.550 ODE No. 550

$$-ay(x)^s - bx^{\frac{rs}{r-s}} + y'(x)^r = 0$$

✓ **Mathematica** : cpu = 0.718201 (sec), leaf count = 488

$$\text{Solve}\left[\int_1^{y(x)}\left(\frac{r}{-rx\left(aK[2]^s+bx^{\frac{rs}{r-s}}\right)^{\frac{1}{r}}+sx\left(aK[2]^s+bx^{\frac{rs}{r-s}}\right)^{\frac{1}{r}}+rK[2]}-\int_1^x\left(\frac{asK[2]^{s-1}\left(a\right.}{rK[1]\left(aK[2]^s+bK[1]^{\frac{rs}{r-s}}\right)^{\frac{1}{r}}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.762 (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 = 0.125296 (sec), leaf count = 86

$$\left\{\left\{y(x)\to\frac{-bn^n-a(a-b)^n\left(\int_1^x(-1)^{1+\frac{1}{n}}f(K[1])dK[1]+c_1\right)^n}{-n^n-(a-b)^n\left(\int_1^x(-1)^{1+\frac{1}{n}}f(K[1])dK[1]+c_1\right)^n}\right\}\right\}$$

✓ **Maple** : cpu = 1.402 (sec), leaf count = 55

$$\left\{y(x)=\left(\left(-\frac{n}{(a-b)\left(\int f(x)\,\mathrm{d}x+\_C1\right)}\right)^n b-a\right)\left(-1+\left(-\frac{n}{(a-b)\left(\int f(x)\,\mathrm{d}x+\_C1\right)}\right)^n\right)^{-1}\right\}$$

2.552 ODE No. 552

$$y'(x)^n - f(x)g(y(x)) = 0$$

✓ **Mathematica** : cpu = 0.0326237 (sec), leaf count = 41

$$\left\{\left\{y(x)\to\text{InverseFunction}\left[\int_1^{\#1}g(K[1])^{-1/n}dK[1]\&\right]\left[\int_1^x f(K[2])^{\frac{1}{n}}dK[2]+c_1\right]\right\}\right\}$$

✓ **Maple** : cpu = 0.384 (sec), leaf count = 43

$$\left\{\int^{y(x)}(g(\_a))^{-n^{-1}}\,d\_a+\int^{x}-\frac{\sqrt[n]{f\left(\_a\right)g\left(y\left(x\right)\right)}}{\sqrt[n]{g\left(y\left(x\right)\right)}}d\_a+\_C1=0\right\}$$

2.553 ODE No. 553

$$ay'(x)^m+by'(x)^n-y(x)=0$$

✓ **Mathematica** : cpu = 0.253614 (sec), leaf count = 52

$$\text{Solve}\left[\left\{x=\frac{\frac{am\text{K\$125198}^m}{m-1}+\frac{bn\text{K\$125198}^n}{n-1}}{\text{K\$125198}}+c_1,y(x)=a\text{K\$125198}^m+b\text{K\$125198}^n\right\},\{y(x),\text{K\$125198}\}\right]$$

✓ **Maple** : cpu = 0.416 (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 = 0.0963611 (sec), leaf count = 49

$$\text{Solve}\left[\left\{y(x)=\frac{\text{K\$125468}nx^2-\text{K\$125468}^nx^n}{x},x=c_1(\text{K\$125468}-\text{K\$125468}n)^{\frac{n}{1-n}}\right\},\{y(x),\text{K\$125468}\}\right]$$

✓ **Maple** : cpu = 1.385 (sec), leaf count = 32

$$\left\{y(x)=\frac{1}{\_C1}\left(\_C1^2\sqrt[n]{\frac{x}{\_C1}}n-\left(\_C1^{-1}\right)^{-n}\right)\right\}$$

2.555 ODE No. 555

$$xy'(x) + \sqrt{y'(x)^2 + 1} - y(x) = 0$$

✓ **Mathematica** : cpu = 0.330312 (sec), leaf count = 119

$$\left\{\left\{y(x) \to \frac{-ix + ix\cos(2c_1) - x\sin(2c_1) + 2\cos(c_1) + 2i\sin(c_1)}{1 + \cos(2c_1) + i\sin(2c_1)}\right\}, \left\{y(x) \to \frac{i(-x + x\cos(2c_1) + ix\sin(2c_1) + 2}{1 + \cos(2c_1) + i\sin}\right.\right.$$

✓ **Maple** : cpu = 0.09 (sec), leaf count = 15

$$\left\{y(x) = \sqrt{\_C1^2 + 1} + \_C1\,x\right\}$$

2.556 ODE No. 556

$$xy'(x)^2 + \sqrt{y'(x)^2 + 1} + y(x) = 0$$

✓ **Mathematica** : cpu = 4.48413 (sec), leaf count = 60

$$\text{Solve}\left[\left\{x = \frac{-\sqrt{\text{K\$126285}^2 + 1} - \sinh^{-1}(\text{K\$126285})}{(\text{K\$126285} + 1)^2} + \frac{c_1}{(\text{K\$126285} + 1)^2}, y(x) = \text{K\$126285}^2(-x) - \sqrt{\text{K\$12628}}\right.\right.$$

✓ **Maple** : cpu = 0.463 (sec), leaf count = 581

$$\left\{\_C1\,x^2\left(\sqrt{-4\,xy\,(x) + 2 + 2\,\sqrt{4\,x^2 - 4\,xy\,(x) + 1}} - 2\,x\right)^{-2} + x + 2\,\frac{x^2}{\left(\sqrt{-4\,xy\,(x) + 2 + 2\,\sqrt{4\,x^2 - 4\,xy\,(x) +}}\right.}\right.$$

2.557 ODE No. 557

$$x\left(y'(x) + \sqrt{y'(x)^2 + 1}\right) - y(x) = 0$$

✓ **Mathematica** : cpu = 0.0293207 (sec), leaf count = 39

$$\left\{\left\{y(x) \to -\sqrt{-x^2 + c_1 x}\right\}, \left\{y(x) \to \sqrt{-x^2 + c_1 x}\right\}\right\}$$

✓ **Maple** : cpu = 0.203 (sec), leaf count = 74

$$\left\{2\,xy(x)\,\_C1\,\frac{1}{\sqrt{\frac{\left((y(x))^2 + x^2\right)^2}{x^2(y(x))^2}}}\left(\sqrt{\frac{x^4 + 2\,x^2\,(y\,(x))^2 + (y\,(x))^4}{x^2\,(y\,(x))^2}}xy(x) + (y(x))^2 - x^2\right)^{-1} + x = 0\right\}$$

2.558 ODE No. 558

$$ax\sqrt{y'(x)^2+1}+xy'(x)-y(x)=0$$

✓ **Mathematica** : cpu = 0.590884 (sec), leaf count = 327

$$\left\{\text{Solve}\left[\frac{2i\tan^{-1}\left(\frac{y(x)}{x\sqrt{a^2-\frac{y(x)^2}{x^2}-1}}\right)+a\tanh^{-1}\left(\frac{-a^2-\frac{iy(x)}{x}+1}{a\sqrt{a^2-\frac{y(x)^2}{x^2}-1}}\right)-a\tanh^{-1}\left(\frac{-a^2+\frac{iy(x)}{x}+1}{a\sqrt{a^2-\frac{y(x)^2}{x^2}-1}}\right)+a\log\left(\frac{y(x)^2}{x^2}+1\right)}{2a^2-2}\right.\right.$$

✓ **Maple** : cpu = 0.275 (sec), leaf count = 223

$$\left\{x-\_C1\,\mathrm{e}^{\frac{1}{a}Arcsinh\left(\frac{1}{\left(a^2-1\right)x}\left(\sqrt{-a^2x^2+x^2+(y(x))^2}a+y(x)\right)\right)}\frac{1}{\sqrt{\frac{1}{\left(a^2-1\right)^2x^2}\left(-a^2x^2+a^2\left(y\left(x\right)\right)^2+2\sqrt{-a^2x^2+x^2+(y\right.}\right.}}\right.$$

2.559 ODE No. 559

$$-ay(x)y'(x)-ax+y(x)\sqrt{y'(x)^2+1}=0$$

✓ **Mathematica** : cpu = 0.304084 (sec), leaf count = 212

$$\left\{\left\{y(x)\to-\frac{\sqrt{a^6\left(-x^2\right)+3a^4x^2-3a^2x^2+2a^2xe^{a^2c_1-c_1}-2xe^{a^2c_1-c_1}+e^{2a^2c_1-2c_1}+x^2}}{\sqrt{a^6-3a^4+3a^2-1}}\right\},\left\{y(x)\to\frac{\sqrt{a^6\left(-x^2\right)}}{}\right.\right.$$

✓ **Maple** : cpu = 0.382 (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 = 13.7502 (sec), leaf count = 110

$$\left\{\left\{y(x)\to -\frac{\sqrt{a^2c_1{}^2\left(-x^2\right)-4a^2c_1x-4a^2+4x^2}}{\sqrt{-4+a^2c_1{}^2}}\right\},\left\{y(x)\to \frac{\sqrt{a^2c_1{}^2\left(-x^2\right)-4a^2c_1x-4a^2+4x^2}}{\sqrt{-4+a^2c_1{}^2}}\right\}\right\}$$

✓ **Maple** : cpu = 1.16 (sec), leaf count = 1120

$$\left\{\int_{\_b}^{x}\left(2\_a^3-2\_a\,(y(x))^2+\sqrt{a^2\left(\_a^4+2\_a^2\,(y\,(x))^2-a^2\,(y\,(x))^2+(y\,(x))^4\right)}\right)\left(-2\,a^2\_a\,(y(x))^2+2\_a^5\right.\right.$$

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 = 1.66517 (sec), leaf count = 2138

$$\left\{\text{Solve}\left[\int_1^x\left(\frac{\sqrt{f\left(K[1]^2+y(x)^2\right)^2\left(-f\left(K[1]^2+y(x)^2\right)^2+K[1]^2+y(x)^2\right)}K[1]}{f\left(K[1]^2+y(x)^2\right)^2\left(K[1]^2+y(x)^2\right)}-\frac{\sqrt{f\left(K[1]^2+y(x)^2\right)^2\left(-f\left(K\right.\right.}}{f\left(K[1]^2+y(x)^2\right)^2\left(-f\left(\right.\right.}\right.\right.\right.$$

✓ **Maple** : cpu = 3.048 (sec), leaf count = 50

$$\left\{y(x)=x\left(\tan\left(RootOf\left(-2\_Z+\int^{\frac{x^2\left((\tan(\_Z))^2+1\right)}{(\tan(\_Z))^2}}\frac{f(\_a)}{\_a}\frac{1}{\sqrt{-\left(f\left(\_a\right)\right)^2+\_a}}d\_a+2\_C1\right)\right)\right)^{-1}\right\}$$

2.562 ODE No. 562

$$a\sqrt[3]{y'(x)^3+1}+bxy'(x)-y(x)=0$$

✗ **Mathematica** : cpu = 300.007 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.463 (sec), leaf count = 3306

$$\left\{\left(-\int^{\frac{1}{2b^3x^3+2a^3}}\left(2b^2x^2y(x)\sqrt[3]{-4b^6x^6-8a^3b^3x^3-4b^3x^3(y(x))^3+4\sqrt{b^6x^6+2a^3b^3x^3+2b^3x^3(y(x))^3+a^6-2(y(x))^3a^3+(y(x))^6}\,b^3x^3-4a^6-}\right.\right.\right.$$

2.563 ODE No. 563

$$ay(x)+b+xy'(x)+\log\left(y'(x)\right)=0$$

✓ **Mathematica** : cpu = 0.136469 (sec), leaf count = 59

$$\text{Solve}\left[a\left(\frac{(a+1)\log\left(1-aW\left(xe^{-ay(x)-b}\right)\right)}{a^2}+\frac{W\left(xe^{-ay(x)-b}\right)}{a}\right)+ay(x)=c_1,y(x)\right]$$

✓ **Maple** : cpu = 0.606 (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 = 0.0549336 (sec), leaf count = 28

$$\left\{\left\{y(x)\to-\frac{e^{-c_1}\left(-ax+e^{c_1}c_1\right)}{a}\right\}\right\}$$

✓ **Maple** : cpu = 0.116 (sec), leaf count = 32

$$\left\{y(x)=\frac{1}{a}\left(\ln\left(-\frac{1}{ax}\right)-1\right),y(x)=\_C1\,x+\frac{\ln\left(\_C1\right)}{a}\right\}$$

2.565 ODE No. 565

$$y'(x) + y(x)\log\left(y'(x)\right) - xy(x) - y(x)\log(y(x)) = 0$$

✓ **Mathematica** : cpu = 0.0170926 (sec), leaf count = 25

$$\left\{\left\{y(x) \to c_1 e^{\frac{1}{2}W(e^x)^2 + W(e^x)}\right\}\right\}$$

✓ **Maple** : cpu = 0.303 (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 = 0.0307497 (sec), leaf count = 31

$$\text{Solve}\left[\left\{x = \text{K\$136875} + \sin(\text{K\$136875}), y(x) = \frac{\text{K\$136875}^2}{2} + \text{K\$136875}\sin(\text{K\$136875}) + \cos(\text{K\$136875}) + c_1\right\}\right.$$

✓ **Maple** : cpu = 0.069 (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 = 0.0418369 (sec), leaf count = 42

$$\text{Solve}\left[\left\{y(x) = a\sin(\text{K\$137124}) - a\text{K\$137124}\cos(\text{K\$137124}) - \frac{b\text{K\$137124}^2}{2} + c_1, x = -a\cos(\text{K\$137124}) - b\text{K\$}\right.\right.$$

✓ **Maple** : cpu = 0.081 (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

$$y'(x)^2 \sin(y'(x)) - y(x) = 0$$

✓ **Mathematica** : cpu = 0.0516869 (sec), leaf count = 28

$$\text{Solve}\left[\left\{x = \text{K\$137367} \sin(\text{K\$137367}) - \cos(\text{K\$137367}) + c_1, y(x) = \text{K\$137367}^2 \sin(\text{K\$137367})\right\}, \{y(x), \text{K\$1373}$$

✓ **Maple** : cpu = 0.219 (sec), leaf count = 32

$$\left\{x - \int^{y(x)} \left(\mathit{RootOf}\left(\sin(\_Z)\_Z^2 - \_a\right)\right)^{-1} d\_a - \_C1 = 0, y(x) = 0\right\}$$

2.569 ODE No. 569

$$\left(y'(x)^2 + 1\right) \sin^2\left(y(x) - xy'(x)\right) - 1 = 0$$

✓ **Mathematica** : cpu = 0.0885836 (sec), leaf count = 59

$$\left\{\left\{y(x) \to c_1 x - \frac{1}{2}\cos^{-1}\left(\frac{-1 + c_1^2}{1 + c_1^2}\right)\right\}, \left\{y(x) \to c_1 x + \frac{1}{2}\cos^{-1}\left(\frac{-1 + c_1^2}{1 + c_1^2}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.676 (sec), leaf count = 147

$$\left\{y(x) = \_C1\, x - \arcsin\left(\frac{1}{\sqrt{\_C1^2 + 1}}\right), y(x) = \_C1\, x + \arcsin\left(\frac{1}{\sqrt{\_C1^2 + 1}}\right), y(x) = -x\sqrt{1 - x}\sqrt{x^{-1}} - \text{a}$$

2.570 ODE No. 570

$$\left(y'(x)^2 + 1\right)\left(ax + \tan^{-1}\left(y'(x)\right)\right) + y'(x) = 0$$

✓ **Mathematica** : cpu = 1.46901 (sec), leaf count = 51

$$\text{Solve}\left[\left\{y(x) = \frac{1}{a\left(\text{K\$137866}^2 + 1\right)} + c_1, x = \frac{\text{K\$137866}^2\left(-\tan^{-1}(\text{K\$137866})\right) - \text{K\$137866} - \tan^{-1}(\text{K\$137866}}{a\left(\text{K\$137866}^2 + 1\right)}\right.\right.$$

✓ **Maple** : cpu = 0.09 (sec), leaf count = 30

$$\left\{y(x) = \int \tan\left(\mathit{RootOf}\left(ax(\tan(\_Z))^2 + (\tan(\_Z))^2\_Z + ax + \tan(\_Z) + \_Z\right)\right) dx + \_C1\right\}$$

2.571 ODE No. 571

$$ax^n f(y'(x)) + xy'(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 0.0941502 (sec), leaf count = 116

$$\text{Solve}\left[\left\{y(x) = af(\text{K\$138132})x^n + \text{K\$138132}x, x = \left(nf(\text{K\$138132})^{\frac{1}{n}-1}\int_1^{\text{K\$138132}} -\frac{f(K[1])^{\frac{n-1}{n}-1}}{an}dK[1] - f(K\right.\right.\right.$$

✓ **Maple** : cpu = 2.505 (sec), leaf count = 169

$$\left\{[y(\_T) = a\left(\left(\frac{1}{anf(\_T)}\left((1-n)\int(f(\_T))^{-n^{-1}}\,\mathrm{d}\_T + \_C1\,an\right)\right)^{(n-1)^{-1}}(f(\_T))^{\frac{1}{n(n-1)}}\right)^n f(\_T) + \_T\right.$$

2.572 ODE No. 572

$$f(y'(x))\,(xy'(x) - y(x))^n + y(x)g(y'(x)) + xh(y'(x)) = 0$$

✗ **Mathematica** : cpu = 0.0393143 (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 = 0.021881 (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 = 0.09 (sec), leaf count = 24

$$\left\{y(x) = \_C1 + 2\sqrt{x}\,RootOf\left(-f\left(\_Z^2\right) - 2\_Z + \_C1 + \_C2\right)\right\}$$

2.574 ODE No. 574

$$f\left(x-\frac{3}{2}y'(x)^2\right)+y'(x)^3-y(x)=0$$

✓ **Mathematica** : cpu = 0.0246586 (sec), leaf count = 102

$$\left\{\left\{y(x)\to\frac{1}{9}\left(9f(c_1)+2\sqrt{6}x\sqrt{x-c_1}-2\sqrt{6}c_1\sqrt{x-c_1}\right),y(x)\to\frac{1}{9}\left(9f(c_1)-2\sqrt{6}x\sqrt{x-c_1}+2\sqrt{6}c_1\sqrt{x-c_1}\right)\right\}$$

✓ **Maple** : cpu = 0.131 (sec), leaf count = 41

$$\left\{y(x)=f(\_C1)-\frac{2\sqrt{6}}{9}\sqrt{(x-\_C1)^3},y(x)=f(\_C1)+\frac{2\sqrt{6}}{9}\sqrt{(x-\_C1)^3}\right\}$$

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 = 0.026133 (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 = 0.0101343 (sec), leaf count = 0 , could not solve

```
DSolve[phi[f[x, y[x], Derivative[1][y][x]], g[x, y[x], Derivative[1][y][x]]] == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(phi(f(x,y(x),diff(y(x),x)),g(x,y(x),diff(y(x),x)))=0,y(x))
```

2.577 ODE No. 577

$$y'(x) = F\left(\frac{y(x)}{a+x}\right)$$

✓ **Mathematica** : cpu = 0.27311 (sec), leaf count = 243

$$\text{Solve}\left[\int_1^{y(x)}\left(\frac{1}{-aF\left(\frac{K[2]}{a+x}\right)-xF\left(\frac{K[2]}{a+x}\right)+K[2]}-\int_1^x\left(\frac{F'\left(\frac{K[2]}{a+K[1]}\right)}{(a+K[1])\left(aF\left(\frac{K[2]}{a+K[1]}\right)+K[1]F\left(\frac{K[2]}{a+K[1]}\right)-K[2]\right)}-\right.\right.\right.$$

✓ **Maple** : cpu = 0.102 (sec), leaf count = 28

$$\left\{y(x) = -RootOf\left(\int^{\_Z}(F(-\_a)+\_a)^{-1}\,d\_a+\ln(x+a)+\_C1\right)(x+a)\right\}$$

2.578 ODE No. 578

$$y'(x) = F\left(y(x)-x^2\right)+2x$$

✓ **Mathematica** : cpu = 0.161354 (sec), leaf count = 100

$$\text{Solve}\left[\int_1^{y(x)}-\frac{F\left(K[2]-x^2\right)\int_1^x-\frac{2K[1]F'\left(K[2]-K[1]^2\right)}{F\left(K[2]-K[1]^2\right)^2}dK[1]+1}{F\left(K[2]-x^2\right)}dK[2]+\int_1^x\left(\frac{2K[1]}{F\left(y(x)-K[1]^2\right)}+1\right)dK[1]=c_1,\right.$$

✓ **Maple** : cpu = 0.12 (sec), leaf count = 22

$$\left\{y(x) = x^2+RootOf\left(-x+\int^{\_Z}(F(\_a))^{-1}\,d\_a+\_C1\right)\right\}$$

2.579 ODE No. 579

$$y'(x) = F\left(\frac{ax^2}{4}+\frac{bx}{2}+y(x)\right)-\frac{ax}{2}$$

✓ **Mathematica** : cpu = 0.247811 (sec), leaf count = 514

$$\text{Solve}\left[\int_1^{y(x)}-\frac{b\int_1^x\left(\frac{2aK[1]F'\left(\frac{1}{4}aK[1]^2+\frac{1}{2}bK[1]+K[2]\right)}{\left(b+2F\left(\frac{1}{4}aK[1]^2+\frac{1}{2}bK[1]+K[2]\right)\right)^2}+\frac{2F'\left(\frac{1}{4}aK[1]^2+\frac{1}{2}bK[1]+K[2]\right)}{b+2F\left(\frac{1}{4}aK[1]^2+\frac{1}{2}bK[1]+K[2]\right)}-\frac{4F\left(\frac{1}{4}aK[1]^2+\frac{1}{2}bK[1]+K[2]\right)F'\left(\frac{1}{4}aK[1]\right.}{\left(b+2F\left(\frac{1}{4}aK[1]^2+\frac{1}{2}bK[1]+K\right.\right.}\right.}{}\right.$$

✓ **Maple** : cpu = 0.18 (sec), leaf count = 35

$$\left\{y(x)=-\frac{a x^{2}}{4}-\frac{b x}{2}+\mathit{RootOf}\left(-x+2\int^{\_Z}\left(2\,F(\_a)+b\right)^{-1}d\_a+\_C1\right)\right\}$$

2.580 ODE No. 580

$$y'(x)=e^{bx}F\left(e^{-bx}y(x)\right)$$

✓ **Mathematica** : cpu = 0.249081 (sec), leaf count = 203

$$\text{Solve}\left[\int_1^{y(x)}\left(\frac{1}{bK[2]-e^{bx}F\left(e^{-bx}K[2]\right)}-\int_1^x\left(\frac{F'\left(e^{-bK[1]}K[2]\right)}{e^{bK[1]}F\left(e^{-bK[1]}K[2]\right)-bK[2]}-\frac{e^{bK[1]}F\left(e^{-bK[1]}K[2]\right)\left(F'\left(e^{-bK\right.\right.}{\left(e^{bK[1]}F\left(e^{-bK[1]}K[2]\right)-\right.}\right.\right.$$

✓ **Maple** : cpu = 0.221 (sec), leaf count = 31

$$\left\{y(x)=\frac{\mathit{RootOf}\left(-x+\int^{\_Z}\left(F(\_a)-\_a\,b\right)^{-1}d\_a+\_C1\right)}{\mathrm{e}^{-bx}}\right\}$$

2.581 ODE No. 581

$$y'(x)=\frac{xF\left(\frac{x^2y(x)+\frac{1}{4}}{x^2}\right)+\frac{1}{2}}{x^3}$$

✓ **Mathematica** : cpu = 0.233556 (sec), leaf count = 144

$$\text{Solve}\left[\int_1^{y(x)}-\frac{F\left(\frac{K[2]x^2+\frac{1}{4}}{x^2}\right)\int_1^x-\frac{F'\left(\frac{K[2]K[1]^2+\frac{1}{4}}{K[1]^2}\right)}{2F\left(\frac{K[2]K[1]^2+\frac{1}{4}}{K[1]^2}\right)^2K[1]^3}dK[1]+1}{F\left(\frac{K[2]x^2+\frac{1}{4}}{x^2}\right)}dK[2]+\int_1^x\left(\frac{1}{K[1]^2}+\frac{1}{2K[1]^3F\left(\frac{y(x)K[1]^2+\frac{1}{4}}{K[1]^2}\right)}\right.\right.$$

✓ **Maple** : cpu = 0.216 (sec), leaf count = 32

$$\left\{y(x)=\frac{4\,\mathit{RootOf}\left(\int^{\_Z}\left(F(\_a)\right)^{-1}d\_ax+\_C1\,x+1\right)x^{2}-1}{4\,x^{2}}\right\}$$

2.582 ODE No. 582

$$y'(x) = \frac{ax^2 F\left(\frac{axy(x)+1}{ax}\right) + 1}{ax^2}$$

✓ **Mathematica** : cpu = 0.258947 (sec), leaf count = 142

$$\text{Solve}\left[\int_1^{y(x)} -\frac{F\left(\frac{axK[2]+1}{ax}\right) \int_1^x \frac{F'\left(\frac{aK[1]K[2]+1}{aK[1]}\right)}{aF\left(\frac{aK[1]K[2]+1}{aK[1]}\right)^2 K[1]^2} dK[1] - 1}{F\left(\frac{axK[2]+1}{ax}\right)} dK[2] + \int_1^x \left(-1 - \frac{1}{aK[1]^2 F\left(\frac{aK[1]y(x)+1}{aK[1]}\right)}\right) dK[1$$

✓ **Maple** : cpu = 0.28 (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 = 0.217244 (sec), leaf count = 126

$$\text{Solve}\left[\int_1^{y(x)} -\frac{F\left(\frac{ax^4}{8} + K[2]\right) \int_1^x \frac{aK[1]^3 F'\left(\frac{1}{8}aK[1]^4 + K[2]\right)}{2F\left(\frac{1}{8}aK[1]^4 + K[2]\right)^2} dK[1] + 1}{F\left(\frac{ax^4}{8} + K[2]\right)} dK[2] + \int_1^x \left(K[1] - \frac{aK[1]^3}{2F\left(\frac{1}{8}aK[1]^4 + y(x)\right)}\right) d$$

✓ **Maple** : cpu = 0.209 (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

$$y'(x) = \frac{2a}{2aF(y(x)^2 - 4ax) + y(x)}$$

✓ **Mathematica** : cpu = 0.284573 (sec), leaf count = 115

$$\text{Solve}\left[\int_1^{y(x)} \left(\frac{K[2]}{4a^2F(K[2]^2 - 4ax)} - \frac{2a\int_1^x \frac{K[2]F'(K[2]^2-4aK[1])}{aF(K[2]^2-4aK[1])^2}dK[1] - 1}{2a}\right) dK[2] + \int_1^x -\frac{1}{2aF(y(x)^2 - 4aK[1])}\right.$$

✓ **Maple** : cpu = 0.244 (sec), leaf count = 35

$$\left\{\frac{y(x)}{2a} + \frac{\int^{(y(x))^2-4ax}(F(\_a))^{-1}\,d\_a}{8a^2} - \_C1 = 0\right\}$$

2.585 ODE No. 585

$$y'(x) = y(x)F(\log(\log(y(x))) - \log(x))$$

✓ **Mathematica** : cpu = 0.210344 (sec), leaf count = 205

$$\text{Solve}\left[\int_1^{y(x)} \left(\frac{1}{K[2](xF(\log(\log(K[2])) - \log(x)) - \log(K[2]))} - \int_1^x \left(\frac{F(\log(\log(K[2])) - \log(K[1]))\left(\frac{K[1]F'(\log}{F}\right.}{(F(\log(\log(K[2])) - \log(K[1]))F}\right.\right.\right.$$

✓ **Maple** : cpu = 2.681 (sec), leaf count = 120

$$\left\{\int_{\_b}^x \frac{F(\ln(\ln(y(x))) - \ln(\_a))}{\_a\,F(\ln(\ln(y(x))) - \ln(\_a)) - \ln(y(x))}\,\mathrm{d}\_a + \int^{y(x)} \frac{1}{\_f\,(-xF(\ln(\ln(\_f)) - \ln(x)) + \ln(\_f))} - \int_{\_b}^x \frac{F}{}\right.$$

2.586 ODE No. 586

$$y'(x) = \frac{xF\left(\frac{y(x)}{\sqrt{x^2+1}}\right)}{\sqrt{x^2+1}}$$

✓ **Mathematica** : cpu = 0.537654 (sec), leaf count = 975

$$\text{Solve}\left[\int_1^x \left(-\frac{K[1]\sqrt{K[1]^2+1}F\left(\frac{y(x)}{\sqrt{K[1]^2+1}}\right)^3}{y(x)\left(K[1]^2F\left(\frac{y(x)}{\sqrt{K[1]^2+1}}\right)^2+F\left(\frac{y(x)}{\sqrt{K[1]^2+1}}\right)^2-y(x)^2\right)} - \frac{K[1]F\left(\frac{y(x)}{\sqrt{K[1]^2+1}}\right)^2}{K[1]^2F\left(\frac{y(x)}{\sqrt{K[1]^2+1}}\right)^2+F\left(\frac{y(x)}{\sqrt{K[1]^2+1}}\right)^2}\right.\right.$$

✓ **Maple** : cpu = 0.356 (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 = 0.224113 (sec), leaf count = 123

$$\text{Solve}\left[\int_1^{y(x)} -\frac{F\left(K[2]-\frac{x^3}{6}\right)\int_1^x -\frac{K[1]^2F'\left(K[2]-\frac{K[1]^3}{6}\right)}{2F\left(K[2]-\frac{K[1]^3}{6}\right)^2}dK[1]+1}{F\left(K[2]-\frac{x^3}{6}\right)}dK[2]+\int_1^x\left(\frac{K[1]^2}{2F\left(y(x)-\frac{K[1]^3}{6}\right)}+\sqrt{K[1]}\right)dK\right.$$

✓ **Maple** : cpu = 0.224 (sec), leaf count = 29

$$\left\{\int_{\_b}^{y(x)}\left(F\left(\_a-\frac{x^3}{6}\right)\right)^{-1}\mathrm{d}\_a-\frac{2}{3}x^{\frac{3}{2}}-\_C1=0\right\}$$

2.588 ODE No. 588

$$y'(x) = \frac{F(-(x-y(x))(y(x)+x))+x}{y(x)}$$

✓ **Mathematica** : cpu = 0.193391 (sec), leaf count = 113

$$\text{Solve}\left[\int_1^{y(x)}\left(-\frac{K[2]}{F(-(x-K[2])(x+K[2]))}-\int_1^x -\frac{2K[1]K[2]F'(-(K[1]-K[2])(K[1]+K[2]))}{F(-(K[1]-K[2])(K[1]+K[2]))^2}dK[1]\right)dK[2]+\right.$$

✓ **Maple** : cpu = 0.247 (sec), leaf count = 53

$$\left\{y(x)=\sqrt{x^2+RootOf\left(-2\,x+\int^{\_Z}(F(\_a))^{-1}\,d\_a+2\_C1\right)},y(x)=-\sqrt{x^2+RootOf\left(-2\,x+\int^{\_Z}(F(\_$$

2.589 ODE No. 589

$$y'(x)=\frac{y(x)^2F\left(\frac{1-y(x)\log(x)}{y(x)}\right)}{x}$$

✓ **Mathematica** : cpu = 0.226576 (sec), leaf count = 245

$$\text{Solve}\left[\int_1^{y(x)}\left(\frac{1}{\left(-F\left(\frac{1-K[2]\log(x)}{K[2]}\right)-1\right)K[2]^2}-\int_1^x\left(\frac{\left(-\frac{\log(K[1])}{K[2]}-\frac{1-K[2]\log(K[1])}{K[2]^2}\right)F'\left(\frac{1-K[2]\log(K[1])}{K[2]}\right)}{\left(F\left(\frac{1-K[2]\log(K[1])}{K[2]}\right)+1\right)K[1]}-\frac{F\left(1\right.}{}\right.\right.\right.$$

✓ **Maple** : cpu = 0.441 (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

$$y'(x)=\frac{x}{F\left(x^2+y(x)^2\right)-y(x)}$$

✓ **Mathematica** : cpu = 0.228246 (sec), leaf count = 94

$$\text{Solve}\left[\int_1^{y(x)}\left(-\frac{K[2]}{F\left(x^2+K[2]^2\right)}-\int_1^x\frac{2K[1]K[2]F'\left(K[1]^2+K[2]^2\right)}{F\left(K[1]^2+K[2]^2\right)^2}dK[1]+1\right)dK[2]+\int_1^x-\frac{K[1]}{F\left(K[1]^2+y(x)^2\right.}\right.$$

✓ **Maple** : cpu = 0.207 (sec), leaf count = 28

$$\left\{-y(x)+\frac{\int^{(y(x))^2+x^2}(F(\_a))^{-1}\,d\_a}{2}-\_C1=0\right\}$$

2.591 ODE No. 591

$$y'(x) = \frac{xF\left(\frac{ay(x)^2+bx^2}{a}\right)}{\sqrt{a}y(x)}$$

✓ **Mathematica** : cpu = 0.456118 (sec), leaf count = 253

$$\text{Solve}\left[\int_1^{y(x)}\left(-\frac{bK[2]}{b+\sqrt{a}F\left(\frac{bx^2+aK[2]^2}{a}\right)}-\int_1^x\left(\frac{2bK[1]K[2]F'\left(\frac{bK[1]^2+aK[2]^2}{a}\right)}{\sqrt{a}\left(b+\sqrt{a}F\left(\frac{bK[1]^2+aK[2]^2}{a}\right)\right)}-\frac{2bF\left(\frac{bK[1]^2+aK[2]^2}{a}\right)K[1]K[2]F}{\left(b+\sqrt{a}F\left(\frac{bK[1]^2+aK}{a}\right.\right.}\right.\right.\right.$$

✓ **Maple** : cpu = 0.565 (sec), leaf count = 108

$$\left\{y(x) = \frac{1}{a}\sqrt{a\left(-bx^2+RootOf\left(\int^{\_Z}\left(F\left(\_a\right)a+b\sqrt{a}\right)^{-1}d\_aba^{\frac{3}{2}}-bx^2+2\_C1\ a\right)a\right)}, y(x) = -\frac{1}{a}\sqrt{a\left(-bx\right.}\right.$$

2.592 ODE No. 592

$$y'(x) = \frac{F\left(-\frac{2x^3}{5}+y(x)-2\sqrt{x}\right)+\frac{6x^3}{5}+\sqrt{x}}{x}$$

✓ **Mathematica** : cpu = 0.492682 (sec), leaf count = 241

$$\text{Solve}\left[\int_1^{y(x)}-\frac{F\left(-\frac{2x^3}{5}-2\sqrt{x}+K[2]\right)\int_1^x\left(-\frac{6F'\left(-\frac{2}{5}K[1]^3-2\sqrt{K[1]}+K[2]\right)K[1]^2}{5F\left(-\frac{2}{5}K[1]^3-2\sqrt{K[1]}+K[2]\right)^2}-\frac{F'\left(-\frac{2}{5}K[1]^3-2\sqrt{K[1]}+K[2]\right)}{F\left(-\frac{2}{5}K[1]^3-2\sqrt{K[1]}+K[2]\right)^2\sqrt{K[1]}}\right)d}{F\left(-\frac{2x^3}{5}-2\sqrt{x}+K[2]\right)}\right.$$

✓ **Maple** : cpu = 0.262 (sec), leaf count = 33

$$\left\{\int_{\_b}^{y(x)}\left(F\left(\_a-\frac{2\,x^3}{5}-2\,\sqrt{x}\right)\right)^{-1}\,d\_a-\ln(x)-\_C1=0\right\}$$

2.593 ODE No. 593

$$y'(x) = \frac{e^x F\left(y(x)^{3/2} - \frac{3e^x}{2}\right)}{\sqrt{y(x)}}$$

✓ **Mathematica** : cpu = 0.386065 (sec), leaf count = 221

$$\text{Solve}\left[\int_1^{y(x)} \left(\frac{\sqrt{K[2]}}{F\left(K[2]^{3/2} - \frac{3e^x}{2}\right) - 1} - \int_1^x \left(\frac{3e^{K[1]} F\left(K[2]^{3/2} - \frac{3e^{K[1]}}{2}\right)\sqrt{K[2]} F'\left(K[2]^{3/2} - \frac{3e^{K[1]}}{2}\right)}{2\left(F\left(K[2]^{3/2} - \frac{3e^{K[1]}}{2}\right) - 1\right)^2} - \frac{3e^{K[1]}\sqrt{}}{2\left(F\right.}\right.\right.\right.$$

✓ **Maple** : cpu = 0.391 (sec), leaf count = 35

$$\left\{\int_{\_b}^{y(x)} \sqrt{\_a}\left(F\left(\_a^{\frac{3}{2}} - \frac{3\,\mathrm{e}^x}{2}\right) - 1\right)^{-1} \mathrm{d}\_a - \mathrm{e}^x - \_C1 = 0\right\}$$

2.594 ODE No. 594

$$y'(x) = \frac{xF\left(\frac{y(x)^2 - b}{x^2}\right)}{y(x)}$$

✓ **Mathematica** : cpu = 0.339565 (sec), leaf count = 236

$$\text{Solve}\left[\int_1^{y(x)} \left(-\frac{K[2]}{-F\left(\frac{K[2]^2-b}{x^2}\right)x^2 + K[2]^2 - b} - \int_1^x \left(\frac{F\left(\frac{K[2]^2-b}{K[1]^2}\right)K[1]\left(2K[2]F'\left(\frac{K[2]^2-b}{K[1]^2}\right) - 2K[2]\right)}{\left(F\left(\frac{K[2]^2-b}{K[1]^2}\right)K[1]^2 - K[2]^2 + b\right)^2} - \frac{}{K[1]\left(\right.}\right.\right.\right.$$

✓ **Maple** : cpu = 0.351 (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

$$y'(x) = \frac{F\left(\frac{xy(x)^2+1}{x}\right)}{x^2 y(x)}$$

✓ **Mathematica** : cpu = 0.325125 (sec), leaf count = 204

$$\text{Solve}\left[\int_1^{y(x)} \left(\frac{K[2]}{2F\left(\frac{xK[2]^2+1}{x}\right)-1} - \int_1^x \left(\frac{4F\left(\frac{K[1]K[2]^2+1}{K[1]}\right)K[2]F'\left(\frac{K[1]K[2]^2+1}{K[1]}\right)}{\left(2F\left(\frac{K[1]K[2]^2+1}{K[1]}\right)-1\right)^2 K[1]^2} - \frac{2K[2]F'\left(\frac{K[1]K[2]^2+1}{K[1]}\right)}{\left(2F\left(\frac{K[1]K[2]^2+1}{K[1]}\right)-1\right)K[1\right.\right.\right.$$

✓ **Maple** : cpu = 0.302 (sec), leaf count = 72

$$\left\{y(x) = \frac{1}{x}\sqrt{x\left(RootOf\left(\int^{\_Z}(-1+2\,F(\_a))^{-1}\,d\_a x + \_C1\,x+1\right)x-1\right)}, y(x) = -\frac{1}{x}\sqrt{x\left(RootOf\left(\int^{\_Z}\right.\right.}\right.$$

2.596 ODE No. 596

$$y'(x) = \frac{F(x^2+y(x)-x)-2x^2+x}{x}$$

✓ **Mathematica** : cpu = 0.254841 (sec), leaf count = 156

$$\text{Solve}\left[\int_1^{y(x)} -\frac{F(x^2-x+K[2])\int_1^x\left(\frac{2K[1]F'(K[1]^2-K[1]+K[2])}{F(K[1]^2-K[1]+K[2])^2} - \frac{F'(K[1]^2-K[1]+K[2])}{F(K[1]^2-K[1]+K[2])^2}\right)dK[1]+1}{F(x^2-x+K[2])}dK[2] + \int_1^x\left(-\frac{}{F}\right.\right.$$

✓ **Maple** : cpu = 0.194 (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 = 0.358719 (sec), leaf count = 130

$$\text{Solve}\left[\int_1^{y(x)}\left(-\frac{K[2]}{2aF\left(\frac{xK[2]^2-4a}{x}\right)}-\int_1^x\frac{2K[2]F'\left(\frac{K[1]K[2]^2-4a}{K[1]}\right)}{F\left(\frac{K[1]K[2]^2-4a}{K[1]}\right)^2K[1]^2}dK[1]+1\right)dK[2]+\int_1^x-\frac{1}{F\left(\frac{K[1]y(x)^2-4a}{K[1]}\right)K[1\right.$$

✓ **Maple** : cpu = 0.601 (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 = 0.162064 (sec), leaf count = 37

$$\text{Solve}\left[\int_1^{\frac{y(x)}{x}}\frac{1}{F(K[1])+K[1]}dK[1]=\log(1-x)-\log(x)+c_1,y(x)\right]$$

✓ **Maple** : cpu = 0.086 (sec), leaf count = 29

$$\left\{y(x)=RootOf\left(-\int^{\_Z}(F(\_a)+\_a)^{-1}\,d\_a+\ln(x-1)-\ln(x)+\_C1\right)x\right\}$$

2.599 ODE No. 599

$$y'(x)=\frac{F(x^2+y(x)^2)-x}{y(x)}$$

✓ **Mathematica** : cpu = 0.154008 (sec), leaf count = 95

$$\text{Solve}\left[\int_1^{y(x)}\left(-\frac{K[2]}{F(x^2+K[2]^2)}-\int_1^x\frac{2K[1]K[2]F'(K[1]^2+K[2]^2)}{F(K[1]^2+K[2]^2)^2}dK[1]\right)dK[2]+\int_1^x\left(1-\frac{K[1]}{F(K[1]^2+y(x)^2)\right.\right.$$

✓ **Maple** : cpu = 0.144 (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

$$y'(x)=\frac{y(x)^2F\left(\frac{1-2y(x)\log(x)}{y(x)}\right)}{x}$$

✓ **Mathematica** : cpu = 0.265956 (sec), leaf count = 246

$$\text{Solve}\left[\int_1^{y(x)}\left(-\int_1^x\left(\frac{2\left(-\frac{2\log(K[1])}{K[2]}-\frac{1-2K[2]\log(K[1])}{K[2]^2}\right)F'\left(\frac{1-2K[2]\log(K[1])}{K[2]}\right)}{\left(F\left(\frac{1-2K[2]\log(K[1])}{K[2]}\right)+2\right)K[1]}-\frac{2F\left(\frac{1-2K[2]\log(K[1])}{K[2]}\right)\left(-\frac{2\log(K[1]}{K[2]}\right.}{\left(F\left(\frac{1-2K[2]}{K}\right.\right.}\right.\right.\right.$$

✓ **Maple** : cpu = 0.351 (sec), leaf count = 38

$$\left\{\int_{\_b}^{y(x)}\frac{1}{\_a^2}\left(F\left(\frac{-2\_a\ln(x)+1}{\_a}\right)+2\right)^{-1}d\_a-\ln(x)-\_C1=0\right\}$$

2.601 ODE No. 601

$$y'(x)=\frac{xF(-(x-y(x))(y(x)+x))}{y(x)}$$

✓ **Mathematica** : cpu = 0.23969 (sec), leaf count = 190

$$\text{Solve}\left[\int_1^{y(x)}\left(\frac{K[2]}{F(-(x-K[2])(x+K[2]))-1}-\int_1^x\left(\frac{2F(-(K[1]-K[2])(K[1]+K[2]))K[1]K[2]F'(-(K[1]-\right.}{(F(-(K[1]-K[2])(K[1]+K[2]))-1)}\right.\right.$$

✓ **Maple** : cpu = 0.207 (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 = 0.539013 (sec), leaf count = 167

$$\text{Solve}\left[\int_1^{y(x)}\left(-\int_1^x-\frac{2\left(-\frac{K[1]^2-K[2]}{K[1]^2K[2]^2}-\frac{1}{K[1]^2K[2]}\right)F'\left(\frac{K[1]^2-K[2]}{K[1]^2K[2]}\right)}{F\left(\frac{K[1]^2-K[2]}{K[1]^2K[2]}\right)^2K[1]^3}dK[1]-\frac{1}{F\left(\frac{x^2-K[2]}{x^2K[2]}\right)K[2]^2}\right)dK[2]+\int_1^x\left(\frac{\ }{K}\right.\right.$$

✓ **Maple** : cpu = 0.384 (sec), leaf count = 33

$$\left\{ y(x) = \frac{x^2}{RootOf\left(-\ln(x) - \int^{-Z} (F(\_a))^{-1} d\_a + \_C1\right) x^2 + 1} \right\}$$

2.603 ODE No. 603

$$y'(x) = \frac{2xF(y(x) + \log(2x+1)) + F(y(x) + \log(2x+1)) - 2}{2x+1}$$

✓ **Mathematica** : cpu = 0.315651 (sec), leaf count = 117

$$\text{Solve}\left[\int_1^{y(x)} -\frac{F(K[2] + \log(2x+1)) \int_1^x -\frac{2F'(K[2]+\log(2K[1]+1))}{F(K[2]+\log(2K[1]+1))^2(2K[1]+1)} dK[1] - 1}{F(K[2] + \log(2x+1))} dK[2] + \int_1^x \left(\frac{\quad}{F(\log(2K[1]+1)} \right.\right.$$

✓ **Maple** : cpu = 0.24 (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 = 0.378156 (sec), leaf count = 143

$$\text{Solve}\left[\int_1^{y(x)} \left(-\int_1^x \frac{\left(\frac{8K[1]}{K[2]} - \frac{2(4K[1]K[2]^2+1)}{K[2]^3}\right) F'\left(\frac{4K[1]K[2]^2+1}{K[2]^2}\right)}{F\left(\frac{4K[1]K[2]^2+1}{K[2]^2}\right)^2} dK[1] + \frac{1}{K[2]^2} + \frac{1}{2F\left(\frac{4xK[2]^2+1}{K[2]^2}\right) K[2]^3} \right) dK[2]\right.$$

✓ **Maple** : cpu = 0.176 (sec), leaf count = 30

$$\left\{ -\_C1 - (y(x))^{-1} - \frac{\int^{4x+(y(x))^{-2}} (F(\_a))^{-1} d\_a}{4} = 0 \right\}$$

2.605 ODE No. 605

$$y'(x) = -\frac{y(x)^2 \left(2x - F\left(\frac{1-\frac{1}{2}xy(x)}{y(x)}\right)\right)}{4x}$$

✓ **Mathematica** : cpu = 0.450136 (sec), leaf count = 145

$$\text{Solve}\left[\int_1^{y(x)} \left(-\int_1^x \frac{2\left(-\frac{K[1]}{2K[2]} - \frac{1-\frac{1}{2}K[1]K[2]}{K[2]^2}\right) F'\left(\frac{1-\frac{1}{2}K[1]K[2]}{K[2]}\right)}{F\left(\frac{1-\frac{1}{2}K[1]K[2]}{K[2]}\right)^2} dK[1] - \frac{4}{F\left(\frac{1-\frac{1}{2}xK[2]}{K[2]}\right) K[2]^2}\right) dK[2] + \int_1^x \left(\frac{1}{K[\right.\right.$$

✓ **Maple** : cpu = 0.295 (sec), leaf count = 29

$$\left\{y(x) = 2\left(2\,RootOf\left(-\ln(x) - 4\int^{\_Z} (F(\_a))^{-1}\, d\_a + \_C1\right) + x\right)^{-1}\right\}$$

2.606 ODE No. 606

$$y'(x) = -x\left(-F\left(y(x) - \frac{1}{2}e^{-x^2}x^2\right) + e^{-x^2}x^2 - e^{-x^2}\right)$$

✓ **Mathematica** : cpu = 0.567191 (sec), leaf count = 361

$$\text{Solve}\left[\int_1^{y(x)} -\frac{F\left(K[2] - \frac{1}{2}e^{-x^2}x^2\right) \int_1^x \left(\frac{e^{-K[1]^2} F'\left(K[2]-\frac{1}{2}e^{-K[1]^2}K[1]^2\right)K[1]^3}{F\left(K[2]-\frac{1}{2}e^{-K[1]^2}K[1]^2\right)^2} - \frac{e^{-K[1]^2}\left(e^{K[1]^2}F\left(K[2]-\frac{1}{2}e^{-K[1]^2}K[1]^2\right)+1\right)}{F\left(K[2]-\frac{1}{2}e^{-K[1]^2}K\right.}\right.}{F\left(K[2] - \frac{1}{2}e^{-x^2}x^2\right)}\right.$$

✓ **Maple** : cpu = 0.759 (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 = 0.225493 (sec), leaf count = 121

$$\text{Solve}\left[\int_1^{y(x)} -\frac{F\left(\frac{K[2]}{x^2}\right)\int_1^x \left(\frac{2}{F\left(\frac{K[2]}{K[1]^2}\right)K[1]^3} - \frac{2K[2]F'\left(\frac{K[2]}{K[1]^2}\right)}{F\left(\frac{K[2]}{K[1]^2}\right)^2 K[1]^5}\right) dK[1]x^2 + 1}{x^2 F\left(\frac{K[2]}{x^2}\right)} dK[2] + \int_1^x \left(\frac{2y(x)}{F\left(\frac{y(x)}{K[1]^2}\right)K[1]^3} + 1\right) d\right.$$

✓ **Maple** : cpu = 0.121 (sec), leaf count = 22

$$\left\{y(x) = RootOf\left(-x + \int^{\_Z} (F(\_a))^{-1}\, d\_a + \_C1\right) x^2\right\}$$

2.608 ODE No. 608

$$y'(x) = \frac{\sqrt{y(x)}}{F\left(\frac{x-y(x)}{\sqrt{y(x)}}\right) + \sqrt{y(x)}}$$

✓ **Mathematica** : cpu = 0.409511 (sec), leaf count = 274

$$\text{Solve}\left[\int_1^{y(x)} \left(-\frac{F\left(\frac{x-K[2]}{\sqrt{K[2]}}\right)}{x\sqrt{K[2]}} - \int_1^x -\frac{-\frac{F\left(\frac{K[1]-K[2]}{\sqrt{K[2]}}\right)}{\sqrt{K[2]}} - 2\left(-\frac{K[1]-K[2]}{2K[2]^{3/2}} - \frac{1}{\sqrt{K[2]}}\right)\sqrt{K[2]}F'\left(\frac{K[1]-K[2]}{\sqrt{K[2]}}\right) - 1}{\left(-2\sqrt{K[2]}F\left(\frac{K[1]-K[2]}{\sqrt{K[2]}}\right) + K[1] - K[2]\right)^2} dK[1] + \right.\right.$$

✓ **Maple** : cpu = 0.351 (sec), leaf count = 40

$$\left\{\frac{\ln(y(x))}{2} - \int^{x\frac{1}{\sqrt{y(x)}} - \sqrt{y(x)}} (2\,F(\_a) - \_a)^{-1}\, d\_a - \_C1 = 0\right\}$$

2.609 ODE No. 609

$$y'(x) = \frac{F(x^3 y(x)) - 3x^2 y(x)}{x^3}$$

✓ **Mathematica** : cpu = 0.261613 (sec), leaf count = 117

$$\text{Solve}\left[\int_1^{y(x)} -\frac{x^3 + F(x^3 K[2]) \int_1^x \left(\frac{3K[1]^5 K[2] F'(K[1]^3 K[2])}{F(K[1]^3 K[2])^2} - \frac{3K[1]^2}{F(K[1]^3 K[2])}\right) dK[1]}{F(x^3 K[2])} dK[2] + \int_1^x \left(1 - \frac{3K[1]^2 y(x)}{F(K[1]^3 y(x))}\right.\right.$$

✓ **Maple** : cpu = 0.32 (sec), leaf count = 22

$$\left\{y(x) = \frac{\mathit{RootOf}\left(x - \int^{\_Z} (F(\_a))^{-1} \, d\_a + \_C1\right)}{x^3}\right\}$$

2.610 ODE No. 610

$$y'(x) = \frac{x^2 F\left(\frac{y(x)}{x}\right) + y(x)}{x}$$

✓ **Mathematica** : cpu = 0.0794958 (sec), leaf count = 25

$$\text{Solve}\left[\int_1^{\frac{y(x)}{x}} \frac{1}{F(K[1])} dK[1] = x + c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.079 (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 = 0.270072 (sec), leaf count = 191

$$\text{Solve}\left[\int_1^{y(x)} -\frac{x + F(x(x + K[2])) \int_1^x \left(\frac{2F'(K[1](K[1]+K[2]))K[1]^2}{F(K[1](K[1]+K[2]))^2} + \frac{(K[2]-F(K[1](K[1]+K[2])))F'(K[1](K[1]+K[2]))K[1]}{F(K[1](K[1]+K[2]))^2} - \right.}{F(x(x + K[2]))}\right.$$

✓ **Maple** : cpu = 0.14 (sec), leaf count = 28

$$\left\{y(x)=\frac{-x^2+RootOf\left(-x+\int^{\_Z}(F(\_a))^{-1}d\_a+\_C1\right)}{x}\right\}$$

2.612 ODE No. 612

$$y'(x)=\frac{1}{2}e^{\frac{x^2}{4}}\left(2F\left(e^{-\frac{x^2}{4}}y(x)\right)+e^{-\frac{x^2}{4}}xy(x)\right)$$

✓ **Mathematica** : cpu = 0.355309 (sec), leaf count = 199

$$\text{Solve}\left[\int_1^{y(x)}-\frac{e^{-\frac{x^2}{4}}\left(e^{\frac{x^2}{4}}F\left(e^{-\frac{x^2}{4}}K[2]\right)\int_1^x\left(\frac{e^{-\frac{1}{4}K[1]^2}K[1]}{2F\left(e^{-\frac{1}{4}K[1]^2}K[2]\right)}-\frac{e^{-\frac{1}{2}K[1]^2}K[1]K[2]F'\left(e^{-\frac{1}{4}K[1]^2}K[2]\right)}{2F\left(e^{-\frac{1}{4}K[1]^2}K[2]\right)^2}\right)dK[1]+1\right)}{F\left(e^{-\frac{x^2}{4}}K[2]\right)}dK\right.$$

✓ **Maple** : cpu = 0.207 (sec), leaf count = 27

$$\left\{y(x)=RootOf\left(-x+\int^{\_Z}(F(\_a))^{-1}d\_a+\_C1\right)\left(e^{-\frac{x^2}{4}}\right)^{-1}\right\}$$

2.613 ODE No. 613

$$y'(x)=\frac{x^2F\left(\frac{y(x)-x\log(x)}{x}\right)+y(x)+x}{x}$$

✓ **Mathematica** : cpu = 0.287117 (sec), leaf count = 226

$$\text{Solve}\left[\int_1^{y(x)}-\frac{xF\left(\frac{K[2]-x\log(x)}{x}\right)\int_1^x\left(-\frac{K[2]F'\left(\frac{K[2]-K[1]\log(K[1])}{K[1]}\right)}{F\left(\frac{K[2]-K[1]\log(K[1])}{K[1]}\right)^2K[1]^3}-\frac{F'\left(\frac{K[2]-K[1]\log(K[1])}{K[1]}\right)}{F\left(\frac{K[2]-K[1]\log(K[1])}{K[1]}\right)^2K[1]^2}+\frac{1}{F\left(\frac{K[2]-K[1]\log(K[1])}{K[1]}\right)F\right.}{xF\left(\frac{K[2]-x\log(x)}{x}\right)}\right.$$

✓ **Maple** : cpu = 0.174 (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

$$y'(x) = \frac{(a-1)(a+1)x}{a^2F\left(-\frac{1}{2}a^2x^2 + \frac{x^2}{2} + \frac{y(x)^2}{2}\right) - F\left(-\frac{1}{2}a^2x^2 + \frac{x^2}{2} + \frac{y(x)^2}{2}\right) + y(x)}$$

✓ **Mathematica** : cpu = 0.373455 (sec), leaf count = 177

$$\text{Solve}\left[\int_1^{y(x)}\left(\frac{K[2]}{(a-1)(a+1)F\left(-\frac{1}{2}a^2x^2+\frac{x^2}{2}+\frac{K[2]^2}{2}\right)} - \int_1^x \frac{K[1]K[2]F'\left(-\frac{1}{2}a^2K[1]^2+\frac{K[1]^2}{2}+\frac{K[2]^2}{2}\right)}{F\left(-\frac{1}{2}a^2K[1]^2+\frac{K[1]^2}{2}+\frac{K[2]^2}{2}\right)^2}dK[1] +\right.\right.$$

✓ **Maple** : cpu = 0.482 (sec), leaf count = 60

$$\left\{\frac{y(x)}{(a-1)(a+1)} + \frac{1}{2a^4-4a^2+2}\int^{-a^2x^2+x^2+(y(x))^2}\left(F\left(\frac{\_a}{2}\right)\right)^{-1}d\_a - \_C1 = 0\right\}$$

2.615 ODE No. 615

$$y'(x) = \frac{y(x)}{x(y(x)F(xy(x))-1)}$$

✓ **Mathematica** : cpu = 0.271606 (sec), leaf count = 77

$$\text{Solve}\left[\int_1^{y(x)}\left(-\int_1^x \frac{F'(K[1]K[2])}{F(K[1]K[2])^2}dK[1] - \frac{1}{F(xK[2])K[2]} + 1\right)dK[2] + \int_1^x -\frac{1}{F(K[1]y(x))K[1]}dK[1] = c_1, y(x\right.$$

✓ **Maple** : cpu = 0.192 (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 = 0.491442 (sec), leaf count = 177

$$\text{Solve}\left[\int_1^{y(x)} -\frac{x^2 + F(x(xK[2]-1))\int_1^x\left(\frac{2K[2]F'(K[1](K[1]K[2]-1))K[1]^3}{F(K[1](K[1]K[2]-1))^2} - \frac{F'(K[1](K[1]K[2]-1))K[1]^2}{F(K[1](K[1]K[2]-1))^2} - \frac{2K[1]}{F(K[1](K[1]K[2]-\right.}{F(x(xK[2]-1))}\right.$$

✓ **Maple** : cpu = 0.143 (sec), leaf count = 26

$$\left\{y(x) = \frac{RootOf\left(\int^{\_Z}(F(\_a))^{-1}\,d\_ax + \_C1\,x + 1\right) + x}{x^2}\right\}$$

2.617 ODE No. 617

$$y'(x) = \frac{1}{9}e^{-\frac{3x^2}{2}}xy(x)^2F\left(\frac{e^{\frac{3x^2}{2}}(y(x)+3)}{3y(x)}\right)$$

✓ **Mathematica** : cpu = 0.950582 (sec), leaf count = 615

$$\text{Solve}\left[\int_1^{y(x)}\left(\frac{9e^{\frac{3x^2}{2}} - F\left(\frac{e^{\frac{3x^2}{2}}(K[2]+3)}{3K[2]}\right)}{3\left(\left(9e^{\frac{3x^2}{2}} - F\left(\frac{e^{\frac{3x^2}{2}}(K[2]+3)}{3K[2]}\right)\right)K[2] + 27e^{\frac{3x^2}{2}}\right)} - \int_1^x\left(-\frac{K[2]\left(\frac{e^{\frac{3K[1]^2}{2}}}{3K[2]} - \frac{e^{\frac{3K[1]^2}{2}}(K[2]+3)}{3K[2]^2}\right)F'\left(\right.}{-9e^{\frac{3K[1]^2}{2}}K[2] + F\left(\frac{e^{\frac{3K[1]^2}{2}}(K[2]+3)}{3K[2]}\right.}\right.\right.\right.$$

✓ **Maple** : cpu = 0.527 (sec), leaf count = 47

$$\left\{y(x) = -3\,\frac{e^{3/2\,x^2}}{e^{3/2\,x^2} - 3\,RootOf\left(-x^2 - 18\int^{\_Z}(F(\_a) - 27\_a)^{-1}\,d\_a + 2\_C1\right)}\right\}$$

2.618 ODE No. 618

$$y'(x) = \frac{(y(x)+1)(x(y(x) - \log(y(x)+1) - \log(x)) + 1)}{xy(x)}$$

✓ **Mathematica** : cpu = 0.204835 (sec), leaf count = 25

$$\left\{\left\{y(x) \to -1 - W\left(-\frac{e^{-1+c_1e^x}}{x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 1.332 (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 = 0.674247 (sec), leaf count = 330

$$\text{Solve}\left[\int_1^{y(x)} \left(-\frac{8K[2]^3}{F\left(-\frac{1}{3}K[2]^4 - \frac{K[2]^3}{2} - K[2]^2 - K[2] + x\right)} - \frac{9K[2]^2}{F\left(-\frac{1}{3}K[2]^4 - \frac{K[2]^3}{2} - K[2]^2 - K[2] + x\right)} - \frac{}{F\left(-\right.}\right.\right.$$

✓ **Maple** : cpu = 0.532 (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 = 0.762136 (sec), leaf count = 210

$$\text{Solve}\left[\int_1^{y(x)} \left(-\frac{2K[2]}{-x^2 + e^{2F(-(x-K[2])(x+K[2]))} + K[2]^2} - \int_1^x \left(\frac{2K[1]\left(-4\exp(2F(-(K[1]-K[2])(K[1]+K[2])))\right.}{(K[1]^2 - \exp(2F(-(K[1]-K[\right.\right.\right.$$

✓ **Maple** : cpu = 0.492 (sec), leaf count = 37

$$\left\{y(x) = \mathrm{e}^{RootOf\left(-\_Z + \int^{\left(\mathrm{e}^{\_Z}\right)^2 - 2x\mathrm{e}^{\_Z}} \left(\mathrm{e}^{2F(\_a)} + \_a\right)^{-1} d\_a + \_C1\right)} - x\right\}$$

2.621 ODE No. 621

$$y'(x) = \frac{1}{y(x) + \sqrt{x}}$$

✓ **Mathematica** : cpu = 0.0578293 (sec), leaf count = 445

$$\left\{\left\{y(x) \to -\sqrt{x} + \frac{1}{\text{Root}\left[-24\#1^4 x^2 + 8\#1^3 x^{3/2} + \#1^6 \left(16x^3 + 16e^{12c_1}\right) + 9\#1^2 x - 6\#1\sqrt{x} + 1\&, 1\right]}\right\}, \left\{y(x)\right.\right.$$

✓ **Maple** : cpu = 1.143 (sec), leaf count = 59

$$\left\{y(x) = \left(\sqrt{x}\left(RootOf\left(\_Z^{18}\_C1 - 9\,x\_Z^6 - 6\,\sqrt{x}\_Z^3 - 1\right)\right)^3 + 1\right)\left(RootOf\left(\_Z^{18}\_C1 - 9\,x\_Z^6 - 6\,\sqrt{x}\_Z^3\right.\right.\right.$$

2.622 ODE No. 622

$$y'(x) = \frac{1}{y(x) + \sqrt{3x+1} + 2}$$

✓ **Mathematica** : cpu = 0.229631 (sec), leaf count = 140

$$\text{Solve}\left[6\sqrt{33}\tanh^{-1}\left(\frac{3y(x) + 7\sqrt{3x+1} + 6}{\sqrt{33}\left(y(x) + \sqrt{3x+1} + 2\right)}\right) + 44c_1 = 33\left(\log\left(\frac{-3\sqrt{3x+1}y(x)^2 - 3\left(3x + 4\sqrt{3x+1} + 1\right)}{2(3x}\right.\right.\right.$$

✓ **Maple** : cpu = 0.443 (sec), leaf count = 77

$$\left\{\ln\left(\left(3\,y(x) + 6\right)\sqrt{3\,x+1} + 3\left(y(x)\right)^2 - 6\,x + 12\,y(x) + 10\right) - 6\,\frac{\sqrt{3\,x+1}}{\sqrt{99\,x+33}}Artanh\left(\frac{3\,\sqrt{3\,x+1} + 6\,y(x) + 12}{\sqrt{99\,x+33}}\right)\right.$$

2.623 ODE No. 623

$$y'(x) = \frac{x^2}{x^{3/2} + y(x)}$$

✓ **Mathematica** : cpu = 0.137942 (sec), leaf count = 77

$$\text{Solve}\left[6\sqrt{33}\tanh^{-1}\left(\frac{7x^{3/2} + 3y(x)}{\sqrt{33}\left(x^{3/2} + y(x)\right)}\right) + 44c_1 = 33\left(\log\left(-\frac{3y(x)^2}{2x^3} - \frac{3y(x)}{2x^{3/2}} + 1\right) + 3\log(x)\right), y(x)\right]$$

✓ **Maple** : cpu = 0.85 (sec), leaf count = 49

$$\left\{\ln\left(3\,x^{3/2}y(x) - 2\,x^3 + 3\left(y(x)\right)^2\right) - \frac{2\,\sqrt{33}}{11}Artanh\left(\frac{\sqrt{33}}{11}\left(x^{\frac{3}{2}} + 2\,y(x)\right)x^{-\frac{3}{2}}\right) - \_C1 = 0\right\}$$

2.624 ODE No. 624

$$y'(x) = \frac{x^{5/3}}{x^{4/3} + y(x)}$$

✓ **Mathematica** : cpu = 29.4185 (sec), leaf count = 9837

✓ **Maple** : cpu = 113.177 (sec), leaf count = 46

$$\left\{y(x) = \frac{1}{2}\left(\mathit{RootOf}\left(\_Z^{192} + 12\,x^{4/3}\_Z^{176} + 48\,x^{8/3}\_Z^{160} + 64\,x^{4}\_Z^{144} - \_\mathit{C1}\right)\right)^{16} + \frac{1}{2}x^{\frac{4}{3}}\right\}$$

2.625 ODE No. 625

$$y'(x) = \frac{1}{2}ix^2\left(-2\sqrt{6y(x) - x^3} + i\right)$$

✓ **Mathematica** : cpu = 0.286507 (sec), leaf count = 56

$$\left\{\left\{y(x) \to \frac{1}{6}\left(-W\left(ie^{-x^3-1-6c_1}\right)^2 - 2W\left(ie^{-x^3-1-6c_1}\right) + x^3 - 1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.305 (sec), leaf count = 53

$$\left\{\ln\left(x^3 - 6\,y(x) - 1\right) - 2\,i\sqrt{-x^3 + 6\,y\left(x\right)} + 2\,i\arctan\left(\sqrt{-x^3 + 6\,y\left(x\right)}\right) + 2\,x^3 - \_\mathit{C1} = 0\right\}$$

2.626 ODE No. 626

$$y'(x) = \frac{x}{\sqrt{x^2+1}+y(x)}$$

✓ **Mathematica** : cpu = 0.150483 (sec), leaf count = 88

$$\text{Solve}\left[\frac{1}{2}\left(\log\left(-\frac{y(x)^2}{x^2+1}-\frac{y(x)}{\sqrt{x^2+1}}+1\right)+\log\left(x^2+1\right)\right)=\frac{\tanh^{-1}\left(\frac{3\sqrt{x^2+1}+y(x)}{\sqrt{5}\left(\sqrt{x^2+1}+y(x)\right)}\right)}{\sqrt{5}}+c_1,y(x)\right]$$

✓ **Maple** : cpu = 1.107 (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 = 0.841347 (sec), leaf count = 25

$$\left\{\left\{y(x)\to\frac{\tan(\log(x)+c_1)}{1+\log(x)\tan(\log(x)+c_1)}\right\}\right\}$$

✓ **Maple** : cpu = 0.378 (sec), leaf count = 35

$$\left\{y(x)=\frac{\sin(\ln(x))\_C1+\cos(\ln(x))}{(\ln(x)+\_C1)\cos(\ln(x))+\sin(\ln(x))(\ln(x)\_C1-1)}\right\}$$

2.628 ODE No. 628

$$y'(x) = \frac{1}{3}x\left(3\sqrt{x^2+3y(x)}-2\right)$$

✓ **Mathematica** : cpu = 0.157735 (sec), leaf count = 38

$$\left\{\left\{y(x)\to\frac{1}{432}\left(81x^4-72x^2-486c_1x^2+16+729c_1{}^2-216c_1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.424 (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 = 0.850243 (sec), leaf count = 47

$$\left\{\left\{y(x) \to \frac{1}{\sqrt{2}\left(\sqrt{2}\log(x) - \tan\left(\frac{1}{2}\left(2\sqrt{2}\log(x) + \sqrt{2}c_1\right)\right)\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.279 (sec), leaf count = 62

$$\left\{y(x) = \frac{\sin\left(\sqrt{2}\ln(x)\right)\_C1 - \cos\left(\sqrt{2}\ln(x)\right)}{\sin\left(\sqrt{2}\ln(x)\right)\left(2\ln(x)\_C1 + \sqrt{2}\right) + \left(\sqrt{2}\_C1 - 2\ln(x)\right)\cos\left(\sqrt{2}\ln(x)\right)}\right\}$$

2.630 ODE No. 630

$$y'(x) = \frac{e^{bx}}{e^{-bx}y(x) + 1}$$

✓ **Mathematica** : cpu = 0.349992 (sec), leaf count = 101

$$\text{Solve}\left[\frac{1}{2}b\left(\log\left(-be^{-2bx}y(x)^2 - be^{-bx}y(x) + 1\right) + 2bx\right) = \frac{b\tan^{-1}\left(\frac{(b+2)\left(-e^{bx}\right) - by(x)}{b\sqrt{-\frac{b+4}{b}}\left(e^{bx}+y(x)\right)}\right)}{\sqrt{-\frac{b+4}{b}}} + c_1, y(x)\right]$$

✓ **Maple** : cpu = 1.156 (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 = 0.177136 (sec), leaf count = 38

$$\left\{\left\{y(x) \to \frac{1}{96}\left(-16x^6 + 8x^3 - 192c_1x^3 - 1 - 576c_1{}^2 - 48c_1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.427 (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 = 0.142397 (sec), leaf count = 65

$$\text{Solve}\left[\frac{1}{2}\log\left(-e^{-2x}y(x)^2 - e^{-x}y(x) + 1\right) + x = \frac{\tanh^{-1}\left(\frac{y(x)+3e^x}{\sqrt{5}(y(x)+e^x)}\right)}{\sqrt{5}} + c_1, y(x)\right]$$

✓ **Maple** : cpu = 1.093 (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 = 0.156525 (sec), leaf count = 85

$$\text{Solve}\left[7\left(3\log\left(-\frac{2}{3}e^{-4x/3}y(x)^2 - \frac{2}{3}e^{-2x/3}y(x) + 1\right) + 4x - 9c_1\right) = 6\sqrt{7}\tanh^{-1}\left(\frac{y(x) + 4e^{2x/3}}{\sqrt{7}\left(y(x) + e^{2x/3}\right)}\right), y(x)\right]$$

✓ **Maple** : cpu = 2.969 (sec), leaf count = 52

$$\left\{y(x) = \mathit{RootOf}\left(-\mathrm{e}^{\mathit{RootOf}\left(-343\left(\tanh\left(1/6\,(4\_C1 - 4\,x - 3\_Z)\sqrt{7}\right)\right)^2 + 343 + 98\,\mathrm{e}^{-\_Z}\right)} - 3 + 2\_Z + 2\_Z^2\right)\left(\mathrm{e}^{-\frac{2\,x}{3}}\right)^{-1}\right\}$$

2.634 ODE No. 634

$$y'(x) = \frac{x^5\sqrt{4x^2y(x)+1}+\frac{1}{2}}{x^3}$$

✓ **Mathematica** : cpu = 0.203948 (sec), leaf count = 33

$$\left\{\left\{y(x)\to \frac{x^{10}-8c_1x^6+16c_1{}^2x^2-4}{16x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.523 (sec), leaf count = 26

$$\left\{\_C1-\frac{1}{x}\sqrt{4\,x^2y\left(x\right)+1}+\frac{x^4}{2}=0\right\}$$

2.635 ODE No. 635

$$y'(x) = \frac{1}{2}x\left(2\sqrt{x^3-6y(x)}+x\right)$$

✓ **Mathematica** : cpu = 0.164765 (sec), leaf count = 33

$$\left\{\left\{y(x)\to \frac{1}{24}\left(-9x^4+4x^3+36c_1x^2-36c_1{}^2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.417 (sec), leaf count = 22

$$\left\{\_C1-\frac{3\,x^2}{2}-\sqrt{x^3-6\,y\left(x\right)}=0\right\}$$

2.636 ODE No. 636

$$y'(x) = y(x)\left(x^2-\log(y(x))\right)$$

✓ **Mathematica** : cpu = 0.103506 (sec), leaf count = 24

$$\left\{\left\{y(x)\to e^{x^2-2x-2c_1e^{-x}+2}\right\}\right\}$$

✓ **Maple** : cpu = 0.793 (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 = 11.7657 (sec), leaf count = 59

$$\text{Solve}\left[-\frac{1}{4}\log\left(2e^{2x^2}y(x)^2+2e^{x^2}y(x)+1\right)-\frac{1}{2}\tan^{-1}\left(2e^{x^2}y(x)+1\right)+\frac{x^2}{2}=c_1,y(x)\right]$$

✓ **Maple** : cpu = 0.346 (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 = 1.71041 (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 = 0.36 (sec), leaf count = 35

$$\left\{\int_{\_b}^{y(x)}\frac{1}{\_a\,(x\ln(x)-\ln(\ln(\_a))\,x+\ln(\_a))}\,d\_a+\ln(x)-\_C1=0\right\}$$

2.639 ODE No. 639

$$y'(x) = y(x)(\log(x)-\log(\log(y(x))))^2$$

✗ **Mathematica** : cpu = 0.283089 (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 = 0.381 (sec), leaf count = 50

$$\left\{\int_{\_b}^{y(x)}\frac{1}{\_a\,\left(x\,(\ln(x))^2-2\,\ln(\ln(\_a))\ln(x)\,x+(\ln(\ln(\_a)))^2\,x-\ln(\_a)\right)}\,d\_a-\ln(x)-\_C1=0\right\}$$

2.640 ODE No. 640

$$y'(x) = \frac{y(x)}{\log(\log(y(x))) - \log(x) + 1}$$

✗ **Mathematica** : cpu = 2.34937 (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 = 0.442 (sec), leaf count = 47

$$\left\{\int_{\_b}^{y(x)} \frac{-\ln(\ln(\_a)) + \ln(x) - 1}{\_a\,(\ln(\_a)\ln(x) - \ln(\_a)\ln(\ln(\_a)) - \ln(\_a) + x)}\, d\_a - \_C1 = 0\right\}$$

2.641 ODE No. 641

$$y'(x) = \frac{x^4\sqrt{4x^2y(x)+1} + \frac{1}{2}}{x^3}$$

✓ **Mathematica** : cpu = 0.198573 (sec), leaf count = 35

$$\left\{\left\{y(x) \to \frac{4x^8 - 24c_1x^5 + 36c_1{}^2x^2 - 9}{36x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.455 (sec), leaf count = 26

$$\left\{\_C1 + \frac{2\,x^3}{3} - \frac{1}{x}\sqrt{4\,x^2y\,(x) + 1} = 0\right\}$$

2.642 ODE No. 642

$$y'(x) = \frac{(4ax - y(x)^2)^2}{y(x)}$$

✓ **Mathematica** : cpu = 0.162656 (sec), leaf count = 105

$$\left\{\left\{y(x) \to -\sqrt{4ax - \sqrt{2}\sqrt{a}\tanh\left(\frac{2\sqrt{2}ax - \sqrt{2}c_1}{\sqrt{a}}\right)}\right\}, \left\{y(x) \to \sqrt{4ax - \sqrt{2}\sqrt{a}\tanh\left(\frac{2\sqrt{2}ax - \sqrt{2}c_1}{\sqrt{a}}\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.414 (sec), leaf count = 286

$$\left\{y(x) = \sqrt{4}\sqrt{\left(\_C1\, e^{2\,x\left(\sqrt{2}\sqrt{a}-2\,ax\right)} + e^{-2\,x\left(\sqrt{2}\sqrt{a}+2\,ax\right)}\right)\left(\_C1\,\left(ax - \frac{\sqrt{2}}{4}\sqrt{a}\right)e^{2\,x\left(\sqrt{2}\sqrt{a}-2\,ax\right)} + e^{-2\,x\left(\sqrt{2}\sqrt{a}+\right.}\right.}\right.$$

2.643 ODE No. 643

$$y'(x) = \frac{1}{3}x\left(3x\sqrt{x^2 + 3y(x)} - 2\right)$$

✓ **Mathematica** : cpu = 0.166771 (sec), leaf count = 31

$$\left\{\left\{y(x) \to \frac{1}{12}(x^6 - 4x^2 - 6c_1x^3 + 9c_1{}^2)\right\}\right\}$$

✓ **Maple** : cpu = 0.44 (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 = 0.337553 (sec), leaf count = 34

$$\left\{\left\{y(x) \to \frac{1}{72}a\left(16x^6 - 9x^4 - 96c_1x^3 + 144c_1{}^2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.742 (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 = 0.0854489 (sec), leaf count = 20

$$\left\{\left\{y(x) \to e^{x - e^{-x+c_1} - 1}\right\}\right\}$$

✓ **Maple** : cpu = 0.629 (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 = 0.283076 (sec), leaf count = 35

$$\left\{\left\{y(x) \to \frac{1}{6}\left(x^3 - 9\log^2(x+1) + 18c_1\log(x+1) - 9{c_1}^2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.62 (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 = 0.361197 (sec), leaf count = 115

$$\left\{\left\{y(x) \to -\sqrt{-\frac{bx^2}{a} + \frac{\sqrt{b}\tan\left(\frac{a^{3/2}bx^2+2c_1}{a^{9/4}\sqrt{b}}\right)}{\sqrt[4]{a}}}\right\}, \left\{y(x) \to \sqrt{-\frac{bx^2}{a} + \frac{\sqrt{b}\tan\left(\frac{a^{3/2}bx^2+2c_1}{a^{9/4}\sqrt{b}}\right)}{\sqrt[4]{a}}}\right\}\right\}$$

✓ **Maple** : cpu = 0.492 (sec), leaf count = 460

$$\left\{y(x) = \frac{1}{a}\sqrt{-a\left(\_C1\,e^{\frac{x^2}{2}\left(2\,a^{3/2}\sqrt{-\frac{b}{a^{3/2}}}+bx^2\right)a^{-\frac{3}{2}}} + e^{\frac{x^2}{2}\left(-2\,a^{3/2}\sqrt{-\frac{b}{a^{3/2}}}+bx^2\right)a^{-\frac{3}{2}}}\right)\left(\left(bx^2 - a^{\frac{3}{2}}\sqrt{-ba^{-\frac{3}{2}}}\right)e^{\frac{x^2}{2}\left(-2\,a\right.}\right.}\right.$$

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 = 0.502292 (sec), leaf count = 128

$$\left\{\left\{y(x) \to \frac{1}{72}\left(16ax^6 - 48ax^5 + 123ax^4 - 72ax^2 - 96ax^3\log(x+1) + 144ax^2\log(x+1) - 96ac_1x^3 + 144ac_1x^2 -\right.\right.\right.$$

✓ **Maple** : cpu = 1.187 (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 = 0.24989 (sec), leaf count = 37

$$\left\{\left\{y(x) \to \frac{1}{8}\left(4x^4 - x^2 - 16c_1x^2 + 2x - 1 + 16c_1{}^2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.495 (sec), leaf count = 27

$$\left\{\_C1 + 2\,x^2 + \frac{1}{4} - \sqrt{x^2 - 2\,x + 1 + 8\,y\left(x\right)} = 0\right\}$$

2.650 ODE No. 650

$$y'(x) = x\sqrt{a^2 + 2ax + x^2 + 4y(x)} - \frac{a}{2} - \frac{x}{2}$$

✓ **Mathematica** : cpu = 0.383047 (sec), leaf count = 109

$$\text{Solve}\left[-\frac{1}{2}\sqrt{a^2 + 2ax + x^2 + 4y(x)} - \frac{1}{2}a\log\left(\sqrt{a^2 + 2ax + x^2 + 4y(x)} + a + x\right) + \frac{1}{2}a\tanh^{-1}\left(\frac{2a + 2a}{2\sqrt{a^2 + 2ax + x}}\right.\right.$$

✓ **Maple** : cpu = 0.491 (sec), leaf count = 28

$$\left\{\_C1 + x^2 + \frac{1}{2} - \sqrt{x^2 + 2\,ax + a^2 + 4\,y\left(x\right)} = 0\right\}$$

2.651 ODE No. 651

$$y'(x) = \frac{y(x)\left(x^2 + \log(y(x))\right)}{x}$$

✓ **Mathematica** : cpu = 0.0922997 (sec), leaf count = 16

$$\left\{\left\{y(x) \to e^{x^2 + 2c_1x}\right\}\right\}$$

✓ **Maple** : cpu = 0.237 (sec), leaf count = 13

$$\left\{y(x) = e^{-\_C1\,x}e^{x^2}\right\}$$

2.652 ODE No. 652

$$y'(x) = \frac{x\sqrt{4ax - y(x)^2} + 2a}{y(x)}$$

✓ **Mathematica** : cpu = 1.22345 (sec), leaf count = 101

$$\left\{\left\{y(x) \to -\frac{\sqrt{-256a^4x^4 + 32a^2e^{c_1}x^2 + 4096a^5x - e^{2c_1}}}{32a^2}\right\}, \left\{y(x) \to \frac{\sqrt{-256a^4x^4 + 32a^2e^{c_1}x^2 + 4096a^5x - e^{2c_1}}}{32a^2}\right.\right.$$

✓ **Maple** : cpu = 0.269 (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 = 0.499653 (sec), leaf count = 94

$$\text{Solve}\left[-\frac{1}{2}\sqrt{x^2 + 4y(x) - 4x} + \log\left(-\sqrt{x^2 + 4y(x) - 4x} - x + 2\right) - \tanh^{-1}\left(\frac{2x - 4}{2\sqrt{x^2 + 4y(x) - 4x}}\right) + \frac{x^2}{2} - \frac{1}{2}\text{lo}\right.$$

✓ **Maple** : cpu = 0.441 (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 = 0.271602 (sec), leaf count = 37

$$\left\{\left\{y(x) \to \frac{1}{12}\left(-4x^2 + 9\log^2(x+1) - 18c_1\log(x+1) + 9{c_1}^2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.631 (sec), leaf count = 23

$$\left\{\_C1 + \frac{3\,\ln\left(1 + x\right)}{2} - \sqrt{x^2 + 3\,y\left(x\right)} = 0\right\}$$

2.655 ODE No. 655

$$y'(x) = \frac{e^{-4x/3}y(x)^3}{e^{-2x/3}y(x)+1}$$

✓ **Mathematica** : cpu = 15.3076 (sec), leaf count = 82

$$\text{Solve}\left[\frac{3}{2}\log(y(x)) + \frac{1}{28}\left(-21\log\left(-3y(x)^2 + 2e^{2x/3}y(x) + 2e^{4x/3}\right) + 6\sqrt{7}\tanh^{-1}\left(\frac{y(x)+2e^{2x/3}}{\sqrt{7}y(x)}\right) + 28x\right) = c_1$$

✓ **Maple** : cpu = 2.632 (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 = 0.0891143 (sec), leaf count = 20

$$\left\{\left\{y(x) \to e^{\frac{x^3}{2}+3c_1x}\right\}\right\}$$

✓ **Maple** : cpu = 0.222 (sec), leaf count = 15

$$\left\{y(x) = e^{\frac{x^3}{2}}e^{\_C1\,x}\right\}$$

2.657 ODE No. 657

$$y'(x) = x^2\sqrt{x^2+8y(x)-2x+1} - \frac{x}{4} + \frac{1}{4}$$

✓ **Mathematica** : cpu = 0.245205 (sec), leaf count = 37

$$\left\{\left\{y(x) \to \frac{1}{72}\left(16x^6 - 9x^2 - 96c_1x^3 + 18x - 9 + 144{c_1}^2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.39 (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 = 0.408618 (sec), leaf count = 41

$$\left\{\left\{y(x) \to \frac{1}{8}\left(-x^2 + 2x + 16\log^2(x+1) - 32c_1\log(x+1) - 1 + 16c_1{}^2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.616 (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 = 0.678838 (sec), leaf count = 164

$$\text{Solve}\left[-\frac{\sqrt{a^2x^2 + 2abx + 4ay(x) + b^2 - 4c}}{2a} - \frac{b\log\left(\sqrt{a^2x^2 + 2abx + 4ay(x) + b^2 - 4c} + ax + b\right)}{2a} + \frac{b\tanh^{-1}\left(\frac{}{2a\cdots}\right.}{}\right.$$

✓ **Maple** : cpu = 0.672 (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 = 0.39385 (sec), leaf count = 109

$$\text{Solve}\left[-\frac{1}{2}\sqrt{a^2 + 2ax + x^2 + 4y(x)} - \frac{1}{2}a\log\left(\sqrt{a^2 + 2ax + x^2 + 4y(x)} + a + x\right) + \frac{1}{2}a\tanh^{-1}\left(\frac{2a + 2a\cdots}{2\sqrt{a^2 + 2ax + x\cdots}}\right.\right.$$

✓ **Maple** : cpu = 0.46 (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 = 0.632958 (sec), leaf count = 164

$$\text{Solve}\left[-\frac{\sqrt{a^2x^2 + 2abx + 4ay(x) + b^2 - 4c}}{2a} - \frac{b\log\left(\sqrt{a^2x^2 + 2abx + 4ay(x) + b^2 - 4c} + ax + b\right)}{2a} + \frac{b\tanh^{-1}\left(\frac{\ldots}{2a}\right.}{\ldots}\right.$$

✓ **Maple** : cpu = 0.492 (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 = 0.246718 (sec), leaf count = 37

$$\left\{\left\{y(x) \to \frac{1}{36}\left(-4x^6 + 9x^2 + 24c_1x^3 + 18x + 9 - 36{c_1}^2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.485 (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 = 1.52554 (sec), leaf count = 101

$$\left\{\left\{y(x) \to -\frac{\sqrt{-4096a^6x^6 + 128a^3e^{c_1}x^3 + 147456a^7x - e^{2c_1}}}{192a^3}\right\}, \left\{y(x) \to \frac{\sqrt{-4096a^6x^6 + 128a^3e^{c_1}x^3 + 147456a\ldots}}{192a^3}\right.\right.$$

✓ **Maple** : cpu = 0.251 (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 = 0.543652 (sec), leaf count = 94

$$\text{Solve}\left[-\frac{1}{2}\sqrt{x^2+4y(x)-4x} + \log\left(-\sqrt{x^2+4y(x)-4x} - x + 2\right) - \tanh^{-1}\left(\frac{2x-4}{2\sqrt{x^2+4y(x)-4x}}\right) + \frac{x^3}{3} - \frac{1}{2}\text{lo}$$

✓ **Maple** : cpu = 0.393 (sec), leaf count = 25

$$\left\{\_C1 + \frac{2\,x^3}{3} - \sqrt{x^2-4\,x+4\,y\left(x\right)} = 0\right\}$$

2.665 ODE No. 665

$$y'(x) = -\frac{\sqrt{a}\left(-2\sqrt{ax^4+8y(x)} + \sqrt{a}x^4 + \sqrt{a}x^3\right)}{2(x+1)}$$

✓ **Mathematica** : cpu = 0.436083 (sec), leaf count = 41

$$\left\{\left\{y(x) \to \frac{1}{8}\left(-ax^4 + 16a\log^2(x+1) - 32ac_1\log(x+1) + 16ac_1{}^2\right)\right\}\right\}$$

✓ **Maple** : cpu = 1.067 (sec), leaf count = 28

$$\left\{-\frac{1}{4}\sqrt{ax^4+8\,y\left(x\right)}\frac{1}{\sqrt{a}} + \ln\left(1+x\right) - \_C1 = 0\right\}$$

2.666 ODE No. 666

$$y'(x) = y(x)\left(x^3+x^2-\log(y(x))+1\right)$$

✓ **Mathematica** : cpu = 0.140827 (sec), leaf count = 29

$$\left\{\left\{y(x) \to e^{x^3-2x^2+4x-c_1e^{-x}-3}\right\}\right\}$$

✓ **Maple** : cpu = 0.821 (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 = 0.908295 (sec), leaf count = 90

$$\text{Solve}\left[\frac{\log(y(x))}{b}+\frac{1}{2}\left(-\frac{\log\left(y(x)^2-be^{bx}\left(e^{bx}+y(x)\right)\right)}{b}+\frac{2\tanh^{-1}\left(\frac{\sqrt{\frac{b}{b+4}}\left(2e^{bx}+y(x)\right)}{y(x)}\right)}{\sqrt{b}\sqrt{b+4}}+2x\right)=c_1,y(x)\right]$$

✓ **Maple** : cpu = 0.709 (sec), leaf count = 82

$$\left\{bx-bArtanh\left(\left(-2\,y(x)\,\mathrm{e}^{-bx}+b\right)\frac{1}{\sqrt{b^2+4\,b}}\right)\frac{1}{\sqrt{b^2+4\,b}}-\frac{\ln\left(-by(x)\,\mathrm{e}^{-bx}+(y(x))^2\left(\mathrm{e}^{-bx}\right)^2-b\right)}{2}+\ln\left(y(x)\,\mathrm{e}^{-}\right.\right.$$

2.668 ODE No. 668

$$y'(x) = \frac{e^{-2x}y(x)^3}{e^{-x}y(x)+1}$$

✓ **Mathematica** : cpu = 0.577433 (sec), leaf count = 78

$$\text{Solve}\left[\log(y(x))+y(x)^2\left(\frac{x}{y(x)^2}-\frac{\log\left(-y(x)^2+e^xy(x)+e^{2x}\right)}{2y(x)^2}+\frac{\tanh^{-1}\left(\frac{y(x)+2e^x}{\sqrt{5}y(x)}\right)}{\sqrt{5}y(x)^2}\right)=c_1,y(x)\right]$$

✓ **Maple** : cpu = 1.809 (sec), leaf count = 58

$$\left\{y(x)=\mathrm{e}^{RootOf\left(2\sqrt{5}Artanh\left(1/5\,\frac{\left(-2\,\mathrm{e}^{\_Z}+\mathrm{e}^{x}\right)\sqrt{5}}{\mathrm{e}^{x}}\right)+5\,\ln\left(-\left(\mathrm{e}^{x}\right)^2-\mathrm{e}^{x+\_Z}+\left(\mathrm{e}^{\_Z}\right)^2\right)+10\_C1-10\_Z-10\,x\right)}\right\}$$

2.669 ODE No. 669

$$y'(x) = \frac{e^x \left(3e^x - 2y(x)^{3/2}\right)^2}{4\sqrt{y(x)}}$$

✓ **Mathematica** : cpu = 0.710669 (sec), leaf count = 264

$$\left\{\left\{y(x) \to \frac{\left(-2e^{3e^x} + 3e^{x+3e^x} + 3e^{x+3c_1} + 2e^{3c_1}\right)^{2/3}}{\sqrt[3]{4e^{6e^x} + 8e^{3e^x+3c_1} + 4e^{6c_1}}}\right\}, \left\{y(x) \to -\frac{\sqrt[3]{-1}\left(-2e^{3e^x} + 3e^{x+3e^x} + 3e^{x+3c_1} + 2e^{3c_1}\right)^{2/}}{\sqrt[3]{4e^{6e^x} + 8e^{3e^x+3c_1} + 4e^{6c_1}}}\right.\right.$$

✓ **Maple** : cpu = 0.505 (sec), leaf count = 72

$$\left\{\_C1 + e^{-\frac{3e^x}{2} - \frac{9e^{2x}}{8}}\left(2(y(x))^{3/2}e^x - 2e^x - 3e^{2x}\right)\left(e^{\frac{3e^x}{2} - \frac{9e^{2x}}{8}}\right)^{-1}\left(2(y(x))^{3/2}e^x + 2e^x - 3e^{2x}\right)^{-1} = 0\right\}$$

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 = 0.484256 (sec), leaf count = 62

$$\left\{\left\{y(x) \to \exp\left(\frac{1}{4}\left(-4\log(a) - W\left(ie^{-x^2-1-4c_1}\right)^2 - 2W\left(ie^{-x^2-1-4c_1}\right) + x^2 - 1\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.467 (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 = 0.346985 (sec), leaf count = 192

$$\left\{\left\{y(x) \to -\frac{\sqrt{-\frac{2}{x} + \sqrt{2}e^{\frac{2\sqrt{2}(1+c_1x)}{x}} - \frac{2e^{\frac{2\sqrt{2}(1+c_1x)}{x}}}{x} - \sqrt{2}}}{\sqrt{2 + 2e^{\frac{2\sqrt{2}(1+c_1x)}{x}}}}\right\}, \left\{y(x) \to \frac{\sqrt{-\frac{2}{x} + \sqrt{2}e^{\frac{2\sqrt{2}(1+c_1x)}{x}} - \frac{2e^{\frac{2\sqrt{2}(1+c_1x)}{x}}}{x} - \sqrt{2}}}{\sqrt{2 + 2e^{\frac{2\sqrt{2}(1+c_1x)}{x}}}}\right.\right.$$

✓ **Maple** : cpu = 0.298 (sec), leaf count = 237

$$\left\{y(x)=-\frac{\sqrt{2}}{2\,x}\sqrt{-x\left(\_C1\ \left(\sqrt{2}x+2\right)\mathrm{e}^{\frac{-1-\sqrt{2}x}{x^2}}+\left(2-\sqrt{2}x\right)\mathrm{e}^{\frac{-1+\sqrt{2}x}{x^2}}\right)\left(\_C1\,\mathrm{e}^{\frac{-1-\sqrt{2}x}{x^2}}+\mathrm{e}^{\frac{-1+\sqrt{2}x}{x^2}}\right)}\left(\_C1\,\mathrm{e}^{\frac{-1-\sqrt{}}{x^2}}\right.\right.$$

2.672 ODE No. 672

$$y'(x)=\frac{x^2\left(\sqrt{4y(x)^3-9x^4}+3x\right)}{y(x)^2}$$

✓ **Mathematica** : cpu = 1.90354 (sec), leaf count = 4512

$$\text{Solve}\left[\int_1^x\left(-\frac{24\sqrt{4y(x)^3-9K[1]^4}y(x)^9}{(9K[1]^4-4y(x)^3)\,(4y(x)^9-729)}+\frac{16K[1]^2\sqrt{4y(x)^3-9K[1]^4}y(x)^9}{(4K[1]^6+9K[1]^4+16K[1]^3-4y(x)^3+16)\,(4y(x)^9-729)}+\right.\right.$$

✓ **Maple** : cpu = 0.327 (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 = 0.293364 (sec), leaf count = 23

$$\left\{\left\{y(x)\to\tan^{-1}\left(\frac{2x^3+3c_1}{6x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.45 (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 = 0.58605 (sec), leaf count = 91

$$\text{Solve}\left[-\frac{1}{2}\sqrt{x^2+4y(x)-4x} + \log\left(-\sqrt{x^2+4y(x)-4x} - x + 2\right) - \tanh^{-1}\left(\frac{2x-4}{2\sqrt{x^2+4y(x)-4x}}\right) - \frac{1}{2}\log(2 -$$

✓ **Maple** : cpu = 0.637 (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 = 0.316757 (sec), leaf count = 48

$$\left\{\left\{y(x) \to \sqrt{a}x \tanh\left(\frac{1}{6}\sqrt{a}(2x^3 + 3x^2 + 6e^x x - 6e^x + 6c_1)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.232 (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

$$y'(x) = \frac{x^6\sqrt{4x^2y(x)+1} + \frac{x}{2} + \frac{1}{2}}{x^3(x+1)}$$

✓ **Mathematica** : cpu = 0.433268 (sec), leaf count = 144

$$\left\{\left\{y(x) \to \frac{9x^{10} - 24x^9 + 52x^8 - 120x^7 + 132x^6 - 144x^5 + 144x^4 + 144x^2\log^2(x+1) + 72x^6\log(x+1) - 96x^5}{}\right.\right.$$

✓ **Maple** : cpu = 0.763 (sec), leaf count = 43

$$\left\{\_C1 + 2\ln(1+x) - \frac{1}{x}\sqrt{4x^2y(x)+1} - 2x + x^2 - \frac{2x^3}{3} + \frac{x^4}{2} = 0\right\}$$

2.677 ODE No. 677

$$y'(x) = \frac{ax^4 + ax^3 + ax^3 \log(x+1) - x^2y(x)^2 - xy(x)^2 + y(x) - xy(x)^2 \log(x+1)}{x}$$

✓ **Mathematica** : cpu = 0.172582 (sec), leaf count = 80

$$\left\{\left\{y(x) \to \sqrt{a}x \tanh\left(\frac{1}{12}(4\sqrt{a}x^3 + 3\sqrt{a}x^2 + 6\sqrt{a}x^2 \log(x+1) + 6\sqrt{a}x - 6\sqrt{a}\log(x+1) + 12\sqrt{a}c_1)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.25 (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 = 0.288318 (sec), leaf count = 101

$$\left\{\left\{y(x) \to \frac{1}{24}(-4x^6 + 12x^5 - 33x^4 + 40x^3 - 36x^2 + 24x^3 \log(x+1) - 36x^2 \log(x+1) + 24c_1x^3 - 36c_1x^2 - 36\mathrm{l}\right.\right.$$

✓ **Maple** : cpu = 0.656 (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

$$y'(x) = \frac{7x^2y(x)^2 + x^4 + x^3 + x^3\log(x) + 7xy(x)^2 + y(x) + 7xy(x)^2\log(x)}{x}$$

✓ **Mathematica** : cpu = 0.145972 (sec), leaf count = 59

$$\left\{\left\{y(x) \to \frac{x\tan\left(\frac{1}{12}(4\sqrt{7}x^3 + 3\sqrt{7}x^2 + 6\sqrt{7}x^2\log(x) + 12\sqrt{7}c_1)\right)}{\sqrt{7}}\right\}\right\}$$

✓ **Maple** : cpu = 0.201 (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 = 0.713266 (sec), leaf count = 89

$$\text{Solve}\left[\frac{1}{2}\left(\sqrt{x^2 - 4y(x) + 2x + 1} + \log\left(\sqrt{x^2 - 4y(x) + 2x + 1} + x + 1\right) - \tanh^{-1}\left(\frac{2x + 2}{2\sqrt{x^2 - 4y(x) + 2x + 1}}\right) +\right.\right.$$

✓ **Maple** : cpu = 0.615 (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 = 0.195383 (sec), leaf count = 84

$$\left\{\left\{y(x) \to \frac{\sqrt{b}x\tan\left(\frac{1}{12}\left(4\sqrt{a}\sqrt{b}x^3 + 9\sqrt{a}\sqrt{b}x^2 - 6\sqrt{a}\sqrt{b}x^2\log(x) + 12\sqrt{a}\sqrt{b}c_1\right)\right)}{\sqrt{a}}\right\}\right\}$$

✓ **Maple** : cpu = 0.258 (sec), leaf count = 45

$$\left\{y(x) = \frac{x}{a}\tan\left(\frac{4x^3 + 6\ln\left(x^{-1}\right)x^2 + 9x^2 + 12\_C1}{12}\sqrt{ab}\right)\sqrt{ab}\right\}$$

2.682 ODE No. 682

$$y'(x) = \frac{2a}{x\left(-8a^2 + 2axy(x)^2 - xy(x)\right)}$$

✓ **Mathematica** : cpu = 0.232475 (sec), leaf count = 39

$$\text{Solve}\left[\frac{y(x)^2e^{-4ay(x)}}{8a} - \frac{e^{-4ay(x)}}{2x} = c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.367 (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 = 1.0741 (sec), leaf count = 84

$$\left\{\left\{y(x) \to \frac{e^{\frac{2x^3}{9}+\frac{x}{3}}}{e^{\frac{x^2}{6}+\frac{1}{18}(4x^2-3x+6)x}x + c_1 e^{\frac{x^2}{6}}x\sqrt[3]{x+1}(x(x+1))^{\frac{x^3}{3}}}\right\}\right\}$$

✓ **Maple** : cpu = 0.368 (sec), leaf count = 114

$$\Bigg\{y(x) = \Big(\left(x(1+x)\right)^{\frac{x^3}{3}}\Big)^{-1}\Big(\sqrt[3]{1+x}\mathrm{e}^{-\frac{2x^3}{9}+\frac{x^2}{6}-\frac{x}{3}}\_C1\, x + x^{1-\frac{x^3}{3}}(1+x)^{-\frac{x^3}{3}}\,\mathrm{e}^{\frac{i}{6}x^3(csgn(i+ix)-csgn(ix(1+x)))(-csgn(ix(}$$

2.684 ODE No. 684

$$y'(x) = \frac{x^2\sqrt{x^2+y(x)^2}+y(x)}{x}$$

✓ **Mathematica** : cpu = 0.100942 (sec), leaf count = 20

$$\left\{\left\{y(x) \to x\sinh\left(\frac{1}{2}(x^2+2c_1)\right)\right\}\right\}$$

✓ **Maple** : cpu = 6.488 (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 = 0.136537 (sec), leaf count = 87

$$\left\{\left\{y(x) \to \frac{x\tan\left(\frac{1}{2}\left(-\sqrt{7}x^2+\sqrt{7}x^2\log(x-1)+\sqrt{7}x^2\log(x+1)-\sqrt{7}\log(1-x)-\sqrt{7}\log(x+1)+2\sqrt{7}c_1\right)\right)}{\sqrt{7}}\right\}\right\}$$

✓ **Maple** : cpu = 0.289 (sec), leaf count = 48

$$\left\{y(x) = \frac{x\sqrt{7}}{7}\tan\left(\frac{\left(x^2\ln((1+x)(x-1)) - x^2 - \ln((1+x)(x-1)) + 2\_C1 + 1\right)\sqrt{7}}{2}\right)\right\}$$

2.686 ODE No. 686

$$y'(x) = \frac{e^{2x^2} x y(x)^3}{e^{x^2} y(x) + 1}$$

✓ **Mathematica** : cpu = 11.7599 (sec), leaf count = 68

$$\text{Solve}\left[\log(y(x)) - 2y(x)^2\left(\frac{\log\left(e^{2x^2}y(x)^2 + 2e^{x^2}y(x) + 2\right)}{4y(x)^2} - \frac{\tan^{-1}\left(e^{x^2}y(x)+1\right)}{2y(x)^2}\right) = c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.301 (sec), leaf count = 85

$$\left\{y(x) = \frac{1}{e^{x^2}}\left(-\tan\left(RootOf\left(-2\,x^2 - \ln\left(\frac{81\,(\tan(\_Z))^2}{10} + \frac{81}{10}\right) + 2\,\ln(9/2\,\tan(\_Z) - 9/2) + 6\_C1 - 2\_Z\right.\right.\right.\right.$$

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 = 0.152831 (sec), leaf count = 130

$$\left\{\left\{y(x) \to \frac{-x^2(x-1)^{x^2} - x(x-1)^{x^2} - x^2(x+1)^{x^2}e^{2x+2c_1} + x(x+1)^{x^2}e^{2x+2c_1}}{-x(x-1)^{x^2} - (x-1)^{x^2} - (x+1)^{x^2}e^{2x+2c_1} + x(x+1)^{x^2}e^{2x+2c_1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.303 (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 = 0.351181 (sec), leaf count = 82

$$\left\{\left\{y(x) \to x\tan\left(\frac{1}{2}\left(-8e\text{Ei}\left(\frac{2}{x-1}\right) + e^{\frac{x}{x-1}+\frac{1}{x-1}}x^2 + 2e^{\frac{x}{x-1}+\frac{1}{x-1}}x - 3e^{\frac{x}{x-1}+\frac{1}{x-1}} + 2c_1\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.22 (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 = 0.328563 (sec), leaf count = 60

$$\left\{\left\{y(x) \to -\frac{x\left(-1+e^{2e^2\text{Ei}(x-1)+2e^{x+1}+2c_1}\right)}{1+e^{2e^2\text{Ei}(x-1)+2e^{x+1}+2c_1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.184 (sec), leaf count = 25

$$\{y(x) = -\tanh\left(e^{1+x} - e^2 Ei(1, 1-x) + \_C1\right) x\}$$

2.690 ODE No. 690

$$y'(x) = \frac{x^3\sqrt{x^2+8y(x)-2x+1} - \frac{x^2}{4} + \frac{1}{4}}{x+1}$$

✓ **Mathematica** : cpu = 0.515458 (sec), leaf count = 105

$$\left\{\left\{y(x) \to \frac{1}{72}(16x^6 - 48x^5 + 132x^4 - 144x^3 + 135x^2 - 96x^3\log(x+1) + 144x^2\log(x+1) - 96c_1x^3 + 144c_1x^2 -$$

✓ **Maple** : cpu = 0.657 (sec), leaf count = 40

$$\left\{\_C1 + \frac{4x^3}{3} - 2x^2 + 4x - 4\ln(1+x) - \sqrt{x^2-2x+1+8y(x)} = 0\right\}$$

2.691 ODE No. 691

$$y'(x) = \frac{\frac{1}{2}x^3\cos(2y(x)) + \frac{x^3}{2} - \frac{1}{2}\sin(2y(x))}{x}$$

✓ **Mathematica** : cpu = 0.287078 (sec), leaf count = 21

$$\left\{\left\{y(x) \to \tan^{-1}\left(\frac{x^4+2c_1}{4x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.636 (sec), leaf count = 17

$$\left\{y(x) = \arctan\left(\frac{x^4+8\_C1}{4x}\right)\right\}$$

2.692 ODE No. 692

$$y'(x) = \frac{x^3\sqrt{x^2 + y(x)^2} + y(x)}{x}$$

✓ **Mathematica** : cpu = 0.10053 (sec), leaf count = 20

$$\left\{\left\{y(x) \to x \sinh\left(\frac{1}{3}(x^3 + 3c_1)\right)\right\}\right\}$$

✓ **Maple** : cpu = 5.813 (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 = 0.302615 (sec), leaf count = 146

$$\text{Solve}\left[-\frac{1}{3}(9b + 29)^{2/3}\text{RootSum}\left[\#1^3(9b + 29)^{2/3} - 9\#1b - 3\#1 + (9b + 29)^{2/3}\&, \frac{\log\left(\frac{3e^{-2bx}y(x) + e^{-bx}}{\sqrt[3]{(9b+29)e^{-3bx}}} - \#1\right)}{\#1^2\left(-(9b + 29)^{2/3}\right) + 3b + 1}\right.\right.$$

✓ **Maple** : cpu = 0.338 (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 = 0.40609 (sec), leaf count = 66

$$\left\{\left\{y(x) \to \frac{4x^4 + 4x^2\log^2(x + 1) - 8x^3\log(x + 1) - 8c_1x^3 + 4c_1{}^2x^2 + 8c_1x^2\log(x + 1) - 1}{4x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.688 (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

$$y'(x) = \frac{x^2y(x)^2 + x^4 + x^3 + xy(x)^2 + y(x)\log(x-1)}{x\log(x-1)}$$

✓ **Mathematica** : cpu = 0.211626 (sec), leaf count = 34

$$\{\{y(x) \to x\tan(2\text{Ei}(\log(x-1)) + 3\text{Ei}(2\log(x-1)) + \text{Ei}(3\log(x-1)) + c_1)\}\}$$

✓ **Maple** : cpu = 0.162 (sec), leaf count = 39

$$\{y(x) = \tan(-Ei(1, -3\ln(x-1)) - 3\,Ei(1, -2\ln(x-1)) - 2\,Ei(1, -\ln(x-1)) + \_C1)\,x\}$$

2.696 ODE No. 696

$$y'(x) = \frac{e^{x+1}x^3 + 7e^{x+1}xy(x)^2 + y(x)\log(x-1)}{x\log(x-1)}$$

✓ **Mathematica** : cpu = 0.910149 (sec), leaf count = 51

$$\left\{\left\{y(x) \to \frac{x\tan\left(\sqrt{7}\int_1^x \frac{e^{K[1]+1}K[1]}{\log(K[1]-1)}dK[1] + \sqrt{7}c_1\right)}{\sqrt{7}}\right\}\right\}$$

✓ **Maple** : cpu = 0.275 (sec), leaf count = 32

$$\left\{y(x) = \frac{x\sqrt{7}}{7}\tan\left(\left(\mathrm{e}\int \frac{xe^x}{\ln(x-1)}\,\mathrm{d}x + \_C1\right)\sqrt{7}\right)\right\}$$

2.697 ODE No. 697

$$y'(x) = e^{2x/3}\left(e^{-2x}y(x)^3 + e^{-4x/3}y(x)^2 + 1\right)$$

✓ **Mathematica** : cpu = 0.259811 (sec), leaf count = 114

$$\text{Solve}\left[-\frac{35}{3}\text{RootSum}\left[-35\#1^3 + 9\sqrt[3]{35}\#1 - 35\&, \frac{\log\left(\frac{3e^{-4x/3}y(x)+e^{-2x/3}}{\sqrt[3]{35}\sqrt[3]{e^{-2x}}} - \#1\right)}{3\sqrt[3]{35} - 35\#1^2}\&\right] = \frac{1}{9}35^{2/3}e^{4x/3}\left(e^{-2x}\right)^{2/3}x +$$

✓ **Maple** : cpu = 0.28 (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 = 0.252682 (sec), leaf count = 108

$$\text{Solve}\left[-\frac{19}{3}\text{RootSum}\left[-19\#1^3 + 6\sqrt[3]{38}\#1 - 19\&, \frac{\log\left(\frac{3e^{-2x}y(x)+e^{-x}}{\sqrt[3]{38}\sqrt[3]{e^{-3x}}} - \#1\right)}{2\sqrt[3]{38} - 19\#1^2}\&\right] = \frac{1}{9}38^{2/3} e^{2x} \left(e^{-3x}\right)^{2/3} x + c_1, y(x$$

✓ **Maple** : cpu = 0.265 (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 = 0.336921 (sec), leaf count = 101

$$\left\{\left\{y(x) \to \frac{1}{48}(4x^6 - 12x^5 + 33x^4 - 36x^3 + 20x^2 - 24x^3 \log(x+1) + 36x^2 \log(x+1) - 24c_1x^3 + 36c_1x^2 + 36 \log$$

✓ **Maple** : cpu = 0.66 (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 = 0.145556 (sec), leaf count = 76

$$\left\{\left\{y(x) \to -\frac{\sqrt{2xW\left(c_1 e^{\frac{1}{2x}-\frac{1}{2}}\right) + x - 1}}{\sqrt{x}}\right\}, \left\{y(x) \to \frac{\sqrt{2xW\left(c_1 e^{\frac{1}{2x}-\frac{1}{2}}\right) + x - 1}}{\sqrt{x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.205 (sec), leaf count = 62

$$\left\{y(x)=\frac{1}{x}\sqrt{x\left(2\,\mathit{lambertW}\left(1/2\_C1\,\mathrm{e}^{-1/2\,\frac{x-1}{x}}\right)x+x-1\right)},y(x)=-\frac{1}{x}\sqrt{x\left(2\,\mathit{lambertW}\left(1/2\_C1\,\mathrm{e}^{-1/2\,\frac{x-1}{x}}\right)\right.}\right.$$

2.701 ODE No. 701

$$y'(x)=\frac{-2x^2y(x)-2x^2y(x)\log(x)+x^4+x^4\log(x)+y(x)^2+y(x)^2\log(x)+2e^xx-2x-\log(x)-1}{e^x-1}$$

✓ **Mathematica** : cpu = 1.81287 (sec), leaf count = 88

$$\left\{\left\{y(x)\to\frac{\exp\left(\int_1^x\frac{2(\log(K[5])+1)}{-1+e^{K[5]}}dK[5]\right)}{-\int_1^x\frac{\exp\left(\int_1^{K[6]}\frac{2(\log(K[5])+1)}{-1+e^{K[5]}}dK[5]\right)(\log(K[6])+1)}{-1+e^{K[6]}}dK[6]+c_1}+x^2+1\right\}\right\}$$

✓ **Maple** : cpu = 8.244 (sec), leaf count = 71

$$\left\{y(x)=\left(-x^2\left(\mathrm{e}^{\int\frac{\ln(x)+1}{\mathrm{e}^x-1}\,\mathrm{d}x}\right)^2+\_C1\,x^2+\left(\mathrm{e}^{\int\frac{\ln(x)+1}{\mathrm{e}^x-1}\,\mathrm{d}x}\right)^2+\_C1\right)\left(-\left(\mathrm{e}^{\int\frac{\ln(x)+1}{\mathrm{e}^x-1}\,\mathrm{d}x}\right)^2+\_C1\right)^{-1}\right\}$$

2.702 ODE No. 702

$$y'(x)=\frac{-x^3+x^3(-\log(x))-xy(x)^2+xy(x)-e^xy(x)-xy(x)^2\log(x)}{x\left(x-e^x\right)}$$

✓ **Mathematica** : cpu = 2.52406 (sec), leaf count = 37

$$\left\{\left\{y(x)\to x\tan\left(\int_1^x\frac{K[1](\log(K[1])+1)}{e^{K[1]}-K[1]}dK[1]+c_1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.24 (sec), leaf count = 35

$$\left\{y(x)=\tan\left(\int\frac{x\ln(x)}{\mathrm{e}^x-x}\,\mathrm{d}x+\int\frac{x}{\mathrm{e}^x-x}\,\mathrm{d}x+\_C1\right)x\right\}$$

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 = 0.439658 (sec), leaf count = 101

$$\left\{\left\{y(x)\to-\frac{e^{-\text{Li}_2(x)-x}(1-x)^{-\log(x)}}{(x-1)x\left(-\int_1^x\frac{\exp(-K[1]-\log(1-K[1])(\log(K[1])+1)-\text{Li}_2(K[1]))(K[1]^3+\log(K[1])K[1]^2)}{(K[1]-1)K[1]^2}dK[1]+c_1\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.612 (sec), leaf count = 44

$$\left\{y(x)=\frac{e^{dilog(x)}}{xe^x(x-1)}\left(\int-\frac{e^{dilog(x)}(x+\ln(x))}{e^x(x-1)^2}\,dx+\_C1\right)^{-1}\right\}$$

2.704 ODE No. 704

$$y'(x)=\frac{2ax^3y(x)^2+2bx^5-y(x)+xy(x)\log(x)}{x(x\log(x)-1)}$$

✓ **Mathematica** : cpu = 8.18556 (sec), leaf count = 66

$$\left\{\left\{y(x)\to\frac{\sqrt{b}x\tan\left(\sqrt{a}\sqrt{b}\int_1^x\frac{2K[1]^3}{K[1]\log(K[1])-1}dK[1]+\sqrt{a}\sqrt{b}c_1\right)}{\sqrt{a}}\right\}\right\}$$

✓ **Maple** : cpu = 0.283 (sec), leaf count = 38

$$\left\{y(x)=\frac{x}{a}\tan\left(2\sqrt{ab}\left(\_C1+\int\frac{x^3}{x\ln(x)-1}\,dx\right)\right)\sqrt{ab}\right\}$$

2.705 ODE No. 705

$$y'(x)=\frac{y(x)\left(x^4+x^3+\log(y(x))+x\right)}{x}$$

✓ **Mathematica** : cpu = 0.138333 (sec), leaf count = 30

$$\left\{\left\{y(x)\to x^xe^{\frac{x^4}{3}+\frac{x^3}{2}+c_1x}\right\}\right\}$$

✓ **Maple** : cpu = 0.767 (sec), leaf count = 24

$$\left\{y(x)=e^{\frac{x^4}{3}}e^{\frac{x^3}{2}}e^{\_C1\,x}x^x\right\}$$

2.706 ODE No. 706

$$y'(x) = -\frac{1}{8}x(y(x)+1)^2(-\log(y(x)-1)+\log(y(x)+1)+2\log(x))$$

✓ **Mathematica** : cpu = 36.171 (sec), leaf count = 610

$$\text{Solve}\left[\int_1^{y(x)}\left(\frac{-2\log(x)x^2+\log(K[2]-1)x^2-\log(K[2]+1)x^2-8}{2\left(2\log(x)x^2-\log(K[2]-1)x^2+\log(K[2]+1)x^2+K[2]\left(2\log(x)x^2-\log(K[2]-1)x^2+\log(K[\right.\right.}\right.\right.$$

✓ **Maple** : cpu = 1.133 (sec), leaf count = 65

$$\left\{\int_{\_b}^{y(x)}\frac{1}{2\_a+2}\left(-\frac{x^2(\_a+1)\ln(\_a-1)}{2}+\frac{x^2(\_a+1)\ln(\_a+1)}{2}+x^2(\_a+1)\ln(x)+4\_a-4\right)^{-1}\mathrm{d}\_a+\right.$$

2.707 ODE No. 707

$$y'(x) = \frac{1}{16}x(y(x)+1)^2(-\log(y(x)-1)+\log(y(x)+1)+2\log(x))^2$$

✓ **Mathematica** : cpu = 4.90978 (sec), leaf count = 1391

$$\text{Solve}\left[\int_1^x-\frac{}{4\log^2(K[1])K[1]^2+\log^2(y(x)-1)K[1]^2+\log^2(y(x)+1)K[1]^2-4\log(K[1])\log(y(x)-1)K[1]^2+4\right.$$

✓ **Maple** : cpu = 0.988 (sec), leaf count = 105

$$\left\{\int_{\_b}^{y(x)}\frac{1}{4\_a+4}\left(\frac{x^2(\_a+1)(\ln(\_a+1))^2}{4}+x^2\left(-\frac{\ln(\_a-1)}{2}+\ln(x)\right)(\_a+1)\ln(\_a+1)+\frac{x^2(\_a+1)(\ln}{4}\right.\right.$$

2.708 ODE No. 708

$$y'(x) = \frac{(4ax-y(x)^2)^3}{y(x)(4ax-y(x)^2-1)}$$

✓ **Mathematica** : cpu = 0.346828 (sec), leaf count = 89

$$\text{Solve}\left[2a\left(x-\frac{\text{RootSum}\left[-\#1^3+2\#1a-2a\&,\frac{\#1a\log(-\#1+4ax-y(x)^2)-a\log(-\#1+4ax-y(x)^2)}{2a-3\#1^2}\&\right]}{2a}\right)=c_1,y(x)\right]$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , exception

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time expired
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2.709 ODE No. 709

$$y'(x) = \frac{x^3\sqrt{4ax - y(x)^2} + 2ax + 2a}{(x+1)y(x)}$$

✓ **Mathematica** : cpu = 2.77013 (sec), leaf count = 217

$$\left\{\left\{y(x) \to -\frac{1}{6}\sqrt{144ax - 4x^6 + 12x^5 - 33x^4 + 36x^3 - 36x^2 + 24x^3\log(x+1) - 36x^2\log(x+1) - 24c_1x^3 + 36c_1\right.\right.$$

✓ **Maple** : cpu = 0.358 (sec), leaf count = 39

$$\left\{-\sqrt{-\left(y\left(x\right)\right)^2 + 4\,ax} - \frac{x^3}{3} + \frac{x^2}{2} - x + \ln\left(1+x\right) - \_C1 = 0\right\}$$

2.710 ODE No. 710

$$y'(x) = \frac{4x^2y(x) + 2x^3 + 2xy(x)^2 + 2x + e^{\frac{1}{x}} - \log(x)}{\log(x) - e^{\frac{1}{x}}}$$

✓ **Mathematica** : cpu = 1.15704 (sec), leaf count = 38

$$\left\{\left\{y(x) \to -x + \tan\left(\int_1^x -\frac{2K[5]}{e^{\frac{1}{K[5]}} - \log(K[5])}dK[5] + c_1\right)\right\}\right\}$$

✓ **Maple** : cpu = 5.291 (sec), leaf count = 31

$$\left\{y(x) = -x + \tan\left(2\_C1 - 2\int -\frac{x}{\ln\left(x\right) - e^{x^{-1}}}\,dx\right)\right\}$$

2.711 ODE No. 711

$$y'(x) = -\frac{y(x)(x\log(y(x)) + \log(y(x)) - 1)}{x+1}$$

✓ **Mathematica** : cpu = 0.185608 (sec), leaf count = 28

$$\left\{\left\{y(x) \to e^{e^{-x-1}\mathrm{Ei}(x+1) + c_1e^{-x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.274 (sec), leaf count = 31

$$\left\{y(x) = e^{\frac{\_C1}{e^x}}\left(e^{\frac{Ei(1,-1-x)}{e^x e}}\right)^{-1}\right\}$$

2.712 ODE No. 712

$$y'(x) = \frac{x^3\sqrt{x^2 - 4y(x) + 2x + 1} + \frac{x^2}{2} + x + \frac{1}{2}}{x + 1}$$

✓ **Mathematica** : cpu = 0.446107 (sec), leaf count = 105

$$\left\{\left\{y(x) \to \frac{1}{36}(-4x^6 + 12x^5 - 33x^4 + 36x^3 - 27x^2 + 24x^3\log(x+1) - 36x^2\log(x+1) + 24c_1x^3 - 36c_1x^2 + 18x\right.\right.$$

✓ **Maple** : cpu = 0.668 (sec), leaf count = 38

$$\left\{\_C1 - \frac{2\,x^3}{3} + x^2 - 2\,x + 2\,\ln(1+x) - \sqrt{x^2 + 2\,x + 1 - 4\,y(x)} = 0\right\}$$

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 = 0.0907574 (sec), leaf count = 649

$$\left\{\left\{y(x) \to -\frac{a\sqrt{x} - a - bx - b}{a} + \frac{1}{a^2\text{Root}\left[-\frac{24\#1^4x^2}{a^4} + \frac{8\#1^3x^{3/2}}{a^6} + \frac{9\#1^2x}{a^8} + \#1^6\left(16x^3 + 16e^{12c_1}\right) - \frac{6\#1\sqrt{x}}{a^{10}} + \frac{1}{a^{12}}\right.}\right.\right.$$

✓ **Maple** : cpu = 0.656 (sec), leaf count = 86

$$\left\{y(x) = \frac{1}{2\,a}\left(3\,\tanh\left(RootOf\left(729\,x^3(\tanh(\_Z))^6\,a^6 - 2187\,x^3(\tanh(\_Z))^4\,a^6 + 2187\,x^3(\tanh(\_Z))^2\,a^6 - 729\right.\right.\right.\right.$$

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 = 1.34968 (sec), leaf count = 162

$$\left\{\left\{y(x) \to \frac{\exp\left(\int_1^x -\frac{-K[1]^2 - \log(K[1])K[1] + e^{K[1]} - \log\left(\frac{1}{K[1]}\right)}{K[1]\left(e^{K[1]} - \log\left(\frac{1}{K[1]}\right)\right)}dK[1]\right)}{-\int_1^x -\frac{\exp\left(\int_1^{K[2]} -\frac{-K[1]^2 - \log(K[1])K[1] + e^{K[1]} - \log\left(\frac{1}{K[1]}\right)}{K[1]\left(e^{K[1]} - \log\left(\frac{1}{K[1]}\right)\right)}dK[1]\right)\left(K[2]^3 + \log(K[2])K[2]^2\right)}{K[2]\left(e^{K[2]} - \log\left(\frac{1}{K[2]}\right)\right)}dK[2] + c_1}\right\}\right\}$$

✓ **Maple** : cpu = 0.362 (sec), leaf count = 96

$$\left\{y(x)=\mathrm{e}^{\int\frac{x\ln(x)+x^2+\ln\left(x^{-1}\right)-\mathrm{e}^x}{\left(-\ln\left(x^{-1}\right)+\mathrm{e}^x\right)x}\mathrm{d}x}\left(\int\frac{x(x+\ln(x))}{-\ln(x^{-1})+\mathrm{e}^x}\mathrm{e}^{\int\frac{x\ln(x)+x^2+\ln\left(x^{-1}\right)-\mathrm{e}^x}{\left(-\ln\left(x^{-1}\right)+\mathrm{e}^x\right)x}\mathrm{d}x}\mathrm{d}x+\_C1\right)^{-1}\right\}$$

2.715 ODE No. 715

$$y'(x)=\frac{x^3\sqrt{x^2+4y(x)-4x}-\frac{x^2}{2}+\frac{x}{2}+1}{x+1}$$

✓ **Mathematica** : cpu = 0.471678 (sec), leaf count = 104

$$\left\{\left\{y(x)\to\frac{1}{36}(4x^6-12x^5+33x^4-36x^3+27x^2-24x^3\log(x+1)+36x^2\log(x+1)-24c_1x^3+36c_1x^2+36x+\right.\right.$$

✓ **Maple** : cpu = 0.686 (sec), leaf count = 39

$$\left\{\_C1+\frac{2x^3}{3}-x^2+2x-2\ln(1+x)-\sqrt{x^2-4x+4y(x)}=0\right\}$$

2.716 ODE No. 716

$$y'(x)=\frac{\sqrt{9x^4-4y(x)^3}+3x^4+3x^3}{(x+1)y(x)^2}$$

✓ **Mathematica** : cpu = 2.69303 (sec), leaf count = 133

$$\left\{\left\{y(x)\to\left(-\frac{3}{2}\right)^{2/3}\sqrt[3]{x^4-4\log^2(x+1)+8c_1\log(x+1)-4c_1{}^2}\right\},\left\{y(x)\to\left(\frac{3}{2}\right)^{2/3}\sqrt[3]{x^4-4\log^2(x+1)+8c\right.\right.$$

✓ **Maple** : cpu = 0.442 (sec), leaf count = 37

$$\left\{\int_{\_b}^{y(x)}\_a^2\frac{1}{\sqrt{9x^4-4\_a^3}}\mathrm{d}\_a-\ln(1+x)-\_C1=0\right\}$$

2.717 ODE No. 717

$$y'(x) = \frac{\sqrt{a^2 + 2ax + x^2 + 4y(x)} - \frac{ax}{2} - \frac{a}{2} - \frac{x^2}{2} - \frac{x}{2}}{x+1}$$

✓ **Mathematica** : cpu = 0.554278 (sec), leaf count = 106

$$\text{Solve}\left[-\frac{1}{2}\sqrt{a^2 + 2ax + x^2 + 4y(x)} - \frac{1}{2}a\log\left(\sqrt{a^2 + 2ax + x^2 + 4y(x)} + a + x\right) + \frac{1}{2}a\tanh^{-1}\left(\frac{2a + 2a}{2\sqrt{a^2 + 2ax + x}}\right.\right.$$

✓ **Maple** : cpu = 0.684 (sec), leaf count = 33

$$\left\{\_C1 + \frac{a}{2} + 2\ln(1+x) - \sqrt{x^2 + 2ax + a^2 + 4y(x)} = 0\right\}$$

2.718 ODE No. 718

$$y'(x) = e^{-x^2}x\left(e^{3x^2}y(x)^3 + e^{2x^2}y(x)^2 + 1\right)$$

✓ **Mathematica** : cpu = 0.270777 (sec), leaf count = 127

$$\text{Solve}\left[\frac{11}{3}\text{RootSum}\left[11\#1^3 + 15\sqrt[3]{11}\#1 + 11\&, \frac{\log\left(\frac{3e^{2x^2}xy(x)+e^{x^2}x}{\sqrt[3]{11}\sqrt[3]{e^{3x^2}x^3}} - \#1\right)}{11\#1^2 + 5\sqrt[3]{11}}\&\right] = \frac{11^{2/3}e^{x^2}x^3}{18\sqrt[3]{e^{3x^2}x^3}} + c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.184 (sec), leaf count = 44

$$\left\{y(x) = \frac{-11\,RootOf\left(-5x^2 + 20250\int^{\_Z}(121\_a^3 + 3375\_a - 3375)^{-1}d\_a + 6\_C1\right) - 15}{45\,e^{x^2}}\right\}$$

2.719 ODE No. 719

$$y'(x) = \frac{e^{-x}y(x)\left(x^2y(x)\log(2x) - e^x - x\log(2x)\right)}{x}$$

✓ **Mathematica** : cpu = 0.364543 (sec), leaf count = 49

$$\left\{\left\{y(x) \to \frac{2^{e^{-x}}x^{e^{-x}-1}}{2^{e^{-x}}x^{e^{-x}} + c_1e^{\text{Ei}(-x)}}\right\}\right\}$$

✓ **Maple** : cpu = 0.338 (sec), leaf count = 34

$$\left\{y(x) = \left(2^{-e^{-x}}x^{-e^{-x}+1}\_C1\,e^{-Ei(1,x)} + x\right)^{-1}\right\}$$

2.720 ODE No. 720

$$y'(x) = \frac{x^3\left(\sqrt{9x^4 - 4y(x)^3} + 3x + 3\right)}{(x+1)y(x)^2}$$

✓ **Mathematica** : cpu = 2.93465 (sec), leaf count = 314

$$\left\{\left\{y(x) \to \sqrt[3]{-x^6 + 3x^5 - 6x^4 + 9x^3 - 9x^2 + 6x^3\log(x+1) - 9x^2\log(x+1) + 6c_1x^3 - 9c_1x^2 - 9\log^2(x+1) +}\right.\right.$$

✓ **Maple** : cpu = 0.264 (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

$$y'(x) = \frac{1}{36}\sqrt{x}\left(-12x^3y(x) + x^6 + 18x^{3/2} + 36y(x)^2\right)$$

✓ **Mathematica** : cpu = 0.106233 (sec), leaf count = 27

$$\left\{\left\{y(x) \to \frac{x^3}{6} + \frac{1}{-\frac{2x^{3/2}}{3} + c_1}\right\}\right\}$$

✓ **Maple** : cpu = 0.127 (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 = 20.5491 (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 = 1.11 (sec), leaf count = 70

$$\left\{y(x) = \mathrm{e}^{RootOf\left(-\mathrm{e}^{\_Z}\ln\left(\frac{\mathrm{e}^{\_Z}+2}{2\,x^4}\right)+3\,\mathrm{e}^{\_Z}\_C1+\_Z\,\mathrm{e}^{\_Z}+2\right)}\left(1+(2\ln(x)-1)\,\mathrm{e}^{RootOf\left(-\mathrm{e}^{\_Z}\ln\left(\frac{\mathrm{e}^{\_Z}+2}{2\,x^4}\right)+3\,\mathrm{e}^{\_Z}\_C1+\_Z\,\mathrm{e}^{\_Z}\right.}\right.\right.$$

2.723 ODE No. 723

$$y'(x) = \frac{2a}{32a^3x^2 - 16a^2xy(x)^2 + 2ay(x)^4 + y(x)}$$

✓ **Mathematica** : cpu = 0.209268 (sec), leaf count = 663

$$\left\{\left\{y(x) \to -\frac{\sqrt[3]{9216a^5c_1x + \sqrt{4\left(-192a^3x - 64a^4c_1{}^2\right)^3 + \left(9216a^5c_1x - 432a^2 - 1024a^6c_1{}^3\right)^2} - 432a^2 - 1024a^6}}{12\sqrt[3]{2}a}\right.\right.$$

✓ **Maple** : cpu = 0.253 (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 = 13.9802 (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 = 0.092 (sec), leaf count = 18

$$\left\{y(x) = \left(-lambertW\left(\_C1\,\mathrm{e}^{-2}x\right) + \ln(x) - 2\right)^{-1}\right\}$$

2.725 ODE No. 725

$$y'(x) = \frac{x^2 \log(2x) + 2xy(x)\log(2x) + y(x)^2 \log(2x) - \log(x) + \log(2x)}{\log(x)}$$

✓ **Mathematica** : cpu = 0.317343 (sec), leaf count = 19

$$\{\{y(x) \to -x + \tan(\log(2)\mathrm{li}(x) + x + c_1)\}\}$$

✓ **Maple** : cpu = 1.03 (sec), leaf count = 25

$$\{y(x) = -x - \tan(\ln(2)\, Ei(1, -\ln(x)) + \_C1 - x)\}$$

2.726 ODE No. 726

$$y'(x) = \frac{a^2 - aby(x) - ab\sqrt{x} - b^2x + bc}{a\left(ay(x) + a\sqrt{x} + bx - c\right)}$$

✓ **Mathematica** : cpu = 0.0593418 (sec), leaf count = 625

$$\left\{\left\{y(x) \to -\frac{a\sqrt{x} + bx - c}{a} + \frac{1}{a^2\mathrm{Root}\left[-\frac{24\#1^4x^2}{a^4} + \frac{8\#1^3x^{3/2}}{a^6} + \frac{9\#1^2x}{a^8} + \#1^6\left(16x^3 + 16e^{12c_1}\right) - \frac{6\#1\sqrt{x}}{a^{10}} + \frac{1}{a^{12}}\&, 1\right]\right.\right.$$

✓ **Maple** : cpu = 0.546 (sec), leaf count = 83

$$\left\{y(x) = \frac{1}{2\,a}\left(3\tanh\left(RootOf\left(-729\,x^3(\tanh(\_Z))^6\,a^6 + 2187\,x^3(\tanh(\_Z))^4\,a^6 - 2187\,x^3(\tanh(\_Z))^2\,a^6 + 7\right.\right.\right.\right.$$

2.727 ODE No. 727

$$y'(x) = \frac{y(x)(y(x) + 2x + 2)}{(x+1)(\log(y(x)) + 2x - 1)}$$

✓ **Mathematica** : cpu = 0.429635 (sec), leaf count = 29

$$\left\{\left\{y(x) \to \frac{W\left(e^{-2x}(\log(x+1) + c_1)\right)}{\log(x+1) + c_1}\right\}\right\}$$

✓ **Maple** : cpu = 0.392 (sec), leaf count = 25

$$\left\{y(x) = \mathrm{e}^{-lambertW\left((\ln(1+x) - \_C1)\mathrm{e}^{-2\,x}\right) - 2\,x}\right\}$$

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 = 0.350053 (sec), leaf count = 72

$$\left\{\left\{y(x) \to -\frac{\sqrt{x}\sqrt{W\left(\frac{6e^{x^2+2c_1}}{x}\right)}}{\sqrt{6}}\right\}, \left\{y(x) \to \frac{\sqrt{x}\sqrt{W\left(\frac{6e^{x^2+2c_1}}{x}\right)}}{\sqrt{6}}\right\}\right\}$$

✓ **Maple** : cpu = 1.191 (sec), leaf count = 50

$$\left\{\left(\left(y(x)\right)^{-2} + 6\,x^{-1}\right)^{-1} = \frac{x}{54}\left(e^{RootOf\left(e^{\_Z}x^2 - e^{\_Z}\ln\left(\frac{\left(e^{\_Z}+9\right)x}{2}\right) + 3\,e^{\_Z}\_C1 + \_Z\,e^{\_Z} + 9\right)} + 9\right)\right\}$$

2.729 ODE No. 729

$$y'(x) = \frac{(x - y(x))y(x)}{x\left(x - y(x)^3\right)}$$

✓ **Mathematica** : cpu = 0.291467 (sec), leaf count = 327

$$\left\{\left\{y(x) \to \frac{\sqrt[3]{2}(-6\log(x) + 6c_1)}{3\sqrt[3]{54x + \sqrt{2916x^2 + 4(-6\log(x) + 6c_1)^3}}} - \frac{\sqrt[3]{54x + \sqrt{2916x^2 + 4(-6\log(x) + 6c_1)^3}}}{3\sqrt[3]{2}}\right\}, \left\{y(x) \to\right.\right.$$

✓ **Maple** : cpu = 0.292 (sec), leaf count = 404

$$\left\{y(x) = \frac{1}{3}\left(\left(-27\,x + 3\sqrt{-24\,\left(\ln(x)\right)^3 + 72\,\left(\ln(x)\right)^2\_C1 - 72\,\ln(x)\_C1^2 + 24\_C1^3 + 81\,x^2}\right)^{\frac{2}{3}} + 6\,\ln(x)\right.\right.$$

2.730 ODE No. 730

$$y'(x) = \frac{e^x \left(2y(x)^{3/2} - 3e^x\right)^3}{4\sqrt{y(x)}\left(2y(x)^{3/2} - 3e^x + 2\right)}$$

✗ **Mathematica** : cpu = 47.2408 (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 = 1.75 (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 = 0.350225 (sec), leaf count = 47

$$\text{Solve}\left[\frac{1}{64}\left(-4y(x)^2 + 4y(x) - 2\log(8y(x) + 4) + 3\right) - \frac{1}{4x(2y(x) + 1)} = c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.29 (sec), leaf count = 42

$$\left\{ y(x) = \frac{e^{RootOf\left(x\left(e^{\_Z}\right)^3 - 4x\left(e^{\_Z}\right)^2 + 8\_C1\, xe^{\_Z} + 2\_Z\, xe^{\_Z} + 3\, xe^{\_Z} + 16\right)}}{2} - \frac{1}{2} \right\}$$

2.732 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 = 0.678469 (sec), leaf count = 116

$$\text{Solve}\left[-\frac{1}{2}\sqrt{a^2 + 2ax + x^2 + 4y(x)} - \frac{1}{2}a\log\left(\sqrt{a^2 + 2ax + x^2 + 4y(x)} + a + x\right) + \frac{1}{2}a\tanh^{-1}\left(\frac{a + x}{\sqrt{a^2 + 2ax + x^2}}\right.\right.$$

✓ **Maple** : cpu = 0.665 (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

$$y'(x) = \csc(x)\left(-2x^2 y(x)\log(2x) + x^4\log(2x) + y(x)^2\log(2x) - \log(2x) + 2x\sin(x)\right)$$

✓ **Mathematica** : cpu = 12.3583 (sec), leaf count = 73

$$\left\{\left\{y(x) \to \frac{\exp\left(\int_1^x 2\csc(K[5])\log(2K[5])dK[5]\right)}{-\int_1^x \exp\left(\int_1^{K[6]} 2\csc(K[5])\log(2K[5])dK[5]\right)\csc(K[6])\log(2K[6])dK[6] + c_1} + x^2 + 1\right\}\right\}$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(y(x),x) = (2*x*sin(x)-ln(2*x)+ln(2*x)*x^4-2*ln(2*x)*x^2*y(x)+ln(2*x)*y(x)^2)/sin
```

2.734 ODE No. 734

$$y'(x) = \frac{y(x)\left(x^3 - x\log(y(x)) - \log(y(x))\right)}{x+1}$$

✓ **Mathematica** : cpu = 0.246343 (sec), leaf count = 37

$$\left\{\left\{y(x) \to \exp\left(-e^{-x-1}\text{Ei}(x+1) + x^2 - 3x - c_1 e^{-x} + 4\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.298 (sec), leaf count = 39

$$\left\{y(x) = \frac{e^{x^2} e^4}{\left(e^x\right)^3} e^{\frac{\_C1}{e^x}} e^{\frac{Ei(1,-1-x)}{e^x e}}\right\}$$

2.735 ODE No. 735

$$y'(x) = \frac{(2y(x)\log(x) - 1)^3}{x(-y(x) + 2y(x)\log(x) - 1)}$$

✓ **Mathematica** : cpu = 11.4914 (sec), leaf count = 573

$$\text{Solve}\left[\int_1^{y(x)} \left(\frac{2(2\log(x)K[1] - K[1] - 1)}{8\log^3(x)K[1]^3 + 4\log(x)K[1]^3 - 2K[1]^3 - 12\log^2(x)K[1]^2 - 2K[1]^2 + 6\log(x)K[1] - 1} + 2\text{Root}\right.\right.$$

✓ **Maple** : cpu = 0.216 (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

$$y'(x) = \frac{-2x^2y(x) + x^4 + 2x^2 + y(x)^2 + 2x - 1}{x+1}$$

✓ **Mathematica** : cpu = 0.208811 (sec), leaf count = 31

$$\left\{\left\{y(x) \to x^2 + \frac{(x+1)^2}{-\frac{x^2}{2} - x + c_1} + 1\right\}\right\}$$

✓ **Maple** : cpu = 0.188 (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 = 0.0246754 (sec), leaf count = 36

$$\left\{\left\{y(x) \to x^2 + \frac{1}{2}\left(1 + W\left(-e^{\frac{4x^3}{3} - 2x^2 - 1 + c_1}\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.246 (sec), leaf count = 29

$$\left\{y(x) = x^2 + \frac{1}{2} lambertW\left(-2\,\frac{e^{4/3\,x^3}\,\_C1\,e^{-1}}{\left(e^{x^2}\right)^2}\right) + \frac{1}{2}\right\}$$

2.738 ODE No. 738

$$y'(x) = \frac{2a}{-16a^2xy(x)^2 + 32a^3 + 2ax^2y(x)^4 - x^2y(x)}$$

✓ **Mathematica** : cpu = 0.468192 (sec), leaf count = 1347

$$\left\{\left\{y(x) \to -\frac{4a + e^{c_1}}{12a} + \frac{\sqrt[3]{4608x^2a^4 - 128x^3a^3 + 1152e^{c_1}x^2a^3 - 96e^{c_1}x^3a^2 - 432x^3a^2 - 24e^{2c_1}x^3a - 2e^{3c_1}x^3 +}}{}\right.\right.$$

✓ **Maple** : cpu = 0.869 (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 = 0.290668 (sec), leaf count = 39

$$\text{Solve}\left[\frac{1}{8}(-2y(x) + \log(4y(x) + 2) - 1) - \frac{1}{2x(2y(x) + 1)} = c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.275 (sec), leaf count = 35

$$\left\{y(x) = \frac{e^{RootOf\left(x\left(e^{-Z}\right)^2 + 2\_C1\,xe^{-Z} - \_Z\,xe^{-Z} - xe^{-Z} + 4\right)}}{2} - \frac{1}{2}\right\}$$

2.740 ODE No. 740

$$y'(x) = \frac{-2x^2y(x)^2 + x^4 + y(x)^4 + x}{y(x)}$$

✓ **Mathematica** : cpu = 0.111167 (sec), leaf count = 74

$$\left\{\left\{y(x) \to -\frac{\sqrt{2x^3 + 2c_1x^2 - 1}}{\sqrt{2}\sqrt{x + c_1}}\right\}, \left\{y(x) \to \frac{\sqrt{2x^3 + 2c_1x^2 - 1}}{\sqrt{2}\sqrt{x + c_1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.221 (sec), leaf count = 72

$$\left\{y(x) = \frac{\sqrt{2}}{2\,x + 2\_C1}\sqrt{(x + \_C1)\,(2\_C1\,x^2 + 2\,x^3 - 1)}, y(x) = -\frac{\sqrt{2}}{2\,x + 2\_C1}\sqrt{(x + \_C1)\,(2\_C1\,x^2 + 2\,x^3 -}\right.$$

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 = 2.10914 (sec), leaf count = 175

$$\text{Solve}\left[\frac{1}{2}\left(x^2-a^{3/2}\text{RootSum}\left[3\#1^2ab^2y(x)^2+\#1^3b^3+\#1a^{3/2}b^2+3\#1a^2by(x)^4+a^{5/2}by(x)^2+a^{5/2}b+a^3y(x)^6\right.\right.\right.$$

✓ **Maple** : cpu = 1.548 (sec), leaf count = 246

$$\left\{\int_{\_b}^{x}\frac{\left(b\_a^2+a(y(x))^2\right)^3\_a}{a^3}\left(b\left((y(x))^2+1\right)a^{\frac{5}{2}}+a^{\frac{3}{2}}b^2\_a^2+\left(b\_a^2+a(y(x))^2\right)^3\right)^{-1}\mathrm{d}\_a+\int^{y(x)}\left(\left((-\_f^2\right.\right.\right.$$

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 = 3.07936 (sec), leaf count = 3913

$$\left\{\left\{y(x)\to-\sec^{-1}\left(\frac{c_1x^3}{x^2-1}+\frac{\log(x+1)x^3}{x^2-1}-\frac{{c_1}^3x^3}{(x^2-1)\left({c_1}^2+2\log(x+1)c_1+\log^2(x+1)+1\right)}-\frac{}{(x^2-1)\left({c_1}^2\right.}\right.\right.\right.$$

✓ **Maple** : cpu = 1.654 (sec), leaf count = 239

$$\left\{y(x)=\arctan\left(\frac{1}{\_C1^2-2\_C1\ \ln(1+x)+(\ln(1+x))^2+1}\left((-\ln(1+x)+\_C1)\sqrt{(\ln(1+x))^2-2\_C1\ \ln}\right.\right.\right.$$

2.743 ODE No. 743

$$y'(x) = -\frac{i\left(8x^2y(x)^2+x^4+16y(x)^4+8ix\right)}{32y(x)}$$

✗ **Mathematica** : cpu = 45.9619 (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 = 0.483 (sec), leaf count = 296

$$\left\{y(x)=\sqrt{2}\sqrt{\left(\text{Ai}\left(\frac{(i-\sqrt{3})\,x}{2}\right)\_C1+\text{Bi}\left(\frac{(i-\sqrt{3})\,x}{2}\right)\right)\left(\left(1+i\sqrt{3}\right)\_C1\ \text{Ai}^{(1)}\left(\frac{(i-\sqrt{3})\,x}{2}\right)+\left(1+i\sqrt{3}\right.\right.}\right.$$

2.744 ODE No. 744

$$y'(x) = \frac{x}{2x^2y(x)^2 + x^4 + y(x)^4 - y(x)}$$

✓ **Mathematica** : cpu = 0.157258 (sec), leaf count = 510

$$\left\{\left\{y(x) \to \frac{\sqrt[3]{144c_1x^2 + \sqrt{4\left(12x^2 - 4c_1{}^2\right)^3 + \left(144c_1x^2 - 108 + 16c_1{}^3\right)^2} - 108 + 16c_1{}^3}}{6\sqrt[3]{2}} - \frac{}{3\ 2^{2/3}\sqrt[3]{144c_1x^2 + \sqrt{}}}\right.\right.$$

✓ **Maple** : cpu = 0.329 (sec), leaf count = 621

$$\left\{y(x) = \frac{1}{12}\left(-2\_C1\ \sqrt[3]{-36\_C1\ x^2 - 54 - \_C1^3 + 6\sqrt{48\,x^6 + 24\,x^4\_C1^2 + \left(3\_C1^4 + 108\_C1\right)x^2 + 3\_C}}\right.\right.$$

2.745 ODE No. 745

$$y'(x) = \frac{(y(x)\log(x) - 1)^3}{x(-y(x) + y(x)\log(x) - 1)}$$

✓ **Mathematica** : cpu = 11.3678 (sec), leaf count = 546

$$\text{Solve}\left[\int_1^{y(x)}\left(\frac{\log(x)K[1] - K[1] - 1}{\log^3(x)K[1]^3 + \log(x)K[1]^3 - K[1]^3 - 3\log^2(x)K[1]^2 - K[1]^2 + 3\log(x)K[1] - 1} + \text{RootSum}\left[K\right.\right.\right.$$

✓ **Maple** : cpu = 0.275 (sec), leaf count = 78

$$\left\{y(x) = \frac{47\,RootOf\left(-27783\int^{\_Z}\left(2209\_a^3 - 9261\_a + 9261\right)^{-1}d\_a - 7\ln(x) + 3\_C1\right) - 84}{(47\ln(x) - 47)\,RootOf\left(-27783\int^{\_Z}\left(2209\_a^3 - 9261\_a + 9261\right)^{-1}d\_a - 7\ln(x) + 3\_C1\right) - 84\ln}\right.$$

2.746 ODE No. 746

$$y'(x) = -\frac{i\left(2x^2y(x)^2 + x^4 + y(x)^4 + ix\right)}{y(x)}$$

✗ **Mathematica** : cpu = 44.9395 (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 = 0.443 (sec), leaf count = 232

$$\left\{y(x) = \frac{\sqrt{2}}{2\,\mathrm{Ai}\left(-\sqrt[3]{-8}\,ix\right)\_C1 + 2\,\mathrm{Bi}\left(-\sqrt[3]{-8}\,ix\right)}\sqrt{\left(\left(1+i\sqrt{3}\right)\_C1\,\mathrm{Ai}^{(1)}\left(-\sqrt[3]{-8}\,ix\right) + \left(1+i\sqrt{3}\right)\mathrm{Bi}^{(1)}\left(-\sqrt[3]{-\right.\right.}}\right.$$

2.747 ODE No. 747

$$y'(x) = -\frac{y(x)\cot(x)\left(x^2y(x)(-\log(2x)) + x\log(2x) + \tan(x)\right)}{x}$$

✓ **Mathematica** : cpu = 2.87078 (sec), leaf count = 88

$$\left\{\left\{y(x) \to \frac{\exp\left(\int_1^x \frac{-\cot(K[1])K[1]\log(2K[1])-1}{K[1]}dK[1]\right)}{-\int_1^x \exp\left(\int_1^{K[2]} \frac{-\cot(K[1])K[1]\log(2K[1])-1}{K[1]}dK[1]\right)\cot(K[2])K[2]\log(2K[2])dK[2] + c_1}\right\}\right\}$$

✓ **Maple** : cpu = 0.31 (sec), leaf count = 75

$$\left\{y(x) = e^{\int \frac{-x\ln(x)-x\ln(2)-\tan(x)}{x\tan(x)}\,dx}\left(\int -\frac{(\ln(2)+\ln(x))\,x}{\tan(x)}e^{\int \frac{-x\ln(x)-x\ln(2)-\tan(x)}{x\tan(x)}\,dx}\,dx + \_C1\right)^{-1}\right\}$$

2.748 ODE No. 748

$$y'(x) = \frac{y(x)(y(x)+x)}{x\left(y(x)^3+x\right)}$$

✓ **Mathematica** : cpu = 0.308037 (sec), leaf count = 285

$$\left\{\left\{y(x) \to \frac{2\sqrt[3]{2}(\log(x)+c_1)}{\sqrt[3]{54x+\sqrt{2916x^2-864(\log(x)+c_1)^3}}} + \frac{\sqrt[3]{54x+\sqrt{2916x^2-864(\log(x)+c_1)^3}}}{3\sqrt[3]{2}}\right\}, \left\{y(x) \to -\frac{}{\sqrt[3]{5}}\right.\right.$$

✓ **Maple** : cpu = 0.278 (sec), leaf count = 404

$$\left\{y(x) = \frac{1}{3}\left(\left(27\,x + 3\,\sqrt{-24\_C1^3 - 72\ln(x)\_C1^2 - 72\,(\ln(x))^2\_C1 - 24\,(\ln(x))^3 + 81\,x^2}\right)^{\frac{2}{3}} + 6\ln(x) + 6\right.\right.$$

2.749 ODE No. 749

$$y'(x) = \frac{x(x-y(x))^2(y(x)+x)^2}{y(x)}$$

✓ **Mathematica** : cpu = 0.148255 (sec), leaf count = 126

$$\left\{\left\{y(x)\to -\frac{\sqrt{x^2+x^2e^{2x^2+4c_1}-e^{2x^2+4c_1}+1}}{\sqrt{1+e^{2x^2+4c_1}}}\right\},\left\{y(x)\to \frac{\sqrt{x^2+x^2e^{2x^2+4c_1}-e^{2x^2+4c_1}+1}}{\sqrt{1+e^{2x^2+4c_1}}}\right\}\right\}$$

✓ **Maple** : cpu = 0.25 (sec), leaf count = 192

$$\left\{y(x)=\sqrt{\left((x^2+1)\,\mathrm{e}^{-\frac{x^2(x^2+2)}{2}}+\_C1\;(x^2-1)\,\mathrm{e}^{-\frac{x^2(x^2-2)}{2}}\right)\left(\_C1\,\mathrm{e}^{-\frac{x^2(x^2-2)}{2}}+\mathrm{e}^{-\frac{x^2(x^2+2)}{2}}\right)\left(\_C1\,\mathrm{e}^{-\frac{x^2(x^2-2)}{2}}\right.}\right.$$

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 = 0.328554 (sec), leaf count = 72

$$\left\{\left\{y(x)\to -\frac{\sqrt{x}\sqrt{W\left(\frac{6e^{2x+2c_1}}{x}\right)}}{\sqrt{6}}\right\},\left\{y(x)\to \frac{\sqrt{x}\sqrt{W\left(\frac{6e^{2x+2c_1}}{x}\right)}}{\sqrt{6}}\right\}\right\}$$

✓ **Maple** : cpu = 1.254 (sec), leaf count = 49

$$\left\{\left((y(x))^{-2}+6\,x^{-1}\right)^{-1}=\frac{x}{54}\left(\mathrm{e}^{\mathit{RootOf}\left(-\mathrm{e}^{\_Z}\ln\left(\frac{(\mathrm{e}^{\_Z}+9)x}{2}\right)+3\,\mathrm{e}^{\_Z}\_C1+\_Z\,\mathrm{e}^{\_Z}+2\,x\mathrm{e}^{\_Z}+9\right)}+9\right)\right\}$$

2.751 ODE No. 751

$$y'(x) = \frac{y(x)\left(x^4 + x\log(y(x)) + \log(y(x))\right)}{x(x+1)}$$

✓ **Mathematica** : cpu = 0.169177 (sec), leaf count = 30

$$\left\{\left\{y(x) \to (x+1)^x e^{\frac{x^3}{2} - x^2 + c_1 x}\right\}\right\}$$

✓ **Maple** : cpu = 0.299 (sec), leaf count = 26

$$\left\{y(x) = \frac{(1+x)^x\, \mathrm{e}^{\_C1\, x}}{\mathrm{e}^{x^2}} \mathrm{e}^{\frac{x^3}{2}}\right\}$$

2.752 ODE No. 752

$$y'(x) = \frac{\cos(y(x))\left(x^3\cos(y(x)) - x - 1\right)}{(x+1)(x\sin(y(x)) - 1)}$$

✗ **Mathematica** : cpu = 28.7776 (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 = 1.881 (sec), leaf count = 723

$$\left\{y(x) = \arctan\left(\frac{1}{36\,\left(\ln\left(1+x\right)\right)^2 + \left(-24\,x^3 + 36\,x^2 - 72\_C1 - 72\,x\right)\ln\left(1+x\right) + 4\,x^6 - 12\,x^5 + 33\,x^4 + (24\_C\right.\right.$$

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 = 0.164176 (sec), leaf count = 41

$$\left\{\left\{y(x) \to \exp\left(-\frac{12x}{3x^4 - 4x^3 + 6x^2 - 12x + 12\log(x+1) - 12c_1}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.313 (sec), leaf count = 38

$$\left\{y(x) = \mathrm{e}^{-12\,\frac{x}{3\,x^4 - 4\,x^3 + 6\,x^2 + 12\,\ln(1+x) - 12\_C1 - 12\,x}}\right\}$$

2.754 ODE No. 754

$$y'(x) = \frac{x^3 + xy(x)^2 + xy(x) + y(x)^3}{x^2}$$

✓ **Mathematica** : cpu = 0.110226 (sec), leaf count = 47

$$\text{Solve}\left[\text{RootSum}\left[\#1^3 + \#1^2 + 1\&, \frac{\log\left(\frac{y(x)}{x} - \#1\right)}{3\#1^2 + 2\#1}\&\right] = x + c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.127 (sec), leaf count = 26

$$\left\{y(x) = \mathit{RootOf}\left(-\int^{\_Z}\left(\_a^3 + \_a^2 + 1\right)^{-1} d\_a + x + \_C1\right) x\right\}$$

2.755 ODE No. 755

$$y'(x) = \frac{y(x)^{3/2}}{x^2 - 2xy(x) + y(x)^2 + y(x)^{3/2}}$$

✓ **Mathematica** : cpu = 0.278947 (sec), leaf count = 2633

$$\left\{\left\{y(x) \to \frac{2}{3}\left(x + e^{c_1} + 2e^{2c_1}\right) - \frac{1}{3}\sqrt[3]{x^3 + 3e^{c_1}x^2 - 12e^{2c_1}x^2 + 3e^{2c_1}x + 12e^{3c_1}x + 48e^{4c_1}x + e^{3c_1} - 30e^{4c_1} - 96e^{5}\right.\right.$$

✓ **Maple** : cpu = 0.24 (sec), leaf count = 44

$$\left\{2\,\frac{\sqrt{y\left(x\right)}}{y\left(x\right) - x} + \left(y(x) - x\right)^{-1} - 2\,\frac{x}{\left(y\left(x\right) - x\right)\sqrt{y\left(x\right)}} - \_C1 = 0\right\}$$

2.756 ODE No. 756

$$y'(x) = \frac{2x^3y(x) + x^2y(x)^2 + x^6 + y(x)^3}{x^4}$$

✓ **Mathematica** : cpu = 0.144457 (sec), leaf count = 95

$$\text{Solve}\left[-\frac{29}{3}\text{RootSum}\left[-29\#1^3 + 3\sqrt[3]{29}\#1 - 29\&, \frac{\log\left(\frac{\frac{3y(x)}{x^4} + \frac{1}{x^2}}{\sqrt[3]{29}\sqrt[3]{\frac{1}{x^6}}} - \#1\right)}{\sqrt[3]{29} - 29\#1^2}\&\right] = \frac{1}{9}29^{2/3}\left(\frac{1}{x^6}\right)^{2/3} x^5 + c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.112 (sec), leaf count = 37

$$\left\{y(x) = \frac{\left(-3 + 29\, RootOf\left(-81 \int^{\_Z} \left(841\, \_a^3 - 27\, \_a + 27\right)^{-1} d\_a + x + 3\, \_C1\right)\right) x^2}{9}\right\}$$

2.757 ODE No. 757

$$y'(x) = \frac{x^3 + 2x^2 - 4xy(x) - 4x - 8}{2x^2 - 8y(x) + 4x - 8}$$

✓ **Mathematica** : cpu = 0.0256316 (sec), leaf count = 36

$$\left\{\left\{y(x) \to \frac{1}{4}(x^2 + 2x - 4) + 2\left(1 + W\left(-e^{-\frac{x}{4} - 1 + c_1}\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.209 (sec), leaf count = 26

$$\left\{y(x) = \frac{x^2}{4} + 2\, lambertW\left(1/2\, \_C1\, e^{-x/4} e^{-1/2}\right) + \frac{x}{2} + 1\right\}$$

2.758 ODE No. 758

$$y'(x) = \frac{y(x)\left(x^3 y(x) + 2x + 2\right)}{(x+1)(\log(y(x)) + 2x - 1)}$$

✓ **Mathematica** : cpu = 0.775661 (sec), leaf count = 459

$$\left\{\left\{y(x) \to \frac{6W\left(-\frac{1}{6}\sqrt[6]{e^{-12x}\left(2x^3 - 3x^2 + 6x - 6\log(x+1) + 6c_1\right)^6}\right)}{2x^3 - 3x^2 + 6x - 6\log(x+1) + 6c_1}\right\}, \left\{y(x) \to \frac{6W\left(\frac{1}{6}\sqrt[6]{e^{-12x}\left(2x^3 - 3x^2 + 6\right.}\right.}{2x^3 - 3x^2 + 6x - 6}\right.$$

✓ **Maple** : cpu = 0.385 (sec), leaf count = 41

$$\left\{y(x) = e^{-lambertW\left(-\frac{\left(-2x^3 + 3x^2 + 6\ln(1+x) + 6\_C1 - 6x\right)e^{-2x}}{6}\right) - 2x}\right\}$$

2.759 ODE No. 759

$$y'(x) = -\frac{ix\left(18x^4y(x)^2 + x^8 + 54ix^2 + 81y(x)^4\right)}{243y(x)}$$

✗ **Mathematica** : cpu = 40.5991 (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 = 0.621 (sec), leaf count = 305

$$\left\{y(x) = -\frac{\sqrt{3}}{3\,x}\sqrt{\left(J_{\frac{1}{3}}\left(\left(\frac{2}{27}-\frac{2\,i}{27}\right)\sqrt{6}x^3\right)\_C1 + Y_{\frac{1}{3}}\left(\left(\frac{2}{27}-\frac{2\,i}{27}\right)\sqrt{6}x^3\right)\right)\left(-9\_C1\ (1/27\,x^6+i)\,J_{1/3}\left(\left(\frac{2}{27}\right.\right.\right.}\right.$$

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 = 0.974199 (sec), leaf count = 112

$$\text{Solve}\left[2\left(\frac{1}{10}\log\left(2x^2y(x)^4+2x^2y(x)^2+x^2+4xy(x)^2+2x+2\right)-\frac{1}{5}\log\left(xy(x)^2-x+1\right)-\frac{1}{10}\tan^{-1}\left(2xy(x)^4+\right.\right.\right.$$

✓ **Maple** : cpu = 2.979 (sec), leaf count = 136

$$\left\{-\frac{\left(\ln\left(2\,x^2(y(x))^4+\left(2\,x^2+4\,x\right)(y(x))^2+x^2+2\,x+2\right)x-\arctan\left(2\,x(y(x))^4+\left(2\,x+2\right)(y(x))^2+1+x\right)x\right.}{10\,x\left(2\right.}\right.$$

2.761 ODE No. 761

$$y'(x) = \frac{-x^3+4x^2-4xy(x)-4x+8}{2x^2+8y(x)-8x+8}$$

✓ **Mathematica** : cpu = 0.0220264 (sec), leaf count = 33

$$\left\{\left\{y(x)\to W\left(-e^{-x-1+c_1}\right)+\frac{1}{4}\left(-x^2+4x-4\right)+1\right\}\right\}$$

✓ **Maple** : cpu = 0.217 (sec), leaf count = 18

$$\left\{y(x) = -\frac{x^2}{4}+\mathit{lambertW}\left(\frac{\_C1}{e^x}\right)+x\right\}$$

2.762 ODE No. 762

$$y'(x) = -\frac{y(x)(x\log(y(x)) + \log(y(x)) - x)}{x(x+1)}$$

✓ **Mathematica** : cpu = 0.162162 (sec), leaf count = 26

$$\left\{\left\{y(x) \to (x+1)^{-1/x}e^{1-\frac{c_1}{x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.251 (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 = 0.138668 (sec), leaf count = 22

$$\left\{\left\{y(x) \to x^x(x+1)^{-x}e^{c_1 x}\right\}\right\}$$

✓ **Maple** : cpu = 0.282 (sec), leaf count = 14

$$\left\{y(x) = \left(\frac{\_C1\, x}{1+x}\right)^x\right\}$$

2.764 ODE No. 764

$$y'(x) = \frac{y(x)\left(x^4 - x\log(y(x)) - \log(y(x))\right)}{x(x+1)}$$

✓ **Mathematica** : cpu = 0.158478 (sec), leaf count = 50

$$\left\{\left\{y(x) \to (x+1)^{\frac{1}{x}}e^{\frac{x^3}{4}-\frac{x^2}{3}+\frac{x}{2}-\frac{25}{12x}-\frac{c_1}{x}-1}\right\}\right\}$$

✓ **Maple** : cpu = 0.294 (sec), leaf count = 36

$$\left\{y(x) = \mathrm{e}^{\frac{x^3}{4}}\mathrm{e}^{-\frac{x^2}{3}}\mathrm{e}^{\frac{x}{2}}\sqrt[x]{1+x}\mathrm{e}^{-\frac{\_C1}{x}}\mathrm{e}^{-1}\right\}$$

2.765 ODE No. 765

$$y'(x) = \frac{y(x)\left(xy(x)\log\left(\frac{(x-1)(x+1)}{x}\right) - \log\left(\frac{(x-1)(x+1)}{x}\right) - 1\right)}{x}$$

✓ **Mathematica** : cpu = 0.342893 (sec), leaf count = 138

$$\left\{\left\{y(x) \to \frac{\exp\left(-\text{Li}_2(1-x) + \text{Li}_2(-x) - \frac{1}{2}\log^2(x) + \log(x+1)\log(x) - \log\left(x-\frac{1}{x}\right)\log(x)\right)}{x\left(-\int_1^x \frac{\exp\left(-\frac{1}{2}\log^2(K[1]) + \log(K[1]+1)\log(K[1]) - \log\left(K[1]-\frac{1}{K[1]}\right)\log(K[1]) - \text{Li}_2(1-K[1]) + \text{Li}_2(-K[1])\right)\log\left(\frac{(K[1]-1)(K}{K[1]}\right.}{K[1]}\right.}\right.\right.$$

✓ **Maple** : cpu = 0.464 (sec), leaf count = 106

$$\left\{y(x) = \frac{e^{dilog(1+x)}x^{\ln(1+x)}}{xe^{dilog(x)}}e^{-\frac{(\ln(x))^2}{2}}\left(x^{\ln\left(\frac{(1+x)(x-1)}{x}\right)}\right)^{-1}\left(\int -\frac{e^{dilog(1+x)}x^{\ln(1+x)}}{xe^{dilog(x)}}e^{-\frac{(\ln(x))^2}{2}}\ln\left(\frac{(1+x)(x-1)}{x}\right)\right(\right.$$

2.766 ODE No. 766

$$y'(x) = \frac{y(x)\left(x^2y(x)\log\left(\frac{(x-1)(x+1)}{x}\right) - x\log\left(\frac{(x-1)(x+1)}{x}\right) - \log(x)\right)}{x\log(x)}$$

✓ **Mathematica** : cpu = 0.307829 (sec), leaf count = 129

$$\left\{\left\{y(x) \to \frac{\exp\left(\int_1^x \frac{-\log(K[1]) - K[1]\log\left(\frac{(K[1]-1)(K[1]+1)}{K[1]}\right)}{K[1]\log(K[1])}dK[1]\right)}{-\int_1^x \frac{\exp\left(\int_1^{K[2]} \frac{-\log(K[1]) - K[1]\log\left(\frac{(K[1]-1)(K[1]+1)}{K[1]}\right)}{K[1]\log(K[1])}dK[1]\right)K[2]\log\left(\frac{(K[2]-1)(K[2]+1)}{K[2]}\right)}{\log(K[2])}dK[2] + c_1}\right\}\right\}$$

✓ **Maple** : cpu = 0.327 (sec), leaf count = 89

$$\left\{y(x) = e^{\int \frac{1}{x\ln(x)}\left(-x\ln\left(\frac{(1+x)(x-1)}{x}\right) - \ln(x)\right)dx}\left(\int -\frac{x}{\ln(x)}e^{\int \frac{1}{x\ln(x)}\left(-x\ln\left(\frac{(1+x)(x-1)}{x}\right) - \ln(x)\right)dx}\ln\left(\frac{(1+x)(x-1)}{x}\right)dx +\right.\right.$$

2.767 ODE No. 767

$$y'(x) = \frac{-x^3 + 2x^2 - 8xy(x) - 8x + 32}{4x^2 + 32y(x) - 8x + 32}$$

✓ **Mathematica** : cpu = 0.0248566 (sec), leaf count = 38

$$\left\{\left\{y(x) \to \frac{1}{8}\left(-x^2 + 2x - 8\right) + 4\left(1 + W\left(-e^{-\frac{x}{16}-1+c_1}\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.211 (sec), leaf count = 26

$$\left\{y(x) = -\frac{x^2}{8} + 4\,lambertW\left(1/4\_C1\,e^{-x/16}e^{-3/4}\right) + \frac{x}{4} + 3\right\}$$

2.768 ODE No. 768

$$y'(x) = \frac{y(x)(y(x)+1)}{x(xy(x) - y(x) - 1)}$$

✓ **Mathematica** : cpu = 1.02663 (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 = 0.161 (sec), leaf count = 26

$$\left\{y(x) = -\left(x\,lambertW\left(\frac{1}{x\_C1\,e^{x^{-1}}}\right) + 1\right)^{-1}\right\}$$

2.769 ODE No. 769

$$y'(x) = -\frac{ix(8x^4y(x)^2 + x^8 + 16ix^2 + 16y(x)^4)}{32y(x)}$$

✗ **Mathematica** : cpu = 42.1232 (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 = 0.537 (sec), leaf count = 251

$$\left\{y(x) = -\frac{\sqrt{4}}{2\,x}\sqrt{\left(-2\,\left(1/8\,x^6 + i\right)\_C1\,J_{1/3}\left(\left(1/3 - i/3\right)x^3\right) + \left(-\frac{x^6}{4} - 2\,i\right)Y_{\frac{1}{3}}\left(\left(\frac{1}{3} - \frac{i}{3}\right)x^3\right) + (1+i)\,x^3\left(\_\right.\right.}$$

2.770 ODE No. 770

$$y'(x)=\frac{2y(x)^6}{32x^2y(x)^4+y(x)^3+16xy(x)^2+2}$$

✓ **Mathematica** : cpu = 0.209494 (sec), leaf count = 705

$$\left\{\left\{y(x)\to\frac{\sqrt[3]{8192x^3+18432c_1{}^2x^2+\sqrt{4\left(-256x^2+192c_1{}^2x-12c_1\right)^3+\left(8192x^3+18432c_1{}^2x^2-2880c_1x+10\right.}}}{3\sqrt[3]{2}(1-16c_1x)}\right.\right.$$

✓ **Maple** : cpu = 0.165 (sec), leaf count = 1105

$$\left\{y(x)=\frac{1}{96\,x+6\_C1}\left(32\_C1\,x\sqrt[3]{96\sqrt{3}\left(\_C1/16+x\right)\sqrt{\left(4096\,x^3+27\right)\_C1^4+576\,x\_C1^3+2048\_C1^2x^2}}\right.\right.$$

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 = 0.0307011 (sec), leaf count = 46

$$\left\{\left\{y(x)\to\frac{1}{4}\left(-ax^2-2bx-4\right)-\frac{2\left(1+W\left(-e^{-\frac{b^2x}{4}-1+c_1}\right)\right)}{b}\right\}\right\}$$

✓ **Maple** : cpu = 0.472 (sec), leaf count = 84

$$\left\{y(x)=\frac{1}{4\,b}\left(-ax^2b-2\,b^2x-4\,b+4\,\mathrm{e}^{1/4\,\frac{1}{a}\left(-4\,\mathit{lambertW}\left(-1/2\,\mathrm{e}^{-1/4\,b^2x}\mathrm{e}^{-1/2\,\frac{\_C1\,b^2}{a}}\mathrm{e}^{-b/2}\mathrm{e}^{-1}\right)a+\left(-b^2x-2\,b-4\right)a-2\_C1\,b^2\right)}\right.\right.$$

2.772 ODE No. 772

$$y'(x) = \frac{y(x)\log(y(x))(x\log(y(x)) + x + 1)}{x(x+1)}$$

✓ **Mathematica** : cpu = 0.143623 (sec), leaf count = 21

$$\left\{\left\{y(x) \to e^{\frac{x}{-x+\log(x+1)+c_1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.297 (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 = 0.151525 (sec), leaf count = 61

$$\text{Solve}\left[\frac{1}{2}\log\left(\frac{y(x)^2}{x^2} + \frac{y(x)}{x} + 1\right) + \frac{\tan^{-1}\left(\frac{\frac{2y(x)}{x}+1}{\sqrt{3}}\right)}{\sqrt{3}} = \log(1-x) - \log(x) + c_1, y(x)\right]$$

✓ **Maple** : cpu = 1.102 (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 = 0.0267747 (sec), leaf count = 45

$$\left\{\left\{y(x) \to \frac{1}{4}(-2ax - x^2 - 4) - \frac{2\left(1 + W\left(-e^{-\frac{a^2x}{4}-1+c_1}\right)\right)}{a}\right\}\right\}$$

✓ **Maple** : cpu = 0.348 (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 = 0.156272 (sec), leaf count = 943

$$\{\{y(x)\to \mathrm{Root}\left[x^6-2e^{3c_1}x^3+e^{6c_1}+\#1^6+(-6x-6)\#1^5+\left(15x^2+24x+9\right)\#1^4+\left(-20x^3-36x^2-18x+2\right.\right.$$

✓ **Maple** : cpu = 0.228 (sec), leaf count = 44

$$\left\{-2\,(y(x))^{3/2}+(y(x))^3+(-3\,x-3)\,(y(x))^2+\left(3\,x^2+3\,x\right)y(x)-x^3-\_C1=0\right\}$$

2.776 ODE No. 776

$$y'(x)=\frac{y(x)\left(x^2y(x)\log\left(\frac{x^2+1}{x}\right)-x\log\left(\frac{x^2+1}{x}\right)-\log\left(\frac{1}{x}\right)\right)}{x\log\left(\frac{1}{x}\right)}$$

✓ **Mathematica** : cpu = 0.367995 (sec), leaf count = 133

$$\left\{\left\{y(x)\to\frac{\exp\left(\int_1^x\frac{-\log\left(\frac{1}{K[1]}\right)-K[1]\log\left(\frac{K[1]^2+1}{K[1]}\right)}{K[1]\log\left(\frac{1}{K[1]}\right)}dK[1]\right)}{-\int_1^x\frac{\exp\left(\int_1^{K[2]}\frac{-\log\left(\frac{1}{K[1]}\right)-K[1]\log\left(\frac{K[1]^2+1}{K[1]}\right)}{K[1]\log\left(\frac{1}{K[1]}\right)}dK[1]\right)K[2]\log\left(\frac{K[2]^2+1}{K[2]}\right)}{\log\left(\frac{1}{K[2]}\right)}dK[2]+c_1}\right\}\right\}$$

✓ **Maple** : cpu = 0.294 (sec), leaf count = 96

$$\left\{y(x)=\mathrm{e}^{\int\frac{1}{x\ln\left(x^{-1}\right)}\left(-\ln\left(\frac{x^2+1}{x}\right)x-\ln\left(x^{-1}\right)\right)\mathrm{d}x}\left(\int-\frac{x}{\ln\left(x^{-1}\right)}\mathrm{e}^{\int\frac{1}{x\ln\left(x^{-1}\right)}\left(-\ln\left(\frac{x^2+1}{x}\right)x-\ln\left(x^{-1}\right)\right)\mathrm{d}x}\ln\left(\frac{x^2+1}{x}\right)\mathrm{d}x+\_C\right.\right.$$

2.777 ODE No. 777

$$y'(x) = \frac{y(x)(y(x)+1)}{x\left(xy(x)^4 - y(x) - 1\right)}$$

✓ **Mathematica** : cpu = 0.205417 (sec), leaf count = 39

$$\text{Solve}\left[-\frac{1}{2}(y(x)+1)^2 + 2(y(x)+1) - \frac{1}{xy(x)} - \log(y(x)+1) = c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.392 (sec), leaf count = 51

$$\left\{y(x) = e^{\mathit{RootOf}\left(x\left(e^{\_Z}\right)^3 - 5x\left(e^{\_Z}\right)^2 + 2\_C1\, xe^{\_Z} + 2\_Z\, xe^{\_Z} + 7\, xe^{\_Z} - 2\_C1\, x - 2x\_Z - 3x + 2\right)} - 1\right\}$$

2.778 ODE No. 778

$$y'(x) = \frac{x^9y(x)^3 + x^6y(x)^2 - 3x^2y(x) + 1}{x^3}$$

✓ **Mathematica** : cpu = 0.139763 (sec), leaf count = 95

$$\text{Solve}\left[-\frac{29}{3}\text{RootSum}\left[-29\#1^3 + 3\sqrt[3]{29}\#1 - 29\&, \frac{\log\left(\frac{3x^6y(x)+x^3}{\sqrt[3]{29}\sqrt[3]{x^9}} - \#1\right)}{\sqrt[3]{29} - 29\#1^2}\&\right] = \frac{29^{2/3}\left(x^9\right)^{2/3}}{9x^5} + c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.106 (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

$$y'(x) = \frac{x^3y(x) + x^3 + xy(x)^2 + y(x)^3}{(x-1)x^3}$$

✓ **Mathematica** : cpu = 0.138307 (sec), leaf count = 57

$$\text{Solve}\left[-\frac{1}{4}\log\left(\frac{y(x)^2}{x^2}+1\right) + \frac{1}{2}\log\left(\frac{y(x)}{x}+1\right) + \frac{1}{2}\tan^{-1}\left(\frac{y(x)}{x}\right) = \log(1-x) - \log(x) + c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.255 (sec), leaf count = 50

$$\left\{-\frac{1}{4}\ln\left(\frac{(y(x))^2 + x^2}{x^2}\right) + \frac{1}{2}\arctan\left(\frac{y(x)}{x}\right) + \frac{1}{2}\ln\left(\frac{y(x)+x}{x}\right) - \ln(x-1) + \ln(x) - \_C1 = 0\right\}$$

2.780 ODE No. 780

$$y'(x) = \frac{x\sqrt{x^2 + y(x)^2} + xy(x) + y(x)}{x(x+1)}$$

✓ **Mathematica** : cpu = 0.13469 (sec), leaf count = 15

$$\{\{y(x) \to x \sinh(\log(x+1) + c_1)\}\}$$

✓ **Maple** : cpu = 0.825 (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 = 0.473437 (sec), leaf count = 82

$$\left\{\left\{y(x) \to -\frac{\sqrt{x}\sqrt{W\left(6xe^{\frac{2x^3}{3}+x^2+2c_1}\right)}}{\sqrt{6}}\right\}, \left\{y(x) \to \frac{\sqrt{x}\sqrt{W\left(6xe^{\frac{2x^3}{3}+x^2+2c_1}\right)}}{\sqrt{6}}\right\}\right\}$$

✓ **Maple** : cpu = 1.228 (sec), leaf count = 61

$$\left\{\left((y(x))^{-2} + 6\,x^{-1}\right)^{-1} = \frac{x}{54}\left(e^{RootOf\left(2\,x^3e^{\_Z}+3\,e^{\_Z}x^2-3\,e^{\_Z}\ln\left(1/2\,\frac{e^{\_Z}+9}{x}\right)+9\,e^{\_Z}\_C1+3\_Z\,e^{\_Z}+27\right)}+9\right)\right\}$$

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 = 3.95979 (sec), leaf count = 115

$$\left\{\left\{y(x) \to \frac{\exp\left(\int_1^x \frac{-\coth\left(\frac{1}{K[1]}\right)K[1]\log\left(\frac{K[1]^2+1}{K[1]}\right)-1}{K[1]}dK[1]\right)}{-\int_1^x \exp\left(\int_1^{K[2]} \frac{-\coth\left(\frac{1}{K[1]}\right)K[1]\log\left(\frac{K[1]^2+1}{K[1]}\right)-1}{K[1]}dK[1]\right)\coth\left(\frac{1}{K[2]}\right)K[2]\log\left(\frac{K[2]^2+1}{K[2]}\right)dK[2] + c_1}\right\}\right\}$$

✓ **Maple** : cpu = 2.435 (sec), leaf count = 96

$$\left\{y(x) = e^{\int \frac{1}{x \tanh(x^{-1})}\left(-\ln\left(\frac{x^2+1}{x}\right)x-\tanh(x^{-1})\right) dx}\left(\int -\frac{x}{\tanh(x^{-1})} e^{\int \frac{1}{x \tanh(x^{-1})}\left(-\ln\left(\frac{x^2+1}{x}\right)x-\tanh(x^{-1})\right) dx} \ln\left(\frac{x^2+1}{x}\right.\right.\right.$$

2.783 ODE No. 783

$$y'(x) = -\frac{y(x)\coth(x)\left(x^2 y(x)(-\log(2x)) + x\log(2x) + \tanh(x)\right)}{x}$$

✓ **Mathematica** : cpu = 4.02431 (sec), leaf count = 88

$$\left\{\left\{y(x) \to \frac{\exp\left(\int_1^x \frac{-\coth(K[1])K[1]\log(2K[1])-1}{K[1]}dK[1]\right)}{-\int_1^x \exp\left(\int_1^{K[2]} \frac{-\coth(K[1])K[1]\log(2K[1])-1}{K[1]}dK[1]\right)\coth(K[2])K[2]\log(2K[2])dK[2] + c_1}\right\}\right\}$$

✓ **Maple** : cpu = 0.242 (sec), leaf count = 75

$$\left\{y(x) = e^{\int \frac{-x\ln(2)-x\ln(x)-\tanh(x)}{x\tanh(x)} dx}\left(\int -\frac{(\ln(2)+\ln(x))x}{\tanh(x)} e^{\int \frac{-x\ln(2)-x\ln(x)-\tanh(x)}{x\tanh(x)} dx} dx + \_C1\right)^{-1}\right\}$$

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 = 19.7429 (sec), leaf count = 27

$$\left\{\left\{y(x) \to -x + \tan\left(\int_1^x \operatorname{csch}(K[5])\log(K[5])dK[5] + c_1\right)\right\}\right\}$$

✓ **Maple** : cpu = 8.236 (sec), leaf count = 24

$$\left\{y(x) = -x - \tan\left(\_C1 - \int \frac{\ln(x)}{\sinh(x)} dx\right)\right\}$$

2.785 ODE No. 785

$$y'(x) = \frac{x^2 \sinh(x) + 2xy(x)\sinh(x) + y(x)^2 \sinh(x) - \log(x) + \sinh(x)}{\log(x)}$$

✓ **Mathematica** : cpu = 7.44776 (sec), leaf count = 29

$$\left\{\left\{y(x) \to -x + \tan\left(\int_1^x \frac{\sinh(K[5])}{\log(K[5])} dK[5] + c_1\right)\right\}\right\}$$

✓ **Maple** : cpu = 46.047 (sec), leaf count = 24

$$\left\{y(x) = -x - \tan\left(\_C1 - \int \frac{\sinh(x)}{\ln(x)}\, dx\right)\right\}$$

2.786 ODE No. 786

$$y'(x) = \frac{axy(x)^2 \cosh(x) + bx^3 \cosh(x) + y(x)\log(x)}{x \log(x)}$$

✓ **Mathematica** : cpu = 3.70437 (sec), leaf count = 61

$$\left\{\left\{y(x) \to \frac{\sqrt{b}x \tan\left(\sqrt{a}\sqrt{b}\int_1^x \frac{\cosh(K[1])K[1]}{\log(K[1])} dK[1] + \sqrt{a}\sqrt{b}c_1\right)}{\sqrt{a}}\right\}\right\}$$

✓ **Maple** : cpu = 0.273 (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

$$y'(x) = \frac{x\left(-2x^2 y(x) + 2x^4 + x^2 - x - 1\right)}{(x+1)\left(x^2 - y(x)\right)}$$

✓ **Mathematica** : cpu = 19.0067 (sec), leaf count = 488

$$\text{Solve}\Bigg[\frac{\left(2 - \frac{x(x^2-x-1)(2x^2-2y(x)+3)}{\sqrt[3]{x^3(x^2-x-1)^3(x^2-y(x))}}\right)\left(\frac{x(x^2-x-1)(2x^2-2y(x)+3)}{\sqrt[3]{x^3(x^2-x-1)^3(x^2-y(x))}} + 4\right)\Bigg(\left(1 - \frac{x(x^2-x-1)(2x^2-2y(x)+3)}{2\sqrt[3]{x^3(x^2-x-1)^3(x^2-y(x))}}\right)\log\Bigg(\frac{2 - \frac{x(x^2 \cdots}{\sqrt[3]{x^3 \cdots}}}{\cdots}}{18\sqrt[3]{2}\Bigg(-\frac{(2x^2-2y(x)+3)^3}{8(x^2-y(x))^3} + \frac{3x(x^2-x-1 \cdots}{2\sqrt[3]{x^3(x^2- \cdots}}}$$

✓ **Maple** : cpu = 1.281 (sec), leaf count = 191

$$\left\{y(x)=\left(4\,x^2\mathrm{e}^{RootOf\left(8\,x^3\mathrm{e}^{\_Z}-24\,\mathrm{e}^{\_Z}x^2-36\,x^3+6\,\ln\left(\frac{2\,\mathrm{e}^{\_Z}-9}{(1+x)^4}\right)\mathrm{e}^{\_Z}+18\,\mathrm{e}^{\_Z}\_C1-6\_Z\,\mathrm{e}^{\_Z}+24\,x\mathrm{e}^{\_Z}+108\,x^2-27\,\ln\left(\frac{2\,\mathrm{e}^{\_Z}-9}{(1+x)^4}\right)-81\_\right.}\right.\right.$$

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 = 24.8381 (sec), leaf count = 348

$$\left\{\left\{y(x)\to\frac{\exp\left(\int_1^x\frac{-e^2\cosh(K[1])K[1]-\cosh(K[1])K[1]-e^2\sinh(K[1])K[1]+\sinh(K[1])K[1]-e^2\cosh}{K[1]\log(K[1]-1)(e^2\cosh(}\right.}{-\int_1^x\frac{\exp\left(\int_1^{K[2]}\frac{-e^2\cosh(K[1])K[1]-\cosh(K[1])K[1]-e^2\sinh(K[1])K[1]+\sinh(K[1])K[1]-e^2\cosh(K[1])\log(K[1]-1)+\cosh(K[1])\log(K[1]-1}{K[1]\log(K[1]-1)\left(e^2\cosh(K[1])-\cosh(K[1])+e^2\sinh(K[1])+\sinh(K[1])\right)}\right.}{K[2]\log(K[2]-1)(e^2\cosh(K[2]}}\right.\right.$$

✓ **Maple** : cpu = 0.279 (sec), leaf count = 108

$$\left\{y(x)=\left(\mathrm{e}^{-\int\frac{-x\cosh(1+x)-\ln(x-1)\sinh(1+x)}{\ln(x-1)\sinh(1+x)x}\,\mathrm{d}x}\right)^{-1}\left(\_C1+\int-\frac{x\cosh(1+x)}{\ln(x-1)\sinh(1+x)}\mathrm{e}^{\int\frac{-x\cosh(1+x)-\ln(x-1)\sinh(1+x)}{\ln(x-1)\sinh(1+x)x}\,\mathrm{d}x}\,\mathrm{d}x\right.\right.$$

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 = 58.3974 (sec), leaf count = 120

$$\left\{\left\{y(x)\to-\frac{e^2x\sinh(x)-x\sinh(x)+e^2x\cosh(x)+x\cosh(x)}{e^2\sinh(x)-\sinh(x)+e^2\cosh(x)+\cosh(x)}+\tan\left(\int_1^x\frac{e^2\cosh(K[5])+\cosh(K[5])+}{\log(K[5]-1)\left(e^2\cosh(K[5])-\cosh(\right.}\right.\right.\right.$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(y(x),x) = -(ln(x-1)-coth(1+x)*x^2-2*coth(1+x)*x*y(x)-coth(1+x)-coth(1+x)*y(x)^2)
1),y(x))
```

2.790 ODE No. 790

$$y'(x) = \frac{-2x^2 y(x) \coth\left(\frac{x+1}{x-1}\right) + x^4 \coth\left(\frac{x+1}{x-1}\right) + y(x)^2 \coth\left(\frac{x+1}{x-1}\right) + 2x \log\left(\frac{1}{x-1}\right) - \coth\left(\frac{x+1}{x-1}\right)}{\log\left(\frac{1}{x-1}\right)}$$

✓ **Mathematica** : cpu = 81.8991 (sec), leaf count = 127

$$\left\{\left\{y(x) \to \frac{\exp\left(\int_1^x \frac{2\coth\left(\frac{K[5]}{K[5]-1}+\frac{1}{K[5]-1}\right)}{\log\left(\frac{1}{K[5]-1}\right)}dK[5]\right)}{-\int_1^x \frac{\exp\left(\int_1^{K[6]} \frac{2\coth\left(\frac{K[5]}{K[5]-1}+\frac{1}{K[5]-1}\right)}{\log\left(\frac{1}{K[5]-1}\right)}dK[5]\right)\coth\left(\frac{K[6]}{K[6]-1}+\frac{1}{K[6]-1}\right)}{\log\left(\frac{1}{K[6]-1}\right)}dK[6] + c_1} + x^2 + 1\right\}\right\}$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(y(x),x) = (2*x*ln(1/(x-1))-coth((1+x)/(x-1))+coth((1+x)/(x-1))*y(x)^2-
2*coth((1+x)/(x-1))*x^2*y(x)+coth((1+x)/(x-1))*x^4)/ln(1/(x-1)),y(x))
```

2.791 ODE No. 791

$$y'(x) = \frac{\operatorname{sech}\left(\frac{1}{x-1}\right)\left(-2x^3 y(x) - 2x^2 y(x) + x^5 + x^4 + 2x^2 \cosh\left(\frac{1}{x-1}\right) + x y(x)^2 + y(x)^2 - x - 2x \cosh\left(\frac{1}{x-1}\right) - \right.}{x-1}$$

✓ **Mathematica** : cpu = 7.09919 (sec), leaf count = 110

$$\left\{\left\{y(x) \to \frac{\exp\left(\int_1^x \frac{2(K[5]+1)\operatorname{sech}\left(\frac{1}{K[5]-1}\right)}{K[5]-1}dK[5]\right)}{-\int_1^x \frac{\exp\left(\int_1^{K[6]} \frac{2(K[5]+1)\operatorname{sech}\left(\frac{1}{K[5]-1}\right)}{K[5]-1}dK[5]\right)(K[6]+1)\operatorname{sech}\left(\frac{1}{K[6]-1}\right)}{K[6]-1}dK[6] + c_1} + \frac{x^3+x^2}{x+1} + 1\right\}\right\}$$

✓ **Maple** : cpu = 8.148 (sec), leaf count = 306

$$\left\{y(x) = \left(\left(-x^2+1\right)\left(e^{\frac{1}{\left(e^{(x-1)^{-1}}\right)^2+1}\int \frac{e^{(x-1)^{-1}}(1+x)}{\left(\left(e^{(x-1)^{-1}}\right)^2+1\right)(x-1)}\,dx}\right)^4 \left(e^{\frac{1}{\left(e^{(x-1)^{-1}}\right)^2+1}\int \frac{e^{(x-1)^{-1}}(1+x)}{\left(\left(e^{(x-1)^{-1}}\right)^2+1\right)(x-1)}\,dx e^{2\,(x-1)^{-1}}}\right.\right.\right.$$

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 = 2.72693 (sec), leaf count = 157

$$\left\{\left\{y(x) \to \frac{\exp\left(\int_1^x \frac{-\operatorname{sech}\left(\frac{1}{K[1]+1}\right)K[1]^2 - \operatorname{sech}\left(\frac{1}{K[1]+1}\right)K[1] - K[1] + 1}{(K[1]-1)K[1]}dK[1]\right)}{-\int_1^x \frac{\exp\left(\int_1^{K[2]} \frac{-\operatorname{sech}\left(\frac{1}{K[1]+1}\right)K[1]^2 - \operatorname{sech}\left(\frac{1}{K[1]+1}\right)K[1] - K[1]+1}{(K[1]-1)K[1]}dK[1]\right)\left(\operatorname{sech}\left(\frac{1}{K[2]+1}\right)K[2]^3 + \operatorname{sech}\left(\frac{1}{K[2]+1}\right)K[2]^2\right)}{(K[2]-1)K[2]}dK[2]\ -$$

✓ **Maple** : cpu = 0.726 (sec), leaf count = 112

$$\left\{ y(x) = \mathrm{e}^{\int \frac{(1-x)\cosh\left((1+x)^{-1}\right) - x^2 - x}{x(x-1)\cosh\left((1+x)^{-1}\right)}\,\mathrm{d}x} \left(\int -\frac{x(1+x)}{\cosh\left((1+x)^{-1}\right)(x-1)} \mathrm{e}^{\int \frac{(1-x)\cosh\left((1+x)^{-1}\right) - x^2 - x}{x(x-1)\cosh\left((1+x)^{-1}\right)}\,\mathrm{d}x}\,\mathrm{d}x + \_C1 \right)^{-1} \right\}$$

2.793 ODE No. 793

$$y'(x) = -\frac{y(x)(xy(x)+1)}{x(xy(x) - y(x) + 1)}$$

✓ **Mathematica** : cpu = 9.95946 (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 = 0.3 (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

$$y'(x) = \frac{y(x)}{x\left(x^3 y(x)^4 + x^2 y(x)^3 + y(x) - 1\right)}$$

✓ **Mathematica** : cpu = 0.18953 (sec), leaf count = 67

$$\text{Solve}\left[\text{RootSum}\left[\#1^3 y(x)^3 + \#1^2 y(x)^2 + 1\&, \frac{\#1 y(x)\log(x-\#1) + \log(x-\#1)}{3\#1 y(x) + 2}\&\right] + y(x) - \log(x) = c_1, y(x)\right]$$

✓ **Maple** : cpu = 1.075 (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

$$y'(x) = \frac{3a^2 x + a^3 + 3ax^2 + ay(x)^2 + x^3 + y(x)^3 + xy(x)^2}{(a+x)^3}$$

✓ **Mathematica** : cpu = 0.359187 (sec), leaf count = 111

$$\text{Solve}\left[-\frac{19}{3}\text{RootSum}\left[-19\#1^3 + 6\sqrt[3]{38}\#1 - 19\&, \frac{\log\left(\frac{\frac{3y(x)}{(a+x)^3} + \frac{1}{(a+x)^2}}{\sqrt[3]{38}\sqrt[3]{\frac{1}{(a+x)^6}}} - \#1\right)}{2\sqrt[3]{38} - 19\#1^2}\&\right] = \frac{1}{9}38^{2/3}\left(\frac{1}{(a+x)^6}\right)^{2/3}(a+x$$

✓ **Maple** : cpu = 0.13 (sec), leaf count = 37

$$\left\{y(x) = -RootOf\left(-\int^{\_Z}\left(\_a^3 - \_a^2 - \_a - 1\right)^{-1} d\_a + \ln(x+a) + \_C1\right)(x+a)\right\}$$

2.796 ODE No. 796

$$y'(x) = \frac{e^{-\frac{3x^2}{2}} x y(x)^3}{3\left(e^{\frac{3x^2}{2}} y(x) + 3e^{\frac{3x^2}{2}} + 3y(x)\right)}$$

✓ **Mathematica** : cpu = 12.1357 (sec), leaf count = 102

$$\text{Solve}\left[\frac{1}{62}\left(-31\log\left(9e^{\frac{3x^2}{2}}(y(x)+3)y(x)+3e^{3x^2}(y(x)+3)^2-y(x)^2\right)+6\sqrt{93}\tanh^{-1}\left(\frac{\sqrt{\frac{3}{31}}\left(2e^{\frac{3x^2}{2}}(y(x)+3)-\right.}{y(x)}\right.\right.\right.$$

✓ **Maple** : cpu = 3.665 (sec), leaf count = 143

$$\left\{y(x)=\mathit{RootOf}\left(\left(\left(7\,\mathrm{e}^{3\,x^2+\mathit{RootOf}\left(\left(\mathrm{e}^{3/2\,x^2}\right)^2\left(42\,\sqrt{93}\tanh\left(\frac{(\_C1-5\_Z)\sqrt{93}}{90}\right)\mathrm{e}^{3\,x^2+\_Z}+217\left(\tanh\left(\frac{(\_C1-5\_Z)\sqrt{93}}{90}\right)\right)^2\mathrm{e}^{3\,x^2+\_Z}+189\right.\right.}\right.\right.\right.\right.$$

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 = 1.86051 (sec), leaf count = 349

$$\left\{\left\{y(x)\to\frac{\exp\left(\frac{(3e^2-1)\mathrm{Chi}\left(\frac{2}{x-1}\right)}{e}+\frac{(1+3e^2)\mathrm{Shi}\left(\frac{2}{x-1}\right)}{e}-\frac{1}{4}ex^2\sinh\left(\frac{2}{x-1}\right)+\frac{x^2\sinh\left(\frac{2}{x-1}\right)}{4e}-\frac{1}{4}ex^2\cosh\left(\frac{2}{x-1}\right)-\frac{x^2\cos}{\ }\right.}{x\left(\exp\left(\frac{(3e^2-1)\mathrm{Chi}\left(\frac{2}{x-1}\right)}{e}+\right.\right.}\right.\right.$$

✓ **Maple** : cpu = 0.597 (sec), leaf count = 168

$$\left\{y(x)=\frac{1}{x}\left(\mathrm{e}^{\frac{x^2-1}{4}}\mathrm{e}^{\frac{-1-x}{x-1}}+\frac{x^2+4\,x-5}{4}\mathrm{e}^{\frac{1+x}{x-1}}-\mathit{Ei}\left(1,2\,(x-1)^{-1}\right)\mathrm{e}^{-1}+3\,\mathrm{e}\mathit{Ei}\left(1,-2\,(x-1)^{-1}\right)\right)^{-1}\left(\_C1+\int-\mathrm{e}^{\frac{-x^2+1}{4}}\mathrm{e}^{\frac{-1-x}{x-1}}+\frac{-x^2-4\,x}{4}\right.\right.$$

2.798 ODE No. 798

$$y'(x)=\frac{y(x)(y(x)+x+1)}{(x+1)\left(2y(x)^3+y(x)+x\right)}$$

✓ **Mathematica** : cpu = 0.581529 (sec), leaf count = 27

$$\text{Solve}\left[y(x)^2-\frac{x}{y(x)}+\log(y(x))-\log(x+1)=c_1,y(x)\right]$$

✓ **Maple** : cpu = 0.361 (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 = 1.1045 (sec), leaf count = 126

$$\left\{\left\{y(x) \to \frac{\exp\left(6e\text{Ei}\left(\frac{2}{x-1}\right) + \frac{1}{2}e^{\frac{x}{x-1}+\frac{1}{x-1}}(x^2+4x-5) - e^{\frac{2}{x-1}}\left(\frac{1}{2}e(x-1)^2 + 3e(x-1)\right)\right)}{x\left(e^{6e\text{Ei}\left(\frac{2}{x-1}\right)} + c_1 e^{\frac{1}{2}e^{\frac{x}{x-1}+\frac{1}{x-1}}(x^2+4x-5)}\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.429 (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

$$y'(x) = \frac{6b^2x - b^3 - 12bx^2 - 4by(x)^2 + 8x^3 + 8y(x)^3 + 8xy(x)^2}{(2x-b)^3}$$

✓ **Mathematica** : cpu = 0.347738 (sec), leaf count = 128

$$\text{Solve}\left[-\frac{19}{3}\text{RootSum}\left[-19\#1^3 + 6\sqrt[3]{38}\#1 - 19\&, \frac{\log\left(\frac{\frac{4}{(b-2x)^2} - \frac{24y(x)}{(b-2x)^3}}{4\sqrt[3]{38}\sqrt[3]{\frac{1}{(b-2x)^6}}} - \#1\right)}{2\sqrt[3]{38} - 19\#1^2}\&\right] = \frac{1}{9}38^{2/3}\left(\frac{1}{(b-2x)^6}\right)^{2/3}(b -\right.$$

✓ **Maple** : cpu = 0.121 (sec), leaf count = 41

$$\left\{y(x) = \frac{RootOf\left(-\int^{-Z}(\_a^3 - \_a^2 - \_a - 1)^{-1}d\_a + \ln(-2x+b) + \_C1\right)(-2x+b)}{2}\right\}$$

2.801 ODE No. 801

$$y'(x) = \frac{1}{2} e^{\frac{x^2}{4}} \left(2e^{-\frac{3x^2}{4}} y(x)^3 + 2e^{-\frac{x^2}{2}} y(x)^2 + e^{-\frac{x^2}{4}} x y(x) + 2 \right)$$

✓ **Mathematica** : cpu = 0.309698 (sec), leaf count = 126

$$\text{Solve}\left[-\frac{29}{3} \text{RootSum}\left[-29\#1^3 + 3\sqrt[3]{29}\#1 - 29\&, \frac{\log\left(\frac{3e^{-\frac{x^2}{2}} y(x) + e^{-\frac{x^2}{4}}}{\sqrt[3]{29}\sqrt[3]{e^{-\frac{3x^2}{4}}}} - \#1 \right)}{\sqrt[3]{29} - 29\#1^2} \& \right] = \frac{1}{9} 29^{2/3} e^{\frac{x^2}{2}} \left(e^{-\frac{3x^2}{4}} \right)^{2/3} x +$$

✓ **Maple** : cpu = 0.174 (sec), leaf count = 63

$$\left\{ y(x) = \frac{1}{9} \left(-3\, e^{-1/4\, x^2} e^{1/4\, x^2} + 29\, RootOf\left(-81 \int^{\_Z} \left(841\_a^3 - 27\_a + 27 \right)^{-1} d\_a + x + 3\_C1 \right) \right) \left(e^{\frac{x^2}{4}} \right)^{-1}\right.$$

2.802 ODE No. 802

$$y'(x) = \frac{\_F1\left(y(x) + \frac{1}{x}\right) + \frac{1}{x}}{x}$$

✓ **Mathematica** : cpu = 0.121438 (sec), leaf count = 101

$$\text{Solve}\left[\int_1^{y(x)} -\frac{\_F1\left(K[2] + \frac{1}{x}\right) \int_1^x -\frac{\_F1'\left(K[2] + \frac{1}{K[1]}\right)}{K[1]^2 \left(\_F1\left(K[2] + \frac{1}{K[1]}\right)\right)^2} dK[1] + 1}{\_F1\left(K[2] + \frac{1}{x}\right)} dK[2] + \int_1^x \left(\frac{1}{K[1]} + \frac{1}{\_F1\left(y(x) + \frac{1}{K[1]}\right) K} \right.\right.$$

✓ **Maple** : cpu = 0.249 (sec), leaf count = 27

$$\left\{ y(x) = \frac{RootOf\left(-\ln(x) + \int^{\_Z} (\_F1(\_a))^{-1} d\_a + \_C1 \right) x - 1}{x} \right\}$$

2.803 ODE No. 803

$$y'(x) = \frac{\_F1\left(y(x)^2 - 2\log(x)\right)}{x\sqrt{y(x)^2}}$$

✓ **Mathematica** : cpu = 0.30093 (sec), leaf count = 637

$$\text{Solve}\left[\int_1^{y(x)}\left(\frac{K[2]}{(\_F1\,(K[2]^2 - 2\log(x)) - 1)\,(\_F1\,(K[2]^2 - 2\log(x)) + 1)} - \int_1^x\left(\frac{2K[2]\_F1'\left(K[2]^2 - 2\log(K\right.}{K[1]\,(\_F1\,(K[2]^2 - 2\log(K[1])\right.}\right.\right.$$

✓ **Maple** : cpu = 0.994 (sec), leaf count = 65

$$\left\{y(x) = \sqrt{2\,\ln(x) + 2\,RootOf\left(\ln(x) - \int^{\_Z}(\_F1\,(2\,\_a) - 1)^{-1}\,d\_a + \_C1\right)}, y(x) = -\sqrt{2\,\ln(x) + 2\,RootOf\right.$$

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 = 0.609762 (sec), leaf count = 43

$$\left\{\left\{y(x) \to \tan^{-1}\left(\frac{3x^4 - 4x^3 + 6x^2 - 12x + 12\log(x+1) - 25 - 12c_1}{12x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.983 (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 = 0.161327 (sec), leaf count = 37

$$\left\{\left\{y(x) \to x\sinh\left(\frac{1}{6}(2x^3 - 3x^2 + 6x - 6\log(x+1) + 11 + 6c_1)\right)\right\}\right\}$$

✓ **Maple** : cpu = 1.074 (sec), leaf count = 42

$$\left\{\ln\left(\sqrt{(y(x))^2 + x^2} + y(x)\right) - \frac{x^3}{3} + \frac{x^2}{2} - x + \ln(1+x) - \ln(x) - \_C1 = 0\right\}$$

2.806 ODE No. 806

$$y'(x) = \frac{-\frac{1}{2}x\sin(2y(x)) - \frac{1}{2}\sin(2y(x)) + \frac{1}{2}x\cos(2y(x)) + \frac{x}{2}}{x(x+1)}$$

✓ **Mathematica** : cpu = 0.416814 (sec), leaf count = 22

$$\left\{\left\{y(x) \to \tan^{-1}\left(\frac{x - \log(x+1) - c_1}{x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.606 (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 = 1.39042 (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 = 0.684 (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 = 1.41014 (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 = 0.134 (sec), leaf count = 45

$$\left\{y(x) = \left(-x\,lambertW\left(\frac{1}{x\_C1\,e^{x^{-1}}}\right) - 2\right)\left(2\,x\,lambertW\left(\frac{1}{x\_C1\,e^{x^{-1}}}\right) + 2\right)^{-1}\right\}$$

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 = 0.284608 (sec), leaf count = 128

$$\text{Solve}\left[-\frac{19}{3}\text{RootSum}\left[-19\#1^3 + 6\sqrt[3]{38}\#1 - 19\&, \frac{\log\left(\frac{\frac{192y(x)}{(4x-5)^3}+\frac{16}{(4x-5)^2}}{16\sqrt[3]{38}\sqrt[3]{\frac{1}{(4x-5)^6}}} - \#1\right)}{2\sqrt[3]{38} - 19\#1^2}\&\right] = \frac{1}{9}38^{2/3}\left(\frac{1}{(5-4x)^6}\right)^{2/3}(5 -$$

✓ **Maple** : cpu = 0.128 (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 = 0.103915 (sec), leaf count = 40

$$\left\{\left\{y(x) \to -\frac{1}{2}x^2\left(\frac{1-2x\log(x)}{x^2} - \frac{1}{x^2}\right) + \frac{1}{-1+\frac{c_1}{x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.042 (sec), leaf count = 16

$$\left\{y(x) = \left(\ln(x) + (-x + \_C1)^{-1}\right)x\right\}$$

2.811 ODE No. 811

$$y'(x) = \frac{x^3e^{y(x)} + x^4 + xy(x) + e^{y(x)}y(x) - x\log\left(e^{y(x)} + x\right) - e^{y(x)}\log\left(e^{y(x)} + x\right) + x}{x^2}$$

✓ **Mathematica** : cpu = 1.74983 (sec), leaf count = 33

$$\left\{\left\{y(x) \to -\log\left(-\frac{1}{x} + \frac{e^{-\frac{x^3}{2} - c_1x}}{x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 2.413 (sec), leaf count = 32

$$\left\{y(x)=\frac{x^3}{2}+\_C1\,x+\ln\left(-x\left(-1+\mathrm{e}^{\frac{x^3}{2}}\mathrm{e}^{-\_C1\,x}\right)^{-1}\right)\right\}$$

2.812 ODE No. 812

$$y'(x)=x^3\sqrt{x^3-6y(x)}+x^2\sqrt{x^3-6y(x)}+\sqrt{x^3-6y(x)}+\frac{x^2}{2}$$

✓ **Mathematica** : cpu = 0.367157 (sec), leaf count = 78

$$\left\{\left\{y(x)\to\frac{1}{96}(-9x^8-24x^7-16x^6-72x^5-102x^4+8x^3-144x^2+72c_1x^4+96c_1x^3-24x+288c_1x-1-144\right.\right.$$

✓ **Maple** : cpu = 0.476 (sec), leaf count = 30

$$\left\{\_C1-\frac{3\,x^4}{4}-x^3-3\,x-\sqrt{x^3-6\,y\left(x\right)}=0\right\}$$

2.813 ODE No. 813

$$y'(x)=\frac{1}{2}\sqrt{a}\left(2x^3\sqrt{ax^4+8y(x)}+2x^2\sqrt{ax^4+8y(x)}+2\sqrt{ax^4+8y(x)}-\sqrt{a}x^3\right)$$

✓ **Mathematica** : cpu = 0.548159 (sec), leaf count = 93

$$\left\{\left\{y(x)\to\frac{144ax^8+384ax^7+256ax^6+1152ax^5+1464ax^4+96ax^3+2304ax^2-1152ac_1x^4-1536ac_1x^3+28}{1152}\right.\right.$$

✓ **Maple** : cpu = 0.852 (sec), leaf count = 40

$$\left\{\frac{1}{4}\sqrt{ax^4+8\,y\left(x\right)}+\frac{-3\,x^4-4\,x^3-12\,x}{12}\sqrt{a}-\_C1=0\right\}$$

2.814 ODE No. 814

$$y'(x) = \frac{y(x)\left(x^7 y(x)^2 - 3x^3 y(x) - 3\right)}{x\left(x^3 y(x) + 1\right)}$$

✓ **Mathematica** : cpu = 0.13934 (sec), leaf count = 72

$$\left\{\left\{y(x) \to \frac{x}{-x^4 + \frac{\sqrt{x + x(-2x + c_1)}}{\sqrt{\frac{1}{x^7}}}}\right\}, \left\{y(x) \to -\frac{x}{x^4 + \frac{\sqrt{x + x(-2x + c_1)}}{\sqrt{\frac{1}{x^7}}}}\right\}\right\}$$

✓ **Maple** : cpu = 0.115 (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 = 13.3522 (sec), leaf count = 99

$$\text{Solve}\left[\frac{1}{186}\left(\left(31 + 3\sqrt{93}\right)\log\left(9\left(9 + \sqrt{93}\right)y(x) - 2e^{\frac{3x^2}{2}}(y(x) + 3)\right) + \left(31 - 3\sqrt{93}\right)\log\left(2e^{\frac{3x^2}{2}}(y(x) + 3) + 9\left(\sqrt{}\right.\right.\right.\right.$$

✓ **Maple** : cpu = 2.956 (sec), leaf count = 168

$$\left\{-10\,\ln\left(\frac{10\,e^{3/2\,x^2}(3 + y(x))}{27\,e^{3/2\,x^2} + 9\,e^{3/2\,x^2} y\,(x) + 27\,y\,(x)}\right) + 5\,\ln\left(\frac{100\,(3 + y(x))^2\left(e^{3/2\,x^2}\right)^2 + \left(-8100\,(y(x))^2 - 24300\,y(\right.}{189\,\left(e^{3/2\,x^2}\,(3 + y\,(x)) + 3\,y\,(x)\right.}\right.\right.$$

2.816 ODE No. 816

$$y'(x) = \frac{x(x - y(x))^3 (y(x) + x)^3}{y(x)\left(x^2 - y(x)^2 - 1\right)}$$

✓ **Mathematica** : cpu = 0.215531 (sec), leaf count = 74

$$\text{Solve}\left[\frac{1}{2}\left(\text{RootSum}\left[\#1^3 - \#1 + 1\&, \frac{\#1\log\left(-\#1 + x^2 - y(x)^2\right) - \log\left(-\#1 + x^2 - y(x)^2\right)}{3\#1^2 - 1}\&\right] + x^2\right) = c_1, y(x\right.$$

✓ **Maple** : cpu = 0.795 (sec), leaf count = 190

$$\left\{\int_{\_b}^{x}\frac{(-y(x)+\_a)^3\,(y(x)+\_a)^3\,\_a}{\_a^6-3\,\_a^4\,(y\,(x))^2+3\,\_a^2\,(y\,(x))^4-(y\,(x))^6-\_a^2+(y\,(x))^2+1}\,\mathrm{d}\_a+\int^{y(x)}-\frac{(-\_f^2+}{-\_f^6+3\,\_f^4x^2-3\,\_}\right.$$

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 = 0.542644 (sec), leaf count = 63

$$\left\{\left\{y(x)\to-\sec^{-1}\left(\frac{-x^3+3x^3\log(x)-9c_1}{9\log(x)}\right)\right\},\left\{y(x)\to\sec^{-1}\left(\frac{-x^3+3x^3\log(x)-9c_1}{9\log(x)}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.79 (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

$$y'(x)=\frac{y(x)}{x\,(xy(x)^4+xy(x)^3+xy(x)-1)}$$

✓ **Mathematica** : cpu = 0.18406 (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 = 0.244 (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

$$y'(x) = x^3\sqrt{x^2+3y(x)} + x^2\sqrt{x^2+3y(x)} + \sqrt{x^2+3y(x)} - \frac{2x}{3}$$

✓ **Mathematica** : cpu = 0.279622 (sec), leaf count = 65

$$\left\{\left\{y(x)\to \frac{1}{192}\left(9x^8+24x^7+16x^6+72x^5+96x^4+80x^2-72c_1x^4-96c_1x^3-288c_1x+144c_1{}^2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.468 (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 = 0.522236 (sec), leaf count = 63

$$\left\{\left\{y(x)\to -\sec^{-1}\left(\frac{-x^2+2x^2\log(x)-4c_1}{4\log(x)}\right)\right\},\left\{y(x)\to \sec^{-1}\left(\frac{-x^2+2x^2\log(x)-4c_1}{4\log(x)}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.783 (sec), leaf count = 27

$$\left\{y(x)=\arccos\left(4\,\frac{\ln(x)}{2\,x^2\ln(x)-x^2+4\_C1}\right)\right\}$$

2.821 ODE No. 821

$$y'(x) = \frac{y(x)(xy(x)+1)}{x\left(x^3y(x)^4-xy(x)-1\right)}$$

✓ **Mathematica** : cpu = 0.20732 (sec), leaf count = 2093

$$\left\{\left\{y(x)\to \frac{c_1}{4}-\frac{1}{2}\sqrt{\frac{c_1{}^2}{4}+\frac{\sqrt[3]{1944c_1{}^2x^6+1458x^5+\sqrt{\left(1944c_1{}^2x^6+1458x^5\right)^2-4\left(54c_1x^4+144x^3\right)^3}}}{18\sqrt[3]{2}x^3}+\frac{}{x^3\sqrt[3]{19}}}\right.\right.$$

✓ **Maple** : cpu = 0.188 (sec), leaf count = 27

$$\left\{-\frac{1}{3\,x^3\,(y\,(x))^3}-\frac{1}{2\,x^2\,(y\,(x))^2}-y(x)+\_C1=0\right\}$$

2.822 ODE No. 822

$$y'(x) = \frac{1}{4}x\left(-4e^{-x^2}x^2y(x) + e^{-2x^2}x^4 - 4e^{-x^2}x^2 + 4e^{-x^2} + 4y(x)^2\right)$$

✓ **Mathematica** : cpu = 0.287834 (sec), leaf count = 32

$$\left\{\left\{y(x) \to \frac{1}{2}e^{-x^2}x^2 + \frac{1}{-\frac{x^2}{2} + c_1}\right\}\right\}$$

✓ **Maple** : cpu = 0.144 (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 = 0.40403 (sec), leaf count = 39

$$\text{Solve}\left[\frac{y(x)^3}{3} + \frac{y(x)^2}{2} + \log(y(x)) - \frac{y(x)\log(x) + x}{y(x)} = c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.35 (sec), leaf count = 38

$$\left\{y(x) = \mathrm{e}^{\mathit{RootOf}\left(-2\left(\mathrm{e}^{\_Z}\right)^4 - 3\left(\mathrm{e}^{\_Z}\right)^3 + 6\,\mathrm{e}^{\_Z}\ln(x) + 6\,\mathrm{e}^{\_Z}\_C1 - 6\_Z\,\mathrm{e}^{\_Z} + 6\,x\right)}\right\}$$

2.824 ODE No. 824

$$y'(x) = \frac{y(x)\left(x^2y(x) + x^3 + y(x)^2\right)}{(x-1)x^2(y(x) + x)}$$

✓ **Mathematica** : cpu = 0.194395 (sec), leaf count = 68

$$\text{Solve}\left[-\frac{1}{2}\log\left(\frac{y(x)^2}{x^2} + \frac{y(x)}{x} + 1\right) + \log\left(\frac{y(x)}{x}\right) + \frac{\tan^{-1}\left(\frac{\frac{2y(x)}{x}+1}{\sqrt{3}}\right)}{\sqrt{3}} = \log(1-x) - \log(x) + c_1, y(x)\right]$$

✓ **Maple** : cpu = 1.25 (sec), leaf count = 61

$$\left\{-\frac{1}{2}\ln\left(\frac{(y(x))^2 + xy(x) + x^2}{x^2}\right) + \frac{\sqrt{3}}{3}\arctan\left(\frac{(x + 2\,y(x))\sqrt{3}}{3\,x}\right) + \ln\left(\frac{y(x)}{x}\right) - \ln(x-1) + \ln(x) - \_C1 = 0\right.$$

2.825 ODE No. 825

$$y'(x) = \frac{x\left(x^2y(x)^3 + \left(x^2+1\right)^{3/2}y(x)^2 + x^2\left(x^2+1\right)^{3/2} + \left(x^2+1\right)^{3/2} + y(x)^3\right)}{\left(x^2+1\right)^3}$$

✓ **Mathematica** : cpu = 0.398184 (sec), leaf count = 148

$$\text{Solve}\left[-\frac{19}{3}\text{RootSum}\left[-19\#1^3+6\sqrt[3]{38}\#1-19\&,\frac{\log\left(\frac{\frac{3xy(x)}{\left(x^2+1\right)^2}+\frac{x}{\left(x^2+1\right)^{3/2}}}{\sqrt[3]{38}\sqrt[3]{\frac{x^3}{\left(x^2+1\right)^{9/2}}}}-\#1\right)}{2\sqrt[3]{38}-19\#1^2}\&\right]=\frac{19^{2/3}\left(\frac{x^3}{\left(x^2+1\right)^{9/2}}\right)^{2/3}\left(x^2\right.}{9\sqrt[3]{2}x^2}$$

✓ **Maple** : cpu = 0.262 (sec), leaf count = 48

$$\left\{y(x)=\frac{19\,RootOf\left(-1296\int^{\_Z}\left(361\_a^3-432\_a+432\right)^{-1}d\_a+2\ln\left(x^2+1\right)+3\_C1\right)-6}{18}\sqrt{x^2+1}\right\}$$

2.826 ODE No. 826

$$y'(x) = \frac{y(x)\left(3xy(x)^2+3y(x)^2+x\right)}{x(x+1)\left(6y(x)^2+x\right)}$$

✓ **Mathematica** : cpu = 0.547028 (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 = 2.256 (sec), leaf count = 51

$$\left\{\left((y(x))^{-2}+6\,x^{-1}\right)^{-1}=\frac{x}{54}\left(\mathrm{e}^{RootOf\left(-\mathrm{e}^{\_Z}\ln\left(\frac{(1+x)^2\left(\mathrm{e}^{\_Z}+9\right)}{2\,x}\right)+3\,\mathrm{e}^{\_Z}\_C1+\_Z\,\mathrm{e}^{\_Z}+9\right)}+9\right)\right\}$$

2.827 ODE No. 827

$$y'(x) = \frac{x^3\left(-\sqrt{x^2+y(x)^2}\right)+x^2y(x)\sqrt{x^2+y(x)^2}+y(x)}{x}$$

✓ **Mathematica** : cpu = 0.255256 (sec), leaf count = 221

$$\left\{\left\{y(x)\to \frac{x-2\sqrt{x^2\tanh^2\left(\frac{1}{3}\left(-\sqrt{2}x^3-3\sqrt{2}c_1\right)\right)-x^2\tanh^4\left(\frac{1}{3}\left(-\sqrt{2}x^3-3\sqrt{2}c_1\right)\right)}}{-1+2\tanh^2\left(\frac{1}{3}\left(-\sqrt{2}x^3-3\sqrt{2}c_1\right)\right)}\right\},\left\{y(x)\to \frac{x+2\sqrt{x^2\tan}}{}\right.$$

✓ **Maple** : cpu = 0.446 (sec), leaf count = 49

$$\left\{\ln\left(2\,\frac{x\left(\sqrt{2\,\left(y\left(x\right)\right)^2+2\,x^2}+y(x)+x\right)}{y\left(x\right)-x}\right)+\frac{\sqrt{2}x^3}{3}-\ln\left(x\right)-\_C1=0\right\}$$

2.828 ODE No. 828

$$y'(x) = \frac{(y(x)+1)(2y(x)+1)}{x\left(2xy(x)^4+xy(x)^3-2y(x)-2\right)}$$

✓ **Mathematica** : cpu = 0.393136 (sec), leaf count = 56

$$\text{Solve}\left[-\frac{1}{8}y(x)^2+\frac{3y(x)}{8}-\frac{1}{2x(2y(x)+1)}-\frac{1}{2}\log(y(x)+1)+\frac{1}{16}\log(2y(x)+1)=c_1,y(x)\right]$$

✓ **Maple** : cpu = 0.896 (sec), leaf count = 54

$$\left\{y(x)=\frac{1}{2}\mathrm{e}^{RootOf\left(x\left(\mathrm{e}^{\_Z}\right)^3-8\,x\left(\mathrm{e}^{\_Z}\right)^2+16\,\ln(1/2\,\mathrm{e}^{\_Z}+1/2)x\mathrm{e}^{\_Z}+8\,\_C1\,x\mathrm{e}^{\_Z}-2\,\_Z\,x\mathrm{e}^{\_Z}+7\,x\mathrm{e}^{\_Z}+16\right)}-\frac{1}{2}\right\}$$

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 = 0.415325 (sec), leaf count = 74

$$\left\{\left\{y(x)\to \frac{16x^{12}+40x^{11}+25x^{10}+80x^9+100x^8+100x^6-160c_1x^7-200c_1x^6-400c_1x^4+400{c_1}^2x^2-100}{400x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.523 (sec), leaf count = 34

$$\left\{\_C1-\frac{1}{x}\sqrt{4\,x^2y\left(x\right)+1}+x^2+\frac{x^4}{2}+\frac{2\,x^5}{5}=0\right\}$$

2.830 ODE No. 830

$$y'(x) = \frac{(x - y(x))y(x)}{x(-y(x)^4 - y(x)^3 - y(x) + x)}$$

✓ **Mathematica** : cpu = 0.443519 (sec), leaf count = 37

$$\text{Solve}\left[-\frac{1}{3}y(x)^3 - \frac{y(x)^2}{2} - \frac{x}{y(x)} - \log(y(x)) + \log(x) = c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.373 (sec), leaf count = 38

$$\left\{y(x) = e^{RootOf\left(2\,(e^{\_Z})^4+3\,(e^{\_Z})^3-6\,e^{\_Z}\ln(x)+6\,e^{\_Z}\_C1+6\,\_Z\,e^{\_Z}+6\,x\right)}\right\}$$

2.831 ODE No. 831

$$y'(x) = \frac{x^3\sqrt{4ax - y(x)^2} + x^2\sqrt{4ax - y(x)^2} + \sqrt{4ax - y(x)^2} + 2a}{y(x)}$$

✓ **Mathematica** : cpu = 2.94089 (sec), leaf count = 145

$$\left\{\left\{y(x) \to -\frac{1}{12}\sqrt{576ax - 9x^8 - 24x^7 - 16x^6 - 72x^5 - 96x^4 - 144x^2 - 72c_1x^4 - 96c_1x^3 - 288c_1x - 144c_1{}^2}\right\}, \left\{\right.\right.$$

✓ **Maple** : cpu = 0.35 (sec), leaf count = 35

$$\left\{-\sqrt{-(y(x))^2 + 4\,ax} - \frac{x^4}{4} - \frac{x^3}{3} - x - \_C1 = 0\right\}$$

2.832 ODE No. 832

$$y'(x) = \frac{y(x)(y(x) + x + 1)}{(x+1)(y(x)^4 + y(x)^3 + y(x)^2 + x)}$$

✓ **Mathematica** : cpu = 2.19468 (sec), leaf count = 2497

$$\left\{\left\{\left\{y(x) \to -\frac{1}{2}\sqrt{\frac{3\sqrt[3]{2}(-8x + 3c_1 + 3\log(x}{\sqrt[3]{1944(c_1 + \log(x+1))^2 + 972(c_1 + \log(x+1)) + 3726x + \sqrt{(1944(c_1 + \log(x+1))^2 + 972(c}}}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.237 (sec), leaf count = 31

$$\left\{\ln(1+x) + \frac{x}{y(x)} - \frac{(y(x))^3}{3} - \frac{(y(x))^2}{2} - y(x) + \_C1 = 0\right\}$$

2.833 ODE No. 833

$$y'(x) = \frac{x^4\left(-\sqrt{x^2+y(x)^2}\right)+x^3y(x)\sqrt{x^2+y(x)^2}+y(x)}{x}$$

✓ **Mathematica** : cpu = 0.245573 (sec), leaf count = 221

$$\left\{\left\{y(x)\to \frac{x-2\sqrt{x^2\tanh^2\left(\frac{1}{4}\left(-\sqrt{2}x^4-4\sqrt{2}c_1\right)\right)-x^2\tanh^4\left(\frac{1}{4}\left(-\sqrt{2}x^4-4\sqrt{2}c_1\right)\right)}}{-1+2\tanh^2\left(\frac{1}{4}\left(-\sqrt{2}x^4-4\sqrt{2}c_1\right)\right)}\right\},\left\{y(x)\to \frac{x+2\sqrt{x^2\tanh\right.}}{}\right.$$

✓ **Maple** : cpu = 0.436 (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 = 0.630005 (sec), leaf count = 90

$$\left\{\left\{y(x)\to -\frac{\sqrt{x}\sqrt{W\left(\frac{6(x+1)^2e^{x^2-2x-3+2c_1}}{x}\right)}}{\sqrt{6}}\right\},\left\{y(x)\to \frac{\sqrt{x}\sqrt{W\left(\frac{6(x+1)^2e^{x^2-2x-3+2c_1}}{x}\right)}}{\sqrt{6}}\right\}\right\}$$

✓ **Maple** : cpu = 2.606 (sec), leaf count = 60

$$\left\{\left((y(x))^{-2}+6\,x^{-1}\right)^{-1}=\frac{x}{54}\left(e^{RootOf\left(e^{\_Z}x^2-e^{\_Z}\ln\left(\frac{\left(e^{\_Z}+9\right)x}{2\,(1+x)^2}\right)+3\,e^{\_Z}\_C1+\_Z\,e^{\_Z}-2\,xe^{\_Z}+9\right)}+9\right)\right\}$$

2.835 ODE No. 835

$$y'(x) = -\frac{1}{x\left(-\sqrt[3]{y(x)^3}\right)\_\mathrm{F1}\left(y(x)^3 - 3\log(x)\right) - x\left(y(x)^3\right)^{2/3}}$$

✗ **Mathematica** : cpu = 1.65518 (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 = 9.56437 (sec), leaf count = 379

$$\mathrm{Solve}\left[\frac{1}{9}2^{2/3}\left(\frac{\left(1-\frac{(x-1)^2\left(\frac{x^6}{(x-1)^3}\right)^{2/3}((x+2)y(x)+x)}{x^4((x-1)y(x)+x)}\right)\left(\frac{\left(\frac{x^6}{(x-1)^3}\right)^{2/3}(x-1)^2((x+2)y(x)+x)}{x^4((x-1)y(x)+x)}+2\right)\left(\left(1-\frac{(x-1)^2\left(\frac{x^6}{(x-1)^3}\right)^{2/3}(\ldots}{x^4((x-1)y(x\ldots}\right.\right.}{}\right.\right.$$

✓ **Maple** : cpu = 1.131 (sec), leaf count = 73

$$\left\{y(x) = -x e^{RootOf\left(-\ln\left(\frac{e^{\_Z}}{2}+\frac{9}{2}\right)e^{\_Z}+3e^{\_Z}\_C1+\_Z e^{\_Z}-xe^{\_Z}+9\right)}\left(-9+(x-1)e^{RootOf\left(-\ln\left(\frac{e^{\_Z}}{2}+\frac{9}{2}\right)e^{\_Z}+3e^{\_Z}\_C1+\_Z\ldots}\right.\right.$$

2.837 ODE No. 837

$$y'(x) = -\frac{1}{-\sqrt[3]{y(x)^3}\log(x)\_\mathrm{F1}\left(3\mathrm{Ei}(-\log(x)) + y(x)^3\right) - \left(y(x)^3\right)^{2/3}\log(x)}$$

✗ **Mathematica** : cpu = 2.00385 (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

$$y'(x) = \frac{-\frac{4}{5}x^3y(x) + \frac{4x^6}{25} + \frac{8x^{7/2}}{5} + \frac{6x^3}{5} - 4\sqrt{x}y(x) + y(x)^2 + 4x + \sqrt{x}}{x}$$

✓ **Mathematica** : cpu = 0.149169 (sec), leaf count = 31

$$\left\{\left\{y(x) \to \frac{2}{5}\sqrt{x}\left(x^{5/2}+5\right) + \frac{1}{-\log(x)+c_1}\right\}\right\}$$

✓ **Maple** : cpu = 0.154 (sec), leaf count = 25

$$\left\{y(x) = \frac{2\,x}{5}\left(x^2 + 5\,\frac{1}{\sqrt{x}}\right) + \left(-\ln(x) + \_C1\right)^{-1}\right\}$$

2.839 ODE No. 839

$$y'(x) = \frac{e^{\frac{y(x)}{x}}\left(x^2 + xe^{-\frac{y(x)}{x}} + e^{-\frac{y(x)}{x}}y(x)\right)}{x}$$

✓ **Mathematica** : cpu = 0.262019 (sec), leaf count = 28

$$\left\{\left\{y(x) \to -x\log\left(-\frac{x}{2} + \frac{e^{2c_1}}{2x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.222 (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 = 0.27323 (sec), leaf count = 30

$$\left\{\left\{y(x) \to -x\log\left(-\frac{x^2}{3} + \frac{e^{3c_1}}{3x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.179 (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 = 1.02406 (sec), leaf count = 236

$$\left\{\left\{y(x)\to -\frac{\sqrt{4a^3b^2x^3-4a^3bcx+2a^{5/2}bx^2-2a^{5/2}c+a^2x+4\sqrt{a}b^2c_1x^2-4\sqrt{a}bcc_1+2bc_1x}}{\sqrt{2}\sqrt{2a^4bx+2a^{3/2}bc_1+a^{7/2}}}\right\},\left\{y(x)\to \frac{\sqrt{4a^3}}{}\right.\right.$$

✓ **Maple** : cpu = 0.548 (sec), leaf count = 97

$$\left\{y(x)=\frac{1}{\_C1\,x+1}\sqrt{a^{\frac{3}{2}}\left(\_C1\,x+1\right)\left(\left(\_C1\,x+1\right)\left(bx^2-c\right)\sqrt{a}+\frac{x}{2}\right)}a^{-\frac{3}{2}},y(x)=-2\,\frac{\sqrt{a^{3/2}\left(\_C1\,x+1\right)\left(\left(\_C\right.\right.}}{a^{3/2}\left(2\right.}\right.$$

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 = 0.205759 (sec), leaf count = 186

$$\left\{\left\{y(x)\to -\frac{\frac{1}{4}x^2e^{\frac{1}{4}x^2(2\log(x)-1)}(2\log(x)-1)\left(\frac{x}{2}+\frac{1}{2}x(2\log(x)-1)\right)+\frac{1}{2}xe^{\frac{1}{4}x^2(2\log(x)-1)}+\frac{1}{2}xe^{\frac{1}{4}x^2(2\log(x)-1)}(2\log}{x\left(\frac{1}{4}x^2e^{\frac{1}{4}x^2(2\log(x)-1)}(2\log(x)-1)+c_1e^{\frac{1}{4}x^2(2\log(x)-}\right.}\right.\right.$$

✓ **Maple** : cpu = 0.149 (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 = 0.195025 (sec), leaf count = 198

$$\left\{\left\{y(x)\to -\frac{\frac{1}{9}x^3e^{\frac{1}{9}x^3(3\log(x)-1)}(3\log(x)-1)\left(\frac{x^2}{3}+\frac{1}{3}x^2(3\log(x)-1)\right)+\frac{1}{3}x^2e^{\frac{1}{9}x^3(3\log(x)-1)}+\frac{1}{3}x^2e^{\frac{1}{9}x^3(3\log(x)-1)}}{x^2\left(\frac{1}{9}x^3e^{\frac{1}{9}x^3(3\log(x)-1)}(3\log(x)-1)+c_1e^{\frac{1}{9}x^3(3\log}\right.}\right.\right.$$

✓ **Maple** : cpu = 0.167 (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 = 10.4817 (sec), leaf count = 386

$$\text{Solve}\left[\frac{2^{2/3}\left(1 - \frac{\left(\frac{x^6}{(x+1)^3}\right)^{2/3}(x+1)^2((x-2)y(x)+x)}{x^4((x+1)y(x)+x)}\right)\left(\frac{\left(\frac{x^6}{(x+1)^3}\right)^{2/3}(x+1)^2((x-2)y(x)+x)}{x^4((x+1)y(x)+x)} + 2\right)\left(\left(1 - \frac{\left(\frac{x^6}{(x+1)^3}\right)^{2/3}(x+1)^2((x-2\right.}{x^4((x+1)y(x)+x)}\right.\right.}{9\left(\frac{3(}{}\right.}\right.$$

✓ **Maple** : cpu = 1.039 (sec), leaf count = 97

$$\left\{y(x) = -x\mathrm{e}^{RootOf\left(-\ln\left(\frac{\mathrm{e}^{\_Z}}{2}+\frac{9}{2}\right)\mathrm{e}^{\_Z}+3\,\mathrm{e}^{\_Z}\_C1+\_Z\,\mathrm{e}^{\_Z}+x\mathrm{e}^{\_Z}+9\right)}\left(\mathrm{e}^{RootOf\left(-\ln\left(\frac{\mathrm{e}^{\_Z}}{2}+\frac{9}{2}\right)\mathrm{e}^{\_Z}+3\,\mathrm{e}^{\_Z}\_C1+\_Z\,\mathrm{e}^{\_Z}+x\mathrm{e}^{\_Z}+9\right)}x\right.\right.$$

2.845 ODE No. 845

$$y'(x) = \frac{x^3\sqrt{4y(x)^3 - 9x^4} + x^2\sqrt{4y(x)^3 - 9x^4} + \sqrt{4y(x)^3 - 9x^4} + 3x^3}{y(x)^2}$$

✓ **Mathematica** : cpu = 3.12535 (sec), leaf count = 266

$$\left\{\left\{y(x) \to -\frac{1}{2}\sqrt[3]{-\frac{1}{2}}\sqrt[3]{9x^8 + 24x^7 + 16x^6 + 72x^5 + 114x^4 - 24x^3 + 144x^2 + 72c_1x^4 + 96c_1x^3 - 72x + 288c_1x +}\right.\right.$$

✓ **Maple** : cpu = 0.255 (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

$$y'(x) = \frac{1}{x^2\left(-\left(\frac{1}{y(x)}+1\right)\right)\_F1\left(x\left(\frac{1}{y(x)}+1\right)\right)+x^2\_F1\left(x\left(\frac{1}{y(x)}+1\right)\right)+x\left(\frac{1}{y(x)}+1\right)-x}$$

✓ **Mathematica** : cpu = 0.881432 (sec), leaf count = 365

$$\text{Solve}\left[\int_1^{y(x)}\left(\frac{x\_F1\left(x\left(1+\frac{1}{K[2]}\right)\right)-1}{x\_F1\left(x\left(1+\frac{1}{K[2]}\right)\right)K[2]-K[2]+x\_F1\left(x\left(1+\frac{1}{K[2]}\right)\right)}-\int_1^x\left(\frac{\_F1\left(K[1]\left(1+\frac{1}{K[2]}\right)\right)-\frac{K[1}{}}{K[1]\left(K[2]\_F1\left(K[1]\left(1+\right.\right.\right.}\right.\right.\right.$$

✓ **Maple** : cpu = 0.341 (sec), leaf count = 40

$$\left\{y(x) = \mathrm{e}^{RootOf\left(-\_Z-\int^{\frac{x\mathrm{e}^{\_Z}}{\mathrm{e}^{\_Z}-1}}\frac{1}{(\_F1(\_a)\_a-1)\_a}d\_a+\_C1\right)}-1\right\}$$

2.847 ODE No. 847

$$y'(x) = x^3\sqrt{x^2-4y(x)+2x+1}+x^2\sqrt{x^2-4y(x)+2x+1}+\sqrt{x^2-4y(x)+2x+1}+\frac{x}{2}+\frac{1}{2}$$

✓ **Mathematica** : cpu = 0.79207 (sec), leaf count = 103

$$\text{Solve}\left[\frac{1}{2}\sqrt{x^2-4y(x)+2x+1}+\frac{1}{2}\log\left(\sqrt{x^2-4y(x)+2x+1}+x+1\right)-\frac{1}{2}\tanh^{-1}\left(\frac{2x+2}{2\sqrt{x^2-4y(x)+2x+1}}\right)\right.$$

✓ **Maple** : cpu = 0.468 (sec), leaf count = 34

$$\left\{\_C1-\frac{x^4}{2}-\frac{2\,x^3}{3}-2\,x-\sqrt{x^2+2\,x+1-4\,y\,(x)}=0\right\}$$

2.848 ODE No. 848

$$y'(x) = \_F1(y(x) - \log(\sinh(x))) + \coth(x)$$

✓ **Mathematica** : cpu = 0.182105 (sec), leaf count = 157

$$\text{Solve}\left[\int_1^{y(x)} -\frac{\_F1(K[2]-\log(\sinh(x)))\int_1^x \left(\frac{(\coth(K[1])+\_F1(K[2]-\log(\sinh(K[1]))))\_F1'(K[2]-\log(\sinh(K[1])))}{(\_F1(K[2]-\log(\sinh(K[1]))))^2} - \frac{\_F1'(K[2}{\_F1(K[2}\right.}{\_F1(K[2]-\log(\sinh(x)))}\right.$$

✓ **Maple** : cpu = 0.572 (sec), leaf count = 27

$$\left\{\int_{\_b}^{y(x)} (\_F1\,(\_a - \ln{(\sinh{(x)})}))^{-1}\, d\_a - x - \_C1 = 0\right\}$$

2.849 ODE No. 849

$$y'(x) = x^3\sqrt{x^2+4y(x)-4x} + x^2\sqrt{x^2+4y(x)-4x} + \sqrt{x^2+4y(x)-4x} - \frac{x}{2} + 1$$

✓ **Mathematica** : cpu = 0.732913 (sec), leaf count = 102

$$\text{Solve}\left[-\frac{1}{2}\sqrt{x^2+4y(x)-4x} + \log\left(-\sqrt{x^2+4y(x)-4x} - x + 2\right) - \tanh^{-1}\left(\frac{2x-4}{2\sqrt{x^2+4y(x)-4x}}\right) + \frac{x^4}{4} + \frac{x^3}{3}\right.$$

✓ **Maple** : cpu = 0.529 (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

$$y'(x) = \_F1(y(x) - \log(\sin(x)) + \log(\cos(x)+1)) + \csc(x)$$

✓ **Mathematica** : cpu = 0.222082 (sec), leaf count = 1485

$$\text{Solve}\left[\int_1^x -\frac{(\cot^2(K[1]) + \csc(K[1])\cot(K[1]) + 1)\sin(K[1])(\csc(K[1]) + \_F1(\log(\cos(K[1}{-\cot^2(K[1]) + \_F1(\log(\cos(K[1])+1) - \log(\sin(K[1])) + y(x))\cot(K[1]) + \csc^2(K[1]) + \csc(K[1]}\right.$$

✓ **Maple** : cpu = 1.357 (sec), leaf count = 32

$$\left\{\int_{\_b}^{y(x)} (\_F1\,(\_a - \ln{(\sin{(x)})} + \ln{(\cos{(x)}+1)}))^{-1}\, d\_a - x - \_C1 = 0\right\}$$

2.851 ODE No. 851

$$y'(x) = \frac{3a^2bx^2y(x) + a^2bx^2 + a^3x^3 + 3ab^2xy(x)^2 + 2ab^2xy(x) + b^3y(x)^3 + b^3y(x)^2 + b^3}{b^3}$$

✓ **Mathematica** : cpu = 0.338223 (sec), leaf count = 145

$$\text{Solve}\left[-\frac{1}{3}(27a+29b)^{2/3}\text{RootSum}\left[\#1^3(27a+29b)^{2/3} - 3\#1b^{2/3} + (27a+29b)^{2/3}\&, \frac{\log\left(\frac{\frac{3ax+b}{b}+3y(x)}{\sqrt[3]{\frac{27a+29b}{b}}} - \#1\right)}{b^{2/3} - \#1^2(27a+29b)^{2/3}}\&\right.\right.$$

✓ **Maple** : cpu = 0.322 (sec), leaf count = 42

$$\left\{y(x) = \frac{RootOf\left(\int^{\_Z}\left(b\_a^3 + b\_a^2 + a + b\right)^{-1} d\_ab - x + \_C1\right)b - ax}{b}\right\}$$

2.852 ODE No. 852

$$y'(x) = \frac{3\alpha^2\beta xy(x)^2 + 2\alpha^2\beta xy(x) + \alpha^3y(x)^3 + \alpha^3y(x)^2 + \alpha^3 + 3\alpha\beta^2x^2y(x) + \alpha\beta^2x^2 + \beta^3x^3}{\alpha^3}$$

✓ **Mathematica** : cpu = 0.334587 (sec), leaf count = 145

$$\text{Solve}\left[-\frac{1}{3}(29\alpha+27\beta)^{2/3}\text{RootSum}\left[\#1^3(29\alpha+27\beta)^{2/3} - 3\#1\alpha^{2/3} + (29\alpha+27\beta)^{2/3}\&, \frac{\log\left(\frac{\frac{\alpha+3\beta x}{\alpha}+3y(x)}{\sqrt[3]{\frac{29\alpha+27\beta}{\alpha}}} - \#1\right.}{\alpha^{2/3} - \#1^2(29\alpha+27\beta)^2}\right.\right.$$

✓ **Maple** : cpu = 0.322 (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 = 0.214669 (sec), leaf count = 76

$$\left\{\left\{y(x) \to -\frac{x+2}{x} + \frac{1}{x^3\left(\frac{1}{x^3} - \frac{1}{x^3\sqrt{-2x+c_1}}\right)}\right\}, \left\{y(x) \to -\frac{x+2}{x} + \frac{1}{x^3\left(\frac{1}{x^3} + \frac{1}{x^3\sqrt{-2x+c_1}}\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.12 (sec), leaf count = 63

$$\left\{y(x) = \frac{1}{x}\left(-2\sqrt{\_C1 - 2x} - x - 2\right)\left(\sqrt{\_C1 - 2x} + 1\right)^{-1}, y(x) = \frac{1}{x}\left(-2\sqrt{\_C1 - 2x} + x + 2\right)\left(\sqrt{\_C1 - 2x}\right.$$

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 = 0.894089 (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 = 0.941 (sec), leaf count = 51

$$\left\{y(x) = \left(x^{\frac{x^3}{x^3+3\_C1}}\right)^{-1}\left(x^{\frac{\_C1}{x^3+3\_C1}}\right)^{-3}\left(e^{\frac{x}{x^3+3\_C1}}\right)^{-3}\right\}$$

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 = 0.821865 (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 = 0.946 (sec), leaf count = 51

$$\left\{y(x) = \left(x^{\frac{x^4}{x^4+4\_C1}}\right)^{-1}\left(x^{\frac{\_C1}{x^4+4\_C1}}\right)^{-4}\left(e^{\frac{x}{x^4+4\_C1}}\right)^{-4}\right\}$$

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 = 0.617005 (sec), leaf count = 103

$$\text{Solve}\left[\int_1^{y(x)} \left(\frac{\sqrt{K[2]^2}}{\_F1\left(K[2]^2 - 2x\right)} - \int_1^x \frac{2K[2]\_F1'\left(K[2]^2 - 2K[1]\right)}{\left(\_F1\left(K[2]^2 - 2K[1]\right)\right)^2} dK[1]\right) dK[2] + \int_1^x \left(-K[1] - \frac{1}{\_F1\left(y(x)^2 - \right.}\right.\right.$$

✓ **Maple** : cpu = 0.533 (sec), leaf count = 65

$$\left\{y(x) = \sqrt{2\,RootOf\left(x^2 - 2\int^{\_Z} \left(\_F1\left(2\_a\right)\right)^{-1} d\_a + 4\_C1\right) + 2\,x}, y(x) = -\sqrt{2\,RootOf\left(x^2 - 2\int^{\_Z} \left(\_F\right.\right.}\right.$$

2.857 ODE No. 857

$$y'(x) = x^3\sqrt{x^2 + 8y(x) - 2x + 1} + x^2\sqrt{x^2 + 8y(x) - 2x + 1} + \sqrt{x^2 + 8y(x) - 2x + 1} - \frac{x}{4} + \frac{1}{4}$$

✓ **Mathematica** : cpu = 0.655029 (sec), leaf count = 107

$$\text{Solve}\left[-\frac{1}{4}\sqrt{x^2 + 8y(x) - 2x + 1} + \frac{1}{4}\log\left(-\sqrt{x^2 + 8y(x) - 2x + 1} - x + 1\right) - \frac{1}{4}\tanh^{-1}\left(\frac{2x - 2}{2\sqrt{x^2 + 8y(x) - 2x + \right.}\right.\right.$$

✓ **Maple** : cpu = 0.493 (sec), leaf count = 32

$$\left\{\_C1 + x^4 + \frac{4\,x^3}{3} + 4\,x - \sqrt{x^2 - 2\,x + 1 + 8\,y\left(x\right)} = 0\right\}$$

2.858 ODE No. 858

$$y'(x) = \frac{3a^2bxy(x)^2 + 2a^2bxy(x) + a^3y(x)^3 + a^3y(x)^2 + a^3 + 3ab^2x^2y(x) + ab^2x^2 + b^3x^3}{a^3}$$

✓ **Mathematica** : cpu = 0.333847 (sec), leaf count = 145

$$\text{Solve}\left[-\frac{1}{3}(29a + 27b)^{2/3}\text{RootSum}\left[\#1^3(29a + 27b)^{2/3} - 3\#1a^{2/3} + (29a + 27b)^{2/3}\&, \frac{\log\left(\frac{\frac{a+3bx}{a} + 3y(x)}{\sqrt[3]{\frac{29a+27b}{a}}} - \#1\right)}{a^{2/3} - \#1^2(29a + 27b)^{2/3}}\&\right.\right.$$

✓ **Maple** : cpu = 0.296 (sec), leaf count = 42

$$\left\{ y(x) = \frac{RootOf\left(\int^{-Z} \left(\_a^3 a + \_a^2 a + a + b\right)^{-1} d\_aa - x + \_C1\right) a - bx}{a} \right\}$$

2.859 ODE No. 859

$$y'(x) = \frac{\_F1\left(y(x)^2 - 2x\right) + x}{x\sqrt{y(x)^2}}$$

✓ **Mathematica** : cpu = 0.823968 (sec), leaf count = 105

$$\text{Solve}\left[\int_1^{y(x)} \left(\frac{\sqrt{K[2]^2}}{\_F1\left(K[2]^2 - 2x\right)} - \int_1^x \frac{2K[2]\_F1'\left(K[2]^2 - 2K[1]\right)}{\left(\_F1\left(K[2]^2 - 2K[1]\right)\right)^2} dK[1] \right) dK[2] + \int_1^x \left(-\frac{1}{\_F1\left(y(x)^2 - 2K[1]\right)} \right.\right.$$

✓ **Maple** : cpu = 0.386 (sec), leaf count = 63

$$\left\{ y(x) = \sqrt{2\, RootOf\left(\ln(x) - \int^{-Z} \left(\_F1\,(2\_a)\right)^{-1} d\_a + 2\_C1\right) + 2\,x}, y(x) = -\sqrt{2\, RootOf\left(\ln(x) - \int^{-Z} \left(\right.\right.}\right.$$

2.860 ODE No. 860

$$y'(x) = \frac{\frac{1}{2}x^4\cos(2y(x)) + \frac{1}{2}x^3\cos(2y(x)) + \frac{x^4}{2} + \frac{x^3}{2} - \frac{1}{2}\sin(2y(x)) + \frac{1}{2}x\cos(2y(x)) + \frac{x}{2}}{x}$$

✓ **Mathematica** : cpu = 0.359853 (sec), leaf count = 33

$$\left\{ \left\{ y(x) \to \tan^{-1}\left(\frac{4x^5 + 5x^4 + 10x^2 + 10c_1}{20x} \right) \right\} \right\}$$

✓ **Maple** : cpu = 1.783 (sec), leaf count = 29

$$\left\{ y(x) = \arctan\left(\frac{4\,x^5 + 5\,x^4 + 10\,x^2 + 40\_C1}{20\,x} \right) \right\}$$

2.861 ODE No. 861

$$y'(x) = -\frac{e^{-1/x}\left(-\_\mathrm{F1}\left(e^{\frac{1}{x}}y(x)\right) - \frac{e^{\frac{1}{x}}y(x)}{x}\right)}{x}$$

✓ **Mathematica** : cpu = 1.45601 (sec), leaf count = 158

$$\text{Solve}\left[\int_1^{y(x)} -\frac{\_\mathrm{F1}\left(e^{\frac{1}{x}}K[2]\right)\int_1^x\left(\frac{e^{\frac{1}{K[1]}}}{K[1]^2\_\mathrm{F1}\left(e^{\frac{1}{K[1]}}K[2]\right)} - \frac{e^{\frac{2}{K[1]}}K[2]\_\mathrm{F1}'\left(e^{\frac{1}{K[1]}}K[2]\right)}{K[1]^2\left(\_\mathrm{F1}\left(e^{\frac{1}{K[1]}}K[2]\right)\right)^2}\right)dK[1] + e^{\frac{1}{x}}}{\_\mathrm{F1}\left(e^{\frac{1}{x}}K[2]\right)}dK[2] + \int_1^x \left(\frac{}{K[}\right.\right.$$

✓ **Maple** : cpu = 0.274 (sec), leaf count = 26

$$\left\{y(x) = \frac{RootOf\left(-\ln(x) + \int^{\_Z}(\_F1(\_a))^{-1}d\_a + \_C1\right)}{e^{x^{-1}}}\right\}$$

2.862 ODE No. 862

$$y'(x) = -\log(y(x)-1)\left(\frac{\mathrm{Ei}(-\log(y(x)-1))}{x} - \_\mathrm{F1}(x)\right)$$

✗ **Mathematica** : cpu = 0.773101 (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 = 0.346 (sec), leaf count = 27

$$\left\{y(x) = e^{RootOf\left(\int -\frac{F1(x)}{x}dx + \_C1\,x + Ei(1, -\_Z)\right)} + 1\right\}$$

2.863 ODE No. 863

$$y'(x) = \frac{x^4\sqrt{x^2+y(x)^2} + x^3\sqrt{x^2+y(x)^2} + x\sqrt{x^2+y(x)^2} + y(x)}{x}$$

✓ **Mathematica** : cpu = 0.168677 (sec), leaf count = 30

$$\left\{\left\{y(x) \to x\sinh\left(\frac{1}{12}(3x^4 + 4x^3 + 12x + 12c_1)\right)\right\}\right\}$$

✓ **Maple** : cpu = 12.839 (sec), leaf count = 38

$$\left\{\ln\left(\sqrt{(y(x))^2 + x^2} + y(x)\right) - \frac{x^4}{4} - \frac{x^3}{3} - x - \ln(x) - \_C1 = 0\right\}$$

2.864 ODE No. 864

$$y'(x) = \frac{e^{\frac{x^2}{4}} y(x) \left(2e^{-\frac{3x^2}{4}} y(x)^2 + e^{-\frac{x^2}{2}} x y(x) + e^{-\frac{x^2}{4}} x\right)}{2e^{-\frac{x^2}{4}} y(x) + 2}$$

✓ **Mathematica** : cpu = 0.28418 (sec), leaf count = 137

$$\left\{\left\{y(x) \to \frac{2e^{\frac{x^2}{2}}}{-2e^{\frac{x^2}{4}} + \sqrt{2}\sqrt{2e^{\frac{x^2}{2}} + 2e^{\frac{x^2}{2}}(-2x + c_1)}}\right\}, \left\{y(x) \to -\frac{2e^{\frac{x^2}{2}}}{2e^{\frac{x^2}{4}} + \sqrt{2}\sqrt{2e^{\frac{x^2}{2}} + 2e^{\frac{x^2}{2}}(-2x + c_1)}}\right\}\right\}$$

✓ **Maple** : cpu = 0.145 (sec), leaf count = 162

$$\left\{y(x) = \left(e^{\frac{x^2}{2}}\left(\sqrt{\_C1 - 2x} - 1\right)e^{-\frac{x^2}{4}} - e^{\frac{x^2}{4}}\sqrt{\_C1 - 2x}\right)\left(e^{-\frac{x^2}{4}}\right)^{-1}\left(e^{\frac{x^2}{4}}\sqrt{\_C1 - 2x} + e^{-\frac{x^2}{4}}e^{\frac{x^2}{2}}\right)^{-1}, y(x) =$$

2.865 ODE No. 865

$$y'(x) = (1 - y(x))\left(-f(x) + \frac{y(x)\log(y(x) - 1)}{x(1 - y(x))\log(x)} - \frac{\log(y(x) - 1)}{x(1 - y(x))\log(x)}\right)$$

✓ **Mathematica** : cpu = 0.303579 (sec), leaf count = 87

$$\text{Solve}\left[\int_1^x \left(-\frac{f(K[1])}{\log(K[1])} - \frac{\log(y(x) - 1)}{K[1]\log^2(K[1])}\right) dK[1] + \int_1^{y(x)} \left(\frac{1}{(K[2] - 1)\log(x)} - \int_1^x -\frac{1}{K[1](K[2] - 1)\log^2(K[1]}\right.\right.$$

✓ **Maple** : cpu = 0.865 (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

$$y'(x) = x^3\sqrt{a^2 + 2ax + x^2 + 4y(x)} + x^2\sqrt{a^2 + 2ax + x^2 + 4y(x)} + \sqrt{a^2 + 2ax + x^2 + 4y(x)} - \frac{a}{2} - \frac{x}{2}$$

✓ **Mathematica** : cpu = 0.649474 (sec), leaf count = 117

$$\text{Solve}\left[-\frac{1}{2}\sqrt{a^2 + 2ax + x^2 + 4y(x)} - \frac{1}{2}a\log\left(\sqrt{a^2 + 2ax + x^2 + 4y(x)} + a + x\right) + \frac{1}{2}a\tanh^{-1}\left(\frac{2a + 2a}{2\sqrt{a^2 + 2ax + x}}\right.\right.$$

✓ **Maple** : cpu = 0.522 (sec), leaf count = 37

$$\left\{\_C1 + \frac{x^4}{2} + \frac{2x^3}{3} + 2x - \sqrt{x^2 + 2ax + a^2 + 4y(x)} = 0\right\}$$

2.867 ODE No. 867

$$y'(x) = \frac{1}{3}x^4y(x) + x^2y(x)^2 + \frac{2}{3}x^2y(x) + \frac{x^6}{27} + \frac{x^4}{9} + y(x)^3 + y(x)^2 - \frac{2x}{3} + 1$$

✓ **Mathematica** : cpu = 0.183702 (sec), leaf count = 77

$$\text{Solve}\left[-\frac{29}{3}\text{RootSum}\left[-29\#1^3 + 3\sqrt[3]{29}\#1 - 29\&, \frac{\log\left(\frac{x^2+3y(x)+1}{\sqrt[3]{29}} - \#1\right)}{\sqrt[3]{29} - 29\#1^2}\&\right] = \frac{1}{9}29^{2/3}x + c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.257 (sec), leaf count = 30

$$\left\{y(x) = -\frac{x^2}{3} + \mathit{RootOf}\left(-x + \int^{\_Z}\left(\_a^3 + \_a^2 + 1\right)^{-1}d\_a + \_C1\right)\right\}$$

2.868 ODE No. 868

$$y'(x) = 3x^4y(x) - 3x^2y(x)^2 - 2x^2y(x) - x^6 + x^4 + y(x)^3 + y(x)^2 + 2x + 1$$

✓ **Mathematica** : cpu = 0.153236 (sec), leaf count = 79

$$\text{Solve}\left[-\frac{29}{3}\text{RootSum}\left[-29\#1^3 + 3\sqrt[3]{29}\#1 - 29\&, \frac{\log\left(\frac{-3x^2+3y(x)+1}{\sqrt[3]{29}} - \#1\right)}{\sqrt[3]{29} - 29\#1^2}\&\right] = \frac{1}{9}29^{2/3}x + c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.213 (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

$$y'(x) = \frac{-2x^3y(x) - 2x^2y(x) + 2x^5 + 2x^4 + x^3 + 3x^2 - 2y(x) - x + 1}{x^2 - y(x)}$$

✓ **Mathematica** : cpu = 0.0320043 (sec), leaf count = 42

$$\left\{\left\{y(x) \to x^2 + \frac{1}{2}\left(1 + W\left(-e^{x^4+\frac{4x^3}{3}-2x^2+4x-1+c_1}\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.245 (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 = 1.4857 (sec), leaf count = 35

$$\left\{\left\{y(x) \to -x\log\left(\frac{-\frac{x^4}{4} - \frac{x^3}{3} - x - c_1}{x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.822 (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 = 0.228767 (sec), leaf count = 22

$$\left\{\left\{y(x) \to -\log(2x+1) + \frac{1}{-x + c_1}\right\}\right\}$$

✓ **Maple** : cpu = 0.115 (sec), leaf count = 26

$$\left\{y(x) = \frac{-1 + (-x + \_C1)\ln(2\,x+1)}{x - \_C1}\right\}$$

2.872 ODE No. 872

$$y'(x) = \frac{-6x^3y(x) + \frac{12x^6}{5} + 14x^{7/2} - 6x^3 - 5\sqrt{x}y(x) + 10x - 5\sqrt{x} - 5}{x\left(2x^3 - 5y(x) + 10\sqrt{x} - 5\right)}$$

✓ **Mathematica** : cpu = 0.0446531 (sec), leaf count = 215

$$\left\{\left\{y(x) \to \frac{1}{5}(2x^3 + 10\sqrt{x} - 5) - \frac{\sqrt{-x\left(2x^3 + 10\sqrt{x} - 5\right)^2 - 50x\left(-\frac{2x^6}{25} - \frac{4x^{7/2}}{5} + \frac{2x^3}{5} - 2x + 2\sqrt{x} + \log(x)\right) -}}{5\sqrt{-\frac{1}{x}}x}\right.\right.$$

✓ **Maple** : cpu = 0.125 (sec), leaf count = 49

$$\left\{y(x) = \frac{2\,x^3}{5} + 2\,\sqrt{x} - \sqrt{\_C1 + 2\,\ln(x)} - 1, y(x) = \frac{2\,x^3}{5} + 2\,\sqrt{x} + \sqrt{\_C1 + 2\,\ln(x)} - 1\right\}$$

2.873 ODE No. 873

$$y'(x) = \frac{2y(x)+1}{x\left(2xy(x)^4+3xy(x)^3+xy(x)^2+2xy(x)+x-2\right)}$$

✓ **Mathematica** : cpu = 0.491061 (sec), leaf count = 53

$$\text{Solve}\left[\frac{1}{192}\left(-16y(x)^3-12y(x)^2+12y(x)-54\log(4y(x)+2)+7\right)-\frac{1}{2x(2y(x)+1)}=c_1,y(x)\right]$$

✓ **Maple** : cpu = 0.328 (sec), leaf count = 50

$$\left\{y(x)=\frac{e^{RootOf\left(2\,x\left(e^{\_Z}\right)^4-3\,x\left(e^{\_Z}\right)^3-6\,x\left(e^{\_Z}\right)^2+48\,\_C1\,xe^{\_Z}+54\,\_Z\,xe^{\_Z}+7\,xe^{\_Z}+96\right)}}{2}-\frac{1}{2}\right\}$$

2.874 ODE No. 874

$$y'(x) = \frac{1}{512}x\left(24a^2x^8y(x)+a^3x^{12}+8a^2x^8+192ax^4y(x)^2+128ax^4y(x)-256ax^2+512y(x)^3+512y(x)^2+512\right.$$

✓ **Mathematica** : cpu = 0.216223 (sec), leaf count = 101

$$\text{Solve}\left[-\frac{29}{3}\text{RootSum}\left[-29\#1^3+3\sqrt[3]{29}\#1-29\&,\frac{\log\left(\frac{\frac{1}{8}\left(3ax^5+8x\right)+3xy(x)}{\sqrt[3]{29}\sqrt[3]{x^3}}-\#1\right)}{\sqrt[3]{29}-29\#1^2}\&\right]=\frac{1}{18}29^{2/3}\left(x^3\right)^{2/3}+c_1,y(x)\right.$$

✓ **Maple** : cpu = 0.158 (sec), leaf count = 40

$$\left\{y(x)=-\frac{ax^4}{8}-\frac{1}{3}+\frac{29\,RootOf\left(x^2-162\int^{\_Z}\left(841\,\_a^3-27\,\_a+27\right)^{-1}d\_a+6\,\_C1\right)}{9}\right\}$$

2.875 ODE No. 875

$$y'(x) = \frac{x^5\left(-\sqrt{x^2+y(x)^2}\right)+x^4y(x)\sqrt{x^2+y(x)^2}+xy(x)+y(x)}{x(x+1)}$$

✓ **Mathematica** : cpu = 0.23858 (sec), leaf count = 497

$$\left\{\left\{y(x)\to\frac{x-2\sqrt{x^2\tanh^2\left(\frac{1}{12}\left(-3\sqrt{2}x^4+4\sqrt{2}x^3-6\sqrt{2}x^2+12\sqrt{2}x-12\sqrt{2}\log(x+1)+25\sqrt{2}-12\sqrt{2}c_1\right)\right)-}}{-1+2\tanh^2\left(\frac{1}{12}\left(-3\sqrt{2}x^4+4\sqrt{2}x^3-6\sqrt{2}x^2+12\sqrt{}\right.\right.}\right.\right.$$

✓ **Maple** : cpu = 0.453 (sec), leaf count = 73

$$\left\{\ln\left(2\,\frac{x\left(\sqrt{2\,(y(x))^{2}+2\,x^{2}}+y(x)+x\right)}{y(x)-x}\right)+\sqrt{2}\ln(1+x)+\frac{(3\,x^{4}-4\,x^{3}+6\,x^{2}-12\,x)\sqrt{2}}{12}-\_C1-\ln(x)=\right.$$

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 = 0.190116 (sec), leaf count = 135

$$\left\{\left\{y(x)\to-\frac{4x}{-2(x-2)x+\frac{2\sqrt{-x(x-2)^{2}-4x\left(-2\left(\frac{x^{2}}{8}-\frac{x}{2}+\frac{\log(x)}{4}\right)+c_{1}\right)}}{\sqrt{-\frac{1}{x}}}}\right\},\left\{y(x)\to\frac{4x}{2(x-2)x+\frac{2\sqrt{-x(x-2)^{2}-4x\left(-2\left(\frac{x^{2}}{8}\right.\right.}}{\sqrt{-\frac{1}{x}}}}\right.\right.$$

✓ **Maple** : cpu = 0.151 (sec), leaf count = 41

$$\left\{y(x)=-4\left(\sqrt{\_C1-8\ln(x)}-2\,x+4\right)^{-1},y(x)=4\left(\sqrt{\_C1-8\ln(x)}+2\,x-4\right)^{-1}\right\}$$

2.877 ODE No. 877

$$y'(x)=\frac{-3x^{4}y(x)+3x^{2}y(x)^{2}+x^{6}+2x^{3}-2xy(x)-y(x)^{3}-2x}{x^{2}-y(x)-1}$$

✓ **Mathematica** : cpu = 0.159018 (sec), leaf count = 49

$$\left\{\left\{y(x)\to x^{2}+\frac{1}{1-\frac{1}{\sqrt{-2x+c_{1}}}}-1\right\},\left\{y(x)\to x^{2}+\frac{1}{1+\frac{1}{\sqrt{-2x+c_{1}}}}-1\right\}\right\}$$

✓ **Maple** : cpu = 0.114 (sec), leaf count = 73

$$\left\{y(x)=\frac{1}{-2\,\_C1+2\,x}\left(-2\,\_C1\,x^{2}+2\,x^{3}+\sqrt{2\,\_C1-2\,x+1}-1\right),y(x)=\frac{1}{-2\,x+2\,\_C1}\left(2\,\_C1\,x^{2}-2\,x^{3}+\right.\right.$$

2.878 ODE No. 878

$$y'(x) = \frac{48a^2x^2y(x)^2 - 64a^3x^3 + 16a^2x^2 - 12axy(x)^4 - 8axy(x)^2 + y(x)^6 + y(x)^4 + 1}{y(x)}$$

✓ **Mathematica** : cpu = 0.34374 (sec), leaf count = 130

$$\text{Solve}\left[2a\left(x - \frac{1}{2}\text{RootSum}\left[-48\#1^2a^2y(x)^2 + 64\#1^3a^3 - 16\#1^2a^2 + 12\#1ay(x)^4 + 8\#1ay(x)^2 + 2a - y(x)^6 - y\right.\right.\right.$$

✓ **Maple** : cpu = 19.054 (sec), leaf count = 75

$$\left\{\int_{\_b}^{y(x)} \frac{\_a}{-\_a^6 + 12\_a^4ax - 48\_a^2a^2x^2 + 64\,a^3x^3 - \_a^4 + 8\_a^2ax - 16\,a^2x^2 + 2\,a - 1} d\_a + x - \_C1 = 0\right\}$$

2.879 ODE No. 879

$$y'(x) = \frac{x^2\left(-\sqrt{x^2 + y(x)^2}\right) + xy(x)\sqrt{x^2 + y(x)^2} + xy(x) + y(x)}{x(x+1)}$$

✓ **Mathematica** : cpu = 0.313471 (sec), leaf count = 239

$$\left\{\left\{y(x) \to \frac{x - 2\sqrt{x^2\tanh^2\left(\sqrt{2}x - \sqrt{2}\log(x+1) + \sqrt{2}c_1\right) - x^2\tanh^4\left(\sqrt{2}x - \sqrt{2}\log(x+1) + \sqrt{2}c_1\right)}}{-1 + 2\tanh^2\left(\sqrt{2}x - \sqrt{2}\log(x+1) + \sqrt{2}c_1\right)}\right\}, \left\{y(x\right.\right.$$

✓ **Maple** : cpu = 0.477 (sec), leaf count = 55

$$\left\{\ln\left(2\,\frac{x\left(\sqrt{2\,(y(x))^2 + 2\,x^2} + y(x) + x\right)}{y(x) - x}\right) + \sqrt{2}x - \sqrt{2}\ln(1+x) - \ln(x) - \_C1 = 0\right\}$$

2.880 ODE No. 880

$$y'(x) = -\frac{2a}{-96a^3x^2y(x)^2 + 128a^4x^3 - 32a^3x^2 + 24a^2xy(x)^4 + 16a^2xy(x)^2 - 2ay(x)^6 - 2ay(x)^4 - 2a - y(x)}$$

✓ **Mathematica** : cpu = 0.408524 (sec), leaf count = 131

$$\text{Solve}\left[\frac{\text{RootSum}\left[48\#1^2a^2y(x)^2 - 64\#1^3a^3 + 16\#1^2a^2 - 12\#1ay(x)^4 - 8\#1ay(x)^2 + y(x)^6 + y(x)^4 + 1\&, \frac{}{48\#1^2}\right.}{8a^2}\right.$$

✓ **Maple** : cpu = 0.234 (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

$$y'(x)=\frac{9x^4y(x)+27x^2y(x)^2+x^6-6x^3-18xy(x)+27y(x)^3-18x}{9x^2+27y(x)+27}$$

✓ **Mathematica** : cpu = 0.161262 (sec), leaf count = 75

$$\left\{\left\{y(x)\to\frac{1}{3}\left(-x^2-3\right)+\frac{1}{27\left(\frac{1}{27}-\frac{1}{\sqrt{-1458x+c_1}}\right)}\right\},\left\{y(x)\to\frac{1}{3}\left(-x^2-3\right)+\frac{1}{27\left(\frac{1}{27}+\frac{1}{\sqrt{-1458x+c_1}}\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.118 (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

$$y'(x)=-\frac{1}{216}\sqrt{x}\left(-18x^6y(x)+108x^3y(x)^2+72x^3y(x)+x^9-6x^6-108x^{3/2}-216y(x)^3-216y(x)^2-216\right)$$

✓ **Mathematica** : cpu = 0.225998 (sec), leaf count = 119

$$\text{Solve}\left[-\frac{29}{3}\text{RootSum}\left[-29\#1^3+3\sqrt[3]{29}\#1-29\&,\frac{\log\left(\frac{\frac{1}{2}(2\sqrt{x}-x^{7/2})+3\sqrt{x}y(x)}{\sqrt[3]{29}\sqrt[3]{x^{3/2}}}-\#1\right)}{\sqrt[3]{29}-29\#1^2}\&\right]=\frac{2}{27}29^{2/3}\sqrt{x}\left(x^{3/2}\right)^{2/3}\right.$$

✓ **Maple** : cpu = 0.163 (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

$$y'(x) = \frac{x(3a^2bx^2y(x)^4 + 2a^2bx^2y(x)^2 + a^3y(x)^6 + a^3y(x)^4 + a^3 + 3ab^2x^4y(x)^2 + ab^2x^4 + b^3x^6)}{a^{7/2}y(x)}$$

✓ **Mathematica** : cpu = 1.13261 (sec), leaf count = 164

$$\text{Solve}\left[\frac{x^2}{2} - \frac{1}{2}a^{5/2}\text{RootSum}\left[3\#1^2ab^2y(x)^2 + \#1^2ab^2 + \#1^3b^3 + 3\#1a^2by(x)^4 + 2\#1a^2by(x)^2 + a^{5/2}b + a^3y(x)^6\right.\right.$$

✓ **Maple** : cpu = 1.094 (sec), leaf count = 352

$$\left\{\int_{\_b}^{x}\left(b^3\_a^6 + 3\,ab^2\_a^4(y(x))^2 + 3\,a^2b\_a^2(y(x))^4 + (y(x))^6\,a^3 + a\_a^4b^2 + 2\,(y(x))^2\,a^2b\_a^2 + (y(x))^4\,a^3 + a^3\right)\right.$$

2.884 ODE No. 884

$$y'(x) = -\frac{x(-3x^4y(x)^2 + 3x^2y(x)^4 + 2x^2y(x)^2 + x^6 - x^4 - y(x)^6 - y(x)^4 - 1)}{y(x)}$$

✓ **Mathematica** : cpu = 0.543185 (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 = 1.041 (sec), leaf count = 107

$$\left\{y(x) = -\mathrm{e}^{RootOf\left(3\,x^2\,(\mathrm{e}^{\_Z})^2 - 6\,x^3\mathrm{e}^{\_Z} - 3\,(\mathrm{e}^{\_Z})^2\ln\left(\frac{(\mathrm{e}^{\_Z})^2 - 2\,x\mathrm{e}^{\_Z} + 1}{\mathrm{e}^{\_Z} - 2\,x}\right) - 2\,(\mathrm{e}^{\_Z})^2\_C1 + 3\_Z\,(\mathrm{e}^{\_Z})^2 + 6\,\mathrm{e}^{\_Z}\ln\left(\frac{(\mathrm{e}^{\_Z})^2 - 2\,x\mathrm{e}^{\_Z} + 1}{\mathrm{e}^{\_Z} - 2\,x}\right)x\right.}\right.$$

2.885 ODE No. 885

$$y'(x) = -\frac{i(12x^4y(x)^2 + 48x^2y(x)^4 + 32x^2y(x)^2 + x^6 + 4x^4 + 64y(x)^6 + 64y(x)^4 + 32ix + 64)}{128y(x)}$$

✗ **Mathematica** : cpu = 40.6233 (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

$$y'(x) = \frac{x^6 y(x)^3 - 3x^5 y(x)^2 + x^4 y(x)^2 + 3x^4 y(x) - 4x^3 y(x) - x^3 + 2x^2 + 1}{x^4}$$

✓ **Mathematica** : cpu = 0.169137 (sec), leaf count = 82

$$\text{Solve}\left[-\frac{29}{3}\text{RootSum}\left[-29\#1^3 + 3\sqrt[3]{29}\#1 - 29\&, \frac{\log\left(\frac{3x^2y(x)-3x+1}{\sqrt[3]{29}} - \#1\right)}{\sqrt[3]{29} - 29\#1^2}\&\right] = -\frac{29^{2/3}}{9x} + c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.133 (sec), leaf count = 42

$$\left\{y(x) = \frac{9\,x - 3 + 29\,RootOf\left(-81\int^{\_Z}\left(841\,\_a^3 - 27\,\_a + 27\right)^{-1} d\_a x + 3\,\_C1\,x - 1\right)}{9\,x^2}\right\}$$

2.887 ODE No. 887

$$y'(x) = \frac{a^3x^3y(x)^3 + 3a^2x^2y(x)^2 + a^2xy(x) + a^2x + 3axy(x) + a + 1}{a^2x^2(axy(x) + ax + 1)}$$

✓ **Mathematica** : cpu = 0.22509 (sec), leaf count = 106

$$\left\{\left\{y(x) \to -\frac{ax+1}{ax} + \frac{1}{a^3x^3\left(\frac{1}{a^3x^3} - \frac{1}{x^3\sqrt{-2a^6x+c_1}}\right)}\right\}, \left\{y(x) \to -\frac{ax+1}{ax} + \frac{1}{a^3x^3\left(\frac{1}{a^3x^3} + \frac{1}{x^3\sqrt{-2a^6x+c_1}}\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.152 (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 = 0.153244 (sec), leaf count = 78

$$\left\{\left\{y(x) \to \frac{x-1}{x^2} + \frac{1}{x^4\left(\frac{1}{x^2} - \frac{1}{x^2\sqrt{\frac{2}{x}+c_1}}\right)}\right\}, \left\{y(x) \to \frac{x-1}{x^2} + \frac{1}{x^4\left(\frac{1}{x^2} + \frac{1}{x^2\sqrt{\frac{2}{x}+c_1}}\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.168 (sec), leaf count = 79

$$\left\{y(x)=\frac{1}{x^2}\left(\sqrt{\frac{\_C1\,x+2}{x}}x-x+1\right)\left(\sqrt{\frac{\_C1\,x+2}{x}}-1\right)^{-1},y(x)=\frac{1}{x^2}\left(\sqrt{\frac{\_C1\,x+2}{x}}x+x-1\right)\left(\sqrt{\frac{\_C1\,x}{x}}\right.\right.$$

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 = 300.585 (sec), leaf count = 0 , timed out

```
$Aborted
```

✓ **Maple** : cpu = 1.159 (sec), leaf count = 49

$$\left\{e^x-\frac{2}{3}\ln\left((y(x))^{\frac{3}{2}}-\frac{3\,e^x}{2}+1\right)-4\left(-6\,(y(x))^{3/2}+9\,e^x\right)^{-1}+\frac{2}{3}\ln\left((y(x))^{\frac{3}{2}}-\frac{3\,e^x}{2}\right)-\_C1=0\right\}$$

2.890 ODE No. 890

$$y'(x)=\frac{x}{3x^4y(x)^2+3x^2y(x)^4+2x^2y(x)^2+x^6+x^4+y(x)^6+y(x)^4-y(x)+1}$$

✓ **Mathematica** : cpu = 0.171611 (sec), leaf count = 103

$$\text{Solve}\left[y(x)-\frac{1}{2}\text{RootSum}\left[3\#1^2y(x)^2+\#1^3+\#1^2+3\#1y(x)^4+2\#1y(x)^2+y(x)^6+y(x)^4+1\&,\frac{}{3\#1^2+6\#1}\right.\right.$$

✓ **Maple** : cpu = 0.9 (sec), leaf count = 34

$$\left\{-y(x)+\frac{\int^{(y(x))^2+x^2}\left(\_a^3+\_a^2+1\right)^{-1}d\_a}{2}-\_C1=0\right\}$$

2.891 ODE No. 891

$$y'(x) = \frac{y(x)^2 \left(x^4 y(x) + 2x^2 y(x) + 2x^2 - 2y(x)\right)}{x^3 \left(x^2 y(x) + x^2 - y(x)\right)}$$

✓ **Mathematica** : cpu = 0.166652 (sec), leaf count = 135

$$\left\{\left\{y(x) \to \frac{x^5}{-x^3\left(x^2-1\right) + \frac{\sqrt{(x^2-1)^2 x + x^5\left(-2\left(-\frac{1}{x^2}+\frac{1}{2x^4}+\log(x)\right)+c_1\right)}}{\sqrt{\frac{1}{x^5}}}}\right\}, \left\{y(x) \to -\frac{x^5}{\left(x^2-1\right)x^3 + \frac{\sqrt{(x^2-1)^2 x + x^5\left(-2\left(\right.\right.}}{\sqrt{}}}\right.$$

✓ **Maple** : cpu = 0.165 (sec), leaf count = 56

$$\left\{ y(x) = x^2 \left(\sqrt{\_C1 - 2\ln(x)}x^2 - x^2 + 1\right)^{-1}, y(x) = -x^2 \left(\sqrt{\_C1 - 2\ln(x)}x^2 + x^2 - 1\right)^{-1} \right\}$$

2.892 ODE No. 892

$$y'(x) = \frac{e^{-\frac{2}{x^2 - y(x)^2 - 1}} + x^2 + 2xy(x) + y(x)^2}{-e^{-\frac{2}{x^2 - y(x)^2 - 1}} + x^2 + 2xy(x) + y(x)^2}$$

✓ **Mathematica** : cpu = 2.07701 (sec), leaf count = 1283

$$\text{Solve}\left[\int_1^x \left(-e^{\int_1^{(K[2]-y(x))(K[2]+y(x))} \frac{2((K[1]-3)K[1]+1)}{\left(e^{-\frac{2}{K[1]-1}} - K[1]\right)(K[1]-1)^2} dK[1] + \frac{2}{K[2]^2 - y(x)^2 - 1}} K[2]^2 - 2e^{\int_1^{(K[2]-y(x))(K[2]+y(x))} \frac{2((K[1]}{\left(e^{-\frac{2}{K[1]-1}}\right.}}\right.\right.$$

✓ **Maple** : cpu = 2.487 (sec), leaf count = 40

$$\left\{ y(x) = \mathrm{e}^{RootOf\left(-\_Z + \int \left(\mathrm{e}^{\_Z}\right)^2 - 2\,x\mathrm{e}^{\_Z}\left(\mathrm{e}^{2\,(\_a+1)^{-1}} + \_a\right)^{-1} d\_a + \_C1\right)} - x \right\}$$

2.893 ODE No. 893

$$y'(x) = \frac{x^3y(x)^3 + x^3y(x)^2 + 6x^2y(x)^2 + 4x^2y(x) + x^3 + 12xy(x) + 6x + 8}{x^3}$$

✓ **Mathematica** : cpu = 0.161096 (sec), leaf count = 80

$$\text{Solve}\left[-\frac{29}{3}\text{RootSum}\left[-29\#1^3 + 3\sqrt[3]{29}\#1 - 29\&, \frac{\log\left(\frac{3y(x)+\frac{x+6}{x}}{\sqrt[3]{29}} - \#1\right)}{\sqrt[3]{29} - 29\#1^2}\&\right] = \frac{1}{9}29^{2/3}x + c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.109 (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

$$y'(x) = -\frac{i\left(3x^4y(x)^2 + 3x^2y(x)^4 + 2x^2y(x)^2 + x^6 + x^4 + y(x)^6 + y(x)^4 + ix + 1\right)}{y(x)}$$

✗ **Mathematica** : cpu = 40.5825 (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

$$y'(x) = \frac{x\left(24a^2x^8y(x) + a^3x^{12} - 32a^2x^6 + 192ax^4y(x)^2 - 256ax^2y(x) - 256ax^2 + 512y(x)^3\right)}{64ax^4 + 512y(x) + 512}$$

✓ **Mathematica** : cpu = 0.214201 (sec), leaf count = 81

$$\left\{\left\{y(x) \to \frac{1}{8}\left(-ax^4 - 8\right) + \frac{1}{512\left(\frac{1}{512} - \frac{1}{\sqrt{-262144x^2+c_1}}\right)}\right\}, \left\{y(x) \to \frac{1}{8}\left(-ax^4 - 8\right) + \frac{1}{512\left(\frac{1}{512} + \frac{1}{\sqrt{-262144x^2+c_1}}\right)}\right.\right.$$

✓ **Maple** : cpu = 0.169 (sec), leaf count = 79

$$\left\{y(x) = \left(-8 + \left(-\sqrt{-x^2 + \_C1} - 1\right)ax^4\right)\left(8 + 8\sqrt{-x^2 + \_C1}\right)^{-1}, y(x) = \left(8 + \left(-\sqrt{-x^2 + \_C1} + 1\right)ax^4\right)\right.$$

2.896 ODE No. 896

$$y'(x) = \frac{3x^4y(x)^2 - 3x^2y(x)^4 - 2x^2y(x)^2 - x^6 + x^4 + y(x)^6 + y(x)^4 + x + 1}{y(x)}$$

✓ **Mathematica** : cpu = 0.274243 (sec), leaf count = 106

$$\text{Solve}\left[\frac{1}{2}\text{RootSum}\left[3\#1^2y(x)^2 - \#1^3 + \#1^2 - 3\#1y(x)^4 - 2\#1y(x)^2 + y(x)^6 + y(x)^4 + 1\&, \frac{\log (}{3\#1^2 - 6\#1y(x)^2 -}\right.\right.$$

✓ **Maple** : cpu = 0.795 (sec), leaf count = 63

$$\left\{\int_{\_b}^{y(x)} \frac{\_a}{-\_a^6 + 3\,\_a^4x^2 - 3\,x^4\_a^2 + x^6 - \_a^4 + 2\,\_a^2x^2 - x^4 - 1}\,\mathrm{d}\_a + x - \_C1 = 0\right\}$$

2.897 ODE No. 897

$$y'(x) = \frac{\sqrt{x}\left(-18x^6y(x) + 108x^3y(x)^2 - 108x^{3/2}y(x) + x^9 + 18x^{9/2} - 108x^{3/2} - 216y(x)^3\right)}{36x^3 - 216y(x) - 216}$$

✓ **Mathematica** : cpu = 0.2022 (sec), leaf count = 79

$$\left\{\left\{y(x) \to \frac{1}{6}\left(x^3 - 6\right) - \frac{1}{216\left(-\frac{1}{216} - \frac{1}{\sqrt{-62208x^{3/2}+c_1}}\right)}\right\}, \left\{y(x) \to \frac{1}{6}\left(x^3 - 6\right) - \frac{1}{216\left(-\frac{1}{216} + \frac{1}{\sqrt{-62208x^{3/2}+c_1}}\right)}\right.$$

✓ **Maple** : cpu = 0.175 (sec), leaf count = 87

$$\left\{y(x) = \left(\sqrt{9\_C1 - 12\,x^{3/2}}x^3 - 3\,x^3 + 18\right)\left(6\,\sqrt{9\_C1 - 12\,x^{3/2}} - 18\right)^{-1}, y(x) = \left(\sqrt{9\_C1 - 12\,x^{3/2}}x^3 + 3\,x\right.\right.$$

2.898 ODE No. 898

$$y'(x) = \frac{4x^6y(x)^3 + 2x^5y(x) + 3x^4y(x)^2 + \frac{3}{4}x^2y(x) + 2x^5 + \frac{x^3}{2} + \frac{1}{16}}{x^6\left(4x^2y(x) + 4x^2 + 1\right)}$$

✓ **Mathematica** : cpu = 0.17968 (sec), leaf count = 106

$$\left\{\left\{y(x) \to -\frac{4x^2+1}{4x^2} + \frac{1}{64x^8\left(\frac{1}{64x^8} - \frac{1}{x^8\sqrt{\frac{8192}{x}+c_1}}\right)}\right\}, \left\{y(x) \to -\frac{4x^2+1}{4x^2} + \frac{1}{64x^8\left(\frac{1}{64x^8} + \frac{1}{x^8\sqrt{\frac{8192}{x}+c_1}}\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.125 (sec), leaf count = 87

$$\left\{y(x)=\frac{1}{4\,x^2}\left(-4\,x^2-\sqrt{\frac{\_C1\,x+2}{x}}-1\right)\left(\sqrt{\frac{\_C1\,x+2}{x}}+1\right)^{-1},y(x)=\frac{1}{4\,x^2}\left(4\,x^2-\sqrt{\frac{\_C1\,x+2}{x}}+1\right)\left(\sqrt{\right.\right.$$

2.899 ODE No. 899

$$y'(x)=\frac{x^6y(x)^3+x^6y(x)^2+\frac{3}{4}x^4y(x)^2+\frac{1}{2}x^4y(x)+\frac{3}{16}x^2y(x)+x^6+\frac{x^5}{2}+\frac{x^2}{16}+\frac{1}{64}}{x^8}$$

✓ **Mathematica** : cpu = 0.188566 (sec), leaf count = 106

$$\text{Solve}\left[-\frac{29}{3}\text{RootSum}\left[-29\#1^3+3\sqrt[3]{29}\#1-29\&,\frac{\log\left(\frac{\frac{3y(x)}{x^2}+\frac{4x^2+3}{4x^4}}{\sqrt[3]{29}\sqrt[3]{\frac{1}{x^6}}}-\#1\right)}{\sqrt[3]{29}-29\#1^2}\&\right]=-\frac{1}{9}29^{2/3}\left(\frac{1}{x^6}\right)^{2/3}x^3+c_1,y(x)\right.$$

✓ **Maple** : cpu = 0.138 (sec), leaf count = 47

$$\left\{y(x)=\frac{116\,RootOf\left(-81\int^{\_Z}\left(841\,\_a^3-27\,\_a+27\right)^{-1}d\_a x+3\,\_C1\,x-1\right)x^2-12\,x^2-9}{36\,x^2}\right\}$$

2.900 ODE No. 900

$$y'(x)=\frac{2a\left(4ax-y(x)^2-1\right)}{-96a^3x^2y(x)^2+128a^4x^3+24a^2xy(x)^4-2ay(x)^6+4axy(x)-y(x)^3-y(x)}$$

✓ **Mathematica** : cpu = 0.168226 (sec), leaf count = 381

$$\{\{y(x)\to\text{Root}\left[-64\#1^3a^2x+\#1^2\left(-2+128a^3c_1x\right)-16\#1^4a^2c_1+8\#1^5a+128\#1a^3x^2-256a^4c_1x^2+8ax-\right.$$

✓ **Maple** : cpu = 0.246 (sec), leaf count = 48

$$\left\{\frac{y(x)}{2\,a}-\frac{1}{16\,\left(\left(y\left(x\right)\right)^2-4\,ax\right)^2a^2}+\left(32\,a^3x-8\,a^2(y(x))^2\right)^{-1}-\_C1=0\right\}$$

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 = 0.519897 (sec), leaf count = 33

$$\text{Solve}\left[ax\log(y(x)) - \frac{x^2}{2} - y(x)\log(x) - y(x)\log(y(x)) = c_1, y(x)\right]$$

✓ **Maple** : cpu = 1.353 (sec), leaf count = 30

$$\left\{y(x) = \mathrm{e}^{RootOf\left(-2\,ax\_Z+2\,\mathrm{e}^{\_Z}\ln(x)+2\_Z\,\mathrm{e}^{\_Z}+2\_C1\,a+x^2\right)}\right\}$$

2.902 ODE No. 902

$$y'(x) = \frac{-3x^4y(x)^2 + 3x^2y(x)^4 + x^6 + x^3 - xy(x)^2 - y(x)^6 - x}{y(x)\left(x^2 - y(x)^2 - 1\right)}$$

✓ **Mathematica** : cpu = 0.191283 (sec), leaf count = 295

$$\left\{\left\{y(x) \to -\frac{1}{2}\sqrt{\frac{4x^3}{x-c_1} - \frac{4c_1x^2}{x-c_1} - \frac{\sqrt{-4x+1+4c_1}}{x-c_1} - \frac{1}{x-c_1}}\right\}, \left\{y(x) \to \frac{1}{2}\sqrt{\frac{4x^3}{x-c_1} - \frac{4c_1x^2}{x-c_1} - \frac{\sqrt{-4x+1+}}{x-c_1}}\right.\right.$$

✓ **Maple** : cpu = 0.394 (sec), leaf count = 183

$$\left\{y(x) = \frac{1}{6\,x+2\_C1}\sqrt{(3\,x+\_C1)\left(4\_C1\,x^2+12\,x^3-\sqrt{-12\_C1-36\,x+9}-3\right)}, y(x) = \frac{1}{6\,x+2\_C1}\sqrt{(3\right.$$

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 = 0.109961 (sec), leaf count = 19

$$\left\{\left\{y(x) \to 2x\cot^{-1}\left(e^{-x-c_1}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.21 (sec), leaf count = 48

$$\left\{y(x) = \arctan\left(2\,\frac{\mathrm{e}^x\_C1}{(\mathrm{e}^x)^2\_C1^2+1}, \frac{-(\mathrm{e}^x)^2\_C1^2+1}{(\mathrm{e}^x)^2\_C1^2+1}\right)x\right\}$$

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 = 0.0955035 (sec), leaf count = 23

$$\left\{\left\{y(x)\to 2x\cot^{-1}\left(e^{-\frac{x^2}{2}-c_1}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.203 (sec), leaf count = 64

$$\left\{y(x)=\arctan\left(2\,\frac{e^{1/2\,x^2}\_C1}{\_C1^2\left(e^{1/2\,x^2}\right)^2+1},\left(-\_C1^2\left(e^{\frac{x^2}{2}}\right)^2+1\right)\left(\_C1^2\left(e^{\frac{x^2}{2}}\right)^2+1\right)^{-1}\right)x\right\}$$

2.905 ODE No. 905

$$y'(x) = \frac{a^3x^3y(x)^3+a^3x^3y(x)^2+3a^2x^2y(x)^2+2a^2x^2y(x)+a^3x^3+a^2x+3axy(x)+ax+1}{a^3x^3}$$

✓ **Mathematica** : cpu = 0.215357 (sec), leaf count = 85

$$\text{Solve}\left[-\frac{29}{3}\text{RootSum}\left[-29\#1^3+3\sqrt[3]{29}\#1-29\&,\frac{\log\left(\frac{\frac{ax+3}{ax}+3y(x)}{\sqrt[3]{29}}-\#1\right)}{\sqrt[3]{29}-29\#1^2}\&\right]=\frac{1}{9}29^{2/3}x+c_1,y(x)\right]$$

✓ **Maple** : cpu = 0.117 (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

$$y'(x) = \frac{x\left(x^2+y(x)^2+1\right)}{3x^4y(x)^2+3x^2y(x)^4-x^2y(x)+x^6+y(x)^6-y(x)^3-y(x)}$$

✓ **Mathematica** : cpu = 0.121226 (sec), leaf count = 326

$$\left\{\left\{y(x)\to \text{Root}\left[8\#1^3x^2+\#1^2\left(2-8c_1x^2\right)+4\#1^5-4\#1^4c_1+4\#1x^4+2x^2-4c_1x^4+1\&,1\right]\right\},\left\{y(x)\to \text{Root}\left[\right.\right.$$

✓ **Maple** : cpu = 0.323 (sec), leaf count = 37

$$\left\{-\frac{1}{4\left((y(x))^{2}+x^{2}\right)^{2}}-\left(2(y(x))^{2}+2x^{2}\right)^{-1}-y(x)+\_C1=0\right\}$$

2.907 ODE No. 907

$$y'(x)=\frac{\frac{3x^2}{2}+x^2\sin(x)-2x^2\cos(x)+\frac{1}{2}x^2\cos(2x)-2xy(x)+y(x)^2+2xy(x)\cos(x)+x-x\cos(x)}{x}$$

✓ **Mathematica** : cpu = 0.231538 (sec), leaf count = 22

$$\left\{\left\{y(x)\to -x(\cos(x)-1)+\frac{1}{-\log(x)+c_1}\right\}\right\}$$

✓ **Maple** : cpu = 0.286 (sec), leaf count = 20

$$\left\{y(x)=-(-1+\cos(x))\,x+(-\ln(x)+\_C1)^{-1}\right\}$$

2.908 ODE No. 908

$$y'(x)=\frac{4(a-1)(a+1)x}{-2a^4x^2y(x)^2+4a^2x^2y(x)^2+a^6x^4-3a^4x^4+3a^2x^4+a^2y(x)^4-2x^2y(x)^2-x^4-y(x)^4+4y(x)}$$

✓ **Mathematica** : cpu = 1.12845 (sec), leaf count = 1269

$$\left\{\left\{y(x)\to\frac{c_1}{3(a^2-1)}+\frac{\sqrt[3]{-18x^2c_1a^6+54x^2c_1a^4+54a^4-54x^2c_1a^2-108a^2+2c_1{}^3+18x^2c_1+\sqrt{4(-3x^2a^6+}}}{}\right.\right.$$

✓ **Maple** : cpu = 0.54 (sec), leaf count = 1742

$$\left\{y(x)=\frac{9^{\frac{2}{3}}}{27a^2-27}\left(\left(-\_C1\,a^2+\_C1\right)\sqrt[3]{9}\sqrt[3]{(a-1)^2\left(\frac{1}{3}\sqrt{-3(a-1)^5(a+1)^5x^6+6\_C1^2(a-1)^4(a+1)^4}\right.}\right.\right.$$

2.909 ODE No. 909

$$y'(x) = \frac{x^3y(x)^6 + x^3y(x)^4 + 3x^2y(x)^4 + 2x^2y(x)^2 + x^3 + 3xy(x)^2 + x + 1}{x^5y(x)}$$

✗ **Mathematica** : cpu = 40.6398 (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 = 1.097 (sec), leaf count = 84

$$\left\{y(x) = \frac{1}{x}\sqrt{x\left(RootOf\left(\int^{\_Z}(2\_a^3+2\_a^2+1)^{-1}\,d\_ax + \_C1\,x+1\right)x-1\right)}, y(x) = -\frac{1}{x}\sqrt{x\left(RootOf\left(\int\right.\right.}\right.$$

2.910 ODE No. 910

$$y'(x) = \frac{3x^5y(x) + 3x^4y(x)^2 + x^3y(x)^3 + 2x^3y(x) + x^2y(x)^2 + x^6 + x^4 - y(x) - 2x + 1}{x}$$

✓ **Mathematica** : cpu = 0.183674 (sec), leaf count = 98

$$\text{Solve}\left[-\frac{29}{3}\text{RootSum}\left[-29\#1^3+3\sqrt[3]{29}\#1-29\&, \frac{\log\left(\frac{3x^2y(x)+3x^3+x}{\sqrt[3]{29}\sqrt[3]{x^3}}-\#1\right)}{\sqrt[3]{29}-29\#1^2}\&\right] = \frac{29^{2/3}\left(x^3\right)^{2/3}}{9x}+c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.109 (sec), leaf count = 42

$$\left\{y(x) = \frac{-9\,x^2+29\,RootOf\left(-81\,\int^{\_Z}(841\,\_a^3-27\,\_a+27)^{-1}\,d\_a+x+3\,\_C1\right)-3}{9\,x}\right\}$$

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 = 0.71596 (sec), leaf count = 106

$$\text{Solve}\left[\int_1^x\left(\frac{2\log(y(x))\sin(K[1])}{K[1]^2} - \frac{2(\cos(K[1])\log(y(x)) - \sin(K[1])\_\text{F1}(K[1]))}{K[1]}\right)dK[1] + \int_1^{y(x)}\left(-\frac{2\sin(x)}{xK[2]} -\right.\right.$$

✓ **Maple** : cpu = 1.2 (sec), leaf count = 30

$$\left\{y(x) = e^{\frac{\_C1\,x}{\sin(x)}}e^{\frac{x}{\sin(x)}\int\frac{\_F1(x)\sin(x)}{x}\,dx}\right\}$$

2.912 ODE No. 912

$$y'(x) = \frac{2ax}{-24a^2x^2y(x)^4 - 16a^2x^2y(x)^2 + 96a^3xy(x)^2 + 32a^3x - 128a^4 + 2ax^3y(x)^6 + 2ax^3y(x)^4 + 2ax^3 - x^3y(x)}$$

✓ **Mathematica** : cpu = 1.2911 (sec), leaf count = 201

$$\text{Solve}\left[-\text{RootSum}\left[12\#1^2ay(x)^4 + 8\#1^2ay(x)^2 - \#1^3y(x)^6 - \#1^3y(x)^4 - \#1^3 - 48\#1a^2y(x)^2 - 16\#1a^2 + 64a^3\right.\right.$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(y(x),x) = 2*a*x/(-x^3*y(x)+2*a*x^3+2*a*y(x)^4*x^3-16*y(x)^2*a^2*x^2+32*a^3*x+2*a
24*y(x)^4*a^2*x^2+96*y(x)^2*x*a^3-128*a^4),y(x))
```

2.913 ODE No. 913

$$y'(x) = \frac{y(x)^3 + y(x) + y(x)^3\left(-\log^3(x)\right) + y(x)^3\log^2(x) + 3y(x)^2\log^2(x) - 2y(x)^2\log(x) - 3y(x)\log(x) + 1}{xy(x)}$$

✓ **Mathematica** : cpu = 0.780276 (sec), leaf count = 716

$$\text{Solve}\left[\int_1^{y(x)}\left(2\text{RootSum}\left[\#1^3K[1]^3 - \#1^2K[1]^3 - 2K[1]^3 - 3\#1^2K[1]^2 + 2\#1K[1]^2 + 3\#1K[1] - K[1] - 1\&,\right.\right.\right.$$

✓ **Maple** : cpu = 0.236 (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

$$y'(x) = \frac{2a\left(-4a + xy(x)^2 + x\right)}{-24a^2x^2y(x)^4 + 96a^3xy(x)^2 - 128a^4 + 2ax^3y(x)^6 + 4ax^2y(x) - x^3y(x)^3 - x^3y(x)}$$

✓ **Mathematica** : cpu = 1.23192 (sec), leaf count = 401

$$\{\{y(x) \to \text{Root}\left[\#1^2\left(2x^2 + 64a^2c_1x\right) - 64\#1^3a^2x + 8\#1^5ax^2 - 8\#1^4ac_1x^2 + 128\#1a^3 - 128a^3c_1 - 8ax + x^2\&,\right.$$

✓ **Maple** : cpu = 2.659 (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 = 0.850626 (sec), leaf count = 724

$$\text{Solve}\left[\int_1^{y(x)} \left(4\text{RootSum}\left[8\#1^3K[1]^3 - 4\#1^2K[1]^3 - 3K[1]^3 - 12\#1^2K[1]^2 + 4\#1K[1]^2 + 6\#1K[1] - K[1] - 1\right.\right.\right.$$

✓ **Maple** : cpu = 0.23 (sec), leaf count = 43

$$\left\{y(x) = 9\left(18\ln(x) + 83\,RootOf\left(-81\int^{\_Z}(6889\_a^3 - 27\_a + 27)^{-1}\,d\_a - \ln(x) + 3\_C1\right) - 3\right)^{-1}\right\}$$

2.916 ODE No. 916

$$y'(x) = \frac{y(x)\left(x^4\log^2(y(x)) + 2x^4\log(x)\log(y(x)) + x^4\log^2(x) + x\log(y(x)) + \log(y(x)) - x + x\log(x) + \log(x)\right.}{x(x+1)}$$

✗ **Mathematica** : cpu = 1.71768 (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 = 1.006 (sec), leaf count = 73

$$\left\{y(x) = e^{\frac{-12\ln(x)\ln(1+x) + \left(-3x^4 + 4x^3 - 6x^2 + 12\_C1 + 12x\right)\ln(x) - 12x}{3x^4 - 4x^3 + 6x^2 + 12\ln(1+x) - 12\_C1 - 12x}}\right\}$$

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 = 1.05713 (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 = 0.977 (sec), leaf count = 38

$$\left\{y(x) = e^{\frac{\ln(x)\ln(1+x) + (-x + \_C1)\ln(x) - x}{-\ln(1+x) - \_C1 + x}}\right\}$$

2.918 ODE No. 918

$$y'(x) = \frac{2y(x)^8}{128x^3y(x)^6 + 32x^2y(x)^6 + 96x^2y(x)^4 + 2y(x)^6 + y(x)^5 + 16xy(x)^4 + 24xy(x)^2 + 2y(x)^2 + 2}$$

✓ **Mathematica** : cpu = 0.460737 (sec), leaf count = 720

$$\text{Solve}\left[\int_1^{y(x)} \left(\text{RootSum}\left[64\#1^3K[1]^6 + 16\#1^2K[1]^6 + K[1]^6 + 48\#1^2K[1]^4 + 8\#1K[1]^4 + 12\#1K[1]^2 + K[1]^2 \right.\right.\right.$$

✓ **Maple** : cpu = 1.14 (sec), leaf count = 41

$$\left\{x - \mathit{RootOf}\left(\int^{\_Z} \left(64\_a^3 + 16\_a^2 + 1\right)^{-1} d\_ay(x) + y(x)\_C1 + 1\right) + \frac{1}{4\,(y(x))^2} = 0\right\}$$

2.919 ODE No. 919

$$y'(x) = \frac{\left(-y(x) + \sqrt{y(x)} + x\right) y(x)^{3/2}}{-3x^2y(x) + x^3 + 3xy(x)^2 + xy(x)^{3/2} - y(x)^3 - y(x)^{5/2} + y(x)^2}$$

✗ **Mathematica** : cpu = 300.441 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.283 (sec), leaf count = 61

$$\left\{-\left(\left(x - y(x) - \sqrt{y(x)}\right)\sqrt{2\,y(x) - \sqrt{y(x)} - 2\,x} + \_C1\,(y(x))^{\frac{3}{4}}\,(y(x) - x)^{\frac{3}{2}}\right)(y(x))^{-\frac{3}{4}}\,(y(x) - x)^{-\frac{3}{2}} = 0\right\}$$

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 = 0.402761 (sec), leaf count = 301

$$\left\{\left\{y(x) \to \text{Root}\left[128\#1^4x^2 + \#1^5\left(128c_1x^2 - 8x - 1\right) + 64\#1^2x + \#1^3(-2 + 64c_1x) + 8\#1c_1 + 8\&, 1\right]\right\}, \left\{y(x) \right.\right.$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(y(x),x) = 2*y(x)^6*(1+4*x*y(x)^2+y(x)^2)/(y(x)^3+4*y(x)^5*x+y(x)^5+2+24*x*y(x)^2
```

2.921 ODE No. 921

$$y'(x) = -y(x)\left(-\_F1(x) - \frac{\log(y(x))}{x} + \frac{\log(y(x))}{x\log(x)}\right)$$

✓ **Mathematica** : cpu = 0.238332 (sec), leaf count = 92

$$\text{Solve}\left[\int_1^x \left(\frac{\log(y(x)) - \log(K[1])\log(y(x))}{K[1]^2} - \frac{\log(K[1])\_F1(K[1])}{K[1]}\right) dK[1] + \int_1^{y(x)} \left(\frac{\log(x)}{xK[2]} - \int_1^x \frac{\frac{1}{K[2]} - \frac{\log(K}{K[2}}{K[1]^2}\right.\right.$$

✓ **Maple** : cpu = 0.579 (sec), leaf count = 30

$$\left\{y(x) = e^{\frac{\_C1\,x}{\ln(x)}} e^{\frac{x}{\ln(x)} \int \frac{\_F1(x)\ln(x)}{x}\,dx}\right\}$$

2.922 ODE No. 922

$$y'(x) = \frac{y(x)^2}{-3x^2y(x) + x^2\sqrt{y(x)} + x^3 + 3xy(x)^2 - 2xy(x)^{3/2} - y(x)^3 + y(x)^{5/2} + y(x)^2 + y(x)^{3/2}}$$

✓ **Mathematica** : cpu = 1.1555 (sec), leaf count = 882

$$\text{Solve}\left[\int_1^{y(x)} \left(\frac{-x-K[1]}{2\left(-2x^3 + 6K[1]x^2 - 2\sqrt{K[1]}x^2 - 6K[1]^2x + 4K[1]^{3/2}x + K[1]x + 2K[1]^3 - 2K[1]^{5/2} - K[1]^2 -\right.}\right.\right.$$

✓ **Maple** : cpu = 0.351 (sec), leaf count = 47

$$\left\{\frac{\ln(y(x))}{2} - \int^{x\frac{1}{\sqrt{y(x)}} - \sqrt{y(x)}} \left(2\_a^3 + 2\_a^2 - \_a + 2\right)^{-1} d\_a - \_C1 = 0\right\}$$

2.923 ODE No. 923

$$y'(x) = \frac{x^2 + 2xy(x) + e^{-2(x-y(x))(y(x)+x)} + y(x)^2}{x^2 + 2xy(x) - e^{-2(x-y(x))(y(x)+x)} + y(x)^2}$$

✓ **Mathematica** : cpu = 1.37901 (sec), leaf count = 432

$$\text{Solve}\left[\int_1^{y(x)} \left(-\frac{2e^{2(x-K[2])(x+K[2])}K[2]}{-e^{2(x-K[2])(x+K[2])}x^2 + e^{2(x-K[2])(x+K[2])}K[2]^2 + 1} - \int_1^x \left(-\frac{2e^{2(K[1]-K[2])(K[1]+K[2])}K[1](2(K[1}{e^{2(K[1]-K[2])(K[1]+K[2])}K[1]^2 - e^{2(K}\right.\right.\right.$$

✓ **Maple** : cpu = 0.552 (sec), leaf count = 36

$$\left\{y(x) = \mathrm{e}^{RootOf\left(-\_Z+\int^{\left(\mathrm{e}^{\_Z}\right)^2-2x\,\mathrm{e}^{\_Z}}\left(\mathrm{e}^{2\_a}+\_a\right)^{-1}d\_a+\_C1\right)}-x\right\}$$

2.924 ODE No. 924

$$y'(x) = -\frac{y(x)\left(-\_\mathrm{F1}(x)-\frac{\log^2(y(x))}{2x}\right)}{\log(y(x))}$$

✓ **Mathematica** : cpu = 0.249312 (sec), leaf count = 80

$$\mathrm{Solve}\left[\int_1^x\left(-\frac{\log^2(y(x))}{2K[1]^2}-\frac{\_\mathrm{F1}(K[1])}{K[1]}\right)dK[1]+\int_1^{y(x)}\left(\frac{\log(K[2])}{xK[2]}-\int_1^x-\frac{\log(K[2])}{K[1]^2K[2]}dK[1]\right)dK[2]=c_1,y(x)\right]$$

✓ **Maple** : cpu = 0.334 (sec), leaf count = 46

$$\left\{y(x) = \mathrm{e}^{\sqrt{2\int\frac{\_F1(x)}{x}\,\mathrm{d}x x+2\_C1\,x}}, y(x) = \mathrm{e}^{-\sqrt{2}\sqrt{x\left(\int\frac{\_F1(x)}{x}\,\mathrm{d}x+\_C1\right)}}\right\}$$

2.925 ODE No. 925

$$y'(x) = \frac{x^2+2xy(x)+e^{2(x-y(x))^2(y(x)+x)^2}+y(x)^2}{x^2+2xy(x)-e^{2(x-y(x))^2(y(x)+x)^2}+y(x)^2}$$

✓ **Mathematica** : cpu = 2.03702 (sec), leaf count = 228

$$\mathrm{Solve}\left[\int_1^{y(x)}\left(-\frac{2K[2]}{-x^2+e^{2(x-K[2])^2(x+K[2])^2}+K[2]^2}-\int_1^x\left(\frac{2K[1]\left(-2K[2]-e^{2(K[1]-K[2])^2(K[1]+K[2])^2}\left(4(K[1]-\right.\right.}{\left(K[1]^2-e^{2(K[1]-K[}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.472 (sec), leaf count = 38

$$\left\{y(x) = \mathrm{e}^{RootOf\left(-\_Z+\int^{\left(\mathrm{e}^{\_Z}\right)^2-2x\,\mathrm{e}^{\_Z}}\left(\mathrm{e}^{2\_a^2}+\_a\right)^{-1}d\_a+\_C1\right)}-x\right\}$$

2.926 ODE No. 926

$$y'(x) = \frac{\frac{1}{16}x^3y(x)^3 - \frac{1}{2}x^2y(x)^3 - \frac{3}{8}x^2y(x)^2 + xy(x)^3 + xy(x)^2 + \frac{3}{4}xy(x) - \frac{1}{2}}{x(xy(x) - 2y(x) - 2)}$$

✓ **Mathematica** : cpu = 0.189697 (sec), leaf count = 128

$$\left\{\left\{y(x)\to \frac{2}{x-2}+\frac{1}{16x(x-2)\left(-\frac{1}{64}-\frac{e^{2\left(\frac{1}{2}\log(2-x)-\frac{\log(x)}{2}\right)}}{\sqrt{2048\log(x)+c_1}}\right)}\right\},\left\{y(x)\to \frac{2}{x-2}+\frac{1}{16x(x-2)\left(-\frac{1}{64}+\frac{e^{2\left(\frac{1}{2}\log(2-\right.}}{\sqrt{2048\,l}}\right.}\right.$$

✓ **Maple** : cpu = 0.168 (sec), leaf count = 67

$$\left\{y(x) = \left(2\sqrt{\_C1+8\ln(x)}-8\right)\left(x\sqrt{\_C1+8\ln(x)}-4x+8\right)^{-1}, y(x) = \left(2\sqrt{\_C1+8\ln(x)}+8\right)\left(x\sqrt{\_C\right.\right.$$

2.927 ODE No. 927

$$y'(x) = -\frac{1}{8}x\left(-6e^{-2x^2}x^4y(x)+12e^{-x^2}x^2y(x)^2+8e^{-x^2}x^2y(x)+e^{-3x^2}x^6-2e^{-2x^2}x^4+8e^{-x^2}x^2-8e^{-x^2}-8y(x)\right.$$

✓ **Mathematica** : cpu = 0.546355 (sec), leaf count = 112

$$\text{Solve}\left[-\frac{29}{3}\text{RootSum}\left[-29\#1^3+3\sqrt[3]{29}\#1-29\&,\frac{\log\left(\frac{\frac{1}{2}e^{-x^2}x\left(2e^{x^2}-3x^2\right)+3xy(x)}{\sqrt[3]{29}\sqrt[3]{x^3}}-\#1\right)}{\sqrt[3]{29}-29\#1^2}\&\right]=\frac{1}{18}29^{2/3}\left(x^3\right)^{2/3}+\right.$$

✓ **Maple** : cpu = 0.23 (sec), leaf count = 68

$$\left\{y(x) = \frac{58\,RootOf\left(x^2-162\int^{\_Z}\left(841\,\_a^3-27\,\_a+27\right)^{-1}d\_a+6\,\_C1\right)+\left(9\,x^2-6\,e^{x^2}\right)e^{-x^2}}{18\,e^{-x^2}e^{x^2}}\right\}$$

2.928 ODE No. 928

$$y'(x) = \frac{e^{\frac{y(x)}{x}}\left(x^2 e^{-\frac{y(x)}{x}} + x e^{-\frac{y(x)}{x}} + x e^{-\frac{y(x)}{x}} y(x) + e^{-\frac{y(x)}{x}} y(x) + x\right)}{x(x+1)}$$

✓ **Mathematica** : cpu = 1.19303 (sec), leaf count = 23

$$\left\{\left\{y(x) \to -x \log\left(-\frac{\log(x+1) - c_1}{x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.453 (sec), leaf count = 20

$$\left\{y(x) = -\ln\left(\frac{-\ln(1+x) + \_C1}{x}\right) x\right\}$$

2.929 ODE No. 929

$$y'(x) = \frac{-\frac{1}{32}x^3 y(x)^3 + \frac{1}{16}x^2 y(x)^3 + \frac{3}{16}x^2 y(x)^2 - \frac{1}{2}x y(x)^3 + \frac{y(x)^3}{4} - \frac{1}{4}x y(x)^2 - \frac{3}{8}x y(x) + \frac{y(x)}{4} + \frac{1}{4}}{x y(x)}$$

✓ **Mathematica** : cpu = 0.825621 (sec), leaf count = 683

$$\text{Solve}\left[\int_1^{y(x)} \left(-32\text{RootSum}\left[\#1^3 K[1]^3 - 2\#1^2 K[1]^3 - 8K[1]^3 - 6\#1^2 K[1]^2 + 8\#1 K[1]^2 + 12\#1 K[1] - 8K[1] \right.\right.\right.$$

✓ **Maple** : cpu = 0.199 (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

$$y'(x) = \frac{e^{\frac{y(x)}{x}}\left(x^2 e^{-\frac{y(x)}{x}} + x^4 + x e^{-\frac{y(x)}{x}} + x e^{-\frac{y(x)}{x}} y(x) + e^{-\frac{y(x)}{x}} y(x)\right)}{x(x+1)}$$

✓ **Mathematica** : cpu = 1.45082 (sec), leaf count = 39

$$\left\{\left\{y(x) \to -x \log\left(\frac{-\frac{x^3}{3} + \frac{x^2}{2} - x + \log(x+1) - c_1}{x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.537 (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

$$y'(x) = \frac{3x^5y(x) + 3x^4y(x)^2 + x^3y(x)^3 - 3x^2y(x) + x^6 - 2x^3 - xy(x)^2 - y(x) - 2x}{x(x^2 + xy(x) + 1)}$$

✓ **Mathematica** : cpu = 0.173121 (sec), leaf count = 80

$$\left\{\left\{y(x) \to -\frac{x^2+1}{x} + \frac{1}{x^2\left(\frac{1}{x} - \frac{1}{x\sqrt{-2x+c_1}}\right)}\right\}, \left\{y(x) \to -\frac{x^2+1}{x} + \frac{1}{x^2\left(\frac{1}{x} + \frac{1}{x\sqrt{-2x+c_1}}\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.086 (sec), leaf count = 73

$$\left\{y(x) = \frac{1}{x}\left(-\sqrt{\_C1 - 2\,x}x^2 - x^2 - 1\right)\left(\sqrt{\_C1 - 2\,x} + 1\right)^{-1}, y(x) = \frac{1}{x}\left(-\sqrt{\_C1 - 2\,x}x^2 + x^2 + 1\right)\left(\sqrt{\_C1 -\right.\right.$$

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 = 4.76193 (sec), leaf count = 4323

$$\text{Solve}\left[\frac{x^2}{2} + \frac{27}{2}\text{RootSum}\left[y(x)^3\#1^3 + 9y(x)^2\#1^3 + 27y(x)\#1^3 + 27\#1^3 + 3y(x)^3\#1^2 + 18y(x)^2\#1^2 + 27y(x)\#\right.\right.$$

✓ **Maple** : cpu = 0.266 (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

$$y'(x) = \frac{3x^2y(x)\log^2(x) - 2x^2y(x)\log(x) + x^3 + x^2 + x^3(-\log^3(x)) + x^3\log^2(x) + xy(x)^2 + xy(x) + y(x)^3 - 3x}{x^2}$$

✓ **Mathematica** : cpu = 0.234489 (sec), leaf count = 99

$$\text{Solve}\left[-\frac{29}{3}\text{RootSum}\left[-29\#1^3 + 3\sqrt[3]{29}\#1 - 29\&, \frac{\log\left(\frac{\frac{3y(x)}{x^2}+\frac{1-3\log(x)}{x}}{\sqrt[3]{29}\sqrt[3]{\frac{1}{x^3}}} - \#1\right)}{\sqrt[3]{29} - 29\#1^2}\&\right] = \frac{29^{2/3}}{9\sqrt[3]{\frac{1}{x^3}}} + c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.127 (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

$$y'(x) = \frac{3}{16}x^4y(x) + \frac{3}{4}x^3y(x) - \frac{3}{4}x^2y(x)^2 + \frac{1}{4}x^2y(x) - \frac{x^6}{64} - \frac{3x^5}{32} - \frac{x^4}{8} + \frac{x^3}{8} + \frac{x^2}{4} - \frac{3}{2}xy(x)^2 - xy(x) + y(x)^3 + y(x)^2 + \frac{x}{2} + 1$$

✓ **Mathematica** : cpu = 0.27988 (sec), leaf count = 102

$$\text{Solve}\left[-\frac{31}{3}\text{RootSum}\left[-31\#1^3 + 3\,2^{2/3}\sqrt[3]{31}\#1 - 31\&, \frac{\log\left(\sqrt[3]{\frac{2}{31}}\left(\frac{1}{4}(-3x^2 - 6x + 4) + 3y(x)\right) - \#1\right)}{2^{2/3}\sqrt[3]{31} - 31\#1^2}\&\right] = \frac{1}{9}\left(\right.$$

✓ **Maple** : cpu = 0.243 (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

$$y'(x)=\frac{3}{16}x^4y(x)-\frac{3}{2}x^3y(x)+\frac{3}{4}x^2y(x)^2+\frac{7}{2}x^2y(x)+\frac{x^6}{64}-\frac{3x^5}{16}+\frac{13x^4}{16}-\frac{3x^3}{2}+x^2-3xy(x)^2-2xy(x)+y(x)^3+y(x)^2-\frac{x}{2}$$

✓ **Mathematica** : cpu = 30.1041 (sec), leaf count = 248

$$\text{Solve}\left[\frac{\sqrt[3]{2}\left(\frac{\frac{1}{4}(3x^2-12x+4)+3y(x)}{\sqrt[3]{2}}+2^{2/3}\right)\left(2^{2/3}-2^{2/3}\left(\frac{1}{4}(3x^2-12x+4)+3y(x)\right)\right)\left(\left(\frac{1}{4}(-3x^2+12x-4)-3y(x)+\right.\right.}{9\left(-\left(\frac{1}{4}(3x^2-12x+4)+\right.\right.}\right.$$

✓ **Maple** : cpu = 0.922 (sec), leaf count = 55

$$\left\{y(x)=\frac{e^{RootOf\left(\ln\left(e^{\_Z}-4\right)e^{\_Z}+e^{\_Z}\_C1-\_Z\,e^{\_Z}+xe^{\_Z}-4\ln\left(e^{\_Z}-4\right)-4\_C1+4\_Z-4x+4\right)}}{4}-1-\frac{x^2}{4}+x\right\}$$

2.936 ODE No. 936

$$y'(x)=\frac{3}{64}x^4y(x)-\frac{3}{16}x^3y(x)+\frac{3}{8}x^2y(x)^2+\frac{7}{16}x^2y(x)+\frac{x^6}{512}-\frac{3x^5}{256}+\frac{5x^4}{128}-\frac{5x^3}{64}+\frac{x^2}{16}-\frac{3}{4}xy(x)^2-\frac{1}{2}xy(x)+y(x)^3+y(x)$$

✓ **Mathematica** : cpu = 0.258814 (sec), leaf count = 99

$$\text{Solve}\left[-\frac{89}{3}\text{RootSum}\left[-89\#1^3+6\sqrt[3]{178}\#1-89\&,\frac{\log\left(\frac{2^{2/3}\left(\frac{1}{8}(3x^2-6x+8)+3y(x)\right)}{\sqrt[3]{89}}-\#1\right)}{2\sqrt[3]{178}-89\#1^2}\&\right]=\frac{89^{2/3}x}{18\sqrt[3]{2}}+c_1,y(x)\right]$$

✓ **Maple** : cpu = 0.248 (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 = 0.261418 (sec), leaf count = 124

$$\left\{\left\{y(x)\to\frac{1}{(2x+1)\left(\frac{2x+1}{4x^2+4x+1}-\frac{1}{(2x+1)\sqrt{-2x+c_1}}\right)}-\log(2x+1)-1\right\},\left\{y(x)\to\frac{1}{(2x+1)\left(\frac{2x+1}{4x^2+4x+1}+\frac{1}{(2x+1)\sqrt{-}}\right.}\right.\right.$$

✓ **Maple** : cpu = 0.155 (sec), leaf count = 79

$$\left\{y(x)=\left(-\sqrt{\_C1-2\,x}\ln(2\,x+1)-\ln(2\,x+1)-1\right)\left(\sqrt{\_C1-2\,x}+1\right)^{-1},y(x)=\left(-\sqrt{\_C1-2\,x}\ln(2\,x+\right.\right.$$

2.938 ODE No. 938

$$y'(x)=\frac{3x^4y(x)-6x^3y(x)+3x^2y(x)^2+5x^2y(x)+x^6-3x^5+4x^4-3x^3-x^2-3xy(x)^2-2xy(x)+y(x)^3+y(}{x}$$

✓ **Mathematica** : cpu = 0.225764 (sec), leaf count = 108

$$\text{Solve}\left[-\frac{29}{3}\text{RootSum}\left[-29\#1^3+3\sqrt[3]{29}\#1-29\&,\frac{\log\left(\frac{\frac{3x^2-3x+1}{x}+\frac{3y(x)}{x}}{\sqrt[3]{29}\sqrt[3]{\frac{1}{x^3}}}-\#1\right)}{\sqrt[3]{29}-29\#1^2}\&\right]=\frac{1}{9}29^{2/3}\left(\frac{1}{x^3}\right)^{2/3}x^2\log(x)+\right.$$

✓ **Maple** : cpu = 0.14 (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

$$y'(x)=\frac{-12x^4y(x)-48x^3y(x)+48x^2y(x)^2-48x^2y(x)+x^6+6x^5+12x^4+16x^3+16x^2+96xy(x)^2-32xy(x)}{16x^2-64y(x)+32x-64}$$

✓ **Mathematica** : cpu = 0.538792 (sec), leaf count = 136

$$\text{Solve}\left[\frac{2}{5}\text{RootSum}\left[-8\#1^2y(x)+\#1^4+4\#1^3-16\#1y(x)-8\#1+16y(x)^2+16y(x)+8\&,\frac{\#1^2(-\log(x-\#1))}{}\right.\right.$$

✓ **Maple** : cpu = 0.207 (sec), leaf count = 70

$$\left\{x-\frac{4}{5}\ln\left(y(x)-\frac{x^2}{4}-\frac{x}{2}-1\right)+\frac{2}{5}\ln\left(2\left(y(x)-1/4\,x^2-x/2\right)^2+2\,y(x)-\frac{x^2}{2}-x+1\right)-\frac{2}{5}\arctan\left(-2\,y(x)\right.\right.$$

2.940 ODE No. 940

$$y'(x) = \frac{-3x^2y(x)\log^2(x) - x^2 + x^3\log^3(x) + x^2\log(x) - y(x)^3 - y(x)^2 - 2xy(x) + 3xy(x)^2\log(x) + xy(x)\log(x}{x(-y(x) - x + x\log(x))}$$

✓ **Mathematica** : cpu = 0.204456 (sec), leaf count = 80

$$\left\{\left\{y(x)\to -\frac{1}{x\left(-\frac{1}{x^2}-\frac{1}{x^2\sqrt{-2x+c_1}}\right)}-x+x\log(x)\right\},\left\{y(x)\to -\frac{1}{x\left(-\frac{1}{x^2}+\frac{1}{x^2\sqrt{-2x+c_1}}\right)}-x+x\log(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.118 (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

$$y'(x) = \frac{12x^4y(x) - 96x^3y(x) + 48x^2y(x)^2 + 192x^2y(x) + x^6 - 12x^5 + 48x^4 - 72x^3 + 32x^2 - 192xy(x)^2 - 32xy(}{16x^2 + 64y(x) - 64x + 64}$$

✓ **Mathematica** : cpu = 0.459078 (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 = 0.17 (sec), leaf count = 35

$$\left\{y(x) = -\frac{x^2}{4} + x + RootOf\left(-x + \int^{\_Z}\frac{\_a + 1}{\_a^3 - \_a - 1}d\_a + \_C1\right)\right\}$$

2.942 ODE No. 942

$$y'(x) = \frac{-\exp\left(\frac{2(x-y(x))^3(y(x)+x)^3}{x^2-y(x)^2-1}\right) - x^2 - 2xy(x) - y(x)^2}{\exp\left(\frac{2(x-y(x))^3(y(x)+x)^3}{x^2-y(x)^2-1}\right) - x^2 - 2xy(x) - y(x)^2}$$

✓ **Mathematica** : cpu = 4.64022 (sec), leaf count = 349

$$\text{Solve}\left[\int_1^{y(x)}\left(-\frac{2K[2]}{-x^2+\exp\left(\frac{2(x-K[2])^3(x+K[2])^3}{x^2-K[2]^2-1}\right)+K[2]^2} - \int_1^x\left(\frac{2K[1]\left(-2K[2]-\exp\left(\frac{2(K[1]-K[2])^3(K[1]+K[2])^3}{K[1]^2-K[2]^2-1}\right.\right.}{\left(K[1\right.}\right.\right.\right.$$

✓ **Maple** : cpu = 0.792 (sec), leaf count = 43

$$\left\{ y(x) = \mathrm{e}^{\mathit{RootOf}\left(-\_Z+\int^{\left(\mathrm{e}^{\_Z}\right)^2-2\,x\mathrm{e}^{\_Z}}\left(\mathrm{e}^{2\,\frac{\_a^3}{\_a+1}}+\_a\right)^{-1}d\_a+\_C1\right)} - x \right\}$$

2.943 ODE No. 943

$$y'(x) = \frac{24x^4y(x) - 96x^3y(x) + 192x^2y(x)^2 + 96x^2y(x) + x^6 - 6x^5 + 12x^4 - 24x^3 + 32x^2 - 384xy(x)^2 - 128xy(}{64x^2 + 512y(x) - 128x + 512}$$

✓ **Mathematica** : cpu = 0.511314 (sec), leaf count = 53

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 = 0.155 (sec), leaf count = 40

$$\left\{ y(x) = -\frac{x^2}{8} + \frac{x}{4} + \mathit{RootOf}\left(-x + \int^{\_Z} 4\,\frac{\_a+1}{4\,\_a^3 - \_a - 1} d\_a + \_C1\right) \right\}$$

2.944 ODE No. 944

$$y'(x) = \frac{6a^2bx^5 + 12a^2x^4y(x) + a^3x^6 - 8a^2x^3 + 12ab^2x^4 + 48abx^3y(x) - 16abx^2 + 48ax^2y(x)^2 - 32axy(x) - 32a}{16ax^2 + 32bx + 64y(x) + 64}$$

✓ **Mathematica** : cpu = 1.63799 (sec), leaf count = 233

Solve$\left[x - 4\text{RootSum}\left[6\#1^5a^2b + 12\#1^4a^2y(x) + \#1^6a^3 + 12\#1^4ab^2 + 48\#1^3aby(x) + 8\#1^2ab + 48\#1^2ay(x)^2 -\right.\right.$

✓ **Maple** : cpu = 0.227 (sec), leaf count = 47

$$\left\{ y(x) = -\frac{ax^2}{4} - \frac{bx}{2} + \mathit{RootOf}\left(bx + 2\int^{\_Z} -\frac{b(\_a+1)}{2\,\_a^3 + \_a\,b + b} d\_a + 2\,\_C1\right) \right\}$$

2.945 ODE No. 945

$$y'(x) = \frac{48a^2x^2y(x) + 12a^2x^4 + 8a^3x^3 + 48ax^3y(x) + 6ax^5 - 16ax^2 + 96axy(x)^2 + 12x^4y(x) + 48x^2y(x)^2 + x^6 -}{32ax + 16x^2 + 64y(x) + 64}$$

✓ **Mathematica** : cpu = 1.29226 (sec), leaf count = 213

$$\text{Solve}\Big[x - 4\text{RootSum}\Big[48\#1^2a^2y(x) + 12\#1^4a^2 + 8\#1^3a^3 + 48\#1^3ay(x) + 6\#1^5a + 8\#1^2a + 12\#1^4y(x) + 48\#$$

✓ **Maple** : cpu = 0.229 (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

$$y'(x) = \frac{x\Big(-6e^{-2x^2}x^4y(x) + 12e^{-x^2}x^2y(x)^2 + 8e^{-x^2}x^2y(x) - 8e^{-x^2}y(x) + e^{-3x^2}x^6 - 4e^{-2x^2}x^4 + 4e^{-2x^2}x^2 + 8e^{-}}{4e^{-x^2}x^2 - 8y(x) - 8}$$

✓ **Mathematica** : cpu = 0.723996 (sec), leaf count = 150

$$\left\{\left\{y(x) \to -\frac{1}{2}e^{-x^2}\left(2e^{x^2} - x^2\right) + \frac{e^{-3x^2}}{8\left(\frac{1}{8}e^{-3x^2} - \frac{e^{-3x^2}}{\sqrt{-64x^2+c_1}}\right)}\right\}, \left\{y(x) \to -\frac{1}{2}e^{-x^2}\left(2e^{x^2} - x^2\right) + \frac{e^{-3x^2}}{8\left(\frac{1}{8}e^{-3x^2} + \frac{}{\sqrt{-}}\right.}\right.\right.$$

✓ **Maple** : cpu = 0.178 (sec), leaf count = 85

$$\left\{y(x) = \left(-2 + x^2\left(\sqrt{-x^2 + \_C1} + 1\right)e^{-x^2}\right)\left(2\sqrt{-x^2 + \_C1} + 2\right)^{-1}, y(x) = \left(2 + x^2\left(\sqrt{-x^2 + \_C1} - 1\right)e^{-x}\right.\right.$$

2.947 ODE No. 947

$$y'(x) = \frac{x^2y(x)^2 + 2x^2y(x)\cos(x) + \frac{x^2}{2} + x^3\sin(x) + x^2\cos(x) + \frac{1}{2}x^2\cos(2x) + 2xy(x) - 2xy(x)\sin(x) + x - x\sin}{x^3}$$

✓ **Mathematica** : cpu = 0.399424 (sec), leaf count = 30

$$\left\{\left\{y(x) \to -\frac{-\sin(x) + x\cos(x) + 1}{x} + \frac{1}{-\log(x) + c_1}\right\}\right\}$$

✓ **Maple** : cpu = 0.382 (sec), leaf count = 44

$$\left\{y(x) = \frac{(\cos(x)\,x - \sin(x) + 1)\ln(x) - \cos(x)\_C1\,x + \sin(x)\_C1 + x - \_C1}{x(-\ln(x) + \_C1)}\right\}$$

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 = 0.581524 (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 = 0.386 (sec), leaf count = 68

$$\left\{y(x) = e^{RootOf\left(-12\_C1\,(e^{\_Z})^4 - 2\,(e^{\_Z})^4\_Z - 18\_C1\,(e^{\_Z})^3 - 3\,(e^{\_Z})^3\_Z - 36\,(e^{\_Z})^2\_C1 - 6\_Z\,(e^{\_Z})^2 - 36\,e^{\_Z}\_C1 - 6\_Z\,e^{\_Z} + 36\right.}\right.$$

2.949 ODE No. 949

$$y'(x) = \frac{3x^4y(x) - 6x^3y(x) + 3x^2y(x)^2 + x^2y(x) + x^6 - 3x^5 + x^4 + 2x^3 - 3x^2 - 3xy(x)^2 + xy(x) + y(x)^3 + x}{x\left(x^2 + y(x) - x + 1\right)}$$

✓ **Mathematica** : cpu = 0.208518 (sec), leaf count = 76

$$\left\{\left\{y(x) \to -x^2 + x + \frac{1}{x\left(\frac{1}{x} - \frac{1}{x\sqrt{-2\log(x) + c_1}}\right)} - 1\right\}, \left\{y(x) \to -x^2 + x + \frac{1}{x\left(\frac{1}{x} + \frac{1}{x\sqrt{-2\log(x) + c_1}}\right)} - 1\right\}\right\}$$

✓ **Maple** : cpu = 0.12 (sec), leaf count = 81

$$\left\{y(x) = \left(\left(-x^2 + x\right)\sqrt{\_C1 - 2\ln(x)} - x^2 + x - 1\right)\left(1 + \sqrt{\_C1 - 2\ln(x)}\right)^{-1}, y(x) = \left(\left(-x^2 + x\right)\sqrt{\_C1 - 2\right.\right.$$

2.950 ODE No. 950

$$y'(x) = \frac{3}{32}a^2bx^5 + \frac{3}{16}a^2x^4y(x) + \frac{a^3x^6}{64} + \frac{a^2x^4}{16} + \frac{3}{16}ab^2x^4 + \frac{3}{4}abx^3y(x) + \frac{1}{4}abx^3 + \frac{3}{4}ax^2y(x)^2 + \frac{1}{2}ax^2y(x) - \frac{ax}{2} + \frac{3}{4}b^2x^2y$$

✓ **Mathematica** : cpu = 0.489696 (sec), leaf count = 141

$$\text{Solve}\left[-\frac{1}{3}(27b + 58)^{2/3}\text{RootSum}\left[\#1^3(27b + 58)^{2/3} - 3\,2^{2/3}\#1 + (27b + 58)^{2/3}\&, \frac{\log\left(\frac{\sqrt[3]{2}\left(\frac{1}{4}\left(3ax^2 + 6bx + 4\right) + 3y(x)\right)}{\sqrt[3]{27b + 58}}\right.}{2^{2/3} - \#1^2(27b + 58)^{2/3}}\right.\right.$$

✓ **Maple** : cpu = 0.227 (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

$$y'(x) = \frac{3}{4}a^2x^2y(x)+\frac{3a^2x^4}{16}+\frac{a^3x^3}{8}+\frac{a^2x^2}{4}+\frac{3}{4}ax^3y(x)+\frac{3ax^5}{32}+\frac{ax^3}{4}+\frac{3}{2}axy(x)^2+axy(x)+\frac{3}{16}x^4y(x)+\frac{3}{4}x^2y(x)^2+\frac{1}{2}x$$

✓ **Mathematica** : cpu = 0.395079 (sec), leaf count = 140

$$\text{Solve}\left[-\frac{1}{3}(27a+58)^{2/3}\text{RootSum}\left[\#1^3(27a+58)^{2/3}-3\,2^{2/3}\#1+(27a+58)^{2/3}\&,\frac{\log\left(\frac{\sqrt[3]{2}\left(\frac{1}{4}\left(6ax+3x^2+4\right)+3y(x)\right)}{\sqrt[3]{27a+58}}\right.}{2^{2/3}-\#1^2(27a+58)^{2/}}\right.\right.$$

✓ **Maple** : cpu = 0.221 (sec), leaf count = 41

$$\left\{y(x)=-\frac{x^2}{4}-\frac{ax}{2}+RootOf\left(-x+2\int^{\_Z}\left(2\_a^3+2\_a^2+a+2\right)^{-1}d\_a+\_C1\right)\right\}$$

2.952 ODE No. 952

$$y'(x) = \frac{x^5\left(-\sqrt{x^2+y(x)^2}\right)+x^4y(x)\sqrt{x^2+y(x)^2}-x^4\sqrt{x^2+y(x)^2}+x^3y(x)\sqrt{x^2+y(x)^2}-x^2\sqrt{x^2+y(x)^2}+}{x}$$

✓ **Mathematica** : cpu = 0.346597 (sec), leaf count = 341

$$\left\{\left\{y(x)\to\frac{x-2\sqrt{x^2\tanh^2\left(\frac{1}{20}\left(-4\sqrt{2}x^5-5\sqrt{2}x^4-10\sqrt{2}x^2-20\sqrt{2}c_1\right)\right)-x^2\tanh^4\left(\frac{1}{20}\left(-4\sqrt{2}x^5-5\sqrt{2}x^4-\right.\right.}}{-1+2\tanh^2\left(\frac{1}{20}\left(-4\sqrt{2}x^5-5\sqrt{2}x^4-10\sqrt{2}x^2-20\sqrt{2}c_1\right)\right)}\right.\right.$$

✓ **Maple** : cpu = 0.527 (sec), leaf count = 62

$$\left\{\ln\left(2\,\frac{x\left(\sqrt{2\,(y(x))^2+2\,x^2}+y(x)+x\right)}{y(x)-x}\right)+\frac{\left(4\,x^5+5\,x^4+10\,x^2\right)\sqrt{2}}{20}-\_C1-\ln(x)=0\right\}$$

2.953 ODE No. 953

$$y'(x) = \frac{y(x)\left(x^4\log^2(y(x)) + x^3\log^2(y(x)) + 2x^4\log(x)\log(y(x)) + 2x^3\log(x)\log(y(x)) + x^4\log^2(x) + x^3\log^2(x\right.}{x}$$

✗ **Mathematica** : cpu = 1.35575 (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 = 1.082 (sec), leaf count = 145

$$\left\{y(x) = \left(x^{\frac{x^5}{4x^5+5x^4+10x^2+20\_C1}}\right)^{-4}\left(x^{\frac{x^4}{4x^5+5x^4+10x^2+20\_C1}}\right)^{-5}\left(x^{\frac{x^2}{4x^5+5x^4+10x^2+20\_C1}}\right)^{-10}\left(x^{\frac{\_C1}{4x^5+5x^4+10x^2+20\_C1}}\right)^{-}\right.$$

2.954 ODE No. 954

$$y'(x) = \frac{\frac{12}{25}x^6y(x) + \frac{24}{5}x^{7/2}y(x) - \frac{6}{5}x^3y(x)^2 - \frac{4}{5}x^3y(x) - \frac{8x^9}{125} - \frac{24x^{13/2}}{25} + \frac{4x^6}{25} - \frac{24x^4}{5} + \frac{8x^{7/2}}{5} + \frac{6x^3}{5} - 8x^{3/2} + 12xy}{x}$$

✓ **Mathematica** : cpu = 0.357118 (sec), leaf count = 115

$$\text{Solve}\left[-\frac{29}{3}\text{RootSum}\left[-29\#1^3 + 3\sqrt[3]{29}\#1 - 29\&, \frac{\log\left(\frac{\frac{-6x^3-30\sqrt{x}+5}{5x}+\frac{3y(x)}{x}}{\sqrt[3]{29}\sqrt[3]{\frac{1}{x^3}}} - \#1\right)}{\sqrt[3]{29} - 29\#1^2}\&\right] = \frac{1}{9}29^{2/3}\left(\frac{1}{x^3}\right)^{2/3}x^2\log(x\right.$$

✓ **Maple** : cpu = 0.177 (sec), leaf count = 53

$$\left\{y(x) = \frac{1}{45}\left(18x^{7/2} + 145\,RootOf\left(-81\int^{\_Z}\left(841\_a^3 - 27\_a + 27\right)^{-1}d\_a + \ln(x) + 3\_C1\right)\sqrt{x} - 15\sqrt{x} + \right.\right.$$

2.955 ODE No. 955

$$y'(x) = \frac{-\frac{12}{5}x^6y(x) - 24x^{7/2}y(x) + 6x^3y(x)^2 - 6x^3y(x) + \frac{8x^9}{25} + \frac{24x^{13/2}}{5} + \frac{12x^6}{5} + 24x^4 + 14x^{7/2} - 6x^3 + 40x^{3/2} -}{x\left(2x^3 - 5y(x) + 10\sqrt{x} - 5\right)}$$

✓ **Mathematica** : cpu = 0.321636 (sec), leaf count = 112

$$\left\{\left\{y(x) \to \frac{1}{5}\left(2x^3 + 10\sqrt{x} - 5\right) - \frac{1}{125x\left(-\frac{1}{125x} - \frac{1}{x\sqrt{-31250\log(x)+c_1}}\right)}\right\}, \left\{y(x) \to \frac{1}{5}\left(2x^3 + 10\sqrt{x} - 5\right) - \frac{}{125x\left(\right.}\right.\right.$$

✓ **Maple** : cpu = 0.143 (sec), leaf count = 101

$$\left\{y(x) = \left(\left(2x^3 + 10\sqrt{x}\right)\sqrt{\_C1 - 2\ln(x)} - 2x^3 - 10\sqrt{x} + 5\right)\left(5\sqrt{\_C1 - 2\ln(x)} - 5\right)^{-1}, y(x) = \left(\left(2x^3 + 10\right.\right.\right.$$

2.956 ODE No. 956

$$y'(x) = \frac{y(x)\left(y(x)e^{\frac{2\log^2(x)}{\log(x)+1}}x^{\frac{2}{\log(x)+1}+2} + y(x)e^{\frac{2\log^2(x)}{\log(x)+1}}\log^2(x)x^{\frac{2}{\log(x)+1}+2} + 2y(x)e^{\frac{2\log^2(x)}{\log(x)+1}}\log(x)x^{\frac{2}{\log(x)+1}+2} - e^{\frac{2\log^2(x)}{\log(x)+1}}\right.}{x(\log(x)+1)}$$

✓ **Mathematica** : cpu = 1.1773 (sec), leaf count = 28

$$\left\{\left\{y(x)\to\frac{1}{\left(1+c_1e^{\frac{x^4}{4}}\right)(\log(x)+1)}\right\}\right\}$$

✓ **Maple** : cpu = 0.491 (sec), leaf count = 79

$$\left\{y(x) = \frac{1}{\ln(x)+1}e^{-\frac{x^4}{4}}\left(x^{-2\frac{\ln(x)}{\ln(x)+1}}(\ln(x)+1)\,e^{\frac{(-4\ln(x)-4)\ln(\ln(x)+1)-x^4\ln(x)-x^4+8(\ln(x))^2}{4\ln(x)+4}} + \_C1\right)^{-1}\right\}$$

2.957 ODE No. 957

$$y'(x) = \frac{y(x)\left(y(x)e^{\frac{2\log^2(x)}{\log(x)+1}}x^{\frac{2}{\log(x)+1}+3} + y(x)e^{\frac{2\log^2(x)}{\log(x)+1}}\log^2(x)x^{\frac{2}{\log(x)+1}+3} + 2y(x)e^{\frac{2\log^2(x)}{\log(x)+1}}\log(x)x^{\frac{2}{\log(x)+1}+3} - e^{\frac{2\log^2(x)}{\log(x)+1}}\right.}{x(\log(x)+1)}$$

✓ **Mathematica** : cpu = 1.15963 (sec), leaf count = 28

$$\left\{\left\{y(x)\to\frac{1}{\left(1+c_1e^{\frac{x^5}{5}}\right)(\log(x)+1)}\right\}\right\}$$

✓ **Maple** : cpu = 0.455 (sec), leaf count = 79

$$\left\{y(x) = \frac{1}{\ln(x)+1}e^{-\frac{x^5}{5}}\left(x^{-2\frac{\ln(x)}{\ln(x)+1}}(\ln(x)+1)\,e^{\frac{(-5\ln(x)-5)\ln(\ln(x)+1)-x^5\ln(x)-x^5+10(\ln(x))^2}{5\ln(x)+5}} + \_C1\right)^{-1}\right\}$$

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 = 0.354834 (sec), leaf count = 82

$$\text{Solve}\left[-\frac{29}{3}\text{RootSum}\left[-29\#1^3+3\sqrt[3]{29}\#1-29\&,\frac{\log\left(\frac{3y(x)+3\log(2x+1)+1}{\sqrt[3]{29}}-\#1\right)}{\sqrt[3]{29}-29\#1^2}\&\right]=\frac{1}{9}29^{2/3}x+c_1,y(x)\right]$$

✓ **Maple** : cpu = 0.128 (sec), leaf count = 40

$$\left\{y(x)=-\ln(2x+1)-\frac{1}{3}+\frac{29\,RootOf\left(-81\int^{\_Z}(841\_a^3-27\_a+27)^{-1}d\_a+x+3\_C1\right)}{9}\right\}$$

2.959 ODE No. 959

$$y'(x)=\frac{\csc\left(\frac{y(x)}{2x}\right)\sec\left(\frac{y(x)}{2x}\right)\sec\left(\frac{y(x)}{x}\right)\left(x^3\sin\left(\frac{y(x)}{2x}\right)\sin\left(\frac{y(x)}{x}\right)\cos\left(\frac{y(x)}{2x}\right)-\frac{1}{2}y(x)\sin\left(\frac{y(x)}{x}\right)+\frac{1}{2}y(x)\sin\left(\frac{y(x)}{2x}\right)\right.}{x}$$

✓ **Mathematica** : cpu = 0.225676 (sec), leaf count = 20

$$\left\{\left\{y(x)\to x\sin^{-1}\left(e^{\frac{x^2}{2}+c_1}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.353 (sec), leaf count = 15

$$\left\{y(x)=\arcsin\left(e^{\frac{x^2}{2}}\_C1\right)x\right\}$$

2.960 ODE No. 960

$$y'(x)=\frac{\csc\left(\frac{y(x)}{2x}\right)\sec\left(\frac{y(x)}{2x}\right)\sec\left(\frac{y(x)}{x}\right)\left(x^2\sin\left(\frac{y(x)}{2x}\right)\sin\left(\frac{y(x)}{x}\right)\cos\left(\frac{y(x)}{2x}\right)-\frac{1}{2}y(x)\sin\left(\frac{y(x)}{x}\right)+\frac{1}{2}y(x)\sin\left(\frac{y(x)}{2x}\right)\right.}{x}$$

✓ **Mathematica** : cpu = 0.172388 (sec), leaf count = 14

$$\left\{\left\{y(x)\to x\sin^{-1}\left(e^{x+c_1}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.372 (sec), leaf count = 11

$$\{y(x)=\arcsin(e^x\_C1)x\}$$

2.961 ODE No. 961

$$y'(x) = \frac{\exp\left(6x^4y(x)^2 - 6x^2y(x)^4 - 4x^2y(x)^2 - 2x^6 + 2x^4 + 2y(x)^6 + 2y(x)^4 + 2\right) + x^2 + 2xy(x) + y(x)^2}{-\exp\left(6x^4y(x)^2 - 6x^2y(x)^4 - 4x^2y(x)^2 - 2x^6 + 2x^4 + 2y(x)^6 + 2y(x)^4 + 2\right) + x^2 + 2xy(x) + y(x)^2}$$

✓ **Mathematica** : cpu = 5.38754 (sec), leaf count = 813

$$\text{Solve}\left[\int_1^x \left(\frac{1}{K[1]+y(x)} - \frac{2e^{2K[1]^6+6y(x)^4K[1]^2+4y(x)^2K[1]^2}K[1]}{e^{2K[1]^6+6y(x)^4K[1]^2+4y(x)^2K[1]^2}K[1]^2 - e^{2y(x)^6+2y(x)^4+6K[1]^4y(x)^2+2K[1]^4+2} - e^{2K[1]^6+6y(x}\right.\right.$$

✓ **Maple** : cpu = 0.553 (sec), leaf count = 45

$$\left\{y(x) = e^{RootOf\left(-\_Z+\int^{\left(e^{\_Z}\right)^2-2\,xe^{\_Z}}\left(e^{2\_a^3+2\_a^2+2}+\_a\right)^{-1}d\_a+\_C1\right)} - x\right\}$$

2.962 ODE No. 962

$$y'(x) = \frac{4(a-1)(a+1)x(a^2x^2 - x^2 -}{-3a^6x^4y(x)^2 + 3a^4x^2y(x)^4 + 9a^4x^4y(x)^2 - 6a^2x^2y(x)^4 - 9a^2x^4y(x)^2 + 4a^2x^2y(x) + a^8x^6 - 4a^6x^6 + 6a^4}$$

✓ **Mathematica** : cpu = 4.78607 (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 = 1.257 (sec), leaf count = 79

$$\left\{-\frac{y(x)}{(a-1)(a+1)} + 2\frac{1}{\left(a^2-1\right)^2\left(a^2x^2 - x^2 - (y(x))^2\right)^2} - 2\frac{1}{\left(a^2-1\right)^2\left(a^2x^2 - x^2 - (y(x))^2\right)} + \_C1 = 0\right\}$$

2.963 ODE No. 963

$$y'(x) = \frac{\frac{9}{2}x^2y(x) - 6x^2y(x)\cos(x) + \frac{3}{2}x^2y(x)\cos(2x) - \frac{5x^3}{2} + \frac{3x^2}{2} + x^2\sin(x) + \frac{15}{4}x^3\cos(x) - \frac{3}{2}x^3\cos(2x) + \frac{1}{4}x^3}{}$$

✓ **Mathematica** : cpu = 0.457623 (sec), leaf count = 108

$$\text{Solve}\left[-\frac{29}{3}\text{RootSum}\left[-29\#1^3 + 3\sqrt[3]{29}\#1 - 29\&, \frac{\log\left(\frac{\frac{3y(x)}{x}+\frac{-3x+3x\cos(x)+1}{x}}{\sqrt[3]{29}\sqrt[3]{\frac{1}{x^3}}} - \#1\right)}{\sqrt[3]{29} - 29\#1^2}\&\right] = \frac{1}{9}29^{2/3}\left(\frac{1}{x^3}\right)^{2/3}x^2\log(\right.$$

✓ **Maple** : cpu = 0.257 (sec), leaf count = 39

$$\left\{y(x) = -\cos(x)\,x + x - \frac{1}{3} + \frac{29\,RootOf\left(-81\int^{\_Z}(841\_a^3 - 27\_a + 27)^{-1}\,d\_a + \ln(x) + 3\_C1\right)}{9}\right\}$$

2.964 ODE No. 964

$$y'(x) = -\frac{}{-3a^6x^4y(x)^2 + 3a^4x^2y(x)^4 + 9a^4x^4y(x)^2 + 4a^4x^2y(x)^2 - 6a^2x^2y(x)^4 - 9a^2x^4y(x)^2 - 8a^2x^2y(x)^2 + a^8\ldots}$$

✓ **Mathematica** : cpu = 4.34243 (sec), leaf count = 264

$$\text{Solve}\left[\frac{y(x)}{(a-1)(a+1)} - \frac{8\text{RootSum}\left[3\#1^2a^4y(x)^2 - 6\#1^2a^2y(x)^2 - \#1^3a^6 + 3\#1^3a^4 + 2\#1^2a^4 - 3\#1^3a^2 - 4\#1\ldots}{}\right.$$

✓ **Maple** : cpu = 2.414 (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

$$y'(x) = \frac{\csc\left(\frac{y(x)}{2x}\right)\sec\left(\frac{y(x)}{2x}\right)\sec\left(\frac{y(x)}{x}\right)\left(x^4\sin\left(\frac{y(x)}{2x}\right)\sin\left(\frac{y(x)}{x}\right)\cos\left(\frac{y(x)}{2x}\right) + x^3\sin\left(\frac{y(x)}{2x}\right)\sin\left(\frac{y(x)}{x}\right)\cos\left(\frac{y(x)}{2x}\right) \ldots\right.}{}$$

✓ **Mathematica** : cpu = 0.283231 (sec), leaf count = 29

$$\left\{\left\{y(x) \to x\sin^{-1}\left(xe^{\frac{x^3}{3} + \frac{x^2}{2} + c_1}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.434 (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

$$y'(x) = -\frac{}{-216x^2y(x)^4 - 324x^2y(x)^3 - 648x^2y(x)^2 - 648x^2y(x) + 216x^3 + 216x^2 - 8y(x)^{12} - 36y(x)^{11} - 126y(}$$

✓ **Mathematica** : cpu = 0.733453 (sec), leaf count = 292

$$\text{Solve}\left[72\text{RootSum}\left[216\#1^2y(x)^4 + 324\#1^2y(x)^3 + 648\#1^2y(x)^2 + 648\#1^2y(x) - 216\#1^3 - 216\#1^2 - 72\#1y(x\right.\right.$$

✓ **Maple** : cpu = 0.81 (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

$$y'(x) = -\frac{x\left(-288x^8y(x) + 432x^7y(x)^2 + 288x^7y(x) - 216x^6y(x)^3 - 216x^6y(x)^2 - 288x^6y(x) + 864x^5y(x)^2 + 10\right.}{}$$

✓ **Mathematica** : cpu = 0.486708 (sec), leaf count = 151

$$\text{Solve}\left[-\frac{29}{3}\text{RootSum}\left[-29\#1^3 + 3\sqrt[3]{29}\#1 - 29\&, \frac{\log\left(\frac{\frac{3xy(x)}{x^2+1} + \frac{-4x^4+2x^3+5x}{2\left(x^2+1\right)^2}}{\sqrt[3]{29}\sqrt[3]{\frac{x^3}{\left(x^2+1\right)^3}}} - \#1\right)}{\sqrt[3]{29} - 29\#1^2}\&\right] = \frac{29^{2/3}\left(\frac{x^3}{\left(x^2+1\right)^3}\right)^{2/3}\left(x^2 +\right.}{18x^2}\right.$$

✓ **Maple** : cpu = 0.236 (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 = 0.352623 (sec), leaf count = 30

$$\left\{\left\{y(x)\to x\sin^{-1}\left((x+1)e^{\frac{x^2}{2}-x-\frac{3}{2}+c_1}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.597 (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 = 0.239056 (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 = 0.666 (sec), leaf count = 15

$$\left\{y(x) = \arcsin\left(\frac{\_C1\,x}{1+x}\right)x\right\}$$

2.970 ODE No. 970

$$y'(x) = -\frac{}{-216x^2y(x)^4 - 324x^2y(x)^3 - 648x^2y(x)^2 - 648x^2y(x) + 216x^3 - 8y(x)^{12} - 36y(x)^{11} - 126y(x)^{10} - 31}$$

✓ **Mathematica** : cpu = 0.597816 (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 = 0.808 (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 = 0.205106 (sec), leaf count = 157

$$\text{Solve}\left[\frac{1}{3}\log\left(\frac{\frac{3y(x)}{x^2}+\frac{3}{x^3}}{3\sqrt[3]{-\frac{1}{x^6}}}+1\right)-\frac{1}{6}\log\left(\frac{\left(\frac{3y(x)}{x^2}+\frac{3}{x^3}\right)^2}{9\left(-\frac{1}{x^6}\right)^{2/3}}-\frac{\frac{3y(x)}{x^2}+\frac{3}{x^3}}{3\sqrt[3]{-\frac{1}{x^6}}}+1\right)+\frac{\tan^{-1}\left(\frac{\frac{2\left(\frac{3y(x)}{x^2}+\frac{3}{x^3}\right)}{3\sqrt[3]{-\frac{1}{x^6}}}-1}{\sqrt{3}}\right)}{\sqrt{3}}=-\left(-\right.\right.$$

✓ **Maple** : cpu = 1.2 (sec), leaf count = 86

$$\left\{y(x)=\frac{\sqrt{3}}{6\,x}\left(3\tan\left(\mathit{RootOf}\left(-18\,x^3\left(-x^{-6}\right)^{2/3}-6\sqrt{3}\_Z-\ln\left(\frac{\left(\sqrt{3}+\tan\left(\_Z\right)\right)^6}{\left(\left(\tan\left(\_Z\right)\right)^2+1\right)^3}\right)+18\_C1\right)\right)\right)x^3\sqrt[3]{-\right.$$

2.972 ODE No. 972

$$y'(x) = \frac{x\left(2x^2y(x)-2x^4-x^2+1\right)}{y(x)-x^2}$$

✓ **Mathematica** : cpu = 0.0235595 (sec), leaf count = 32

$$\left\{\left\{y(x)\to x^2+\frac{1}{2}\left(1+W\left(-e^{x^4-2x^2-1+c_1}\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.226 (sec), leaf count = 27

$$\left\{y(x)=x^2+\frac{1}{2}\mathit{lambertW}\left(-2\,\frac{e^{x^4}\_C1\,e^{-1}}{\left(e^{x^2}\right)^2}\right)+\frac{1}{2}\right\}$$

2.973 ODE No. 973

$$y'(x) = e^{-2bx}y(x)\left(e^{bx}y(x) + e^{2bx} + y(x)^2\right)$$

✓ **Mathematica** : cpu = 0.359904 (sec), leaf count = 146

$$\text{Solve}\left[-\frac{1}{3}(9b-7)^{2/3}\text{RootSum}\left[\#1^3(9b-7)^{2/3} - 9\#1b + 6\#1 + (9b-7)^{2/3}\&, \frac{\log\left(\frac{3e^{-2bx}y(x)+e^{-bx}}{\sqrt[3]{(9b-7)e^{-3bx}}} - \#1\right)}{\#1^2\left(-(9b-7)^{2/3}\right) + 3b - 2}\&\right]\right.$$

✓ **Maple** : cpu = 1.173 (sec), leaf count = 134

$$\left\{y(x) = -\frac{1}{2}\tan\left(RootOf\left(-\sqrt{-\left(e^{bx}\right)^2(4b-3)}\ln\left(\left(4(\tan(\_Z))^2 b - 3(\tan(\_Z))^2 + 4b - 3\right)\left(\tan(\_Z)\sqrt{-\right.\right.\right.\right.\right.$$

2.974 ODE No. 974

$$y'(x) = 3x^4y(x) - 3x^2y(x)^2 - x^6 + y(x)^3 + 2x$$

✓ **Mathematica** : cpu = 0.0835751 (sec), leaf count = 39

$$\left\{\left\{y(x) \to x^2 - \frac{1}{\sqrt{-2x + c_1}}\right\}, \left\{y(x) \to x^2 + \frac{1}{\sqrt{-2x + c_1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.091 (sec), leaf count = 57

$$\left\{y(x) = \left(x^2\sqrt{-2x + 2\_C1} - 1\right)\frac{1}{\sqrt{-2x + 2\_C1}}, y(x) = \left(x^2\sqrt{-2x + 2\_C1} + 1\right)\frac{1}{\sqrt{-2x + 2\_C1}}\right\}$$

2.975 ODE No. 975

$$y'(x) = \frac{1}{3}x^4y(x) + x^2y(x)^2 + \frac{x^6}{27} + y(x)^3 - \frac{2x}{3}$$

✓ **Mathematica** : cpu = 0.0867243 (sec), leaf count = 47

$$\left\{\left\{y(x) \to -\frac{x^2}{3} - \frac{1}{\sqrt{-2x + c_1}}\right\}, \left\{y(x) \to -\frac{x^2}{3} + \frac{1}{\sqrt{-2x + c_1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.082 (sec), leaf count = 59

$$\left\{y(x) = -\frac{1}{3}\left(x^2\sqrt{-54\_C1 - 2x} - 3\right)\frac{1}{\sqrt{-54\_C1 - 2x}}, y(x) = -\frac{1}{3}\left(x^2\sqrt{-54\_C1 - 2x} + 3\right)\frac{1}{\sqrt{-54\_C1 - 2\right.}}\right.$$

2.976 ODE No. 976

$$y'(x) = \frac{y(x)\left(x^7 y(x)^2 + x^4 y(x) + x - 3\right)}{x}$$

✓ **Mathematica** : cpu = 0.163601 (sec), leaf count = 101

$$\text{Solve}\left[-\frac{7}{3}\text{RootSum}\left[-7\#1^3 + 6\sqrt[3]{-7}\#1 - 7\&, \frac{\log\left(\frac{3x^6 y(x)+x^3}{\sqrt[3]{7}\sqrt[3]{-x^9}} - \#1\right)}{2\sqrt[3]{-7} - 7\#1^2}\&\right] = \frac{7^{2/3}\left(-x^9\right)^{2/3}}{9x^5} + c_1, y(x)\right]$$

✓ **Maple** : cpu = 1.179 (sec), leaf count = 59

$$\left\{y(x) = \frac{1}{2\,x^3}\left(\sqrt{3}\tan\left(\mathit{RootOf}\left(-\sqrt{3}\ln\left(\frac{9\left(\tan\left(\_Z\right)\right)^2 + 9}{7\,\left(-\sqrt{3} + 3\,\tan\left(\_Z\right)\right)^2}\right) + 3\,\sqrt{3}\_C1 - 2\,\sqrt{3}x - 2\_Z\right)\right) - 1\right)\right\}$$

2.977 ODE No. 977

$$y'(x) = e^{2x^2} x y(x)\left(e^{-x^2} y(x) + e^{-2x^2} + y(x)^2\right)$$

✓ **Mathematica** : cpu = 0.356225 (sec), leaf count = 139

$$\text{Solve}\left[-\frac{25}{3}\text{RootSum}\left[-25\#1^3 + 24\sqrt[3]{-15}^{2/3}\#1 - 25\&, \frac{\log\left(\frac{3e^{2x^2} x y(x)+e^{x^2} x}{5^{2/3}\sqrt[3]{-e^{3x^2} x^3}} - \#1\right)}{8\sqrt[3]{-15}^{2/3} - 25\#1^2}\&\right] = -\frac{5\sqrt[3]{5}e^{x^2} x^3}{18\sqrt[3]{-e^{3x^2} x^3}} + c_1, y$$

✓ **Maple** : cpu = 0.828 (sec), leaf count = 122

$$\left\{y(x) = \frac{1}{2\,e^{x^2}}\left(\sqrt{11}\tan\left(\mathit{RootOf}\left(-4\,\sqrt{11}x^2 + 4\,\sqrt{11}\ln\left(11\right) + 8\,\sqrt{11}\ln\left(-\frac{36\,\sqrt{11}}{11} + 36\,\tan\left(\_Z\right)\right) - 4\,\sqrt{11}\ln\right.\right.\right.\right.$$

2.978 ODE No. 978

$$y'(x) = \frac{y(x)\left(x^2 + xy(x) + y(x)^2 + x\right)}{x^2}$$

✓ **Mathematica** : cpu = 0.142509 (sec), leaf count = 60

$$\text{Solve}\left[-\frac{1}{2}\log\left(\frac{y(x)^2}{x^2} + \frac{y(x)}{x} + 1\right) + \log\left(\frac{y(x)}{x}\right) - \frac{\tan^{-1}\left(\frac{\frac{2y(x)}{x}+1}{\sqrt{3}}\right)}{\sqrt{3}} = x + c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.887 (sec), leaf count = 71

$$\left\{y(x) = \frac{\sqrt{3}x}{2}\tan\left(RootOf\left(-\sqrt{3}\ln(3) - \sqrt{3}\ln\left(\frac{4}{3 + 3\left(\tan(\_Z)\right)^2}\right) - 2\sqrt{3}\ln\left(-1/6\sqrt{3} + 1/2\tan(\_Z)\right) + 2\right.\right.\right.$$

2.979 ODE No. 979

$$y'(x) = \frac{3x^2y(x) - x^3 - 3xy(x)^2 + y(x)^3 + x}{x}$$

✓ **Mathematica** : cpu = 0.102249 (sec), leaf count = 37

$$\left\{\left\{y(x) \to x - \frac{1}{\sqrt{-2\log(x) + c_1}}\right\}, \left\{y(x) \to x + \frac{1}{\sqrt{-2\log(x) + c_1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.21 (sec), leaf count = 57

$$\left\{y(x) = \left(x\sqrt{-2\ln(x) + 2\_C1} - 1\right)\frac{1}{\sqrt{-2\ln(x) + 2\_C1}}, y(x) = \left(x\sqrt{-2\ln(x) + 2\_C1} + 1\right)\frac{1}{\sqrt{-2\ln(x) +}}\right.$$

2.980 ODE No. 980

$$y'(x) = \frac{x^3y(x)^3 + 6x^2y(x)^2 + 12xy(x) + 2x + 8}{x^3}$$

✓ **Mathematica** : cpu = 0.118406 (sec), leaf count = 43

$$\left\{\left\{y(x) \to -\frac{2}{x} - \frac{1}{\sqrt{-2x + c_1}}\right\}, \left\{y(x) \to -\frac{2}{x} + \frac{1}{\sqrt{-2x + c_1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.041 (sec), leaf count = 35

$$\left\{y(x) = -\frac{1}{\sqrt{\_C1 - 2x}} - 2x^{-1}, y(x) = \frac{1}{\sqrt{\_C1 - 2x}} - 2x^{-1}\right\}$$

2.981 ODE No. 981

$$y'(x) = \frac{a^3x^3y(x)^3 + 3a^2x^2y(x)^2 + a^2x + 3axy(x) + 1}{a^3x^3}$$

✓ **Mathematica** : cpu = 0.146897 (sec), leaf count = 49

$$\left\{\left\{y(x) \to -\frac{1}{ax} - \frac{1}{\sqrt{-2x + c_1}}\right\}, \left\{y(x) \to -\frac{1}{ax} + \frac{1}{\sqrt{-2x + c_1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.046 (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 = 0.354312 (sec), leaf count = 132

$$\text{Solve}\left[-\frac{7}{3}\text{RootSum}\left[-7\#1^3 + 6\sqrt[3]{-7}\#1 - 7\&, \frac{\log\left(\frac{3e^{-\frac{x^2}{2}}y(x) + e^{-\frac{x^2}{4}}}{\sqrt[3]{7}\sqrt[3]{-e^{-\frac{3x^2}{4}}}} - \#1\right)}{2\sqrt[3]{-7} - 7\#1^2}\&\right] = \frac{1}{9}7^{2/3}e^{\frac{x^2}{2}}\left(-e^{-\frac{3x^2}{4}}\right)^{2/3}x + c_1$$

✓ **Maple** : cpu = 1.261 (sec), leaf count = 145

$$\left\{-\frac{2}{3}\ln\left(-6 + \left(18\,y(x)\,\mathrm{e}^{-1/2\,x^2} + 6\,\mathrm{e}^{-1/4\,x^2}\right)\mathrm{e}^{\frac{x^2}{4}}\right) + \frac{1}{3}\ln\left(36 + \frac{324}{7}\left(y(x)\,\mathrm{e}^{-\frac{x^2}{2}} + \frac{1}{3}\mathrm{e}^{-\frac{x^2}{4}}\right)^2\left(\mathrm{e}^{\frac{x^2}{4}}\right)^2 + \frac{1}{7}\left(108\,y(\right.\right.\right.$$

2.983 ODE No. 983

$$y'(x) = \frac{3x^2y(x) - x^3 + x^2 - 3xy(x)^2 + y(x)^3}{(x-1)(x+1)}$$

✓ **Mathematica** : cpu = 0.50343 (sec), leaf count = 238

$$\text{Solve}\left[\frac{1}{3}\log\left(\frac{\frac{3y(x)}{x^2-1}-\frac{3x}{x^2-1}}{3\sqrt[3]{\frac{1}{(x-1)^3(x+1)^3}}}+1\right)-\frac{1}{6}\log\left(\frac{\left(\frac{3y(x)}{x^2-1}-\frac{3x}{x^2-1}\right)^2}{9\left(\frac{1}{(x-1)^3(x+1)^3}\right)^{2/3}}-\frac{\frac{3y(x)}{x^2-1}-\frac{3x}{x^2-1}}{3\sqrt[3]{\frac{1}{(x-1)^3(x+1)^3}}}+1\right)+\frac{\tan^{-1}\left(\frac{\frac{2\left(\frac{3y(x)}{x^2-1}-\frac{3}{x^2}\right.}{3\sqrt[3]{\frac{1}{(x-1)^3(x}}}}{\sqrt{3}}\right.}{\sqrt{3}}\right.$$

✓ **Maple** : cpu = 1.48 (sec), leaf count = 188

$$\left\{y(x)=\frac{\sqrt{3}}{2}\left(\frac{x^2-1}{3}\left(3\tan\left(RootOf\left(-9\ln\left(\frac{1+x}{x-1}\right)\left(\frac{1}{(1+x)^3(x-1)^3}\right)^{2/3}x^4+18\ln\left(\frac{1+x}{x-1}\right)\left(\frac{1}{(1+x)^3(\right.\right.\right.\right.\right.\right.\right.$$

2.984 ODE No. 984

$$y'(x)=\frac{e^{-2x}(x-1)y(x)\left(x^2y(x)^2+e^xxy(x)+e^{2x}\right)}{x}$$

✓ **Mathematica** : cpu = 6.33317 (sec), leaf count = 428

$$\text{Solve}\left[\frac{\sqrt[3]{2}\left(\frac{3e^{-2x}x(x-1)y(x)+e^{-x}(x-1)}{\sqrt[3]{2}\sqrt[3]{e^{-3x}(x-1)^3}}+2^{2/3}\right)\left(2^{2/3}-\frac{2^{2/3}\left(3e^{-2x}x(x-1)y(x)+e^{-x}(x-1)\right)}{\sqrt[3]{e^{-3x}(x-1)^3}}\right)\left(\left(1-\frac{3e^{-2x}x(x-1)y(x)+e^{-x}(x-1}{\sqrt[3]{e^{-3x}(x-1)^3}}\right.\right.}{9\left(-\frac{e^{3x}(3e^{-2x}x(x-1)y(x)+e}{(x-1)^3}\right.}\right.$$

✓ **Maple** : cpu = 1.402 (sec), leaf count = 40

$$\left\{y(x)=\frac{1}{9x}e^{RootOf\left(-e^{\_Z}\ln\left(\frac{\left(e^{\_Z}+9\right)x}{2}\right)+3e^{\_Z}\_C1+\_Z e^{\_Z}+xe^{\_Z}+9\right)+x}\right\}$$

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 = 0.329032 (sec), leaf count = 103

$$\text{Solve}\left[-\frac{17}{3}\text{RootSum}\left[-17\#1^3+3\sqrt[3]{-34}\#1-17\&,\frac{\log\left(\frac{\frac{3y(x)}{x^2}+\frac{x+3}{x^3}}{\sqrt[3]{34}\sqrt[3]{-\frac{1}{x^6}}}-\#1\right)}{\sqrt[3]{-34}-17\#1^2}\&\right]=-\frac{1}{9}34^{2/3}\left(-\frac{1}{x^6}\right)^{2/3}x^3+c_1,y(\right.$$

✓ **Maple** : cpu = 0.15 (sec), leaf count = 43

$$\left\{y(x)=\frac{17\,\mathit{RootOf}\left(162\int^{-Z}\left(289\_a^3+54\_a-54\right)^{-1}d\_ax+3\_C1\,x+2\right)x-3\,x-9}{9\,x}\right\}$$

2.986 ODE No. 986

$$y'(x)=\frac{3x^2y(x)\log^2(x)+x^2-x^3\log^3(x)+y(x)^3+xy(x)-3xy(x)^2\log(x)}{x^2}$$

✓ **Mathematica** : cpu = 0.116257 (sec), leaf count = 44

$$\left\{\left\{y(x)\to x\log(x)-\frac{x}{\sqrt{-2x+c_1}}\right\},\left\{y(x)\to x\log(x)+\frac{x}{\sqrt{-2x+c_1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.062 (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 = 0.155928 (sec), leaf count = 41

$$\left\{\left\{y(x)\to\sqrt{a}x\tanh\left(\sqrt{a}\int_1^x F(K[1])K[1]dK[1]+\sqrt{a}c_1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.235 (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 = 0.193521 (sec), leaf count = 107

$$\left\{\left\{y(x) \to -\frac{x\left(-\exp\left(2\sqrt{2}\left(\int_1^x -F(K[1])K[1]dK[1] + c_1\right)\right) + \sqrt{2}\exp\left(2\sqrt{2}\left(\int_1^x -F(K[1])K[1]dK[1] + c_1\right)\right) - 1 -\right.}{1 + \exp\left(2\sqrt{2}\left(\int_1^x -F(K[1])K[1]dK[1] + c_1\right)\right)}\right.\right.$$

✓ **Maple** : cpu = 0.169 (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 = 0.159796 (sec), leaf count = 56

$$\left\{\left\{y(x) \to \frac{\sqrt{b}x\tan\left(\sqrt{a}\sqrt{b}\int_1^x F(K[1])K[1]dK[1] + \sqrt{a}\sqrt{b}c_1\right)}{\sqrt{a}}\right\}\right\}$$

✓ **Maple** : cpu = 0.263 (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

$$y'(x) = 2x - F(x)\left(2x^2y(x) - x^4 - y(x)^2 + 1\right)$$

✓ **Mathematica** : cpu = 0.204567 (sec), leaf count = 58

$$\left\{\left\{y(x) \to \frac{\exp\left(\int_1^x 2F(K[5])dK[5]\right)}{-\int_1^x \exp\left(\int_1^{K[6]} 2F(K[5])dK[5]\right)F(K[6])dK[6] + c_1} + x^2 + 1\right\}\right\}$$

✓ **Maple** : cpu = 1.428 (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 = 0.175165 (sec), leaf count = 104

$$\left\{\left\{y(x) \to -\frac{x\left(-\exp\left(2\sqrt{2}\left(\int_1^x F(K[1])K[1]dK[1] + c_1\right)\right) + \sqrt{2}\exp\left(2\sqrt{2}\left(\int_1^x F(K[1])K[1]dK[1] + c_1\right)\right) - 1 - \sqrt{2}\right.}{1 + \exp\left(2\sqrt{2}\left(\int_1^x F(K[1])K[1]dK[1] + c_1\right)\right)}\right.\right.$$

✓ **Maple** : cpu = 0.178 (sec), leaf count = 29

$$\left\{y(x) = \frac{x\left(\sqrt{2} - 2\tanh\left(\left(\_C1 + \int F(x)\,x\,dx\right)\sqrt{2}\right)\right)\sqrt{2}}{2}\right\}$$

2.992 ODE No. 992

$$y'(x) = \frac{y(x)}{x} - F(x)\left(-x^3 - 7xy(x)^2\right)$$

✓ **Mathematica** : cpu = 0.120685 (sec), leaf count = 43

$$\left\{\left\{y(x) \to \frac{x\tan\left(\sqrt{7}\int_1^x F(K[1])K[1]^2 dK[1] + \sqrt{7}c_1\right)}{\sqrt{7}}\right\}\right\}$$

✓ **Maple** : cpu = 0.22 (sec), leaf count = 25

$$\left\{y(x) = \frac{\tan\left(\left(\int x^2 F(x)\,dx + \_C1\right)\sqrt{7}\right)x\sqrt{7}}{7}\right\}$$

2.993 ODE No. 993

$$y'(x) = \frac{y(x)}{x\log(x)} - F(x)\left(-y(x)^2 - 2y(x)\log(x) - \log^2(x)\right)$$

✓ **Mathematica** : cpu = 1.43647 (sec), leaf count = 73

$$\left\{\left\{y(x) \to \frac{\int_1^x \frac{F(K[5])}{\sqrt{\frac{1}{\log^2(K[5])}}}dK[5] - 1 + c_1}{\sqrt{\frac{1}{\log^2(x)}}\int_1^x \frac{F(K[5])}{\sqrt{\frac{1}{\log^2(K[5])}}}dK[5] + c_1\sqrt{\frac{1}{\log^2(x)}}}\right\}\right\}$$

✓ **Maple** : cpu = 0.164 (sec), leaf count = 35

$$\left\{y(x) = -\frac{\ln(x)\left(\int -2\ln(x)F(x)\,dx - \_C1 - 2\right)}{\int -2\ln(x)F(x)\,dx - \_C1}\right\}$$

2.994 ODE No. 994

$$y'(x) = \frac{y(x)}{x \log(x)} - x^3\left(-y(x)^2 - 2y(x)\log(x) - \log^2(x)\right)$$

✓ **Mathematica** : cpu = 0.210036 (sec), leaf count = 198

$$\left\{\left\{y(x) \to -\frac{\frac{1}{16}x^4 e^{\frac{1}{16}x^4(4\log(x)-1)}(4\log(x)-1)\left(\frac{x^3}{4} + \frac{1}{4}x^3(4\log(x)-1)\right) + \frac{1}{4}x^3 e^{\frac{1}{16}x^4(4\log(x)-1)} + \frac{1}{4}x^3 e^{\frac{1}{16}x^4(4\log(x)}}{x^3\left(\frac{1}{16}x^4 e^{\frac{1}{16}x^4(4\log(x)-1)}(4\log(x)-1) + c_1 e^{\frac{1}{16}x^4}\right.}\right.\right.$$

✓ **Maple** : cpu = 0.164 (sec), leaf count = 43

$$\left\{y(x) = -\frac{\ln(x)\left(4x^4\ln(x) - x^4 + 8\_C1 + 16\right)}{4x^4\ln(x) - x^4 + 8\_C1}\right\}$$

2.995 ODE No. 995

$$y'(x) = (y(x) - e^x)^2 + e^x$$

✓ **Mathematica** : cpu = 0.175138 (sec), leaf count = 17

$$\left\{\left\{y(x) \to e^x + \frac{1}{-x + c_1}\right\}\right\}$$

✓ **Maple** : cpu = 0.099 (sec), leaf count = 14

$$\left\{y(x) = e^x + (-x + \_C1)^{-1}\right\}$$

2.996 ODE No. 996

$$y'(x) = \frac{(y(x) - \mathrm{Si}(x))^2 + \sin(x)}{x}$$

✗ **Mathematica** : cpu = 26.6313 (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 = 0.127 (sec), leaf count = 15

$$\left\{y(x) = Si(x) + (-\ln(x) + \_C1)^{-1}\right\}$$

2.997 ODE No. 997

$$y'(x) = (y(x) + \cos(x))^2 + \sin(x)$$

✓ **Mathematica** : cpu = 0.11646 (sec), leaf count = 18

$$\left\{\left\{y(x) \to -\cos(x) + \frac{1}{-x + c_1}\right\}\right\}$$

✓ **Maple** : cpu = 0.063 (sec), leaf count = 16

$$\left\{y(x) = -\cos(x) + (-x + \_C1)^{-1}\right\}$$

2.998 ODE No. 998

$$y'(x) = \frac{(-\mathrm{Ci}(x) + y(x) - \log(x))^2 + \cos(x)}{x}$$

✓ **Mathematica** : cpu = 0.483247 (sec), leaf count = 27

$$\left\{\left\{y(x) \to \mathrm{Ci}(x) + \frac{x^2}{-\frac{x^2}{2} + c_1} + \log(x) + 1\right\}\right\}$$

✓ **Maple** : cpu = 0.398 (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 = 0.186427 (sec), leaf count = 24

$$\left\{\left\{y(x) \to x - \log(x+1) + \frac{1}{-\log(x+1) + c_1}\right\}\right\}$$

✓ **Maple** : cpu = 0.154 (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

$$y'(x) = \frac{2x^2 y(x) + x^3 - xy(x) - y(x)^2 + xy(x)\log(x)}{x^2(x + \log(x))}$$

✓ **Mathematica** : cpu = 0.993535 (sec), leaf count = 351

$$\left\{\left\{y(x) \to \frac{x^2(x+\log(x))\left(-\frac{\sqrt{x}(x+\log(x)+2)\log(x)\exp\left(-\frac{1}{2}\int_1^x \frac{K[5]+\log(K[5])+2}{K[5]^2+\log(K[5])K[5]}dK[5]\right)}{2(x^2+x\log(x))} + c_1\left(\frac{\exp\left(-\frac{1}{2}\int_1^x \frac{K[5]+\log(K[5])+2}{K[5]^2+\log(K[5])K[5]} \cdots}{2\sqrt{x}} \cdots\right.\right.}{\sqrt{x}\log(x)\exp\left(-\frac{1}{2}\int_1^x \frac{K[5]+\log(\cdots}{K[5]^2+\log(\cdots} \cdots\right.}\right.\right.$$

✓ **Maple** : cpu = 0.194 (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 = 0.0027648 (sec), leaf count = 12

$$\{\{y(x) \to c_2 x + c_1\}\}$$

✓ **Maple** : cpu = 0.003 (sec), leaf count = 9

$$\{y(x) = \_C1\, x + \_C2\}$$

Hand solution

$$y'' = 0$$

Integration twice gives

$$y(x) = c_1 x + c_2$$

2.1002 ODE No. 1002

$$y''(x) + y(x) = 0$$

✓ **Mathematica** : cpu = 0.0038789 (sec), leaf count = 16

$$\{\{y(x) \to c_1 \cos(x) + c_2 \sin(x)\}\}$$

✓ **Maple** : cpu = 0.003 (sec), leaf count = 13

$$\{y(x) = \sin(x)\_C1 + \_C2 \cos(x)\}$$

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 = 0.104358 (sec), leaf count = 45

$$\left\{\left\{y(x) \to \frac{\cos^2(x)(-\sin(nx)) - \sin^2(x)\sin(nx)}{n^2-1} + c_1\cos(x) + c_2\sin(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.079 (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 = 0.0926666 (sec), leaf count = 47

$$\left\{\left\{y(x) \to \frac{-a\cos^2(x)\cos(bx) - a\sin^2(x)\cos(bx)}{b^2-1} + c_1\cos(x) + c_2\sin(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.06 (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 = 0.427287 (sec), leaf count = 1163

$$\left\{\left\{y(x)\to c_1\cos(x) + c_2\sin(x) + \frac{-\cos(x)\cos((a-b-1)x)a^3 + \cos(x)\cos((a-b+1)x)a^3 + \cos(x)\cos((a+b}{}\right.\right.$$

✓ **Maple** : cpu = 0.109 (sec), leaf count = 82

$$\left\{y(x) = \sin(x)\_C2 + \cos(x)\_C1 + \frac{-(a+b+1)(a+b-1)\cos((a-b)x) + \cos((a+b)x)(a-b+1)(a-b}{2a^4 + (-4b^2-4)a^2 + 2b^4 - 4b^2 + 2}\right.$$

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

$$\begin{aligned}y_h &= c_1\cos x + c_2\sin x\\ &= y_h = c_1y_1 + c_2y_2\end{aligned}$$

Now we solve for the particular solution using variation of parameters.

$$y_p = u_1y_1 + u_2y_2$$

Wonskian is

$$W = \begin{vmatrix} y_1 & y_2\\ y_1' & y_2'\end{vmatrix} = \begin{vmatrix}\cos x & \sin x\\ -\sin x & \cos x\end{vmatrix} = \cos^2 x + \sin^2 x = 1$$

Hence, using $f = \sin ax \sin bx$, which is the RHS of the ODE, and noting that a_0 is the coefficient of y'' which is one here, then

$$\begin{aligned}u_1 &= \int \frac{-y_2}{W}\frac{f}{a_0}dx = -\int \sin x \sin(ax)\sin(bx)\,dx\\ &= -\frac{1}{4}\left(\frac{\cos((a-b-1)x)}{a-b-1} - \frac{\cos((a-b+1)x)}{a-b+1} - \frac{\cos((a+b-1)x)}{a+b-1} + \frac{\cos((a+b+1)x)}{a+b+1}\right)\end{aligned}$$

And

$$
\begin{aligned}
u_2 &= \int \frac{y_1}{W}\frac{f}{a_0} dx = -\int \cos x \sin(ax)\sin(bx)\,dx \\
&= \frac{1}{4}\left(\frac{\sin((a-b-1)x)}{a-b-1} + \frac{\sin((a-b+1)x)}{a-b+1} - \frac{\sin((a+b-1)x)}{a+b-1} - \frac{\sin((a+b+1)x)}{a+b+1}\right)
\end{aligned}
$$

Since $y_p = u_1(x)\cos x + u_2(x)\sin x$ then

$$
\begin{aligned}
y_p = &-\frac{1}{4}\left(\frac{\cos((a-b-1)x)}{a-b-1} - \frac{\cos((a-b+1)x)}{a-b+1} - \frac{\cos((a+b-1)x)}{a+b-1} + \frac{\cos((a+b+1)x)}{a+b+1}\right)\cos x \\
&+ \frac{1}{4}\left(\frac{\sin((a-b-1)x)}{a-b-1} + \frac{\sin((a-b+1)x)}{a-b+1} - \frac{\sin((a+b-1)x)}{a+b-1} - \frac{\sin((a+b+1)x)}{a+b+1}\right)\sin x
\end{aligned}
$$

$$
\begin{aligned}
&= \frac{1}{4}\left(-\frac{\cos^2((a-b-1)x)}{a-b-1} + \frac{\sin^2((a-b-1)x)}{a-b-1}\right) + \frac{1}{4}\left(\frac{\cos^2((a-b+1)x)}{a-b+1} + \frac{\sin^2((a-b+1)x)}{a-b+1}\right) \\
&+ \frac{1}{4}\left(\frac{\cos^2((a+b-1)x)}{a+b-1} - \frac{\sin^2((a+b-1)x)}{a+b-1}\right) + \frac{1}{4}\left(-\frac{\cos^2((a+b+1)x)}{a+b+1} - \frac{\sin^2((a+b+1)x)}{a+b+1}\right)
\end{aligned}
$$

$$
\begin{aligned}
&= \frac{1}{4}\left(-\frac{\cos^2((a-b-1)x)}{a-b-1} + \frac{\sin^2((a-b-1)x)}{a-b-1}\right) + \frac{1}{4}\left(\frac{1}{a-b+1}\right) \\
&+ \frac{1}{4}\left(\frac{\cos^2((a+b-1)x)}{a+b-1} - \frac{\sin^2((a+b-1)x)}{a+b-1}\right) - \frac{1}{4}\left(\frac{1}{a+b+1}\right)
\end{aligned}
$$

Let $a-b-1=\alpha, a+b-1=\beta$ then

$$
\begin{aligned}
y_p &= \frac{1}{4}\left(\frac{\sin^2(\alpha x) - \cos^2(\alpha x)}{\alpha}\right) + \frac{1}{4}\left(\frac{\cos^2(\beta x) - \sin^2(\beta x)}{\beta}\right) + \frac{1}{4}\left(\frac{1}{\alpha+2}\right) - \frac{1}{4}\left(\frac{1}{\beta+2}\right) \\
&= \frac{1}{4}\left(\frac{\sin^2(\alpha x) - \cos^2(\alpha x)}{\alpha} + \frac{\cos^2(\beta x) - \sin^2(\beta x)}{\beta} + \frac{1}{\alpha+2} - \frac{1}{\beta+2}\right)
\end{aligned}
$$

Therefore, the full solution is

$$
\begin{aligned}
y &= y_h + y_p \\
&= c_1 \cos x + c_2 \sin x + \frac{1}{4}\left(\frac{\sin^2(\alpha x) - \cos^2(\alpha x)}{\alpha} + \frac{\cos^2(\beta x) - \sin^2(\beta x)}{\beta} + \frac{1}{\alpha+2} - \frac{1}{\beta+2}\right)
\end{aligned}
$$

I made mistake. Need to go over it again. I do not see it now. Maple does not verify.

```
restart;
ode:=diff(diff(y(x),x),x)+y(x)-sin(a*x)*sin(b*x)=0;
```

```
alpha:=a-b-1;
beta:=a+b-1;
yp:=1/4*(1/alpha* (sin(alpha*x)^2-cos(alpha*x)^2)+1/beta* (cos(beta*x)^2-sin(beta*x)^2))+(1/4)*(1/(al
y0:=yp+_C1*sin(x)+_C2*cos(x);
not zero
```

2.1006 ODE No. 1006

$$y''(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 0.0036051 (sec), leaf count = 20

$$\{\{y(x) \to c_1 e^x + c_2 e^{-x}\}\}$$

✓ **Maple** : cpu = 0.01 (sec), leaf count = 15

$$\{y(x) = \_C1\, e^{-x} + \_C2\, e^x\}$$

Hand solution

$$y'' - y = 0 \tag{1}$$

Let $y = e^{\lambda x}$, substitution in above gives

$$\lambda^2 e^{\lambda x} - e^{\lambda x} = 0$$
$$\lambda^2 - 1 = 0$$

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 = 0.0941077 (sec), leaf count = 135

$$\left\{\left\{y(x) \to \frac{e^{-\sqrt{2}x}\left(-2e^{x\left(x+\sqrt{2}\right)}x + 2e^{\left(x-\sqrt{2}\right)x+2\sqrt{2}x}x + \sqrt{2}e^{x\left(x+\sqrt{2}\right)} + \sqrt{2}e^{\left(x-\sqrt{2}\right)x+2\sqrt{2}x}\right)}{2\sqrt{2}} + c_1 e^{\sqrt{2}x} + c_2 e^{-\sqrt{2}x}\right.\right.$$

✓ **Maple** : cpu = 0.02 (sec), leaf count = 26

$$\left\{y(x) = e^{\sqrt{2}x}\_C2 + e^{-\sqrt{2}x}\_C1 + e^{x^2}\right\}$$

Hand solution

$$y'' - 2y = 4x^2e^{x^2} \tag{1}$$

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.

$$y_p = u_1y_1 + u_2y_2$$

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 $f = 4x^2e^{x^2}$, which is the RHS of the ODE, and noting that a_0 is the coefficient of y'' which is one here, then

$$\begin{aligned}u_1 &= \int \frac{-y_2}{W}\frac{f}{a_0}dx = -\int \frac{e^{-\sqrt{2}x}}{-2\sqrt{2}}4x^2e^{x^2}dx\\ &= \frac{2}{\sqrt{2}}\int x^2e^{x^2-\sqrt{2}x}dx\\ &= \frac{2}{\sqrt{2}}\left(\frac{1}{4}e^{x\left(x-\sqrt{2}\right)}\left(\sqrt{2}+2x\right)\right)\end{aligned}$$

And

$$
\begin{aligned}
u_2 &= \int \frac{y_1}{W}\frac{f}{a_0}dx = \int \frac{e^{\sqrt{2}x}}{-2\sqrt{2}}4x^2e^{x^2}dx \\
&= \frac{-2}{\sqrt{2}}\int x^2e^{x^2+\sqrt{2}x}dx \\
&= \frac{-2}{\sqrt{2}}\left(-\frac{1}{4}e^{x\left(x+\sqrt{2}\right)}\left(\sqrt{2}-2x\right)\right)
\end{aligned}
$$

Since $y_p = u_1e^{\sqrt{2}x} + u_2e^{-\sqrt{2}x}$ then

$$
\begin{aligned}
y_p &= \frac{2}{\sqrt{2}}\left(\frac{1}{4}e^{x\left(x-\sqrt{2}\right)}\left(\sqrt{2}+2x\right)\right)e^{\sqrt{2}x} - \frac{2}{\sqrt{2}}\left(-\frac{1}{4}e^{x\left(x+\sqrt{2}\right)}\left(\sqrt{2}-2x\right)\right)e^{-\sqrt{2}x} \\
&= \frac{2}{\sqrt{2}}\frac{1}{4}e^{x^2}\left(\sqrt{2}+2x\right) + \frac{2}{\sqrt{2}}\frac{1}{4}e^{x^2}\left(\sqrt{2}-2x\right) \\
&= \frac{1}{2}e^{x^2} + \frac{1}{2}e^{x^2} \\
&= e^{x^2}
\end{aligned}
$$

Therefore, the full solution is

$$
\begin{aligned}
y &= y_h + y_p \\
&= Ae^{\sqrt{2}x} + Be^{-\sqrt{2}x} + e^{x^2}
\end{aligned}
$$

```
restart;
ode:=diff(y(x),x$2)-2*y(x)=4*x^2*exp(x^2);
y0:=_C1*exp(sqrt(2)*x)+_C2*exp(-sqrt(2)*x)+exp(x^2);
odetest(y(x)=y0,ode);
0
```

2.1008 ODE No. 1008

$$
a^2y(x) - \cot(ax) + y''(x) = 0
$$

✓ **Mathematica** : cpu = 0.0340277 (sec), leaf count = 48

$$
\left\{\left\{y(x) \to -\frac{\sin(ax)\left(\log\left(\cos\left(\frac{ax}{2}\right)\right) - \log\left(\sin\left(\frac{ax}{2}\right)\right)\right)}{a^2} + c_1\cos(ax) + c_2\sin(ax)\right\}\right\}
$$

✓ **Maple** : cpu = 0.147 (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 = 0.0037287 (sec), leaf count = 28

$$\left\{\left\{y(x) \to c_1 \cos\left(\sqrt{l}x\right) + c_2 \sin\left(\sqrt{l}x\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.027 (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 = 0.0047719 (sec), leaf count = 46

$$\left\{\left\{y(x) \to c_1 \text{Ai}\left(\frac{-b - ax}{(-a)^{2/3}}\right) + c_2 \text{Bi}\left(\frac{-b - ax}{(-a)^{2/3}}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.054 (sec), leaf count = 31

$$\left\{y(x) = \_C1 \text{ Ai}\left(-(ax + b)a^{-\frac{2}{3}}\right) + \_C2 \text{ Bi}\left(-(ax + b)a^{-\frac{2}{3}}\right)\right\}$$

Hand solution

$$y'' + (ax + b)\, y = 0 \tag{1}$$

For $a \neq 0$. Let $y = \eta(\xi), \xi = ax + b$, hence

$$\begin{aligned} \frac{dy}{dx} &= \frac{d\eta}{d\xi}\frac{d\xi}{dx} \\ &= \frac{d\eta}{d\xi}a \end{aligned}$$

And

$$
\begin{aligned}
\frac{d^2y}{dx^2} &= \frac{d}{dx}\left(\frac{d\eta}{d\xi}a\right)\\
&= a\frac{d}{dx}\left(\frac{d\eta}{d\xi}\right)\\
&= a\left(\frac{d^2\eta}{d\xi^2}\frac{d\xi}{dx}\right)\\
&= a^2\frac{d^2\eta}{d\xi^2}
\end{aligned}
$$

Therefore (1) becomes

$$
\begin{aligned}
a^2\frac{d^2\eta}{d\xi^2} + \xi\eta(\xi) &= 0\\
a^2\eta'' + \xi\eta &= 0 \qquad (2)
\end{aligned}
$$

This is Airy ODE but with plus sign instead of the normal Airy $\eta'' - \xi\eta = 0$. Let

$$
\begin{aligned}
\eta &= \sum_{n=0}^{\infty} c_n\xi^n\\
\eta' &= \sum_{n=0}^{\infty} nc_n\xi^{n-1} = \sum_{n=1}^{\infty} nc_n\xi^{n-1} = \sum_{n=0}^{\infty}(n+1)\,c_{n+1}\xi^n\\
\eta'' &= \sum_{n=0}^{\infty} n(n+1)\,c_{n+1}\xi^{n-1} = \sum_{n=1}^{\infty} n(n+1)\,c_{n+1}\xi^{n-1} = \sum_{n=0}^{\infty}(n+1)\,(n+2)\,c_{n+2}\xi^n
\end{aligned}
$$

Hence (2) becomes

$$
\begin{aligned}
a^2\sum_{n=0}^{\infty}(n+1)\,(n+2)\,c_{n+2}\xi^n + \xi\sum_{n=0}^{\infty} c_n\xi^n &= 0\\
\sum_{n=0}^{\infty} a^2(n+1)\,(n+2)\,c_{n+2}\xi^n + \sum_{n=0}^{\infty} c_n\xi^{n+1} &= 0\\
\sum_{n=0}^{\infty} a^2(n+1)\,(n+2)\,c_{n+2}\xi^n + \sum_{n=1}^{\infty} c_{n-1}\xi^n &= 0\\
2a^2c_2 + \sum_{n=1}^{\infty}\left(a^2(n+1)\,(n+2)\,c_{n+2} + c_{n-1}\right)\xi^n &= 0
\end{aligned}
$$

Hence

$$
\begin{aligned}
2a^2 c_2 &= 0 && (3)\\
a^2(n+1)(n+2)\,c_{n+2} + c_{n-1} &= 0 \qquad n \geq 1 && (4)
\end{aligned}
$$

From (3) and since $a \neq 0$

$$c_2 = 0$$

From (4)

$$c_{n+2} = \frac{-c_{n-1}}{a^2\,(n+1)\,(n+2)}$$

Hence for $n = 3$, we see from the above recurrence equation and because $c_2 = 0$ that

$$c_5 = \frac{-c_2}{a^2\,(4)\,(6)} = 0$$

Similarly, for $n = 6$

$$c_8 = \frac{-c_5}{a^2\,(7)\,(8)} = 0$$

Similarly, for $n = 9$

$$c_{11} = \frac{-c_8}{a^2\,(10)\,(11)} = 0$$

And so on. Hence we found so far that for $n = 3, 6, 9, 12, \cdots$ all terms generated which are $c_5, c_8, c_{11}, \cdots$ are zero.

Now, for $n = 1$, the recurrence equation gives

$$c_3 = \frac{-c_0}{a^2}\frac{1}{2\cdot 3}$$

For $n = 2$

$$c_4 = \frac{-c_1}{a^2}\frac{1}{3\cdot 4}$$

For $n = 4$

$$c_6 = \frac{-c_3}{a^2\,(5)\,(6)} = c_0\left(\frac{1}{a^2}\frac{1}{5\cdot 6}\right)\left(\frac{1}{a^2}\frac{1}{2\cdot 3}\right)$$

For $n=5$

$$c_7 = \frac{-c_4}{a^2\,(6)\,(7)} = c_1\left(\frac{1}{a^2}\frac{1}{6\cdot 7}\right)\left(\frac{1}{a^2}\frac{1}{3\cdot 4}\right)$$

For $n=7$

$$c_9 = \frac{-c_6}{a^2\,(8)\,(9)} = -c_0\left(\frac{1}{a^2}\frac{1}{8\cdot 9}\right)\left(\frac{1}{a^2}\frac{1}{5\cdot 6}\right)\left(\frac{1}{a^2}\frac{1}{2\cdot 3}\right)$$

For $n=8$

$$c_{10} = \frac{-c_7}{a^2\,(9)\,(10)} = -c_1\left(\frac{1}{a^2}\frac{1}{9\cdot 10}\right)\left(\frac{1}{a^2}\frac{1}{6\cdot 7}\right)\left(\frac{1}{a^2}\frac{1}{3\cdot 4}\right)$$

Therefore, in summary, this is what we have so far. For $n=3,6,9,12,\cdots$ all terms are zero. For $n=1,4,7,\cdots$ all terms are expressed using c_0 and for $n=2,5,8,\cdots$ all terms are expressed using c_1. So there are two arbitrary constants c_0, c_1.

In other words, $c_2, c_5, c_8, c_{11}, \cdots = 0$ and $c_3, c_6, c_9, c_{12}, \cdots = f(c_0)$ and $c_4, c_7, c_{10}, c_{13}, \cdots = f(c_1)$.

$$\begin{aligned}
\eta &= \sum_{n=0}^{\infty} c_n \xi^n \\
&= c_0 + c_1\xi^1 + c_2\xi^2 + c_3\xi^3 + \cdots \\
&= c_0 + \left(c_1\xi^1\right) + 0 - \left(c_0\frac{\xi^3}{a^2}\frac{1}{2\cdot 3}\right) - \left(c_1\frac{\xi^4}{a^2}\frac{1}{3\cdot 4}\right) + 0 + c_0\frac{\xi^6}{a^4}\frac{1}{2\cdot 3\cdot 5\cdot 6} + c_1\frac{\xi^7}{a^4}\frac{1}{3\cdot 4\cdot 6\cdot 7} + 0 \\
&= c_0\left(1 - \frac{\xi^3}{a^2}\frac{1}{2\cdot 3} + \frac{\xi^6}{a^4}\frac{1}{2\cdot 3\cdot 5\cdot 6} - \cdots\right) + c_1\left(\xi - \frac{\xi^4}{a^2}\frac{1}{3\cdot 4} + \frac{\xi^7}{a^4}\frac{1}{3\cdot 4\cdot 6\cdot 7} - \cdots\right) \\
&= c_0\left(1 - \frac{1}{a^2}\frac{\xi^3}{3!} + \frac{1\cdot 4}{a^4}\frac{\xi^6}{6!} - \frac{1\cdot 4\cdot 7}{a^6}\frac{\xi^9}{9!} + \cdots\right) + c_1\left(\xi - \frac{\xi^4}{a^2}\frac{2}{4!} + \frac{\xi^7}{a^4}\frac{2\cdot 5}{7!} - \frac{\xi^{10}}{a^6}\frac{2\cdot 5\cdot 8}{10!} + \cdots\right)
\end{aligned}$$

Hence

$$\eta = c_0\left(\sum_{n=0}^{\infty} 3^n\left(\frac{1}{3}\right)_n \frac{(-1)^n}{a^{2n}}\frac{\xi^{3n}}{(3n)!}\right) + c_1\left(\sum_{n=0}^{\infty} 3^n\left(\frac{2}{3}\right)_n \frac{(-1)^n}{a^{2n}}\frac{\xi^{3n+1}}{(3n+1)!}\right) \tag{5}$$

Where

$$\begin{aligned}
3^n\left(\frac{1}{3}\right)_n &= (1)\cdot(4)\cdot(7)\ldots(3n-2) \\
3^n\left(\frac{2}{3}\right)_n &= (2)\cdot(5)\cdot(8)\ldots(3n-1)
\end{aligned}$$

And

$$\left(\frac{1}{3}\right)_0 = \left(\frac{2}{3}\right)_0 = 1$$

Equation (5) can be simplified more by moving $\frac{(-1)^n}{a^{2n}}$ into ξ as follows

$$\eta = c_0\left(\sum_{n=0}^{\infty} 3^n \left(\frac{1}{3}\right)_n \frac{1}{(3n)!}\left(\frac{-\xi}{a^{\frac{2}{3}}}\right)^{3n}\right) + ac_1\left(\sum_{n=0}^{\infty} 3^n \left(\frac{2}{3}\right)_n \frac{1}{(3n+1)!}\left(\frac{-\xi}{a^{\frac{2}{3}}}\right)^{3n+1}\right)$$

Let $\left(\frac{-\xi}{a^{\frac{2}{3}}}\right) = z$ then the above is

$$\eta = c_0\left(\sum_{n=0}^{\infty} 3^n \left(\frac{1}{3}\right)_n \frac{z^{3n}}{(3n)!}\right) + ac_1\left(\sum_{n=0}^{\infty} 3^n \left(\frac{2}{3}\right)_n \frac{z^{3n+1}}{(3n+1)!}\right)$$

Let

$$f(\xi) = \sum_{n=0}^{\infty} 3^n \left(\frac{1}{3}\right)_n \frac{\xi^{3n}}{(3n)!}$$
$$g(\xi) = \sum_{n=0}^{\infty} 3^n \left(\frac{2}{3}\right)_n \frac{\xi^{3n+1}}{(3n+1)!}$$

Now looking at definition of $\mathrm{AiryAI}(z)$ we see

$$\mathrm{AiryAI}(z) = r_1 f(z) - r_2 g(z)$$
$$\mathrm{AiryBI}(z) = \sqrt{3}(r_1 f(z) + r_2 g(z))$$

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 = 0.0047041 (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 = 0.05 (sec), leaf count = 17

$$\left\{y(x) = \mathrm{e}^{\frac{x^2}{2}}\left(\mathit{Erf}(x)\_C2 + \_C1\right)\right\}$$

Hand solution

$$y'' - (x^2 + 1)\, y = 0 \tag{1}$$

Second order with varying coefficient. Using power series, let $y = \sum_{n=0}^{\infty} c_n x^n$, hence

$$\begin{aligned}
y' &= \sum_{n=0}^{\infty} n c_n x^{n-1} = \sum_{n=1}^{\infty} n c_n x^{n-1} = \sum_{n=0}^{\infty} (n+1)\, c_{n+1} x^n \\
y'' &= \sum_{n=0}^{\infty} n(n+1)\, c_{n+1} x^{n-1} = \sum_{n=1}^{\infty} n(n+1)\, c_{n+1} x^{n-1} = \sum_{n=0}^{\infty} (n+1)\,(n+2)\, c_{n+2} x^n
\end{aligned}$$

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

$$\begin{aligned} y &= \sum_{n=0}^{\infty} c_n x^n \\ &= c_0 + c_1 x + c_2 x^2 + c_3 x^3 + \cdots \\ &= c_0 + c_1 x + \frac{c_0}{2}x^2 + \frac{c_1}{6}x^3 + c_0\frac{3}{(2)(3)(4)}x^4 + c_1\frac{7}{(4)(5)(6)}x^5 + c_0\frac{15}{(2)(3)(4)(5)(6)}x^6 + c_1\frac{3}{560}x^7 + \cdots \\ &= c_0 + c_1 x + \frac{c_0}{2}x^2 + \frac{c_1}{6}x^3 + c_0\frac{1}{8}x^4 + c_1\frac{7}{120}x^5 + c_0\frac{1}{48}x^6 + c_1\frac{3}{560}x^7 + \cdots \\ &= c_0\left(1+\frac{x^2}{2}+\frac{1}{8}x^4+\frac{1}{48}x^6+\cdots\right) + c_1\left(x+\frac{1}{6}x^3+\frac{7}{120}x^5+\frac{3}{560}x^7+\cdots\right) \end{aligned}$$

Now the power series for $e^{\frac{x^2}{2}} = 1+\frac{x^2}{2}+\frac{x^4}{8}+\frac{x^6}{48}+\cdots$, so we can convert the first term above (the expression for c_0 to be $e^{\frac{x^2}{2}}$. Hence

$$c_0\left(1+\frac{x^2}{2}+\frac{1}{8}x^4+\frac{1}{48}x^6+\cdots\right) = c_0 e^{\frac{x^2}{2}}$$

So now we have to work on the second term (the expression for c_1)

$$c_1\left(x+\frac{1}{6}x^3+\frac{7}{120}x^5+\frac{3}{560}x^7+\cdots\right) = ?$$

Recall that series for error function is

$$\operatorname{erf}(x) = \frac{2}{\sqrt{\pi}}\left(x-\frac{x^3}{3}+\frac{x^5}{10}-\frac{x^7}{48}+\cdots\right)$$

Multiplying $e^{\frac{x^2}{2}}$ by $\operatorname{erf}(x)$ gives

$$\begin{aligned} e^{\frac{x^2}{2}}\operatorname{erf}(x) &= \frac{2}{\sqrt{\pi}}\left(1+\frac{x^2}{2}+\frac{x^4}{(2)(4)}+\frac{x^6}{(2)(4)(6)}+\cdots\right)\left(x-\frac{x^3}{3}+\frac{x^5}{10}-\frac{x^7}{48}+\cdots\right) \\ &= \frac{2}{\sqrt{\pi}}\left(x-\frac{x^3}{3}+\frac{x^5}{10}-\frac{x^7}{48}+\cdots+\frac{x^3}{2}-\frac{x^5}{6}+\frac{x^7}{20}-\frac{x^{15}}{96}+\cdots\right) \\ &= \frac{2}{\sqrt{\pi}}\left(x+\frac{x^3}{6}+\frac{7x^5}{120}+\frac{3}{560}x^7+\cdots\right) \end{aligned}$$

Comparing the above to the term next to c_1 above, we see they are the same with a multiplier $\frac{2}{\sqrt{\pi}}$, which can be absorbed into the constant c_1, Hence

$$
\begin{aligned}
y &= c_0\left(1+\frac{x^2}{2}+\frac{1}{8}x^4+\frac{1}{48}x^6+\cdots\right)+c_1\left(x+\frac{1}{6}x^3+\frac{7}{120}x^5+\frac{3}{560}x^7+\cdots\right)\\
&= c_0 e^{\frac{x^2}{2}}+c_1\left(e^{\frac{x^2}{2}}\operatorname{erf}(x)\right)
\end{aligned}
$$

Hence final solution is

$$
y = c_0 e^{\frac{x^2}{2}}+c_2\left(e^{\frac{x^2}{2}}\operatorname{erf}(x)\right)
$$

Verification

```
restart;
ode:=diff(diff(y(x),x),x)-(x^2+1)*y(x)=0;
y0:=_C1*exp(x^2/2)+_C2*exp(x^2/2)*erf(x);
odetest(y(x)=y0,ode);
0
```

2.1012 ODE No. 1012

$$
y''(x)-\left(a+x^2\right)y(x)=0
$$

✓ **Mathematica** : cpu = 0.007156 (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 = 0.49 (sec), leaf count = 29

$$
\left\{y(x)=\left(\_C2\, W_{-\frac{a}{4},\frac{1}{4}}\left(x^2\right)+\_C1\, M_{-\frac{a}{4},\frac{1}{4}}\left(x^2\right)\right)\frac{1}{\sqrt{x}}\right\}
$$

2.1013 ODE No. 1013

$$
y''(x)-\left(a^2x^2+a\right)y(x)=0
$$

✓ **Mathematica** : cpu = 0.0114875 (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 = 0.067 (sec), leaf count = 22

$$
\left\{y(x)=e^{\frac{a x^2}{2}}\left(\mathit{Erf}\left(\sqrt{a}x\right)\_C2+\_C1\right)\right\}
$$

2.1014 ODE No. 1014

$$y''(x) - cx^a y(x) = 0$$

✓ **Mathematica** : cpu = 0.0231569 (sec), leaf count = 170

$$\left\{\left\{y(x) \to (a+2)^{-\frac{1}{a+2}} c_1 c^{\frac{1}{2(a+2)}} x^{\frac{\frac{a}{2}+1}{a+2}} \Gamma\left(1-\frac{1}{a+2}\right) I_{-\frac{1}{a+2}}\left(\frac{2\sqrt{c}x^{\frac{a+2}{2}}}{a+2}\right) + (-1)^{\frac{1}{a+2}} (a+2)^{-\frac{1}{a+2}} c_2 c^{\frac{1}{2(a+2)}} x^{1-\frac{\frac{a}{2}+1}{a+2}} \Gamma\right.\right.$$

✓ **Maple** : cpu = 1.077 (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

$$y''(x) - y(x)\left(a^2 x^{2n} - 1\right) = 0$$

✗ **Mathematica** : cpu = 0.283794 (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

$$\left\{y(x) = DESol\left(\left\{\frac{d^2}{dx^2}\_Y(x) + \left(-a^2 x^{2\,n} + 1\right)\_Y(x)\right\}, \{\_Y(x)\}\right)\right\}$$

2.1016 ODE No. 1016

$$y(x)\left(ax^{2c} + bx^{c-1}\right) + y''(x) = 0$$

✓ **Mathematica** : cpu = 0.108631 (sec), leaf count = 312

$$\left\{\left\{y(x) \to 2^{\frac{c}{2(c+1)}} c_1 \left(x^{c+1}\right)^{\frac{c}{2(c+1)}} x^{-c/2} e^{-\frac{\sqrt{a}x^{c+1}}{\sqrt{-c^2-2c-1}}} U\left(\frac{\frac{\sqrt{a}cb}{\sqrt{-(c+1)^2}} + \frac{\sqrt{a}b}{\sqrt{-(c+1)^2}} + ac}{2(ca+a)}, \frac{c}{c+1}, \frac{2\sqrt{a}x^{c+1}}{\sqrt{-c^2-2c-1}}\right) + 2^{\frac{}{2(c}}\right.\right.$$

✓ **Maple** : cpu = 2.377 (sec), leaf count = 91

$$\left\{y(x) = x^{-\frac{c}{2}}\left(W_{\frac{-ib}{2\,c+2}\frac{1}{\sqrt{a}},(2\,c+2)^{-1}}\left(\frac{2\,ix^{c+1}}{c+1}\sqrt{a}\right)\_C2 + M_{\frac{-ib}{2\,c+2}\frac{1}{\sqrt{a}},(2\,c+2)^{-1}}\left(\frac{2\,ix^{c+1}}{c+1}\sqrt{a}\right)\_C1\right)\right\}$$

2.1017 ODE No. 1017

$$(e^{2x} - v^2)\, y(x) + y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0189899 (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 = 0.042 (sec), leaf count = 17

$$\{y(x) = \_C1\, J_v(\mathrm{e}^x) + \_C2\, Y_v(\mathrm{e}^x)\}$$

2.1018 ODE No. 1018

$$ae^{bx}y(x) + y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0160755 (sec), leaf count = 55

$$\left\{\left\{y(x)\to c_1 J_0\left(\frac{2\sqrt{a}\sqrt{e^{bx}}}{b}\right)+2c_2Y_0\left(\frac{2\sqrt{a}\sqrt{e^{bx}}}{b}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.52 (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 = 0.606162 (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 = 0.568417 (sec), leaf count = 180

$$\left\{\left\{y(x)\to c_1e^{i\left(\sqrt{c}\log(e^x)-\sqrt{a}e^x\right)}U\left(\frac{i\left(b-i\sqrt{a}+2\sqrt{a}\sqrt{c}\right)}{2\sqrt{a}},2i\sqrt{c}+1,2i\sqrt{a}e^x\right)+c_2e^{i\left(\sqrt{c}\log(e^x)-\sqrt{a}e^x\right)}L_{-\frac{i\left(b-i\sqrt{a}+2\sqrt{a}\right.}{2\sqrt{a}}}^{2i\sqrt{c}}\right.\right.$$

✓ **Maple** : cpu = 1.243 (sec), leaf count = 58

$$\left\{y(x)=\mathrm{e}^{-\frac{x}{2}}\left(M_{-\frac{i}{2}b\frac{1}{\sqrt{a}},i\sqrt{c}}(2\,i\sqrt{a}\mathrm{e}^{x})\_C1+W_{-\frac{i}{2}b\frac{1}{\sqrt{a}},i\sqrt{c}}(2\,i\sqrt{a}\mathrm{e}^{x})\_C2\right)\right\}$$

2.1021 ODE No. 1021

$$y(x)\left(a\cos^2(x)+b\right)+y''(x)=0$$

✓ **Mathematica** : cpu = 0.0235897 (sec), leaf count = 44

$$\left\{\left\{y(x)\to c_1\text{MathieuC}\left[\frac{1}{2}(a+2b),-\frac{a}{4},x\right]+c_2\text{MathieuS}\left[\frac{1}{2}(a+2b),-\frac{a}{4},x\right]\right\}\right\}$$

✓ **Maple** : cpu = 1.376 (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 = 0.019041 (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 = 2.273 (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 = 0.0094339 (sec), leaf count = 44

$$\left\{\left\{y(x)\to c_1\text{MathieuC}\left[\frac{1}{2}(a+2b),-\frac{a}{4},x\right]+c_2\text{MathieuS}\left[\frac{1}{2}(a+2b),-\frac{a}{4},x\right]\right\}\right\}$$

✓ **Maple** : cpu = 2.24 (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 = 0.131025 (sec), leaf count = 84

$$\left\{\left\{y(x)\to\frac{c_1\sqrt[4]{1-\cos^2(x)}\sec(x)}{\sqrt[4]{\cos^2(x)-1}}-\frac{c_2\sqrt[4]{1-\cos^2(x)}\sec(x)\left(\cos(x)\sqrt{1-\cos^2(x)}-\sin^{-1}(\cos(x))\right)}{2\sqrt[4]{\cos^2(x)-1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.448 (sec), leaf count = 30

$$\left\{y(x)=\frac{i\cos(x)\sin(x)\_C2+\ln(\cos(x)+i\sin(x))\_C2+\_C1}{\cos(x)}\right\}$$

2.1025 ODE No. 1025

$$y''(x)-y(x)\left(a+(m-1)m\sec^2(x)+(n-1)n\csc^2(x)\right)=0$$

✓ **Mathematica** : cpu = 0.911507 (sec), leaf count = 615

$$\left\{\left\{y(x)\to\frac{c_2(-1)^{\frac{1}{2}(-2m-1)+1}\cos^2(x)^{\frac{1}{4}(-2m-1)+1}\left(\cos^2(x)-1\right)^{\frac{1}{2}\left(\frac{4am+4\sqrt{-a}n^2+4an-4\sqrt{-a}n+4(-a)^{3/2}+8\sqrt{-a}a+\sqrt{-a}+4mn^2-4}{8a+8n^2-8n+2}\right.}}{}\right.\right.$$

✓ **Maple** : cpu = 0.988 (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

$$y''(x) - y(x)(B + n(n+1)\wp(x; \mathrm{g2}, \mathrm{g3})) = 0$$

✗ **Mathematica** : cpu = 0.166655 (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

$$\left\{y(x) = DESol\left(\left\{\frac{d^2}{dx^2}\_Y(x) + (-n(n+1)\ WeierstrassP(x, g2, g3) - B)\_Y(x)\right\}, \{\_Y(x)\}\right)\right\}$$

2.1027 ODE No. 1027

$$y(x)\left(a\,\mathrm{sn}(x|k)^2 + b\right) + y''(x) = 0$$

✓ **Mathematica** : cpu = 0.753797 (sec), leaf count = 235

$$\left\{\left\{y(x) \to c_1\sqrt{k\,\mathrm{sn}(x|k)^2 - 1}\mathrm{HeunG}\left[\frac{1}{k}, -\frac{b-k}{4k}, \frac{\sqrt{k-4a}+3\sqrt{k}}{4\sqrt{k}}, \frac{\sqrt{k}\sqrt{k-4a}+2a+k}{2\sqrt{k}\left(\sqrt{k-4a}+\sqrt{k}\right)}, \frac{1}{2}, \frac{1}{2}, \mathrm{sn}(x|k)^2\right] + c_2\mathrm{s}\right.\right.$$

✓ **Maple** : cpu = 3.557 (sec), leaf count = 69

$$\left\{y(x) = \_C1\ HeunG\left(k^{-2}, \frac{b}{4\,k^2}, -\frac{n}{2}, \frac{n}{2} + \frac{1}{2}, \frac{1}{2}, \frac{1}{2}, (JacobiSN(x,k))^2\right) + \_C2\ HeunG\left(k^{-2}, \frac{k^2+b+1}{4\,k^2}, \frac{n}{2} + 1, -\right.\right.$$

2.1028 ODE No. 1028

$$y''(x) - y(x)\left(ap(x) + b + \frac{7p''(x)}{3} + \frac{p^4(x)}{30}\right) = 0$$

✗ **Mathematica** : cpu = 0.214658 (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

$$\left\{y(x) = DESol\left(\left\{\frac{d^2}{dx^2}\_Y(x) + \left(-\frac{\frac{d^4}{dx^4}p(x)}{30} - \frac{7\,\frac{d^2}{dx^2}p(x)}{3} - ap(x) - b\right)\_Y(x)\right\}, \{\_Y(x)\}\right)\right\}$$

2.1029 ODE No. 1029

$$y''(x) - y(x)\left(f'(x) + f(x)^2\right) = 0$$

✗ **Mathematica** : cpu = 0.126589 (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 = 0.281 (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 = 0.135798 (sec), leaf count = 0 , could not solve

```
DSolve[(l + P[x])*y[x] + Derivative[2][y][x] == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x) = DESol\left(\left\{(P(x) + l)\_Y(x) + \frac{d^2}{dx^2}\_Y(x)\right\}, \{\_Y(x)\}\right)\right\}$$

2.1031 ODE No. 1031

$$y''(x) - f(x)y(x) = 0$$

✗ **Mathematica** : cpu = 0.113838 (sec), leaf count = 0 , could not solve

```
DSolve[-(f[x]*y[x]) + Derivative[2][y][x] == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x) = DESol\left(\left\{-f(x)\_Y(x) + \frac{d^2}{dx^2}\_Y(x)\right\}, \{\_Y(x)\}\right)\right\}$$

2.1032 ODE No. 1032

$$y(x)\left(\frac{\left(\frac{1}{4}-v^2\right)g'(x)^2}{g(x)}-\frac{3g''(x)^2}{4g'(x)^2}+g'(x)^2+\frac{g^3(x)}{2g'(x)}\right)+y''(x)=0$$

✗ **Mathematica** : cpu = 0.407629 (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 = 0.252 (sec), leaf count = 48

$$\left\{y(x)=\left(\_C2\, W_{\frac{i}{2}v^2-\frac{i}{8},\,\frac{1}{2}}(2\,ig(x))+\_C1\, M_{\frac{i}{2}v^2-\frac{i}{8},\,\frac{1}{2}}(2\,ig(x))\right)\frac{1}{\sqrt{\frac{\mathrm{d}}{\mathrm{d}x}g\left(x\right)}}\right\}$$

2.1033 ODE No. 1033

$$ae^{-2x}y(x)+y'(x)+y''(x)=0$$

✓ **Mathematica** : cpu = 0.0128446 (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 = 0.051 (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

$$
\begin{aligned}
\frac{d^2y}{dx^2} &= \frac{d}{dx}\left(\frac{d\eta}{d\xi}(-e^{-x})\right)\\
&= \frac{d^2\eta}{d\xi^2}\frac{d\xi}{dx}(-e^{-x}) + \frac{d\eta}{d\xi}(e^{-x})\\
&= \frac{d^2\eta}{d\xi^2}(-e^{-x})(-e^{-x}) + \frac{d\eta}{d\xi}(e^{-x})\\
&= \frac{d^2\eta}{d\xi^2}(e^{-2x}) + \frac{d\eta}{d\xi}(e^{-x})
\end{aligned}
$$

Hence the original ODE becomes

$$
\begin{aligned}
\frac{d^2\eta}{d\xi^2}(e^{-2x}) + \frac{d\eta}{d\xi}(e^{-x}) + \frac{d\eta}{d\xi}(-e^{-x}) + ae^{-2x}\eta(\xi) = 0\\
\eta'' + a\eta = 0
\end{aligned}
$$

This is standard second order with constant coefficients. The solution is

$$
\eta = c_1 \cos\left(\sqrt{a}\xi\right) + c_2 \sin\left(\sqrt{a}\xi\right)
$$

Substituting back

$$
y(x) = c_1 \cos\left(\sqrt{a}e^{-x}\right) + c_2 \sin\left(\sqrt{a}e^{-x}\right)
$$

Verification

```
restart;
ode:=diff(diff(y(x),x),x)+diff(y(x),x)+a*exp(-2*x)*y(x)=0;
ys:=_C1*cos(sqrt(a)*exp(-x))+_C2*sin(sqrt(a)*exp(-x));
odetest(y(x)=ys,ode);
0
```

2.1034 ODE No. 1034

$$
-y'(x) + y''(x) + e^{2x}y(x) = 0
$$

✓ **Mathematica** : cpu = 0.0088324 (sec), leaf count = 20

$$
\{\{y(x) \to c_1 \cos(e^x) + c_2 \sin(e^x)\}\}
$$

✓ **Maple** : cpu = 0.052 (sec), leaf count = 15

$$
\{y(x) = \_C1 \sin(e^x) + \_C2 \cos(e^x)\}
$$

Hand solution

$$
y'' - y' + e^{2x}y = 0
$$

Let $y(x) = \eta(\xi)$ where $\xi = e^x$, hence

$$
\begin{aligned}
\frac{dy}{dx} &= \frac{d\eta}{d\xi}\frac{d\xi}{dx} \\
&= \frac{d\eta}{d\xi}e^x
\end{aligned}
$$

And

$$
\begin{aligned}
\frac{d^2y}{dx^2} &= \frac{d}{dx}\left(\frac{d\eta}{d\xi}e^x\right) \\
&= \frac{d^2\eta}{d\xi^2}\frac{d\xi}{dx}(e^x) + \frac{d\eta}{d\xi}(e^x) \\
&= \frac{d^2\eta}{d\xi^2}(e^x)(e^x) + \frac{d\eta}{d\xi}(e^x) \\
&= \frac{d^2\eta}{d\xi^2}\left(e^{2x}\right) + \frac{d\eta}{d\xi}(e^x)
\end{aligned}
$$

Hence the original ODE becomes

$$
\begin{aligned}
\frac{d^2\eta}{d\xi^2}\left(e^{2x}\right) + \frac{d\eta}{d\xi}(e^x) - \frac{d\eta}{d\xi}(e^x) + e^{2x}\eta &= 0 \\
\eta'' + \eta &= 0
\end{aligned}
$$

This is standard second order with constant coefficients. The solution is

$$
\eta = c_1 \cos(\xi) + c_2 \sin(\xi)
$$

Substituting back

$$
y(x) = c_1 \cos(e^x) + c_2 \sin(e^x)
$$

Verification

```
restart;
ode:=diff(diff(y(x),x),x)-diff(y(x),x)+exp(2*x)*y(x)=0;
ys:=_C1*cos(exp(x))+_C2*sin(exp(x));
odetest(y(x)=ys,ode);
0
```

2.1035 ODE No. 1035

$$ay'(x) + by(x) + y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0047663 (sec), leaf count = 58

$$\left\{\left\{y(x)\to c_1 e^{\frac{1}{2}x\left(-\sqrt{a^2-4b}-a\right)} + c_2 e^{\frac{1}{2}x\left(\sqrt{a^2-4b}-a\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.077 (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 = 0.130587 (sec), leaf count = 209

$$\left\{\left\{y(x)\to e^{\frac{1}{2}x\left(-\sqrt{a^2-4b}-a\right)}\int_1^x -\frac{e^{aK[1]+\frac{1}{2}\left(\sqrt{a^2-4b}-a\right)K[1]}f(K[1])}{\sqrt{a^2-4b}}dK[1] + e^{\frac{1}{2}x\left(\sqrt{a^2-4b}-a\right)}\int_1^x \frac{e^{aK[2]+\frac{1}{2}\left(-a-\sqrt{a^2-4b\right.}}}{\sqrt{a^2-4}}\right.\right.$$

✓ **Maple** : cpu = 0.214 (sec), leaf count = 124

$$\left\{y(x) = \mathrm{e}^{-\frac{x}{2}\left(a-\sqrt{a^2-4\,b}\right)}\_C2 + \mathrm{e}^{-\frac{x}{2}\left(a+\sqrt{a^2-4\,b}\right)}\_C1 + \left(\left(\int f(x)\,\mathrm{e}^{-\frac{x}{2}\left(-a+\sqrt{a^2-4\,b}\right)}\,\mathrm{d}x\mathrm{e}^{x\sqrt{a^2-4\,b}} - \int f(x)\,\mathrm{e}^{\frac{x}{2}\left(a+\sqrt{a^2\right.}}\right.\right.$$

2.1037 ODE No. 1037

$$ay'(x) + y(x)\left(-\left(b^2x^2 + c\right)\right) + y''(x) = 0$$

✓ **Mathematica** : cpu = 0.023853 (sec), leaf count = 101

$$\left\{\left\{y(x) \to c_1 e^{-\frac{ax}{2}-\frac{bx^2}{2}} H_{\frac{-a^2-4b-4c}{8b}}\left(\sqrt{b}x\right) + c_2 e^{-\frac{ax}{2}-\frac{bx^2}{2}}\, {}_1F_1\left(-\frac{-a^2-4b-4c}{16b}; \frac{1}{2}; bx^2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.426 (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 = 0.32332 (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

$$xy'(x) + y''(x) + y(x) = 0$$

✓ **Mathematica** : cpu = 0.010427 (sec), leaf count = 47

$$\left\{\left\{y(x) \to \sqrt{\frac{\pi}{2}} c_1 e^{-\frac{x^2}{2}} \operatorname{erfi}\left(\frac{x}{\sqrt{2}}\right) + c_2 e^{-\frac{x^2}{2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.034 (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

$$xy'(x) + y''(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 0.0420729 (sec), leaf count = 53

$$\left\{\left\{y(x) \to c_1 x - \frac{1}{2} c_2 e^{-\frac{x^2}{2}} \left(\sqrt{2\pi} e^{\frac{x^2}{2}} x \operatorname{erf}\left(\frac{x}{\sqrt{2}}\right) + 2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.065 (sec), leaf count = 33

$$\left\{y(x) = \sqrt{\pi}\sqrt{2} e^{-\frac{x^2}{2}} \_C2 + x\left(\pi \_C2 \, Erf\left(\frac{\sqrt{2}x}{2}\right) + \_C1\right)\right\}$$

2.1041 ODE No. 1041

$$(n+1)y(x) + xy'(x) + y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0091196 (sec), leaf count = 55

$$\left\{\left\{y(x) \to c_1 e^{-\frac{x^2}{2}} H_n\left(\frac{x}{\sqrt{2}}\right) + c_2 e^{-\frac{x^2}{2}} {}_1F_1\left(-\frac{n}{2}; \frac{1}{2}; \frac{x^2}{2}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.343 (sec), leaf count = 41

$$\left\{y(x) = e^{-\frac{x^2}{2}} x \left(U\left(-\frac{n}{2} + \frac{1}{2}, \frac{3}{2}, \frac{x^2}{2}\right)\_C2 + M\left(-\frac{n}{2} + \frac{1}{2}, \frac{3}{2}, \frac{x^2}{2}\right)\_C1\right)\right\}$$

2.1042 ODE No. 1042

$$-ny(x) + xy'(x) + y''(x) = 0$$

✓ **Mathematica** : cpu = 0.007098 (sec), leaf count = 61

$$\left\{\left\{y(x) \to c_1 e^{-\frac{x^2}{2}} H_{-n-1}\left(\frac{x}{\sqrt{2}}\right) + c_2 e^{-\frac{x^2}{2}} {}_1F_1\left(\frac{n+1}{2}; \frac{1}{2}; \frac{x^2}{2}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.334 (sec), leaf count = 41

$$\left\{y(x) = e^{-\frac{x^2}{2}} x \left(U\left(\frac{n}{2} + 1, \frac{3}{2}, \frac{x^2}{2}\right)\_C2 + M\left(\frac{n}{2} + 1, \frac{3}{2}, \frac{x^2}{2}\right)\_C1\right)\right\}$$

2.1043 ODE No. 1043

$$-xy'(x) + y''(x) + 2y(x) = 0$$

✓ **Mathematica** : cpu = 0.110648 (sec), leaf count = 69

$$\left\{\left\{y(x) \to \frac{1}{4}c_2\left(\sqrt{2\pi}x^2\text{erfi}\left(\frac{x}{\sqrt{2}}\right) - \sqrt{2\pi}\text{erfi}\left(\frac{x}{\sqrt{2}}\right) - 2e^{\frac{x^2}{2}}x\right) + c_1\left(x^2-1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.511 (sec), leaf count = 42

$$\left\{y(x) = 2\,e^{1/2\,x^2}\_C1\,x - (x-1)\,(1+x)\left(\sqrt{2}\mathit{erfi}\left(\frac{\sqrt{2}x}{2}\right)\sqrt{\pi}\_C1 - \_C2\right)\right\}$$

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

$$y' = \sum_{n=0}^{\infty} nc_n x^{n-1} = \sum_{n=1}^{\infty} nc_n x^{n-1} = \sum_{n=0}^{\infty} (n+1)\,c_{n+1}x^n$$
$$y'' = \sum_{n=0}^{\infty} n(n+1)\,c_{n+1}x^{n-1} = \sum_{n=1}^{\infty} n(n+1)\,c_{n+1}x^{n-1} = \sum_{n=0}^{\infty} (n+1)\,(n+2)\,c_{n+2}x^n$$

Substituting back in the original ODE gives

$$\sum_{n=0}^{\infty}(n+1)\,(n+2)\,c_{n+2}x^n - x\sum_{n=0}^{\infty}(n+1)\,c_{n+1}x^n + 2\sum_{n=0}^{\infty}c_nx^n = 0$$
$$\sum_{n=0}^{\infty}(n+1)\,(n+2)\,c_{n+2}x^n - \sum_{n=0}^{\infty}(n+1)\,c_{n+1}x^{n+1} + \sum_{n=0}^{\infty}2c_nx^n = 0$$
$$\sum_{n=0}^{\infty}(n+1)\,(n+2)\,c_{n+2}x^n - \sum_{n=1}^{\infty}nc_nx^n + \sum_{n=0}^{\infty}2c_nx^n = 0$$

For $n = 0$

$$(n+1)\,(n+2)\,c_{n+2} + 2c_n = 0$$
$$(1)\,(2)\,c_2 + 2c_0 = 0$$
$$c_2 = -c_0$$

For $n \geq 1$

$$(n+1)\,(n+2)\,c_{n+2} - nc_n + 2c_n = 0$$
$$c_{n+2} = \frac{c_n(n-2)}{(n+1)\,(n+2)}$$

Hence for $n=1$

$$c_3 = \frac{-c_1}{(2)(3)}$$

For $n=2$

$$c_4 = \frac{c_2(2-2)}{(3)(4)} = 0$$

For $n=3$

$$c_5 = \frac{c_3}{(4)(5)} = \frac{-c_1}{(2)(3)(4)(5)}$$

For $n=4$ and since $c_4=0$ then

$$c_6 = \frac{c_4(n-2)}{(n+1)(n+2)} = 0$$

For $n=5$

$$c_7 = \frac{3c_5}{(6)(7)} = -\frac{3c_1}{(2)(3)(4)(5)(6)(7)}$$

For $n=6$ and since $c_6=0$ then

$$c_8 = \frac{c_6(n-2)}{(n+1)(n+2)} = 0$$

For $n=7$

$$c_9 = \frac{5c_7}{(8)(9)} = -\frac{(3)(5)c_1}{(2)(3)(4)(5)(6)(7)(8)(9)}$$

And so on. Hence

$$\begin{aligned}
y &= \sum_{n=0}^{\infty} c_n x^n \\
&= c_0 + c_1 x + c_2 x^2 + c_3 x^3 + \cdots \\
&= c_0 + c_1 x - c_0 x^2 - \frac{c_1}{(2)(3)} x^3 - \frac{c_1}{(2)(3)(4)(5)} x^5 - \frac{3c_1}{(2)(3)(4)(5)(6)(7)} x^7 - \frac{(3)(5)c_1}{(2)(3)(4)(5)(6)(7)(8)(9)} x^9 - \cdots \\
&= c_0(1-x^2) + c_1\left(x - \frac{1}{(2)(3)}x^3 - \frac{1}{(2)(3)(4)(5)}x^5 - \frac{3}{(2)(3)(4)(5)(6)(7)}x^7 - \frac{(3)(5)}{(2)(3)(4)(5)(6)(7)(8)(9)}x^9\right) \\
&= c_0(1-x^2) + c_1\left(x - \frac{1}{3!}x^3 - \frac{1}{5!}x^5 - \frac{3}{7!}x^7 - \frac{15}{9!}x^9 - \cdots\right)
\end{aligned}$$

Hence

$$y(x) = c_0(1-x^2) + c_1\left(x - \frac{1}{6}x^3 - \frac{1}{120}x^5 - \frac{1}{1680}x^7 - \frac{1}{24\,192}x^9 - \cdots\right)$$

Verification

```
restart;
Order:=10:
sol:=dsolve(ode,y(x),series):
subs({y(0)=c0,D(y)(0)=c1},rhs(sol)):
```

```
sol:=convert(%,polynom):

sol:=collect(sol,{c0,c1});
sol := (-x^2+1)*c0+(x-(1/6)*x^3-(1/120)*x^5-(1/1680)*x^7-(1/24192)*x^9)*c1
```

2.1044 ODE No. 1044

$$-ay(x) - xy'(x) + y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0056349 (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 = 0.33 (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

$$-xy'(x) + y''(x) + (x-1)y(x) = 0$$

✓ **Mathematica** : cpu = 0.0376108 (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 = 0.036 (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

$$ay(x) - 2xy'(x) + y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0060009 (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 = 0.345 (sec), leaf count = 31

$$\left\{y(x) = x\left(U\left(\frac{1}{2} - \frac{a}{4}, \frac{3}{2}, x^2\right)\_C2 + M\left(\frac{1}{2} - \frac{a}{4}, \frac{3}{2}, x^2\right)\_C1\right)\right\}$$

2.1047 ODE No. 1047

$$\left(4x^2+2\right)y(x)+4xy'(x)+y''(x)=0$$

✓ **Mathematica** : cpu = 0.0098451 (sec), leaf count = 27

$$\left\{\left\{y(x)\to c_1e^{-x^2}+c_2e^{-x^2}x\right\}\right\}$$

✓ **Maple** : cpu = 0.05 (sec), leaf count = 16

$$\left\{y(x)=\mathrm{e}^{-x^2}(\_C2\,x+\_C1)\right\}$$

Hand solution

$$y''+4xy'+\left(4x^2+2\right)y=0 \tag{1}$$

Second order with varying coefficient. Using power series, let $y=\sum_{n=0}^{\infty}c_nx^n$, hence

$$y'=\sum_{n=0}^{\infty}nc_nx^{n-1}=\sum_{n=1}^{\infty}nc_nx^{n-1}=\sum_{n=0}^{\infty}(n+1)\,c_{n+1}x^n$$
$$y''=\sum_{n=0}^{\infty}n(n+1)\,c_{n+1}x^{n-1}=\sum_{n=1}^{\infty}n(n+1)\,c_{n+1}x^{n-1}=\sum_{n=0}^{\infty}(n+1)\,(n+2)\,c_{n+2}x^n$$

Substituting back in the original ODE gives

$$\sum_{n=0}^{\infty}(n+1)\,(n+2)\,c_{n+2}x^n+4x\sum_{n=0}^{\infty}(n+1)\,c_{n+1}x^n+\left(4x^2+2\right)\sum_{n=0}^{\infty}c_nx^n=0$$
$$\sum_{n=0}^{\infty}(n+1)\,(n+2)\,c_{n+2}x^n+\sum_{n=0}^{\infty}4(n+1)\,c_{n+1}x^{n+1}+\sum_{n=0}^{\infty}4c_nx^{n+2}+\sum_{n=0}^{\infty}2c_nx^n=0$$
$$\sum_{n=0}^{\infty}(n+1)\,(n+2)\,c_{n+2}x^n+\sum_{n=1}^{\infty}4nc_nx^n+\sum_{n=2}^{\infty}4c_{n-2}x^n+\sum_{n=0}^{\infty}2c_nx^n=0$$

For $n=0$

$$(n+1)\,(n+2)\,c_{n+2}+2c_n=0$$
$$(1)\,(2)\,c_2+2c_0=0$$
$$c_2=-c_0$$

For $n=1$

$$(n+1)\,(n+2)\,c_{n+2}+4nc_n+2c_n=0$$
$$(2)\,(3)\,c_3+4c_1+2c_1=0$$
$$c_3=-c_1$$

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

$$(2n+3x^2-1)\,y(x)-4xy'(x)+y''(x)=0$$

✓ **Mathematica** : cpu = 0.0090219 (sec), leaf count = 45

$$\left\{\left\{y(x)\to c_1e^{\frac{x^2}{2}}H_n(x)+c_2e^{\frac{x^2}{2}}\,{}_1F_1\left(-\frac{n}{2};\frac{1}{2};x^2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.348 (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

$$(4x^2-1)\,y(x)-4xy'(x)+y''(x)-e^x=0$$

✓ **Mathematica** : cpu = 0.0532486 (sec), leaf count = 109

$$\left\{\left\{y(x)\to\frac{1}{4}\sqrt{\pi}e^{x(x-i)-\frac{i}{2}}\left(e^{2ix}\mathrm{erfi}\left(\left(\frac{1}{2}+\frac{i}{2}\right)-ix\right)-ie^{i}\mathrm{erf}\left(-x+\left(\frac{1}{2}+\frac{i}{2}\right)\right)\right)+c_1e^{x(x-i)}-\frac{1}{2}ic_2e^{(x-i)x+2ix}\right\}\right.$$

✓ **Maple** : cpu = 0.275 (sec), leaf count = 66

$$\left\{y(x)=\frac{\left((i\cos(x)+\sin(x))\,\mathrm{e}^{\frac{i}{2}}\sqrt{\pi}Erf\left(x-\frac{1}{2}-\frac{i}{2}\right)-\mathrm{e}^{-\frac{i}{2}}(i\cos(x)-\sin(x))\sqrt{\pi}Erf\left(x-\frac{1}{2}+\frac{i}{2}\right)+4\sin(x)\_C\right.}{4}\right.$$

2.1050 ODE No. 1050

$$\left(4x^2-2\right)y(x)-4xy'(x)+y''(x)=0$$

✓ **Mathematica** : cpu = 0.0093036 (sec), leaf count = 23

$$\left\{\left\{y(x)\to c_1e^{x^2}+c_2e^{x^2}x\right\}\right\}$$

✓ **Maple** : cpu = 0.049 (sec), leaf count = 14

$$\left\{y(x)=\mathrm{e}^{x^2}(\_C2\,x+\_C1)\right\}$$

2.1051 ODE No. 1051

$$\left(4x^2-3\right)y(x)-e^{x^2}-4xy'(x)+y''(x)=0$$

✓ **Mathematica** : cpu = 0.0193756 (sec), leaf count = 44

$$\left\{\left\{y(x)\to -e^{(x-1)x+x}+c_1e^{(x-1)x}+\frac{1}{2}c_2e^{(x-1)x+2x}\right\}\right\}$$

✓ **Maple** : cpu = 0.057 (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 = 0.0142015 (sec), leaf count = 78

$$\left\{\left\{y(x)\to c_1e^{-\frac{ax^2}{2}}H_{\frac{b-a}{a}}\left(\frac{\sqrt{a}x}{\sqrt{2}}\right)+c_2e^{-\frac{ax^2}{2}}\,{}_1F_1\left(-\frac{b-a}{2a};\frac{1}{2};\frac{ax^2}{2}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.411 (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 = 0.0242948 (sec), leaf count = 57

$$\left\{\left\{y(x) \to c_1 e^{-\frac{ax^2}{2}-\sqrt{a}x} + \frac{c_2 e^{\sqrt{a}x-\frac{ax^2}{2}}}{2\sqrt{a}}\right\}\right\}$$

✓ **Maple** : cpu = 0.092 (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 = 0.038096 (sec), leaf count = 172

$$\left\{\left\{y(x) \to c_1 e^{\frac{cx}{a}-\frac{ax^2}{2}-bx} H_{\frac{-a^3+da^2-bca+c^2}{a^3}}\left(\frac{ab-2c}{\sqrt{2}a^{3/2}} + \frac{\sqrt{a}x}{\sqrt{2}}\right) + c_2 e^{\frac{cx}{a}-\frac{ax^2}{2}-bx}\, {}_1F_1\left(-\frac{-a^3+da^2-bca+c^2}{2a^3}; \frac{1}{2}; \left(\frac{ab}{\sqrt{}}\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.121 (sec), leaf count = 98

$$\left\{y(x) = \mathrm{e}^{-\frac{cx}{a}}\left(U\left(\frac{a^2d-abc+c^2}{2\,a^3}, \frac{1}{2}, -\frac{(a^2x+ab-2\,c)^2}{2\,a^3}\right)\_C2 + M\left(\frac{a^2d-abc+c^2}{2\,a^3}, \frac{1}{2}, -\frac{(a^2x+ab-2\,c)^2}{2\,a^3}\right.\right.\right.$$

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 = 0.138796 (sec), leaf count = 421

$$\left\{\left\{y(x) \to c_1 \exp\left(\frac{-bx\sqrt{a^2-4\mathrm{a1}} - \frac{1}{2}ax^2\sqrt{a^2-4\mathrm{a1}} - \frac{1}{2}a^2x^2 - abx + 2\mathrm{a1}x^2 + 2\mathrm{b1}x}{2\sqrt{a^2-4\mathrm{a1}}}\right) H_{\frac{-a^3+2\mathrm{c1}a^2-\sqrt{a^2-4\mathrm{a1}}a^2+4\mathrm{a1}a}{2(}}\right.\right.$$

✓ **Maple** : cpu = 0.451 (sec), leaf count = 262

$$\left\{y(x) = \left(\_C2\,(a^2x+ab-4\,a1\,x-2\,b1)\,{}_1\mathrm{F}_1(\frac{1}{4}\left(3\,(a^2-4\,a1)^{3/2} + a^3 - 2\,a^2c1 + (2\,b1\,b-4\,a1)\,a + (-2\,b^2 +\right.\right.\right.$$

2.1056 ODE No. 1056

$$x^2(-y'(x)) + y''(x) + xy(x) = 0$$

✓ **Mathematica** : cpu = 0.0399583 (sec), leaf count = 41

$$\left\{\left\{y(x) \to c_1 x - \frac{c_2 \sqrt[3]{-x^3}\Gamma\left(-\frac{1}{3}, -\frac{x^3}{3}\right)}{3\sqrt[3]{3}}\right\}\right\}$$

✓ **Maple** : cpu = 0.091 (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 = 0.0487047 (sec), leaf count = 56

$$\left\{\left\{y(x) \to c_2 e^{\frac{x^3}{3}+x} \int_1^x e^{-\frac{1}{3}K[1]^3 - 2K[1]} dK[1] + c_1 e^{\frac{x^3}{3}+x}\right\}\right\}$$

✓ **Maple** : cpu = 0.866 (sec), leaf count = 50

$$\left\{y(x) = \_C1\ HeunT\left(0, -3, 2\sqrt[3]{3}, \frac{3^{\frac{2}{3}}x}{3}\right)\mathrm{e}^{-x} + \_C2\ HeunT\left(0, 3, 2\sqrt[3]{3}, -\frac{3^{\frac{2}{3}}x}{3}\right)\mathrm{e}^{\frac{x\left(x^2+3\right)}{3}}\right\}$$

2.1058 ODE No. 1058

$$-(x+1)x^2 y'(x) + \left(x^4 - 2\right)xy(x) + y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0534596 (sec), leaf count = 56

$$\left\{\left\{y(x) \to c_2 e^{\frac{x^3}{3}} \int_1^x e^{\frac{K[1]^4}{4} - \frac{K[1]^3}{3}} dK[1] + c_1 e^{\frac{x^3}{3}}\right\}\right\}$$

✓ **Maple** : cpu = 2.211 (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 = 0.0531639 (sec), leaf count = 39

$$\left\{\left\{y(x)\to c_1x - \frac{c_2\sqrt[5]{x^5}\Gamma\left(-\frac{1}{5},\frac{x^5}{5}\right)}{5\sqrt[5]{5}}\right\}\right\}$$

✓ **Maple** : cpu = 0.106 (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 = 0.0261616 (sec), leaf count = 83

$$\left\{\left\{y(x)\to c_2q^{-1/q}a^{\frac{1}{q}}\left(x^q\right)^{\frac{1}{q}}\,{}_1F_1\left(\frac{b}{aq}+\frac{1}{q};1+\frac{1}{q};-\frac{ax^q}{q}\right) + c_1\,{}_1F_1\left(\frac{b}{aq};1-\frac{1}{q};-\frac{ax^q}{q}\right)\right\}\right\}$$

✓ **Maple** : cpu = 2.393 (sec), leaf count = 81

$$\left\{y(x) = e^{-\frac{x^qa}{q}}x\left(M\left(\frac{aq-b}{aq},\,\frac{q+1}{q},\,\frac{x^qa}{q}\right)\_C1 + U\left(\frac{aq-b}{aq},\,\frac{q+1}{q},\,\frac{x^qa}{q}\right)\_C2\right)\right\}$$

2.1061 ODE No. 1061

$$-e^{-\frac{x^{3/2}}{3}}x + \sqrt{x}y'(x) + y''(x) + \left(\frac{x}{4}+\frac{1}{4\sqrt{x}}-9\right)y(x) = 0$$

✓ **Mathematica** : cpu = 0.0696002 (sec), leaf count = 70

$$\left\{\left\{y(x)\to -\frac{1}{9}e^{3x-\frac{1}{3}\left(\sqrt{x}+9\right)x}x + c_1e^{-\frac{1}{3}\left(\sqrt{x}+9\right)x} + \frac{1}{6}c_2e^{6x-\frac{1}{3}\left(\sqrt{x}+9\right)x}\right\}\right\}$$

✓ **Maple** : cpu = 0.133 (sec), leaf count = 28

$$\left\{y(x) = -\frac{-9\,\cosh\left(3\,x\right)\_C1 - 9\,\sinh\left(3\,x\right)\_C2 + x}{9}e^{-\frac{1}{3}x^{\frac{3}{2}}}\right\}$$

2.1062 ODE No. 1062

$$\frac{\left(x+\sqrt{x}-8\right)y(x)}{4x^2}-\frac{y'(x)}{\sqrt{x}}+y''(x)=0$$

✓ **Mathematica** : cpu = 0.0245062 (sec), leaf count = 35

$$\left\{\left\{y(x)\to\frac{1}{3}c_2e^{\sqrt{x}}x^2+\frac{c_1e^{\sqrt{x}}}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.047 (sec), leaf count = 19

$$\left\{y(x)=\frac{\_C2\,x^3+\_C1}{x}\mathrm{e}^{\sqrt{x}}\right\}$$

2.1063 ODE No. 1063

$$-\left(2e^x+1\right)y'(x)+y''(x)+e^{2x}y(x)-e^{3x}=0$$

✓ **Mathematica** : cpu = 0.0510891 (sec), leaf count = 28

$$\left\{\left\{y(x)\to e^x+c_1e^{e^x}+c_2e^{x+e^x}+2\right\}\right\}$$

✓ **Maple** : cpu = 0.26 (sec), leaf count = 34

$$\left\{y(x)=\mathrm{e}^{\frac{x}{2}+\mathrm{e}^x}\sinh\left(\frac{x}{2}\right)\_C2+\mathrm{e}^{\frac{x}{2}+\mathrm{e}^x}\cosh\left(\frac{x}{2}\right)\_C1+\mathrm{e}^x+2\right\}$$

2.1064 ODE No. 1064

$$ay'(x)+by(x)+y''(x)+\tan(x)=0$$

✓ **Mathematica** : cpu = 0.463967 (sec), leaf count = 1400

$$\left\{\left\{y(x)\to e^{\frac{1}{2}\left(-a-\sqrt{a^2-4b}\right)x}c_1+e^{\frac{1}{2}\left(\sqrt{a^2-4b}-a\right)x}c_2+\frac{8\left(2\,{}_2F_1\left(1,\frac{1}{4}i\left(\sqrt{a^2-4b}-a\right);\frac{1}{4}i\left(\sqrt{a^2-4b}-a\right)+1;-e^{2ix}\right.\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.36 (sec), leaf count = 125

$$\left\{y(x)=\mathrm{e}^{-\frac{x}{2}\left(a-\sqrt{a^2-4\,b}\right)}\_C2+\mathrm{e}^{-\frac{x}{2}\left(a+\sqrt{a^2-4\,b}\right)}\_C1-\left(\int\tan(x)\,\mathrm{e}^{-\frac{x}{2}\left(-a+\sqrt{a^2-4\,b}\right)}\,\mathrm{d}x\mathrm{e}^{x\sqrt{a^2-4\,b}}-\int\tan(x)\,\mathrm{e}^{\frac{x}{2}\left(a\right.}\right.\right.$$

2.1065 ODE No. 1065

$$(n^2 - a^2)\, y(x) + 2n \cot(x) y'(x) + y''(x) = 0$$

✓ **Mathematica** : cpu = 0.14574 (sec), leaf count = 114

$$\left\{\left\{y(x) \to c_1 \left(\cos^2(x) - 1\right)^{\frac{1}{4}(1-2n)} P^{\frac{1}{2}(2n-1)}_{\frac{1}{2}\left(2\sqrt{2n^2-a^2}-1\right)}(\cos(x)) + c_2 \left(\cos^2(x) - 1\right)^{\frac{1}{4}(1-2n)} Q^{\frac{1}{2}(2n-1)}_{\frac{1}{2}\left(2\sqrt{2n^2-a^2}-1\right)}(\cos(x))\right\}\right\}$$

✓ **Maple** : cpu = 0.977 (sec), leaf count = 60

$$\left\{y(x) = (\sin(x))^{-n+\frac{1}{2}} \left(\mathit{LegendreQ}\left(-\frac{1}{2} + \sqrt{-a^2 + 2\,n^2}, n - \frac{1}{2}, \cos(x)\right) \_C2 + \mathit{LegendreP}\left(-\frac{1}{2} + \sqrt{-a^2 + 2\,n\right.\right.\right.$$

2.1066 ODE No. 1066

$$\tan(x) y'(x) + y''(x) + y(x) \cos^2(x) = 0$$

✓ **Mathematica** : cpu = 0.0260606 (sec), leaf count = 18

$$\{\{y(x) \to c_2 \sin(\sin(x)) + c_1 \cos(\sin(x))\}\}$$

✓ **Maple** : cpu = 0.178 (sec), leaf count = 15

$$\{y(x) = \_C1\ \sin(\sin(x)) + \_C2\ \cos(\sin(x))\}$$

2.1067 ODE No. 1067

$$\tan(x) y'(x) + y''(x) - y(x) \cos^2(x) = 0$$

✓ **Mathematica** : cpu = 0.023499 (sec), leaf count = 21

$$\{\{y(x) \to c_1 \cosh(\sin(x)) + i c_2 \sinh(\sin(x))\}\}$$

✓ **Maple** : cpu = 0.038 (sec), leaf count = 17

$$\left\{y(x) = \_C1\ e^{\sin(x)} + \_C2\ e^{-\sin(x)}\right\}$$

2.1068 ODE No. 1068

$$v(v+1)y(x)+\cot(x)y'(x)+y''(x)=0$$

✓ **Mathematica** : cpu = 0.114882 (sec), leaf count = 20

$$\{\{y(x)\to c_1P_v(\cos(x))+c_2Q_v(\cos(x))\}\}$$

✓ **Maple** : cpu = 1.13 (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

$$-\cot(x)y'(x)+y''(x)+y(x)\sin^2(x)=0$$

✓ **Mathematica** : cpu = 0.0273901 (sec), leaf count = 19

$$\{\{y(x)\to c_1\cos(\cos(x))-c_2\sin(\cos(x))\}\}$$

✓ **Maple** : cpu = 0.333 (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 = 0.254935 (sec), leaf count = 143

$$\left\{\left\{y(x)\to i^{a+1}c_2\cos^{a+1}(x)\,{}_2F_1\left(\frac{a}{4}-\frac{1}{4}\sqrt{a^2+4b}+\frac{1}{2},\frac{a}{4}+\frac{1}{4}\sqrt{a^2+4b}+\frac{1}{2};\frac{a}{2}+\frac{3}{2};\cos^2(x)\right)+c_1\,{}_2F_1\left(-\frac{a}{4}-\frac{1}{4}\sqrt{\right.\right.\right.$$

✓ **Maple** : cpu = 0.68 (sec), leaf count = 60

$$\left\{y(x)=(\cos(x))^{\frac{1}{2}+\frac{a}{2}}\left(LegendreP\left(\frac{1}{2}\sqrt{a^2+4\,b}-\frac{1}{2},\frac{1}{2}+\frac{a}{2},\sin(x)\right)\_C1+LegendreQ\left(\frac{1}{2}\sqrt{a^2+4\,b}-\frac{1}{2},\frac{1}{2}+\frac{a}{2}\right.\right.\right.$$

2.1071 ODE No. 1071

$$(b^2 - a^2)\, y(x) + 2a\cot(ax)y'(x) + y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0623393 (sec), leaf count = 44

$$\left\{\left\{y(x) \to c_1 e^{-ibx}\csc(ax) - \frac{ic_2 e^{ibx}\csc(ax)}{2b}\right\}\right\}$$

✓ **Maple** : cpu = 0.289 (sec), leaf count = 24

$$\left\{y(x) = \frac{\_C2\, \cos(bx) + \_C1\, \sin(bx)}{\sin(ax)}\right\}$$

2.1072 ODE No. 1072

$$y(x)\left(-4anp(x)^2 + a + bp(x)\right) + ap''(x)y'(x) + y''(x) = 0$$

✗ **Mathematica** : cpu = 0.304841 (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

$$\frac{y'(x)\left(-\wp(x;a,b)\wp'(x;a,b) + \wp(x;a,b)^3 - 6\wp(x;a,b)^2 + \frac{a}{2}\right)}{\wp'(x;a,b) - \wp(x;a,b)^2} + \frac{y(x)\left(\wp(x;a,b)^2(-\wp'(x;a,b)) - \left(6\wp(x;a,b)^2 - \frac{a}{2}\right)\wp}{\wp(x;a,b)^2 + \wp'(x;a,b)}$$

✗ **Mathematica** : cpu = 1.1591 (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 = 4.9093 (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 = 0.1 (sec), leaf count = 21

$$\{y(x)=\_C1\ \sin\left(nJacobiAM(x,k)\right)+\_C2\ \cos\left(nJacobiAM(x,k)\right)\}$$

2.1075 ODE No. 1075

$$f(x)y'(x)+g(x)y(x)+y''(x)=0$$

✗ **Mathematica** : cpu = 0.222226 (sec), leaf count = 0 , could not solve

```
DSolve[g[x]*y[x] + f[x]*Derivative[1][y][x] + Derivative[2][y][x] == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x)=DESol\left(\left\{g(x)\_Y(x)+f(x)\frac{\mathrm{d}}{\mathrm{d}x}\_Y(x)+\frac{\mathrm{d}^2}{\mathrm{d}x^2}\_Y(x)\right\},\{\_Y(x)\}\right)\right\}$$

2.1076 ODE No. 1076

$$y(x)\left(a+f'(x)\right)+f(x)y'(x)-g(x)+y''(x)=0$$

✗ **Mathematica** : cpu = 0.218674 (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 = 0.349437 (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 = 0.0359333 (sec), leaf count = 76

$$\left\{\left\{y(x)\to c_1\exp\left(-\frac{1}{2}\int_1^x f(K[1])dK[1]-i\sqrt{a}x\right)-\frac{ic_2\exp\left(-\frac{1}{2}\int_1^x f(K[1])dK[1]+i\sqrt{a}x\right)}{2\sqrt{a}}\right\}\right\}$$

✓ **Maple** : cpu = 0.075 (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 = 0.203059 (sec), leaf count = 315

$$\left\{\left\{y(x)\to-\frac{\sqrt{c_1}\exp\left(-\int_1^x -i\sqrt{b}f(K[1])^a dK[1]-c_2\right)\left(-1+\exp\left(2\int_1^x -i\sqrt{b}f(K[1])^a dK[1]+2c_2\right)\right)}{\sqrt{2}}\right\},\left\{y(x)\right.\right.$$

✓ **Maple** : cpu = 0.092 (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 = 0.0543663 (sec), leaf count = 49

$$\left\{\left\{y(x)\to c_1\exp\left(b\int_1^x f(K[1])dK[1]+ax\right)+c_2\exp\left(ax-b\int_1^x f(K[2])dK[2]\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.871 (sec), leaf count = 74

$$\left\{y(x)=\mathrm{e}^{\int-\left(\frac{f(x)\left(\mathrm{e}^{\_C1\,b}\right)^2 b}{\left(\mathrm{e}^{b\int f(x)\,\mathrm{d}x}\right)^2}+bf(x)-\frac{\left(\mathrm{e}^{\_C1\,b}\right)^2 a}{\left(\mathrm{e}^{b\int f(x)\,\mathrm{d}x}\right)^2}+a\right)\left(\frac{\left(\mathrm{e}^{\_C1\,b}\right)^2}{\left(\mathrm{e}^{b\int f(x)\,\mathrm{d}x}\right)^2}-1\right)^{-1}\mathrm{d}x}\_C2\right\}$$

2.1081 ODE No. 1081

$$-\frac{a^2y(x)f'(x)^2}{b^2+f(x)^2}+\frac{f(x)f^3(x)y'(x)}{b^2+f(x)^2}+y''(x)=0$$

✗ **Mathematica** : cpu = 0.716785 (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 = 0.554805 (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 = 0.371 (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

$$y(x)\left(\frac{3f'(x)^2}{4f(x)^2}-\frac{f''(x)}{2f(x)}+\frac{\left(\frac{1}{4}-v^2\right)g'(x)^2}{g(x)^2}-\frac{3g''(x)^2}{4g'(x)^2}+g'(x)^2+\frac{g^3(x)}{2g'(x)}\right)-\frac{f'(x)y'(x)}{f(x)}+y''(x)=0$$

✗ **Mathematica** : cpu = 0.73093 (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 = 0.245 (sec), leaf count = 31

$$\left\{y(x)=\sqrt{\frac{f(x)\,g(x)}{\frac{d}{dx}g(x)}}\left(Y_v(g(x))\_C2+J_v(g(x))\_C1\right)\right\}$$

2.1084 ODE No. 1084

$$y(x)\left(\frac{f'(x)\left(\frac{2f'(x)}{f(x)}+\frac{g''(x)}{g'(x)}-\frac{g'(x)}{g(x)}\right)}{f(x)}-\frac{f''(x)}{f(x)}-\frac{v^2g'(x)^2}{g(x)^2}+g'(x)^2\right)-y'(x)\left(\frac{2f'(x)}{f(x)}+\frac{g''(x)}{g'(x)}-\frac{g'(x)}{g(x)}\right)+y''(x)=$$

✓ **Mathematica** : cpu = 0.152243 (sec), leaf count = 36

$$\left\{\left\{y(x)\to c_1f(x)J_{\sqrt{v^2}}(g(x))+c_2f(x)Y_{\sqrt{v^2}}(g(x))\right\}\right\}$$

✓ **Maple** : cpu = 0.178 (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

$$-y'(x)\left(\frac{(2v-1)g'(x)}{g(x)}+\frac{g''(x)}{g'(x)}+\frac{2h'(x)}{h(x)}\right)+y(x)\left(\frac{h'(x)\left(\frac{(2v-1)g'(x)}{g(x)}+\frac{g''(x)}{g'(x)}+\frac{2h'(x)}{h(x)}\right)}{h(x)}+g'(x)^2-\frac{h''(x)}{h(x)}\right)+y''(x$$

✓ **Mathematica** : cpu = 0.153514 (sec), leaf count = 32

$$\{\{y(x)\to c_1h(x)g(x)^vJ_v(g(x))+c_2h(x)g(x)^vY_v(g(x))\}\}$$

✓ **Maple** : cpu = 0.195 (sec), leaf count = 24

$$\{y(x)=h(x)\,(g(x))^v\left(Y_v(g(x))\_C2+J_v(g(x))\_C1\right)\}$$

2.1086 ODE No. 1086

$$4y''(x) + 9xy(x) = 0$$

✓ **Mathematica** : cpu = 0.0050847 (sec), leaf count = 42

$$\left\{\left\{y(x) \to c_1 \text{Ai}\left(\sqrt[3]{-1}\left(\frac{3}{2}\right)^{2/3} x\right) + c_2 \text{Bi}\left(\sqrt[3]{-1}\left(\frac{3}{2}\right)^{2/3} x\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.023 (sec), leaf count = 29

$$\left\{y(x) = \_C1 \operatorname{Ai}\left(-\frac{3^{\frac{2}{3}}\sqrt[3]{2}x}{2}\right) + \_C2 \operatorname{Bi}\left(-\frac{3^{\frac{2}{3}}\sqrt[3]{2}x}{2}\right)\right\}$$

2.1087 ODE No. 1087

$$4y''(x) - \left(a + x^2\right) y(x) = 0$$

✓ **Mathematica** : cpu = 0.0069061 (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 = 0.513 (sec), leaf count = 33

$$\left\{y(x) = \left(\_C1\, M_{-\frac{a}{8},\, \frac{1}{4}}\left(\frac{x^2}{2}\right) + \_C2\, W_{-\frac{a}{8},\, \frac{1}{4}}\left(\frac{x^2}{2}\right)\right) \frac{1}{\sqrt{x}}\right\}$$

2.1088 ODE No. 1088

$$4\tan(x)y'(x) + 4y''(x) + y(x)\left(-\left(5\tan^2(x) + 2\right)\right) = 0$$

✓ **Mathematica** : cpu = 0.0711954 (sec), leaf count = 180

$$\left\{\left\{y(x) \to \frac{3(-1)^{5/8}c_2\left(4\sqrt[4]{-1}2^{3/4}\sinh^{-1}\left(\frac{1}{2}\sqrt[4]{-\frac{1}{2}}\sqrt[4]{-8\cos^2(2x) - 16\cos(2x) - 8}\right) - i\sqrt[4]{-8\cos^2(2x) - 16\cos(2}{8\sqrt[8]{2}\sqrt[8]{-8\cos^2(2x) - 16\cos(2x) - 8}}\right.\right.$$

✓ **Maple** : cpu = 0.534 (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 = 0.038418 (sec), leaf count = 99

$$\left\{\left\{y(x)\to c_1e^{bx}H_d\left(\frac{x}{\sqrt{2}\sqrt{a}}-\frac{ab-c}{\sqrt{2}\sqrt{a}}\right)+c_2e^{bx}\,{}_1F_1\left(-\frac{d}{2};\frac{1}{2};\left(\frac{x}{\sqrt{2}\sqrt{a}}-\frac{ab-c}{\sqrt{2}\sqrt{a}}\right)^2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.109 (sec), leaf count = 58

$$\left\{y(x)=e^{bx}\left(U\left(-\frac{d}{2},\frac{1}{2},\frac{(ab-c-x)^2}{2a}\right)\_C2+M\left(-\frac{d}{2},\frac{1}{2},\frac{(ab-c-x)^2}{2a}\right)\_C1\right)\right\}$$

2.1090 ODE No. 1090

$$a\left(a^2-2be^{-ax}\right)y'(x)+a^2y''(x)+b^2e^{-2ax}y(x)=0$$

✓ **Mathematica** : cpu = 0.0317027 (sec), leaf count = 50

$$\left\{\left\{y(x)\to c_1e^{-\frac{be^{-ax}}{a^2}}-\frac{bc_2e^{-\frac{be^{-ax}}{a^2}-ax}}{a^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.089 (sec), leaf count = 40

$$\left\{y(x)=e^{-\frac{a^3x+2\,be^{-ax}}{2\,a^2}}\left(\sinh\left(\frac{ax}{2}\right)\_C1+\cosh\left(\frac{ax}{2}\right)\_C2\right)\right\}$$

2.1091 ODE No. 1091

$$x\left(y''(x)+y(x)\right)-\cos(x)=0$$

✓ **Mathematica** : cpu = 0.0232566 (sec), leaf count = 41

$$\left\{\left\{y(x)\to\frac{1}{2}(\text{Ci}(2x)\sin(x)-\text{Si}(2x)\cos(x)+\log(x)\sin(x))+c_1\cos(x)+c_2\sin(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.119 (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 = 0.0708558 (sec), leaf count = 72

$$\left\{\left\{y(x)\to c_2e^{-ix}x\,{}_1F_1\left(1-\frac{1}{4}i(-2(a-2)-4);2;2ix\right)+c_1e^{-ix}xU\left(1-\frac{1}{4}i(-2(a-2)-4),2,2ix\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.146 (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

$$y'(x)+xy''(x)=0$$

✓ **Mathematica** : cpu = 0.0081511 (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

$$ay(x)+y'(x)+xy''(x)=0$$

✓ **Mathematica** : cpu = 0.0176631 (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 = 0.009 (sec), leaf count = 29

$$\left\{y(x)=J_0\left(2\,\sqrt{a}\sqrt{x}\right)\_C1+\_C2\,Y_0\left(2\,\sqrt{a}\sqrt{x}\right)\right\}$$

2.1095 ODE No. 1095

$$lxy(x) + y'(x) + xy''(x) = 0$$

✓ **Mathematica** : cpu = 0.0072699 (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 = 0.027 (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

$$(a + x)y(x) + y'(x) + xy''(x) = 0$$

✓ **Mathematica** : cpu = 0.0093735 (sec), leaf count = 61

$$\left\{\left\{y(x) \to c_1 e^{-ix} U\left(\frac{1}{2}i(a-i), 1, 2ix\right) + c_2 e^{-ix} L_{-\frac{1}{2}i(a-i)}(2ix)\right\}\right\}$$

✓ **Maple** : cpu = 0.406 (sec), leaf count = 39

$$\left\{y(x) = \mathrm{e}^{-ix}\left(U\left(\frac{1}{2} + \frac{i}{2}a,\ 1,\ 2\,ix\right)\_C2 + M\left(\frac{1}{2} + \frac{i}{2}a,\ 1,\ 2\,ix\right)\_C1\right)\right\}$$

2.1097 ODE No. 1097

$$ay(x) - y'(x) + xy''(x) = 0$$

✓ **Mathematica** : cpu = 0.0203647 (sec), leaf count = 46

$$\left\{\left\{y(x) \to 2ac_1 x J_2\left(2\sqrt{a}\sqrt{x}\right) - 2ac_2 x Y_2\left(2\sqrt{a}\sqrt{x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.008 (sec), leaf count = 31

$$\left\{y(x) = x\left(Y_2\left(2\,\sqrt{a}\sqrt{x}\right)\_C2 + J_2\left(2\,\sqrt{a}\sqrt{x}\right)\_C1\right)\right\}$$

2.1098 ODE No. 1098

$$-ax^3y(x) - y'(x) + xy''(x) = 0$$

✓ **Mathematica** : cpu = 0.007001 (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 = 0.035 (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

$$x^3\left(e^{x^3} - v^2\right)y(x) - y'(x) + xy''(x) = 0$$

✗ **Mathematica** : cpu = 0.987607 (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 = 0.33 (sec), leaf count = 25

$$\left\{y(x) = \_C1\, J_v\left(e^{\frac{x^2}{2}}\right) + \_C2\, Y_v\left(e^{\frac{x^2}{2}}\right)\right\}$$

2.1100 ODE No. 1100

$$2y'(x) + xy''(x) - xy(x) - e^x = 0$$

✓ **Mathematica** : cpu = 0.0155611 (sec), leaf count = 44

$$\left\{\left\{y(x) \to \frac{e^x(2x-1)}{4x} + \frac{c_1e^{-x}}{x} + \frac{c_2e^x}{2x}\right\}\right\}$$

✓ **Maple** : cpu = 0.059 (sec), leaf count = 23

$$\left\{y(x) = \frac{\sinh(x)\_C2}{x} + \frac{\cosh(x)\_C1}{x} + \frac{e^x}{2}\right\}$$

Hand solution

$$xy'' + 2y' - xy = e^x \tag{1}$$

First method, much shorter, using transformation. Let $y_h = \frac{u(x)}{x}$, hence (now we are solving only the homogeneous part).

$$
\begin{aligned}
y' &= \frac{u'}{x} - \frac{u}{x^2} \\
y'' &= \frac{u''}{x} - \frac{u'}{x^2} - \frac{u'}{x^2} + 2\frac{u}{x^3}
\end{aligned}
$$

And (1) becomes

$$
\begin{aligned}
x\left(\frac{u''}{x} - \frac{u'}{x^2} - \frac{u'}{x^2} + 2\frac{u}{x^3}\right) + 2\left(\frac{u'}{x} - \frac{u}{x^2}\right) - x\left(\frac{u}{x}\right) &= 0 \\
u'' - 2\frac{u'}{x} + 2\frac{u}{x^2} + \frac{2u'}{x} - \frac{2u}{x^2} - u &= 0 \\
u'' - u &= 0
\end{aligned}
$$

Hence the roots of the characteristic equation are ± 1 and the solution is

$$
u = Ae^x + Be^{-x}
$$

Hence

$$
y_h = \frac{1}{x}\left(Ae^x + Be^{-x}\right)
$$

The particular solution is found below, and given in the second method. The transformation method is much simpler.

The second method, which is much longer, using series method. This is used if a transformation is not known or can not be found. There is singularity at $x = 0$. We need to check if the singularity is regular or not. Writing in standard form $y'' + p(x)\, y' + q(x)\, y = 0$ gives (we are looking at the homogeneous part now only)

$$
y'' + \frac{2}{x} y' - y = 0
$$

Hence $\lim_{x\to 0} xp(x) = \lim_{x\to 0} x\frac{2}{x} = 2$ which is analytic at $x = 0$. And $\lim_{x\to 0} x^2 q(x) = \lim_{x\to 0} -x^2 = 0$ which is analytic. Hence the singularity is regular (removable). Using Frobenius series, assume that

$$
y = \sum_{n=-\infty}^{\infty} c_n x^{n+r}
$$

Where $c_n = 0$ for $n < 0$. Hence

$$
\begin{aligned}
y' &= \sum (n+r)\, c_n x^{n+r-1} \\
y'' &= \sum (n+r)\,(n+r-1)\, c_n x^{n+r-2}
\end{aligned}
$$

Substituting back in the original ODE gives

$$\sum (n+r)(n+r-1) c_n x^{n+r-1} + \sum 2(n+r) c_n x^{n+r-1} - \sum c_n x^{n+r+1} = 0$$

Adjusting so that all have same power x^{n+r} gives

$$\sum (n+r+1)(n+r) c_{n+1} x^{n+r} + \sum 2(n+r+1) c_{n+1} x^{n+r} - \sum c_{n-1} x^{n+r} = 0$$

Hence

$$\begin{aligned} (n+r+1)(n+r) c_{n+1} + 2(n+r+1) c_{n+1} - c_{n-1} &= 0 \\ (n+r+1)(2+(n+r)) c_{n+1} - c_{n-1} &= 0 \end{aligned} \tag{2}$$

We want equation with c_0 in it. Hence let $n=-1$

$$(-1+r+1)(2+(-1+r)) c_0 - c_{-2} = 0$$

But $c_n = 0$ for all $n < 0$ hence

$$(-1+r+1)(2+(-1+r)) c_0 = 0$$

But $c_0 \neq 0$, as this is the basis for this method. Therefore, we obtain the indicial equation for r

$$\begin{aligned} (-1+r+1)(2+(-1+r)) &= 0 \\ r(r+1) &= 0 \end{aligned}$$

Hence $r=0$ or $r=-1$ are the roots. Now for each r we find a solution. Using $r=0$, we go back the recurrence equation (2)

$$\begin{aligned} (n+1)(2+n) c_{n+1} - c_{n-1} &= 0 \\ c_{n+1} &= \frac{c_{n-1}}{(n+1)(2+n)} \end{aligned}$$

For $n=0$

$$c_1 = \frac{c_{-1}}{(n+1)(2+n)} = 0$$

For $n=1$

$$c_2 = \frac{c_0}{(2)(3)}$$

For $n=2$

$$c_3 = \frac{c_1}{(n+1)(2+n)} = 0$$

For $n=3$

$$c_4 = \frac{c_2}{(4)(5)} = \frac{c_0}{(2)(3)(4)(5)}$$

And so on. Hence, for $r = 0$ we have

$$
\begin{aligned}
y_{r=0} &= \sum_{n=0}^{\infty} c_n x^n = c_0 + c_1 x^1 + c_2 x^2 + c_3 x^3 + \cdots \\
&= c_0 + \frac{c_0}{6} x^2 + \frac{c_0}{120} x^4 + \cdots \\
&= A\left(1 + \frac{1}{6} x^2 + \frac{1}{120} x^4 + \cdots\right) \qquad (3)
\end{aligned}
$$

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

$$\begin{aligned}
\frac{1}{x}e^x &= \frac{1}{x}\left(1 + x + \frac{1}{2}x^2 + \frac{1}{6}x^3 + \frac{1}{24}x^4 + \frac{1}{120}x^5 + \cdots\right) \\
&= \frac{1}{x} + 1 + \frac{1}{2}x + \frac{1}{6}x^2 + \frac{1}{24}x^3 + \frac{1}{120}x^4 + \cdots && \text{(3A)}
\end{aligned}$$

And

$$\begin{aligned}
\frac{1}{x}e^{-x} &= \frac{1}{x}\left(1 - x + \frac{1}{2}x^2 - \frac{1}{6}x^3 + \frac{1}{24}x^4 - \frac{1}{120}x^5 + \cdots\right) \\
&= \frac{1}{x} - 1 + \frac{1}{2}x - \frac{1}{6}x^2 + \frac{1}{24}x^3 - \frac{1}{120}x^4 + \cdots && \text{(4A)}
\end{aligned}$$

Now (3A)-(4A) gives

$$\begin{aligned}
\frac{1}{x}e^x - \frac{1}{x}e^{-x} &= \left(\frac{1}{x} + 1 + \frac{1}{2}x + \frac{1}{6}x^2 + \frac{1}{24}x^3 + \frac{1}{120}x^4 + \cdots\right) - \left(\frac{1}{x} - 1 + \frac{1}{2}x - \frac{1}{6}x^2 + \frac{1}{24}x^3 - \frac{1}{120}x^4 + \cdots\right) \\
&= 2 + 2\frac{1}{6}x^2 + 2\frac{1}{120}x^4 + \cdots \\
&= 2\left(1 + \frac{1}{6}x^2 + \frac{1}{120}x^4 + \cdots\right)
\end{aligned}$$

Hence

$$\left(1 + \frac{1}{6}x^2 + \frac{1}{120}x^4 + \cdots\right) = \frac{1}{2x}\left(e^x - e^{-x}\right)$$

But $y_{r=0} = A\left(1 + \frac{1}{6}x^2 + \frac{1}{120}x^4 + \cdots\right)$, therefore comparing the result we found above, wee see that we can write $y_{r=0}$ as

$$\begin{aligned}
y_{r=0} &= A\left(\frac{1}{2x}\left(e^x - e^{-x}\right)\right) \\
&= \frac{A}{2x}\left(e^x - e^{-x}\right)
\end{aligned}$$

Therefore

$$
\begin{aligned}
y_h &= y_{r=0} + y_{r=-1} \\
&= \frac{A}{2x}\left(e^x - e^{-x}\right) + \frac{B}{2x}\left(e^x + e^{-x}\right) \\
&= \frac{1}{x}\left(\frac{A}{2}e^x - \frac{A}{2}e^{-x} + \frac{B}{2}e^x + \frac{B}{2}e^{-x}\right) \\
&= \frac{1}{x}\left(e^x\left(\frac{A}{2} + \frac{B}{2}\right) + e^{-x}\left(-\frac{A}{2} + \frac{B}{2}\right)\right)
\end{aligned}
$$

Let $\frac{A+B}{2} = A_0$, $\frac{B-A}{2} = B_0$ hence the above becomes

$$
y_h = \frac{1}{x}\left(A_0 e^x + B_0 e^{-x}\right)
$$

We see this is the same solution using the transformation method given above. We now need to find particular solution. Let $y_1 = \frac{e^x}{x}, y_2 = \frac{e^{-x}}{x}$, hence $y_1' = \frac{e^x}{x} - \frac{e^x}{x^2}$ and $y_2' = \frac{-e^{-x}}{x^2} - \frac{e^{-x}}{x}$, hence the Wronskian is

$$
\begin{aligned}
W &= \begin{vmatrix} y_1 & y_2 \\ y_1' & y_2' \end{vmatrix} \\
&= \begin{vmatrix} \frac{e^x}{x} & \frac{e^{-x}}{x} \\ \frac{e^x}{x} - \frac{e^x}{x^2} & \frac{-e^{-x}}{x^2} - \frac{e^{-x}}{x} \end{vmatrix} \\
&= \frac{e^x}{x}\left(\frac{-e^{-x}}{x^2} - \frac{e^{-x}}{x}\right) - \frac{e^{-x}}{x}\left(\frac{e^x}{x} - \frac{e^x}{x^2}\right) \\
&= \left(\frac{-1}{x^3} - \frac{1}{x^2}\right) - \left(\frac{1}{x^2} - \frac{1}{x^3}\right) \\
&= -\frac{2}{x^2}
\end{aligned}
$$

Therefore, let $y_p = u_1 y_1 + u_2 y_2$ and hence

$$
u_1 = -\int \frac{y_2}{aW} e^x dx
$$

Where $a = x$ since the original ODE is $xy'' + 2y' - xy = e^x$, and a is the coefficient of y'' always. Hence the above becomes

$$
u_1 = -\int \frac{\frac{e^{-x}}{x}}{x\left(-\frac{2}{x^2}\right)} e^x dx = \int \frac{e^{-x}}{2} e^x dx = \int \frac{1}{2} dx = \frac{x}{2}
$$

And

$$
u_2 = \int \frac{\frac{e^x}{x}}{x\left(-\frac{2}{x^2}\right)} e^x dx = -\int \frac{\frac{e^x}{x}}{\frac{2}{x}} e^x dx = -\frac{1}{2}\int e^{2x} dx = -\frac{1}{2}\frac{e^{2x}}{2} = \frac{-1}{4}e^{2x}
$$

Hence

$$\begin{aligned} y_p &= u_1 y_1 + u_2 y_2 \\ &= \frac{x}{2}\frac{e^x}{x} - \frac{1}{4}e^{2x}\frac{e^{-x}}{x} \\ &= \frac{1}{2}e^x - \frac{1}{4x}e^x \end{aligned}$$

Therefore

$$y_p = e^x\left(\frac{1}{2} - \frac{1}{4x}\right)$$

Hence the general solution is

$$\begin{aligned} y &= y_h + y_p \\ &= \frac{1}{x}\left(A_0 e^x + B_0 e^{-x}\right) + e^x\left(\frac{1}{2} - \frac{1}{4x}\right) \end{aligned}$$

Verification

```
restart;
ode:=x*diff(diff(y(x),x),x)+2*diff(y(x),x)-x*y(x)=exp(x);
y0:=1/x*( _C1* exp(x)+ _C2*exp(-x))+ (1/2-1/(4*x))*exp(x);
odetest(y(x)=y0,ode);
0
```

2.1101 ODE No. 1101

$$axy(x) + 2y'(x) + xy''(x) = 0$$

✓ **Mathematica** : cpu = 0.0202574 (sec), leaf count = 52

$$\left\{\left\{y(x) \to \frac{c_1 e^{-i\sqrt{a}x}}{x} - \frac{ic_2 e^{i\sqrt{a}x}}{2\sqrt{a}x}\right\}\right\}$$

✓ **Maple** : cpu = 0.084 (sec), leaf count = 29

$$\left\{y(x) = \frac{1}{x}\left(\_C2 \cosh\left(\sqrt{-a}x\right) + \_C1 \sinh\left(\sqrt{-a}x\right)\right)\right\}$$

Hand solution

$$xy'' + 2y' + axy = 0 \tag{1}$$

First method much shorter, using transformation suggested by Kamke. Let $y = \frac{u(x)}{x}$, hence

$$
\begin{aligned}
y' &= \frac{u'}{x} - \frac{u}{x^2} \\
y'' &= \frac{u''}{x} - \frac{u'}{x^2} - \frac{u'}{x^2} + 2\frac{u}{x^3}
\end{aligned}
$$

And (1) becomes

$$
\begin{aligned}
x\left(\frac{u''}{x} - \frac{u'}{x^2} - \frac{u'}{x^2} + 2\frac{u}{x^3}\right) + 2\left(\frac{u'}{x} - \frac{u}{x^2}\right) + ax\left(\frac{u}{x}\right) &= 0 \\
u'' - 2\frac{u'}{x} + 2\frac{u}{x^2} + \frac{2u'}{x} - \frac{2u}{x^2} + au &= 0 \\
u'' + au &= 0
\end{aligned}
$$

Hence the roots of the characteristic equation are $\pm\sqrt{-a}$ and the solution is

$$
u = A\cos\left(\sqrt{a}x\right) + B\sin\left(\sqrt{a}x\right)
$$

Hence

$$
y = \frac{1}{x}\left(A\cos\left(\sqrt{a}x\right) + B\sin\left(\sqrt{a}x\right)\right)
$$

<u>Second method</u> Using series method.

There is singularity at $x = 0$. We need to check if it regular or not. Writing in standard form $y'' + p(x)\,y' + q(x)\,y = 0$ gives (we are looking at the homogeneous part now only)

$$
y'' + \frac{2}{x}y' + ay = 0
$$

Hence $\lim_{x\to 0} xp(x) = \lim_{x\to 0} x\frac{2}{x} = 2$ which is analytic at $x = 0$. And $\lim_{x\to 0} x^2 q(x) = \lim_{x\to 0} -ax^2 = 0$ which is analytic. Hence the singularity is regular (removable). Using Frobenius series, assume that

$$
y = \sum_{n=-\infty}^{\infty} c_n x^{n+r}
$$

Where $c_n = 0$ for $n < 0$. Hence

$$
\begin{aligned}
y' &= \sum (n+r)\,c_n x^{n+r-1} \\
y'' &= \sum (n+r)\,(n+r-1)\,c_n x^{n+r-2}
\end{aligned}
$$

Substituting back in the original ODE gives

$$
\sum (n+r)\,(n+r-1)\,c_n x^{n+r-1} + \sum 2(n+r)\,c_n x^{n+r-1} + \sum a c_n x^{n+r+1} = 0
$$

Adjusting so that all have same power x^{n+r} gives

$$\sum (n+r+1)(n+r)c_{n+1}x^{n+r} + \sum 2(n+r+1)c_{n+1}x^{n+r} + \sum ac_{n-1}x^{n+r} = 0$$

Hence

$$\begin{aligned}(n+r+1)(n+r)c_{n+1} + 2(n+r+1)c_{n+1} + ac_{n-1} &= 0\\ (n+r+1)(2+(n+r))c_{n+1} + ac_{n-1} &= 0 \end{aligned} \tag{2}$$

We want equation with c_0 in it. Hence let $n=-1$

$$(-1+r+1)(2+(-1+r))c_0 + ac_{-2} = 0$$

But $c_n = 0$ for all $n<0$ hence

$$(-1+r+1)(2+(-1+r))c_0 = 0$$

But $c_0 \neq 0$, as this is the basis for this method. Therefore, we obtain the indicial equation for r

$$\begin{aligned}(-1+r+1)(2+(-1+r)) &= 0\\ r(r+1) &= 0\end{aligned}$$

Hence $r=0$ or $r=-1$ are the roots. Now for each r we find a solution. Using $r=0$, we go back the recurrence equation (2)

$$\begin{aligned}(n+1)(2+n)c_{n+1} + ac_{n-1} &= 0\\ c_{n+1} &= \frac{-ac_{n-1}}{(n+1)(2+n)}\end{aligned}$$

For $n=0$

$$c_1 = \frac{-ac_{-1}}{(n+1)(2+n)} = 0$$

For $n=1$

$$c_2 = \frac{-ac_0}{(2)(3)}$$

For $n=2$

$$c_3 = \frac{-ac_1}{(n+1)(2+n)} = 0$$

For $n=3$

$$c_4 = \frac{-ac_2}{(4)(5)} = \frac{-a(-ac_0)}{(2)(3)(4)(5)} = \frac{a^2c_0}{(2)(3)(4)(5)}$$

And so on. Hence, for $r=0$ we have

$$\begin{aligned}y_{r=0} &= \sum_{n=0}^{\infty} c_n x^n = c_0 + c_1x^1 + c_2x^2 + c_3x^3 + \cdots\\ &= c_0 - a\frac{c_0}{6}x^2 + a^2\frac{c_0}{120}x^4 + \cdots\\ &= A\left(1 - a\frac{1}{6}x^2 + a^2\frac{1}{120}x^4 + \cdots\right)\end{aligned} \tag{3}$$

Where A is used as arbitrary constant instead of a_0. Now we find the solution for $r=-1$. we go back the recurrence equation (2)

$$
\begin{aligned}
(n-1+1)\,(2+(n-1))\,c_{n+1}+ac_{n-1}&=0\\
n(1+n)\,c_{n+1}+ac_{n-1}&=0\\
c_{n+1}&=\frac{-ac_{n-1}}{n\,(1+n)}
\end{aligned}
$$

For $n=0$

$$c_1=\frac{-ac_{-1}}{n\,(1+n)}=0$$

For $n=1$

$$c_2=\frac{-ac_0}{2}$$

For $n=2$

$$c_3=\frac{-ac_1}{n\,(1+n)}=0$$

For $n=3$

$$c_4=\frac{-ac_2}{(3)\,(4)}=\frac{-a(-ac_0)}{(2)\,(3)\,(4)}=\frac{a^2c_0}{(2)\,(3)\,(4)}$$

For $n=4$

$$c_5=\frac{-ac_3}{n\,(1+n)}=0$$

For $n=5$

$$c_6=\frac{-ac_4}{(5)\,(6)}=\frac{-a\left(a^2c_0\right)}{(2)\,(3)\,(4)\,(5)\,(6)}=\frac{-a^3c_0}{(2)\,(3)\,(4)\,(5)\,(6)}$$

And so on. Hence solution is

$$
\begin{aligned}
y_{r=-1}&=\frac{1}{x}\sum_{n=0}^{\infty}c_nx^n=\frac{1}{x}\left(c_0-\frac{ac_0}{2}x^2+\frac{a^2c_0}{(2)\,(3)\,(4)}x^4-\frac{a^3c_0}{(2)\,(3)\,(4)\,(5)\,(6)}x^6+\cdots\right)\\
&=\frac{B}{x}\left(1-\frac{a}{2}x^2+\frac{a^2}{24}x^4-\frac{a^3}{720}x^6+\cdots\right)
\end{aligned}
$$

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

$$\begin{aligned}
\mathcal{L}(xy'' + 2y' + axy) &= 0 \\
-\frac{d}{ds}(\mathcal{L}y'') + 2\left(-\frac{d}{ds}(\mathcal{L}y')\right) + a\left(-\frac{d}{ds}Y\right) &= 0 \\
-\frac{d}{ds}\left(s^2Y - sA - B\right) + 2\left(-\frac{d}{ds}(sY - A)\right) + a(-Y') &= 0
\end{aligned}$$

Where $A = y(0), B = y'(0)$. Simplifying gives

$$\begin{aligned}
-\left(2sY + s^2Y' - A\right) - 2(Y + sY') - aY' &= 0 \\
Y'\left(-s^2 - 2s - a\right) + Y(-2s - 2) + A &= 0 \\
Y' + Y\frac{2s + 2}{s^2 + 2s + a} &= \frac{A}{s^2 + 2s + a}
\end{aligned}$$

This is first order ODE, which is solved easily using an integrating factor. Solving for $Y(s)$ gives

$$Y(s) = \frac{As + c_1}{s^2 + a + 2s}$$

Where c_1 is constant of integration. The inverse Laplace of the above is

$$y(x) = e^{-x}\left(A\cos\left(x\sqrt{1-a}\right) + \frac{(-A+c_1)}{\sqrt{1-a}}\sinh\left(x\sqrt{1-a}\right)\right)$$

I need to find why the above does not verify. May be I made a mistake somewhere. Verification of the result of the first two methods is below.

```
restart;
ode:=x*diff(diff(y(x),x),x)+2*diff(y(x),x)+a*x*y(x)=0;
y0:=1/x*( _C1* cos(sqrt(a)*x)+ _C2*sin(sqrt(a)*x));
odetest(y(x)=y0,ode);
0
```

2.1102 ODE No. 1102

$$ax^2y(x) + 2y'(x) + xy''(x) = 0$$

✓ **Mathematica** : cpu = 0.0056911 (sec), leaf count = 42

$$\left\{\left\{y(x)\to \frac{c_1\text{Ai}\left(-\frac{ax}{(-a)^{2/3}}\right)}{x} + \frac{c_2\text{Bi}\left(-\frac{ax}{(-a)^{2/3}}\right)}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.208 (sec), leaf count = 33

$$\left\{y(x) = \left(\_C2\, Y_{\frac{1}{3}}\left(\frac{2}{3}\sqrt{a}x^{\frac{3}{2}}\right) + \_C1\, J_{\frac{1}{3}}\left(\frac{2}{3}\sqrt{a}x^{\frac{3}{2}}\right)\right)\frac{1}{\sqrt{x}}\right\}$$

Hand solution

$$xy'' + 2y' + ax^2y = 0 \tag{1}$$

Since there is a term $2y$, we can use $y = \frac{u(x)}{x}$, hence

$$\begin{aligned} y' &= \frac{u'}{x} - \frac{u}{x^2} \\ y'' &= \frac{u''}{x} - \frac{u'}{x^2} - \frac{u'}{x^2} + 2\frac{u}{x^3} \end{aligned}$$

And (1) becomes

$$\begin{aligned} x\left(\frac{u''}{x} - \frac{u'}{x^2} - \frac{u'}{x^2} + 2\frac{u}{x^3}\right) + 2\left(\frac{u'}{x} - \frac{u}{x^2}\right) + ax^2\left(\frac{u}{x}\right) &= 0 \\ u'' - 2\frac{u'}{x} + 2\frac{u}{x^2} + \frac{2u'}{x} - \frac{2u}{x^2} + axu &= 0 \\ u'' + axu &= 0 \end{aligned} \tag{2}$$

This is Emdon-Fowler. (form is $u'' + x^n u = 0$) with $n = 1$. Assume that

$$u = \sum_{n=0}^{\infty} c_n x^n$$

Hence

$$\begin{aligned}
u' &= \sum_{n=0} n c_n x^{n-1} = \sum_{n=1} n c_n x^{n-1} = \sum_{n=0} (n+1)\, c_{n+1} x^n \\
u'' &= \sum_{n=0} n(n+1)\, c_{n+1} x^{n-1} = \sum_{n=1} n(n+1)\, c_{n+1} x^{n-1} = \sum_{n=0} (n+1)\,(n+2)\, c_{n+2} x^n
\end{aligned}$$

Substituting back in (2) gives

$$\begin{aligned}
\sum_{n=0} (n+1)\,(n+2)\, c_{n+2} x^n + \sum_{n=0} a c_n x^{n+1} &= 0 \\
\sum_{n=0} (n+1)\,(n+2)\, c_{n+2} x^n + \sum_{n=1} a c_{n-1} x^n &= 0
\end{aligned}$$

For $n = 0$

$$(1)\,(2)\, c_2 = 0$$

Hence $c_2 = 0$. For $n \geq 1$

$$\begin{aligned}
(n+1)\,(n+2)\, c_{n+2} + a c_{n-1} &= 0 \\
c_{n+2} &= \frac{-a c_{n-1}}{(n+1)\,(n+2)} \qquad (3)
\end{aligned}$$

For $n = 1$, from (3)

$$c_3 = \frac{-a c_0}{(2)\,(3)}$$

For $n = 2$, from (3)

$$c_4 = \frac{-a c_1}{(3)\,(4)}$$

For $n = 3$, from (3)

$$c_5 = \frac{-a c_2}{(4)\,(5)} = 0$$

For $n = 4$, from (3)

$$c_6 = \frac{-a c_3}{(5)\,(6)} = \frac{-a}{(5)\,(6)} \left(\frac{-a c_0}{(2)\,(3)} \right) = \frac{a^2 c_0}{(2)\,(3)\,(5)\,(6)}$$

For $n = 5$, from (3)

$$c_7 = \frac{-a c_4}{(6)\,(7)} = \frac{-a}{(6)\,(7)} \left(\frac{-a c_1}{(3)\,(4)} \right) = \frac{a^2 c_1}{(3)\,(4)\,(6)\,(7)}$$

For $n = 6$, from (3)

$$c_8 = \frac{-a c_5}{(7)\,(8)} = 0$$

For $n=7$, from (3)

$$c_9 = \frac{-ac_6}{(8)(9)} = \frac{-a}{(8)(9)}\left(\frac{a^2c_0}{(2)(3)(5)(6)}\right) = \frac{-a^3c_0}{(2)(3)(5)(6)(8)(9)}$$

For $n=8$, from (3)

$$c_{10} = \frac{-ac_7}{(9)(10)} = \frac{-a}{(9)(10)}\left(\frac{a^2c_1}{(3)(4)(6)(7)}\right) = \frac{-a^3c_1}{(3)(4)(6)(7)(9)(10)}$$

And so on. Hence,

$$\begin{aligned}
u &= \sum_{n=0}^{\infty} c_n x^n = c_0 + c_1x^1 + c_2x^2 + c_3x^3 + \cdots \\
&= c_0 + c_1x + 0 + c_3x^3 + c_4x^4 + 0 + c_6x^6 + c_7x^7 + 0 + c_9x^9 + \cdots \\
&= c_0 + c_1x - \frac{ac_0}{(2)(3)}x^3 - \frac{ac_1}{(3)(4)}x^4 + \frac{a^2c_0}{(2)(3)(5)(6)}x^6 + \frac{a^2c_1}{(3)(4)(6)(7)}x^7 - \frac{a^3c_0}{(2)(3)(5)(6)(8)(9)}x^9 - \frac{a}{(3)(4)(6)} \\
&= c_0\left(1 - \frac{a}{6}x^3 + \frac{a^2}{180}x^6 - \frac{a^3}{12\,960}x^9 + \cdots\right) + xc_1\left(1 - \frac{a}{12}x^3 + \frac{a^2}{504}x^6 - \frac{a^3}{45\,360}x^9 + \cdots\right) \\
&= c_0\left(1 - \frac{1}{6}\left(a^{\frac{1}{3}}x\right)^3 + \frac{1}{180}\left(a^{\frac{1}{3}}x\right)^6 - \frac{1}{12\,960}\left(a^{\frac{1}{3}}x\right)^9 + \cdots\right) + xc_1\left(1 - \frac{1}{12}\left(a^{\frac{1}{3}}x\right)^3 + \frac{1}{504}\left(a^{\frac{1}{3}}x\right)^6 - \frac{1}{45\,360}\left(a^{\frac{1}{3}}\right.\right.
\end{aligned}$$

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

$$ay(x) - 2y'(x) + xy''(x) = 0$$

✓ **Mathematica** : cpu = 0.0206588 (sec), leaf count = 64

$$\left\{\left\{y(x)\to 6a^{3/2}c_1x^{3/2}J_3\left(2\sqrt{a}\sqrt{x}\right)-2ia^{3/2}c_2x^{3/2}Y_3\left(2\sqrt{a}\sqrt{x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.008 (sec), leaf count = 33

$$\left\{y(x)=x^{\frac{3}{2}}\left(Y_3\left(2\sqrt{a}\sqrt{x}\right)\_C2+J_3\left(2\sqrt{a}\sqrt{x}\right)\_C1\right)\right\}$$

2.1104 ODE No. 1104

$$ay(x) + vy'(x) + xy''(x) = 0$$

✓ **Mathematica** : cpu = 0.0291287 (sec), leaf count = 104

$$\left\{\left\{y(x)\to c_1a^{\frac{1-v}{2}}x^{\frac{1-v}{2}}\Gamma(v)J_{v-1}\left(2\sqrt{a}\sqrt{x}\right)+c_2a^{\frac{v-1}{2}-v+1}x^{\frac{v-1}{2}-v+1}\Gamma(2-v)J_{1-v}\left(2\sqrt{a}\sqrt{x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.054 (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 = 0.0152571 (sec), leaf count = 64

$$\left\{\left\{y(x)\to c_1x^{\frac{1-a}{2}}J_{\frac{a-1}{2}}\left(\sqrt{b}x\right)+c_2x^{\frac{1-a}{2}}Y_{\frac{a-1}{2}}\left(\sqrt{b}x\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.075 (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

$$a y'(x)+b x^{\mathrm{a1}} y(x)+x y''(x)=0$$

✓ **Mathematica** : cpu = 0.0394293 (sec), leaf count = 441

$$\left\{\left\{y(x)\to c_1\left(\frac{1}{\mathrm{a1}}+1\right)^{\frac{a}{\left(\frac{1}{\mathrm{a1}}+1\right)\mathrm{a1}}-\frac{1}{\left(\frac{1}{\mathrm{a1}}+1\right)\mathrm{a1}}}\mathrm{a1}^{\frac{a}{\left(\frac{1}{\mathrm{a1}}+1\right)\mathrm{a1}}-\frac{1}{\left(\frac{1}{\mathrm{a1}}+1\right)\mathrm{a1}}}b^{\frac{1}{2}\left(\frac{1}{\left(\frac{1}{\mathrm{a1}}+1\right)\mathrm{a1}}-\frac{a}{\left(\frac{1}{\mathrm{a1}}+1\right)\mathrm{a1}}\right)}\left(x^{\mathrm{a1}}\right)^{\frac{1}{2}\left(\frac{1}{\mathrm{a1}}+1\right)\left(\frac{1}{\left(\frac{1}{\mathrm{a1}}+1\right)\mathrm{a1}}-\frac{a}{\left(\frac{1}{\mathrm{a1}}+\right.}\right.}\right.\right.$$

✓ **Maple** : cpu = 0.799 (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

$$a y(x)+(b+x)y'(x)+x y''(x)=0$$

✓ **Mathematica** : cpu = 0.0226922 (sec), leaf count = 40

$$\left\{\left\{y(x)\to c_1e^{-x}U(b-a,b,x)+c_2e^{-x}L_{a-b}^{b-1}(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.323 (sec), leaf count = 30

$$\left\{y(x)=\mathrm{e}^{-x}(U(-a+b,\,b,\,x)\_C2+M(-a+b,\,b,\,x)\_C1)\right\}$$

2.1108 ODE No. 1108

$$(a+b+x)y'(x)+a y(x)+x y''(x)=0$$

✓ **Mathematica** : cpu = 0.0276616 (sec), leaf count = 37

$$\left\{\left\{y(x)\to c_1e^{-x}U(b,a+b,x)+c_2e^{-x}L_{-b}^{a+b-1}(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.31 (sec), leaf count = 26

$$\left\{y(x)=\mathrm{e}^{-x}(M(b,\,a+b,\,x)\_C1+U(b,\,a+b,\,x)\_C2)\right\}$$

2.1109 ODE No. 1109

$$-xy'(x)+xy''(x)-y(x)-e^x x(x+1)=0$$

✓ **Mathematica** : cpu = 0.131918 (sec), leaf count = 45

$$\left\{\left\{y(x)\to c_2(-e^x x\text{Ei}(-x)-1)+e^x\left(x^2+x-x\log(-x)-1\right)+c_1e^x x\right\}\right\}$$

✓ **Maple** : cpu = 0.109 (sec), leaf count = 33

$$\left\{y(x)=\mathrm{e}^x\left(-Ei(1,x)\,x\_C1+\mathrm{e}^{-x}\_C1-x\ln(x)+x\_C2+x^2-1\right)\right\}$$

2.1110 ODE No. 1110

$$-ay(x)-xy'(x)+xy''(x)=0$$

✓ **Mathematica** : cpu = 0.0340652 (sec), leaf count = 36

$$\left\{\left\{y(x)\to c_2G_{1,2}^{2,0}\left(-x\left|\begin{array}{c}1-a\\0,1\end{array}\right.\right)+c_1x\,{}_1F_1(a+1;2;x)\right\}\right\}$$

✓ **Maple** : cpu = 0.114 (sec), leaf count = 23

$$\{y(x)=x(U(a+1,\,2,\,x)\_C2+M(a+1,\,2,\,x)\_C1)\}$$

2.1111 ODE No. 1111

$$-(x+1)y'(x)+xy''(x)+y(x)=0$$

✓ **Mathematica** : cpu = 0.0187706 (sec), leaf count = 20

$$\{\{y(x)\to c_1e^x+c_2(-x-1)\}\}$$

✓ **Maple** : cpu = 0.047 (sec), leaf count = 13

$$\{y(x)=\_C2\,\mathrm{e}^x+\_C1\,x+\_C1\}$$

Hand solution

$$xy''-(x+1)\,y'+y=0 \tag{1}$$

Taking Laplace transform of each term and using property of $\mathcal{L}(xf(x))=-\frac{d}{ds}F(s)$ where $F(s)=\mathcal{L}f(x)$, then

$$\mathcal{L}(xy'')=-\frac{d}{ds}(\mathcal{L}y'')$$

Let $\mathcal{L}y(x) = Y(s) \equiv Y$. Now $\mathcal{L}y'' = s^2Y - sy(0) - y'(0)$. Assuming $y(0) = A, y'(0) = B$ then

$$
\begin{aligned}
\mathcal{L}(xy'') &= -\frac{d}{ds}\left(s^2Y - As - B\right) \\
&= -\left(2sY + s^2Y' - A\right)
\end{aligned}
$$

And

$$
\begin{aligned}
\mathcal{L}\left((x+1)\,y'\right) &= \mathcal{L}\left(xy' + y'\right) \\
&= -\frac{d}{ds}\left(\mathcal{L}y'\right) + \mathcal{L}y' \\
&= -\frac{d}{ds}(sY - y(0)) + (sY - y(0)) \\
&= -\frac{d}{ds}(sY - A) + (sY - y(0)) \\
&= -\left(Y + sY'\right) + (sY - A) \\
&= -Y - sY' + sY - A
\end{aligned}
$$

Hence Laplace transform of the ODE becomes

$$
\begin{aligned}
-\left(2sY + s^2Y' - A\right) - \left(-Y - sY' + sY - A\right) + Y &= 0 \\
-2sY - s^2Y' + A + Y + sY' - sY + A + Y &= 0 \\
Y'\left(s - s^2\right) + Y(-2s + 1 - s + 1) &= -2A \\
Y'\left(s^2 - s\right) + Y(3s - 2) &= 2A \\
Y' + \frac{(3s-2)}{s\,(s-1)}Y &= \frac{2A}{s\,(s-1)}
\end{aligned}
$$

The integrating factor is $\mu = e^{\int \frac{(3s-2)}{s(s-1)}} = e^{\ln(s-1) + 2\ln(s)} = (s-1)\,s^2$, hence

$$
\begin{aligned}
d\left((s-1)\,s^2Y\right) &= (s-1)\,s^2\frac{2A}{s\,(s-1)} \\
(s-1)\,s^2Y &= 2A\int s ds + c_1 \\
(s-1)\,s^2Y &= 2A\frac{s^2}{2} + c_1 \\
Y &= \frac{As^2 + c_1}{(s-1)\,s^2}
\end{aligned}
$$

Inverse Laplace transform gives

$$
\begin{aligned}
y(x) &= -c_1 + (A + c_1)\,e^x - c_1x \\
&= -c_1(1 + x) + (A + c_1)\,e^x
\end{aligned}
$$

Let $-c_1 = A_0, A + c_1 + B_0$, hence

$$
y(x) = A_0(1 + x) + B_0e^x
$$

Verification

```
rrestart;
ode:=x*diff(diff(y(x),x),x)-(1+x)*diff(y(x),x)+y(x)=0;
y0:=_C0*(1+x)+_C1*exp(x);
odetest(y(x)=y0,ode);
0
```

2.1112 ODE No. 1112

$$-(x+1)y'(x)+xy''(x)-2(x-1)y(x)=0$$

✓ **Mathematica** : cpu = 0.0226495 (sec), leaf count = 30

$$\left\{\left\{y(x)\to c_1e^{2x}-\frac{1}{9}c_2e^{-x}(3x+1)\right\}\right\}$$

✓ **Maple** : cpu = 0.053 (sec), leaf count = 22

$$\left\{y(x)=\_C1\,\mathrm{e}^{2x}+\_C2\,\mathrm{e}^{-x}(3x+1)\right\}$$

2.1113 ODE No. 1113

$$-ay(x)+(b-x)y'(x)+xy''(x)=0$$

✓ **Mathematica** : cpu = 0.0126917 (sec), leaf count = 24

$$\{\{y(x)\to c_1U(a,b,x)+c_2L_{-a}^{b-1}(x)\}\}$$

✓ **Maple** : cpu = 0.254 (sec), leaf count = 17

$$\{y(x)=\_C1\,M(a,\,b,\,x)+\_C2\,U(a,\,b,\,x)\}$$

2.1114 ODE No. 1114

$$-2(x-1)y'(x)+xy''(x)-y(x)=0$$

✓ **Mathematica** : cpu = 0.0375023 (sec), leaf count = 39

$$\left\{\left\{y(x)\to c_2G_{1,2}^{2,0}\left(-2x\middle|\begin{array}{c}\frac{1}{2}\\-1,0\end{array}\right)+c_1e^x(I_0(x)-I_1(x))\right\}\right\}$$

✓ **Maple** : cpu = 0.079 (sec), leaf count = 34

$$\{y(x)=\mathrm{e}^x(\_C2\,K_1(-x)-\_C2\,K_0(-x)+\_C1\,(I_0(x)-I_1(x)))\}$$

2.1115 ODE No. 1115

$$-(3x-2)y'(x)+xy''(x)-(2x-3)y(x)=0$$

✓ **Mathematica** : cpu = 0.049794 (sec), leaf count = 76

$$\left\{\left\{y(x)\to c_2e^{-\frac{1}{2}\left(\sqrt{17}-3\right)x}\,{}_1F_1\left(1-\frac{6}{\sqrt{17}};2;\sqrt{17}x\right)+c_1e^{-\frac{1}{2}\left(\sqrt{17}-3\right)x}U\left(1-\frac{6}{\sqrt{17}},2,\sqrt{17}x\right)\right\}\right\}$$

✓ **Maple** : cpu = 2.98 (sec), leaf count = 47

$$\left\{y(x)=\mathrm{e}^{-\frac{x\left(-3+\sqrt{17}\right)}{2}}\left(M\left(1-\frac{6\sqrt{17}}{17},\,2,\,\sqrt{17}x\right)\_C1+U\left(1-\frac{6\sqrt{17}}{17},\,2,\,\sqrt{17}x\right)\_C2\right)\right\}$$

2.1116 ODE No. 1116

$$y'(x)(ax+b+n)+any(x)+xy''(x)=0$$

✓ **Mathematica** : cpu = 0.0449482 (sec), leaf count = 43

$$\left\{\left\{y(x)\to c_1e^{-ax}U(b,b+n,ax)+c_2e^{-ax}L_{-b}^{b+n-1}(ax)\right\}\right\}$$

✓ **Maple** : cpu = 0.303 (sec), leaf count = 31

$$\{y(x)=\mathrm{e}^{-ax}(M(b,\,b+n,\,ax)\_C1+U(b,\,b+n,\,ax)\_C2)\}$$

2.1117 ODE No. 1117

$$-(x+1)(a+b)y'(x)+abxy(x)+xy''(x)=0$$

✓ **Mathematica** : cpu = 0.0709108 (sec), leaf count = 107

$$\left\{\left\{y(x)\to c_1U\left(-\frac{-a^2-ba-a+b}{a-b},a+b+2,(a-b)x\right)e^{(a+b+1)\log(x)+bx}+c_2L_{\frac{-a^2-ba-a+b}{a-b}}^{a+b+1}((a-b)x)e^{(a+b+1)\log(}\right.\right.$$

✓ **Maple** : cpu = 0.349 (sec), leaf count = 82

$$\left\{y(x)=\mathrm{e}^{bx}x^{a+b+1}\left(M\left(\frac{a^2+ab+a-b}{a-b},\,a+b+2,\,(a-b)\,x\right)\_C1+U\left(\frac{a^2+ab+a-b}{a-b},\,a+b+2,\,(a-b)\,x\right)\right.\right.$$

2.1118 ODE No. 1118

$$y'(x)(x(a+b)+m+n)+y(x)(abx+an+bm)+xy''(x)=0$$

✓ **Mathematica** : cpu = 0.0651933 (sec), leaf count = 51

$$\left\{\left\{y(x)\to c_1e^{-ax}U(m,m+n,(a-b)x)+c_2e^{-ax}L_{-m}^{m+n-1}((a-b)x)\right\}\right\}$$

✓ **Maple** : cpu = 0.374 (sec), leaf count = 39

$$\{y(x)=\mathrm{e}^{-ax}(U(m,\,m+n,\,(a-b)\,x)\_C2+M(m,\,m+n,\,(a-b)\,x)\_C1)\}$$

2.1119 ODE No. 1119

$$y(x)\left(a^2x+2ab\right)-2(ax+b)y'(x)+xy''(x)=0$$

✓ **Mathematica** : cpu = 0.121547 (sec), leaf count = 77

$$\left\{\left\{y(x)\to c_1e^{ax}x^{b-\frac{1}{2}\sqrt{(2b+1)^2}+\frac{1}{2}}+\frac{c_2e^{ax}x^{b+\frac{1}{2}\sqrt{(2b+1)^2}+\frac{1}{2}}}{\sqrt{(2b+1)^2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.106 (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 = 0.0427731 (sec), leaf count = 168

$$\left\{\left\{y(x)\to c_1e^{-\frac{1}{2}x\sqrt{a^2-4c}-\frac{ax}{2}}U\left(-\frac{-ab-\sqrt{a^2-4c}b+2d}{2\sqrt{a^2-4c}},b,\sqrt{a^2-4c}x\right)+c_2e^{-\frac{1}{2}x\sqrt{a^2-4c}-\frac{ax}{2}}L_{\frac{-ab-\sqrt{a^2-4c}b+2d}{2\sqrt{a^2-4c}}}^{b-1}\left(\sqrt{\right.\right.\right.$$

✓ **Maple** : cpu = 0.449 (sec), leaf count = 109

$$\left\{y(x)=\mathrm{e}^{-\frac{x}{2}\left(a+\sqrt{a^2-4\,c}\right)}\left(M\left(\frac{1}{2}\left(b\sqrt{a^2-4\,c}+ab-2\,d\right)\frac{1}{\sqrt{a^2-4\,c}},\,b,\,\sqrt{a^2-4\,cx}\right)\_C1+U\left(\frac{1}{2}\left(b\sqrt{a^2-4\,c}+\right.\right.\right.\right.$$

2.1121 ODE No. 1121

$$-\left(x^2-x\right)y'(x)+xy''(x)+(x-1)y(x)=0$$

✓ **Mathematica** : cpu = 0.188583 (sec), leaf count = 41

$$\left\{\left\{y(x)\to c_2x\int_1^x\frac{e^{\frac{K[1]^2}{2}-K[1]}}{K[1]^2}dK[1]+c_1x\right\}\right\}$$

✓ **Maple** : cpu = 0.053 (sec), leaf count = 23

$$\left\{y(x)=\left(\int\frac{1}{x^2}\mathrm{e}^{\frac{x(x-2)}{2}}\,\mathrm{d}x\_C1+\_C2\right)x\right\}$$

2.1122 ODE No. 1122

$$-\left(x^2-x-2\right)y'(x)+xy''(x)-x(x+3)y(x)=0$$

✓ **Mathematica** : cpu = 0.201 (sec), leaf count = 57

$$\left\{\left\{y(x)\to c_2e^{\frac{x^2}{2}}\int_1^x\frac{e^{-\frac{1}{2}K[1]^2-K[1]}}{K[1]^2}dK[1]+c_1e^{\frac{x^2}{2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.849 (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 = 0.0109047 (sec), leaf count = 91

$$\left\{\left\{y(x)\to c_1e^{\frac{1}{2}\sqrt{b}x^2\left(\frac{a}{\sqrt{b}}-\frac{\sqrt{a^2-b}}{\sqrt{b}}\right)}+c_2e^{\frac{1}{2}\sqrt{b}x^2\left(\frac{\sqrt{a^2-b}}{\sqrt{b}}+\frac{a}{\sqrt{b}}\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.147 (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 = 0.065165 (sec), leaf count = 65

$$\left\{\left\{y(x)\to i^{1-2a}c_2x^{1-2a}\,{}_1F_1\left(-a-\frac{n}{2}+\frac{1}{2};\frac{3}{2}-a;x^2\right)+c_1\,{}_1F_1\left(-\frac{n}{2};a+\frac{1}{2};x^2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.378 (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

$$\left(4x^2-1\right)y'(x)-4x^3y(x)-4x^5+xy''(x)=0$$

✓ **Mathematica** : cpu = 0.10728 (sec), leaf count = 84

$$\left\{\left\{y(x)\to-\frac{3\sqrt{2}x^2+4x^2+6\sqrt{2}+8}{\sqrt{2}\left(3+2\sqrt{2}\right)}+c_1e^{-\left(1-\sqrt{2}\right)x^2}+c_2e^{-\left(1+\sqrt{2}\right)x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.064 (sec), leaf count = 36

$$\left\{y(x)=\mathrm{e}^{x^2\left(\sqrt{2}-1\right)}\_C2+\mathrm{e}^{-x^2\left(1+\sqrt{2}\right)}\_C1-x^2-2\right\}$$

2.1126 ODE No. 1126

$$\left(a^2x^3+a\right)y(x)+\left(2ax^3-1\right)y'(x)+xy''(x)=0$$

✗ **Mathematica** : cpu = 0.900904 (sec), leaf count = 0 , DifferentialRoot result

$$\left\{\left\{y(x)\to\text{DifferentialRoot}\left(\{y,x\},\left\{\left(a^2x^3+a\right)y(x)+\left(2x^3a-1\right)y'(x)+xy''(x)=0,y(1)=c_1,y'(1)=c_2\right\}\right)(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.061 (sec), leaf count = 19

$$\left\{y(x)=\mathrm{e}^{-\frac{ax^3}{3}}\left(\_C2\,x^2+\_C1\right)\right\}$$

2.1127 ODE No. 1127

$$y(x)\left(a^2x\log^2(x)+a\log(x)+a\right)+(2ax\log(x)+1)y'(x)+xy''(x)=0$$

✓ **Mathematica** : cpu = 0.0285232 (sec), leaf count = 36

$$\left\{\left\{y(x)\to c_1e^{ax}x^{-ax}+c_2e^{ax}x^{-ax}\log(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.092 (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 = 0.0210966 (sec), leaf count = 40

$$\left\{\left\{y(x)\to\frac{c_2\int_1^x\exp\left(-\int_1^{K[2]}f(K[1])dK[1]\right)dK[2]}{x}+\frac{c_1}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.403 (sec), leaf count = 32

$$\left\{y(x)=\frac{1}{x}\left(\_C2\int\mathrm{e}^{\int\frac{-xf(x)-2}{x}\,\mathrm{d}x}x^2\,\mathrm{d}x+\_C1\right)\right\}$$

2.1129 ODE No. 1129

$$-(4x-9)y'(x)+(x-3)y''(x)+(3x-6)y(x)=0$$

✓ **Mathematica** : cpu = 0.0605994 (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 = 0.057 (sec), leaf count = 30

$$\left\{y(x)=\mathrm{e}^{x}\_C1+\_C2\,\mathrm{e}^{3x}\left(4x^3-42x^2+150x-183\right)\right\}$$

2.1130 ODE No. 1130

$$ay(x) + y'(x) + 2xy''(x) = 0$$

✓ **Mathematica** : cpu = 0.0091799 (sec), leaf count = 46

$$\left\{\left\{y(x) \to c_1 \cos\left(\sqrt{2}\sqrt{a}\sqrt{x}\right) + c_2 \sin\left(\sqrt{2}\sqrt{a}\sqrt{x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.081 (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

$$ay(x) - (x-1)y'(x) + 2xy''(x) = 0$$

✓ **Mathematica** : cpu = 0.0095743 (sec), leaf count = 58

$$\left\{\left\{y(x) \to c_1\sqrt{x}U\left(\frac{1}{2}(1-2a), \frac{3}{2}, \frac{x}{2}\right) + c_2\sqrt{x}L_{\frac{1}{2}(2a-1)}^{\frac{1}{2}}\left(\frac{x}{2}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.425 (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

$$ay(x) - (2x-1)y'(x) + 2xy''(x) = 0$$

✓ **Mathematica** : cpu = 0.0083553 (sec), leaf count = 48

$$\left\{\left\{y(x) \to c_1\sqrt{x}U\left(\frac{1-a}{2}, \frac{3}{2}, x\right) + c_2\sqrt{x}L_{\frac{a-1}{2}}^{\frac{1}{2}}(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.417 (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

$$-(3x-4)y'(x)+(2x-1)y''(x)+(x-3)y(x)=0$$

✓ **Mathematica** : cpu = 0.0555587 (sec), leaf count = 52

$$\left\{\left\{y(x)\to 2^{5/8}c_1e^{x-\frac{1}{2}}-\frac{c_2e^{x-\frac{1}{2}}\Gamma\left(-\frac{1}{4},\frac{1}{4}(2x-1)\right)}{4\sqrt[8]{2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.272 (sec), leaf count = 37

$$\left\{y(x)=e^{\frac{x}{2}}\left(U\left(1,\frac{3}{4},\frac{x}{2}-\frac{1}{4}\right)\_C2+M\left(1,\frac{3}{4},\frac{x}{2}-\frac{1}{4}\right)\_C1\right)\frac{1}{\sqrt[4]{2x-1}}\right\}$$

2.1134 ODE No. 1134

$$4xy''(x)-(a+x)y(x)=0$$

✓ **Mathematica** : cpu = 0.074702 (sec), leaf count = 78

$$\left\{\left\{y(x)\to\frac{1}{4}c_2e^{-x/2}x\,{}_1F_1\left(\frac{1}{128}(-32(-a-4i)-128i)+1;2;x\right)+\frac{1}{4}c_1e^{-x/2}xU\left(\frac{1}{128}(-32(-a-4i)-128i)+1\right.\right.\right.$$

✓ **Maple** : cpu = 0.122 (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

$$2y'(x)+4xy''(x)-y(x)=0$$

✓ **Mathematica** : cpu = 0.0080813 (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 = 0.037 (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

$$4y'(x) + 4xy''(x) - (x + 2)y(x) = 0$$

✓ **Mathematica** : cpu = 0.0194258 (sec), leaf count = 30

$$\left\{\left\{y(x) \to c_2 e^{x/2}\text{Ei}(-x) + c_1 e^{x/2}\right\}\right\}$$

✓ **Maple** : cpu = 0.059 (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 = 0.0741216 (sec), leaf count = 74

$$\left\{\left\{y(x) \to \frac{1}{4}c_2 e^{-x/2}x\,{}_1F_1\left(\frac{1}{128}(-32(l + (2 - 4i)) - 128i) + 1; 2; x\right) + \frac{1}{4}c_1 e^{-x/2}xU\left(\frac{1}{128}(-32(l + (2 - 4i)) - 12\right.\right.\right.$$

✓ **Maple** : cpu = 0.142 (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 = 0.0225359 (sec), leaf count = 38

$$\left\{\left\{y(x) \to c_1 e^{-x/2}U(-n, m, x) + c_2 e^{-x/2}L_n^{m-1}(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.258 (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

$$-(a+x)y(x)+8y'(x)+16xy''(x)=0$$

✓ **Mathematica** : cpu = 0.0103289 (sec), leaf count = 74

$$\left\{\left\{y(x)\to c_1e^{\frac{1}{4}(2\log(x)-x)}U\left(\frac{a+6}{8},\frac{3}{2},\frac{x}{2}\right)+c_2e^{\frac{1}{4}(2\log(x)-x)}L_{\frac{1}{8}(-a-6)}^{\frac{1}{2}}\left(\frac{x}{2}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.37 (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 = 0.0370475 (sec), leaf count = 190

$$\left\{\left\{y(x)\to c_1a^{\frac{1}{2}\left(\frac{b}{a}-1\right)}c^{\frac{1}{2}\left(1-\frac{b}{a}\right)}x^{\frac{1}{2}\left(1-\frac{b}{a}\right)}\Gamma\left(\frac{b}{a}\right)J_{\frac{b}{a}-1}\left(\frac{2\sqrt{c}\sqrt{x}}{\sqrt{a}}\right)+c_2a^{\frac{1}{2}\left(1-\frac{b}{a}\right)-\frac{a-b}{a}}c^{\frac{a-b}{a}+\frac{1}{2}\left(\frac{b}{a}-1\right)}x^{\frac{a-b}{a}+\frac{1}{2}\left(\frac{b}{a}-1\right)}\Gamma\left(2-\right.\right.\right.$$

✓ **Maple** : cpu = 0.098 (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 = 0.119417 (sec), leaf count = 79

$$\left\{\left\{y(x)\to c_1e^{-\frac{bx}{a}}-\frac{c_2e^{-\frac{bx}{a}}\left(a^2e^{\frac{bx}{a}}-b^2x^2\mathrm{Ei}\left(\frac{bx}{a}\right)+abxe^{\frac{bx}{a}}\right)}{2a^2x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.066 (sec), leaf count = 55

$$\left\{y(x)=\frac{1}{x^2}\left(Ei\left(1,-\frac{bx}{a}\right)\mathrm{e}^{-\frac{bx}{a}}\_C2\,b^2x^2+\_C1\,\mathrm{e}^{-\frac{bx}{a}}x^2+a\_C2\,(bx+a)\right)\right\}$$

2.1142 ODE No. 1142

$$cy(x)\sqrt[5]{ax+b}+5(ax+b)y''(x)+8ay'(x)=0$$

✓ **Mathematica** : cpu = 0.0373262 (sec), leaf count = 108

$$\left\{\left\{y(x)\to \frac{6ac_1\cos\left(\frac{\sqrt{5}\sqrt{c}(ax+b)^{3/5}}{3a}\right)}{\sqrt{5}\sqrt{c}(ax+b)^{3/5}}+\frac{3ac_2\sin\left(\frac{\sqrt{5}\sqrt{c}(ax+b)^{3/5}}{3a}\right)}{\sqrt{5}\sqrt{c}(ax+b)^{3/5}}\right\}\right\}$$

✓ **Maple** : cpu = 0.885 (sec), leaf count = 53

$$\left\{y(x)=\left(\_C2\cosh\left(\frac{1}{3a}(ax+b)^{\frac{3}{5}}\sqrt{-5c}\right)+\_C1\sinh\left(\frac{1}{3a}(ax+b)^{\frac{3}{5}}\sqrt{-5c}\right)\right)(ax+b)^{-\frac{3}{5}}\right\}$$

2.1143 ODE No. 1143

$$(a+bx)y'(x)+2axy''(x)+cy(x)=0$$

✓ **Mathematica** : cpu = 0.0259795 (sec), leaf count = 93

$$\left\{\left\{y(x)\to c_1e^{\frac{a\log(x)-bx}{2a}}U\left(-\frac{c-b}{b},\frac{3}{2},\frac{bx}{2a}\right)+c_2e^{\frac{a\log(x)-bx}{2a}}L_{\frac{c-b}{b}}^{\frac{1}{2}}\left(\frac{bx}{2a}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.545 (sec), leaf count = 57

$$\left\{y(x)=e^{-\frac{bx}{2a}}\sqrt{x}\left(U\left(\frac{b-c}{b},\frac{3}{2},\frac{bx}{2a}\right)\_C2+M\left(\frac{b-c}{b},\frac{3}{2},\frac{bx}{2a}\right)\_C1\right)\right\}$$

2.1144 ODE No. 1144

$$(3a+bx)y'(x)+2axy''(x)+cy(x)=0$$

✓ **Mathematica** : cpu = 0.0278168 (sec), leaf count = 88

$$\left\{\left\{y(x)\to c_1e^{-\frac{bx}{2a}}U\left(-\frac{2c-3b}{2b},\frac{3}{2},\frac{bx}{2a}\right)+c_2e^{-\frac{bx}{2a}}L_{\frac{2c-3b}{2b}}^{\frac{1}{2}}\left(\frac{bx}{2a}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.448 (sec), leaf count = 60

$$\left\{y(x)=e^{-\frac{bx}{2a}}\left(U\left(\frac{3b-2c}{2b},\frac{3}{2},\frac{bx}{2a}\right)\_C2+M\left(\frac{3b-2c}{2b},\frac{3}{2},\frac{bx}{2a}\right)\_C1\right)\right\}$$

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 = 0.262366 (sec), leaf count = 386

$$\left\{\left\{y(x)\to c_1U\left(-\frac{\mathrm{b2a1}^2-\mathrm{a2b1a1}-\sqrt{\mathrm{a1}^2-\mathrm{4a0a2}}\mathrm{b2a1}+\mathrm{2a2}^2\mathrm{b0}+\mathrm{a2}\sqrt{\mathrm{a1}^2-\mathrm{4a0a2}}\mathrm{b1}-\mathrm{2a0a2b2}-\mathrm{2a2}^2\sqrt{\mathrm{a1}^2}}{\mathrm{2a2}^2\sqrt{\mathrm{a1}^2-\mathrm{4a0a2}}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.492 (sec), leaf count = 248

$$\left\{y(x)=(a2\,x+b2)^{\frac{a1\,b2+a2^2-a2\,b1}{a2^2}}\,\mathrm{e}^{-\frac{x}{2\,a2}\left(\sqrt{-4\,a0\,a2+a1^2}+a1\right)}\left(U\left(\frac{1}{2\,a2^2}\left(\left(a1\,b2+2\,a2^2-a2\,b1\right)\sqrt{-4\,a0\,a2+a\right.\right.\right.\right.$$

2.1146 ODE No. 1146

$$x^2y''(x)-6y(x)=0$$

✓ **Mathematica** : cpu = 0.0055232 (sec), leaf count = 18

$$\left\{\left\{y(x)\to c_2x^3+\frac{c_1}{x^2}\right\}\right\}$$

✓ **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 = 0.0063825 (sec), leaf count = 18

$$\left\{\left\{y(x)\to c_2x^4+\frac{c_1}{x^3}\right\}\right\}$$

✓ **Maple** : cpu = 0.009 (sec), leaf count = 15

$$\left\{y(x)=\frac{\_C1\,x^7+\_C2}{x^3}\right\}$$

2.1148 ODE No. 1148

$$ay(x) + x^2y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0079229 (sec), leaf count = 77

$$\left\{\left\{y(x) \to c_1 x^{\frac{1}{2}\left(\frac{1}{\sqrt{a}} - \frac{\sqrt{1-4a}}{\sqrt{a}}\right)\sqrt{a}} + c_2 x^{\frac{1}{2}\left(\frac{\sqrt{1-4a}}{\sqrt{a}} + \frac{1}{\sqrt{a}}\right)\sqrt{a}}\right\}\right\}$$

✓ **Maple** : cpu = 0.054 (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 = 0.0482362 (sec), leaf count = 212

$$\left\{\left\{y(x) \to c_2 a^{\frac{1}{2}(\sqrt{1-4b}+1)-\frac{1}{2}\sqrt{1-4b}} x^{\frac{1}{2}(\sqrt{1-4b}+1)-\frac{1}{2}\sqrt{1-4b}} \Gamma\left(\sqrt{1-4b}+1\right) J_{\sqrt{1-4b}}(2\sqrt{a}\sqrt{x}) + c_1 a^{\frac{1}{2}(1-\sqrt{1-4b})+\frac{1}{2}\sqrt{1-4b}}\right.$$

✓ **Maple** : cpu = 0.012 (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 = 0.0068577 (sec), leaf count = 53

$$\left\{\left\{y(x) \to \sqrt{\frac{2}{\pi}}c_2\left(-\sin(x) - \frac{\cos(x)}{x}\right) + \sqrt{\frac{2}{\pi}}c_1\left(\frac{\sin(x)}{x} - \cos(x)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.161 (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

$$x^2y''(x) - (ax^2+2)\,y(x) = 0$$

✓ **Mathematica** : cpu = 0.0117585 (sec), leaf count = 129

$$\left\{\left\{y(x)\to \frac{\sqrt{\frac{2}{\pi}}c_2\sqrt{x}\left(i\sinh\left(\sqrt{a}x\right)-\frac{i\cosh\left(\sqrt{a}x\right)}{\sqrt{a}x}\right)}{\sqrt{-i\sqrt{a}x}}+\frac{\sqrt{\frac{2}{\pi}}c_1\sqrt{x}\left(\frac{\sinh\left(\sqrt{a}x\right)}{\sqrt{a}x}-\cosh\left(\sqrt{a}x\right)\right)}{\sqrt{-i\sqrt{a}x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.192 (sec), leaf count = 43

$$\left\{y(x)=\frac{1}{x}\left(\_C2\,\left(ax+\sqrt{a}\right)e^{-\sqrt{a}x}-\_C1\,e^{\sqrt{a}x}\left(ax-\sqrt{a}\right)\right)\right\}$$

2.1152 ODE No. 1152

$$\left(a^2x^2-6\right)y(x)+x^2y''(x)=0$$

✓ **Mathematica** : cpu = 0.014096 (sec), leaf count = 114

$$\left\{\left\{y(x)\to \frac{\sqrt{\frac{2}{\pi}}c_1\sqrt{x}\left(\frac{3\sin(ax)}{a^2x^2}-\sin(ax)-\frac{3\cos(ax)}{ax}\right)}{\sqrt{ax}}+\frac{\sqrt{\frac{2}{\pi}}c_2\sqrt{x}\left(-\frac{3\cos(ax)}{a^2x^2}-\frac{3\sin(ax)}{ax}+\cos(ax)\right)}{\sqrt{ax}}\right\}\right\}$$

✓ **Maple** : cpu = 0.369 (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 = 0.0231399 (sec), leaf count = 56

$$\left\{\left\{y(x)\to c_1\sqrt{x}J_{\frac{1}{2}(2v-1)}\left(\sqrt{a}x\right)+c_2\sqrt{x}Y_{\frac{1}{2}(2v-1)}\left(\sqrt{a}x\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.067 (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 = 0.0151721 (sec), leaf count = 88

$$\left\{\left\{y(x)\to c_1M_{-\frac{ib}{2\sqrt{a}},-\frac{1}{2}i\sqrt{4c-1}}(2i\sqrt{a}x)+c_2W_{-\frac{ib}{2\sqrt{a}},-\frac{1}{2}i\sqrt{4c-1}}(2i\sqrt{a}x)\right\}\right\}$$

✓ **Maple** : cpu = 0.318 (sec), leaf count = 57

$$\left\{y(x)=\_C1\ M_{-\frac{i}{2}b\frac{1}{\sqrt{a}},\,\frac{1}{2}\sqrt{1-4\,c}}(2\,i\sqrt{a}x)+\_C2\ W_{-\frac{i}{2}b\frac{1}{\sqrt{a}},\,\frac{1}{2}\sqrt{1-4\,c}}(2\,i\sqrt{a}x)\right\}$$

2.1155 ODE No. 1155

$$y(x)\left(ax^k-(b-1)b\right)+x^2y''(x)=0$$

✓ **Mathematica** : cpu = 0.0379215 (sec), leaf count = 225

$$\left\{\left\{y(x)\to c_1k^{-\frac{2(1-b)}{k}-\frac{2b}{k}+\frac{1}{k}}a^{\frac{1-b}{k}+\frac{1}{2}\left(\frac{2b}{k}-\frac{1}{k}\right)}\left(x^k\right)^{\frac{1-b}{k}+\frac{1}{2}\left(\frac{2b}{k}-\frac{1}{k}\right)}\Gamma\left(-\frac{2b}{k}+\frac{1}{k}+1\right)J_{\frac{1-2b}{k}}\left(\frac{2\sqrt{a}\sqrt{x^k}}{k}\right)+c_2k^{-1/k}a^{\frac{b}{k}+}\right.\right.$$

✓ **Maple** : cpu = 0.194 (sec), leaf count = 67

$$\left\{y(x)=\sqrt{x}\left(Y_{\frac{1}{k}\sqrt{(-1+2\,b)^2}}\left(2\,\frac{\sqrt{a}x^{k/2}}{k}\right)\_C2+J_{\frac{1}{k}\sqrt{(-1+2\,b)^2}}\left(2\,\frac{\sqrt{a}x^{k/2}}{k}\right)\_C1\right)\right\}$$

2.1156 ODE No. 1156

$$x^2y''(x)+\frac{y(x)}{\log(x)}-e^xx(x\log(x)+2)=0$$

✓ **Mathematica** : cpu = 0.0846221 (sec), leaf count = 32

$$\left\{\left\{y(x)\to c_2\log(x)\left(\mathrm{li}(x)-\frac{x}{\log(x)}\right)+e^x\log(x)+c_1\log(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.197 (sec), leaf count = 71

$$\left\{y(x)=\ln(x)\_C2-(Ei(1,-\ln(x))\ln(x)+x)\_C1-\left(-\int\frac{(Ei(1,-\ln(x))\ln(x)+x)\,\mathrm{e}^x(2+x\ln(x))}{x}\,\mathrm{d}x+\mathrm{e}\right.\right.$$

2.1157 ODE No. 1157

$$ay'(x) + x^2y''(x) - xy(x) = 0$$

✗ **Mathematica** : cpu = 0.517507 (sec), leaf count = 0 , DifferentialRoot result

$$\{\{y(x) \to \text{DifferentialRoot}(\{y, x\}, \{y''(x)x^2 - y(x)x + ay'(x) = 0, y(1) = c_1, y'(1) = c_2\})(x)\}\}$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x) = DESol\left(\left\{\frac{d^2}{dx^2}\_Y(x) + \frac{a\frac{d}{dx}\_Y(x)}{x^2} - \frac{\_Y(x)}{x}\right\}, \{\_Y(x)\}\right)\right\}$$

2.1158 ODE No. 1158

$$-y(x)\left(ab + b^2x^2\right) + ay'(x) + x^2y''(x) = 0$$

✓ **Mathematica** : cpu = 0.163164 (sec), leaf count = 43

$$\left\{\left\{y(x) \to c_2 e^{bx} \int_1^x e^{\frac{a}{K[1]} - 2bK[1]} dK[1] + c_1 e^{bx}\right\}\right\}$$

✓ **Maple** : cpu = 1.285 (sec), leaf count = 178

$$\left\{y(x) = \sqrt{x}\left(HeunD\left(4\sqrt{2}\sqrt{ab}, -1 - 4\sqrt{2}\sqrt{ab}, 8\sqrt{2}\sqrt{ab}, -4\sqrt{2}\sqrt{ab} + 1, \left(\sqrt{2}\sqrt{ab}x - a\right)\left(\sqrt{2}\sqrt{ab}x + a\right)^{-1}\right) e^{-}\right.\right.$$

2.1159 ODE No. 1159

$$-ax^2 + x^2y''(x) + xy'(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 0.0065729 (sec), leaf count = 24

$$\left\{\left\{y(x) \to \frac{ax^2}{3} + c_2x + \frac{c_1}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.131 (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 = 0.0070229 (sec), leaf count = 30

$$\left\{\left\{y(x) \to c_1 \cos\left(\sqrt{a}\log(x)\right) + c_2 \sin\left(\sqrt{a}\log(x)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.012 (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 = 0.036541 (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 = 0.01 (sec), leaf count = 31

$$\left\{y(x) = \_C1 \ I_{2\sqrt{a}}(2\sqrt{x}) + \_C2 \ K_{2\sqrt{a}}(2\sqrt{x})\right\}$$

2.1162 ODE No. 1162

$$\left(x^2 - v^2\right) y(x) + x^2y''(x) + xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.042314 (sec), leaf count = 18

$$\{\{y(x) \to c_1 J_v(x) + c_2 Y_v(x)\}\}$$

✓ **Maple** : cpu = 0.01 (sec), leaf count = 15

$$\{y(x) = \_C1 \ J_v(x) + \_C2 \ Y_v(x)\}$$

2.1163 ODE No. 1163

$$-f(x) + \left(x^2 - v^2\right) y(x) + x^2 y''(x) + x y'(x) = 0$$

✓ **Mathematica** : cpu = 0.11388 (sec), leaf count = 72

$$\left\{\left\{y(x) \to J_v(x) \int_1^x -\frac{\pi Y_v(K[1]) f(K[1])}{2K[1]} dK[1] + Y_v(x) \int_1^x \frac{\pi J_v(K[2]) f(K[2])}{2K[2]} dK[2] + c_1 J_v(x) + c_2 Y_v(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.059 (sec), leaf count = 49

$$\left\{y(x) = -\frac{J_v(x)\pi}{2} \int \frac{Y_v(x) f(x)}{x} \, dx + \frac{Y_v(x)\pi}{2} \int \frac{J_v(x) f(x)}{x} \, dx + Y_v(x)\_C1 + J_v(x)\_C2\right\}$$

2.1164 ODE No. 1164

$$y(x)\left(l x^2 - v^2\right) + x^2 y''(x) + x y'(x) = 0$$

✓ **Mathematica** : cpu = 0.0161585 (sec), leaf count = 30

$$\left\{\left\{y(x) \to c_1 J_v\left(\sqrt{l} x\right) + c_2 Y_v\left(\sqrt{l} x\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.025 (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

$$(a + x) y'(x) + x^2 y''(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 0.0936656 (sec), leaf count = 26

$$\left\{\left\{y(x) \to \frac{c_2(a + x)}{a^2} + c_1 x e^{a/x}\right\}\right\}$$

✓ **Maple** : cpu = 0.04 (sec), leaf count = 19

$$\left\{y(x) = (x + a)\_C1 + \_C2 \, e^{\frac{a}{x}} x\right\}$$

2.1166 ODE No. 1166

$$x^2 y''(x) - 3x^3 - xy'(x) + y(x) = 0$$

✓ **Mathematica** : cpu = 0.0114063 (sec), leaf count = 23

$$\left\{\left\{y(x) \to \frac{3x^3}{4} + c_1 x + c_2 x \log(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.012 (sec), leaf count = 21

$$\left\{y(x) = \frac{x\left(4\_C1\,\ln(x) + 3\,x^2 + 4\_C2\right)}{4}\right\}$$

2.1167 ODE No. 1167

$$y(x)\left(ax^m + b\right) + x^2 y''(x) - xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.060603 (sec), leaf count = 326

$$\left\{\left\{y(x) \to c_1 m^{-\frac{2(m-i\sqrt{b-1}m)}{m^2} - \frac{2i\sqrt{b-1}}{m}} a^{\frac{m-i\sqrt{b-1}m}{m^2} + \frac{i\sqrt{b-1}}{m}} (x^m)^{\frac{m-i\sqrt{b-1}m}{m^2} + \frac{i\sqrt{b-1}}{m}} \Gamma\left(1 - \frac{2i\sqrt{b-1}}{m}\right) J_{-\frac{2i\sqrt{b-1}}{m}}\left(\frac{2\sqrt{a}\sqrt{x^m}}{m}\right.$$

✓ **Maple** : cpu = 0.188 (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

$$x^2 y''(x) + 2xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.0073687 (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 = 0.0547821 (sec), leaf count = 236

$$\left\{\left\{y(x)\to c_1a^{\frac{1}{2}\left(-\sqrt{4b^2+1}-1\right)+\frac{1}{2}\sqrt{4b^2+1}}x^{\frac{1}{2}\left(-\sqrt{4b^2+1}-1\right)+\frac{1}{2}\sqrt{4b^2+1}}\Gamma\left(1-\sqrt{4b^2+1}\right)J_{-\sqrt{4b^2+1}}(2\sqrt{a}\sqrt{x})+c_2a^{\frac{1}{2}\left(\sqrt{4b^2+\right.}}\right.\right.$$

✓ **Maple** : cpu = 0.197 (sec), leaf count = 49

$$\left\{y(x)=\left(\_C2\,Y_{\sqrt{4\,b^2+1}}(2\,\sqrt{a}\sqrt{x})+\_C1\,J_{\sqrt{4\,b^2+1}}(2\,\sqrt{a}\sqrt{x})\right)\frac{1}{\sqrt{x}}\right\}$$

2.1170 ODE No. 1170

$$y(x)\left(ax^2+b\right)+x^2y''(x)+2xy'(x)=0$$

✓ **Mathematica** : cpu = 0.0160877 (sec), leaf count = 58

$$\left\{\left\{y(x)\to c_1j_{\frac{1}{2}(\sqrt{1-4b}-1)}\left(\sqrt{a}x\right)+c_2y_{\frac{1}{2}(\sqrt{1-4b}-1)}\left(\sqrt{a}x\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.214 (sec), leaf count = 43

$$\left\{y(x)=\left(\_C2\,Y_{\frac{1}{2}\sqrt{1-4\,b}}(\sqrt{a}x)+\_C1\,J_{\frac{1}{2}\sqrt{1-4\,b}}(\sqrt{a}x)\right)\frac{1}{\sqrt{x}}\right\}$$

2.1171 ODE No. 1171

$$y(x)\left(ax+lx^2-n(n+1)\right)+x^2y''(x)+2xy'(x)=0$$

✓ **Mathematica** : cpu = 0.0407312 (sec), leaf count = 142

$$\left\{\left\{y(x)\to c_1e^{n\log(x)-i\sqrt{l}x}U\left(\frac{i\left(a-2i\sqrt{l}n-2i\sqrt{l}\right)}{2\sqrt{l}},2n+2,2i\sqrt{l}x\right)+c_2e^{n\log(x)-i\sqrt{l}x}L^{2n+1}_{-\frac{i\left(a-2i\sqrt{l}n-2i\sqrt{l}\right)}{2\sqrt{l}}}\left(2i\sqrt{l}x\right)\right.\right.$$

✓ **Maple** : cpu = 0.363 (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 = 0.0626229 (sec), leaf count = 158

$$\left\{\left\{y(x) \to 2^{\frac{1}{2}(1-\sqrt{1-4a})}c_1\left(\frac{1}{x}\right)^{\frac{1}{2}(1-\sqrt{1-4a})} {}_1F_1\left(\frac{1}{2}-\frac{1}{2}\sqrt{1-4a}; 1-\sqrt{1-4a}; -\frac{2}{x}\right) + 2^{\frac{1}{2}(\sqrt{1-4a}+1)}c_2\left(\frac{1}{x}\right)^{\frac{1}{2}(\sqrt{1-4a}\right.\right.$$

✓ **Maple** : cpu = 0.141 (sec), leaf count = 47

$$\left\{y(x) = e^{-x^{-1}}\sqrt{x^{-1}}\left(K_{\frac{1}{2}\sqrt{1-4a}}(x^{-1})\_C2 + I_{\frac{1}{2}\sqrt{1-4a}}(x^{-1})\_C1\right)\right\}$$

2.1173 ODE No. 1173

$$2(a+x)y'(x) - (b-1)by(x) + x^2y''(x) = 0$$

✓ **Mathematica** : cpu = 0.113262 (sec), leaf count = 74

$$\left\{\left\{y(x) \to (-2)^{1-b}c_1a^{1-b}\left(\frac{1}{x}\right)^{1-b} {}_1F_1\left(1-b; 2-2b; \frac{2a}{x}\right) + (-2)^b c_2 a^b\left(\frac{1}{x}\right)^b {}_1F_1\left(b; 2b; \frac{2a}{x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.509 (sec), leaf count = 37

$$\left\{y(x) = e^{\frac{a}{x}}\left(I_{b-\frac{1}{2}}\left(\frac{a}{x}\right)\_C1 + K_{b-\frac{1}{2}}\left(\frac{a}{x}\right)\_C2\right)\frac{1}{\sqrt{x}}\right\}$$

2.1174 ODE No. 1174

$$x^2y''(x) + x^5(-\log(x)) - 2xy'(x) + 2y(x) = 0$$

✓ **Mathematica** : cpu = 0.0092527 (sec), leaf count = 33

$$\left\{\left\{y(x) \to \frac{1}{144}(12x^5\log(x) - 7x^5) + c_2x^2 + c_1x\right\}\right\}$$

✓ **Maple** : cpu = 0.078 (sec), leaf count = 25

$$\left\{y(x) = \frac{x^5\ln(x)}{12} - \frac{7x^5}{144} + \_C2\,x^2 + \_C1\,x\right\}$$

2.1175 ODE No. 1175

$$-\left(ax^2+12a+4\right)\cos(x)+x^2y''(x)-2xy'(x)-4y(x)-x\sin(x)=0$$

✓ **Mathematica** : cpu = 0.209164 (sec), leaf count = 38

$$\left\{\left\{y(x)\to\frac{-2a\sin(x)-ax\cos(x)-\sin(x)}{x}+c_2x^4+\frac{c_1}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.147 (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

$$x^2y''(x)+\left(x^2+2\right)y(x)-2xy'(x)=0$$

✓ **Mathematica** : cpu = 0.0148702 (sec), leaf count = 33

$$\left\{\left\{y(x)\to c_1e^{-ix}x-\frac{1}{2}ic_2e^{ix}x\right\}\right\}$$

✓ **Maple** : cpu = 0.053 (sec), leaf count = 15

$$\{y(x)=x(\cos(x)\_C2+\sin(x)\_C1)\}$$

2.1177 ODE No. 1177

$$\left(x^2+2\right)y'(x)+x^2y''(x)+x^2(-\sec(x))-2xy'(x)=0$$

✓ **Mathematica** : cpu = 0.79137 (sec), leaf count = 141

$$\left\{\left\{y(x)\to\int_1^x e^{\frac{2}{K[1]}-K[1]}K[1]^2dK[1]\int_1^x\frac{e^{K[3]-\frac{2}{K[3]}}\sec(K[3])}{K[3]^2}dK[3]+\int_1^x-\frac{e^{K[2]-\frac{2}{K[2]}}\sec(K[2])\int_1^{K[2]}e^{\frac{2}{K[1]}-K[1]}K$$

✓ **Maple** : cpu = 0.278 (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

$$x^2y''(x) + (x^2+2)\,y(x) + x^3(-\sec(x)) - 2xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.0384999 (sec), leaf count = 74

$$\left\{\left\{y(x) \to \frac{1}{2}e^{-ix}x\left(e^{2ix}\log\left(1+e^{-2ix}\right)+\log\left(1+e^{2ix}\right)\right)+c_1e^{-ix}x-\frac{1}{2}ic_2e^{ix}x\right\}\right\}$$

✓ **Maple** : cpu = 0.054 (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 = 0.0176615 (sec), leaf count = 38

$$\left\{\left\{y(x) \to c_1xe^{-iax} - \frac{ic_2xe^{iax}}{2a}\right\}\right\}$$

✓ **Maple** : cpu = 0.083 (sec), leaf count = 19

$$\{y(x) = x(\cos(ax)\_C2 + \sin(ax)\_C1)\}$$

2.1180 ODE No. 1180

$$-f(x) + (-v^2+x^2+1)\,y(x) + x^2y''(x) + 3xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.065056 (sec), leaf count = 75

$$\left\{\left\{y(x) \to \frac{J_v(x)\int_1^x -\frac{1}{2}\pi Y_v(K[1])f(K[1])dK[1] + Y_v(x)\int_1^x \frac{1}{2}\pi J_v(K[2])f(K[2])dK[2]}{x} + \frac{c_1J_v(x)}{x} + \frac{c_2Y_v(x)}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.067 (sec), leaf count = 49

$$\left\{y(x) = \frac{-J_v(x)\pi\int Y_v(x)f(x)\,dx + Y_v(x)\pi\int J_v(x)f(x)\,dx + 2\,Y_v(x)\_C1 + 2\,J_v(x)\_C2}{2\,x}\right\}$$

2.1181 ODE No. 1181

$$x^2y''(x) + (3x-1)y'(x) + y(x) = 0$$

✓ **Mathematica** : cpu = 0.0475295 (sec), leaf count = 37

$$\left\{\left\{y(x)\to \frac{c_1e^{-1/x}}{x} - \frac{c_2e^{-1/x}\text{Ei}\left(\frac{1}{x}\right)}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.044 (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 = 0.0117474 (sec), leaf count = 24

$$\{\{y(x)\to c_1x^2 + 2c_2x^2\log(x) + 5x\}\}$$

✓ **Maple** : cpu = 0.013 (sec), leaf count = 20

$$\{y(x) = \_C2\,x^2 + \_C1\,x^2\ln(x) + 5\,x\}$$

2.1183 ODE No. 1183

$$x^2y''(x) + x^2(-\log(x)) - 3xy'(x) - 5y(x) = 0$$

✓ **Mathematica** : cpu = 0.0088783 (sec), leaf count = 27

$$\left\{\left\{y(x)\to -\frac{1}{9}x^2\log(x) + c_2x^5 + \frac{c_1}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.09 (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

$$x^2y''(x) - x^4 + x^2 - 4xy'(x) + 6y(x) = 0$$

✓ **Mathematica** : cpu = 0.0070794 (sec), leaf count = 38

$$\left\{\left\{y(x) \to \frac{1}{2}\left(x^4 + 2x^2 + 2x^2\log(x)\right) + c_2x^3 + c_1x^2\right\}\right\}$$

✓ **Maple** : cpu = 0.08 (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

$$x^2y''(x) - \left(2x^3 - 4\right)y(x) + 5xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.0310984 (sec), leaf count = 67

$$\left\{\left\{y(x) \to \frac{3\sqrt[3]{6}c_2K_0\left(\frac{2}{3}\sqrt{2}x^{3/2}\right)}{x^2} - \frac{3\sqrt[3]{-3}c_1I_0\left(\frac{2}{3}\sqrt{2}x^{3/2}\right)}{2^{2/3}x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.026 (sec), leaf count = 33

$$\left\{y(x) = \frac{1}{x^2}\left(\_C2\ K_0\left(\frac{2\sqrt{2}}{3}x^{\frac{3}{2}}\right) + \_C1\ I_0\left(\frac{2\sqrt{2}}{3}x^{\frac{3}{2}}\right)\right)\right\}$$

2.1186 ODE No. 1186

$$x^2y''(x) + x^3(-\sin(x)) - 5xy'(x) + 8y(x) = 0$$

✓ **Mathematica** : cpu = 0.0142154 (sec), leaf count = 42

$$\left\{\left\{y(x) \to \frac{1}{2}\left(x^4\text{Ci}(x) - x^3\sin(x) + x^2\cos(x)\right) + c_2x^4 + c_1x^2\right\}\right\}$$

✓ **Maple** : cpu = 0.077 (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 = 0.0105603 (sec), leaf count = 99

$$\left\{\left\{y(x)\to c_1 x^{\frac{1}{2}\sqrt{b}\left(-\frac{\sqrt{a^2-2a-4b+1}}{\sqrt{b}}-\frac{a-1}{\sqrt{b}}\right)}+c_2 x^{\frac{1}{2}\sqrt{b}\left(\frac{\sqrt{a^2-2a-4b+1}}{\sqrt{b}}-\frac{a-1}{\sqrt{b}}\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.079 (sec), leaf count = 53

$$\left\{y(x) = \_C1\,x^{-\frac{a}{2}+\frac{1}{2}+\frac{1}{2}\sqrt{a^2-2\,a-4\,b+1}}+\_C2\,x^{-\frac{a}{2}+\frac{1}{2}-\frac{1}{2}\sqrt{a^2-2\,a-4\,b+1}}\right\}$$

2.1188 ODE No. 1188

$$(ax+b)y'(x) + cy(x) + x^2y''(x) = 0$$

✓ **Mathematica** : cpu = 0.155804 (sec), leaf count = 266

$$\left\{\left\{y(x)\to c_1 i^{-\sqrt{a^2-2a-4c+1}+a-1} b^{\frac{1}{2}\left(-\sqrt{a^2-2a-4c+1}+a-1\right)}\left(\frac{1}{x}\right)^{\frac{1}{2}\left(-\sqrt{a^2-2a-4c+1}+a-1\right)} {}_1F_1\left(\frac{a}{2}-\frac{1}{2}\sqrt{a^2-2a-4c+\right.\right.\right.$$

✓ **Maple** : cpu = 0.47 (sec), leaf count = 114

$$\left\{y(x) = x^{-\frac{1}{2}\sqrt{a^2-2\,a-4\,c+1}-\frac{a}{2}+\frac{1}{2}}\left(M\left(-\frac{1}{2}+\frac{1}{2}\sqrt{a^2-2\,a-4\,c+1}+\frac{a}{2},\,1+\sqrt{a^2-2\,a-4\,c+1},\,\frac{b}{x}\right)\_C1+U\left(-\right.\right.\right.$$

2.1189 ODE No. 1189

$$axy'(x) + y(x)\left(bx^m + c\right) + x^2y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0581232 (sec), leaf count = 445

$$\left\{\left\{y(x)\to c_1 m^{-\frac{-\sqrt{a^2-2a-4c+1}-a+1}{m}-\frac{\sqrt{a^2-2a-4c+1}}{m}} b^{\frac{-\sqrt{a^2-2a-4c+1}-a+1}{2m}+\frac{\sqrt{a^2-2a-4c+1}}{2m}}\left(x^m\right)^{\frac{-\sqrt{a^2-2a-4c+1}-a+1}{2m}+\frac{\sqrt{a^2-2a-4c+1}}{2m}}\right.\right.$$

✓ **Maple** : cpu = 0.197 (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 = 0.0241676 (sec), leaf count = 122

$$\left\{\left\{y(x)\to c_1e^{\frac{1}{2}\left(\left(\sqrt{1-4b}+1\right)\log(x)-2x\right)}U\left(\frac{1}{2}\left(-2a+\sqrt{1-4b}+1\right),\sqrt{1-4b}+1,x\right)+c_2e^{\frac{1}{2}\left(\left(\sqrt{1-4b}+1\right)\log(x)-2x\right)}L_{\frac{1}{2}(2a}^{\sqrt{1-}}\right.\right.$$

✓ **Maple** : cpu = 0.293 (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 = 0.0079458 (sec), leaf count = 110

$$\left\{\left\{y(x)\to\frac{2c_2e^{\frac{1}{2}(\log(x)-x)}\left(i\sinh\left(\frac{x}{2}\right)-\frac{2i\cosh\left(\frac{x}{2}\right)}{x}\right)}{\sqrt{\pi}\sqrt{-ix}}+\frac{2c_1e^{\frac{1}{2}(\log(x)-x)}\left(\frac{2\sinh\left(\frac{x}{2}\right)}{x}-\cosh\left(\frac{x}{2}\right)\right)}{\sqrt{\pi}\sqrt{-ix}}\right\}\right\}$$

✓ **Maple** : cpu = 0.041 (sec), leaf count = 23

$$\left\{y(x)=\frac{\_C2\,(x+2)\,\mathrm{e}^{-x}+\_C1\,(x-2)}{x}\right\}$$

2.1192 ODE No. 1192

$$\left(x^2-1\right)y'(x)+x^2y''(x)-y(x)=0$$

✓ **Mathematica** : cpu = 0.0781562 (sec), leaf count = 40

$$\left\{\left\{y(x)\to c_2e^{-x}\int_1^x e^{K[1]-\frac{1}{K[1]}}dK[1]+c_1e^{-x}\right\}\right\}$$

✓ **Maple** : cpu = 0.9 (sec), leaf count = 51

$$\left\{y(x)=\sqrt{x}\left(\mathrm{e}^{-x^{-1}}\mathit{HeunD}\left(-4,3,-8,5,\frac{x-1}{1+x}\right)\_C2+\mathrm{e}^{-x}\mathit{HeunD}\left(4,3,-8,5,\frac{x-1}{1+x}\right)\_C1\right)\right\}$$

2.1193 ODE No. 1193

$$x^2y''(x) + (x+1)xy'(x) + (x-9)y(x) = 0$$

✓ **Mathematica** : cpu = 0.213352 (sec), leaf count = 44

$$\left\{\left\{y(x) \to \frac{c_1((x-8)x+20)}{x^3} - \frac{c_2e^{-x}(x^3+9x^2+36x+60)}{x^3}\right\}\right\}$$

✓ **Maple** : cpu = 0.058 (sec), leaf count = 38

$$\left\{y(x) = \frac{\_C2\,(x^3+9\,x^2+36\,x+60)\,\mathrm{e}^{-x} + \_C1\,(x^2-8\,x+20)}{x^3}\right\}$$

2.1194 ODE No. 1194

$$x^2y''(x) + (x+1)xy'(x) + (3x-1)y(x) = 0$$

✓ **Mathematica** : cpu = 0.107314 (sec), leaf count = 65

$$\left\{\left\{y(x) \to c_1e^{-x}(x-3)x - \frac{c_2e^{-x}(x^3(-\mathrm{Ei}(x)) + 3x^2\mathrm{Ei}(x) + e^xx^2 - 2e^xx - e^x)}{6x}\right\}\right\}$$

✓ **Maple** : cpu = 0.067 (sec), leaf count = 48

$$\left\{y(x) = \frac{x^2\_C2\,\mathrm{e}^{-x}(x-3)\,Ei(1,-x) + \_C1\,x^2(x-3)\,\mathrm{e}^{-x} + \_C2\,(x^2-2\,x-1)}{x}\right\}$$

2.1195 ODE No. 1195

$$x^2y''(x) + (x+3)xy'(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 0.023463 (sec), leaf count = 80

$$\left\{\left\{y(x) \to c_1U\left(2+\sqrt{2}, 1+2\sqrt{2}, x\right)e^{\left(\sqrt{2}-1\right)\log(x)-x} + c_2L_{-2-\sqrt{2}}^{2\sqrt{2}}(x)e^{\left(\sqrt{2}-1\right)\log(x)-x}\right\}\right\}$$

✓ **Maple** : cpu = 0.351 (sec), leaf count = 93

$$\left\{y(x) = -\left(-\_C1\left(\sqrt{2}+x+1\right)I_{-\frac{1}{2}+\sqrt{2}}\left(\frac{x}{2}\right) - \_C1\left(-\sqrt{2}+x+1\right)I_{\frac{1}{2}+\sqrt{2}}\left(\frac{x}{2}\right) + \_C2\left(\left(-x-\sqrt{2}-1\right)K_{-\frac{1}{2}}\right.\right.\right.$$

2.1196 ODE No. 1196

$$x^2y''(x) - (x-1)xy'(x) + (x-1)y(x) = 0$$

✓ **Mathematica** : cpu = 0.0280158 (sec), leaf count = 37

$$\left\{\left\{y(x)\to \frac{c_2\left(x^2\text{Ei}(x)-e^x x-e^x\right)}{2x}+c_1 x\right\}\right\}$$

✓ **Maple** : cpu = 0.056 (sec), leaf count = 31

$$\left\{y(x) = \frac{\mathit{Ei}(1,-x)\_C2\,x^2 + \_C2\,(1+x)\,\mathrm{e}^x + \_C1\,x^2}{x}\right\}$$

2.1197 ODE No. 1197

$$-(a+x)y(x) - \left(x^2-2x\right)y'(x) + x^2y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0142393 (sec), leaf count = 78

$$\left\{\left\{y(x)\to c_1 e^{\frac{1}{2}(x-\log(x))} J_{\frac{1}{2}\sqrt{4a+1}}\left(-\frac{ix}{2}\right)+c_2 e^{\frac{1}{2}(x-\log(x))} Y_{\frac{1}{2}\sqrt{4a+1}}\left(-\frac{ix}{2}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.235 (sec), leaf count = 43

$$\left\{y(x) = \mathrm{e}^{\frac{x}{2}}\left(K_{\frac{1}{2}\sqrt{4\,a+1}}\left(\frac{x}{2}\right)\_C2 + I_{\frac{1}{2}\sqrt{4\,a+1}}\left(\frac{x}{2}\right)\_C1\right)\frac{1}{\sqrt{x}}\right\}$$

2.1198 ODE No. 1198

$$-\left(x^2-2x\right)y'(x) + x^2y''(x) - (3x+2)y(x) = 0$$

✓ **Mathematica** : cpu = 0.0389997 (sec), leaf count = 41

$$\left\{\left\{y(x)\to c_1 e^x x-\frac{c_2\left(e^x x^3\text{Ei}(-x)+x^2-x+2\right)}{6x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.061 (sec), leaf count = 37

$$\left\{y(x) = \frac{\mathit{Ei}(1,x)\,\mathrm{e}^x\_C2\,x^3 + \mathrm{e}^x\_C1\,x^3 - \_C2\,\left(x^2-x+2\right)}{x^2}\right\}$$

2.1199 ODE No. 1199

$$x^2y''(x) - (x+4)xy'(x) + 4y(x) = 0$$

✓ **Mathematica** : cpu = 0.0146932 (sec), leaf count = 41

$$\left\{\left\{y(x) \to c_2e^x x^4 - \frac{1}{6}c_1x\left(e^x x^3\text{Ei}(-x) + x^2 - x + 2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.047 (sec), leaf count = 35

$$\{y(x) = x\left(Ei(1,x)\,e^x\_C2\,x^3 + e^x\_C1\,x^3 - \_C2\,(x^2 - x + 2)\right)\}$$

2.1200 ODE No. 1200

$$-(v-1)vy(x) + 2x^2y'(x) + x^2y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0164252 (sec), leaf count = 62

$$\left\{\left\{y(x) \to c_1e^{-x}\sqrt{x}J_{\frac{1}{2}(2v-1)}(-ix) + c_2e^{-x}\sqrt{x}Y_{\frac{1}{2}(2v-1)}(-ix)\right\}\right\}$$

✓ **Maple** : cpu = 0.068 (sec), leaf count = 27

$$\left\{y(x) = \sqrt{x}e^{-x}\left(K_{v-\frac{1}{2}}(x)\_C2 + I_{v-\frac{1}{2}}(x)\_C1\right)\right\}$$

2.1201 ODE No. 1201

$$x^2y''(x) + (2x+1)xy'(x) - 4y(x) = 0$$

✓ **Mathematica** : cpu = 0.118416 (sec), leaf count = 44

$$\left\{\left\{y(x) \to \frac{c_1e^{-2x}(2x+3)}{2x^2} + \frac{c_2\left(2x^2 - 4x + 3\right)}{4x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.043 (sec), leaf count = 34

$$\left\{y(x) = \frac{\_C1\,\left(2\,x^2 - 4\,x + 3\right)}{x^2} + \frac{\_C2\,e^{-2\,x}(2\,x+3)}{x^2}\right\}$$

2.1202 ODE No. 1202

$$x^2y''(x) - 2(x+1)xy'(x) + 2(x+1)y(x) = 0$$

✓ **Mathematica** : cpu = 0.012025 (sec), leaf count = 22

$$\left\{\left\{y(x) \to c_1x + \frac{1}{2}c_2e^{2x}x\right\}\right\}$$

✓ **Maple** : cpu = 0.054 (sec), leaf count = 14

$$\left\{y(x) = x\left(e^{2x}\_C2 + \_C1\right)\right\}$$

2.1203 ODE No. 1203

$$ax^2y'(x) + x^2y''(x) - 2y(x) = 0$$

✓ **Mathematica** : cpu = 0.0149044 (sec), leaf count = 124

$$\left\{\left\{y(x) \to \frac{2c_2e^{\frac{1}{2}(\log(x)-ax)}\left(i\sinh\left(\frac{ax}{2}\right) - \frac{2i\cosh\left(\frac{ax}{2}\right)}{ax}\right)}{\sqrt{\pi}\sqrt{-iax}} + \frac{2c_1e^{\frac{1}{2}(\log(x)-ax)}\left(\frac{2\sinh\left(\frac{ax}{2}\right)}{ax} - \cosh\left(\frac{ax}{2}\right)\right)}{\sqrt{\pi}\sqrt{-iax}}\right\}\right\}$$

✓ **Maple** : cpu = 0.073 (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 = 0.0176808 (sec), leaf count = 132

$$\left\{\left\{y(x) \to \frac{2c_2e^{\frac{1}{2}(-ax-2bx+\log(x))}\left(i\sinh\left(\frac{ax}{2}\right) - \frac{2i\cosh\left(\frac{ax}{2}\right)}{ax}\right)}{\sqrt{\pi}\sqrt{-iax}} + \frac{2c_1e^{\frac{1}{2}(-ax-2bx+\log(x))}\left(\frac{2\sinh\left(\frac{ax}{2}\right)}{ax} - \cosh\left(\frac{ax}{2}\right)\right)}{\sqrt{\pi}\sqrt{-iax}}\right\}\right\}$$

✓ **Maple** : cpu = 0.094 (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 = 0.245588 (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

$$\left\{y(x) = DESol\left(\left\{\frac{f(x)\_Y(x)}{x^2} + a\frac{\mathrm{d}}{\mathrm{d}x}\_Y(x) + \frac{\mathrm{d}^2}{\mathrm{d}x^2}\_Y(x)\right\}, \{\_Y(x)\}\right)\right\}$$

2.1206 ODE No. 1206

$$y(x)\left(abx + cx^2 + d\right) + x(2ax + b)y'(x) + x^2y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0904464 (sec), leaf count = 120

$$\left\{\left\{y(x) \to c_1e^{\frac{1}{2}(-2ax-(b-1)\log(x))}J_{\frac{1}{2}\sqrt{b^2-2b-4d+1}}\left(-i\sqrt{a^2-cx}\right) + c_2e^{\frac{1}{2}(-2ax-(b-1)\log(x))}Y_{\frac{1}{2}\sqrt{b^2-2b-4d+1}}\left(-i\sqrt{a^2-c\right.\right.\right.$$

✓ **Maple** : cpu = 0.146 (sec), leaf count = 76

$$\left\{y(x) = \mathrm{e}^{-ax}x^{-\frac{b}{2}+\frac{1}{2}}\left(Y_{\frac{1}{2}\sqrt{b^2-2b-4d+1}}\left(\sqrt{-a^2+cx}\right)\_C2 + J_{\frac{1}{2}\sqrt{b^2-2b-4d+1}}\left(\sqrt{-a^2+cx}\right)\_C1\right)\right\}$$

2.1207 ODE No. 1207

$$x(ax + b)y'(x) + y(x)\left(\mathrm{a1}x^2 + \mathrm{b1}x + \mathrm{c1}\right) + x^2y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0909227 (sec), leaf count = 294

$$\left\{\left\{y(x) \to c_1U\left(-\frac{-ab + 2\mathrm{b1} - \sqrt{a^2-4\mathrm{a1}} - \sqrt{a^2-4\mathrm{a1}}\sqrt{b^2-2b-4\mathrm{c1}+1}}{2\sqrt{a^2-4\mathrm{a1}}}, \sqrt{b^2-2b-4\mathrm{c1}+1}+1, \sqrt{a^2-4\mathrm{a1}\right.\right.\right.$$

✓ **Maple** : cpu = 0.485 (sec), leaf count = 110

$$\left\{y(x) = \mathrm{e}^{-\frac{ax}{2}}x^{-\frac{b}{2}}\left(M_{-\frac{ab-2b1}{2}\frac{1}{\sqrt{a^2-4a1}}, \frac{1}{2}\sqrt{b^2-2b-4c1+1}}\left(\sqrt{a^2-4a1}x\right)\_C1 + W_{-\frac{ab-2b1}{2}\frac{1}{\sqrt{a^2-4a1}}, \frac{1}{2}\sqrt{b^2-2b-4c1+1}}\left(\sqrt{\right.\right.\right.$$

2.1208 ODE No. 1208

$$x^3y'(x) + x^2y''(x) + (x^2 - 2)\, y(x) = 0$$

✓ **Mathematica** : cpu = 0.0450785 (sec), leaf count = 59

$$\left\{\left\{y(x) \to \frac{c_2 e^{-\frac{x^2}{2}}\left(\sqrt{2\pi}e^{\frac{x^2}{2}}\operatorname{erf}\left(\frac{x}{\sqrt{2}}\right) - 2x\right)}{2x} + \frac{c_1}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.063 (sec), leaf count = 35

$$\left\{y(x) = \frac{1}{x}\left(\sqrt{\pi}\sqrt{2}\mathit{Erf}\left(\frac{\sqrt{2}x}{2}\right)\_C2 - 2\,\mathrm{e}^{-1/2\,x^2}\_C2\,x + \_C1\right)\right\}$$

2.1209 ODE No. 1209

$$(x^2 + 2)\, xy'(x) + x^2y''(x) + (x^2 - 2)\, y(x) = 0$$

✓ **Mathematica** : cpu = 0.0155164 (sec), leaf count = 67

$$\left\{\left\{y(x) \to \frac{c_1 e^{-\frac{x^2}{2}}\left(e^{\frac{x^2}{2}}x - \sqrt{\frac{\pi}{2}}\operatorname{erfi}\left(\frac{x}{\sqrt{2}}\right)\right)}{x^2} + \frac{c_2 e^{-\frac{x^2}{2}}}{x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.075 (sec), leaf count = 40

$$\left\{y(x) = \frac{1}{x^2}\left(\left(\pi\,\mathit{Erf}\left(\frac{i}{2}\sqrt{2}x\right)\_C2 + \_C1\right)\mathrm{e}^{-\frac{x^2}{2}} - i\sqrt{\pi}\sqrt{2}\_C2\,x\right)\right\}$$

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 = 0.205646 (sec), leaf count = 252

$$\left\{\left\{y(x) \to c_1(-1)^{\frac{1}{4}\left(-\sqrt{4a^2-4a(-1)^n+1}-2a+1\right)}x^{\frac{1}{2}\left(-\sqrt{4a^2-4a(-1)^n+1}-2a+1\right)}\,{}_1F_1\left(-\frac{a}{2} - \frac{n}{2} - \frac{1}{4}\sqrt{4a^2 - 4(-1)^n a + 1} +\right.\right.\right.$$

✓ **Maple** : cpu = 0.462 (sec), leaf count = 81

$$\left\{y(x) = \mathrm{e}^{\frac{x^2}{2}}x^{-\frac{1}{2}-a}\left(M_{\frac{n}{2}+\frac{a}{2}+\frac{1}{4},\,\frac{1}{4}\sqrt{1-4\,(-1)^n a+4\,a^2}}(x^2)\_C1 + W_{\frac{n}{2}+\frac{a}{2}+\frac{1}{4},\,\frac{1}{4}\sqrt{1-4\,(-1)^n a+4\,a^2}}(x^2)\_C2\right)\right\}$$

2.1211 ODE No. 1211

$$4x^3y'(x) + x^2y''(x) + \left(4x^4 + 2x^2 + 1\right)y(x) = 0$$

✓ **Mathematica** : cpu = 0.0436715 (sec), leaf count = 68

$$\left\{\left\{y(x) \to c_1e^{-x^2}x^{\frac{1}{2}-\frac{i\sqrt{3}}{2}} - \frac{ic_2e^{-x^2}x^{\frac{1}{2}+\frac{i\sqrt{3}}{2}}}{\sqrt{3}}\right\}\right\}$$

✓ **Maple** : cpu = 0.085 (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 = 0.444982 (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

$$\left\{y(x) = DESol\left(\left\{\frac{f(x)\_Y(x)}{x^2} + \frac{\left(ax^2 + b\right)\frac{\mathrm{d}}{\mathrm{d}x}\_Y(x)}{x} + \frac{\mathrm{d}^2}{\mathrm{d}x^2}\_Y(x)\right\}, \{\_Y(x)\}\right)\right\}$$

2.1213 ODE No. 1213

$$\left(x^3 + 1\right)xy'(x) + x^2y''(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 0.0836695 (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 = 0.168 (sec), leaf count = 53

$$\left\{y(x) = \left(\_C1\,I_{-\frac{1}{6}}\left(\frac{x^3}{6}\right) + \_C1\,I_{\frac{5}{6}}\left(\frac{x^3}{6}\right) - \_C2\left(K_{\frac{1}{6}}\left(\frac{x^3}{6}\right) - K_{\frac{5}{6}}\left(\frac{x^3}{6}\right)\right)\right)x^{\frac{3}{2}}\mathrm{e}^{-\frac{x^3}{6}}\right\}$$

2.1214 ODE No. 1214

$$y(x)\left(-a^2+x^2(2a+2n+1)+a(-1)^n-x^4\right)+x^2y''(x)=0$$

✓ **Mathematica** : cpu = 0.222152 (sec), leaf count = 260

$$\left\{\left\{y(x)\to\frac{c_1e^{-\frac{x^2}{2}}2^{\frac{1}{4}\left(\sqrt{4a^2-4a(-1)^n+1}+2\right)}\left(x^2\right)^{\frac{1}{4}\left(\sqrt{4a^2-4a(-1)^n+1}+2\right)}U\left(\frac{1}{4}\left(-2a-2n+\sqrt{4a^2-4(-1)^na+1}+1\right)\right.}{\sqrt{x}}\right.\right.$$

✓ **Maple** : cpu = 0.733 (sec), leaf count = 71

$$\left\{y(x)=\left(\_C2\,W_{\frac{n}{2}+\frac{a}{2}+\frac{1}{4},\,\frac{1}{4}\sqrt{1-4\,(-1)^na+4\,a^2}}\left(x^2\right)+\_C1\,M_{\frac{n}{2}+\frac{a}{2}+\frac{1}{4},\,\frac{1}{4}\sqrt{1-4\,(-1)^na+4\,a^2}}\left(x^2\right)\right)\frac{1}{\sqrt{x}}\right\}$$

2.1215 ODE No. 1215

$$xy'(x)\left(ax^n+b\right)+y(x)\left(\mathrm{a1}x^{2n}+\mathrm{b1}x^n+\mathrm{c1}\right)+x^2y''(x)=0$$

✓ **Mathematica** : cpu = 0.116174 (sec), leaf count = 664

$$\left\{\left\{y(x)\to c_1x^{\frac{1-n}{2}}2^{\frac{\sqrt{b^2n^2-2bn^2-4\mathrm{c1}n^2+n^2}+n^2}{2n^2}}\left(x^n\right)^{\frac{\sqrt{b^2n^2-2bn^2-4\mathrm{c1}n^2+n^2}+n^2}{2n^2}}\exp\left(\frac{1}{2}\left(-\frac{ax^n}{n}-b\log(x)\right)-\frac{\sqrt{a^2-4\mathrm{a1}}x^n}{2n}\right.\right.\right.$$

✓ **Maple** : cpu = 0.867 (sec), leaf count = 148

$$\left\{y(x)=x^{-\frac{b}{2}-\frac{n}{2}+\frac{1}{2}}\mathrm{e}^{-\frac{ax^n}{2\,n}}\left(M_{-\frac{(b+n-1)a-2\,b1}{2\,n}\frac{1}{\sqrt{a^2-4\,a1}},\,\frac{1}{2\,n}\sqrt{b^2-2\,b-4\,c1+1}}\left(\frac{x^n}{n}\sqrt{a^2-4\,a1}\right)\_C1+W_{-\frac{(b+n-1)a-2\,b1}{2\,n}\frac{1}{\sqrt{a^2-4}}}\right.\right.$$

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 = 1.23578 (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

$$-y(x)(a+x\tan(x))-\left(2x^2\tan(x)-x\right)y'(x)+x^2y''(x)=0$$

✓ **Mathematica** : cpu = 0.100665 (sec), leaf count = 30

$$\left\{\left\{y(x)\to c_1\sec(x)J_{\sqrt{a}}(x)+c_2\sec(x)Y_{\sqrt{a}}(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.059 (sec), leaf count = 24

$$\left\{y(x)=\frac{1}{\cos(x)}\left(\_C2\,Y_{\sqrt{a}}(x)+\_C1\,J_{\sqrt{a}}(x)\right)\right\}$$

2.1218 ODE No. 1218

$$y(x)(a+x\cot(x))+\left(2x^2\cot(x)+x\right)y'(x)+x^2y''(x)=0$$

✓ **Mathematica** : cpu = 0.102212 (sec), leaf count = 38

$$\left\{\left\{y(x)\to c_1\csc(x)J_{i\sqrt{a}}(x)+c_2\csc(x)Y_{i\sqrt{a}}(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.061 (sec), leaf count = 30

$$\left\{y(x)=\frac{1}{\sin(x)}\left(\_C2\,Y_{i\sqrt{a}}(x)+\_C1\,J_{i\sqrt{a}}(x)\right)\right\}$$

2.1219 ODE No. 1219

$$y(x)\left(ax^2+bx+c+xf'(x)+f(x)^2-f(x)\right)+2xf(x)y'(x)+x^2y''(x)=0$$

✓ **Mathematica** : cpu = 0.10867 (sec), leaf count = 218

$$\left\{\left\{y(x)\to c_1U\left(-\frac{-ib-\sqrt{a}-\sqrt{a}\sqrt{1-4c}}{2\sqrt{a}},\sqrt{1-4c}+1,2i\sqrt{a}x\right)\exp\left(\int_1^x\frac{-2f(K[1])-2i\sqrt{a}K[1]+\sqrt{1-4c}+}{2K[1]}\right.\right.\right.$$

✓ **Maple** : cpu = 0.28 (sec), leaf count = 69

$$\left\{y(x)=\mathrm{e}^{-\int\frac{f(x)}{x}\,\mathrm{d}x}\left(W_{-\frac{i}{2}b\frac{1}{\sqrt{a}},\frac{1}{2}\sqrt{1-4\,c}}(2\,i\sqrt{a}x)\_C2+M_{-\frac{i}{2}b\frac{1}{\sqrt{a}},\frac{1}{2}\sqrt{1-4\,c}}(2\,i\sqrt{a}x)\_C1\right)\right\}$$

2.1220 ODE No. 1220

$$y(x)\left(x^2\left(a+f'(x)+f(x)^2\right)-(v-1)v\right)+2x^2f(x)y'(x)+x^2y''(x)=0$$

✓ **Mathematica** : cpu = 0.0428519 (sec), leaf count = 98

$$\left\{\left\{y(x)\to c_1J_{\frac{1}{2}(2v-1)}(\sqrt{a}x)\exp\left(\int_1^x\frac{1-2f(K[1])K[1]}{2K[1]}dK[1]\right)+c_2Y_{\frac{1}{2}(2v-1)}(\sqrt{a}x)\exp\left(\int_1^x\frac{1-2f(K[1])K[1]}{2K[1]}\right.\right.\right.$$

✓ **Maple** : cpu = 0.078 (sec), leaf count = 40

$$\left\{y(x)=\sqrt{x}\mathrm{e}^{-\frac{\int 2f(x)\,\mathrm{d}x}{2}}\left(Y_{v-\frac{1}{2}}(\sqrt{a}x)\_C2+J_{v-\frac{1}{2}}(\sqrt{a}x)\_C1\right)\right\}$$

2.1221 ODE No. 1221

$$y(x)\left(x^2\left(-f'(x)+f(x)^2+1\right)-xf(x)-v^2\right)+\left(x-2x^2f(x)\right)y'(x)+x^2y''(x)=0$$

✓ **Mathematica** : cpu = 0.0259843 (sec), leaf count = 42

$$\left\{\left\{y(x)\to c_1J_v(x)\exp\left(\int_1^x f(K[1])dK[1]\right)+c_2Y_v(x)\exp\left(\int_1^x f(K[1])dK[1]\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.052 (sec), leaf count = 35

$$\left\{y(x)=\mathrm{e}^{-\frac{1}{2}\int\frac{-2xf(x)+1}{x}\,\mathrm{d}x}\sqrt{x}(Y_v(x)\_C2+J_v(x)\_C1)\right\}$$

2.1222 ODE No. 1222

$$\left(x^2+1\right)y''(x)+xy'(x)+2y(x)=0$$

✓ **Mathematica** : cpu = 0.0153199 (sec), leaf count = 30

$$\left\{\left\{y(x)\to c_1\cos\left(\sqrt{2}\sinh^{-1}(x)\right)+c_2\sin\left(\sqrt{2}\sinh^{-1}(x)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.071 (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 = 0.0147009 (sec), leaf count = 25

$$\left\{\left\{y(x)\to ic_2\sinh\left(3\sinh^{-1}(x)\right)+c_1\cosh\left(3\sinh^{-1}(x)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.074 (sec), leaf count = 19

$$\{y(x)=\_C1\ \sinh(3\,Arcsinh(x))+\_C2\ \cosh(3\,Arcsinh(x))\}$$

2.1224 ODE No. 1224

$$ay(x)+\left(x^2+1\right)y''(x)+xy'(x)=0$$

✓ **Mathematica** : cpu = 0.0141235 (sec), leaf count = 30

$$\left\{\left\{y(x)\to c_1\cos\left(\sqrt{a}\sinh^{-1}(x)\right)+c_2\sin\left(\sqrt{a}\sinh^{-1}(x)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.085 (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

$$\left(x^2+1\right)y''(x)-xy'(x)+y(x)=0$$

✓ **Mathematica** : cpu = 0.0214606 (sec), leaf count = 29

$$\left\{\left\{y(x)\to c_2\left(x\sinh^{-1}(x)-\sqrt{x^2+1}\right)+c_1x\right\}\right\}$$

✓ **Maple** : cpu = 0.054 (sec), leaf count = 23

$$\left\{y(x)=-\sqrt{x^2+1}\_C2+x(\_C2\ Arcsinh(x)+\_C1)\right\}$$

2.1226 ODE No. 1226

$$-(v-1)vy(x)+\left(x^2+1\right)y''(x)+2xy'(x)=0$$

✓ **Mathematica** : cpu = 0.0106585 (sec), leaf count = 30

$$\{\{y(x)\to c_1 P_{v-1}(ix)+c_2 Q_{v-1}(ix)\}\}$$

✓ **Maple** : cpu = 0.223 (sec), leaf count = 25

$$\{y(x)=\_C1\ LegendreP(v-1,ix)+\_C2\ LegendreQ(v-1,ix)\}$$

2.1227 ODE No. 1227

$$\left(x^2+1\right)y''(x)-2xy'(x)+2y(x)=0$$

✓ **Mathematica** : cpu = 0.0252639 (sec), leaf count = 21

$$\left\{\left\{y(x)\to c_2 x-c_1(x-i)^2\right\}\right\}$$

✓ **Maple** : cpu = 0.042 (sec), leaf count = 16

$$\left\{y(x)=\_C2\ x^2+\_C1\ x-\_C2\right\}$$

2.1228 ODE No. 1228

$$ay(x)+\left(x^2+1\right)y''(x)+3xy'(x)=0$$

✓ **Mathematica** : cpu = 0.0121589 (sec), leaf count = 82

$$\left\{\left\{y(x)\to\frac{c_1 P_{\frac{1}{2}\left(2\sqrt{1-a}-1\right)}^{\frac{1}{2}}(ix)}{\sqrt[4]{x^2+1}}+\frac{c_2 Q_{\frac{1}{2}\left(2\sqrt{1-a}-1\right)}^{\frac{1}{2}}(ix)}{\sqrt[4]{x^2+1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.446 (sec), leaf count = 53

$$\left\{y(x)=\left(\_C2\left(x+\sqrt{x^2+1}\right)^{-\sqrt{1-a}}+\_C1\left(x+\sqrt{x^2+1}\right)^{\sqrt{1-a}}\right)\frac{1}{\sqrt{x^2+1}}\right\}$$

2.1229 ODE No. 1229

$$(x^2+1)\,y''(x)+4xy'(x)+2y(x)+2x-2\cos(x)=0$$

✓ **Mathematica** : cpu = 0.0286963 (sec), leaf count = 48

$$\left\{\left\{y(x)\to\frac{-x^3-6\cos(x)}{3\,(x^2+1)}+\frac{c_1}{x^2+1}+\frac{c_2x}{x^2+1}\right\}\right\}$$

✓ **Maple** : cpu = 0.094 (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 = 0.0183879 (sec), leaf count = 82

$$\left\{\left\{y(x)\to c_1(x^2+1)^{\frac{2-a}{4}}P_{\frac{a-4}{2}}^{\frac{a-2}{2}}(ix)+c_2(x^2+1)^{\frac{2-a}{4}}Q_{\frac{a-4}{2}}^{\frac{a-2}{2}}(ix)\right\}\right\}$$

✓ **Maple** : cpu = 0.473 (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 = 0.0577075 (sec), leaf count = 58

$$\left\{\left\{y(x)\to c_1\,{}_2F_1\left(-\frac{v}{2}-\frac{1}{2},\frac{v}{2};\frac{1}{2};x^2\right)+ic_2x\,{}_2F_1\left(\frac{v}{2}+\frac{1}{2},-\frac{v}{2};\frac{3}{2};x^2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.278 (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 = 8.11678 (sec), leaf count = 6628

$$\left\{\left\{y(x) \to c_1\,{}_2F_1\left(-\frac{n}{2} - \frac{1}{2}, \frac{n}{2}; \frac{1}{2}; x^2\right) + \int_1^x \left(\frac{}{4\left({}_2F_1\left(\frac{1}{2}(-n-1), \frac{n}{2}; \frac{1}{2}; K[1]^2\right)\,{}_2F_1\left(1 - \frac{n}{2}, \frac{n+3}{2}; \frac{5}{2}; K[1]^2\right) n^2 + {}_2\right.}\right.\right.\right.$$

✓ **Maple** : cpu = 0.419 (sec), leaf count = 409

$$\left\{y(x) = 3\left(-{}_2\mathrm{F}_1(n/2+1, -n/2+1/2;\ 1/2;\ x^2)(n+1)\int 1/3\,\frac{}{(1+x)^3\,(x-1)^3\,(({}_2\mathrm{F}_1(n/2+1, -n/2+1/2;\ 1/2\right.\right.$$

2.1233 ODE No. 1233

$$\frac{nxQ_n(x) - nQ_{n-1}(x)}{x^2 - 1} - n(n+1)y(x) + (x^2 - 1)\,y''(x) = 0$$

✓ **Mathematica** : cpu = 0.544659 (sec), leaf count = 6628

$$\left\{\left\{y(x) \to c_1\,{}_2F_1\left(-\frac{n}{2} - \frac{1}{2}, \frac{n}{2}; \frac{1}{2}; x^2\right) + \int_1^x \left(\frac{}{4\left({}_2F_1\left(\frac{1}{2}(-n-1), \frac{n}{2}; \frac{1}{2}; K[1]^2\right)\,{}_2F_1\left(1 - \frac{n}{2}, \frac{n+3}{2}; \frac{5}{2}; K[1]^2\right) n^2 + {}_2\right.}\right.\right.\right.$$

✓ **Maple** : cpu = 0.334 (sec), leaf count = 409

$$\left\{y(x) = 3\,(1+x)\left(-{}_2\mathrm{F}_1(n/2+1, -n/2+1/2;\ 1/2;\ x^2)(n+1)\int 1/3\,\frac{}{(1+x)^3\,(x-1)^3\,(({}_2\mathrm{F}_1(n/2+1, -n/2+1\right.\right.$$

2.1234 ODE No. 1234

$$(x^2 - 1)\,y''(x) + xy'(x) + 2 = 0$$

✓ **Mathematica** : cpu = 0.0610052 (sec), leaf count = 48

$$\left\{\left\{y(x) \to c_2 - \frac{1}{4}\left(\log\left(1 - \frac{x}{\sqrt{x^2-1}}\right) - \log\left(\frac{x}{\sqrt{x^2-1}} + 1\right) + c_1\right)^2\right\}\right\}$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve((x^2-1)*diff(diff(y(x),x),x)+x*diff(y(x),x)+2=0,y(x))
```

2.1235 ODE No. 1235

$$ay(x) + (x^2 - 1) y''(x) + xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.0360116 (sec), leaf count = 97

$$\left\{\left\{y(x) \to c_1 \cos\left(\frac{1}{2}\sqrt{a}\left(\log\left(1 - \frac{x}{\sqrt{x^2-1}}\right) - \log\left(\frac{x}{\sqrt{x^2-1}} + 1\right)\right)\right) - c_2 \sin\left(\frac{1}{2}\sqrt{a}\left(\log\left(1 - \frac{x}{\sqrt{x^2-1}}\right) - \text{lo}\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.115 (sec), leaf count = 45

$$\left\{y(x) = \left(\_C1\left(\left(x + \sqrt{x^2-1}\right)^{i\sqrt{a}}\right)^2 + \_C2\right)\left(\left(x + \sqrt{x^2-1}\right)^{i\sqrt{a}}\right)^{-1}\right\}$$

2.1236 ODE No. 1236

$$f(x)y(x) + (x^2 - 1) y''(x) + xy'(x) = 0$$

✗ **Mathematica** : cpu = 0.422606 (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

$$\left\{y(x) = DESol\left(\left\{\frac{f(x)\_Y(x)}{x^2-1} + \frac{x\frac{d}{dx}\_Y(x)}{x^2-1} + \frac{d^2}{dx^2}\_Y(x)\right\}, \{\_Y(x)\}\right)\right\}$$

2.1237 ODE No. 1237

$$(x^2 - 1) y''(x) + 2xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.0120623 (sec), leaf count = 30

$$\left\{\left\{y(x) \to c_1\left(\frac{1}{2}\log(1-x) - \frac{1}{2}\log(x+1)\right) + c_2\right\}\right\}$$

✓ **Maple** : cpu = 0.041 (sec), leaf count = 20

$$\left\{y(x) = \_C1 - \frac{(-\ln(x-1) + \ln(1+x))\_C2}{2}\right\}$$

2.1238 ODE No. 1238

$$-a + (x^2 - 1) y''(x) + 2xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.0178848 (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 = 0.112 (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 = 0.0102734 (sec), leaf count = 46

$$\left\{\left\{y(x) \to c_1 P_{\frac{1}{2}(\sqrt{4l+1}-1)}(x) + c_2 Q_{\frac{1}{2}(\sqrt{4l+1}-1)}(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.249 (sec), leaf count = 35

$$\left\{y(x) = \_C1\ LegendreP\left(\frac{1}{2}\sqrt{1 + 4l} - \frac{1}{2}, x\right) + \_C2\ LegendreQ\left(\frac{1}{2}\sqrt{1 + 4l} - \frac{1}{2}, x\right)\right\}$$

2.1240 ODE No. 1240

$$-v(v + 1)y(x) + (x^2 - 1) y''(x) + 2xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.0130578 (sec), leaf count = 18

$$\{\{y(x) \to c_1 P_v(x) + c_2 Q_v(x)\}\}$$

✓ **Maple** : cpu = 0.225 (sec), leaf count = 15

$$\{y(x) = \_C1\ LegendreP(v, x) + \_C2\ LegendreQ(v, x)\}$$

2.1241 ODE No. 1241

$$-(v-1)(v+2)y(x)+\left(x^2-1\right)y''(x)-2xy'(x)=0$$

✓ **Mathematica** : cpu = 0.013561 (sec), leaf count = 30

$$\left\{\left\{y(x)\to c_1\left(x^2-1\right)P_v^2(x)+c_2\left(x^2-1\right)Q_v^2(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.222 (sec), leaf count = 24

$$\{y(x)=(1+x)(x-1)(\_C2\ LegendreQ(v,2,x)+\_C1\ LegendreP(v,2,x))\}$$

2.1242 ODE No. 1242

$$\left(x^2-1\right)y''(x)-\left(x^2-x\right)y(x)-(3x+1)y'(x)=0$$

✓ **Mathematica** : cpu = 0.221168 (sec), leaf count = 68

$$\left\{\left\{y(x)\to c_1e^{-x}(x+1)^2-c_2e^{-x-2}\left(x^2(-\mathrm{Ei}(2(x+1)))-2x\mathrm{Ei}(2(x+1))-\mathrm{Ei}(2(x+1))+2e^{2x+2}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.082 (sec), leaf count = 41

$$\left\{y(x)=\_C2\ \mathrm{e}^{-x-2}(1+x)^2\ Ei(1,-2x-2)+\_C1\ \mathrm{e}^{-x}(1+x)^2+2\,\mathrm{e}^{x}\_C2\right\}$$

2.1243 ODE No. 1243

$$\left(x^2-1\right)y''(x)+\left(x^2+1\right)y(x)+4xy'(x)=0$$

✓ **Mathematica** : cpu = 0.0242891 (sec), leaf count = 45

$$\left\{\left\{y(x)\to\frac{c_1e^{-ix}}{x^2-1}-\frac{ic_2e^{ix}}{2\left(x^2-1\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.061 (sec), leaf count = 21

$$\left\{y(x)=\frac{\_C2\ \cos(x)+\sin(x)\_C1}{x^2-1}\right\}$$

2.1244 ODE No. 1244

$$-(v-n)(n+v+1)y(x)+2(n+1)xy'(x)+\left(x^2-1\right)y''(x)=0$$

✓ **Mathematica** : cpu = 0.0195283 (sec), leaf count = 42

$$\left\{\left\{y(x)\to c_1\left(x^2-1\right)^{-n/2}P_v^n(x)+c_2\left(x^2-1\right)^{-n/2}Q_v^n(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.297 (sec), leaf count = 27

$$\left\{y(x)=\left(x^2-1\right)^{-\frac{n}{2}}\left(\mathit{LegendreP}(v,n,x)\_C1+\mathit{LegendreQ}(v,n,x)\_C2\right)\right\}$$

2.1245 ODE No. 1245

$$-(-n+v+1)(n+v)y(x)-2(n-1)xy'(x)+\left(x^2-1\right)y''(x)=0$$

✓ **Mathematica** : cpu = 0.0161623 (sec), leaf count = 42

$$\left\{\left\{y(x)\to c_1\left(x^2-1\right)^{n/2}P_v^n(x)+c_2\left(x^2-1\right)^{n/2}Q_v^n(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.306 (sec), leaf count = 27

$$\left\{y(x)=\left(x^2-1\right)^{\frac{n}{2}}\left(\mathit{LegendreP}(v,n,x)\_C1+\mathit{LegendreQ}(v,n,x)\_C2\right)\right\}$$

2.1246 ODE No. 1246

$$-2(v-1)xy'(x)-2vy(x)+\left(x^2-1\right)y''(x)=0$$

✓ **Mathematica** : cpu = 0.0145356 (sec), leaf count = 42

$$\left\{\left\{y(x)\to c_1\left(x^2-1\right)^{v/2}P_v^v(x)+c_2\left(x^2-1\right)^{v/2}Q_v^v(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.504 (sec), leaf count = 28

$$\left\{y(x)=\left(x^2-1\right)^v\left({}_2\mathrm{F}_1(\frac{1}{2},v+1;\ \frac{3}{2};\ x^2)\_C2\,x+\_C1\right)\right\}$$

2.1247 ODE No. 1247

$$2axy'(x)+(a-1)ay(x)+\left(x^2-1\right)y''(x)=0$$

✓ **Mathematica** : cpu = 0.166144 (sec), leaf count = 128

$$\left\{\left\{y(x)\to\frac{c_2\sqrt{1-x^2}(x+1)^{\sqrt{(a-1)^2}}\left(x^2-1\right)^{-a/2}(1-x)^{-\sqrt{(a-1)^2}}e^{-\sqrt{(a-1)^2}\tanh^{-1}(x)}}{2\sqrt{(a-1)^2}}+c_1\sqrt{1-x^2}\left(x^2-1\right)^{-a/2}e\right.\right.$$

✓ **Maple** : cpu = 0.063 (sec), leaf count = 27

$$\left\{y(x)=\_C1\ (x-1)^{1-a}+\_C2\ (1+x)^{1-a}\right\}$$

2.1248 ODE No. 1248

$$axy'(x)+y(x)\left(bx^2+cx+d\right)+\left(x^2-1\right)y''(x)=0$$

✓ **Mathematica** : cpu = 0.251891 (sec), leaf count = 238

$$\left\{\left\{y(x)\to c_2\left(\frac{x}{2}-\frac{1}{2}\right)^{a/4}\left(x^2-1\right)^{-a/4}\left(\frac{x}{2}+\frac{1}{2}\right)^{1-\frac{a}{4}}e^{\sqrt{-b}x}\text{HeunC}\left[\frac{1}{4}a\left(a-4\sqrt{-b}-2\right)-b+4\sqrt{-b}+c-d,2\right(\right.\right.$$

✓ **Maple** : cpu = 1.224 (sec), leaf count = 134

$$\left\{y(x)=\mathrm{e}^{\sqrt{-b}x}\left(x^2-1\right)^{-\frac{a}{4}}\left(\left(\frac{1}{2}+\frac{x}{2}\right)^{1-\frac{a}{4}}\left(-\frac{1}{2}+\frac{x}{2}\right)^{\frac{a}{4}}\mathit{HeunC}\left(4\sqrt{-b},1-\frac{a}{2},\frac{a}{2}-1,2\,c,d-c-\frac{a^2}{8}+b+\frac{1}{2},\frac{1}{2}\right.\right.\right.$$

2.1249 ODE No. 1249

$$(ax+b)y'(x)+cy(x)+\left(x^2-1\right)y''(x)=0$$

✓ **Mathematica** : cpu = 0.126911 (sec), leaf count = 193

$$\left\{\left\{y(x)\to c_2 2^{\frac{1}{2}(a+b-2)}(x-1)^{\frac{1}{2}(-a-b+2)}\,{}_2F_1\left(-\frac{b}{2}-\frac{1}{2}\sqrt{a^2-2a-4c+1}+\frac{1}{2},-\frac{b}{2}+\frac{1}{2}\sqrt{a^2-2a-4c+1}+\frac{1}{2};-\right.\right.\right.$$

✓ **Maple** : cpu = 0.358 (sec), leaf count = 134

$$\left\{y(x)=\_C1\ {}_2\mathrm{F}_1(-\frac{1}{2}-\frac{1}{2}\sqrt{a^2-2\,a-4\,c+1}+\frac{a}{2},-\frac{1}{2}+\frac{1}{2}\sqrt{a^2-2\,a-4\,c+1}+\frac{a}{2};\frac{a}{2}-\frac{b}{2};\frac{1}{2}+\frac{x}{2})+\_C2\left(\frac{1}{2}\right.\right.$$

2.1250 ODE No. 1250

$$\left(x^2-a^2\right)y''(x)+8xy'(x)+12y(x)=0$$

✓ **Mathematica** : cpu = 0.0419103 (sec), leaf count = 41

$$\left\{\left\{y(x)\to\frac{c_2\left(a^2+3x^2\right)}{3(a-x)^3(a+x)^3}+\frac{c_1}{(a+x)^3}\right\}\right\}$$

✓ **Maple** : cpu = 0.045 (sec), leaf count = 41

$$\left\{y(x)=\frac{3\_C2\,a^2x+\_C2\,x^3+\_C1\,a^2+3\_C1\,x^2}{(a-x)^3\,(x+a)^3}\right\}$$

2.1251 ODE No. 1251

$$-(x-1)y'(x)+x(x+1)y''(x)+y(x)=0$$

✓ **Mathematica** : cpu = 0.0271978 (sec), leaf count = 25

$$\{\{y(x)\to c_1(x-1)+c_2(x\log(x)-\log(x)-4)\}\}$$

✓ **Maple** : cpu = 0.054 (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 = 0.110209 (sec), leaf count = 151

$$\left\{\left\{y(x)\to c_2x^{1-b}\,{}_2F_1\left(\frac{a}{2}-b-\frac{1}{2}\sqrt{a^2-2a-4c+1}+\frac{1}{2},\frac{a}{2}-b+\frac{1}{2}\sqrt{a^2-2a-4c+1}+\frac{1}{2};2-b;-x\right)+c_1\,{}_2F_1\right.\right.$$

✓ **Maple** : cpu = 0.379 (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

$$(3x+2)y'(x)+x(x+1)y''(x)+y(x)=0$$

✓ **Mathematica** : cpu = 0.0200847 (sec), leaf count = 34

$$\left\{\left\{y(x)\to \frac{\sqrt{2}c_1}{x}+\frac{c_2\log(2x+2)}{\sqrt{2}x}\right\}\right\}$$

✓ **Maple** : cpu = 0.038 (sec), leaf count = 16

$$\left\{y(x)=\frac{\_C1\ \ln(1+x)+\_C2}{x}\right\}$$

2.1254 ODE No. 1254

$$\left(x^2-x\right)y'(x)+\left(x^2+x-2\right)y''(x)-\left(6x^2+7x\right)y(x)=0$$

✓ **Mathematica** : cpu = 0.150743 (sec), leaf count = 69

$$\left\{\left\{y(x)\to \frac{1}{5}c_2e^{-3x-5}\left(195e^{5x}x\mathrm{Ei}(5-5x)-195e^{5x}\mathrm{Ei}(5-5x)+e^5x+44e^5\right)-c_1e^{2x}(x-1)\right\}\right\}$$

✓ **Maple** : cpu = 0.085 (sec), leaf count = 42

$$\left\{y(x)=-195\_C2\ \mathrm{e}^{2x-5}(x-1)\ Ei(1,5x-5)+\_C2\ (x+44)\,\mathrm{e}^{-3x}+\_C1\ \mathrm{e}^{2x}(x-1)\right\}$$

2.1255 ODE No. 1255

$$ay'(x)+(x-1)xy''(x)-2y(x)=0$$

✓ **Mathematica** : cpu = 0.660043 (sec), leaf count = 360

$$\left\{\left\{y(x)\to \frac{c_2x^a\left(a^2+2ax-a+2x^2-2x\right)(1-x)^{-a}\left(-\frac{a\,{}_2F_1\left(1,-a;1-a;\frac{\left(-a+\sqrt{1-a^2}+1\right)(x-1)}{\left(-a+\sqrt{1-a^2}-1\right)x}\right)}{(1-a^2)^{3/2}}+\frac{a\,{}_2F_1\left(1,-a;1-a;\frac{\left(a+\sqrt{1\cdots}\right.}{\left(a+\cdots\right.}\right.}{(1-a^2)^{3/2}}\cdots\right.}{2a^2\cdots}\right.\right.$$

✓ **Maple** : cpu = 0.043 (sec), leaf count = 42

$$\left\{y(x)=\left(a^2+a(2x-1)+2x^2-2x\right)\_C1+\frac{\_C2\ x^a x(x-1)}{(x-1)^a}\right\}$$

2.1256 ODE No. 1256

$$-v(v+1)y(x)+(2x-1)y'(x)+(x-1)xy''(x)=0$$

✓ **Mathematica** : cpu = 0.0169384 (sec), leaf count = 26

$$\{\{y(x)\to c_1P_v(2x-1)+c_2Q_v(2x-1)\}\}$$

✓ **Maple** : cpu = 0.761 (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 = 0.0307263 (sec), leaf count = 33

$$\left\{\left\{y(x)\to\frac{c_1x^{b+1}\,{}_2F_1(b+1,a+b+1;b+2;x)}{b+1}+c_2\right\}\right\}$$

✓ **Maple** : cpu = 0.634 (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 = 0.121228 (sec), leaf count = 146

$$\left\{\left\{y(x)\to(-1)^{b+1}c_2x^{b+1}\,{}_2F_1\left(\frac{a}{2}+b-\frac{1}{2}\sqrt{a^2-2a-4c+1}+\frac{1}{2},\frac{a}{2}+b+\frac{1}{2}\sqrt{a^2-2a-4c+1}+\frac{1}{2};b+2;x\right)+\right.\right.$$

✓ **Maple** : cpu = 0.296 (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 = 0.09946 (sec), leaf count = 120

$$\left\{\left\{y(x)\to(-1)^{b+1}c_2x^{b+1}\,{}_2F_1\left(\frac{a}{2}+b-\frac{1}{2}\sqrt{a^2+4l}+1,\frac{a}{2}+b+\frac{1}{2}\sqrt{a^2+4l}+1;b+2;x\right)+c_1\,{}_2F_1\left(\frac{a}{2}-\frac{1}{2}\sqrt{a^2-\right.\right.\right.$$

✓ **Maple** : cpu = 0.312 (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 = 0.222542 (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 = 1.168 (sec), leaf count = 77

$$\left\{y(x)=\int-(x-1)^{-a1-b1-1+d1}\left(a1\ b1\ (signum(x-1))^{a1+b1-d1}\,(-signum(x-1))^{-a1-b1+d1}\,{}_2\mathrm{F}_1(d1,-a1-b\right.\right.$$

2.1261 ODE No. 1261

$$y(x)(2lx(-n+p-1)+2lp+m)+2\left(x(-2l+n+1)-lx^2+n+1\right)y'(x)+x(x+2)y''(x)=0$$

✓ **Mathematica** : cpu = 0.451418 (sec), leaf count = 148

$$\left\{\left\{y(x)\to c_2\left(-\frac{x}{2}-1\right)^{\frac{n}{2}+\frac{1}{2}}x^{-n}(x+2)^{-\frac{n}{2}-\frac{1}{2}}\mathrm{HeunC}\left[-4ln-2lp-m+n^2+n,-4l(p-1),1-n,n+1,4l,-\frac{x}{2}\right]\right.\right.$$

✓ **Maple** : cpu = 1.103 (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

$$(x^2+x-1)\,y'(x)+(x+1)^2y''(x)-(x+2)y(x)=0$$

✓ **Mathematica** : cpu = 0.26803 (sec), leaf count = 88

$$\left\{\left\{y(x)\to c_2e^{-x}\int_1^x \exp\left(-\frac{K[1]^2}{K[1]+1}-\frac{K[1]}{K[1]+1}+2K[1]-\frac{1}{K[1]+1}\right)(K[1]+1)^{\frac{K[1]}{K[1]+1}+\frac{1}{K[1]+1}}dK[1]+c_1e^{-x}\right\}\right.$$

✓ **Maple** : cpu = 1.148 (sec), leaf count = 53

$$\left\{y(x)=(1+x)\left(\_C1\,\mathrm{e}^{-x}\mathit{HeunD}\left(4,4,-8,12,\frac{x}{x+2}\right)+\_C2\,\mathit{HeunD}\left(-4,4,-8,12,\frac{x}{x+2}\right)\mathrm{e}^{\frac{x-1}{2x+2}}\right)\right\}$$

2.1263 ODE No. 1263

$$-(20x+30)\left(x^2+3x\right)^{7/3}+(3x-1)y'(x)+x(x+3)y''(x)+y(x)=0$$

✓ **Mathematica** : cpu = 0.422916 (sec), leaf count = 276

$$\left\{\left\{y(x)\to\frac{4x^{4/3}\int_1^x\left(45\sqrt[3]{3}\,{}_2F_1\left(-\frac{4}{3},-\frac{4}{3};-\frac{1}{3};-\frac{K[1]}{3}\right)\sqrt[3]{K[1](K[1]+3)}K[1]^{11/3}+\frac{675}{2}\sqrt[3]{3}\,{}_2F_1\left(-\frac{4}{3},-\frac{4}{3};-\frac{1}{3};-\frac{K[1}{3}\right.\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.385 (sec), leaf count = 52

$$\left\{y(x)=\left(\_C2+\int\frac{1}{x^2+3\,x}\left(\_C1+3\left(x^2+3\,x\right)^{7/3}x(x+3)\right)(x+3)^{\frac{7}{3}}x^{-\frac{4}{3}}\,\mathrm{d}x\right)x^{\frac{4}{3}}(x+3)^{-\frac{7}{3}}\right\}$$

2.1264 ODE No. 1264

$$(x^2+x+1)\,y'(x)+(x^2+3x+4)\,y''(x)-(2x+3)y(x)=0$$

✓ **Mathematica** : cpu = 0.0565727 (sec), leaf count = 23

$$\left\{\left\{y(x)\to c_2\left(x^2+x+3\right)+c_1e^{-x}\right\}\right\}$$

✓ **Maple** : cpu = 0.056 (sec), leaf count = 19

$$\left\{y(x)=\_C1\,\mathrm{e}^{-x}+\_C2\left(x^2+x+3\right)\right\}$$

2.1265 ODE No. 1265

$$-(2x-3)y'(x)+(x-2)(x-1)y''(x)+y(x)=0$$

✓ **Mathematica** : cpu = 0.037089 (sec), leaf count = 64

$$\left\{\left\{y(x)\to c_1\left(x^2-3x+2\right)P_{\frac{1}{2}\left(-1+\sqrt{5}\right)}^2(2x-3)+c_2\left(x^2-3x+2\right)Q_{\frac{1}{2}\left(-1+\sqrt{5}\right)}^2(2x-3)\right\}\right\}$$

✓ **Maple** : cpu = 2.692 (sec), leaf count = 93

$$\left\{y(x)=(x-2)^2\left(\_C2\ {}_2\mathrm{F}_1(\frac{1}{2}+\frac{\sqrt{5}}{2},\frac{5}{2}+\frac{\sqrt{5}}{2};\sqrt{5}+1;(x-1)^{-1})(x-1)^{-\frac{1}{2}-\frac{\sqrt{5}}{2}}+\_C1\ {}_2\mathrm{F}_1(-\frac{\sqrt{5}}{2}+\frac{1}{2},-\frac{\sqrt{5}}{2}+\right.\right.$$

2.1266 ODE No. 1266

$$-(x-2)y'(x)+(x-2)^2y''(x)-3y(x)=0$$

✓ **Mathematica** : cpu = 0.0222442 (sec), leaf count = 22

$$\left\{\left\{y(x)\to c_1(x-2)^3+\frac{c_2}{x-2}\right\}\right\}$$

✓ **Maple** : cpu = 0.01 (sec), leaf count = 19

$$\left\{y(x)=\frac{\_C1\ (x-2)^4+\_C2}{x-2}\right\}$$

2.1267 ODE No. 1267

$$-\left(l+2x^2-5x\right)y'(x)+2x^2y''(x)-(4x-1)y(x)=0$$

✓ **Mathematica** : cpu = 0.395397 (sec), leaf count = 166

$$\left\{\left\{y(x)\to\frac{c_1e^{x-\frac{l}{2x}}}{\sqrt{x}}-\frac{\sqrt{\frac{\pi}{2}}c_2e^{-\frac{l}{2x}-\sqrt{2}\sqrt{-l}+x}\left(\mathrm{erf}\left(\frac{\sqrt{-l}}{\sqrt{2}\sqrt{x}}-\sqrt{x}\right)+e^{2\sqrt{2}\sqrt{-l}}\mathrm{erf}\left(\frac{\sqrt{-l}}{\sqrt{2}\sqrt{x}}+\sqrt{x}\right)-e^{2\sqrt{2}\sqrt{-l}}+1\right)}{\sqrt{-l}\sqrt{x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.864 (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

$$y(x)(ax+b)+(2x-1)y'(x)+2(x-1)xy''(x)=0$$

✓ **Mathematica** : cpu = 0.10551 (sec), leaf count = 50

$$\left\{\left\{y(x)\to c_1\text{MathieuC}\left[-a-2b,\frac{a}{2},\cos^{-1}\left(\sqrt{x}\right)\right]+c_2\text{MathieuS}\left[-a-2b,\frac{a}{2},\cos^{-1}\left(\sqrt{x}\right)\right]\right\}\right\}$$

✓ **Maple** : cpu = 1.058 (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 = 0.0694618 (sec), leaf count = 60

$$\left\{\left\{y(x)\to c_2 i^{-2v-1}x^{\frac{1}{2}(-2v-1)}\,{}_2F_1\left(\frac{1}{2},-v;\frac{1}{2}-v;x\right)+c_1\,{}_2F_1\left(\frac{1}{2},v+1;v+\frac{3}{2};x\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.632 (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

$$\left(10x^2+21x+8\right)y'(x)+\left(2x^2+6x+4\right)y''(x)+\left(12x^2+17x+8\right)y(x)=0$$

✓ **Mathematica** : cpu = 1.86865 (sec), leaf count = 58

$$\left\{\left\{y(x)\to c_2e^{-3x}(x+2)^4\int_1^x\frac{e^{K[1]}(K[1]+1)^{3/2}}{(K[1]+2)^5}dK[1]+c_1e^{-3x}(x+2)^4\right\}\right\}$$

✓ **Maple** : cpu = 1.366 (sec), leaf count = 46

$$\left\{y(x)=\mathrm{e}^{-2\,x}(x+2)^4\left(\_C2\ (1+x)^{\frac{5}{2}}\ \mathit{HeunC}\left(-1,\frac{5}{2},4,-\frac{7}{4},\frac{7}{2},-1-x\right)+\_C1\ \mathit{HeunC}\left(-1,-\frac{5}{2},4,-\frac{7}{4},\frac{7}{2},-1-\right.\right.$$

2.1271 ODE No. 1271

$$4x^2y''(x) + y(x) = 0$$

✓ **Mathematica** : cpu = 0.0096063 (sec), leaf count = 27

$$\left\{\left\{y(x) \to c_1\sqrt{x} + \frac{1}{2}c_2\sqrt{x}\log(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.008 (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 = 0.0099754 (sec), leaf count = 32

$$\{\{y(x) \to c_1\sqrt{x}J_0(ax) + c_2\sqrt{x}Y_0(ax)\}\}$$

✓ **Maple** : cpu = 0.042 (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 = 0.0129157 (sec), leaf count = 20

$$\{\{y(x) \to c_1M_{k,m}(x) + c_2W_{k,m}(x)\}\}$$

✓ **Maple** : cpu = 0.259 (sec), leaf count = 17

$$\{y(x) = \_C1\, M_{k,m}(x) + \_C2\, W_{k,m}(x)\}$$

2.1274 ODE No. 1274

$$(x - v^2)\, y(x) + 4x^2 y''(x) + 4xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.0343216 (sec), leaf count = 38

$$\left\{\left\{y(x) \to c_1 \Gamma(1-v) J_{-v}\left(\sqrt{x}\right) + c_2 \Gamma(v+1) J_v\left(\sqrt{x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.009 (sec), leaf count = 19

$$\left\{y(x) = \_C1\, J_v\left(\sqrt{x}\right) + \_C2\, Y_v\left(\sqrt{x}\right)\right\}$$

2.1275 ODE No. 1275

$$y(x)\left(2x(2l - m + 1) - m^2 - x^2 + 1\right) + 4x^2 y''(x) + 4xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.0284958 (sec), leaf count = 120

$$\left\{\left\{y(x) \to c_1 e^{\frac{1}{2}\left(\sqrt{m^2-1}\log(x) - x\right)} U\left(\frac{1}{2}\left(-2l + m + \sqrt{m^2 - 1}\right), \sqrt{m^2 - 1} + 1, x\right) + c_2 e^{\frac{1}{2}\left(\sqrt{m^2-1}\log(x) - x\right)} L^{\sqrt{m^2-1}}_{\frac{1}{2}\left(2l - m -\right.}\right.\right.$$

✓ **Maple** : cpu = 0.695 (sec), leaf count = 53

$$\left\{y(x) = \left(\_C2\, W_{l - \frac{m}{2} + \frac{1}{2},\, \frac{1}{2}\sqrt{m+1}\sqrt{m-1}}(x) + \_C1\, M_{l - \frac{m}{2} + \frac{1}{2},\, \frac{1}{2}\sqrt{m+1}\sqrt{m-1}}(x)\right) \frac{1}{\sqrt{x}}\right\}$$

2.1276 ODE No. 1276

$$4x^2 y''(x) - \left(4x^2 + 1\right) y(x) - 4e^x \sqrt{x^3} + 4xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.0290308 (sec), leaf count = 55

$$\left\{\left\{y(x) \to \frac{e^x \sqrt{x^3}(2x - 1)}{4x^2} + \frac{c_1 e^{-x}}{\sqrt{x}} + \frac{c_2 e^x}{2\sqrt{x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.287 (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 = 0.0216959 (sec), leaf count = 51

$$\left\{\left\{y(x)\to \frac{c_1e^{-\frac{\sqrt{a}x}{2}}}{\sqrt{x}}+\frac{c_2e^{\frac{\sqrt{a}x}{2}}}{\sqrt{a}\sqrt{x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.293 (sec), leaf count = 27

$$\left\{y(x)=\left(\_C2\,\cosh\left(\frac{x}{2}\sqrt{a}\right)+\_C1\,\sinh\left(\frac{x}{2}\sqrt{a}\right)\right)\frac{1}{\sqrt{x}}\right\}$$

2.1278 ODE No. 1278

$$f(x)y(x)+4x^2y''(x)+4xy'(x)=0$$

✗ **Mathematica** : cpu = 0.356626 (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 = 0.118751 (sec), leaf count = 74

$$\left\{\left\{y(x)\to c_2x^{\frac{1}{2}\left(\frac{\sqrt{17}}{4}-\frac{1}{4}\right)}+c_1x^{\frac{1}{2}\left(-\frac{1}{4}-\frac{\sqrt{17}}{4}\right)}-\frac{256(\log(x)+1)}{\left(\sqrt{17}-1\right)^2\left(1+\sqrt{17}\right)^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.321 (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 = 0.0488253 (sec), leaf count = 52

$$\left\{\left\{y(x) \to \frac{c_2 e^{-x}\left(4e^{2x}x^2\text{Ei}(-2x) + 2x - 1\right)}{2x^{3/2}} + c_1 e^x\sqrt{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.17 (sec), leaf count = 40

$$\left\{y(x) = (-4\,Ei(1, 2\,x)\,e^x\_C2\,x^2 + \_C2\,(2\,x - 1)\,e^{-x} + \_C1\,x^2e^x)x^{-\frac{3}{2}}\right\}$$

2.1281 ODE No. 1281

$$4x^2y''(x) + \left(4x^2 - 4x - 1\right) y(x) - 4(2x - 1)xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.0157409 (sec), leaf count = 28

$$\left\{\left\{y(x) \to \frac{c_1 e^x}{\sqrt{x}} + c_2 e^x\sqrt{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.181 (sec), leaf count = 15

$$\left\{y(x) = e^x(x\_C2 + \_C1)\frac{1}{\sqrt{x}}\right\}$$

2.1282 ODE No. 1282

$$4x^3y'(x) + 4x^2y''(x) + \left(x^2 - 4\right)\left(x^2 + 6\right) y(x) = 0$$

✓ **Mathematica** : cpu = 0.0181674 (sec), leaf count = 39

$$\left\{\left\{y(x) \to \frac{1}{5}c_2 e^{-\frac{x^2}{4}}x^3 + \frac{c_1 e^{-\frac{x^2}{4}}}{x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.066 (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

$$4x^2\log(x)y'(x)+4x^2y''(x)+y(x)\left(x^2\log^2(x)+2x-8\right)-4\sqrt{e^x x^{-x}}x^2=0$$

✓ **Mathematica** : cpu = 0.0686383 (sec), leaf count = 90

$$\left\{\left\{y(x)\to \frac{1}{9}\left(3x^2\sqrt{e^x x^{-x}}\log(x)-x^2\sqrt{e^x x^{-x}}\right)+c_1e^{x/2}x^{-\frac{x}{2}-1}+\frac{1}{3}c_2e^{x/2}x^{2-\frac{x}{2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.167 (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

$$-2(2x+1)y'(x)+(2x+1)^2y''(x)-12y(x)-3x-1=0$$

✓ **Mathematica** : cpu = 0.0329697 (sec), leaf count = 47

$$\left\{\left\{y(x)\to \frac{-72x^2-56x-7}{192(2x+1)}+c_1(2x+1)^3+\frac{c_2}{2x+1}\right\}\right\}$$

✓ **Maple** : cpu = 0.094 (sec), leaf count = 41

$$\left\{y(x)=\frac{\_C1}{2\,x+1}+(2\,x+1)^3\,\_C2+\frac{-72\,x^2-56\,x-7}{384\,x+192}\right\}$$

2.1285 ODE No. 1285

$$((4a+2)x-a)y'(x)+(a-1)ay(x)+x(4x-1)y''(x)=0$$

✓ **Mathematica** : cpu = 1.19539 (sec), leaf count = 269

$$\left\{\left\{y(x)\to c_2x^{-a/2}\left(\sqrt{4x-1}+i\right)^{\frac{1}{2}+\frac{1}{2}i\sqrt{-(a-1)^2}}\left(-\sqrt{4x-1}+i\right)^{\frac{1}{2}-\frac{1}{2}i\sqrt{-(a-1)^2}}\int_1^x-\frac{\left(i-\sqrt{4K[1]-1}\right)^{i\sqrt{-(a-1)^2}}}{\sqrt{1-4K[1]}\ (\right.}\right.\right.$$

✓ **Maple** : cpu = 0.238 (sec), leaf count = 52

$$\left\{y(x)=\_C1\,{}_2\mathrm{F}_1(\frac{a}{2},\frac{a}{2}-\frac{1}{2};\,a;\,4\,x)+\_C2\,x^{1-a}{}_2\mathrm{F}_1(1-\frac{a}{2},-\frac{a}{2}+\frac{1}{2};\,-a+2;\,4\,x)\right\}$$

2.1286 ODE No. 1286

$$3(3x-1)y'(x)+(3x-1)^2y''(x)-9y(x)-\log^2(3x-1)=0$$

✓ **Mathematica** : cpu = 0.0975053 (sec), leaf count = 101

$$\left\{\left\{y(x)\to\frac{-6x-3x\log^2(3x-1)+\log^2(3x-1)+\log(3x-1)-\log(1-3x)+1}{9(3x-1)}+\frac{c_1\left((1-3x)^2+1\right)}{2(1-3x)}+\frac{ic_2\left((1\right.}{2(}\right.\right.$$

✓ **Maple** : cpu = 0.094 (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

$$3(2x-1)y'(x)+9(x-1)xy''(x)-20y(x)=0$$

✓ **Mathematica** : cpu = 0.0150525 (sec), leaf count = 83

$$\left\{\left\{y(x)\to c_2\sqrt[3]{1-x}\sqrt[3]{x}Q_1^{\frac{2}{3}}(2x-1)-\frac{c_1(2-2x)^{2/3}\sqrt[3]{1-x}x^{2/3}(6x-5)}{3\ 2^{2/3}(x-1)\Gamma\left(\frac{4}{3}\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.047 (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 = 0.0254483 (sec), leaf count = 47

$$\left\{\left\{y(x)\to c_1e^{i\sqrt{x}}\sqrt[4]{x}+ic_2e^{-i\sqrt{x}}\sqrt[4]{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.047 (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 = 0.117337 (sec), leaf count = 53

$$\left\{\left\{y(x) \to \frac{c_2 e^{-\sqrt{x}}\left(\sqrt{x}+1\right)}{x^{5/4}} - \frac{c_1 e^{\sqrt{x}}\left(\sqrt{x}-1\right)}{x^{5/4}}\right\}\right\}$$

✓ **Maple** : cpu = 0.304 (sec), leaf count = 33

$$\left\{y(x) = \left(\_C2\,\left(\sqrt{x}+1\right)\mathrm{e}^{-\sqrt{x}} + \_C1\,\mathrm{e}^{\sqrt{x}}\left(\sqrt{x}-1\right)\right)x^{-\frac{5}{4}}\right\}$$

2.1290 ODE No. 1290

$$\left(27x^2+4\right)y''(x) + 27xy'(x) - 3y(x) = 0$$

✓ **Mathematica** : cpu = 0.115975 (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 = 0.076 (sec), leaf count = 29

$$\left\{y(x) = \_C1\ \sinh\left(\frac{1}{3}\mathit{Arcsinh}\left(\frac{3\sqrt{3}x}{2}\right)\right) + \_C2\ \cosh\left(\frac{1}{3}\mathit{Arcsinh}\left(\frac{3\sqrt{3}x}{2}\right)\right)\right\}$$

2.1291 ODE No. 1291

$$(152x-40)y'(x) + 48(x-1)xy''(x) + 53y(x) = 0$$

✓ **Mathematica** : cpu = 0.0638083 (sec), leaf count = 92

$$\left\{\left\{y(x) \to c_1\,{}_2F_1\left(\frac{13}{12} - \frac{\sqrt{\frac{5}{2}}}{6}, \frac{13}{12} + \frac{\sqrt{\frac{5}{2}}}{6}; \frac{5}{6}; x\right) + \sqrt[6]{-1}c_2\sqrt[6]{x}\,{}_2F_1\left(\frac{5}{4} - \frac{\sqrt{\frac{5}{2}}}{6}, \frac{5}{4} + \frac{\sqrt{\frac{5}{2}}}{6}; \frac{7}{6}; x\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.309 (sec), leaf count = 50

$$\left\{y(x) = \_C1\ {}_2\mathrm{F}_1(\frac{13}{12} - \frac{\sqrt{10}}{12}, \frac{13}{12} + \frac{\sqrt{10}}{12}; \frac{5}{6};\ x) + \_C2\ \sqrt[6]{x}{}_2\mathrm{F}_1(\frac{5}{4} - \frac{\sqrt{10}}{12}, \frac{5}{4} + \frac{\sqrt{10}}{12}; \frac{7}{6};\ x)\right\}$$

2.1292 ODE No. 1292

$$25(2x-1)y'(x)+50(x-1)xy''(x)-2y(x)=0$$

✓ **Mathematica** : cpu = 0.0388773 (sec), leaf count = 42

$$\left\{\left\{y(x)\to c_2\sin\left(\frac{2}{5}\sin^{-1}\left(\sqrt{1-x}\right)\right)+c_1\cos\left(\frac{2}{5}\sin^{-1}\left(\sqrt{1-x}\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.132 (sec), leaf count = 31

$$\left\{y(x)=\left(\_C1\left(\sqrt{x}+\sqrt{x-1}\right)^{\frac{4}{5}}+\_C2\right)\left(\sqrt{x}+\sqrt{x-1}\right)^{-\frac{2}{5}}\right\}$$

2.1293 ODE No. 1293

$$(120x-48)y'(x)+144(x-1)xy''(x)+y(x)=0$$

✓ **Mathematica** : cpu = 0.2543 (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 = 0.343 (sec), leaf count = 33

$$\left\{y(x)=\sqrt[3]{x}\left(\mathit{LegendreP}\left(-\frac{1}{2},\frac{2}{3},\sqrt{1-x}\right)\_C1+\mathit{LegendreQ}\left(-\frac{1}{2},\frac{2}{3},\sqrt{1-x}\right)\_C2\right)\right\}$$

2.1294 ODE No. 1294

$$(168x-96)y'(x)+144(x-1)xy''(x)+y(x)=0$$

✓ **Mathematica** : cpu = 0.0585765 (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 = 0.404 (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 = 0.183578 (sec), leaf count = 310

$$\left\{\left\{y(x) \to c_1 U\left(-\frac{-\sqrt{c}a - id\sqrt{a} - \sqrt{c}\sqrt{a^2 - 2ba - 4fa + b^2}}{2a\sqrt{c}}, \frac{\sqrt{a^2 - 2ba - 4fa + b^2}}{a} + 1, \frac{2i\sqrt{c}x}{\sqrt{a}}\right) \exp\left(\frac{\log(x)}{}\right.\right.\right.$$

✓ **Maple** : cpu = 0.543 (sec), leaf count = 106

$$\left\{y(x) = x^{-\frac{b}{2a}}\left(M_{-\frac{i}{2}d\frac{1}{\sqrt{a}}\frac{1}{\sqrt{c}}, \frac{1}{2a}\sqrt{a^2+(-2b-4f)a+b^2}}\left(2ix\sqrt{c}\frac{1}{\sqrt{a}}\right)\_C1 + W_{-\frac{i}{2}d\frac{1}{\sqrt{a}}\frac{1}{\sqrt{c}}, \frac{1}{2a}\sqrt{a^2+(-2b-4f)a+b^2}}\left(2ix\sqrt{c}\frac{1}{\sqrt{}}\right.\right.\right.$$

2.1296 ODE No. 1296

$$y(x)\left(\mathrm{a0}x^2 + \mathrm{b0}x + \mathrm{c0}\right) + \left(\mathrm{a1}x^2 + \mathrm{b1}x\right)y'(x) + \mathrm{a2}x^2y''(x) = 0$$

✓ **Mathematica** : cpu = 0.361297 (sec), leaf count = 356

$$\left\{\left\{y(x) \to c_1 U\left(-\frac{2\mathrm{b0a2} - \sqrt{\mathrm{a1}^2 - 4\mathrm{a0a2}}\mathrm{a2} - \mathrm{a1b1} - \sqrt{\mathrm{a1}^2 - 4\mathrm{a0a2}}\sqrt{\mathrm{a2}^2 - 2\mathrm{b1a2} - 4\mathrm{c0a2} + \mathrm{b1}^2}}{2\mathrm{a2}\sqrt{\mathrm{a1}^2 - 4\mathrm{a0a2}}}, \frac{\sqrt{\mathrm{a2}^2 - 2\mathrm{b1}}}{}\right.\right.\right.$$

✓ **Maple** : cpu = 0.606 (sec), leaf count = 150

$$\left\{y(x) = x^{-\frac{b1}{2\,a2}}\mathrm{e}^{-\frac{a1\,x}{2\,a2}}\left(W_{-\frac{a1\,b1-2\,a2\,b0}{2\,a2}\frac{1}{\sqrt{-4\,a0\,a2+a1^2}}, \frac{1}{2\,a2}\sqrt{a2^2+(-2\,b1-4\,c0)a2+b1^2}}\left(\frac{x}{a2}\sqrt{-4\,a0\,a2 + a1^2}\right)\_C2 + M_{-}\right.\right.$$

2.1297 ODE No. 1297

$$\left(ax^2 + 1\right)y''(x) + axy'(x) + by(x) = 0$$

✓ **Mathematica** : cpu = 0.026372 (sec), leaf count = 52

$$\left\{\left\{y(x) \to c_1 \cos\left(\frac{\sqrt{b}\sinh^{-1}\left(\sqrt{a}x\right)}{\sqrt{a}}\right) + c_2 \sin\left(\frac{\sqrt{b}\sinh^{-1}\left(\sqrt{a}x\right)}{\sqrt{a}}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.175 (sec), leaf count = 63

$$\left\{y(x) = \left(\_C1\left(\left(\sqrt{a}x + \sqrt{ax^2+1}\right)^{i\sqrt{b}\frac{1}{\sqrt{a}}}\right)^2 + \_C2\right)\left(\left(\sqrt{a}x + \sqrt{ax^2+1}\right)^{i\sqrt{b}\frac{1}{\sqrt{a}}}\right)^{-1}\right\}$$

2.1298 ODE No. 1298

$$(ax^2+1)\,y''(x)+bxy'(x)+cy(x)=0$$

✓ **Mathematica** : cpu = 0.0553403 (sec), leaf count = 162

$$\left\{\left\{y(x)\to c_1\left(ax^2+1\right)^{\frac{2a-b}{4a}}P_{\frac{\sqrt{a^2-2ba-4ca+b^2}-a}{2a}}^{\frac{b-2a}{2a}}\left(i\sqrt{a}x\right)+c_2\left(ax^2+1\right)^{\frac{2a-b}{4a}}Q_{\frac{\sqrt{a^2-2ba-4ca+b^2}-a}{2a}}^{\frac{b-2a}{2a}}\left(i\sqrt{a}x\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.444 (sec), leaf count = 124

$$\left\{y(x)=\left(ax^2+1\right)^{\frac{2a-b}{4a}}\left(\mathit{LegendreP}\left(\frac{1}{2\,a}\left(\sqrt{a^2+(-2\,b-4\,c)\,a+b^2}-a\right),\frac{2\,a-b}{2\,a},\sqrt{-a}x\right)\_C1+\mathit{LegendreQ}\left(\right.\right.$$

2.1299 ODE No. 1299

$$(a^2x^2-1)\,y''(x)+2a^2xy'(x)=0$$

✓ **Mathematica** : cpu = 0.0161792 (sec), leaf count = 19

$$\left\{\left\{y(x)\to c_2-\frac{c_1\tanh^{-1}(ax)}{a}\right\}\right\}$$

✓ **Maple** : cpu = 0.044 (sec), leaf count = 27

$$\left\{y(x)=\_C1-\frac{(\ln(ax+1)-\ln(ax-1))\,\_C2}{2\,a}\right\}$$

2.1300 ODE No. 1300

$$(a^2x^2-1)\,y''(x)+2a^2xy'(x)-2a^2y(x)=0$$

✓ **Mathematica** : cpu = 0.0109633 (sec), leaf count = 41

$$\left\{\left\{y(x)\to ac_1x+c_2\left(ax\left(\frac{1}{2}\log(ax+1)-\frac{1}{2}\log(1-ax)\right)-1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.088 (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 = 0.0247093 (sec), leaf count = 31

$$\left\{\left\{y(x)\to\frac{c_2(ax+b)^3}{3ax}+\frac{c_1}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.044 (sec), leaf count = 19

$$\left\{y(x)=\frac{\_C1+\_C2\,(ax+b)^3}{x}\right\}$$

2.1302 ODE No. 1302

$$\mathrm{A0}y(x)(ax+b)+\mathrm{A1}(ax+b)y'(x)+\mathrm{A2}(ax+b)^2y''(x)=0$$

✓ **Mathematica** : cpu = 0.0631535 (sec), leaf count = 243

$$\left\{\left\{y(x)\to c_1\left(\frac{2b}{a}+2x\right)^{\frac{\mathrm{A1}}{2a\mathrm{A2}}}(2a\mathrm{A2}x+2\mathrm{A2}b)^{-\frac{\mathrm{A1}}{2a\mathrm{A2}}}\left(-\frac{\mathrm{A0}\left(\frac{b}{a}+x\right)}{a\mathrm{A2}}\right)^{\frac{1}{2}-\frac{\mathrm{A1}}{2a\mathrm{A2}}}I_{\frac{\mathrm{A1}}{a\mathrm{A2}}-1}\left(2\sqrt{-\frac{\mathrm{A0}\left(\frac{b}{a}+x\right)}{a\mathrm{A2}}}\right)+c_2(-$$

✓ **Maple** : cpu = 0.312 (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 = 5.19027 (sec), leaf count = 498

$$\left\{\left\{y(x)\to c_1\,{}_2F_1\left(-\frac{a-d+\sqrt{(a-d)^2-4ag}}{2a},\frac{-a+d+\sqrt{(a-d)^2-4ag}}{2a};\frac{\left(b+\sqrt{b^2-4ac}\right)d-2af}{2a\sqrt{b^2-4ac}};\frac{b+2ax}{2\sqrt{b}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.784 (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 = 0.0514674 (sec), leaf count = 50

$$\left\{\left\{y(x)\to \frac{c_2\left(e^{\frac{1}{x}}\text{Ei}\left(-\frac{1}{x}\right)+2x^3-x^2+x\right)}{6x}+\frac{c_1e^{\frac{1}{x}}}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.055 (sec), leaf count = 38

$$\left\{y(x) = \frac{1}{x}\left(Ei\left(1,x^{-1}\right)e^{x^{-1}}\_C2 + \_C1\, e^{x^{-1}} - 2\,x\left(x^2 - x/2 + 1/2\right)\_C2\right)\right\}$$

2.1305 ODE No. 1305

$$x^3y''(x) + 2xy'(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 0.0769424 (sec), leaf count = 47

$$\left\{\left\{y(x)\to c_2G_{1,2}^{2,0}\left(-\frac{2}{x}\middle|\begin{array}{c}\frac{1}{2}\\ -1,0\end{array}\right)+c_1e^{\frac{1}{x}}\left(I_0\left(\frac{1}{x}\right)-I_1\left(\frac{1}{x}\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.124 (sec), leaf count = 44

$$\left\{y(x) = \left(\_C2\,K_1\left(-x^{-1}\right) - \_C2\,K_0\left(-x^{-1}\right) + \_C1\,\left(I_0\left(x^{-1}\right) - I_1\left(x^{-1}\right)\right)\right)e^{x^{-1}}\right\}$$

2.1306 ODE No. 1306

$$y(x)\left(ax^2 + a + bx\right) + x^2y'(x) + x^3y''(x) = 0$$

✗ **Mathematica** : cpu = 0.940047 (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 = 1.13 (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 = 0.114272 (sec), leaf count = 54

$$\left\{\left\{y(x) \to \frac{c_1 e^{\frac{1}{x}}(x+1)}{x} - \frac{c_2\left(e^{\frac{1}{x}}x\text{Ei}\left(-\frac{1}{x}\right) + e^{\frac{1}{x}}\text{Ei}\left(-\frac{1}{x}\right) + x\right)}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.074 (sec), leaf count = 36

$$\left\{y(x) = \frac{-\_C2\, e^{x^{-1}}(1+x)\, Ei\left(1, x^{-1}\right) + \_C1\,(1+x)\, e^{x^{-1}} + \_C2\, x}{x}\right\}$$

2.1308 ODE No. 1308

$$-x^2y'(x) + x^3y''(x) + xy(x) - \log^3(x) = 0$$

✓ **Mathematica** : cpu = 0.0136371 (sec), leaf count = 41

$$\left\{\left\{y(x) \to \frac{2\log^3(x) + 6\log^2(x) + 9\log(x) + 6}{8x} + c_1x + c_2x\log(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.052 (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

$$-\left(x^2-1\right)y'(x) + x^3y''(x) + xy(x) = 0$$

✓ **Mathematica** : cpu = 0.0947751 (sec), leaf count = 84

$$\left\{\left\{y(x) \to c_2 G_{1,2}^{2,0}\left(-\frac{1}{2x^2}\middle|\begin{array}{c}1\\ -\frac{1}{2},-\frac{1}{2}\end{array}\right) + \sqrt{2}c_1 e^{\frac{1}{4x^2}}x\left(\left(1-\frac{1}{2x^2}\right)I_0\left(\frac{1}{4x^2}\right) + \frac{I_1\left(\frac{1}{4x^2}\right)}{2x^2}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.271 (sec), leaf count = 85

$$\left\{y(x) = \frac{\_C1}{x}e^{\frac{1}{4\,x^2}}\left(2\,I_0(1/4\,x^{-2})x^2 - I_0\left(\frac{1}{4\,x^2}\right) + I_1\left(\frac{1}{4\,x^2}\right)\right) + \frac{\_C2}{x}e^{\frac{1}{4\,x^2}}\left(2\,K_0(-1/4\,x^{-2})x^2 - K_0\left(-\frac{1}{4\,x^2}\right)\right.$$

2.1310 ODE No. 1310

$$3x^2y'(x) + x^3y''(x) + xy(x) - 1 = 0$$

✓ **Mathematica** : cpu = 0.016752 (sec), leaf count = 31

$$\left\{\left\{y(x) \to \frac{\log^2(x)}{2x} + \frac{c_1}{x} + \frac{c_2\log(x)}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.091 (sec), leaf count = 20

$$\left\{y(x) = \frac{1}{x}\left(\_C1\ \ln(x) + \frac{(\ln(x))^2}{2} + \_C2\right)\right\}$$

2.1311 ODE No. 1311

$$-v(v+1)xy(x) + (2x^2+1)\,y'(x) + x(x^2+1)\,y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0990644 (sec), leaf count = 63

$$\left\{\left\{y(x) \to c_2G_{2,2}^{2,0}\left(-x^2\middle|\begin{array}{c}\frac{1-v}{2},\frac{v+2}{2}\\0,0\end{array}\right) + c_1\,{}_2F_1\left(\frac{v}{2}+\frac{1}{2},-\frac{v}{2};1;-x^2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.849 (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

$$2(x^2-1)\,y'(x) + x(x^2+1)\,y''(x) - 2xy(x) = 0$$

✓ **Mathematica** : cpu = 0.0167936 (sec), leaf count = 32

$$\left\{\left\{y(x) \to \frac{c_2x^3}{3(x^2+1)} + \frac{c_1}{x^2+1}\right\}\right\}$$

✓ **Maple** : cpu = 0.041 (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 = 0.156885 (sec), leaf count = 87

$$\left\{\left\{y(x)\to c_2 x^{-2n}\,{}_2F_1\left(-\frac{n}{2}-\frac{v}{2},-\frac{n}{2}+\frac{v}{2}+\frac{1}{2};1-n;-x^2\right)+c_1\,{}_2F_1\left(\frac{n}{2}-\frac{v}{2},\frac{n}{2}+\frac{v}{2}+\frac{1}{2};n+1;-x^2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.493 (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 = 0.143067 (sec), leaf count = 87

$$\left\{\left\{y(x)\to c_2 x^{2n}\,{}_2F_1\left(\frac{n}{2}-\frac{v}{2},\frac{n}{2}+\frac{v}{2}+\frac{1}{2};n+1;-x^2\right)+c_1\,{}_2F_1\left(-\frac{n}{2}-\frac{v}{2},-\frac{n}{2}+\frac{v}{2}+\frac{1}{2};1-n;-x^2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.477 (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 = 0.021254 (sec), leaf count = 44

$$\left\{\left\{y(x)\to c_1\cos\left(\sqrt{a}\sqrt{x^2-1}\right)+c_2\sin\left(\sqrt{a}\sqrt{x^2-1}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.11 (sec), leaf count = 45

$$\left\{y(x)=\_C1\,\sin\left((1+x)(x-1)\sqrt{a}\frac{1}{\sqrt{x^2-1}}\right)+\_C2\,\cos\left((1+x)(x-1)\sqrt{a}\frac{1}{\sqrt{x^2-1}}\right)\right\}$$

2.1316 ODE No. 1316

$$(x^2-1)\,y'(x)+x(x^2-1)\,y''(x)-xy(x)=0$$

✓ **Mathematica** : cpu = 0.0724323 (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 = 0.163 (sec), leaf count = 18

$$\{y(x)=\_C1\ EllipticE(x)+\_C2\ (EllipticCE(x)-EllipticCK(x))\}$$

2.1317 ODE No. 1317

$$(3x^2-1)\,y'(x)+x(x^2-1)\,y''(x)+xy(x)=0$$

✓ **Mathematica** : cpu = 0.0877478 (sec), leaf count = 38

$$\left\{\left\{y(x)\to c_2G_{2,2}^{2,0}\left(x^2|\begin{array}{c}\frac{1}{2},\frac{1}{2}\\0,0\end{array}\right)+\frac{2c_1K(x^2)}{\pi}\right\}\right\}$$

✓ **Maple** : cpu = 0.264 (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 = 0.209664 (sec), leaf count = 172

$$\left\{\left\{y(x)\to i^{b+1}c_2x^{b+1}\,{}_2F_1\left(\frac{a}{4}+\frac{b}{2}-\frac{1}{4}\sqrt{a^2-2a-4c+1}+\frac{1}{4},\frac{a}{4}+\frac{b}{2}+\frac{1}{4}\sqrt{a^2-2a-4c+1}+\frac{1}{4};\frac{b}{2}+\frac{3}{2};x^2\right)+\right.\right.$$

✓ **Maple** : cpu = 0.617 (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 = 0.0506298 (sec), leaf count = 60

$$\left\{\left\{y(x)\to c_1x^{3/2}(x^2+2)^{3/4} - \frac{c_2(x^2+2)^{3/4}\,{}_2F_1\left(-\frac{3}{4},\frac{7}{4};\frac{1}{4};-\frac{x^2}{2}\right)}{3\,2^{3/4}}\right\}\right\}$$

✓ **Maple** : cpu = 0.305 (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

$$-(x^3+3x^2-2x-2)\,y'(x) + x(x^2-2)\,y''(x) + (x^2+4x+2)\,y(x) = 0$$

✓ **Mathematica** : cpu = 0.0720409 (sec), leaf count = 21

$$\{\{y(x)\to c_1e^xx^2 + c_2(x-1)\}\}$$

✓ **Maple** : cpu = 0.064 (sec), leaf count = 17

$$\{y(x) = \_C1\,(x-1) + \_C2\,x^2\mathrm{e}^x\}$$

2.1321 ODE No. 1321

$$(x+1)x^2y''(x) - (2x+1)xy'(x) + (2x+1)y(x) = 0$$

✓ **Mathematica** : cpu = 0.019607 (sec), leaf count = 18

$$\{\{y(x)\to c_1x + c_2x(x+\log(x))\}\}$$

✓ **Maple** : cpu = 0.048 (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 = 0.0274268 (sec), leaf count = 44

$$\left\{\left\{y(x)\to c_1\left(\frac{1}{x^2}-\frac{1}{3x^3}-\frac{3}{x}-\frac{1}{x+1}-4\log(x)+4\log(x+1)\right)+c_2\right\}\right\}$$

✓ **Maple** : cpu = 0.052 (sec), leaf count = 44

$$\left\{y(x)=\_C1+\left(-4\ln(x)+4\ln(1+x)-\frac{12x^3+6x^2-2x+1}{3x^3(1+x)}\right)\_C2\right\}$$

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 = 0.722116 (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 = 0.045 (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 = 0.0266568 (sec), leaf count = 25

$$\{\{y(x)\to c_1x^3-c_2x^2(x\log(x)+1)\}\}$$

✓ **Maple** : cpu = 0.051 (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 = 0.198467 (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 = 0.648 (sec), leaf count = 86

$$\left\{y(x)=(x-1)^{1-a-\alpha-b-\beta}\left({}_2\mathrm{F}_1(1-b-\beta,1-a-\beta;\ 1-\beta+\alpha;\ x)x^\alpha\_C1+{}_2\mathrm{F}_1(1-a-\alpha,1-\alpha-b;\ 1+\beta-\right.$$

2.1326 ODE No. 1326

$$y''(x) = -\frac{y'(x)}{x+1} - \frac{y(x)}{x(x+1)^2}$$

✓ **Mathematica** : cpu = 0.0182065 (sec), leaf count = 29

$$\left\{\left\{y(x)\to\frac{c_1x}{x+1}+\frac{c_2(x\log(x)-1)}{x+1}\right\}\right\}$$

✓ **Maple** : cpu = 0.049 (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 = 0.140262 (sec), leaf count = 104

$$\left\{\left\{y(x)\to\left(-\frac{1}{2}\right)^{\frac{1}{\sqrt{2}}}c_2x^{\frac{1}{\sqrt{2}}}\,{}_2F_1\left(\frac{1}{\sqrt{2}},-1+\frac{1}{\sqrt{2}};1+\sqrt{2};\frac{x}{2}\right)+\left(-\frac{1}{2}\right)^{-\frac{1}{\sqrt{2}}}c_1x^{-\frac{1}{\sqrt{2}}}\,{}_2F_1\left(-\frac{1}{\sqrt{2}},-1-\frac{1}{\sqrt{2}};1-\sqrt{2};\right.\right.\right.$$

✓ **Maple** : cpu = 1.524 (sec), leaf count = 81

$$\left\{y(x)=(x-2)^2\left(\_C2\,{}_2\mathrm{F}_1(2+\frac{\sqrt{2}}{2},1+\frac{\sqrt{2}}{2};\ 1+\sqrt{2};\ \frac{x}{2})x^{\frac{\sqrt{2}}{2}}+\_C1\,{}_2\mathrm{F}_1(2-\frac{\sqrt{2}}{2},1-\frac{\sqrt{2}}{2};\ 1-\sqrt{2};\ \frac{x}{2})x^{-\frac{\sqrt{2}}{2}}\right)\right\}$$

2.1328 ODE No. 1328

$$y''(x) = \frac{2y(x)}{(x-1)^2 x}$$

✓ **Mathematica** : cpu = 0.0174604 (sec), leaf count = 36

$$\left\{\left\{y(x) \to \frac{c_2\left(-x^2+2x\log(x)+1\right)}{x-1} - \frac{c_1 x}{x-1}\right\}\right\}$$

✓ **Maple** : cpu = 0.049 (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 = 0.606059 (sec), leaf count = 67

$$\{\{y(x) \to c_2 x^{1-\text{gamma1}}\text{HeunG}[a, q-(\text{gamma1}-1)((a-1)\delta+\alpha+\beta-\text{gamma1}+1), \beta-\text{gamma1}+1, \alpha-\text{gan}$$

✓ **Maple** : cpu = 2.505 (sec), leaf count = 64

$$\{y(x) = \_C1\; HeunG(a,q,\alpha,\beta,\gamma 1,\delta,x) + \_C2\; x^{1-\gamma 1} HeunG(a, q-(-1+\gamma 1)\left(\delta\left(a-1\right)+\alpha+\beta-\gamma 1+1\right), \beta+$$

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 = 3.49395 (sec), leaf count = 1175

$$\left\{\left\{y(x) \to c_2\text{HeunG}\left[\frac{a-c}{a-b}, \frac{A^2ba^4+B^2a^3+A\left(b^2-ab+(a+b)B+2C\right)a^3+(a-b)^2(a\text{DD}+e)a^2-2(a-b)\right.\right.\right.$$

✓ **Maple** : cpu = 2.894 (sec), leaf count = 1147

$$\left\{y(x) = \_C1\; HeunG\left(\frac{a-c}{a-b}, \frac{DD\,a+E}{a-b}, \frac{A}{2}-\frac{1}{2}+\frac{1}{2}\sqrt{A^2-2A-4DD+1}, \left((A(b-c)a-Abc-Bc-C)\sqrt{A^{\cdot}}\right.\right.\right.$$

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 = 0.0350131 (sec), leaf count = 55

$$\left\{\left\{y(x) \to \frac{c_1 \sqrt[4]{x-2}\sqrt{x}}{\sqrt[4]{2-x}} + \frac{2c_2(x-2)^{3/4}\sqrt{x}}{\sqrt[4]{2-x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.072 (sec), leaf count = 19

$$\left\{y(x) = \_C1\,\sqrt{x} + \_C2\,\sqrt{x\,(x-2)}\right\}$$

2.1332 ODE No. 1332

$$y''(x) = \frac{y'(x)}{x+1} - \frac{(3x+1)y(x)}{4x^2(x+1)}$$

✓ **Mathematica** : cpu = 0.018698 (sec), leaf count = 26

$$\{\{y(x) \to c_1\sqrt{x} + c_2\sqrt{x}(x+\log(x))\}\}$$

✓ **Maple** : cpu = 0.045 (sec), leaf count = 17

$$\{y(x) = \sqrt{x}(\_C2\,\ln(x) + \_C2\,x + \_C1)\}$$

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 = 0.0763451 (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 = 0.624 (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

$$y''(x) = -\frac{y(x)\left(x\left(a^2-b^2\right)+c^2\right)}{4(x-1)x^2} - \frac{((a+1)x-1)y'(x)}{(x-1)x}$$

✓ **Mathematica** : cpu = 0.149196 (sec), leaf count = 114

$$\left\{\left\{y(x) \to i^{-c} c_1 x^{-c/2} {}_2F_1\left(\frac{a}{2}-\frac{b}{2}-\frac{c}{2},\frac{a}{2}+\frac{b}{2}-\frac{c}{2};1-c;x\right)+i^c c_2 x^{c/2} {}_2F_1\left(\frac{a}{2}-\frac{b}{2}+\frac{c}{2},\frac{a}{2}+\frac{b}{2}+\frac{c}{2};c+1;x\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.505 (sec), leaf count = 89

$$\left\{y(x) = (x-1)^{1-a}\left(x^{-\frac{c}{2}} {}_2\mathrm{F}_1(-\frac{a}{2}+\frac{b}{2}-\frac{c}{2}+1,-\frac{a}{2}-\frac{b}{2}-\frac{c}{2}+1;\ 1-c;\ x)\_C2 + x^{\frac{c}{2}} {}_2\mathrm{F}_1(-\frac{a}{2}-\frac{b}{2}+\frac{c}{2}+1,-\frac{a}{2}\right.$$

2.1335 ODE No. 1335

$$y''(x) = -\frac{y(x)(ax+b)}{4(x-1)^2 x} - \frac{(3x-1)y'(x)}{2(x-1)x}$$

✓ **Mathematica** : cpu = 0.233443 (sec), leaf count = 893

$$\left\{\left\{y(x) \to e^{\frac{1}{4}(-2\log(1-x)-\log(x))} \sqrt[4]{x} c_1 {}_2F_1\left(\frac{1}{4}\left(\sqrt{-8a-4b-4\sqrt{4a^2+4ba-a-b}+1}+1\right), \frac{\left(-8a-4b-4\sqrt{4a\right.}{}\right.\right.\right.$$

✓ **Maple** : cpu = 0.264 (sec), leaf count = 57

$$\left\{y(x) = \_C1\ LegendreP\left(\frac{1}{2}\sqrt{1-4a}-\frac{1}{2},\sqrt{-a-b},\sqrt{x}\right)+\_C2\ LegendreQ\left(\frac{1}{2}\sqrt{1-4a}-\frac{1}{2},\sqrt{-a-b},\sqrt{x}\right)\right\}$$

2.1336 ODE No. 1336

$$y''(x) = -\frac{(1-3x)y(x)}{(x-1)(2x-1)^2}$$

✓ **Mathematica** : cpu = 0.0367789 (sec), leaf count = 70

$$\{\{y(x) \to c_2\sqrt{1-2x}(2x\log(2(x-1)+1)-2\log(2(x-1)+1)-2x\log(x-1)+2\log(x-1)-1)-c_1\sqrt{1-2x}$$

✓ **Maple** : cpu = 0.059 (sec), leaf count = 42

$$\left\{y(x) = \left(-2\_C2\,(x-1)\ln(2x-1)+2\_C2\,(x-1)\ln(x-1)+\_C1\,x-\_C1+\_C2\right)\sqrt{2x-1}\right\}$$

2.1337 ODE No. 1337

$$y''(x) = -\frac{(a+2b+3x)y'(x)}{2(a+x)(b+x)} - \frac{(a-b)y(x)}{4(a+x)^2(b+x)}$$

✓ **Mathematica** : cpu = 0.0581895 (sec), leaf count = 62

$$\left\{\left\{y(x) \to \frac{c_1}{\sqrt{\frac{b+x}{a-b}+1}} + \frac{c_2\sqrt{b+x}}{\sqrt{a-b}\sqrt{\frac{b+x}{a-b}+1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.178 (sec), leaf count = 27

$$\left\{y(x) = \left(\sqrt{x+b}\_C1 + \_C2\right)\frac{1}{\sqrt{\frac{x+a}{a-b}}}\right\}$$

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 = 0.0447011 (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 = 0.055 (sec), leaf count = 27

$$\left\{y(x) = \_C2\,(x-2)^{\frac{17}{6}}\sqrt[6]{x} + 18\,x\left(x^2 - \frac{17\,x}{3} + \frac{187}{18}\right)\_C1\right\}$$

2.1339 ODE No. 1339

$$y''(x) = -\frac{y'(x)\left(a(b+2)x^2 + x(c-d+1)\right)}{x^2(ax+1)} - \frac{y(x)(abx-cd)}{x^2(ax+1)}$$

✓ **Mathematica** : cpu = 0.198758 (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 = 0.656 (sec), leaf count = 76

$$\left\{y(x) = (ax+1)^{-b+c-d}\left({}_2\mathrm{F}_1(-d,1-b-d;\,1-c-d;\,-ax)x^{-c}\_C2 + {}_2\mathrm{F}_1(c,1-b+c;\,1+c+d;\,-ax)x^d\_C1\right.\right.$$

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 = 0.0273789 (sec), leaf count = 32

$$\left\{\left\{y(x) \to \frac{c_2 x^3}{ax + b} + \frac{c_1 x^2}{ax + b}\right\}\right\}$$

✓ **Maple** : cpu = 0.049 (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 = 62.0389 (sec), leaf count = 2924

$$\left\{\left\{y(x) \to \frac{axc_1\,{}_2F_1\left(\frac{3}{2} - \frac{1}{2}\sqrt{1 - 4v}, \frac{1}{2}\sqrt{1 - 4v} + \frac{3}{2}; 3; -\frac{ax}{b}\right)}{b} + c_2 G_{2,2}^{2,0}\left(-\frac{ax}{b} \middle| \begin{array}{c} \frac{1}{2}\left(1 - \sqrt{1 - 4v}\right), \frac{1}{2}\left(\sqrt{1 - 4v} + 1\right) \\ -1, 1 \end{array}\right.\right.\right.$$

✓ **Maple** : cpu = 0.858 (sec), leaf count = 201

$$\left\{y(x) = \frac{1}{a^2\,(v + 6)\,(v + 2)\,(v + 12)}\left(x^{-\frac{1}{2} + \frac{1}{2}\sqrt{1 - 4\,v}} a^2\_C2\,(v + 6)\,(v + 2)\,(v + 12)\,{}_2\mathrm{F}_1\left(\frac{3}{2} - \frac{1}{2}\sqrt{1 - 4\,v}, -\frac{1}{2} - \frac{1}{2}\sqrt{1\right.\right.$$

2.1342 ODE No. 1342

$$y''(x) = -\frac{ay(x)}{x^4}$$

✓ **Mathematica** : cpu = 0.0801479 (sec), leaf count = 52

$$\left\{\left\{y(x) \to c_1 x e^{\frac{i\sqrt{a}}{x}} - \frac{i c_2 x e^{-\frac{i\sqrt{a}}{x}}}{2\sqrt{a}}\right\}\right\}$$

✓ **Maple** : cpu = 0.074 (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 = 0.176915 (sec), leaf count = 73

$$\left\{\left\{y(x) \to c_1\left(2\left(ax + \frac{b}{2}\right)I_a\left(\frac{b}{x}\right) + bI_{a+1}\left(\frac{b}{x}\right)\right) + c_2\left(2\left(ax + \frac{b}{2}\right)K_a\left(\frac{b}{x}\right) - bK_{a+1}\left(\frac{b}{x}\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.325 (sec), leaf count = 58

$$\left\{y(x) = I_{a+1}\left(\frac{b}{x}\right)\_C1\, b + K_{a+1}\left(\frac{b}{x}\right)\_C2\, b + 2\left(\_C1\, I_a\left(\frac{b}{x}\right) - \_C2\, K_a\left(\frac{b}{x}\right)\right)(ax + b/2)\right\}$$

2.1344 ODE No. 1344

$$y''(x) = -\frac{\left(e^{2/x} - v^2\right)y(x)}{x^4}$$

✓ **Mathematica** : cpu = 0.479527 (sec), leaf count = 173

$$\left\{\left\{y(x) \to \frac{c_1 2^{v+\frac{v+1}{2}}\left(e^{2/x}\right)^{\frac{v+1}{2}-\frac{1}{2}}\left(-e^{2/x}\right)^{\frac{1}{2}(-v-1)+\frac{1}{2}} I_v\left(\sqrt{-e^{2/x}}\right)}{\log\left(e^{2/x}\right)} + \frac{c_2(-1)^{-v}2^{v+\frac{v+1}{2}}\left(e^{2/x}\right)^{\frac{v+1}{2}-\frac{1}{2}}\left(-e^{2/x}\right)^{\frac{1}{2}(-v-1}}{\log\left(e^{2/x}\right)}\right.\right.$$

✓ **Maple** : cpu = 0.398 (sec), leaf count = 23

$$\left\{y(x) = x\left(J_v\left(\mathrm{e}^{x^{-1}}\right)\_C1 + Y_v\left(\mathrm{e}^{x^{-1}}\right)\_C2\right)\right\}$$

2.1345 ODE No. 1345

$$y''(x) = \frac{2y(x)}{x^4} - \frac{y'(x)}{x^3}$$

✓ **Mathematica** : cpu = 0.0508358 (sec), leaf count = 52

$$\left\{\left\{y(x) \to c_1 e^{\frac{1}{2x^2}} x - \sqrt{\frac{\pi}{2}} c_2 e^{\frac{1}{2x^2}} x \operatorname{erf}\left(\frac{1}{\sqrt{2}x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.069 (sec), leaf count = 25

$$\left\{y(x) = x e^{\frac{1}{2x^2}} \left(\mathit{Erf}\left(\frac{\sqrt{2}}{2\,x}\right) \_C2 + \_C1\right)\right\}$$

2.1346 ODE No. 1346

$$y''(x) = \frac{(a+b)y'(x)}{x^2} - \frac{y(x)(x(a+b)+ab)}{x^4}$$

✓ **Mathematica** : cpu = 0.0824159 (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 = 0.117 (sec), leaf count = 25

$$\left\{y(x) = x\left(e^{-\frac{a}{x}} \_C1 + e^{-\frac{b}{x}} \_C2\right)\right\}$$

2.1347 ODE No. 1347

$$y''(x) = -\frac{y(x)}{x^4} - \frac{y'(x)}{x}$$

✓ **Mathematica** : cpu = 0.0832317 (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 = 0.08 (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 = 0.36644 (sec), leaf count = 34

$$\{\{y(x) \to c_1 \text{MathieuC}[-b, a, i\log(x)] + c_2 \text{MathieuS}[-b, a, i\log(x)]\}\}$$

✓ **Maple** : cpu = 2.386 (sec), leaf count = 73

$$\left\{y(x) = \mathit{HeunD}\left(0, 2a+b, 0, 2a-b, \frac{x^2+1}{x^2-1}\right)\left(\int \frac{1}{x}\left(\mathit{HeunD}\left(0, 2a+b, 0, 2a-b, \frac{x^2+1}{x^2-1}\right)\right)^{-2} \mathrm{d}x\_C2 + \_C1\right)\right\}$$

2.1349 ODE No. 1349

$$y''(x) = -\frac{\left(x^2+1\right)y'(x)}{x^3} - \frac{y(x)}{x^4}$$

✓ **Mathematica** : cpu = 0.103204 (sec), leaf count = 76

$$\left\{\left\{y(x) \to c_2 G_{1,2}^{2,0}\left(-\frac{1}{2x^2}\middle|\begin{array}{c}\frac{3}{2}\\0,0\end{array}\right) + c_1 e^{\frac{1}{4x^2}}\left(\left(1-\frac{1}{2x^2}\right)I_0\left(\frac{1}{4x^2}\right) + \frac{I_1\left(\frac{1}{4x^2}\right)}{2x^2}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.219 (sec), leaf count = 85

$$\left\{y(x) = \frac{\_C1}{x^2}\mathrm{e}^{\frac{1}{4x^2}}\left(2I_0(1/4x^{-2})x^2 - I_0\left(\frac{1}{4x^2}\right) + I_1\left(\frac{1}{4x^2}\right)\right) + \frac{\_C2}{x^2}\mathrm{e}^{\frac{1}{4x^2}}\left(2K_0(-1/4x^{-2})x^2 - K_0\left(-\frac{1}{4x^2}\right)\right.$$

2.1350 ODE No. 1350

$$y''(x) = -\frac{a^2y(x)}{x^4} - \frac{2y'(x)}{x}$$

✓ **Mathematica** : cpu = 0.0108688 (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 = 0.049 (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 = 0.0162251 (sec), leaf count = 50

$$\left\{\left\{y(x) \to c_1 e^{\frac{1}{2x^2}} - \sqrt{\frac{\pi}{2}} c_2 e^{\frac{1}{2x^2}} \operatorname{erf}\left(\frac{1}{\sqrt{2}x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.057 (sec), leaf count = 24

$$\left\{y(x) = e^{\frac{1}{2\,x^2}} \left(\mathit{Erf}\left(\frac{\sqrt{2}}{2\,x}\right) \_C2 + \_C1\right)\right\}$$

2.1352 ODE No. 1352

$$y''(x) = -\frac{2(a+x)y'(x)}{x^2} - \frac{by(x)}{x^4}$$

✓ **Mathematica** : cpu = 0.0126926 (sec), leaf count = 89

$$\left\{\left\{y(x) \to c_1 e^{-\frac{\sqrt{b}\left(-\frac{\sqrt{a^2-b}}{\sqrt{b}} - \frac{a}{\sqrt{b}}\right)}{x}} + c_2 e^{-\frac{\sqrt{b}\left(\frac{\sqrt{a^2-b}}{\sqrt{b}} - \frac{a}{\sqrt{b}}\right)}{x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.084 (sec), leaf count = 43

$$\left\{y(x) = \_C1\, e^{\frac{1}{x}\left(a-\sqrt{a^2-b}\right)} + \_C2\, e^{\frac{1}{x}\left(a+\sqrt{a^2-b}\right)}\right\}$$

2.1353 ODE No. 1353

$$y''(x) = \frac{(2x^2-1)\, y'(x)}{x^3} - \frac{y(x)}{x^4}$$

✓ **Mathematica** : cpu = 0.864277 (sec), leaf count = 119

$$\left\{\left\{y(x) \to c_1\left(x^3 + 2x - \frac{1}{x}\right) - \frac{c_2\left(\sqrt{2\pi}x^4 \operatorname{erfi}\left(\frac{1}{\sqrt{2}x}\right) + 2\sqrt{2\pi}x^2 \operatorname{erfi}\left(\frac{1}{\sqrt{2}x}\right) - \sqrt{2\pi} \operatorname{erfi}\left(\frac{1}{\sqrt{2}x}\right) - 2e^{\frac{1}{2x^2}} x^3 + 2e^{\frac{1}{2x^2}} x\right.}{16x}$$

✓ **Maple** : cpu = 0.436 (sec), leaf count = 66

$$\left\{y(x) = \frac{1}{x}\left(\_C1\, \sqrt{2}\sqrt{\pi}\left(x^4 + 2\,x^2 - 1\right) \mathit{erfi}\left(\frac{\sqrt{2}}{2\,x}\right) + \left(-2\,\_C1\, x^3 + 2\,\_C1\, x\right) e^{\frac{1}{2\,x^2}} + \_C2\, \left(x^4 + 2\,x^2 - 1\right)\right)\right\}$$

2.1354 ODE No. 1354

$$y''(x) = \frac{(2x^2-1)\,y'(x)}{x^3} - \frac{2y(x)}{x^4}$$

✓ **Mathematica** : cpu = 0.252775 (sec), leaf count = 108

$$\left\{\left\{y(x) \to \frac{c_2\left(-5\sqrt{2\pi}x^2\text{erfi}\left(\frac{1}{\sqrt{2}x}\right)+\sqrt{2\pi}\text{erfi}\left(\frac{1}{\sqrt{2}x}\right)+4e^{\frac{1}{2x^2}}x^5+8e^{\frac{1}{2x^2}}x^3-2e^{\frac{1}{2x^2}}x\right)}{12x^2}+c_1\left(1-\frac{1}{5x^2}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.776 (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 = 0.257534 (sec), leaf count = 51

$$\left\{\left\{y(x) \to \frac{1}{2}c_2\sqrt[3]{x^3+1}x^2\,{}_2F_1\left(\frac{2}{3},\frac{4}{3};\frac{5}{3};-x^3\right)+c_1\sqrt[3]{x^3+1}\right\}\right\}$$

✓ **Maple** : cpu = 0.364 (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 = 0.228603 (sec), leaf count = 90

$$\left\{\left\{y(x) \to c_1x^{-n}\,{}_2F_1\left(-\frac{n}{2}-\frac{v}{2},-\frac{n}{2}+\frac{v}{2}+\frac{1}{2};1-n;-x^2\right)+c_2x^n\,{}_2F_1\left(\frac{n}{2}-\frac{v}{2},\frac{n}{2}+\frac{v}{2}+\frac{1}{2};n+1;-x^2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.456 (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 = 0.511435 (sec), leaf count = 288

$$\left\{\left\{y(x) \to c_1 x^{\frac{1}{2}\left(-\sqrt{a^2-4a-4c+4}-a+2\right)}\, {}_2F_1\left(-\frac{1}{4}\sqrt{a^2-2a-4b+1} - \frac{1}{4}\sqrt{a^2-4a-4c+4} + \frac{1}{4}, \frac{1}{4}\sqrt{a^2-2a-4b+\right.\right.\right.$$

✓ **Maple** : cpu = 0.543 (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 = 0.0499561 (sec), leaf count = 89

$$\left\{\left\{y(x) \to \frac{c_1 x \sqrt[4]{x^2-1}}{\sqrt[4]{1-x^2}} - \frac{c_2 x \sqrt[4]{x^2-1}\left(\log\left(1-\frac{x}{\sqrt{x^2-1}}\right) - \log\left(\frac{x}{\sqrt{x^2-1}}+1\right)\right)}{2\sqrt[4]{1-x^2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.116 (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 = 0.082079 (sec), leaf count = 86

$$\left\{\left\{y(x) \to c_1 i^{-v} x^{-v}\, {}_2F_1\left(\frac{1}{2} - \frac{v}{2}, -\frac{v}{2}; \frac{1}{2} - v; x^2\right) + c_2 i^{v+1} x^{v+1}\, {}_2F_1\left(\frac{v}{2} + \frac{1}{2}, \frac{v}{2} + 1; v + \frac{3}{2}; x^2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.646 (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 = 0.0736504 (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 = 0.631 (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 = 0.377332 (sec), leaf count = 38

$$\{\{y(x) \to c_1 x^{-a} + c_2(-2ax^2 + 2a - x^2 + 3)\, x^{a+1}\}\}$$

✓ **Maple** : cpu = 0.049 (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

$$y''(x) = \frac{2xy'(x)}{x^2-1} - \frac{y(x)\left((x^2-1)\, x^2(a-n)(a+n+1) + 2ax^2 + n(n+1)\, (x^2-1)\right)}{x^2(x^2-1)}$$

✗ **Mathematica** : cpu = 10.3707 (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 = 2.184 (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 = 0.574665 (sec), leaf count = 236

$$\left\{\left\{y(x) \to c_1(-1)^{\frac{1}{4}\left(-\sqrt{a^2-2a-4b+1}+a-1\right)} x^{\frac{1}{2}\left(-\sqrt{a^2-2a-4b+1}+a-1\right)}\, {}_2F_1\left(\frac{a}{2} - \frac{1}{2}, \frac{a}{2} - \frac{1}{2}\sqrt{a^2 - 2a - 4b + 1} - \frac{1}{2}; 1 - \frac{1}{2}\right.\right.\right.$$

✓ **Maple** : cpu = 0.565 (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

$$y''(x) = \frac{y'(x)\left(2(a-1)x^2 - 2a + 2bc(x^2 - 1)\, x^c\right)}{x\,(x^2 - 1)} - \frac{y(x)\left(-bc(2a - c + 1)x^c + bc(2a - c - 1)x^{c+2} + x^2((a - 1)a\right.}{x^2\,(x^2 - 1)}$$

✓ **Mathematica** : cpu = 0.121683 (sec), leaf count = 42

$$\left\{\left\{y(x) \to c_1 P_v(x) e^{a \log(x) + bx^c} + c_2 Q_v(x) e^{a \log(x) + bx^c}\right\}\right\}$$

✓ **Maple** : cpu = 0.303 (sec), leaf count = 25

$$\left\{y(x) = x^a \mathrm{e}^{bx^c} (\mathit{LegendreQ}(v, x)\_C2 + \mathit{LegendreP}(v, x)\_C1)\right\}$$

2.1365 ODE No. 1365

$$y''(x) = -\frac{ay(x)}{(x^2 + 1)^2}$$

✓ **Mathematica** : cpu = 0.0773902 (sec), leaf count = 104

$$\left\{\left\{y(x) \to \frac{ic_2\sqrt{x^2 + 1}(1 - ix)^{\sqrt{a+1}}(1 + ix)^{-\sqrt{a+1}} e^{i\sqrt{a+1}\tan^{-1}(x)}}{2\sqrt{a + 1}} + c_1\sqrt{x^2 + 1} e^{i\sqrt{a+1}\tan^{-1}(x)}\right\}\right\}$$

✓ **Maple** : cpu = 0.137 (sec), leaf count = 59

$$\left\{y(x) = \sqrt{x^2 + 1}\left(\left(\frac{x + i}{-x + i}\right)^{-\frac{1}{2}\sqrt{a+1}} \_C2 + \left(\frac{x + i}{-x + i}\right)^{\frac{1}{2}\sqrt{a+1}} \_C1\right)\right\}$$

2.1366 ODE No. 1366

$$y''(x) = -\frac{2xy'(x)}{x^2+1} - \frac{y(x)}{(x^2+1)^2}$$

✓ **Mathematica** : cpu = 0.0189941 (sec), leaf count = 31

$$\left\{\left\{y(x) \to \frac{c_1}{\sqrt{x^2+1}} + \frac{c_2 x}{\sqrt{x^2+1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.061 (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 = 0.231092 (sec), leaf count = 229

$$\left\{\left\{y(x) \to c_1(x^2+1)^{\frac{\sqrt{m^2}}{2}} \text{HeunC}\left[\frac{1}{4}\left(-a^2 - \sqrt{m^2}\left(\sqrt{m^2}+1\right) + \frac{1}{4}\left(\sqrt{(2n+1)^2}-1\right)^2 + \frac{1}{2}\left(\sqrt{(2n+1)^2}-1\right)\right),\right.\right.$$

✓ **Maple** : cpu = 1.327 (sec), leaf count = 88

$$\left\{y(x) = (x^2+1)^{\frac{m}{2}}\left(HeunC\left(0, \frac{1}{2}, m, -\frac{a^2}{4}, \frac{1}{4} + \frac{a^2}{4} + \frac{m^2}{4} - \frac{n^2}{4} - \frac{n}{4}, -x^2\right)\_C2\, x + HeunC\left(0, -\frac{1}{2}, m, -\frac{a^2}{4}, \frac{1}{4}\right.\right.\right.$$

2.1368 ODE No. 1368

$$y''(x) = -\frac{axy'(x)}{x^2+1} - \frac{by(x)}{(x^2+1)^2}$$

✓ **Mathematica** : cpu = 0.0219905 (sec), leaf count = 106

$$\left\{\left\{y(x) \to c_1(x^2+1)^{\frac{2-a}{4}} P_{\frac{a-2}{2}}^{\frac{1}{2}\sqrt{a^2-4a+4b+4}}(ix) + c_2(x^2+1)^{\frac{2-a}{4}} Q_{\frac{a-2}{2}}^{\frac{1}{2}\sqrt{a^2-4a+4b+4}}(ix)\right\}\right\}$$

✓ **Maple** : cpu = 0.334 (sec), leaf count = 71

$$\left\{y(x) = (x^2+1)^{\frac{1}{2}-\frac{a}{4}}\left(LegendreQ\left(\frac{a}{2}-1, \frac{1}{2}\sqrt{a^2-4a+4b+4}, ix\right)\_C2 + LegendreP\left(\frac{a}{2}-1, \frac{1}{2}\sqrt{a^2-4a+4\right.\right.\right.$$

2.1369 ODE No. 1369

$$y''(x) = -\frac{ay(x)}{(x^2-1)^2}$$

✓ **Mathematica** : cpu = 0.0863866 (sec), leaf count = 106

$$\left\{\left\{y(x)\to \frac{c_2\sqrt{1-x^2}(x+1)^{\sqrt{1-a}}(1-x)^{-\sqrt{1-a}}e^{-\sqrt{1-a}\tanh^{-1}(x)}}{2\sqrt{1-a}}+c_1\sqrt{1-x^2}e^{-\sqrt{1-a}\tanh^{-1}(x)}\right\}\right\}$$

✓ **Maple** : cpu = 0.134 (sec), leaf count = 55

$$\left\{y(x) = \sqrt{x^2-1}\left(\left(\frac{x-1}{1+x}\right)^{-\frac{1}{2}\sqrt{1-a}}\_C2 + \left(\frac{x-1}{1+x}\right)^{\frac{1}{2}\sqrt{1-a}}\_C1\right)\right\}$$

2.1370 ODE No. 1370

$$y''(x) = \frac{a^2y(x)}{(x^2-1)^2} - \frac{2xy'(x)}{x^2-1}$$

✓ **Mathematica** : cpu = 0.0224372 (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 = 0.077 (sec), leaf count = 19

$$\{y(x) = \_C1\ \sinh(aArtanh(x)) + \_C2\ \cosh(aArtanh(x))\}$$

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 = 0.0165252 (sec), leaf count = 48

$$\left\{\left\{y(x)\to c_1P^a_{\frac{1}{2}(\sqrt{4\lambda+1}-1)}(x)+c_2Q^a_{\frac{1}{2}(\sqrt{4\lambda+1}-1)}(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.261 (sec), leaf count = 37

$$\left\{y(x) = \_C1\ LegendreP\left(\frac{1}{2}\sqrt{1+4\lambda}-\frac{1}{2},a,x\right)+\_C2\ LegendreQ\left(\frac{1}{2}\sqrt{1+4\lambda}-\frac{1}{2},a,x\right)\right\}$$

2.1372 ODE No. 1372

$$y''(x) = -\frac{y(x)\left(\left(x^2-1\right)\left(ax^2+bx+c\right)-k^2\right)}{\left(x^2-1\right)^2} - \frac{2xy'(x)}{x^2-1}$$

✓ **Mathematica** : cpu = 0.264252 (sec), leaf count = 202

$$\left\{\left\{y(x) \to c_1 e^{\sqrt{-a}x}\left(x^2-1\right)^{k/2} \text{HeunC}\left[(k+1)\left(2\sqrt{-a}-k\right)-a+b-c, 2\left(2\sqrt{-a}(k+1)+b\right), k+1, k+1, 4\sqrt{-a}\right.\right.\right.$$

✓ **Maple** : cpu = 2.259 (sec), leaf count = 110

$$\left\{y(x) = e^{\sqrt{-a}x}\left(HeunC\left(4\sqrt{-a}, -k, k, 2b, \frac{k^2}{2}+a-b+c, \frac{1}{2}+\frac{x}{2}\right)\sqrt{2x-2}(1+x)^{-\frac{k}{2}}(x-1)^{\frac{k}{2}-\frac{1}{2}}\_C2 + Heun\right.\right.$$

2.1373 ODE No. 1373

$$y''(x) = -\frac{y(x)\left(-a^2\left(x^2-1\right)^2-m^2-n(n+1)\left(x^2-1\right)\right)}{\left(x^2-1\right)^2} - \frac{2xy'(x)}{x^2-1}$$

✓ **Mathematica** : cpu = 0.21957 (sec), leaf count = 113

$$\left\{\left\{y(x) \to c_1\left(x^2-1\right)^{m/2} \text{HeunC}\left[\frac{1}{4}\left(-a^2-m(m+1)+n^2+n\right), -\frac{a^2}{4}, \frac{1}{2}, m+1, 0, x^2\right] + c_2x\left(x^2-1\right)^{m/2} \text{HeunC}\right.\right.$$

✓ **Maple** : cpu = 1.312 (sec), leaf count = 84

$$\left\{y(x) = \left(x^2-1\right)^{\frac{m}{2}}\left(HeunC\left(0, \frac{1}{2}, m, -\frac{a^2}{4}, \frac{1}{4}+\frac{a^2}{4}+\frac{m^2}{4}-\frac{n^2}{4}-\frac{n}{4}, x^2\right)\_C2\,x + HeunC\left(0, -\frac{1}{2}, m, -\frac{a^2}{4}, \frac{1}{4}+\right.\right.\right.$$

2.1374 ODE No. 1374

$$y''(x) = \frac{2(2a-1)xy'(x)}{x^2-1} - \frac{y(x)\left(x^2(2a(2a-1)-v(v+1))+2a+v(v+1)\right)}{\left(x^2-1\right)^2}$$

✓ **Mathematica** : cpu = 0.0237125 (sec), leaf count = 32

$$\left\{\left\{y(x) \to c_1\left(x^2-1\right)^a P_v(x) + c_2\left(x^2-1\right)^a Q_v(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.257 (sec), leaf count = 23

$$\left\{y(x) = \left(x^2-1\right)^a\left(LegendreP(v,x)\_C1 + LegendreQ(v,x)\_C2\right)\right\}$$

2.1375 ODE No. 1375

$$y''(x) = -\frac{y(x)\left(4ax^2(a-n) - (x^2-1)\left(2a+(v-n)(n+v+1)\right)\right)}{(x^2-1)^2} - \frac{2x(-2a+n+1)y'(x)}{x^2-1}$$

✓ **Mathematica** : cpu = 0.0333893 (sec), leaf count = 54

$$\left\{\left\{y(x) \to c_1 (x^2-1)^{\frac{1}{2}(2a-n)} P_v^n(x) + c_2 (x^2-1)^{\frac{1}{2}(2a-n)} Q_v^n(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.277 (sec), leaf count = 29

$$\left\{y(x) = (x^2-1)^{a-\frac{n}{2}} \left(LegendreQ(v,n,x)\_C2 + LegendreP(v,n,x)\_C1\right)\right\}$$

2.1376 ODE No. 1376

$$y''(x) = -\frac{by(x)}{x^2(a+x^2)} - \frac{(a+2x^2)\,y'(x)}{x(a+x^2)}$$

✓ **Mathematica** : cpu = 0.0344834 (sec), leaf count = 69

$$\left\{\left\{y(x) \to c_1 \cos\left(\frac{\sqrt{b}\tanh^{-1}\left(\frac{\sqrt{a+x^2}}{\sqrt{a}}\right)}{\sqrt{a}}\right) - c_2 \sin\left(\frac{\sqrt{b}\tanh^{-1}\left(\frac{\sqrt{a+x^2}}{\sqrt{a}}\right)}{\sqrt{a}}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.173 (sec), leaf count = 73

$$\left\{y(x) = \left(\_C2\left(\left(\frac{1}{x}\left(2\,a + 2\,\sqrt{a}\sqrt{x^2+a}\right)\right)^{i\sqrt{b}\frac{1}{\sqrt{a}}}\right)^2 + \_C1\right)\left(\left(\frac{1}{x}\left(2\,a+2\,\sqrt{a}\sqrt{x^2+a}\right)\right)^{i\sqrt{b}\frac{1}{\sqrt{a}}}\right)^{-1}\right\}$$

2.1377 ODE No. 1377

$$y''(x) = -\frac{b^2 y(x)}{(a^2+x^2)^2}$$

✓ **Mathematica** : cpu = 0.193292 (sec), leaf count = 163

$$\left\{\left\{y(x) \to \frac{ic_2\sqrt{a^2+x^2}\left(1-\frac{ix}{a}\right)^{\sqrt{\frac{a^2+b^2}{a^2}}}\left(1+\frac{ix}{a}\right)^{-\sqrt{\frac{a^2+b^2}{a^2}}} e^{i\sqrt{\frac{a^2+b^2}{a^2}}\tan^{-1}\left(\frac{x}{a}\right)}}{2a\sqrt{\frac{a^2+b^2}{a^2}}} + c_1\sqrt{a^2+x^2}e^{i\sqrt{\frac{b^2}{a^2}+1}\tan^{-1}\left(\frac{x}{a}\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.252 (sec), leaf count = 83

$$\left\{y(x) = \sqrt{a^2+x^2}\left(\left(\frac{ix-a}{ix+a}\right)^{-\frac{1}{2a}\sqrt{a^2+b^2}}\_C2 + \left(\frac{ix-a}{ix+a}\right)^{\frac{1}{2a}\sqrt{a^2+b^2}}\_C1\right)\right\}$$

2.1378 ODE No. 1378

$$y''(x) = -\frac{2(x^2-1)\, y'(x)}{(x-1)^2 x} - \frac{(-2x^2+2x+2)\, y(x)}{(x-1)^2 x^2}$$

✓ **Mathematica** : cpu = 0.0383291 (sec), leaf count = 65

$$\left\{\left\{y(x) \to \frac{c_1 x^2}{1-x} + \frac{c_2 x(2x^2\log(1-x) - 2x^2\log(x) + 2x - 2x\log(1-x) + 2x\log(x) - 1)}{(x-1)^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.06 (sec), leaf count = 48

$$\left\{y(x) = \frac{x}{(x-1)^2}\left(-\_C2\, x(x-1)\ln(x-1) + \_C2\, x(x-1)\ln(x) + \_C1\, x^2 + (-\_C1 - \_C2)\, x + \frac{\_C2}{2}\right)\right\}$$

2.1379 ODE No. 1379

$$y''(x) = \frac{12 y(x)}{(x+1)^2(x^2+2x+3)}$$

✓ **Mathematica** : cpu = 0.059282 (sec), leaf count = 99

$$\left\{\left\{y(x) \to \frac{c_2\left(2x^3+4x^2-3\sqrt{2}x^2\tan^{-1}\left(\frac{x+1}{\sqrt{2}}\right)+8x-6\sqrt{2}x\tan^{-1}\left(\frac{x+1}{\sqrt{2}}\right)-9\sqrt{2}\tan^{-1}\left(\frac{x+1}{\sqrt{2}}\right)+2\right)}{2(x+1)^2} + c_1\left(\frac{2}{(x+\right.\right.\right.$$

✓ **Maple** : cpu = 0.075 (sec), leaf count = 59

$$\left\{y(x) = \frac{1}{(1+x)^2}\left(-3\_C2\,(x^2+2x+3)\arctan\left(1/2\,(1+x)\sqrt{2}\right) + \_C2\,(x^3+2x^2+4x+1)\sqrt{2} + \_C1\,(x^2\right.\right.$$

2.1380 ODE No. 1380

$$y''(x) = -\frac{b y(x)}{x^2(x-a)^2}$$

✓ **Mathematica** : cpu = 0.203936 (sec), leaf count = 132

$$\left\{\left\{y(x) \to \frac{c_2(x-a)^{\frac{1}{2}\sqrt{\frac{a^2-4b}{a^2}}+\frac{1}{2}} x^{\frac{1}{2}-\frac{1}{2}\sqrt{\frac{a^2-4b}{a^2}}}}{a\sqrt{\frac{a^2-4b}{a^2}}} + c_1(x-a)^{\frac{1}{2}-\frac{1}{2}\sqrt{1-\frac{4b}{a^2}}} x^{\frac{1}{2}\sqrt{1-\frac{4b}{a^2}}+\frac{1}{2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.194 (sec), leaf count = 67

$$\left\{y(x) = \sqrt{x(a-x)}\left(\left(\frac{x}{a-x}\right)^{\frac{1}{2a}\sqrt{a^2-4b}}\_C2 + \left(\frac{a-x}{x}\right)^{\frac{1}{2a}\sqrt{a^2-4b}}\_C1\right)\right\}$$

2.1381 ODE No. 1381

$$y''(x) = c - \frac{by(x)}{x^2(x-a)^2}$$

✓ **Mathematica** : cpu = 0.250143 (sec), leaf count = 589

$$\left\{\left\{y(x) \to -\frac{2cx^2(a-x)\left(1-\frac{x}{a}\right)^{-\frac{1}{2}\sqrt{\frac{a^2-4b}{a^2}}}\left(\sqrt{\frac{a^2-4b}{a^2}}\left(1-\frac{x}{a}\right)^{\sqrt{\frac{a^2-4b}{a^2}}}\,{}_2F_1\left(\frac{1}{2}\sqrt{1-\frac{4b}{a^2}}-\frac{1}{2},\frac{1}{2}\sqrt{1-\frac{4b}{a^2}}+\frac{3}{2};\frac{1}{2}\sqrt{1-\right.\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.616 (sec), leaf count = 175

$$\left\{y(x) = \sqrt{x(a-x)}\left(\left(-\int\sqrt{x(a-x)}\left(\frac{a-x}{x}\right)^{-\frac{1}{2a}\sqrt{a^2-4b}}\,\mathrm{d}xc + \_C2\,\sqrt{a^2-4b}\right)\left(\frac{a-x}{x}\right)^{\frac{1}{2a}\sqrt{a^2-4b}} + \left(\int\sqrt{\right.\right.\right.$$

2.1382 ODE No. 1382

$$y''(x) = \frac{cy(x)}{(x-a)^2(x-b)^2}$$

✓ **Mathematica** : cpu = 0.480511 (sec), leaf count = 154

$$\left\{\left\{y(x) \to c_1(x-a)^{\frac{1}{2}\left(\sqrt{\frac{4c}{(a-b)^2}+1}+1\right)}(x-b)^{\frac{1}{2}\left(1-\sqrt{\frac{4c}{(a-b)^2}+1}\right)} - \frac{c_2(x-a)^{\frac{1}{2}-\frac{1}{2}\sqrt{\frac{4c}{(a-b)^2}+1}}(x-b)^{\frac{1}{2}\sqrt{\frac{4c}{(a-b)^2}+1}+\frac{1}{2}}}{(a-b)\sqrt{\frac{4c}{(a-b)^2}+1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.303 (sec), leaf count = 104

$$\left\{y(x) = \sqrt{(a-x)(b-x)}\left(\left(\frac{a-x}{b-x}\right)^{\frac{1}{2a-2b}\sqrt{a^2-2ab+b^2+4c}}\_C1 + \left(\frac{a-x}{b-x}\right)^{-\frac{1}{2a-2b}\sqrt{a^2-2ab+b^2+4c}}\_C2\right)\right\}$$

2.1383 ODE No. 1383

$$y''(x) = -\frac{y'(x)\left((x-a)^2(\alpha+\beta+1)(x-b)+(x-a)(-\alpha-\beta+1)(x-b)^2\right)}{(x-a)^2(x-b)^2} - \frac{\alpha\beta(a-b)^2y(x)}{(x-a)^2(x-b)^2}$$

✓ **Mathematica** : cpu = 0.122026 (sec), leaf count = 50

$$\left\{\left\{y(x) \to c_1e^{\alpha(\log(x-a)-\log(x-b))} + c_2e^{\beta(\log(x-a)-\log(x-b))}\right\}\right\}$$

✓ **Maple** : cpu = 0.224 (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 = 0.0265159 (sec), leaf count = 110

$$\left\{\left\{y(x) \to c_1 M_{\frac{(a+3)b}{2\sqrt{a^2-1}},\frac{\sqrt{b\left(b^2+1\right)}}{2\sqrt{b}}}\left(\sqrt{a^2-1}x\right) + c_2 W_{\frac{(a+3)b}{2\sqrt{a^2-1}},\frac{\sqrt{b\left(b^2+1\right)}}{2\sqrt{b}}}\left(\sqrt{a^2-1}x\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.38 (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 = 0.0151056 (sec), leaf count = 78

$$\left\{\left\{y(x) \to c_1\sqrt{x^2+1}P^{\frac{1}{2}}_{\frac{1}{2}\left(\sqrt{1-a}-1\right)}(ix) + c_2\sqrt{x^2+1}Q^{\frac{1}{2}}_{\frac{1}{2}\left(\sqrt{1-a}-1\right)}(ix)\right\}\right\}$$

✓ **Maple** : cpu = 0.142 (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 = 0.0705993 (sec), leaf count = 108

$$\left\{\left\{y(x) \to \frac{c_1(x^2+x+1)}{(2x+1)^2} + \frac{c_2\left(16x^3+24x^2-12\sqrt{3}x^2\tan^{-1}\left(\frac{2x+1}{\sqrt{3}}\right)+30x-12\sqrt{3}x\tan^{-1}\left(\frac{2x+1}{\sqrt{3}}\right)-12\sqrt{3}\tan\right.}{(2x+1)^2}\right.\right.$$

✓ **Maple** : cpu = 0.075 (sec), leaf count = 58

$$\left\{y(x) = \frac{1}{(2x+1)^2}\left(-36\_C2\,(x^2+x+1)\arctan\left(1/3\,(2x+1)\sqrt{3}\right)+16\_C2\left(x^3+x^2+\frac{11x}{8}+3/16\right)\sqrt{3}+\right.\right.$$

2.1387 ODE No. 1387

$$y''(x) = \frac{3y(x)}{4(x^2+x+1)^2}$$

✓ **Mathematica** : cpu = 0.025761 (sec), leaf count = 50

$$\left\{\left\{y(x) \to c_1\sqrt{x^2+x+1} + \frac{2c_2\sqrt{x^2+x+1}\tan^{-1}\left(\frac{2x+1}{\sqrt{3}}\right)}{\sqrt{3}}\right\}\right\}$$

✓ **Maple** : cpu = 0.049 (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 = 0.239251 (sec), leaf count = 235

$$\left\{\left\{y(x) \to c_2(-1)^{\frac{1}{2}(-2v-3)+1}x^{\frac{1}{4}(-2v-3)+1}e^{\frac{1}{4}(-2\log(1-x)-\log(x))}(x-1)^{\frac{1}{2}\left(\frac{1}{2}(a+v+1)+\frac{1}{2}(a+v+2)+\frac{1}{2}(-2v-3)+1\right)}\,{}_2F_1\left(\frac{1}{2}(-2\right.\right.\right.$$

✓ **Maple** : cpu = 0.418 (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 = 0.293093 (sec), leaf count = 217

$$\left\{\left\{y(x) \to c_2(-1)^{\frac{1}{2}(-2v-3)+1}x^{\frac{1}{4}(-2v-3)+1}e^{\frac{1}{4}(-2\log(1-x)-\log(x))}(x-1)^{\frac{1}{2}\left(n+\frac{1}{2}(2n+1)+\frac{1}{2}(-2v-3)+v+2\right)}\,{}_2F_1\left(\frac{1}{2}(2n+1)+\right.\right.\right.$$

✓ **Maple** : cpu = 0.425 (sec), leaf count = 68

$$\left\{y(x) = (x-1)^{-n}\left(x^{-\frac{v}{2}}\,{}_2\mathrm{F}_1(-v-n,-n+\frac{1}{2};\frac{1}{2}-v;x)\_C1 + x^{\frac{1}{2}+\frac{v}{2}}\,{}_2\mathrm{F}_1(v-n+1,-n+\frac{1}{2};\frac{3}{2}+v;x)\_C2\right)\right\}$$

2.1390 ODE No. 1390

$$y''(x) = -\frac{3y(x)}{16(x-1)^2x^2}$$

✓ **Mathematica** : cpu = 0.0290925 (sec), leaf count = 41

$$\left\{\left\{y(x) \to 2c_2\sqrt[4]{1-x}x^{3/4} + c_1(1-x)^{3/4}\sqrt[4]{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.054 (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 = 0.0484657 (sec), leaf count = 27

$$\left\{\left\{y(x) \to c_1x^5 - \frac{1}{4}c_2x\,(2ax^2+1)\right\}\right\}$$

✓ **Maple** : cpu = 0.045 (sec), leaf count = 20

$$\{y(x) = \_C1\,x^5 + 2\,\_C2\,ax^3 + \_C2\,x\}$$

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 = 69.3544 (sec), leaf count = 1763961

Too large to display

✓ **Maple** : cpu = 0.672 (sec), leaf count = 561

$$\left\{y(x) = (x^2-1)^{-\frac{b}{4a}} \left(-\frac{1}{2}+\frac{x}{2}\right)^{\frac{1}{4a}\left(2a+\sqrt{4a^2+(-4b-4c-4d-4e)a+b^2}\right)} \left({}_2\mathrm{F}_1(-\frac{1}{4a}\left(-\sqrt{4a^2+(-4b-4c-4d-4\right.\right.\right.$$

2.1393 ODE No. 1393

$$y''(x) = -\frac{y(x)(bx^2+cx+d)}{a(x-1)^2x^2}$$

✓ **Mathematica** : cpu = 16.3079 (sec), leaf count = 413606

Too large to display

✓ **Maple** : cpu = 0.653 (sec), leaf count = 299

$$\left\{y(x) = \_C1\, x^{\frac{1}{2}(\sqrt{a}+\sqrt{a-4d})\frac{1}{\sqrt{a}}}\, {}_2\mathrm{F}_1(-\frac{1}{2}\left(\sqrt{a-4b-4c-4d}-\sqrt{a}-\sqrt{a-4d}+\sqrt{a-4b}\right)\frac{1}{\sqrt{a}}, \frac{1}{2}\left(-\sqrt{a-4b-\right.\right.$$

2.1394 ODE No. 1394

$$y''(x) = -\frac{cy(x)}{x^2(ax+b)^2} - \frac{2y'(x)}{x}$$

✓ **Mathematica** : cpu = 0.0341799 (sec), leaf count = 115

$$\left\{\left\{y(x) \to c_1 \exp\left(\frac{\sqrt{c}\left(-\frac{\sqrt{b^2-4c}}{\sqrt{c}}-\frac{b}{\sqrt{c}}\right)(\log(x)-\log(ax+b))}{2b}\right) + c_2 \exp\left(\frac{\sqrt{c}\left(\frac{\sqrt{b^2-4c}}{\sqrt{c}}-\frac{b}{\sqrt{c}}\right)(\log(x)-\log(ax\right.}{2b}\right.\right.\right.$$

✓ **Maple** : cpu = 0.263 (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 = 0.0667372 (sec), leaf count = 59

$$\left\{\left\{y(x) \to c_1 e^{\frac{i}{a(ax+b)}}(ax+b) - \frac{1}{2} i c_2 e^{-\frac{i}{a(ax+b)}}(ax+b)\right\}\right\}$$

✓ **Maple** : cpu = 0.072 (sec), leaf count = 39

$$\left\{y(x) = (ax+b)\left(\_C1\, \sin\left(\frac{1}{a\,(ax+b)}\right) + \_C2\, \cos\left(\frac{1}{a\,(ax+b)}\right)\right)\right\}$$

2.1396 ODE No. 1396

$$y''(x) = -\frac{Ay(x)}{(ax^2+bx+c)^2}$$

✓ **Mathematica** : cpu = 0.903225 (sec), leaf count = 211

$$\left\{\left\{y(x) \to \frac{c_2\sqrt{ax^2+bx+c}\exp\left(-\frac{\sqrt{4ac-b^2}\sqrt{1-\frac{4A}{b^2-4ac}}\tan^{-1}\left(\frac{2ax+b}{\sqrt{4ac-b^2}}\right)}{\sqrt{b^2-4ac}}\right)}{\sqrt{b^2-4ac}\sqrt{1-\frac{4A}{b^2-4ac}}} + c_1\sqrt{x(ax+b)+c}\exp\left(\frac{\sqrt{4ac-b^2}\sqrt{1}}{}\right.\right.\right.$$

✓ **Maple** : cpu = 0.282 (sec), leaf count = 178

$$\left\{y(x) = \sqrt{ax^2+bx+c}\left(\left(\left(i\sqrt{4\,ac-b^2} - 2\,ax - b\right)\left(2\,ax+b+i\sqrt{4\,ac-b^2}\right)^{-1}\right)^{\frac{a}{2}\sqrt{\frac{-4\,ac+b^2-4\,A}{a^2}}\frac{1}{\sqrt{-4\,ac+b^2}}}\_C1 +\right.\right.$$

2.1397 ODE No. 1397

$$y''(x) = \frac{y(x)}{x^5} - \frac{y'(x)}{x^4}$$

✓ **Mathematica** : cpu = 0.0504192 (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 = 0.243 (sec), leaf count = 27

$$\left\{y(x) = x\left(2\sqrt{3}\pi \_C2 - 3\,\Gamma(2/3)\,\Gamma\left(1/3, -1/3\,x^{-3}\right)\_C2 + \_C1\right)\right\}$$

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 = 0.130549 (sec), leaf count = 72

$$\left\{\left\{y(x) \to c_1 \left(x^2-1\right)^{-v-\frac{1}{2}} {}_2F_1\left(-v, -v; -2v; 1-x^2\right) + c_2 \left(x^2-1\right)^{v+\frac{1}{2}} {}_2F_1\left(v+1, v+1; 2v+2; 1-x^2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.869 (sec), leaf count = 69

$$\left\{y(x) = \_C1\,\left(x^2-1\right)^{-\frac{1}{2}-v} {}_2\mathrm{F}_1(-v, -v;\ -2\,v;\ -x^2+1) + \_C2\,\left(x^2-1\right)^{v+\frac{1}{2}} {}_2\mathrm{F}_1(v+1, v+1;\ 2\,v+2;\ -x^2+1)$$

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 = 0.0336781 (sec), leaf count = 72

$$\left\{\left\{y(x) \to c_1 e^{\frac{1}{2}(3\log(1-x)+\log(3x+5))} + \frac{1}{2} c_2 e^{\frac{1}{2}(3\log(1-x)+\log(3x+5))}(3\log(1-x) + \log(3x+5))\right\}\right\}$$

✓ **Maple** : cpu = 0.07 (sec), leaf count = 34

$$\left\{y(x) = \sqrt{3\,x+5}(x-1)^{\frac{3}{2}}\left(\_C2\,\ln(3\,x+5) + 3\,\_C2\,\ln(x-1) + \_C1\right)\right\}$$

2.1400 ODE No. 1400

$$y''(x) = \frac{y'(x)}{x} - \frac{ay(x)}{x^6}$$

✓ **Mathematica** : cpu = 0.0876702 (sec), leaf count = 60

$$\left\{\left\{y(x) \to c_1 x^2 e^{\frac{i\sqrt{a}}{2x^2}} - \frac{ic_2 x^2 e^{-\frac{i\sqrt{a}}{2x^2}}}{2\sqrt{a}}\right\}\right\}$$

✓ **Maple** : cpu = 0.088 (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 = 0.0094504 (sec), leaf count = 93

$$\left\{\left\{y(x) \to c_1 e^{-\frac{\sqrt{b}\left(-\frac{\sqrt{a^2-4b}}{\sqrt{b}} - \frac{a}{\sqrt{b}}\right)}{4x^2}} + c_2 e^{-\frac{\sqrt{b}\left(\frac{\sqrt{a^2-4b}}{\sqrt{b}} - \frac{a}{\sqrt{b}}\right)}{4x^2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.099 (sec), leaf count = 45

$$\left\{y(x) = \_C1\,\mathrm{e}^{-\frac{1}{4\,x^2}\left(-a+\sqrt{a^2-4\,b}\right)} + \_C2\,\mathrm{e}^{\frac{1}{4\,x^2}\left(a+\sqrt{a^2-4\,b}\right)}\right\}$$

2.1402 ODE No. 1402

$$y''(x) = -\frac{y(x)\left(4a(a+1)x^4 - 2a(x^2-1)\,x^2 + (x^2-1)^2\,(x^2-v^2)\right)}{x^2\,(x^2-1)^2} - \frac{((1-4a)x^2-1)\,y'(x)}{x\,(x^2-1)}$$

✓ **Mathematica** : cpu = 0.784432 (sec), leaf count = 86

$$\left\{\left\{y(x) \to c_1 (x^2-1)^{a+1}\,x^v \text{HeunC}\left[\frac{1}{4}(-2a-4v-3), \frac{1}{4}, v+1, 2, 0, x^2\right] + c_2 (x^2-1)^{a+1}\,x^{-v}\text{HeunC}\left[-\frac{a}{2} + v - \frac{3}{4}\right.\right.\right.$$

✓ **Maple** : cpu = 2.627 (sec), leaf count = 58

$$\left\{y(x) = (x^2-1)^a\,(x^2-1)\left(\_C1\,x^v\,HeunC\left(0, v, 1, \frac{1}{4}, \frac{a}{2} + \frac{1}{4}, x^2\right) + \_C2\,x^{-v}\,HeunC\left(0, -v, 1, \frac{1}{4}, \frac{a}{2} + \frac{1}{4}, x^2\right)\right)\right.$$

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 = 51.165 (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 = 2.764 (sec), leaf count = 298

$$\left\{y(x)=(x-c2)^{a2}(x-c3)^{b3}\left((x-c1)^{b1}\mathit{HeunG}\left(\frac{c1-c3}{c1-c2},\frac{((-2\,a1-a3-b2+2)\,c1+(a1+a3-1)\,c2+\right.\right.\right.$$

2.1404 ODE No. 1404

$$y''(x) = -\frac{(2x^2+1)\,y'(x)}{x^3}-\frac{(1-2x^2)\,y(x)}{4x^6}$$

✓ **Mathematica** : cpu = 0.0152219 (sec), leaf count = 33

$$\left\{\left\{y(x)\to \frac{c_1e^{\frac{1}{4x^2}}}{x}+c_2e^{\frac{1}{4x^2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.065 (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 = 0.0472362 (sec), leaf count = 77

$$\left\{\left\{y(x)\to c_1e^{-\frac{1}{4x^2}}x^{\frac{3}{2}-\frac{\sqrt{9-a}}{2}}+\frac{c_2e^{-\frac{1}{4x^2}}x^{\frac{\sqrt{9-a}}{2}+\frac{3}{2}}}{\sqrt{9-a}}\right\}\right\}$$

✓ **Maple** : cpu = 0.139 (sec), leaf count = 42

$$\left\{y(x)=\mathrm{e}^{-\frac{1}{4\,x^2}}\left(x^{\frac{3}{2}+\frac{1}{2}\sqrt{-a+9}}\_C1+x^{\frac{3}{2}-\frac{1}{2}\sqrt{-a+9}}\_C2\right)\right\}$$

2.1406 ODE No. 1406

$$y''(x) = -\frac{27xy(x)}{16\left(x^3-1\right)^2}$$

✓ **Mathematica** : cpu = 1.55934 (sec), leaf count = 258

$$\left\{\left\{y(x)\to \frac{\sqrt{2}c_2(1-x)^{3/4}\sqrt[4]{x^2+x+1}\int_1^x \frac{\sqrt{\sqrt{3}K[1]+\sqrt{2K[1]-i\sqrt{3}+1}\sqrt{2K[1]+i\sqrt{3}+1}+\sqrt{3}}}{2(1-K[1])^{3/2}\sqrt{K[1]^2+K[1]+1}}dK[1]}{\sqrt[4]{\sqrt{3}x+\sqrt{2x-i\sqrt{3}+1}\sqrt{2x+i\sqrt{3}+1}+\sqrt{3}}}+\frac{\sqrt{2}c_1(1-\right.\right.$$

$$\sqrt[4]{\sqrt{3}x+\sqrt{2x-i\sqrt{}}}$$

✓ **Maple** : cpu = 0.208 (sec), leaf count = 44

$$\left\{y(x)=\sqrt{x}\sqrt[4]{x^3-1}\left(LegendreQ\left(-\frac{1}{6},\frac{1}{3},\sqrt{-x^3+1}\right)\_C2+LegendreP\left(-\frac{1}{6},\frac{1}{3},\sqrt{-x^3+1}\right)\_C1\right)\right\}$$

2.1407 ODE No. 1407

$$y''(x) = -y'(x)\left(\frac{\mathrm{b1}(-\mathrm{al1}-\mathrm{bl1}+1)}{\mathrm{b1}x-\mathrm{a1}}+\frac{\mathrm{b2}(-\mathrm{al2}-\mathrm{bl2}+1)}{\mathrm{b2}x-\mathrm{a2}}+\frac{\mathrm{b3}(-\mathrm{al3}-\mathrm{bl3}+1)}{\mathrm{b3}x-\mathrm{a3}}\right)-\frac{y(x)\left(\frac{\mathrm{al1bl1(a1b2-a2b1)(a3b1-}}{\mathrm{b1}x-\mathrm{a1}}\right.}{}$$

✗ **Mathematica** : cpu = 202.059 (sec), leaf count = 0 , DifferentialRoot result

$$\{\{y(x)\to \mathrm{DifferentialRoot}(\{y,x\},\{(\mathrm{a1}-x\mathrm{b1})^2(\mathrm{a2}-x\mathrm{b2})^2y''(x)(\mathrm{a3}-x\mathrm{b3})^2+(\mathrm{a1}-x\mathrm{b1})(\mathrm{a2}-x\mathrm{b2})\left(\mathrm{al1b1b2b}\right.$$

✓ **Maple** : cpu = 3.998 (sec), leaf count = 2603

$$\left\{y(x)=(b3\,x-a3)^{\frac{1}{2}\left((al3+bl3)\sqrt{al1^2+(2\,al2+2\,al3+2\,bl1+2\,bl2+2\,bl3-4)al1+al2^2+(2\,al3+2\,bl1+2\,bl2+2\,bl3-4)al2+2\,al3^2+(2\,bl1}\right.}\right.$$

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 = 45.296 (sec), leaf count = 0 , DifferentialRoot result

$$\left\{\left\{y(x)\to \text{DifferentialRoot}\left(\{y,x\},\left\{\left(Ax^2+B\right)y(x)+\left(2x^6-\mathrm{a1}x^4-\mathrm{a2}x^4-\mathrm{a3}x^4+\mathrm{a1a2a3}\right)y'(x)-x\left(\mathrm{a1}-x^2\right)\right.\right.\right.\right.$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x)=DESol\left(\left\{\frac{d^2}{dx^2}\_Y(x)+\frac{\left(x^2\left(\left(x^2-a1\right)\left(x^2-a2\right)+\left(x^2-a2\right)\left(x^2-a3\right)+\left(x^2-a3\right)\left(x^2-a1\right)\right)-\left(x^2\right.\right.}{\left(x^2-a1\right)\left(x^2-a2\right)x\left(x^2-a3\right)}\right.\right.\right.$$

2.1409 ODE No. 1409

$$y''(x) = -b^2x^{-2a}y(x) - \frac{ay'(x)}{x}$$

✓ **Mathematica** : cpu = 0.0173337 (sec), leaf count = 43

$$\left\{\left\{y(x)\to c_1\cos\left(\frac{bx^{1-a}}{a-1}\right)-c_2\sin\left(\frac{bx^{1-a}}{a-1}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.07 (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 = 0.0902487 (sec), leaf count = 481

$$\left\{\left\{y(x)\to c_1 i^{\frac{-\sqrt{q^2+2q+4s+1}+q+1}{b}}a^{\frac{-\sqrt{q^2+2q+4s+1}+q+1}{2b}}\left(x^b\right)^{\frac{-\sqrt{q^2+2q+4s+1}+q+1}{2b}}\,{}_2F_1\left(\frac{p}{2b}+\frac{q}{2b}-\frac{\sqrt{p^2-2p-4r+1}}{2b}-\sqrt{\right.\right.\right.$$

✓ **Maple** : cpu = 2.284 (sec), leaf count = 253

$$\left\{y(x)=\_C1\,{}_2F_1\left(\frac{1}{2b}\left(p+q+\sqrt{q^2+2q+4s+1}+\sqrt{p^2-2p-4r+1}\right),\frac{1}{2b}\left(p+q+\sqrt{q^2+2q+4s+1}-\sqrt{\right.\right.\right.$$

2.1411 ODE No. 1411

$$y''(x) = \frac{y(x)}{e^x + 1}$$

✓ **Mathematica** : cpu = 0.281602 (sec), leaf count = 42

$$\left\{\left\{y(x) \to c_1\left(e^{-x}+1\right) + c_2 e^{-x}\left(e^x \log\left(e^x+1\right) + \log\left(e^x+1\right)+1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.049 (sec), leaf count = 27

$$\left\{y(x) = \frac{\_C1\,(\mathrm{e}^x+1)\ln(\mathrm{e}^x+1) + \_C2\,\mathrm{e}^x + \_C1 + \_C2}{\mathrm{e}^x}\right\}$$

2.1412 ODE No. 1412

$$y''(x) = \frac{y'(x)}{x\log(x)} + y(x)\log^2(x)$$

✓ **Mathematica** : cpu = 0.0109026 (sec), leaf count = 29

$$\{\{y(x) \to c_1 \cosh(x(\log(x)-1)) + ic_2 \sinh(x(\log(x)-1))\}\}$$

✓ **Maple** : cpu = 0.039 (sec), leaf count = 23

$$\{y(x) = \_C1\ \sinh(x(\ln(x)-1)) + \_C2\ \cosh(x(\ln(x)-1))\}$$

2.1413 ODE No. 1413

$$y''(x) = \frac{y'(x)}{x(\log(x)-1)} - \frac{y(x)}{x^2(\log(x)-1)}$$

✓ **Mathematica** : cpu = 0.0447744 (sec), leaf count = 16

$$\{\{y(x) \to c_1 x - c_2 \log(x)\}\}$$

✓ **Maple** : cpu = 0.105 (sec), leaf count = 12

$$\{y(x) = \_C1\ x + \_C2\ \ln(x)\}$$

2.1414 ODE No. 1414

$$y''(x) = y(x)\left(-\operatorname{csch}^2(x)\right)\left(-a^2\sinh^2(x) - (n-1)n\right)$$

✓ **Mathematica** : cpu = 0.78002 (sec), leaf count = 231

$$\left\{\left\{y(x) \to \frac{c_2(-1)^{\frac{1}{2}(-2n-1)+1}\tanh^2(x)^{\frac{1}{4}(-2n-1)+1}\left(\tanh^2(x)-1\right)^{\frac{1}{2}\left(\frac{a+n}{2}+\frac{1}{2}(a+n+1)+\frac{1}{2}(-2n-1)+1\right)-\frac{1}{2}}\ {}_2F_1\left(\frac{1}{2}(-2n-1\right.}{\sqrt{\tanh(x)}}\right.\right.$$

✓ **Maple** : cpu = 2.059 (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 = 0.640471 (sec), leaf count = 273

$$\left\{\left\{y(x) \to \frac{c_2(-1)^{\frac{1}{2}(-2n-1)+1}\tanh^2(x)^{\frac{1}{4}(-2n-1)+1}\left(\tanh^2(x)-1\right)^{\frac{1}{2}\left(\frac{a+n}{2}+\frac{1}{2}(a+n+1)+\frac{1}{2}(-2n-1)+1\right)}\ {}_2F_1\left(\frac{1}{2}(-2n-1) -\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.595 (sec), leaf count = 36

$$\left\{y(x) = (\sinh(x))^{-n+\frac{1}{2}}\left(\mathit{LegendreQ}\left(a-\frac{1}{2}, n-\frac{1}{2}, \cosh(x)\right)\_C2 + \mathit{LegendreP}\left(a-\frac{1}{2}, n-\frac{1}{2}, \cosh(x)\right)\_C1\right)\right.$$

2.1416 ODE No. 1416

$$y''(x) = -(v-n)(n+v+1)y(x) - (2n+1)\cot(x)y'(x)$$

✓ **Mathematica** : cpu = 0.143888 (sec), leaf count = 46

$$\left\{\left\{y(x) \to c_1\left(\cos^2(x)-1\right)^{-n/2}P_v^n(\cos(x)) + c_2\left(\cos^2(x)-1\right)^{-n/2}Q_v^n(\cos(x))\right\}\right\}$$

✓ **Maple** : cpu = 0.666 (sec), leaf count = 26

$$\{y(x) = (\sin(x))^{-n}\left(\mathit{LegendreQ}(v, n, \cos(x))\_C2 + \mathit{LegendreP}(v, n, \cos(x))\_C1\right)\}$$

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 = 0.12356 (sec), leaf count = 52

$$\left\{\left\{y(x) \to c_1 e^{\frac{\cos(x)}{2}} \cos\left(\frac{1}{2}\sqrt{3}\cos(x)\right) + c_2 e^{\frac{\cos(x)}{2}} \sin\left(\frac{1}{2}\sqrt{3}\cos(x)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.243 (sec), leaf count = 31

$$\left\{y(x) = e^{\frac{\cos(x)}{2}}\left(\cos\left(\frac{\sqrt{3}\cos(x)}{2}\right)\_C2 + \sin\left(\frac{\sqrt{3}\cos(x)}{2}\right)\_C1\right)\right\}$$

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 = 0.116406 (sec), leaf count = 15

$$\{\{y(x) \to c_1 x + c_2 \sin(x)\}\}$$

✓ **Maple** : cpu = 3.459 (sec), leaf count = 58

$$\left\{y(x) = \sin(x)\left(\int e^{\int \frac{-2(\cos(x))^3 x + 3\sin(x)(\cos(x))^2 - \sin(x)}{\left(x\sin(x)\cos(x) + (\cos(x))^2 - 1\right)\cos(x)}\,dx} \cos(x)\,dx\_C2 + \_C1\right)\right\}$$

2.1419 ODE No. 1419

$$y''(x) = -\frac{\sec(x)y'(x)\left(x^2\sin(x) - 2x\cos(x)\right)}{x^2} - \frac{y(x)\sec(x)(2x\cos(x) - x\sin(x))}{x^2}$$

✗ **Mathematica** : cpu = 1.01257 (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 = 0.608 (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 = 0.376123 (sec), leaf count = 134

$$\left\{\left\{y(x) \to c_1 i^{1-n}\cos^{1-n}(x)\,{}_2F_1\left(-\frac{n}{2} - \frac{i\sqrt{a}}{2} + \frac{1}{2}, -\frac{n}{2} + \frac{i\sqrt{a}}{2} + \frac{1}{2}; \frac{3}{2} - n; \cos^2(x)\right) + c_2 i^n \cos^n(x)\,{}_2F_1\left(\frac{n}{2} - \frac{i\sqrt{a}}{2}\right.\right.\right.$$

✓ **Maple** : cpu = 2.495 (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

$$y''(x) = -a^2ny(x)\sec^2(ax)\left((n-1)\sin^2(ax) + \cos^2(ax)\right) - a(n-1)\sin(2ax)\sec^2(ax)y'(x)$$

✓ **Mathematica** : cpu = 0.140855 (sec), leaf count = 81

$$\left\{\left\{y(x) \to c_1 e^{-iax}\cos^{n-1}(ax) - \frac{ic_2 e^{2iax}\left(\frac{1}{2}e^{-iax} + \frac{1}{2}e^{iax}\right)^n}{a\left(1 + e^{2iax}\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.149 (sec), leaf count = 27

$$\left\{y(x) = \_C1\,(\cos(ax))^n + \_C2\,(\cos(ax))^{n-1}\sin(ax)\right\}$$

2.1422 ODE No. 1422

$$y''(x) = 2y(x)\csc^2(x)$$

✓ **Mathematica** : cpu = 0.076626 (sec), leaf count = 58

$$\left\{\left\{y(x) \to \frac{c_1\cos(x)}{\sqrt{\cos^2(x) - 1}} + \frac{c_2\left(\cos(x)\left(-\sin^{-1}(\cos(x))\right) - \sqrt{1 - \cos^2(x)}\right)}{\sqrt{1 - \cos^2(x)}}\right\}\right\}$$

✓ **Maple** : cpu = 0.705 (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 = 0.0537413 (sec), leaf count = 70

$$\left\{\left\{y(x)\to c_1\sqrt[4]{\cos^2(x)-1}P_{-\frac{1}{2}}^{\frac{1}{2}\sqrt{1-4a}}(\cos(x))+c_2\sqrt[4]{\cos^2(x)-1}Q_{-\frac{1}{2}}^{\frac{1}{2}\sqrt{1-4a}}(\cos(x))\right\}\right\}$$

✓ **Maple** : cpu = 2.31 (sec), leaf count = 132

$$\left\{y(x)=\left(\frac{\cos(2x)}{2}-\frac{1}{2}\right)^{\frac{1}{4}\sqrt{1-4a}}\sqrt[4]{2\cos(2x)+2}\sqrt{-2\cos(2x)+2}\left({}_2\mathrm{F}_1(\frac{1}{4}\sqrt{1-4a}+\frac{3}{4},\frac{1}{4}\sqrt{1-4a}+\frac{3}{4};\frac{3}{2};\right.$$

2.1424 ODE No. 1424

$$\sin^2(x)y''(x)-y(x)\left(a\sin^2(x)+(n-1)n\right)=0$$

✓ **Mathematica** : cpu = 0.187965 (sec), leaf count = 90

$$\left\{\left\{y(x)\to c_1\sqrt[4]{\cos^2(x)-1}P_{\frac{1}{2}i(2\sqrt{a}+i)}^{\frac{1}{2}(2n-1)}(\cos(x))+c_2\sqrt[4]{\cos^2(x)-1}Q_{\frac{1}{2}i(2\sqrt{a}+i)}^{\frac{1}{2}(2n-1)}(\cos(x))\right\}\right\}$$

✓ **Maple** : cpu = 2.179 (sec), leaf count = 120

$$\left\{y(x)=\left(\frac{\cos(2x)}{2}-\frac{1}{2}\right)^{\frac{n}{2}}\left({}_2\mathrm{F}_1(\frac{1}{2}+\frac{i}{2}\sqrt{a}+\frac{n}{2},\frac{1}{2}-\frac{i}{2}\sqrt{a}+\frac{n}{2};\frac{3}{2};\frac{\cos(2x)}{2}+\frac{1}{2})(2\cos(2x)+2)^{\frac{3}{4}}\sqrt[4]{-2\cos(2\right.$$

2.1425 ODE No. 1425

$$y''(x)=y(x)\csc^2(x)\left(-\left(-a^2\cos^2(x)-(3-2a)\cos(x)+3a-3\right)\right)$$

✓ **Mathematica** : cpu = 0.658445 (sec), leaf count = 236

$$\left\{\left\{y(x)\to\frac{c_2\sqrt{1-\cos(x)}\left(-\frac{(2a-1)(\cos(x)+1)}{-2a\cos(x)+\cos(x)+2}\right)^{a+\frac{1}{2}}(-2a\cos(x)+\cos(x)+2)\left(1-\cos^2(x)\right)^{-a}\left(\frac{(2a-1)(\cos(x)-1)}{(2a-1)\cos(x)-2}\right.}{2}\right.\right.$$

✓ **Maple** : cpu = 2.643 (sec), leaf count = 91

$$\left\{y(x)=\sqrt[4]{2\cos(x)+2}\left(\_C2\,{}_2\mathrm{F}_1(a-\frac{1}{2},-\frac{1}{2}-a;\frac{3}{2}-a;\frac{\cos(x)}{2}+\frac{1}{2})(\cos(x)+1)^{-\frac{1}{4}-\frac{a}{2}}\sqrt{2\cos(x)+2}(-1+c\right.$$

2.1426 ODE No. 1426

$$\sin^2(x)y''(x) - y(x)\left(a^2\cos^2(x) + \frac{b^2}{(2a-3)^2} + 3a + b\cos(x) + 2\right) = 0$$

✓ **Mathematica** : cpu = 4.52568 (sec), leaf count = 4128

$$\left\{\left\{y(x)\to \frac{c_1(\cos(x)+1)^{\frac{1}{2}\left(-\frac{8a^2}{-16a^2+48a-36}+\frac{24a}{-16a^2+48a-36}+a-\frac{-32a^2+96a+\sqrt{\left(32a^2-96a+72\right)^2-4\left(-16a^2+48a-36\right)\left(16a^4+16ba^2-88a^2-\right.}}{2\left(-16a^2+48a-36\right)}\right.}}{}\right.\right.$$

✓ **Maple** : cpu = 2.636 (sec), leaf count = 549

$$\left\{y(x) = \left(\frac{\cos(x)}{2}-\frac{1}{2}\right)^{\frac{1}{8a-12}\left(4a-6+\sqrt{4b^2+16(a-3/2)^2b+16a^4-72a^2+81}\right)}\left({}_2\mathrm{F}_1\left(\frac{1}{8a-12}\left(8a^2-\sqrt{4b^2-16(a-3/2\right.\right.\right.\right.$$

2.1427 ODE No. 1427

$$y''(x) = y(x)\left(-\csc^2(x)\right)\left(-\left(a^2b^2-(a+1)^2\right)\sin^2(x) - a(a+1)b\sin(2x) - (a-1)a\right)$$

✓ **Mathematica** : cpu = 0.758874 (sec), leaf count = 129

$$\left\{\left\{y(x)\to c_2\left(e^{-abx}\sin^{-a-1}(x) + \frac{(2a+1)\left(-1+e^{2ix}\right)e^{-abx}\sin^{a-2(a+1)}(x)\,{}_2F_1\left(1, ia(b+i); iba+a+2; e^{2ix}\right)(b}{2(a(b-i)-i)}\right.\right.\right.$$

✓ **Maple** : cpu = 1.82 (sec), leaf count = 179

$$\left\{y(x) = \mathrm{e}^{\int \frac{1}{\sin(2x)(b\sin(2x)+\cos(2x)+1)}(2((a+1)\cos(2x)+a+1/2)b\sin(2x)-(\cos(2x)+1)((ab^2-a-2)\cos(2x)-ab^2-a+1))\,dx}\left(\int -2\,\mathrm{e}^{-2}\right.\right.$$

2.1428 ODE No. 1428

$$y''(x) = y(x)\left(-\csc^2(x)\right)\left(a\cos^2(x) + b\sin^2(x) + c\right)$$

✓ **Mathematica** : cpu = 0.335624 (sec), leaf count = 104

$$\left\{\left\{y(x) \to c_1 \sqrt[4]{\cos^2(x)-1} P_{\frac{1}{2}\left(2\sqrt{b-a}-1\right)}^{\frac{1}{2}\sqrt{-4a-4c+1}}(\cos(x)) + c_2 \sqrt[4]{\cos^2(x)-1} Q_{\frac{1}{2}\left(2\sqrt{b-a}-1\right)}^{\frac{1}{2}\sqrt{-4a-4c+1}}(\cos(x))\right\}\right\}$$

✓ **Maple** : cpu = 2.491 (sec), leaf count = 183

$$\left\{y(x) = \left(\frac{\cos(2x)}{2} - \frac{1}{2}\right)^{\frac{1}{4}\sqrt{-4a+1-4c}} \sqrt[4]{2\cos(2x)+2}\sqrt{-2\cos(2x)+2}\left(\sqrt{2\cos(2x)+2}\,{}_2F_1\left(\frac{1}{4}\sqrt{-4a+1-4\right.\right.\right.$$

2.1429 ODE No. 1429

$$y''(x) = y(x)\csc^2(x) - \cot(x)y'(x)$$

✓ **Mathematica** : cpu = 0.037077 (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 = 0.065 (sec), leaf count = 25

$$\left\{y(x) = \frac{\sin(x)\_C1}{-1+\cos(x)} + \frac{(-1+\cos(x))\_C2}{\sin(x)}\right\}$$

2.1430 ODE No. 1430

$$y''(x) = y(x)\csc^2(x)\left(-\left(v(v+1)\sin^2(x) - n^2\right)\right) - \cot(x)y'(x)$$

✓ **Mathematica** : cpu = 0.360065 (sec), leaf count = 22

$$\{\{y(x) \to c_1 P_v^n(\cos(x)) + c_2 Q_v^n(\cos(x))\}\}$$

✓ **Maple** : cpu = 1.214 (sec), leaf count = 85

$$\left\{y(x) = \left(\frac{\cos(2x)}{2} - \frac{1}{2}\right)^{\frac{n}{2}}\left(\sqrt{\cos(2x)+1}\,{}_2F_1(1+\frac{v}{2}+\frac{n}{2}, \frac{1}{2}-\frac{v}{2}+\frac{n}{2}; \frac{3}{2}; \frac{\cos(2x)}{2}+\frac{1}{2})\_C2 + {}_2F_1(-\frac{v}{2}+\frac{n}{2}, \right.\right.$$

2.1431 ODE No. 1431

$$y''(x) = \cot(2x)y'(x) - 2y(x)$$

✓ **Mathematica** : cpu = 0.144545 (sec), leaf count = 80

$$\left\{\left\{y(x) \to c_1\left(\cos^2(x) - \frac{1}{2}\right) - \frac{2}{3}c_2\cos^{\frac{3}{2}}(x)\left(2\cos^2(x)\,{}_2F_1\left(\frac{1}{4}, \frac{3}{4}; \frac{7}{4}; \cos^2(x)\right) - {}_2F_1\left(\frac{1}{4}, \frac{3}{4}; \frac{7}{4}; \cos^2(x)\right) + 3(1 - c\right.\right.\right.$$

✓ **Maple** : cpu = 0.478 (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 = 0.0588389 (sec), leaf count = 37

$$\left\{\left\{y(x) \to \frac{c_1e^{-2x}}{\sqrt{\sin(x)}} + \frac{c_2e^{2x}}{4\sqrt{\sin(x)}}\right\}\right\}$$

✓ **Maple** : cpu = 0.07 (sec), leaf count = 22

$$\left\{y(x) = (\_C1\ \sinh(2x) + \_C2\ \cosh(2x))\frac{1}{\sqrt{\sin(x)}}\right\}$$

2.1433 ODE No. 1433

$$y''(x) = -\frac{y(x)\sec^2(x)\left(2x^2 + x^2\sin^2(x) - 24\cos^2(x)\right)}{4x^2} - \tan(x)y'(x) + \sqrt{\cos(x)}$$

✓ **Mathematica** : cpu = 0.128228 (sec), leaf count = 46

$$\left\{\left\{y(x) \to -\frac{1}{4}x^2\sqrt{\cos(x)} + \frac{1}{5}c_2x^3\sqrt{\cos(x)} + \frac{c_1\sqrt{\cos(x)}}{x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.128 (sec), leaf count = 28

$$\left\{y(x) = \frac{4\_C1\ x^5 - x^4 + 4\_C2}{4x^2}\sqrt{\cos(x)}\right\}$$

2.1434 ODE No. 1434

$$y''(x) = -\frac{b\cot(x)y'(x)}{a} - \frac{y(x)\csc^2(x)\left(c\cos^2(x) + d\cos(x) + e\right)}{a}$$

✓ **Mathematica** : cpu = 66.6384 (sec), leaf count = 1596424

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✓ **Maple** : cpu = 2.995 (sec), leaf count = 517

$$\left\{y(x) = \left(\frac{\cos(x)}{2} - \frac{1}{2}\right)^{\frac{1}{4a}\left(2a+\sqrt{a^2+(-2b-4c-4d-4e)a+b^2}\right)} (\sin(x))^{-\frac{a+b}{2a}} \left({}_2F_1\left(\frac{1}{4a}\left(\sqrt{a^2 + (-2b - 4c - 4d - 4e)\right.\right.\right.\right.$$

2.1435 ODE No. 1435

$$y''(x) = -4y(x)\sin(3x)\csc^3(x)$$

✓ **Mathematica** : cpu = 0.121323 (sec), leaf count = 70

$$\left\{\left\{y(x) \to c_1 \sqrt[4]{\cos^2(x) - 1} P_{-\frac{1}{2}+4i}^{\frac{i\sqrt{47}}{2}}(\cos(x)) + c_2 \sqrt[4]{\cos^2(x) - 1} Q_{-\frac{1}{2}+4i}^{\frac{i\sqrt{47}}{2}}(\cos(x))\right\}\right\}$$

✓ **Maple** : cpu = 0.502 (sec), leaf count = 38

$$\left\{y(x) = \sqrt{\sin(x)}\left(\mathit{LegendreQ}\left(-\frac{1}{2} + 4i, \frac{i}{2}\sqrt{47}, \cos(x)\right)\_C2 + \mathit{LegendreP}\left(-\frac{1}{2} + 4i, \frac{i}{2}\sqrt{47}, \cos(x)\right)\_C1\right)\right\}$$

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 = 0.461605 (sec), leaf count = 42

$$\left\{\left\{y(x) \to c_1 \sqrt[4]{\cos^2(x) - 1} P_v^n(\cos(x)) + c_2 \sqrt[4]{\cos^2(x) - 1} Q_v^n(\cos(x))\right\}\right\}$$

✓ **Maple** : cpu = 2.26 (sec), leaf count = 113

$$\left\{y(x) = \left(\frac{\cos(2x)}{2} - \frac{1}{2}\right)^{\frac{n}{2}} \sqrt[4]{2\cos(2x) + 2}\sqrt{-2\cos(2x) + 2}\left({}_2F_1(1 + \frac{v}{2} + \frac{n}{2}, \frac{1}{2} - \frac{v}{2} + \frac{n}{2}; \frac{3}{2}; \frac{\cos(2x)}{2} + \frac{1}{2})\sqrt{\right.\right.$$

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 = 0.239783 (sec), leaf count = 42

$$\left\{\left\{y(x) \to c_2 \cos^{\frac{1}{2}\left(\sqrt{13}-3\right)}(x) + c_1 \cos^{\frac{1}{2}\left(-3-\sqrt{13}\right)}(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.433 (sec), leaf count = 29

$$\left\{y(x) = \_C1\,(\cos(x))^{-\frac{3}{2}+\frac{\sqrt{13}}{2}} + \_C2\,(\cos(x))^{-\frac{3}{2}-\frac{\sqrt{13}}{2}}\right\}$$

2.1438 ODE No. 1438

$$y''(x) = y(x)\left(-\csc^2(x)\right)\sec^2(x)\left(-a\sin^2(x)\cos^2(x) - (m-1)m\sin^2(x) - (n-1)n\cos^2(x)\right)$$

✓ **Mathematica** : cpu = 0.847682 (sec), leaf count = 615

$$\left\{\left\{y(x) \to \frac{c_2(-1)^{\frac{1}{2}(-2m-1)+1}\cos^2(x)^{\frac{1}{4}(-2m-1)+1}\left(\cos^2(x)-1\right)^{\frac{1}{2}\left(\frac{4am+4\sqrt{-a}n^2+4an-4\sqrt{-a}n+4(-a)^{3/2}+8\sqrt{-a}a+\sqrt{-a}+4mn^2-4}{8a+8n^2-8n+2}\right.}}{}\right.\right.$$

✓ **Maple** : cpu = 0.966 (sec), leaf count = 102

$$\left\{y(x) = (\sin(x))^n\left((\cos(x))^{-m+1}\,{}_2F_1\left(\frac{n}{2} - \frac{m}{2} + \frac{i}{2}\sqrt{a} + \frac{1}{2}, \frac{n}{2} - \frac{m}{2} - \frac{i}{2}\sqrt{a} + \frac{1}{2}; \frac{3}{2} - m; (\cos(x))^2\right)\_C2 + (\cos(\right.\right.$$

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 = 0.616966 (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

$$\left\{y(x) = DESol\left(\left\{\frac{d^2}{dx^2}\_Y(x) - \frac{\left(\frac{d}{dx}\phi(x)\right)\frac{d}{dx}\_Y(x)}{\phi(x)-\phi(a)} + \frac{\left(-n(n+1)(\phi(x)-\phi(a))^2 + \frac{d^2}{da^2}\phi(a)\right)\_Y(x)}{\phi(x)-\phi(a)}\right\}, \{\_Y\right.\right.$$

2.1440 ODE No. 1440

$$y''(x) = -\frac{y'(x)\left(-\phi(x)\phi'(x) - \phi''(x) + \phi(x^3)\right)}{\phi'(x) + \phi(x)^2} - \frac{y(x)\left(\phi(x)^2\left(-\phi'(x)\right) + \phi'(x)^2 - \phi(x)\phi''(x)\right)}{\phi'(x) + \phi(x)^2}$$

✗ **Mathematica** : cpu = 0.627325 (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 = 1.0719 (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

$$\left\{y(x) = DESol\left(\left\{\frac{d^2}{dx^2}\_Y(x) - 2\,\frac{JacobiSN(x,k)\,JacobiCN(x,k)\,JacobiDN(x,k)\,\frac{d}{dx}\_Y(x)}{(JacobiSN\,(x,k))^2 - JacobiSN\,(a,k)} - \frac{\left(-2 + 4\left(k^2 + 1\right.\right.}{}\right.\right.\right.$$

2.1442 ODE No. 1442

$$y''(x) = \frac{y(x)}{f(x)} - \frac{xy'(x)}{f(x)}$$

✓ **Mathematica** : cpu = 0.0513118 (sec), leaf count = 46

$$\left\{\left\{y(x) \to c_2 x \int_1^x \frac{\exp\left(-\int_1^{K[2]} \frac{K[1]}{f(K[1])} dK[1]\right)}{K[2]^2} dK[2] + c_1 x\right\}\right\}$$

✓ **Maple** : cpu = 0.071 (sec), leaf count = 30

$$\left\{y(x) = x\left(\int e^{\int \frac{1}{x}\left(-2 - \frac{x^2}{f(x)}\right) dx} dx\_C1 + \_C2\right)\right\}$$

2.1443 ODE No. 1443

$$y''(x) = -\frac{f'(x)y'(x)}{2f(x)} - \frac{g(x)y(x)}{f(x)}$$

✗ **Mathematica** : cpu = 0.280032 (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 = 1.10424 (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 = 0.038 (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

$$y''(x) = -\frac{y(x)\left(\left(g(x)^2-1\right)\left(f'(x)\left(2f'(x)g'(x)+f(x)g''(x)\right)-f(x)f''(x)g'(x)\right)-f(x)g'(x)^2\left(2g(x)f'(x)+v(v-\right.\right.}{f(x)^2\left(g(x)^2-1\right)g'(x)}$$

✓ **Mathematica** : cpu = 0.143837 (sec), leaf count = 24

$$\{\{y(x) \to c_1 f(x)P_v(g(x)) + c_2 f(x)Q_v(g(x))\}\}$$

✓ **Maple** : cpu = 0.448 (sec), leaf count = 20

$$\{y(x) = f(x)\left(LegendreQ(v, g(x))\,\_C2 + LegendreP(v, g(x))\,\_C1\right)\}$$

2.1446 ODE No. 1446

$$y''(x) = -\frac{(x-1)y(x)}{x^4} - \frac{y'(x)}{x}$$

✓ **Mathematica** : cpu = 0.0402941 (sec), leaf count = 33

$$\left\{\left\{y(x) \to c_1 e^{-1/x} - c_2 e^{-1/x} \text{Ei}\left(\frac{2}{x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.062 (sec), leaf count = 22

$$\left\{y(x) = e^{-x^{-1}}\left(Ei\left(1, -2\,x^{-1}\right)\_C2 + \_C1\right)\right\}$$

2.1447 ODE No. 1447

$$y''(x) = -\frac{(-x-1)y(x)}{x^4} - \frac{y'(x)}{x}$$

✓ **Mathematica** : cpu = 0.0390096 (sec), leaf count = 29

$$\left\{\left\{y(x) \to c_1 e^{\frac{1}{x}} - c_2 e^{\frac{1}{x}} \text{Ei}\left(-\frac{2}{x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.061 (sec), leaf count = 20

$$\left\{y(x) = e^{x^{-1}}\left(Ei\left(1, 2\,x^{-1}\right)\_C2 + \_C1\right)\right\}$$

2.1448 ODE No. 1448

$$y''(x) = -\frac{b^2 y(x)}{(x^2 - a^2)^2}$$

✓ **Mathematica** : cpu = 0.192145 (sec), leaf count = 149

$$\left\{\left\{y(x) \to c_1 (x-a)^{\frac{1}{2}\sqrt{1-\frac{b^2}{a^2}}+\frac{1}{2}} (a+x)^{\frac{1}{2}-\frac{1}{2}\sqrt{1-\frac{b^2}{a^2}}} - \frac{c_2 (x-a)^{\frac{1}{2}-\frac{1}{2}\sqrt{\frac{a^2-b^2}{a^2}}} (a+x)^{\frac{1}{2}\sqrt{\frac{a^2-b^2}{a^2}}+\frac{1}{2}}}{2a\sqrt{\frac{a^2-b^2}{a^2}}}\right\}\right\}$$

✓ **Maple** : cpu = 0.219 (sec), leaf count = 77

$$\left\{y(x) = \sqrt{(a-x)(x+a)}\left(\left(\frac{a-x}{x+a}\right)^{\frac{1}{2a}\sqrt{a^2-b^2}}\_C1 + \left(\frac{a-x}{x+a}\right)^{-\frac{1}{2a}\sqrt{a^2-b^2}}\_C2\right)\right\}$$

2.1449 ODE No. 1449

$$y^{(3)}(x) - \lambda y(x) = 0$$

✓ **Mathematica** : cpu = 0.0075361 (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 = 0.032 (sec), leaf count = 47

$$\left\{y(x) = \_C1\,\mathrm{e}^{-\frac{\left(1+i\sqrt{3}\right)x}{2}\sqrt[3]{\lambda}} + \_C2\,\mathrm{e}^{\frac{\left(-1+i\sqrt{3}\right)x}{2}\sqrt[3]{\lambda}} + \_C3\,\mathrm{e}^{\sqrt[3]{\lambda}x}\right\}$$

2.1450 ODE No. 1450

$$ax^3y(x) - bx + y^{(3)}(x) = 0$$

✗ **Mathematica** : cpu = 0.095031 (sec), leaf count = 0 , DifferentialRoot result

$$\left\{\left\{y(x) \to \mathrm{DifferentialRoot}\left(\{y,x\}, \left\{ay(x)x^3 - bx + y^{(3)}(x) = 0, y(0) = c_1, y'(0) = c_2, y''(0) = c_3\right\}\right)(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.221 (sec), leaf count = 1616

$$\left\{y(x) = \int -11211200\,bx^3\left(\left(-5/8\,x^6{}_0\mathrm{F}_2(\,;\,\frac{13}{6},7/3;\,-\frac{ax^6}{216})a + 35\,{}_0\mathrm{F}_2(\,;\,7/6,4/3;\,-\frac{ax^6}{216})\right){}_0\mathrm{F}_2(\,;\,5/6,7/6;\,-\frac{ax}{21}\right.$$

2.1451 ODE No. 1451

$$y^{(3)}(x) - ax^by(x) = 0$$

✓ **Mathematica** : cpu = 0.0138528 (sec), leaf count = 168

$$\left\{\left\{y(x) \to (-1)^{\frac{2}{b+3}}(b+3)^{-\frac{6}{b+3}}c_3x^2a^{\frac{2}{b+3}}\,{}_0F_2\left(;1+\frac{1}{b+3},1+\frac{2}{b+3};\frac{ax^{b+3}}{(b+3)^3}\right) + (-1)^{\frac{1}{b+3}}(b+3)^{-\frac{3}{b+3}}c_2xa^{\frac{1}{b+3}}\,{}_0F_2\right.\right.$$

✓ **Maple** : cpu = 0.5 (sec), leaf count = 114

$$\left\{y(x) = \_C1\,{}_0\mathrm{F}_2(\,;\,\frac{b+1}{b+3},\frac{b+2}{b+3};\,\frac{x^{b+3}a}{(b+3)^3}) + \_C2\,x{}_0\mathrm{F}_2(\,;\,\frac{b+2}{b+3},\frac{4+b}{b+3};\,\frac{x^{b+3}a}{(b+3)^3}) + \_C3\,x^2{}_0\mathrm{F}_2(\,;\,\frac{b+5}{b+3},\frac{4+b}{b+3}\right.$$

2.1452 ODE No. 1452

$$3y'(x) + y^{(3)}(x) - 4y(x) = 0$$

✓ **Mathematica** : cpu = 0.005238 (sec), leaf count = 54

$$\left\{\left\{y(x) \to c_3 e^x + c_2 e^{-x/2} \cos\left(\frac{\sqrt{15}x}{2}\right) + c_1 e^{-x/2} \sin\left(\frac{\sqrt{15}x}{2}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.007 (sec), leaf count = 35

$$\left\{y(x) = e^x\_C1 + \_C2\, e^{-\frac{x}{2}} \sin\left(\frac{\sqrt{15}x}{2}\right) + \_C3\, e^{-\frac{x}{2}} \cos\left(\frac{\sqrt{15}x}{2}\right)\right\}$$

2.1453 ODE No. 1453

$$a^2(-y'(x)) - e^{2ax}\sin^2(x) + y^{(3)}(x) = 0$$

✓ **Mathematica** : cpu = 1.02056 (sec), leaf count = 128

$$\left\{\left\{y(x) \to \frac{e^{-ax}\left(-3\left(11a^2-4\right)a^3 e^{3ax}\sin(2x) - 9\left(a^2-4\right)a^4 e^{3ax}\cos(2x) + \left(9a^6+49a^4+56a^2+16\right)\left(12a^2 c_1 e^{2ax}\right.\right.}{12a^3\left(9a^6+49a^4+56a^2+16\right)}\right.\right.$$

✓ **Maple** : cpu = 0.249 (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 = 0.0056137 (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 = 0.047 (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 = 0.0198855 (sec), leaf count = 127

$$\left\{\left\{y(x)\to\left(-\frac{1}{3}\right)^{2/3}c_3x^2\,{}_2F_2\left(\frac{2}{3}-\frac{a}{3},\frac{2}{3}-\frac{b}{3};\frac{4}{3},\frac{5}{3};\frac{x^3}{3}\right)+\sqrt[3]{-\frac{1}{3}}c_2x\,{}_2F_2\left(\frac{1}{3}-\frac{a}{3},\frac{1}{3}-\frac{b}{3};\frac{2}{3},\frac{4}{3};\frac{x^3}{3}\right)+c_1\,{}_2F_2\left(-\frac{a}{3}\right.\right.\right.$$

✓ **Maple** : cpu = 0.333 (sec), leaf count = 71

$$\left\{y(x)=\_C1\,{}_2\mathrm{F}_2(-\frac{a}{3},-\frac{b}{3};\frac{1}{3},\frac{2}{3};\frac{x^3}{3})+\_C2\,x{}_2\mathrm{F}_2(\frac{1}{3}-\frac{a}{3},\frac{1}{3}-\frac{b}{3};\frac{2}{3},\frac{4}{3};\frac{x^3}{3})+\_C3\,x^2{}_2\mathrm{F}_2(-\frac{a}{3}+\frac{2}{3},-\frac{b}{3}+\frac{2}{3};\frac{4}{3},\right.$$

2.1456 ODE No. 1456

$$x^{2c-2}y'(x)+(c-1)x^{2c-3}y(x)+y^{(3)}(x)=0$$

✓ **Mathematica** : cpu = 0.0241112 (sec), leaf count = 183

$$\left\{\left\{y(x)\to 4^{-1/c}c^{-2/c}c_3\left(x^{2c}\right)^{\frac{1}{c}}\,{}_1F_2\left(\frac{1}{2}+\frac{1}{2c};1+\frac{1}{2c},1+\frac{1}{c};-\frac{x^{2c}}{4c^2}\right)+2^{-1/c}c^{-1/c}c_2\left(x^{2c}\right)^{\frac{1}{2}/c}\,{}_1F_2\left(\frac{1}{2};1-\frac{1}{2c},1+\frac{1}{2}\right.\right.\right.$$

✓ **Maple** : cpu = 0.361 (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 = 0.0136866 (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

$$\left\{y(x)=DESol\left(\left\{\frac{\mathrm{d}^3}{\mathrm{d}x^3}\_Y(x)+(-6\,WeierstrassP(x,g2,g3)-3\,a)\frac{\mathrm{d}}{\mathrm{d}x}\_Y(x)+b\_Y(x)\right\},\{\_Y(x)\}\right)\right\}$$

2.1458 ODE No. 1458

$$\frac{1}{2}y(x)\left(\left(1-n^2\right)\wp'(x;\text{g2},\text{g3})-a\right)+\left(1-n^2\right)y'(x)\wp(x;\text{g2},\text{g3})+y^{(3)}(x)=0$$

✗ **Mathematica** : cpu = 0.0147868 (sec), leaf count = 0 , could not solve

```
DSolve[((-a + (1 - n^2)*WeierstrassPPrime[x, {g2, g3}])*y[x])/2 + (1 - n^2)*WeierstrassP[x,
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x)=DESol\left(\left\{\frac{d^3}{dx^3}\_Y(x)+\left(-n^2\,WeierstrassP(x,g2,g3)+WeierstrassP(x,g2,g3)\right)\frac{d}{dx}\_Y(x)+\left(-\frac{Weie\right.\right.\right.$$

2.1459 ODE No. 1459

$$-y'(x)(a+4n(n+1)\wp(x;\text{g2},\text{g3}))-2n(n+1)y(x)\wp'(x;\text{g2},\text{g3})+y^{(3)}(x)=0$$

✗ **Mathematica** : cpu = 0.014672 (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

$$\left\{y(x)=\left(DESol\left(\left\{\frac{d^2}{dx^2}\_Y(x)+\left(-n^2\,WeierstrassP(x,g2,g3)-n\,WeierstrassP(x,g2,g3)-\frac{a}{4}\right)\_Y(x)\right\},\{\_\right.\right.\right.$$

2.1460 ODE No. 1460

$$y'(x)(a+A\wp(x;\text{g2},\text{g3}))+By(x)\wp'(x;\text{g2},\text{g3})+y^{(3)}(x)=0$$

✗ **Mathematica** : cpu = 0.0106407 (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

$$\left\{y(x)=DESol\left(\left\{\frac{d^3}{dx^3}\_Y(x)+\left(A\,WeierstrassP(x,g2,g3)+a\right)\frac{d}{dx}\_Y(x)+B\,WeierstrassPPrime(x,g2,g3)\_\right.\right.\right.$$

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 = 0.0224405 (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

$$\left\{y(x)=DESol\left(\left\{\frac{\mathrm{d}^3}{\mathrm{d}x^3}\_Y(x)+\left(-3\,k^2(JacobiSN(z,x))^2-a\right)\frac{\mathrm{d}}{\mathrm{d}x}\_Y(x)+\left(b+c(JacobiSN(z,x))^2-3\,k^2Jaco\right.\right.\right.\right.$$

2.1462 ODE No. 1462

$$-y'(x)\left(a+6k^2\sin^2(x)\right)+by(x)+y^{(3)}(x)=0$$

✗ **Mathematica** : cpu = 0.0161775 (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 = 0.0447785 (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

$$\left\{y(x)=\left(DESol\left(\left\{\frac{\mathrm{d}^2}{\mathrm{d}x^2}\_Y(x)+\frac{f(x)\_Y(x)}{2}\right\},\{\_Y(x)\}\right)\right)^2\right\}$$

2.1464 ODE No. 1464

$$-3y'(x) - 2y''(x) + y^{(3)}(x) + 10y(x) = 0$$

✓ **Mathematica** : cpu = 0.0047079 (sec), leaf count = 34

$$\left\{\left\{y(x) \to c_3 e^{-2x} + c_2 e^{2x}\cos(x) + c_1 e^{2x}\sin(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.006 (sec), leaf count = 27

$$\left\{y(x) = e^{-2\,x}\_C1 + \_C2\,e^{2\,x}\sin(x) + \_C3\,e^{2\,x}\cos(x)\right\}$$

2.1465 ODE No. 1465

$$-a^2y'(x) + 2a^2y(x) - 2y''(x) + y^{(3)}(x) - \sinh(x) = 0$$

✓ **Mathematica** : cpu = 0.0826201 (sec), leaf count = 95

$$\left\{\left\{y(x) \to \frac{e^{-x}\left(3a^2e^{2x} - a^2 - 3e^{2x} - 12e^x\sinh(x) - 6e^x\cosh(x) + 1\right)}{6(a-2)(a+2)\left(a^2-1\right)} + c_1e^{-ax} + c_3e^{ax} + c_2e^{2x}\right\}\right\}$$

✓ **Maple** : cpu = 0.086 (sec), leaf count = 113

$$\left\{y(x) = \frac{1}{6\,a^4 - 30\,a^2 + 24}\left(\left(6\_C3\,a^4 - 30\_C3\,a^2 + 24\_C3\right)e^{-ax} + 6\,(a-1)\left(\_C1\,a^2 + 1/6\sinh(3\,x) - 4\_C\right.\right.$$

2.1466 ODE No. 1466

$$3a^2y'(x) + a^3(-y(x)) - 3ay''(x) - e^{ax} + y^{(3)}(x) = 0$$

✓ **Mathematica** : cpu = 0.0075693 (sec), leaf count = 46

$$\left\{\left\{y(x) \to \frac{1}{6}x^3e^{ax} + c_3x^2e^{ax} + c_2xe^{ax} + c_1e^{ax}\right\}\right\}$$

✓ **Maple** : cpu = 0.018 (sec), leaf count = 27

$$\left\{y(x) = \frac{e^{ax}\left(6\_C3\,x^2 + x^3 + 6\_C2\,x + 6\_C1\right)}{6}\right\}$$

2.1467 ODE No. 1467

$$\text{a0}y(x) + \text{a1}y'(x) + \text{a2}y''(x) + y^{(3)}(x) = 0$$

✓ **Mathematica** : cpu = 0.0043846 (sec), leaf count = 84

$$\left\{\left\{y(x) \to c_1 e^{x\text{Root}\left[\#1^2\text{a2}+\#1^3+\#1\text{a1}+\text{a0}\&,1\right]} + c_2 e^{x\text{Root}\left[\#1^2\text{a2}+\#1^3+\#1\text{a1}+\text{a0}\&,2\right]} + c_3 e^{x\text{Root}\left[\#1^2\text{a2}+\#1^3+\#1\text{a1}+\text{a0}\&,3\right]}\right\}\right.$$

✓ **Maple** : cpu = 0.127 (sec), leaf count = 590

$$\left\{y(x) = \_C1\, \mathrm{e}^{-x\left(\left(\frac{i}{12}\sqrt{3}+\frac{1}{12}\right)\left(36\, a1\, a2-108\, a0-8\, a2^3+12\sqrt{12\, a0\, a2^3-3\, a1^2 a2^2-54\, a1\, a2\, a0+12\, a1^3+81\, a0^2}\right)^{\frac{2}{3}}+\frac{a2}{3}\sqrt[3]{36\, a1\, a2-10\right.\right.}}\right.$$

2.1468 ODE No. 1468

$$2\left(2a + 4x^2 - 1\right) y'(x) - 8axy(x) - 6xy''(x) + y^{(3)}(x) = 0$$

✓ **Mathematica** : cpu = 0.0572008 (sec), leaf count = 57

$$\left\{\left\{y(x) \to c_2 H_{\frac{a}{2}}(x)\, {}_1F_1\left(-\frac{a}{4};\frac{1}{2};x^2\right) + c_1 H_{\frac{a}{2}}(x)^2 + c_3\, {}_1F_1\left(-\frac{a}{4};\frac{1}{2};x^2\right)^2\right\}\right\}$$

✓ **Maple** : cpu = 0.357 (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

$$3a^2x^2y'(x) + a^3x^3y(x) + 3axy''(x) + y^{(3)}(x) = 0$$

✓ **Mathematica** : cpu = 0.0123159 (sec), leaf count = 72

$$\left\{\left\{y(x) \to c_1 e^{-\frac{ax^2}{2}} + c_2 e^{-\frac{ax^2}{2}-\sqrt{3}\sqrt{a}x} + c_3 e^{\sqrt{3}\sqrt{a}x-\frac{ax^2}{2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.05 (sec), leaf count = 37

$$\left\{y(x) = \mathrm{e}^{-\frac{ax^2}{2}}\left(\_C1 + \_C2\,\mathrm{e}^{\sqrt{3}\sqrt{a}x} + \_C3\,\mathrm{e}^{-\sqrt{3}\sqrt{a}x}\right)\right\}$$

2.1470 ODE No. 1470

$$-2\cos(x)y'(x) - \sin(x)y''(x) + y^{(3)}(x) + y(x)\sin(x) - \log(x) = 0$$

✓ **Mathematica** : cpu = 2.47295 (sec), leaf count = 64

$$\left\{\left\{y(x) \to e^{-\cos(x)} \int_1^x \frac{1}{4} e^{\cos(K[1])} \left(2\log(K[1])K[1]^2 - 3K[1]^2 + 4c_1K[1] + 4c_2\right) dK[1] + c_3 e^{-\cos(x)}\right\}\right\}$$

✓ **Maple** : cpu = 0.167 (sec), leaf count = 36

$$\left\{y(x) = \left(\_C3 + \int \left(2\_C1\,x + \_C2 - \frac{3\,x^2}{4} + \frac{x^2 \ln(x)}{2}\right) e^{\cos(x)}\,dx\right) e^{-\cos(x)}\right\}$$

2.1471 ODE No. 1471

$$f(x)y''(x) + f(x)y(x) + y'(x) + y^{(3)}(x) = 0$$

✓ **Mathematica** : cpu = 0.0788075 (sec), leaf count = 84

$$\left\{\left\{y(x) \to c_3 e^{ix} \int_1^x e^{-2iK[3]} \int_1^{K[3]} \exp\left(\int_1^{K[2]} (i - f(K[1]))dK[1]\right) dK[2]dK[3] + c_1 e^{ix} + \frac{1}{2} i c_2 e^{-ix}\right\}\right\}$$

✓ **Maple** : cpu = 0.329 (sec), leaf count = 36

$$\left\{y(x) = e^{ix}\left(\int e^{-2\,ix}\left(\int \_C3\,e^{\int i - f(x)\,dx}\,dx + \_C2\right) dx + \_C1\right)\right\}$$

2.1472 ODE No. 1472

$$f(x)\left(x^2y''(x) - 2xy'(x) + 2y(x)\right) + y^{(3)}(x) = 0$$

✓ **Mathematica** : cpu = 0.0945188 (sec), leaf count = 88

$$\left\{\left\{y(x) \to c_3 x\left(\int_1^x \frac{\exp\left(-\int_1^{K[2]} f(K[1])K[1]^2 dK[1]\right)}{K[2]^2} dK[2] - x\int_1^x \frac{\exp\left(-\int_1^{K[3]} f(K[1])K[1]^2 dK[1]\right)}{K[3]^3} dK[3]\right)\right.\right.$$

✓ **Maple** : cpu = 0.397 (sec), leaf count = 33

$$\left\{y(x) = \left(\int \_C1 + \_C2 \int e^{-\int x^2 f(x) + 3\,x^{-1}\,dx}\,dx\,dx + \_C3\right) x\right\}$$

2.1473 ODE No. 1473

$$y(x)\left(f(x)g(x)+g'(x)\right)+f(x)y''(x)+g(x)y'(x)+y^{(3)}(x)=0$$

✗ **Mathematica** : cpu = 0.0105406 (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

$$\left\{y(x)=DESol\left(\left\{\frac{d^3}{dx^3}\_Y(x)+f(x)\frac{d^2}{dx^2}\_Y(x)+g(x)\frac{d}{dx}\_Y(x)+\left(f(x)\,g(x)+\frac{d}{dx}g(x)\right)\_Y(x)\right\},\{\_Y(x)\}\right.\right.$$

2.1474 ODE No. 1474

$$y'(x)\left(f'(x)+2f(x)^2+4g(x)\right)+y(x)\left(4f(x)g(x)+2g'(x)\right)+3f(x)y''(x)+y^{(3)}(x)=0$$

✗ **Mathematica** : cpu = 0.0114949 (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

$$\left\{y(x)=\left(DESol\left(\left\{\frac{d^2}{dx^2}\_Y(x)+f(x)\frac{d}{dx}\_Y(x)+g(x)\_Y(x)\right\},\{\_Y(x)\}\right)\right)^2\right\}$$

2.1475 ODE No. 1475

$$-11y'(x)-8y''(x)+4y^{(3)}(x)-3y(x)+18e^x=0$$

✓ **Mathematica** : cpu = 0.0244796 (sec), leaf count = 38

$$\left\{\left\{y(x)\to e^x+c_1e^{-x/2}+c_2e^{-x/2}x+c_3e^{3x}\right\}\right\}$$

✓ **Maple** : cpu = 0.017 (sec), leaf count = 23

$$\left\{y(x)=(\_C3\,x+\_C2)\,e^{-\frac{x}{2}}+\_C1\,e^{3\,x}+e^{x}\right\}$$

2.1476 ODE No. 1476

$$-36n^2y'(x)\wp(x;\mathrm{g2},\mathrm{g3})-2(n+3)(4n-3)ny(x)\phi'(x)+27y^{(3)}(x)=0$$

✗ **Mathematica** : cpu = 0.0855025 (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

$$3y''(x)+xy^{(3)}(x)+xy(x)=0$$

✓ **Mathematica** : cpu = 0.129029 (sec), leaf count = 48

$$\left\{\left\{y(x)\to\frac{c_1e^{-x}}{x}+\frac{c_2e^{\sqrt[3]{-1}x}}{x}+\frac{c_3e^{-(-1)^{2/3}x}}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.043 (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

$$-ax^2y(x)+3y''(x)+xy^{(3)}(x)=0$$

✓ **Mathematica** : cpu = 0.0238575 (sec), leaf count = 104

$$\left\{\left\{y(x)\to-\frac{2(-1)^{3/4}\sqrt{2}c_1\,{}_0F_2\left(;\frac{1}{2},\frac{3}{4};\frac{ax^4}{64}\right)}{\sqrt[4]{a}x}+c_2\,{}_0F_2\left(;\frac{3}{4},\frac{5}{4};\frac{ax^4}{64}\right)+\frac{\sqrt[4]{-1}\sqrt[4]{a}c_3x\,{}_0F_2\left(;\frac{5}{4},\frac{3}{2};\frac{ax^4}{64}\right)}{2\sqrt{2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.11 (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

$$(a+b)y''(x)-ay(x)-xy'(x)+xy^{(3)}(x)=0$$

✓ **Mathematica** : cpu = 0.107806 (sec), leaf count = 153

$$\left\{\left\{y(x)\to c_3\left(\frac{i}{2}\right)^{-a-b+2}x^{-a-b+2}\,{}_1F_2\left(1-\frac{b}{2};-\frac{a}{2}-\frac{b}{2}+\frac{3}{2},-\frac{a}{2}-\frac{b}{2}+2;\frac{x^2}{4}\right)+\frac{1}{2}ic_2x\,{}_1F_2\left(\frac{a}{2}+\frac{1}{2};\frac{3}{2},\frac{a}{2}+\frac{b}{2}+\right.\right.\right.$$

✓ **Maple** : cpu = 0.209 (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

$$-(-2v+x-1)y'(x)-(2v+x)y''(x)+xy^{(3)}(x)+(x-1)y(x)=0$$

✓ **Mathematica** : cpu = 0.172909 (sec), leaf count = 93

$$\left\{\left\{y(x)\to\frac{c_3e^xx^{2v+2}\Gamma\left(v+\frac{3}{2}\right)\,{}_1\tilde{F}_1\left(v+\frac{3}{2};2v+3;-2x\right)}{\Gamma\left(\frac{1}{2}-v\right)}+c_22^{-2v-2}e^xG_{2,3}^{2,1}\left(2x\left|\begin{array}{c}1,v+\frac{3}{2}\\1,2(v+1),0\end{array}\right.\right)+c_1e^x\right\}\right\}$$

✓ **Maple** : cpu = 0.227 (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

$$-f(x)+\left(x^2-3\right)y''(x)+4xy'(x)+xy^{(3)}(x)+2y(x)=0$$

✓ **Mathematica** : cpu = 0.374316 (sec), leaf count = 432

$$\left\{\left\{y(x)\to-\frac{1}{240}e^{-\frac{x^2}{2}}\left(-240x^5\int_1^x\left(-\frac{1}{240}\left(15\mathrm{Ei}\left(\frac{K[1]^2}{2}\right)+16e^{\frac{K[1]^2}{2}}\right)f(K[1])+\frac{1}{15}\sqrt{\frac{\pi}{2}}\mathrm{erfi}\left(\frac{K[1]}{\sqrt{2}}\right)K[1]f(K\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.151 (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

$$axy(x) - b + 3y''(x) + 2xy^{(3)}(x) = 0$$

✗ **Mathematica** : cpu = 0.459929 (sec), leaf count = 0 , DifferentialRoot result

$$\left\{\left\{y(x) \to \text{DifferentialRoot}\left(\{y, x\}, \left\{-b + xay(x) + 3y''(x) + 2xy^{(3)}(x) = 0, y(1) = c_1, y'(1) = c_2, y''(1) = c_3\right\}\right)\right.\right.$$

✓ **Maple** : cpu = 0.267 (sec), leaf count = 1616

$$\left\{y(x) = -\int 2802800\, bx\left(\left(-5/8\, {}_0\mathrm{F}_2(\,;\frac{13}{6}, 7/3;\, -\frac{ax^3}{54})ax^3 + \frac{35}{4}{}_0\mathrm{F}_2(\,;7/6, 4/3;\, -\frac{ax^3}{54})\right)\, {}_0\mathrm{F}_2(\,;5/6, 7/6;\, -\frac{ax^3}{54}\right.\right.$$

2.1483 ODE No. 1483

$$(6\nu + 2x - 5)y'(x) - 4(\nu + x - 1)y''(x) + (1 - 2\nu)y(x) + 2xy^{(3)}(x) = 0$$

✓ **Mathematica** : cpu = 0.114203 (sec), leaf count = 112

$$\left\{\left\{y(x) \to \frac{c_3 e^x x\Gamma\left(\frac{5}{2} - 3\nu\right)\left(\frac{2\,{}_1\tilde{F}_1\left(\frac{3}{2}-3\nu;1-2\nu;-x\right)}{3(2\nu-1)x} + \frac{2}{3x\Gamma(2-2\nu)}\right)}{\Gamma\left(\frac{3}{2} - \nu\right)} + c_2 e^x G_{2,3}^{2,1}\left(x \middle| \begin{array}{c} 1, 3\nu - \frac{1}{2} \\ 1, 2\nu, 0 \end{array}\right) + c_1 e^x\right\}\right\}$$

✓ **Maple** : cpu = 0.239 (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 = 61.8649 (sec), leaf count = 0 , DifferentialRoot result

$$\left\{\left\{y(x) \to \text{DifferentialRoot}\left(\{y, x\}, \left\{(2xc + 3bk)y(x) + (6xb + 6ak)y'(x) + (6xa + 3k)y''(x) + 2xy^{(3)}(x) = 0, y(1\right.\right.\right.\right.$$

✗ **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

$$-2y'(x)-(x-2)xy''(x)+(x-2)xy^{(3)}(x)+2y(x)=0$$

✓ **Mathematica** : cpu = 0.160314 (sec), leaf count = 64

$$\left\{\left\{y(x)\to \frac{1}{4}c_3x^2\left(-\frac{4e^{x-2}\text{Ei}(2-x)}{x^2}+\frac{2}{x^2}+\frac{2}{x}+\log(2-x)-\log(x)\right)+c_1x^2+c_2e^x\right\}\right\}$$

✓ **Maple** : cpu = 0.281 (sec), leaf count = 51

$$\left\{y(x)=\_C3\ Ei(1,x-2)\,e^{x-2}+\frac{\_C3\ x^2\ln(x-2)}{4}+\_C2\ e^x-\frac{\_C3\ x^2\ln(x)}{4}+\frac{(2x+2)\_C3}{4}+\_C1\ x^2\right\}$$

2.1486 ODE No. 1486

$$-8xy'(x)+(2x-1)y^{(3)}(x)+8y(x)=0$$

✓ **Mathematica** : cpu = 0.291522 (sec), leaf count = 65

$$\left\{\left\{y(x)\to \frac{1}{4}c_3x\left(\frac{e^{2x-2}\text{Ei}(2-4x)}{x}-\frac{2\text{Ei}(1-2x)}{e}-\frac{e^{-2x}}{x}\right)+c_1x-c_2e^{2x}\right\}\right\}$$

✓ **Maple** : cpu = 0.199 (sec), leaf count = 51

$$\left\{y(x)=\_C1\ x+\_C2\ e^{2x}-\frac{\_C3\ \left(2xe^{-1}Ei(1,2x-1)-Ei(1,4x-2)\,e^{2x-2}-e^{-2x}\right)}{4}\right\}$$

2.1487 ODE No. 1487

$$2y'(x)+(x+4)y''(x)+(2x-1)y^{(3)}(x)=0$$

✓ **Mathematica** : cpu = 0.64856 (sec), leaf count = 87

$$\left\{\left\{y(x)\to \int_1^x\left(\frac{e^{-\frac{K[1]}{2}}c_1\left(1+\frac{1}{4\left(\frac{K[1]}{2}-\frac{1}{4}\right)}\right)}{\sqrt[4]{\frac{K[1]}{2}-\frac{1}{4}}}+e^{-\frac{K[1]}{2}}c_2L_{-\frac{1}{4}}^{\frac{5}{4}}\left(\frac{K[1]}{2}-\frac{1}{4}\right)\right)dK[1]+c_3\right\}\right\}$$

✓ **Maple** : cpu = 0.589 (sec), leaf count = 38

$$\left\{y(x)=\left(\_C3+\int(2\_C1\ x+\_C2)e^{\frac{x}{2}}(2x-1)^{-\frac{3}{4}}\,dx\right)e^{-\frac{x}{2}}\frac{1}{\sqrt[4]{2x-1}}\right\}$$

2.1488 ODE No. 1488

$$ax^2y(x) + x^2y^{(3)}(x) - 6y'(x) = 0$$

✓ **Mathematica** : cpu = 0.399532 (sec), leaf count = 102

$$\left\{\left\{y(x) \to \frac{c_1e^{-\sqrt[3]{a}x}\left(\sqrt[3]{a}x+2\right)}{x} + \frac{c_2e^{\sqrt[3]{-1}\sqrt[3]{a}x}\left(\sqrt[3]{a}x+2(-1)^{2/3}\right)}{x} + \frac{c_3e^{-(-1)^{2/3}\sqrt[3]{a}x}\left(\sqrt[3]{a}x-2\sqrt[3]{-1}\right)}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.67 (sec), leaf count = 135

$$\left\{y(x) = \frac{1}{x}\left(-\left(\left(-i-\sqrt{3}\right)\left(-a^4\right)^{\frac{2}{3}} + ia^3x\right)\_C3\, \mathrm{e}^{\frac{\frac{i}{2}\left(i-\sqrt{3}\right)x}{a}\sqrt[3]{-a^4}} - \left(\left(-i+\sqrt{3}\right)\left(-a^4\right)^{\frac{2}{3}} + ia^3x\right)\_C2\, \mathrm{e}^{\frac{\frac{i}{2}\left(\sqrt{3}+i\right)x}{a}}\right.$$

2.1489 ODE No. 1489

$$x^2y^{(3)}(x) + (x+1)y''(x) - y(x) = 0$$

✗ **Mathematica** : cpu = 0.566591 (sec), leaf count = 0 , DifferentialRoot result

$$\left\{\left\{y(x) \to \text{DifferentialRoot}\left(\{y, x\}, \left\{y^{(3)}(x)x^2 - y(x) + (x+1)y''(x) = 0, y(1) = c_1, y'(1) = c_2, y''(1) = c_3\right\}\right)(x$$

✗ **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

$$\left(x^2+1\right)y'(x) + x^2y^{(3)}(x) - xy''(x) = 0$$

✓ **Mathematica** : cpu = 0.0246846 (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 = 0.046 (sec), leaf count = 18

$$\{y(x) = \_C1 + \_C2\, xJ_1(x) + \_C3\, xY_1(x)\}$$

2.1491 ODE No. 1491

$$\left(-4a^2\nu^2+4a^2x^{2a}+1\right)y'(x)+x^2y^{(3)}(x)+3xy''(x)=4a^3x^{2a-1}y(x)$$

✓ **Mathematica** : cpu = 0.0321792 (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 = 0.258 (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

$$\left(4x(n-m)+m(2m-1)+2x^2\right)y'(x)-2n(-2m+2x+1)y(x)-3x(x-m)y''(x)+x^2y^{(3)}(x)=0$$

✓ **Mathematica** : cpu = 0.27341 (sec), leaf count = 43

$$\left\{\left\{y(x)\to c_2U(-n,m,x)L_n^{m-1}(x)+c_1U(-n,m,x)^2+c_3L_n^{m-1}(x)^2\right\}\right\}$$

✓ **Maple** : cpu = 0.285 (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

$$-f(x)+\left(x^2+2\right)y'(x)+x^2y^{(3)}(x)+4xy''(x)+3xy(x)=0$$

✓ **Mathematica** : cpu = 1.10813 (sec), leaf count = 2585

$$\left\{\left\{y(x)\to J_0(x)c_1+2Y_0(x)c_2+\frac{2c_3\,{}_1F_2\left(1;\frac{1}{2},\frac{1}{2};-\frac{x^2}{4}\right)}{x}+\frac{xJ_0(x)\int_1^x\left(\frac{-16J_1(K[1])Y_0(K[1])^2f(K[1])\,{}_1F_2\left(3;\frac{5}{2},\frac{5}{2};-\frac{1}{4}K[1]^2\right)F\right.}{}\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.306 (sec), leaf count = 1033

$$\left\{y(x)=\frac{1}{x}\left(\int-9\frac{}{((-9\,x^2J_0\,(x)-36\,xJ_1\,(x)+27\,J_0\,(x))\,{}_1\mathrm{F}_2(1;\ 1/2,1/2;\ -1/4\,x^2)+4\,x^2\,(9/4\,J_0\,(x)\,(x^2+9)\,{}_1\mathrm{F}\right.\right.$$

2.1494 ODE No. 1494

$$x^2 y^{(3)}(x) + 4y'(x) + 5xy''(x) - \log(x) = 0$$

✓ **Mathematica** : cpu = 0.0177939 (sec), leaf count = 43

$$\left\{\left\{y(x) \to -\frac{x}{2} + \frac{1}{4}x\log(x) - \frac{c_1}{x} - \frac{2c_2}{x} - \frac{2c_2\log(x)}{x} + c_3\right\}\right\}$$

✓ **Maple** : cpu = 0.125 (sec), leaf count = 32

$$\left\{y(x) = \frac{(x^2 + 4\_C2)\ln(x) - 2x^2 + 4\_C1\,x + 4\_C3}{4x}\right\}$$

2.1495 ODE No. 1495

$$x^2 y^{(3)}(x) + 6y'(x) + 6xy''(x) = 0$$

✓ **Mathematica** : cpu = 0.0055499 (sec), leaf count = 24

$$\left\{\left\{y(x) \to -\frac{c_1}{2x^2} - \frac{c_2}{x} + c_3\right\}\right\}$$

✓ **Maple** : cpu = 0.01 (sec), leaf count = 16

$$\left\{y(x) = \_C1 + \frac{\_C2}{x^2} + \frac{\_C3}{x}\right\}$$

2.1496 ODE No. 1496

$$ax^2 y(x) + x^2 y^{(3)}(x) + 6y'(x) + 6xy''(x) = 0$$

✓ **Mathematica** : cpu = 0.193293 (sec), leaf count = 63

$$\left\{\left\{y(x) \to \frac{c_1 e^{-\sqrt[3]{a}x}}{x^2} + \frac{c_2 e^{\sqrt[3]{-1}\sqrt[3]{a}x}}{x^2} + \frac{c_3 e^{-(-1)^{2/3}\sqrt[3]{a}x}}{x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.046 (sec), leaf count = 57

$$\left\{y(x) = \frac{1}{x^2}\left(\_C1\,e^{\frac{(-1+i\sqrt{3})x}{2}\sqrt[3]{-a}} + \_C2\,e^{-\frac{(1+i\sqrt{3})x}{2}\sqrt[3]{-a}} + \_C3\,e^{\sqrt[3]{-a}x}\right)\right\}$$

2.1497 ODE No. 1497

$$3p(3q+1)y'(x) - 3x(p+q)y''(x) + x^2y^{(3)}(x) + x^2(-y(x)) = 0$$

✓ **Mathematica** : cpu = 0.362773 (sec), leaf count = 135

$$\left\{\left\{y(x) \to c_2(-1)^{\frac{1}{3}(3p+1)}3^{-3p-1}x^{3p+1}\,{}_0F_2\left(;p+\frac{4}{3},p-q+\frac{2}{3};\frac{x^3}{27}\right) + c_3(-1)^{\frac{1}{3}(3q+2)}3^{-3q-2}x^{3q+2}\,{}_0F_2\left(;q+\frac{5}{3},-p\right.\right.\right.$$

✓ **Maple** : cpu = 0.246 (sec), leaf count = 77

$$\left\{y(x) = \_C1\,{}_0\mathrm{F}_2(\,;\,-q+\frac{1}{3},-p+\frac{2}{3};\,\frac{x^3}{27}) + \_C2\,x^{1+3p}{}_0\mathrm{F}_2(\,;\,p+\frac{4}{3},\frac{2}{3}-q+p;\,\frac{x^3}{27}) + \_C3\,x^{3q+2}{}_0\mathrm{F}_2(\,;\,q+\frac{5}{3},\right.$$

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 = 8.48779 (sec), leaf count = 584

$$\left\{\left\{y(x) \to -\frac{\pi c_3 2^{-n-\frac{3}{2}}x\left(\sqrt{a}x\right)^{-n-\frac{1}{2}}\left(-a^{3/2}2^{2n}x^3\sec(\pi n)\Gamma\left(\frac{3}{2}-n\right)\Gamma\left(n+\frac{3}{2}\right)J_{\frac{1}{2}(2n+1)}\left(\sqrt{a}x\right)\,{}_1\tilde{F}_2\left(\frac{3}{2}-n;\frac{1}{2}-n,\right.\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.254 (sec), leaf count = 53

$$\left\{y(x) = \_C1\,x^{n+\frac{1}{2}}J_{-n-\frac{1}{2}}(\sqrt{a}x) + \_C2\,x^{n+\frac{1}{2}}Y_{-n-\frac{1}{2}}(\sqrt{a}x) + \_C3\,\left(ax^2+4n-2\right)\right\}$$

2.1499 ODE No. 1499

$$-\left(\nu^2+x^2-\frac{1}{4}\right)y'(x) + \left(\nu^2+x^2-2x-\frac{1}{4}\right)y(x) - \left(x^2-2x\right)y''(x) + x^2y^{(3)}(x) = 0$$

✓ **Mathematica** : cpu = 0.190953 (sec), leaf count = 97

$$\left\{\left\{y(x) \to \frac{c_3e^xx^{\nu+\frac{1}{2}}\Gamma\left(\nu+\frac{1}{2}\right)\,{}_1\tilde{F}_1\left(\nu+\frac{1}{2};2\nu+1;-2x\right)}{\Gamma\left(\frac{3}{2}-\nu\right)} + c_2 2^{-\nu-\frac{1}{2}}e^xG_{2,3}^{2,1}\left(2x\,\middle|\,\begin{array}{c}1,0\\ \frac{1}{2}-\nu,\nu+\frac{1}{2},0\end{array}\right) + c_1e^x\right\}\right\}$$

✓ **Maple** : cpu = 0.185 (sec), leaf count = 25

$$\left\{y(x) = \mathrm{e}^x\_C1 + \_C2\,\sqrt{x}I_\nu(x) + \_C3\,\sqrt{x}K_\nu(x)\right\}$$

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 = 30.3474 (sec), leaf count = 0 , DifferentialRoot result

$$\left\{\left\{y(x) \to \text{DifferentialRoot}\left(\{y,x\}, \left\{y^{(3)}(x)x^2 - (x+v)y''(x)x - (x+1)\nu y(x) + (2x\nu+\nu)y'(x) = 0, y(1) = c_1,\right.\right.\right.$$

✓ **Maple** : cpu = 0.195 (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

$$\left(-\nu^2 + x^2 - 2x + \frac{1}{4}\right) y'(x) + \left(\nu^2 - \frac{1}{4}\right) y(x) - 2\left(x^2 - x\right) y''(x) + x^2y^{(3)}(x) = 0$$

✓ **Mathematica** : cpu = 0.156528 (sec), leaf count = 86

$$\left\{\left\{y(x) \to \frac{c_3e^x x^{\nu+\frac{1}{2}}\Gamma\left(\nu+\frac{1}{2}\right)\, {}_1\tilde{F}_1\left(\nu+\frac{1}{2}; 2\nu+1; -x\right)}{\Gamma\left(\frac{3}{2}-\nu\right)} + c_2e^x G_{2,3}^{2,1}\left(x \middle| \begin{array}{c} 1,0 \\ \frac{1}{2}-\nu, \nu+\frac{1}{2}, 0 \end{array}\right) + c_1e^x\right\}\right\}$$

✓ **Maple** : cpu = 0.188 (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

$$-\left(2x^3-6\right) y'(x) - \left(x^4-6x\right) y''(x) + x^2y^{(3)}(x) + 2x^2y(x) = 0$$

✓ **Mathematica** : cpu = 0.07058 (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 = 0.684 (sec), leaf count = 104

$$\left\{y(x) = \frac{1}{x^2}\left(\_C2 \int e^{\frac{x^3}{6}}\sqrt{x}\left(I_{-\frac{5}{6}}\left(-\frac{x^3}{6}\right)x^3 + I_{\frac{1}{6}}\left(-\frac{x^3}{6}\right)x^3 - 2\, I_{1/6}(-1/6\, x^3)\right) dx + \_C3 \int -e^{\frac{x^3}{6}}\sqrt{x}\left(-K_{\frac{5}{6}}\left(\right.\right.\right.\right.$$

2.1503 ODE No. 1503

$$(x^2+1)\, y^{(3)}(x)+\frac{1}{x^2}+10y'(x)+8xy''(x)-2\log(x)-3=0$$

✓ **Mathematica** : cpu = 0.391946 (sec), leaf count = 258

$$\left\{\left\{y(x)\to \frac{1}{225}\left(-\frac{51x}{x^2+1}-\frac{34x}{(x^2+1)^2}-\frac{225c_2x}{x^2+1}-\frac{150c_2x}{(x^2+1)^2}-\frac{225c_1}{4\,(x^2+1)^2}-9x+\frac{47}{x-i}+\frac{47}{x+i}+45x\log(x)+\right.\right.\right.$$

✓ **Maple** : cpu = 0.13 (sec), leaf count = 67

$$\left\{y(x)=\frac{(45\,x^5+150\,x^3+225\,x)\ln(x)-9\,x^5+225\_C1\,x^4+(225\_C2-50)\,x^3+450\_C1\,x^2+(675\_C2-}{225\,(x^2+1)^2}\right.$$

2.1504 ODE No. 1504

$$(x^2+2)\, y'(x)+(x^2+2)\, y^{(3)}(x)-2xy''(x)-2xy(x)=0$$

✓ **Mathematica** : cpu = 0.101867 (sec), leaf count = 43

$$\left\{\left\{y(x)\to \frac{c_1x^2}{2}+\frac{1}{2}ic_2e^{-ix}-\frac{1}{4}c_3e^{ix}\right\}\right\}$$

✓ **Maple** : cpu = 0.143 (sec), leaf count = 18

$$\{y(x)=\_C1\,x^2+\_C2\,\cos(x)+\_C3\,\sin(x)\}$$

2.1505 ODE No. 1505

$$(2ax+b)y'(x)+ay(x)+3(2x-1)y''(x)+2(x-1)xy^{(3)}(x)=0$$

✓ **Mathematica** : cpu = 60.2872 (sec), leaf count = 115

$$\left\{\left\{y(x)\to c_3\text{MathieuC}\left[-\frac{a}{2}-\frac{b}{2}+1,\frac{a}{4},\cos^{-1}\left(\sqrt{x}\right)\right]\text{MathieuS}\left[-\frac{a}{2}-\frac{b}{2}+1,\frac{a}{4},\cos^{-1}\left(\sqrt{x}\right)\right]+c_1\text{MathieuC}\left[-\frac{a}{2}\right.\right.\right.$$

✓ **Maple** : cpu = 0.996 (sec), leaf count = 79

$$\left\{y(x)=\_C1\left(\mathit{MathieuC}\left(-\frac{a}{2}-\frac{b}{2}+1,\frac{a}{4},\arccos\left(\sqrt{x}\right)\right)\right)^2+\_C2\left(\mathit{MathieuS}\left(-\frac{a}{2}-\frac{b}{2}+1,\frac{a}{4},\arccos\left(\sqrt{x}\right)\right)\right.\right.$$

2.1506 ODE No. 1506

$$\left(x^2+14x-1\right)y''(x)+4x^2y^{(3)}(x)+4(x+1)y'(x)+2y(x)=0$$

✓ **Mathematica** : cpu = 0.271512 (sec), leaf count = 150

$$\left\{\left\{y(x)\to c_2e^{\frac{1}{4}\left(-x-\frac{1}{x}+2\log(x)\right)}\int_1^x e^{\frac{K[1]^2-10\log(K[1])K[1]+1}{4K[1]}}dK[1]-\sqrt{\pi}c_3\left(e\,\mathrm{erfi}\left(\frac{1-x}{2\sqrt{x}}\right)+\mathrm{erfi}\left(\frac{x+1}{2\sqrt{x}}\right)-i(e-1)\right)\right.\right.$$

✓ **Maple** : cpu = 0.521 (sec), leaf count = 43

$$\left\{y(x)=\left(\_C3+\int\frac{2\_C1\,x+\_C2}{4}e^{\frac{x}{4}}e^{\frac{1}{4x}}x^{-\frac{5}{2}}\,dx\right)e^{-\frac{x}{4}}e^{-\frac{1}{4x}}\sqrt{x}\right\}$$

2.1507 ODE No. 1507

$$xy^{(3)}(x)(ax+b)+(\alpha x+\beta)y''(x)-f(x)+xy'(x)+y(x)=0$$

✗ **Mathematica** : cpu = 1.94099 (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 = 1.737 (sec), leaf count = 1210

$$\left\{y(x)=\left(HeunC\left(0,\frac{2b-\beta}{b},\frac{(2b+\beta)a-b\alpha}{ab},-\frac{b}{a^2},\frac{(4a-\alpha)b^2-\alpha b\beta+a\beta^2}{2ab^2},-\frac{ax}{b}\right)\left(\int-\left(\int f(x)\,dx+\_C1\right.\right.\right.\right.$$

2.1508 ODE No. 1508

$$y(x)\left(ax^3+\nu^2-1\right)+\left(1-\nu^2\right)xy'(x)+x^3y^{(3)}(x)=0$$

✓ **Mathematica** : cpu = 0.617506 (sec), leaf count = 143

$$\left\{\left\{y(x)\to c_23^{\nu-1}a^{\frac{1-\nu}{3}}x^{1-\nu}\,{}_0F_2\left(;1-\frac{2\nu}{3},1-\frac{\nu}{3};-\frac{ax^3}{27}\right)+c_33^{-\nu-1}a^{\frac{\nu+1}{3}}x^{\nu+1}\,{}_0F_2\left(;\frac{\nu}{3}+1,\frac{2\nu}{3}+1;-\frac{ax^3}{27}\right)+\frac{1}{3}\sqrt[3]{\right.\right.$$

✓ **Maple** : cpu = 0.139 (sec), leaf count = 81

$$\left\{y(x)=\_C1\,x\,{}_0F_2\left(\,;-\frac{\nu}{3}+1,1+\frac{\nu}{3};-\frac{ax^3}{27}\right)+\_C2\,x^{-\nu+1}{}_0F_2\left(\,;1-\frac{2\nu}{3},-\frac{\nu}{3}+1;-\frac{ax^3}{27}\right)+\_C3\,x^{\nu+1}{}_0F_2\left(\,;\frac{2\nu}{3}\right.\right.$$

2.1509 ODE No. 1509

$$((1-4\nu^2)\,x+4x^3)\,y'(x)+(4\nu^2-1)\,y(x)+x^3y^{(3)}(x)=0$$

✓ **Mathematica** : cpu = 0.0076247 (sec), leaf count = 34

$$\{\{y(x)\to c_1xJ_\nu(x)^2+c_3xY_\nu(x)^2+c_2xJ_\nu(x)Y_\nu(x)\}\}$$

✓ **Maple** : cpu = 0.043 (sec), leaf count = 29

$$\left\{y(x)=x\left((Y_\nu(x))^2\_C2+Y_\nu(x)J_\nu(x)\_C3+(J_\nu(x))^2\_C1\right)\right\}$$

2.1510 ODE No. 1510

$$y(x)\,(a(\nu-1)x^{2\nu}+bx^{3\nu}+\nu^2-1)+x\,(ax^{2\nu}-\nu^2+1)\,y'(x)+x^3y^{(3)}(x)=0$$

✓ **Mathematica** : cpu = 0.0353295 (sec), leaf count = 102

$$\left\{\left\{y(x)\to c_1x^{1-\nu}e^{\frac{x^\nu\text{Root}\left[\#1^3+\#1a+b\&,1\right]}{\nu}}+c_2x^{1-\nu}e^{\frac{x^\nu\text{Root}\left[\#1^3+\#1a+b\&,2\right]}{\nu}}+c_3x^{1-\nu}e^{\frac{x^\nu\text{Root}\left[\#1^3+\#1a+b\&,3\right]}{\nu}}\right\}\right\}$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x)=DESol\left(\left\{x^3\frac{d^3}{dx^3}\_Y(x)+(x^{2\,\nu}ax-\nu^2x+x)\,\frac{d}{dx}\_Y(x)+(x^{2\,\nu}a\nu-ax^{2\,\nu}+bx^{3\,\nu}+\nu^2-1)\,\_Y(x)\right\},\{\right.$$

2.1511 ODE No. 1511

$$3x^2y''(x)+x^3y^{(3)}(x)+(x+8)x^3-6(x-1)x^3\log(x)-2xy'(x)+2y(x)=0$$

✓ **Mathematica** : cpu = 0.0480172 (sec), leaf count = 51

$$\left\{\left\{y(x)\to\frac{1}{450}(-50x^4-18x^3+50x^4\log(x)-135x^3\log(x))+\frac{c_1}{x^2}+c_2x+c_3x\log(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.049 (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

$$(1-a^2)\,xy'(x)+3x^2y''(x)+x^3y^{(3)}(x)=0$$

✓ **Mathematica** : cpu = 0.0300816 (sec), leaf count = 29

$$\left\{\left\{y(x)\to -\frac{c_1x^{-a}}{a}+\frac{c_2x^a}{a}+c_3\right\}\right\}$$

✓ **Maple** : cpu = 0.01 (sec), leaf count = 18

$$\{y(x)=\_C1+\_C2\,x^a+\_C3\,x^{-a}\}$$

2.1513 ODE No. 1513

$$(x^2+8)\,xy'(x)-4x^2y''(x)+x^3y^{(3)}(x)-2(x^2+4)\,y(x)=0$$

✓ **Mathematica** : cpu = 0.0722406 (sec), leaf count = 25

$$\{\{y(x)\to c_1x^2+c_3x\cos(x)-c_2x\sin(x)\}\}$$

✓ **Maple** : cpu = 0.172 (sec), leaf count = 18

$$\{y(x)=x(\cos(x)\,\_C3+\sin(x)\,\_C2+\_C1\,x)\}$$

2.1514 ODE No. 1514

$$(ax^3-12)\,y(x)+6x^2y''(x)+x^3y^{(3)}(x)=0$$

✓ **Mathematica** : cpu = 0.534067 (sec), leaf count = 102

$$\left\{\left\{y(x)\to \frac{c_1e^{-\sqrt[3]{a}x}\left(\sqrt[3]{a}x+2\right)}{x^3}+\frac{c_2e^{\sqrt[3]{-1}\sqrt[3]{a}x}\left(\sqrt[3]{a}x+2(-1)^{2/3}\right)}{x^3}+\frac{c_3e^{-(-1)^{2/3}\sqrt[3]{a}x}\left(\sqrt[3]{a}x-2\sqrt[3]{-1}\right)}{x^3}\right\}\right\}$$

✓ **Maple** : cpu = 0.675 (sec), leaf count = 135

$$\left\{y(x)=\frac{1}{x^3}\left(-\_C2\left(\left(-i-\sqrt{3}\right)\left(-a^4\right)^{\frac{2}{3}}+ia^3x\right)\mathrm{e}^{\frac{\frac{i}{2}\left(i-\sqrt{3}\right)x}{a}\sqrt[3]{-a^4}}-\left(\left(-i+\sqrt{3}\right)\left(-a^4\right)^{\frac{2}{3}}+ia^3x\right)\_C3\,\mathrm{e}^{\frac{\frac{i}{2}\left(\sqrt{3}+i\right)x}{a}}\right.\right.$$

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 = 0.150694 (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 , result contains DESol

$$\left\{y(x)=DESol\left(\left\{x^3\frac{d^3}{dx^3}\_Y(x)+\left(-3\,ax^2+3\,x^2\right)\frac{d^2}{dx^2}\_Y(x)+\left(4\,b^2c^2x^{2\,c+1}-4\,\nu^2c^2+3\,a^2x-3\,ax+1\right)\frac{d}{dx}\_\right.\right.\right.$$

2.1516 ODE No. 1516

$$(x+3)x^2y''(x)+x^3y^{(3)}(x)+5(x-6)xy'(x)+(4x+30)y(x)=0$$

✓ **Mathematica** : cpu = 260.423 (sec), leaf count = 15142

Too large to display

✓ **Maple** : cpu = 0.337 (sec), leaf count = 188

$$\left\{y(x)=\frac{\_C3\,e^{-x}\left(x^8+28\,x^7+450\,x^6+5100\,x^5+42900\,x^4+267120\,x^3+1179360\,x^2+3326400\,x+4536000\right)}{}\right.$$

2.1517 ODE No. 1517

$$x^2y''(x)+x^3y^{(3)}(x)-2x^3+2xy'(x)-y(x)+\log(x)=0$$

✓ **Mathematica** : cpu = 0.27814 (sec), leaf count = 30686

Too large to display

✓ **Maple** : cpu = 0.348 (sec), leaf count = 866

$$\left\{y(x)=-\int-\frac{\left(3\sqrt{69}\sqrt[3]{44+12\sqrt{69}}-11\sqrt[3]{44+12\sqrt{69}}+100\right)\left(-\ln(x)+2\,x^3\right)\left(x^{\frac{\left(11-3\sqrt{69}\right)\left(44+12\sqrt{69}\right)^{\frac{2}{3}}}{1200}+\frac{\sqrt[3]{44+}}{1}}\right.}{13800\,x^3}\right.$$

2.1518 ODE No. 1518

$$3(2x^2+1)\,y''(x)+x(x^2+1)\,y^{(3)}(x)-12y(x)=0$$

✓ **Mathematica** : cpu = 0.229018 (sec), leaf count = 104

$$\left\{\left\{y(x)\to\frac{1}{3}c_1(2x^2+1)+\frac{1}{3}c_2x\sqrt{x^2+1}-\frac{c_3(2x^2+1)\left(3(x^4+x^2)\tanh^{-1}\left(\sqrt{x^2+1}\right)-\sqrt{x^2+1}(3x^2+1)\right)}{6\sqrt{x^2+1}\,(2x^3+x)}\right\}\right\}$$

✓ **Maple** : cpu = 0.343 (sec), leaf count = 60

$$\left\{y(x)=\frac{1}{x}\left(3\,Artanh\left(\frac{1}{\sqrt{x^2+1}}\right)\sqrt{x^2+1}\_C2\,x^2+\sqrt{x^2+1}\_C1\,x^2+2\_C3\,x^3-3\_C2\,x^2+\_C3\,x-\_C2\right)\right.$$

2.1519 ODE No. 1519

$$(x+3)x^2y^{(3)}(x)+6(x+1)y'(x)-3(x+2)xy''(x)-6y(x)=0$$

✓ **Mathematica** : cpu = 0.0213364 (sec), leaf count = 65

$$\left\{\left\{y(x)\to\frac{1}{4}c_1(x^3-3x^2+3x+3)+\frac{1}{2}c_2(-x^3+3x^2-x-1)+\frac{1}{8}c_3(3x^3-5x^2+x+1)\right\}\right\}$$

✓ **Maple** : cpu = 0.106 (sec), leaf count = 19

$$\{y(x)=\_C2\,x^3+\_C1\,x^2+\_C3\,x+\_C3\}$$

2.1520 ODE No. 1520

$$y''(x)\left(-6x(\mathrm{a1}+\mathrm{a2}+\mathrm{a3})+3\mathrm{a1a2}+3\mathrm{a1a3}+3\mathrm{a2a3}+9x^2\right)+2(x-\mathrm{a1})(x-\mathrm{a2})(x-\mathrm{a3})y^{(3)}(x)-2\left(b+(n^2+n-3)\right.$$

✗ **Mathematica** : cpu = 66.496 (sec), leaf count = 0 , DifferentialRoot result

$$\left\{\left\{y(x)\to\text{DifferentialRoot}\left(\{y,x\},\left\{-n(n+1)y(x)-2(xn^2+xn-3x+b)\,y'(x)+3(3x^2-2\mathrm{a1}x-2\mathrm{a2}x-2\mathrm{a3}\right.\right.\right.\right.$$

✓ **Maple** : cpu = 2.532 (sec), leaf count = 272

$$\left\{y(x)=\_C1\left(HeunG\left(\frac{a1-a3}{a2-a3},\frac{(n^2+n-1)\,a3+b-a1-a2}{4\,a2-4\,a3},-\frac{n}{2},\frac{n}{2}+\frac{1}{2},\frac{1}{2},\frac{1}{2},\frac{x-a3}{a2-a3}\right)\right)^2+\_C3\,Heun\right.$$

2.1521 ODE No. 1521

$$-(4x+2)x^2y''(x)+(x+1)x^3y^{(3)}(x)+(10x+4)xy'(x)-4(3x+1)y(x)=0$$

✓ **Mathematica** : cpu = 0.0465755 (sec), leaf count = 35

$$\left\{\left\{y(x)\to c_1x^2+c_3x^2\left(x+\frac{1}{x}+\log^2(x)\right)+c_2x^2\log(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.319 (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

$$4x^2y'(x)-4x^3y''(x)+4x^4y^{(3)}(x)-1=0$$

✓ **Mathematica** : cpu = 0.0132387 (sec), leaf count = 44

$$\left\{\left\{y(x)\to\frac{c_1x^2}{2}-\frac{c_2x^2}{4}+\frac{1}{2}c_2x^2\log(x)-\frac{1}{36x}+c_3\right\}\right\}$$

✓ **Maple** : cpu = 0.17 (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

$$\left(10x^2+4\right)xy'(x)-\left(4x^2+2\right)x^2y''(x)+\left(x^2+1\right)x^3y^{(3)}(x)-4\left(3x^2+1\right)y(x)=0$$

✓ **Mathematica** : cpu = 0.261636 (sec), leaf count = 74

$$\left\{\left\{y(x)\to c_1\left(-x^3+3x^2-x\right)+\frac{1}{2}c_2\left(x^3-2x^2+x\right)-\frac{c_3x\left(-x^3+3x^2-x\right)(\log(x)+1)}{2\left(x^2-3x+1\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.344 (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

$$x^2y''(x) + x^6y^{(3)}(x) - 2y(x) = 0$$

✓ **Mathematica** : cpu = 0.153207 (sec), leaf count = 96

$$\left\{\left\{y(x)\to -\frac{\left(-\frac{1}{3}\right)^{2/3} c_2 x\Gamma\left(\frac{1}{3}\right)\ {}_2F_2\left(-\frac{2}{3},\frac{1}{3};\frac{2}{3},\frac{4}{3};\frac{1}{3x^3}\right)}{3\Gamma\left(\frac{4}{3}\right)}+\frac{c_3\Gamma\left(\frac{2}{3}\right)\ {}_2F_2\left(-\frac{1}{3},\frac{2}{3};\frac{4}{3},\frac{5}{3};\frac{1}{3x^3}\right)}{9\Gamma\left(\frac{5}{3}\right)}+c_1x^2\right\}\right\}$$

✓ **Maple** : cpu = 0.645 (sec), leaf count = 98

$$\left\{y(x)=x^2\left(\int \mathrm{e}^{\frac{1}{6\,x^3}}\left(2\,x^3I_{1/6}(-1/6\,x^{-3})-I_{\frac{1}{6}}\left(-\frac{1}{6\,x^3}\right)-I_{-\frac{5}{6}}\left(-\frac{1}{6\,x^3}\right)\right)x^{-\frac{11}{2}}\,\mathrm{d}x\_C3+\int \mathrm{e}^{\frac{1}{6\,x^3}}\left(2\,x^3K_{1/6}(-1/\right.\right.$$

2.1525 ODE No. 1525

$$ay(x) + 6x^5y''(x) + x^6y^{(3)}(x) = 0$$

✓ **Mathematica** : cpu = 0.325725 (sec), leaf count = 102

$$\left\{\left\{y(x)\to c_1e^{\frac{\sqrt[3]{a}}{x}}\left(2x-\sqrt[3]{a}\right)+c_2e^{\frac{(-1)^{2/3}\sqrt[3]{a}}{x}}\left(x-\frac{1}{2}(-1)^{2/3}\sqrt[3]{a}\right)+c_3e^{-\frac{\sqrt[3]{-1}\sqrt[3]{a}}{x}}\left(\frac{1}{2}\sqrt[3]{-1}\sqrt[3]{a}+x\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.47 (sec), leaf count = 287

$$\left\{y(x)=\_C1\left(-8\,x^3+a\right)^4\mathrm{e}^{-\frac{1}{ax}\sqrt[3]{-a^4}}\left(2\,ax+\sqrt[3]{-a^4}\right)^{-3}\left(4\,a^2x^2-2\,x\sqrt[3]{-a^4}a+\left(-a^4\right)^{\frac{2}{3}}\right)^{-4}+\_C2\left(-8\,x^3+a\right)\right.$$

2.1526 ODE No. 1526

$$\left(x^6-6x^3-15x^2-12x-2\right)y'(x)-\left(2x^6+3x^4-6x^2-6x-1\right)y''(x)+\left(x^4+2x^2+2x+1\right)x^2y^{(3)}(x)+\left(x^4+4x^3\right.$$

✓ **Mathematica** : cpu = 130.133 (sec), leaf count = 27

$$\left\{\left\{y(x)\to c_1e^x+c_2e^xx+c_3e^{\frac{1}{x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.188 (sec), leaf count = 19

$$\left\{y(x)=\_C2\,\mathrm{e}^{x^{-1}}+\mathrm{e}^x(\_C3\,x+\_C1)\right\}$$

2.1527 ODE No. 1527

$$(x-a)^3(x-b)^3y^{(3)}(x)-cy(x)=0$$

✓ **Mathematica** : cpu = 130.113 (sec), leaf count = 165

$$\left\{\left\{y(x)\to c_1(x-b)^2\left(\frac{x-a}{x-b}\right)^{\text{Root}\left[-\#1^3+3\#1^2-2\#1+\frac{c}{(a-b)^3}\&,1\right]}+c_2(x-b)^2\left(\frac{x-a}{x-b}\right)^{\text{Root}\left[-\#1^3+3\#1^2-2\#1+\frac{c}{(a-b)^3}\&\right.}\right.\right.$$

✓ **Maple** : cpu = 0.611 (sec), leaf count = 437

$$\left\{y(x)=(x-a)^{-2\frac{b}{a-b}}(x-b)^{2\frac{a}{a-b}}\left((b-x)^{-\frac{RootOf\left(\_Z^3+(-3a-3b)\_Z^2+\left(2a^2+8ab+2b^2\right)\_Z-4a^2b-4ab^2-c,index=1\right)}{a-b}}(a-x)^{\frac{RootO}{}}\right.\right.$$

2.1528 ODE No. 1528

$$-\sin(x)y'(x)+(2\cos(x)+1)y''(x)+y^{(3)}(x)\sin(x)-\cos(x)=0$$

✓ **Mathematica** : cpu = 0.840875 (sec), leaf count = 72

$$\left\{\left\{y(x)\to\frac{\sin\left(\frac{x}{2}\right)\left(-2\cos\left(\frac{x}{2}\right)\sin^{-1}(\cos(x))+\sqrt{2}\left(c_2x\sin\left(\frac{x}{2}\right)+\cos\left(\frac{x}{2}\right)\left(c_2\log(2(\cos(x)+1))+2c_1\right)\right)\right)}{\cos(x)-1}+c_3\right\}\right\}$$

✓ **Maple** : cpu = 0.392 (sec), leaf count = 74

$$\left\{y(x)=\frac{1}{\sin(x)\left(-1+\cos(x)\right)}\left(-(\sin(x))^2\ln\left(\frac{1-\cos(x)}{\sin(x)}\right)\_C1+(\sin(x))^2\ln(\sin(x))\_C1+(\sin(x))^2\_C3\right.\right.$$

2.1529 ODE No. 1529

$$-3\sin(x)y'(x)+3(\cos(x)+1)y''(x)+y^{(3)}(x)(x+\sin(x))-y(x)\cos(x)+\sin(x)=0$$

✓ **Mathematica** : cpu = 0.0783905 (sec), leaf count = 47

$$\left\{\left\{y(x)\to\frac{c_3x^2}{x+\sin(x)}-\frac{\cos(x)}{x+\sin(x)}+\frac{c_2x}{x+\sin(x)}+\frac{c_1}{x+\sin(x)}\right\}\right\}$$

✓ **Maple** : cpu = 0.167 (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

$y'(x)\left(4\nu(\nu+1)\sin^2(x)+\cos(2x)\right)+2\nu(\nu+1)y(x)\sin(2x)+3\sin(x)\cos(x)y''(x)+y^{(3)}(x)\sin^2(x)=0$

✓ **Mathematica** : cpu = 0.0783715 (sec), leaf count = 35

$$\left\{\left\{y(x)\to c_3P_\nu(\cos(x))Q_\nu(\cos(x))+c_1P_\nu(\cos(x))^2+c_2Q_\nu(\cos(x))^2\right\}\right\}$$

✓ **Maple** : cpu = 0.803 (sec), leaf count = 113

$$\left\{y(x)=\_C1\left({}_2F_1(-\frac{\nu}{2},\frac{\nu}{2}+\frac{1}{2};\frac{1}{2};\frac{\cos(2x)}{2}+\frac{1}{2})\right)^2+\_C2\,(\cos(2x)+1)\left({}_2F_1(\frac{\nu}{2}+1,\frac{1}{2}-\frac{\nu}{2};\frac{3}{2};\frac{\cos(2x)}{2}+\frac{1}{2}\right.$$

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 = 0.0220104 (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

$$ny(x)+xy'(x)+y^{(3)}(x)=0$$

✓ **Mathematica** : cpu = 0.0110457 (sec), leaf count = 103

$$\left\{\left\{y(x)\to\frac{c_3x^2\,{}_1F_2\left(\frac{n}{3}+\frac{2}{3};\frac{4}{3},\frac{5}{3};-\frac{x^3}{9}\right)}{3\sqrt[3]{3}}+\frac{c_2x\,{}_1F_2\left(\frac{n}{3}+\frac{1}{3};\frac{2}{3},\frac{4}{3};-\frac{x^3}{9}\right)}{3^{2/3}}+c_1\,{}_1F_2\left(\frac{n}{3};\frac{1}{3},\frac{2}{3};-\frac{x^3}{9}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.095 (sec), leaf count = 58

$$\left\{y(x)=\_C1\,{}_1F_2(\frac{n}{3};\frac{1}{3},\frac{2}{3};-\frac{x^3}{9})+\_C2\,x\,{}_1F_2(\frac{1}{3}+\frac{n}{3};\frac{2}{3},\frac{4}{3};-\frac{x^3}{9})+\_C3\,x^2\,{}_1F_2(\frac{2}{3}+\frac{n}{3};\frac{4}{3},\frac{5}{3};-\frac{x^3}{9})\right\}$$

2.1533 ODE No. 1533

$$-ny(x) - xy'(x) + y^{(3)}(x) = 0$$

✓ **Mathematica** : cpu = 0.0120911 (sec), leaf count = 113

$$\left\{\left\{y(x)\to \frac{(-1)^{2/3}c_3x^2\,{}_1F_2\left(\frac{n}{3}+\frac{2}{3};\frac{4}{3},\frac{5}{3};\frac{x^3}{9}\right)}{3\sqrt[3]{3}}+\frac{\sqrt[3]{-1}c_2x\,{}_1F_2\left(\frac{n}{3}+\frac{1}{3};\frac{2}{3},\frac{4}{3};\frac{x^3}{9}\right)}{3^{2/3}}+c_1\,{}_1F_2\left(\frac{n}{3};\frac{1}{3},\frac{2}{3};\frac{x^3}{9}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.11 (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 = 0.0027568 (sec), leaf count = 24

$$\{\{y(x)\to c_4x^3+c_3x^2+c_2x+c_1\}\}$$

✓ **Maple** : cpu = 0.115 (sec), leaf count = 21

$$\left\{y(x) = \frac{\_C1\,x^3}{6}+\frac{\_C2\,x^2}{2}+\_C3\,x+\_C4\right\}$$

2.1535 ODE No. 1535

$$-f(x) + y^{(4)}(x) + 4y(x) = 0$$

✓ **Mathematica** : cpu = 0.321089 (sec), leaf count = 223

$$\left\{\left\{y(x)\to e^{-x}\left(\cos(x)\int_1^x \frac{1}{8}e^{K[1]}f(K[1])(\cos(K[1])-\sin(K[1]))\left(\cos^2(K[1])+\sin^2(K[1])\right)dK[1]+\sin(x)\int_1^x \frac{1}{8}\right.\right.\right.$$

✓ **Maple** : cpu = 0.014 (sec), leaf count = 36

$$\left\{y(x) = \frac{f}{4}+\cos(x)\_C1\,\mathrm{e}^{x}+\_C2\,\mathrm{e}^{x}\sin(x)+\_C3\,\mathrm{e}^{-x}\cos(x)+\_C4\,\mathrm{e}^{-x}\sin(x)\right\}$$

2.1536 ODE No. 1536

$$\lambda y(x) + y^{(4)}(x) = 0$$

✓ **Mathematica** : cpu = 0.0036327 (sec), leaf count = 76

$$\left\{\left\{y(x) \to c_1 e^{(-1)^{3/4}\sqrt[4]{\lambda}x} + c_2 e^{-\sqrt[4]{-1}\sqrt[4]{\lambda}x} + c_3 e^{-(-1)^{3/4}\sqrt[4]{\lambda}x} + c_4 e^{\sqrt[4]{-1}\sqrt[4]{\lambda}x}\right\}\right\}$$

✓ **Maple** : cpu = 0.012 (sec), leaf count = 50

$$\left\{y(x) = \_C1\,\mathrm{e}^{-i\sqrt[4]{-\lambda}x} + \_C2\,\mathrm{e}^{i\sqrt[4]{-\lambda}x} + \_C3\,\mathrm{e}^{-\sqrt[4]{-\lambda}x} + \_C4\,\mathrm{e}^{\sqrt[4]{-\lambda}x}\right\}$$

2.1537 ODE No. 1537

$$-16e^{x^2}x^4 - 12y''(x) + y^{(4)}(x) + 12y(x) = 0$$

✓ **Mathematica** : cpu = 0.925313 (sec), leaf count = 1722

$$\left\{\left\{y(x) \to \frac{1}{12}e^{-\left(\sqrt{2\left(3-\sqrt{6}\right)}-x\right)x-\sqrt{2\left(3+\sqrt{6}\right)}x-\sqrt{2\left(3-\sqrt{6}\right)}x}\left(-2\sqrt{3+\sqrt{6}}e^{\sqrt{2\left(3+\sqrt{6}\right)}x+2\sqrt{2\left(3-\sqrt{6}\right)}x}x^3 + 2\sqrt{3+\sqrt{6}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.112 (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

$$2a^2y''(x) + a^4y(x) - \cosh(ax) + y^{(4)}(x) = 0$$

✓ **Mathematica** : cpu = 0.159916 (sec), leaf count = 66

$$\left\{\left\{y(x) \to \frac{\cos^2(ax)\cosh(ax) + \sin^2(ax)\cosh(ax)}{4a^4} + c_1\cos(ax) + c_2x\cos(ax) + c_3\sin(ax) + c_4x\sin(ax)\right\}\right\}$$

✓ **Maple** : cpu = 0.371 (sec), leaf count = 49

$$\left\{y(x) = \frac{(1+\mathrm{e}^{2\,ax})\,\mathrm{e}^{-ax} + 8\,a^4((\_C3\,x + \_C1)\cos(ax) + \sin(ax)(\_C4\,x + \_C2))}{8\,a^4}\right\}$$

2.1539 ODE No. 1539

$$a^2(\lambda+1)y''(x)+a^4\lambda y(x)+y^{(4)}(x)=0$$

✓ **Mathematica** : cpu = 0.0046784 (sec), leaf count = 44

$$\left\{\left\{y(x)\to c_1\cos\left(a\sqrt{\lambda}x\right)+c_2\sin\left(a\sqrt{\lambda}x\right)+c_3\cos(ax)+c_4\sin(ax)\right\}\right\}$$

✓ **Maple** : cpu = 0.037 (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

$$aby'(x)+a(bx-1)y''(x)+\lambda y(x)+y^{(4)}(x)=0$$

✗ **Mathematica** : cpu = 0.297269 (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

$$\left\{y(x)=DESol\left(\left\{\lambda\_Y(x)+ab\frac{d}{dx}\_Y(x)+a(bx-1)\frac{d^2}{dx^2}\_Y(x)+\frac{d^4}{dx^4}\_Y(x)\right\},\{\_Y(x)\}\right)\right\}$$

2.1541 ODE No. 1541

$$y''(x)\left(ax^2+b\lambda+c\right)+y(x)\left(ax^2+\beta\lambda+\gamma\right)+y^{(4)}(x)=0$$

✗ **Mathematica** : cpu = 80.1908 (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

$$\left\{y(x)=DESol\left(\left\{\left(ax^2+\beta\lambda+\gamma\right)\_Y(x)+\left(ax^2+b\lambda+c\right)\frac{d^2}{dx^2}\_Y(x)+\frac{d^4}{dx^4}\_Y(x)\right\},\{\_Y(x)\}\right)\right\}$$

2.1542 ODE No. 1542

$$ay''(x)\wp(x;\text{g2},\text{g3}) + by'(x)\wp'(x;\text{g2},\text{g3}) + y(x)\left(c\left(6\wp(x;\text{g2},\text{g3})^2 - \frac{\text{g2}}{2}\right) + d\right) + y^{(4)}(x) = 0$$

✗ **Mathematica** : cpu = 0.0228804 (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

$$\left\{y(x) = \mathit{DESol}\left(\left\{\frac{d^4}{dx^4}\_Y(x) + a\,\mathit{WeierstrassP}(x, \mathit{g2}, \mathit{g3})\,\frac{d^2}{dx^2}\_Y(x) + b\,\mathit{WeierstrassPPrime}(x, \mathit{g2}, \mathit{g3})\,\frac{d}{dx}\_Y(\right.\right.\right.$$

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 = 0.0627974 (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

$$\left\{y(x) = \mathit{DESol}\left(\left\{\frac{d^4}{dx^4}\_Y(x) + \left(-12\,k^2(\mathit{JacobiSN}(z,x))^2 - a\right)\frac{d^2}{dx^2}\_Y(x) + b\frac{d}{dx}\_Y(x) + \left(\alpha\,(\mathit{JacobiSN}(z,x)\right.\right.\right.\right.$$

2.1544 ODE No. 1544

$$10f'(x)y'(x) + y(x)\left(3f''(x) + 3f(x)^2\right) + 10f(x)y''(x) + y^{(4)}(x) = 0$$

✗ **Mathematica** : cpu = 0.0114668 (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 = 0.013 (sec), leaf count = 41

$$\left\{y(x) = \sum_{\_a=1}^{4} e^{\mathit{RootOf}(\_Z^4 + 10\,f\,\_Z^2 + 10\,\mathit{df}\,\_Z + 3\,f^2 + 3\,\mathit{ddf}, \mathit{index} = \_a)x}\_C\_a\right\}$$

2.1545 ODE No. 1545

$$-4y'(x) - 3y''(x) + 2y^{(3)}(x) + y^{(4)}(x) + 4y(x) - 32\sin(2x) + 24\cos(2x) = 0$$

✓ **Mathematica** : cpu = 0.597933 (sec), leaf count = 40

$$\left\{\left\{y(x) \to \sin(2x) + c_1 e^{-2x} + c_2 e^{-2x} x + c_3 e^x + c_4 e^x x\right\}\right\}$$

✓ **Maple** : cpu = 0.093 (sec), leaf count = 27

$$\left\{y(x) = (\_C4\, x + \_C2)\, \mathrm{e}^{-2\,x} + \sin(2\,x) + (\_C3\, x + \_C1)\, \mathrm{e}^{x}\right\}$$

2.1546 ODE No. 1546

$$4a^3x^3y'(x) + 6a^2x^2y''(x) + a^4x^4y(x) + 4axy^{(3)}(x) + y^{(4)}(x) = 0$$

✓ **Mathematica** : cpu = 0.497702 (sec), leaf count = 300

$$\left\{\left\{y(x) \to \frac{2(\sqrt{6}-3)\sqrt{-(\sqrt{6}-3)\,a}\,c_3 \exp\left(-\frac{ax^2}{2} - \sqrt{-(\sqrt{6}-3)\,a}\,x - \frac{(-3+\sqrt{3}+\sqrt{6})\,ax}{\sqrt{-(\sqrt{6}-3)\,a}}\right)}{(-3-\sqrt{3}+\sqrt{6})\,(-3+\sqrt{3}+\sqrt{6})\,a} - \frac{2(\sqrt{6}-3)\sqrt{-(\sqrt{}}{}\right.\right.$$

✓ **Maple** : cpu = 0.061 (sec), leaf count = 73

$$\left\{y(x) = \mathrm{e}^{-\frac{ax^2}{2}}\left(\_C2\, \mathrm{e}^{\sqrt{-a(\sqrt{6}-3)}x} + \_C4\, \mathrm{e}^{\sqrt{(3+\sqrt{6})a}x} + \_C1\, \mathrm{e}^{-\sqrt{-a(\sqrt{6}-3)}x} + \_C3\, \mathrm{e}^{-\sqrt{(3+\sqrt{6})a}x}\right)\right\}$$

2.1547 ODE No. 1547

$$y'(x)\left(7f(x)f'(x) + f''(x) + 30f(x)g(x) + 6f(x)^3 + 10g'(x)\right) + 3y(x)\left(2g(x)f'(x) + 5f(x)g'(x) + 6f(x)^2g(x) + g''\right.$$

✗ **Mathematica** : cpu = 0.0263259 (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 = 0.013 (sec), leaf count = 87

$$\left\{y(x) = \sum_{\_a=1}^{4} \mathrm{e}^{RootOf(\_Z^4+6\,f\,\_Z^3+(11\,f^2+4\,df+10\,g)\_Z^2+(6\,f^3+7\,df\,f+30\,fg+ddf+10\,dg)\_Z+18\,f^2g+6\,df\,g+15\,dg\,f+9\,g^2+3\,ddg,in}\right.$$

2.1548 ODE No. 1548

$$-3y'(x)+11y''(x)-12y^{(3)}(x)+4y^{(4)}(x)-4\cos(x)=0$$

✓ **Mathematica** : cpu = 0.0754161 (sec), leaf count = 50

$$\left\{\left\{y(x)\to \frac{18\sin(x)}{65}-\frac{14\cos(x)}{65}+2c_1e^{x/2}+\frac{2}{3}c_2e^{3x/2}+c_3e^x+c_4\right\}\right\}$$

✓ **Maple** : cpu = 0.19 (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

$$5y^{(3)}(x)+xy^{(4)}(x)-24=0$$

✓ **Mathematica** : cpu = 0.0111184 (sec), leaf count = 34

$$\left\{\left\{y(x)\to \frac{4x^3}{5}+c_4x^2-\frac{c_1}{24x^2}+c_3x+c_2\right\}\right\}$$

✓ **Maple** : cpu = 0.171 (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

$$-(9x^2-7)\,x^2y'(x)+12x^3y''(x)-(6x^2+1)\,y^{(3)}(x)+2(x^2-3)\,x^3y(x)+xy^{(4)}(x)=0$$

✓ **Mathematica** : cpu = 2.89309 (sec), leaf count = 270

$$\left\{\left\{y(x)\to c_3e^{\frac{x^2}{2}}\int_1^x \frac{e^{\frac{K[1]^2}{2}}\left(\int \frac{\exp\left(\frac{1}{4}\sqrt{5}K[1]^2+\frac{1}{2}\left(-\frac{1}{2}K[1]^2-2\log(K[1])\right)\right)U\left(-\frac{-9+\sqrt{5}}{4\sqrt{5}},-\frac{1}{2},-\frac{1}{2}\sqrt{5}K[1]^2\right)}{\sqrt{K[1]}\sqrt[4]{K[1]^2}}\,dK[1]\right)K[1]}{\sqrt[4]{2}}dK[1]+\right.\right.$$

✓ **Maple** : cpu = 5.928 (sec), leaf count = 157

$$\left\{y(x)=-\int W_{\frac{9\sqrt{5}}{20},\frac{3}{4}}\left(\frac{\sqrt{5}x^2}{2}\right)e^{-\frac{x^2}{4}}x^{-\frac{3}{2}}\,dx e^{x^2}\_C4+\int W_{\frac{9\sqrt{5}}{20},\frac{3}{4}}\left(\frac{\sqrt{5}x^2}{2}\right)e^{\frac{x^2}{4}}x^{-\frac{3}{2}}\,dx e^{\frac{x^2}{2}}\_C4-e^{x^2}\int M_{\frac{9\sqrt{5}}{20},\frac{3}{4}}\left(\right.\right.$$

2.1551 ODE No. 1551

$$-2(\nu^2x^2+6)\,y''(x)+\nu^2(\nu^2x^2+4)\,y(x)+x^2y^{(4)}(x)=0$$

✓ **Mathematica** : cpu = 0.291807 (sec), leaf count = 110

$$\left\{\left\{y(x)\to \frac{c_3(1-x)e^{-\nu x}(\nu^2x^2+\nu^2x+\nu^2+6\nu x+6\nu+15)}{x}+\frac{c_4(1-x)e^{\nu x}(\nu^2x^2+\nu^2x+\nu^2-6\nu x-6\nu+15)}{x}\right.\right.$$

✓ **Maple** : cpu = 0.212 (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 = 300.007 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.05 (sec), leaf count = 89

$$\left\{y(x)=\frac{bx^2}{a}+\_C1\,\sqrt{x}J_1(2\sqrt[4]{-a}\sqrt{x})+\_C2\,\sqrt{x}Y_1(2\sqrt[4]{-a}\sqrt{x})+\_C3\,\sqrt{x}J_1\left(2\sqrt{-\sqrt{-a}}\sqrt{x}\right)+\_C4\,\sqrt{x}Y_1\left(2\right.\right.$$

2.1553 ODE No. 1553

$$x^2y^{(4)}(x)+2y''(x)+4xy^{(3)}(x)=0$$

✓ **Mathematica** : cpu = 0.0073097 (sec), leaf count = 29

$$\{\{y(x)\to c_2(-x)+c_4x+c_2x\log(x)-c_1\log(x)+c_3\}\}$$

✓ **Maple** : cpu = 0.008 (sec), leaf count = 17

$$\{y(x)=(\_C4\,x+\_C2)\ln(x)+\_C3\,x+\_C1\}$$

2.1554 ODE No. 1554

$$x^2y^{(4)}(x) + 6y''(x) + 6xy^{(3)}(x) = 0$$

✓ **Mathematica** : cpu = 0.0079512 (sec), leaf count = 29

$$\left\{\left\{y(x)\to c_4x+\frac{1}{2}\left(\frac{c_1}{x}-2c_2\log(x)\right)+c_3\right\}\right\}$$

✓ **Maple** : cpu = 0.011 (sec), leaf count = 18

$$\left\{y(x)=\_C1+\_C2\ \ln(x)+\frac{\_C3}{x}+\_C4\ x\right\}$$

2.1555 ODE No. 1555

$$\lambda^2(-y(x)) + x^2y^{(4)}(x) + 6y''(x) + 6xy^{(3)}(x) = 0$$

✓ **Mathematica** : cpu = 0.0451337 (sec), leaf count = 156

$$\left\{\left\{y(x)\to c_4G_{0,4}^{2,0}\left(\frac{\lambda^2x^2}{16}\middle|\ -\frac{1}{2},\frac{1}{2},0,0\right)+c_2G_{0,4}^{2,0}\left(\frac{\lambda^2x^2}{16}\middle|\ 0,0,-\frac{1}{2},\frac{1}{2}\right)+\frac{c_1\left(J_1\left(2\sqrt{\lambda}\sqrt{x}\right)+I_1\left(2\sqrt{\lambda}\sqrt{x}\right)\right)}{2\sqrt{\lambda}\sqrt{x}}-\frac{ic_3}{\ }\right.\right.$$

✓ **Maple** : cpu = 0.448 (sec), leaf count = 61

$$\left\{y(x)=\left(\_C2\ Y_1\left(2\sqrt{\lambda}\sqrt{x}\right)+\_C1\ J_1\left(2\sqrt{\lambda}\sqrt{x}\right)+\_C3\ J_1\left(2\sqrt{-\lambda}\sqrt{x}\right)+\_C4\ Y_1\left(2\sqrt{-\lambda}\sqrt{x}\right)\right)\frac{1}{\sqrt{x}}\right\}$$

2.1556 ODE No. 1556

$$x^2y^{(4)}(x) + 12y''(x) + 8xy^{(3)}(x) = 0$$

✓ **Mathematica** : cpu = 0.008471 (sec), leaf count = 30

$$\left\{\left\{y(x)\to\frac{1}{6}\left(\frac{c_1}{x^2}+\frac{3c_2}{x}\right)+c_4x+c_3\right\}\right\}$$

✓ **Maple** : cpu = 0.012 (sec), leaf count = 19

$$\left\{y(x)=\_C1+\frac{\_C2}{x^2}+\frac{\_C3}{x}+\_C4\ x\right\}$$

2.1557 ODE No. 1557

$$\lambda^2(-y(x)) + x^2 y^{(4)}(x) + 12y''(x) + 8xy^{(3)}(x) = 0$$

✓ **Mathematica** : cpu = 0.0492251 (sec), leaf count = 146

$$\left\{\left\{y(x) \to c_4 G_{0,4}^{2,0}\left(\frac{\lambda^2 x^2}{16} \middle| \, -1, 0, -\tfrac{1}{2}, \tfrac{1}{2}\right) + c_2 G_{0,4}^{2,0}\left(\frac{\lambda^2 x^2}{16} \middle| \, -\tfrac{1}{2}, \tfrac{1}{2}, -1, 0\right) - \frac{3ic_1\left(I_2\left(2\sqrt{\lambda}\sqrt{x}\right) - J_2\left(2\sqrt{\lambda}\sqrt{x}\right)\right)}{4\lambda x}\right.\right.$$

✓ **Maple** : cpu = 0.089 (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

$$-\frac{1}{16}b^4 y(x) + (n-\nu+1)(n-\nu+2)y''(x) + x(2n-2\nu+4)y^{(3)}(x) + x^2 y^{(4)}(x) = 0$$

✓ **Mathematica** : cpu = 0.116547 (sec), leaf count = 319

$$\left\{\left\{y(x) \to c_1 2^{n-\nu-1} b^{\nu-n} x^{\frac{\nu-n}{2}} \Gamma(n-\nu+1)\left(J_{n-\nu}(b\sqrt{x}) + I_{n-\nu}(b\sqrt{x})\right) + c_4 i^{-n+\nu+1} 2^{3n-3\nu-3} b^{2(-n+\nu+1)+n-\nu-2} x^{\frac{1}{2}}\right.\right.$$

✓ **Maple** : cpu = 0.19 (sec), leaf count = 67

$$\left\{y(x) = x^{-\frac{n}{2}+\frac{\nu}{2}}\left(K_{n-\nu}(b\sqrt{x})\_C3 + I_{n-\nu}(b\sqrt{x})\_C1 + J_{n-\nu}(b\sqrt{x})\_C2 + Y_{n-\nu}(b\sqrt{x})\_C4\right)\right\}$$

2.1559 ODE No. 1559

$$a^4\left(-x^3\right) y(x) + 2x^2 y^{(3)}(x) + x^3 y^{(4)}(x) + y'(x) - xy''(x) = 0$$

✓ **Mathematica** : cpu = 0.199824 (sec), leaf count = 100

$$\left\{\left\{y(x) \to c_4 G_{0,4}^{2,0}\left(\frac{a^4 x^4}{256} \middle| \, 0, 0, \tfrac{1}{2}, \tfrac{1}{2}\right) + c_2 G_{0,4}^{2,0}\left(\frac{a^4 x^4}{256} \middle| \, \tfrac{1}{2}, \tfrac{1}{2}, 0, 0\right) + \frac{1}{8}ic_1(I_0(ax) - J_0(ax)) + \frac{1}{2}c_3(J_0(ax) + I_0(a\right.\right.$$

✓ **Maple** : cpu = 0.122 (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 = 0.0063839 (sec), leaf count = 29

$$\left\{\left\{y(x) \to c_4x + \frac{1}{2}\left(\frac{c_1}{x} - 2c_2\log(x)\right) + c_3\right\}\right\}$$

✓ **Maple** : cpu = 0.01 (sec), leaf count = 18

$$\left\{y(x) = \_C1 + \_C2\ \ln(x) + \frac{\_C3}{x} + \_C4\ x\right\}$$

2.1561 ODE No. 1561

$$y(x)\left(ax^4 + (n-2)n(n+1)(n+3)\right) - 2n(n+1)x^2y''(x) + 4n(n+1)xy'(x) + x^4y^{(4)}(x) = 0$$

✓ **Mathematica** : cpu = 2.91633 (sec), leaf count = 400

$$\left\{\left\{y(x) \to c_1\left(-2^{n-\frac{5}{2}}\right)\sqrt{x}a^{\frac{2-n}{4}+\frac{1}{4}\left(n-\frac{3}{2}\right)}\Gamma\left(\frac{3}{2}-n\right)\left(\cos\left(\frac{3}{4}\pi\left(\frac{3}{2}-n\right)\right)\text{ber}_{-n-\frac{1}{2}}(\sqrt[4]{a}x) + \sin\left(\frac{3}{4}\pi\left(\frac{3}{2}-n\right)\right)\text{be}\right.\right.$$

✓ **Maple** : cpu = 0.212 (sec), leaf count = 69

$$\left\{y(x) = \sqrt{x}\left(J_{n+\frac{1}{2}}\left(\sqrt{-\sqrt{-a}}x\right)\_C3 + Y_{n+\frac{1}{2}}(\sqrt[4]{-a}x)\_C2 + J_{n+\frac{1}{2}}(\sqrt[4]{-a}x)\_C1 + Y_{n+\frac{1}{2}}\left(\sqrt{-\sqrt{-a}}x\right)\_C4\right)\right\}$$

2.1562 ODE No. 1562

$$-\left(4n^2-1\right)x^2y''(x) + \left(4n^2-1\right)xy'(x) + x^4y^{(4)}(x) + 4x^3y^{(3)}(x) - 4x^4y(x) = 0$$

✓ **Mathematica** : cpu = 0.809189 (sec), leaf count = 140

$$\left\{\left\{y(x) \to \frac{1}{8}ic_2x^2\,{}_0F_3\left(;\frac{3}{2},\frac{3}{2}-\frac{n}{2},\frac{n}{2}+\frac{3}{2};\frac{x^4}{64}\right) + c_1\,{}_0F_3\left(;\frac{1}{2},1-\frac{n}{2},\frac{n}{2}+1;\frac{x^4}{64}\right) + c_3\left(\frac{i}{2}\right)^{-n}\Gamma(1-n)^2\left(\text{ber}_{-n}(x\right.\right.\right.$$

✓ **Maple** : cpu = 0.289 (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

$$-\left(4n^2-1\right)x^2y''(x)+\left(4n^2-4x^4-1\right)y(x)-\left(4n^2-1\right)xy'(x)+x^4y^{(4)}(x)+4x^3y^{(3)}(x)=0$$

✓ **Mathematica** : cpu = 1.48031 (sec), leaf count = 232

$$\left\{\left\{y(x)\to c_3(-1)^{\frac{1}{4}(1-2n)}2^{2n+\frac{1}{2}(2n-1)-1}x^{1-2n}\,{}_0F_3\left(;1-n,1-\frac{n}{2},\frac{3}{2}-\frac{n}{2};\frac{x^4}{64}\right)+c_4(-1)^{\frac{1}{4}(2n+1)}2^{\frac{1}{2}(-2n-1)-2n-1}x^2\right.\right.$$

✓ **Maple** : cpu = 0.251 (sec), leaf count = 87

$$\left\{y(x)=\frac{1}{x}\left(\_C4\,{}_0\mathrm{F}_3(\,;\,\frac{1}{2},\frac{n}{2}+\frac{1}{2},-\frac{n}{2}+\frac{1}{2};\,\frac{x^4}{64})+\left(\_C3\,{}_0\mathrm{F}_3(\,;\,\frac{3}{2},\frac{n}{2}+1,-\frac{n}{2}+1;\,\frac{x^4}{64})+\_C2\,(\mathrm{bei}_{-n}(x))^2+(\mathrm{b}\right.\right.\right.$$

2.1564 ODE No. 1564

$$-\left(4n^2+3\right)x^2y''(x)-\left(12n^2+4x^4-3\right)y(x)+\left(12n^2-3\right)xy'(x)+x^4y^{(4)}(x)+4x^3y^{(3)}(x)=0$$

✓ **Mathematica** : cpu = 0.988763 (sec), leaf count = 230

$$\left\{\left\{y(x)\to c_3(-1)^{\frac{1}{4}(-2n-1)}2^{2n+\frac{1}{2}(2n+1)+1}x^{-2n-1}\,{}_0F_3\left(;1-n,\frac{1}{2}-\frac{n}{2},-\frac{n}{2};\frac{x^4}{64}\right)+c_4(-1)^{\frac{1}{4}(2n-1)}2^{\frac{1}{2}(1-2n)-2n+1}x^{2n}\right.\right.$$

✓ **Maple** : cpu = 0.227 (sec), leaf count = 88

$$\left\{y(x)=\frac{1}{x}\left(\_C4\,x^2{}_0\mathrm{F}_3(\,;\,\frac{1}{2},\frac{n}{2}+\frac{3}{2},\frac{3}{2}-\frac{n}{2};\,\frac{x^4}{64})+\_C3\,x^4{}_0\mathrm{F}_3(\,;\,\frac{3}{2},\frac{n}{2}+2,-\frac{n}{2}+2;\,\frac{x^4}{64})+\_C2\,(\mathrm{bei}_{-n}(x))^2+(\right.\right.$$

2.1565 ODE No. 1565

$$\left(x\left(-\rho^2-\sigma^2+1\right)+16x^3\right)y'(x)+\left(x^2\left(-\rho^2-\sigma^2+7\right)+4x^4\right)y''(x)+y(x)\left(\rho^2\sigma^2+8x^2\right)+x^4y^{(4)}(x)+6x^3y^{(3)}(x)=0$$

✓ **Mathematica** : cpu = 0.375217 (sec), leaf count = 242

$$\left\{\left\{y(x)\to c_1x^{-\rho}\,{}_2F_3\left(\frac{1}{2}-\frac{\rho}{2},1-\frac{\rho}{2};1-\rho,-\frac{\rho}{2}-\frac{\sigma}{2}+1,-\frac{\rho}{2}+\frac{\sigma}{2}+1;-x^2\right)+c_2x^{\rho}\,{}_2F_3\left(\frac{\rho}{2}+\frac{1}{2},\frac{\rho}{2}+1;\rho+1,\frac{\rho}{2}-\right.\right.\right.$$

✓ **Maple** : cpu = 0.427 (sec), leaf count = 71

$$\left\{y(x)=\left(Y_{\frac{\rho}{2}-\frac{\sigma}{2}}(x)\_C2+\_C1\,J_{\frac{\rho}{2}-\frac{\sigma}{2}}(x)\right)J_{\frac{\rho}{2}+\frac{\sigma}{2}}(x)+Y_{\frac{\rho}{2}+\frac{\sigma}{2}}(x)\left(Y_{\frac{\rho}{2}-\frac{\sigma}{2}}(x)\_C4+\_C3\,J_{\frac{\rho}{2}-\frac{\sigma}{2}}(x)\right)\right\}$$

2.1566 ODE No. 1566

$$\left(x\left(-2\mu^2-2\nu^2+1\right)+16x^3\right)y'(x)+\left(x^2\left(-2\mu^2-2\nu^2+7\right)+4x^4\right)y''(x)+y(x)\left(\left(\mu^2-\nu^2\right)^2+8x^2\right)+x^4y^{(4)}(x)+6x$$

✓ **Mathematica** : cpu = 0.447898 (sec), leaf count = 238

$$\left\{\left\{y(x)\to c_1x^{-\mu-\nu}\,{}_2F_3\left(-\frac{\mu}{2}-\frac{\nu}{2}+\frac{1}{2},-\frac{\mu}{2}-\frac{\nu}{2}+1;1-\mu,1-\nu,-\mu-\nu+1;-x^2\right)+c_2x^{\mu-\nu}\,{}_2F_3\left(\frac{\mu}{2}-\frac{\nu}{2}+\frac{1}{2},\right.\right.\right.$$

✓ **Maple** : cpu = 0.368 (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

$$12x^2y''(x)+x^4y^{(4)}(x)+8x^3y^{(3)}(x)=0$$

✓ **Mathematica** : cpu = 0.0068474 (sec), leaf count = 30

$$\left\{\left\{y(x)\to\frac{1}{6}\left(\frac{c_1}{x^2}+\frac{3c_2}{x}\right)+c_4x+c_3\right\}\right\}$$

✓ **Maple** : cpu = 0.011 (sec), leaf count = 19

$$\left\{y(x)=\_C1+\frac{\_C2}{x^2}+\frac{\_C3}{x}+\_C4\,x\right\}$$

2.1568 ODE No. 1568

$$ay(x)+12x^2y''(x)+x^4y^{(4)}(x)+8x^3y^{(3)}(x)=0$$

✓ **Mathematica** : cpu = 0.0087545 (sec), leaf count = 122

$$\left\{\left\{y(x)\to c_1x^{\frac{1}{2}\left(-\sqrt{5-4\sqrt{1-a}}-1\right)}+c_2x^{\frac{1}{2}\left(\sqrt{5-4\sqrt{1-a}}-1\right)}+c_3x^{\frac{1}{2}\left(-\sqrt{4\sqrt{1-a}+5}-1\right)}+c_4x^{\frac{1}{2}\left(\sqrt{4\sqrt{1-a}+5}-1\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.064 (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 = 300.25 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.645 (sec), leaf count = 63

$$\{y(x)=((J_\mu(x^cb)\_C2+Y_\mu(x^cb)\_C3)\,J_\nu(x^cb)+Y_\nu(x^cb)(\_C4\,Y_\mu(x^cb)+\_C1\,J_\mu(x^cb)))\,x^a\}$$

2.1570 ODE No. 1570

$$y(x)\left(\left(a^2-c^2\nu^2\right)\left(a^2+4ac-c^2\nu^2+4c^2\right)-b^4c^4x^{4c}\right)+x^2\left(2a^2+4(a+c-1)^2+4(a-1)(c-1)-2c^2\nu^2-1\right)y''($$

✓ **Mathematica** : cpu = 0.0982249 (sec), leaf count = 470

$$\left\{\left\{y(x)\to c_1\Gamma(1-\nu)(-1)^{\frac{a-c\nu}{4c}}2^{-\frac{2(a-c\nu)}{c}-\nu-1}b^{\frac{a-c\nu}{c}+\nu}\left(x^{4c}\right)^{\frac{a-c\nu}{4c}+\frac{\nu}{4}}\left(J_{-\nu}\left(b\sqrt[4]{x^{4c}}\right)+I_{-\nu}\left(b\sqrt[4]{x^{4c}}\right)\right)+c_2\Gamma(2-\nu)(-\right.\right.$$

✓ **Maple** : cpu = 0.114 (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

$$-\frac{1}{16}b^4x^{2/v}y(x)+(\nu-1)\nu^2(2\nu-1)x^2y''(x)+\nu^4x^4y^{(4)}(x)+\nu^3(4\nu-2)x^3y^{(3)}(x)=0$$

✓ **Mathematica** : cpu = 0.0588864 (sec), leaf count = 390

$$\left\{\left\{y(x)\to c_2\left(\frac{i}{16}\right)^v v^{2v}b^{2v}\nu^{-2v}\left(x^{2/v}\right)^{v/2}{}_0F_3\left(;\frac{v}{2}+1,1-\frac{v}{2\nu},-\frac{v}{2\nu}+\frac{v}{2}+1;\frac{b^4v^4x^{2/v}}{256\nu^4}\right)+c_3\left(\frac{i}{16}\right)^{\frac{v}{\nu}}v^{\frac{2v}{\nu}}\nu^{-\frac{2v}{\nu}}b\right.\right.$$

✓ **Maple** : cpu = 2.208 (sec), leaf count = 143

$$\left\{y(x)=\sqrt{x}\left(J_{(\lfloor\nu^{-1}\rfloor)^{-1}}\left(\frac{1}{\lfloor\nu^{-1}\rfloor}\sqrt{\frac{b^2}{\nu^2}x^{\frac{\lfloor\nu^{-1}\rfloor}{2}}}\right)\_C1+Y_{(\lfloor\nu^{-1}\rfloor)^{-1}}\left(\frac{1}{\lfloor\nu^{-1}\rfloor}\sqrt{\frac{b^2}{\nu^2}x^{\frac{\lfloor\nu^{-1}\rfloor}{2}}}\right)\_C2+J_{(\lfloor\nu^{-1}\rfloor)^{-1}}\left(\frac{1}{\lfloor\nu^{-1}\rfloor}\sqrt{\right.\right.\right.$$

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 = 86.5194 (sec), leaf count = 0 , DifferentialRoot result

$$\left\{\left\{y(x)\to \text{DifferentialRoot}\left(\{y,x\},\left\{(\mu-\nu-1)(\mu-\nu+1)(\mu+\nu)(\mu+\nu+2)y(x)-6x\left(\mu^2+\mu+\nu^2+\nu-2\right)y\right.\right.\right.$$

✓ **Maple** : cpu = 0.659 (sec), leaf count = 35

$$\{y(x)=(\mathit{LegendreQ}(\mu,x)\_C2+\_C1\ \mathit{LegendreP}(\mu,x))\ \mathit{LegendreP}(\nu,x)+\mathit{LegendreQ}(\nu,x)\ (\mathit{LegendreQ}(\mu,x)\_$$

2.1573 ODE No. 1573

$$-\frac{1}{x^5}+4e^xy'(x)+6e^xy''(x)+4(e^x+2)\,y^{(3)}(x)+(2x+e^x)\,y^{(4)}(x)+e^xy(x)=0$$

✓ **Mathematica** : cpu = 0.0473569 (sec), leaf count = 77

$$\left\{\left\{y(x)\to \frac{c_4x^3}{2x+e^x}+\frac{c_3x^2}{2x+e^x}+\frac{1}{24\,(2x+e^x)\,x}+\frac{c_2x}{2x+e^x}+\frac{c_1}{2x+e^x}\right\}\right\}$$

✓ **Maple** : cpu = 0.163 (sec), leaf count = 41

$$\left\{y(x)=\frac{24\_C1\,x^4+24\_C2\,x^3+24\_C3\,x^2+24\_C4\,x+1}{(24\,\mathrm{e}^x+48\,x)\,x}\right\}$$

2.1574 ODE No. 1574

$$y(x)\left(a^4\sin^4(x)-3\right)+\left(2\sin^2(x)+3\right)\sin(x)\cos(x)y'(x)+\left(\sin^2(x)-3\right)\sin^2(x)y''(x)+y^{(4)}(x)\sin^4(x)+2y^{(3)}(x)\sin$$

✓ **Mathematica** : cpu = 0.134194 (sec), leaf count = 270

$$\left\{\left\{y(x)\to c_1\sin(x)\,{}_2F_1\left(\frac{1}{4}\left(3-\sqrt{5-4\sqrt{1-a^4}}\right),\frac{1}{4}\left(\sqrt{5-4\sqrt{1-a^4}}+3\right);\frac{1}{2};\cos^2(x)\right)+c_3\sin(x)\cos(x)\,{}_2F_1\right.\right.$$

✓ **Maple** : cpu = 1.268 (sec), leaf count = 252

$$\left\{y(x)=\left({}_2\mathrm{F}_1\left(\frac{3}{4}-\frac{1}{4}\sqrt{-4\sqrt{-(a-1)\,(a+1)\,(a^2+1)}+5},\frac{3}{4}+\frac{1}{4}\sqrt{-4\sqrt{-(a-1)\,(a+1)\,(a^2+1)}+5};\frac{1}{2};(\cos\right.\right.\right.$$

2.1575 ODE No. 1575

$$-f(x)-4\sin^5(x)\cos(x)y'(x)-6\sin^6(x)y''(x)+y^{(4)}(x)\sin^6(x)+4y^{(3)}(x)\sin^5(x)\cos(x)+y(x)\sin^6(x)=0$$

✓ **Mathematica** : cpu = 7.17629 (sec), leaf count = 138

$$\left\{\left\{y(x)\to x^3\csc(x)\int_1^x \frac{1}{6}\csc^5(K[4])f(K[4])dK[4]+x^2\csc(x)\int_1^x -\frac{1}{2}\csc^5(K[3])f(K[3])K[3]dK[3]+x\csc(x)\int_1\right.\right.$$

✓ **Maple** : cpu = 0.767 (sec), leaf count = 638

$$\left\{y(x)=\frac{1}{48\left(e^{2ix}-1\right)^4\sin(x)}\left(12f\left(e^{2ix}-3/2e^{4ix}+e^{6ix}-1/4e^{8ix}-1/4\right)\left(x^2+\frac{20}{3}\right)x\ln\left(1-e^{ix}\right)+80if\left(e\right.\right.\right.$$

2.1576 ODE No. 1576

$$2f'(x)\left(y^{(3)}(x)-a^2y'(x)\right)+f(x)\left(-2a^2y''(x)+a^4y(x)+y^{(4)}(x)\right)=0$$

✗ **Mathematica** : cpu = 0.163121 (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 = 0.124 (sec), leaf count = 67

$$\left\{y(x)=\_C1\,e^{ax}+\_C2\,e^{-ax}+\_C3\,e^{\frac{x}{f}\left(-df+\sqrt{a^2f^2+df^2}\right)}+\_C4\,e^{-\frac{x}{f}\left(df+\sqrt{a^2f^2+df^2}\right)}\right\}$$

2.1577 ODE No. 1577

$$2y^{(3)}(x)f'(x)+f''(x)y''(x)+f(x)y^{(4)}(x)=0$$

✓ **Mathematica** : cpu = 0.0579004 (sec), leaf count = 46

$$\left\{\left\{y(x)\to\int_1^x\int_1^{K[2]}\left(\frac{c_1}{f(K[1])}+\frac{c_2K[1]}{f(K[1])}\right)dK[1]dK[2]+c_4x+c_3\right\}\right\}$$

✓ **Maple** : cpu = 0.11 (sec), leaf count = 21

$$\left\{y(x)=\frac{\_C1\,x^3}{6}+\frac{\_C2\,x^2}{2}+\_C3\,x+\_C4\right\}$$

2.1578 ODE No. 1578

$$-\lambda(ax-b)\left(y''(x)-a^2y(x)\right)-2a^2y''(x)+a^4y(x)+y^{(4)}(x)=0$$

✓ **Mathematica** : cpu = 42.6416 (sec), leaf count = 141

$$\left\{\left\{y(x)\to c_3e^{-ax}\int_1^x 2ae^{2aK[1]}\int e^{-aK[1]}\text{Ai}\left(\frac{a^2+\lambda K[1]a-b\lambda}{(a\lambda)^{2/3}}\right)dK[1]dK[1]+c_4e^{-ax}\int_1^x 2ae^{2aK[2]}\int e^{-aK[2]}\text{B}\right.\right.$$

✓ **Maple** : cpu = 0.647 (sec), leaf count = 89

$$\left\{y(x)=\mathrm{e}^{ax}\left(\int\mathrm{e}^{-2\,ax}\left(\int\mathrm{e}^{ax}\left(\text{Bi}\left(-\frac{\lambda\,(ax-b)+a^2}{a\lambda}\sqrt[3]{-a\lambda}\right)\_C4+\text{Ai}\left(-\frac{\lambda\,(ax-b)+a^2}{a\lambda}\sqrt[3]{-a\lambda}\right)\_C3\right)\,\mathrm{d}x+\_\right.\right.\right.$$

2.1579 ODE No. 1579

$$-ax-b\sin(x)-c\cos(x)+y^{(n)}(x)+y'(x)+2y^{(3)}(x)=0$$

✓ **Mathematica** : cpu = 0.818077 (sec), leaf count = 80

$$\left\{\left\{y(x)\to\frac{1}{16}(8ax^2+\cos(x)\left(b\left(2x^2-9\right)-2(5cx+8(c_4x-c_2+c_3))\right)+\sin(x)\left(-6bx+c\left(13-2x^2\right)+16(c_2x+\right.\right.\right.$$

✓ **Maple** : cpu = 0.978 (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 = 2.12085 (sec), leaf count = 234

$$\left\{\left\{y(x)\to\frac{1}{504}\left(-42\sin^2\left(\frac{x}{2}\right)-42\sin^2(x)+42x\sin(x)+42\sin\left(\frac{x}{2}\right)\sin\left(\frac{3x}{2}\right)+21\sin(x)\sin(2x)-24\sin\left(\frac{x}{2}\right)\right.\right.\right.$$

✓ **Maple** : cpu = 0.612 (sec), leaf count = 154

$$\left\{y(x)=\frac{1}{\left(i\sqrt{3}+3\right)\left(i\sqrt{3}-3\right)\left(i\sqrt{3}+9\right)\left(i\sqrt{3}-9\right)}\left(\left(1008\,\cos(x/2)\,\_C3+1008\,\sin(x/2)\,\_C4\right)\mathrm{e}^{-\frac{\sqrt{3}x}{2}}+(1008\right.\right.$$

2.1581 ODE No. 1581

$$-axy(x) - b + y^{(5)}(x) = 0$$

✗ **Mathematica** : cpu = 0.169622 (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

$$ax^{\nu}y'(x) + a\nu x^{\nu-1}y(x) + y^{(5)}(x) = 0$$

✓ **Mathematica** : cpu = 0.11022 (sec), leaf count = 787

$$\left\{\left\{y(x) \to c_5\left(\frac{4}{\nu}+1\right)^{-\frac{16}{\nu+4}}\nu^{-\frac{16}{\nu+4}}a^{\frac{4}{\nu+4}}(x^{\nu})^{\frac{4\left(\frac{4}{\nu}+1\right)}{\nu+4}}\,{}_1F_4\left(\frac{4}{\nu\left(1+\frac{4}{\nu}\right)}+\frac{1}{1+\frac{4}{\nu}};1+\frac{1}{\left(1+\frac{4}{\nu}\right)\nu},1+\frac{2}{\left(1+\frac{4}{\nu}\right)\nu},1+\frac{}{(1\right.\right.\right.$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x) = DESol\left(\left\{\frac{d^5}{dx^5}\_Y(x) + ax^{\nu}\frac{d}{dx}\_Y(x) + a\nu\, x^{\nu-1}\_Y(x)\right\}, \{\_Y(x)\}\right)\right\}$$

2.1583 ODE No. 1583

$$ay^{(4)}(x) - f(x) + y^{(5)}(x) = 0$$

✓ **Mathematica** : cpu = 0.0874491 (sec), leaf count = 92

$$\left\{\left\{y(x) \to \int_1^x \int_1^{K[5]} \int_1^{K[4]} \int_1^{K[3]} \left(e^{-aK[2]}c_1 + e^{-aK[2]}\int_1^{K[2]} e^{aK[1]}f(K[1])dK[1]\right) dK[2]dK[3]dK[4]dK[5] + c_5\right.\right.$$

✓ **Maple** : cpu = 0.314 (sec), leaf count = 40

$$\left\{y(x) = \frac{\_C3\, x^2}{2} + \frac{\_C2\, x^3}{6} + \frac{e^{-ax}\_C1}{a^4} + \frac{fx^4}{24\, a} + \_C4\, x + \_C5\right\}$$

2.1584 ODE No. 1584

$$axy(x) - 5my^{(4)}(x) + xy^{(5)}(x) = 0$$

✓ **Mathematica** : cpu = 2.07302 (sec), leaf count = 216

$$\left\{\left\{y(x) \to c_5 5^{-5m-4} a^{\frac{1}{5}(5m+4)} x^{5m+4} {}_0F_4\left(;m+\frac{6}{5},m+\frac{7}{5},m+\frac{8}{5},m+\frac{9}{5};-\frac{ax^5}{3125}\right)+\frac{1}{125}a^{3/5}c_4x^3\, {}_0F_4\left(;\frac{6}{5},\frac{7}{5},\frac{8}{5},\right.\right.\right.$$

✓ **Maple** : cpu = 0.187 (sec), leaf count = 118

$$\left\{y(x) = \_C1\, {}_0\mathrm{F}_4(\ ;\ \frac{2}{5},\frac{3}{5},\frac{4}{5},\frac{1}{5}-m;\ -\frac{x^5a}{3125}) + \_C2\, x_0\mathrm{F}_4(\ ;\ \frac{3}{5},\frac{4}{5},\frac{6}{5},\frac{2}{5}-m;\ -\frac{x^5a}{3125}) + \_C3\, x^2{}_0\mathrm{F}_4(\ ;\ \frac{4}{5},\frac{6}{5},\frac{7}{5},\frac{3}{5}\right.$$

2.1585 ODE No. 1585

$$xy(x)\left(ay'(x)+by''(x)+cy^{(3)}(x)+ey^{(4)}(x)\right) = 0$$

✓ **Mathematica** : cpu = 0.153003 (sec), leaf count = 214

$$\left\{\{y(x)\to 0\},\left\{y(x)\to \frac{c_1 e^{x\mathrm{Root}\left[\frac{\#1^2c}{e}+\#1^3+\frac{\#1b}{e}+\frac{a}{e}\&,1\right]}}{\mathrm{Root}\left[\frac{\#1^2c}{e}+\#1^3+\frac{\#1b}{e}+\frac{a}{e}\&,1\right]}+\frac{c_2 e^{x\mathrm{Root}\left[\frac{\#1^2c}{e}+\#1^3+\frac{\#1b}{e}+\frac{a}{e}\&,2\right]}}{\mathrm{Root}\left[\frac{\#1^2c}{e}+\#1^3+\frac{\#1b}{e}+\frac{a}{e}\&,2\right]}+\frac{c_3 e^{x\mathrm{Root}\left[\#\right.}}{\mathrm{Root}\left[\frac{\#1^2c}{e}+\right.}\right.\right.$$

✓ **Maple** : cpu = 0.161 (sec), leaf count = 679

$$\left\{y(x) = 0, y(x) = \_C4\ \mathrm{e}^{\frac{x}{6e}\left(\left(12\sqrt{3}\sqrt{27a^2e^2+(-18abc+4b^3)e+4c^3a-b^2c^2}e-108ae^2+36bce-8c^3\right)^{\frac{2}{3}}-2c\sqrt[3]{12\sqrt{3}\sqrt{27a^2e^2+(-18abc}}\right.}\right.$$

2.1586 ODE No. 1586

$$-(x(aA(2)-A(1))+A(2))y'(x)-(x(aA(3)-A(2))+A(3))y''(x)-y^{(3)}(x)(x(aA(4)-A(3))+A(4))-y^{(4)}(x)(x(aA(5)$$

✗ **Mathematica** : cpu = 82.7866 (sec), leaf count = 0 , DifferentialRoot result

$$\left\{\left\{y(x)\to \mathrm{DifferentialRoot}\left(\{y,x\},\left\{xA(0)-xaA(1)-A(1)+(xA(1)-xaA(2)-A(2))y'(x)+(xA(2)-xaA(\right.\right.\right.\right.$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x) = \int DESol\left(\left\{-\frac{(axA_2-xA_1+A_2)\_Y(x)}{x}-\frac{(axA_3-xA_2+A_3)\frac{\mathrm{d}}{\mathrm{d}x}\_Y(x)}{x}-\frac{(axA_4-xA_3+A_4)\frac{\mathrm{d}^2}{\mathrm{d}x^2}\_\right.}{x}\right.\right.$$

2.1587 ODE No. 1587

$$x^5y^{(10)}(x) - ay(x) = 0$$

✓ **Mathematica** : cpu = 0.263024 (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 = 0.348 (sec), leaf count = 154

$$\left\{y(x) = x^{\frac{5}{2}}\left(\_C10\,Y_5\left(2\,(-1)^{\frac{9}{10}}\,a^{1/10}\sqrt{x}\right) + \_C8\,Y_5\left(2\,(-1)^{3/10}\,a^{1/10}\sqrt{x}\right) + \_C9\,Y_5\left(2\,(-1)^{\frac{7}{10}}\,a^{1/10}\sqrt{x}\right) + \_C7\right.\right.$$

2.1588 ODE No. 1588

$$x^{10}y^{(5)}(x) - ay(x) = 0$$

✓ **Mathematica** : cpu = 10.1309 (sec), leaf count = 114

$$\left\{\left\{y(x) \to c_1x^4e^{-\frac{\sqrt[5]{a}}{x}} + c_2x^4e^{\frac{\sqrt[5]{-1}\,\sqrt[5]{a}}{x}} + c_3x^4e^{-\frac{(-1)^{2/5}\,\sqrt[5]{a}}{x}} + c_4x^4e^{\frac{(-1)^{3/5}\,\sqrt[5]{a}}{x}} + c_5x^4e^{-\frac{(-1)^{4/5}\,\sqrt[5]{a}}{x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.127 (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 = 0.0313145 (sec), leaf count = 670

$$\left\{\left\{y(x) \to -\frac{1048576(-1)^{9/11}a^{20/11}c_{11}x^{10}\,{}_0F_{10}\left(;\frac{13}{11},\frac{15}{11},\frac{17}{11},\frac{19}{11},\frac{21}{11},\frac{23}{11},\frac{25}{11},\frac{27}{11},\frac{29}{11},\frac{31}{11};\frac{2048ax^{11/2}}{285311670611}\right)}{672749994932560009201} - \frac{262144(-1)^{7}}{}\right.\right.$$

✓ **Maple** : cpu = 8.269 (sec), leaf count = 4022

2.1590 ODE No. 1590

$$(x-a)^5(x-b)^5y^{(5)}(x)-cy(x)=0$$

✗ **Mathematica** : cpu = 300.002 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 3.457 (sec), leaf count = 553

$$\left\{y(x)=\mathit{ODESolStruc}\left(\mathrm{e}^{\int -4\frac{\left((-b-\_f/4)\mathrm{e}^{(\int \_g(\_f)\,\mathrm{d}\_f+\_C1)(a-b)}+a+\_f/4\right)\_g(\_f)}{\mathrm{e}^{(\int \_g(\_f)\,\mathrm{d}\_f+\_C1)(a-b)}-1}\mathrm{d}\_f+\_C2}, [\left\{\frac{1}{(\_g(\_f))^2}\left(\left(\frac{\mathrm{d}^3}{\mathrm{d}\_f^3}\_g(\_f)\right.\right.\right.\right.$$

2.1591 ODE No. 1591

$$y''(x)-y(x)^2=0$$

✓ **Mathematica** : cpu = 0.0296595 (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 = 0.044 (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 = 0.0207943 (sec), leaf count = 14

$$\{\{y(x)\to\wp(x+c_1;0,c_2)\}\}$$

✓ **Maple** : cpu = 0.044 (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 = 17.1796 (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 = 0.3216 (sec), leaf count = 373

$$\text{Solve}\left[\frac{4\left(\text{Root}\left[4\#1^3 - 4\#1^2 + c_1\&, 2\right] - \text{Root}\left[4\#1^3 - 4\#1^2 + c_1\&, 3\right]\right)\left(y(x) - \text{Root}\left[4\#1^3 - 4\#1^2 + c_1\&, 1\right]\right)(}{\left(4y(x)^3 - 4y(x)^2 + c_1\right)\left(\text{Root}\left[4\#1^3\right.\right.}\right.$$

✓ **Maple** : cpu = 0.17 (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 = 20.0848 (sec), leaf count = 0 , could not solve

```
DSolve[c + b*x + a*y[x]^2 + Derivative[2][y][x] == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(diff(y(x),x),x)+a*y(x)^2+b*x+c=0,y(x))
```

2.1596 ODE No. 1596

$$a + y''(x) - 2y(x)^3 - xy(x) = 0$$

✗ **Mathematica** : cpu = 20.3693 (sec), leaf count = 0 , could not solve

```
DSolve[a - x*y[x] - 2*y[x]^3 + Derivative[2][y][x] == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(diff(y(x),x),x)-2*y(x)^3-x*y(x)+a=0,y(x))
```

2.1597 ODE No. 1597

$$y''(x) - ay(x)^3 = 0$$

✓ **Mathematica** : cpu = 1.70641 (sec), leaf count = 242

$$\left\{\left\{y(x) \to -\frac{\sqrt[4]{2}\sqrt{c_1}\sqrt{\frac{i\sqrt{a}}{\sqrt{c_1}}}\text{sn}\left(\frac{(-1)^{3/4}\sqrt{\sqrt{2}\sqrt{a}\sqrt{c_1}x^2+2\sqrt{2}\sqrt{a}\sqrt{c_1}c_2x+\sqrt{2}\sqrt{a}\sqrt{c_1}c_2{}^2}}{\sqrt{2}}\right| -1\right)}{\sqrt{a}}\right\}, \left\{y(x) \to \frac{\sqrt[4]{2}\sqrt{c_1}\sqrt{\frac{i\sqrt{a}}{\sqrt{c_1}}}\text{sn}\left(\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.078 (sec), leaf count = 21

$$\left\{y(x) = \_C2\ JacobiSN\left(\left(\frac{x}{2}\sqrt{-2\,a} + \_C1\right)\_C2, i\right)\right\}$$

2.1598 ODE No. 1598

$$-2a^2y(x)^3 + 2abxy(x) - b + y''(x) = 0$$

✗ **Mathematica** : cpu = 21.6675 (sec), leaf count = 0 , could not solve

```
DSolve[-b + 2*a*b*x*y[x] - 2*a^2*y[x]^3 + Derivative[2][y][x] == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(diff(y(x),x),x)-2*a^2*y(x)^3+2*a*b*x*y(x)-b=0,y(x))
```

2.1599 ODE No. 1599

$$ay(x)^3 + bxy(x) + cy(x) + d + y''(x) = 0$$

✗ **Mathematica** : cpu = 20.569 (sec), leaf count = 0 , could not solve

```
DSolve[d + c*y[x] + b*x*y[x] + a*y[x]^3 + Derivative[2][y][x] == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(diff(y(x),x),x)+d+b*x*y(x)+c*y(x)+a*y(x)^3=0,y(x))
```

2.1600 ODE No. 1600

$$ay(x)^3 + by(x)^2 + cy(x) + d + y''(x) = 0$$

✓ **Mathematica** : cpu = 1.51541 (sec), leaf count = 1017

$$\text{Solve}\left[\frac{4F\left(\sin^{-1}\left(\sqrt{\frac{(\text{Root}[3a\#1^4+4b\#1^3+6c\#1^2+12d\#1-6c_1\&,2]-\text{Root}[3a\#1^4+4b\#1^3+6c\#1^2+12d\#1-6c_1\&,4])(y(x)-\text{Root}[3a\#1}{(\text{Root}[3a\#1^4+4b\#1^3+6c\#1^2+12d\#1-6c_1\&,1]-\text{Root}[3a\#1^4+4b\#1^3+6c\#1^2+12d\#1-6c_1\&,4])(y(x)-\text{Root}[3a\#1}}\right.\right.\right.}{}\right.$$

✓ **Maple** : cpu = 0.167 (sec), leaf count = 89

$$\left\{\int^{y(x)} -6\frac{1}{\sqrt{-18\_a^4a - 24\,b\_a^3 - 36\_a^2c - 72\_a\,d + 36\_C1}}d\_a - x - \_C2 = 0, \int^{y(x)} 6\frac{}{\sqrt{-18\_a^4a - 24\,b}}\right.$$

2.1601 ODE No. 1601

$$ax^r y(x)^n + y''(x) = 0$$

✗ **Mathematica** : cpu = 0.0277776 (sec), leaf count = 0 , could not solve

```
DSolve[a*x^r*y[x]^n + Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 4.38 (sec), leaf count = 151

$$\left\{y(x) = ODESolStruc\left(\_a\,e^{\int -\_b(\_a)\,d\_a+\_C1}, \left[\left\{\frac{d}{d\_a}\_b(\_a) = \frac{\left(a\_b(\_a)\,(n-1)^2\,\_a^n + (\_a\,(r+1+n)\_b(\right.}{(r+2)^2}\right.\right.\right.$$

2.1602 ODE No. 1602

$$(n+1)a^{2n}y(x)^{2n+1} + y''(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 0.117806 (sec), leaf count = 47

$$\text{Solve}\left[\int_1^{y(x)} \frac{1}{\sqrt{c_1 - K[1]^2 \left(a^{2n}K[1]^{2n} - 1\right)}} dK[1]^2 = (x + c_2)^2, y(x)\right]$$

✓ **Maple** : cpu = 0.732 (sec), leaf count = 73

$$\left\{\int^{y(x)} \frac{1}{\sqrt{-a^{2n}\_a^{2n+2} + \_a^2 + \_C1}} d\_a - x - \_C2 = 0, \int^{y(x)} -\frac{1}{\sqrt{-a^{2n}\_a^{2n+2} + \_a^2 + \_C1}} d\_a - x - \_C$$

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 = 60.3594 (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 = 31.087 (sec), leaf count = 7543

2.1604 ODE No. 1604

$$y''(x) - e^{y(x)} = 0$$

✓ **Mathematica** : cpu = 0.0400051 (sec), leaf count = 34

$$\left\{\left\{y(x) \to \log\left(\frac{1}{2}c_1\left(-1 + \tanh^2\left(\frac{1}{2}\sqrt{c_1(x + c_2)^2}\right)\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 1.542 (sec), leaf count = 23

$$\left\{y(x) = \ln\left(\frac{1}{2\_C1^2}\left(\left(\tan\left(\frac{\_C2 + x}{2\_C1}\right)\right)^2 + 1\right)\right)\right\}$$

2.1605 ODE No. 1605

$$ae^x\sqrt{y(x)} + y''(x) = 0$$

✗ **Mathematica** : cpu = 20.1348 (sec), leaf count = 0 , could not solve

```
DSolve[a*E^x*Sqrt[y[x]] + Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 4.166 (sec), leaf count = 104

$$\left\{y(x) = ODESolStruc\left(\frac{\_a}{e^{-2\int \_b(\_a)\,d\_a - 2\_C1}}, \left[\left\{\frac{d}{d\_a}\_b(\_a) = (\_b(\_a))^2\left(\sqrt{\_a}\_b(\_a)\,a + 4\_b(\_a)\_a + 4\right)\right.\right.\right.$$

2.1606 ODE No. 1606

$$y''(x) + e^x\sin(y(x)) = 0$$

✗ **Mathematica** : cpu = 20.5016 (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 = 0.0821563 (sec), leaf count = 79

$$\left\{\left\{y(x) \to -2\mathrm{am}\left(\frac{1}{2}\sqrt{(2a+c_1)(x+c_2)^2}\middle|\frac{4a}{2a+c_1}\right)\right\}, \left\{y(x) \to 2\mathrm{am}\left(\frac{1}{2}\sqrt{(2a+c_1)(x+c_2)^2}\middle|\frac{4a}{2a+c_1}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.379 (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 = 0.0338855 (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 = 0.0234799 (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 = 2.65382 (sec), leaf count = 754

$$\left\{\text{Solve}\left[\int_1^{y(x)} \frac{2}{\sqrt{x}\sqrt{\frac{K[3]^2+4xc_1+8x\int_1^{\frac{K[3]}{\sqrt{x}}} h(K[2])dK[2]}{x}}}dK[3] - \int_1^x \left(\frac{2\left(\frac{y(x)}{2\sqrt{K[4]}} - \frac{\sqrt{\frac{y(x)^2}{2K[4]}+2c_1+4\int_1^{\frac{y(x)}{\sqrt{K[4]}}} h(K[2])dK[2]}}{\sqrt{2}}\right)}{K[4]\sqrt{\frac{y(x)^2+4c_1K[4]+8K[4]\int_1^{\frac{y(x)}{\sqrt{K[4]}}} h(K[2])dK[2]}{K[4]}}} -\right.\right.\right.$$

✓ **Maple** : cpu = 0.755 (sec), leaf count = 92

$$\left\{y(x) = RootOf\left(-\ln(x) - 2\int^{\_Z} \frac{1}{\sqrt{\_C1 + 8\int h(\_g)\,\mathrm{d}\_g + \_g^2}}d\_g + 2\_C2\right)\sqrt{x}, y(x) = RootOf\left(-\ln(\right.\right.$$

2.1611 ODE No. 1611

$$-3y'(x) + y''(x) - y(x)^2 - 2y(x) = 0$$

✗ **Mathematica** : cpu = 3.33831 (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 = 0.647 (sec), leaf count = 57

$$\left\{y(x) = ODESolStruc\left(\_a, [\left\{\left(\frac{d}{d\_a}\_b(\_a)\right)\_b(\_a) - 3\_b(\_a) - \_a^2 - 2\_a = 0\right\}, \left\{\_a = y(x), \_b(\_a) =\right.\right.\right.$$

2.1612 ODE No. 1612

$$-7y'(x) + y''(x) - y(x)^{3/2} + 12y(x) = 0$$

✗ **Mathematica** : cpu = 21.4318 (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 = 4.173 (sec), leaf count = 57

$$\left\{y(x) = ODESolStruc\left(\_a, [\left\{\left(\frac{d}{d\_a}\_b(\_a)\right)\_b(\_a) - 7\_b(\_a) - \_a^{\frac{3}{2}} + 12\_a = 0\right\}, \left\{\_a = y(x), \_b(\_a)\right.\right.\right.$$

2.1613 ODE No. 1613

$$6a^2y(x) + 5ay'(x) + y''(x) - 6y(x)^2 = 0$$

✗ **Mathematica** : cpu = 1.24408 (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 = 0.094 (sec), leaf count = 27

$$\left\{y(x) = WeierstrassP\left(-\frac{e^{-ax}}{a} + \_C1, 0, \_C2\right)\left(e^{-ax}\right)^2\right\}$$

2.1614 ODE No. 1614

$$2a^2y(x) + 3ay'(x) + y''(x) - 2y(x)^3 = 0$$

✗ **Mathematica** : cpu = 0.89979 (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 = 0.487 (sec), leaf count = 33

$$\left\{y(x) = \frac{\_C2}{e^{ax}} JacobiSN\left(\left(-\frac{1}{a}\sqrt{-e^{-2\,ax}} + \_C1\right)\_C2, i\right)\right\}$$

2.1615 ODE No. 1615

$$-\frac{2(n+1)(n+2)y(x)\left(y(x)^{\frac{n}{n+1}} - 1\right)}{n^2} - \frac{(3n+4)y'(x)}{n} + y''(x) = 0$$

✗ **Mathematica** : cpu = 75.3693 (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 = 12.922 (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 = 16.1545 (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 = 0.806 (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

$$ay'(x) + bx^r y(x)^n + y''(x) = 0$$

✗ **Mathematica** : cpu = 0.0327114 (sec), leaf count = 0 , could not solve

```
DSolve[b*x^r*y[x]^n + a*Derivative[1][y][x] + Derivative[2][y][x] == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(diff(y(x),x),x)+a*diff(y(x),x)+b*x^r*y(x)^n=0,y(x))
```

2.1618 ODE No. 1618

$$ay'(x) - 2a + be^{y(x)} + y''(x) = 0$$

✗ **Mathematica** : cpu = 26.4642 (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 = 0.915 (sec), leaf count = 56

$$\left\{y(x) = ODESolStruc\left(\_a, [\left\{\left(\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a)\right)\_b(\_a) + a\_b(\_a) + be^{\_a} - 2\,a = 0\right\}, \left\{\_a = y(x), \_b(\_a) = \right.\right.\right.$$

2.1619 ODE No. 1619

$$ay'(x) + f(x)\sin(y(x)) + y''(x) = 0$$

✗ **Mathematica** : cpu = 0.0389439 (sec), leaf count = 0 , could not solve

```
DSolve[f[x]*Sin[y[x]] + a*Derivative[1][y][x] + Derivative[2][y][x] == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(diff(y(x),x),x)+a*diff(y(x),x)+f(x)*sin(y(x))=0,y(x))
```

2.1620 ODE No. 1620

$$y(x)y'(x) + y''(x) - y(x)^3 = 0$$

✓ **Mathematica** : cpu = 3.08176 (sec), leaf count = 492

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[\int_1^{\#1} \frac{2}{\frac{e^{6c_1}K[1]^4}{\sqrt[3]{e^{18c_1}K[1]^6 - 2e^{12c_1} + 2\sqrt{e^{24c_1} - e^{30c_1}K[1]^6}}} - K[1]^2 + e^{-6c_1}\sqrt[3]{e^{18c_1}K[1]^6 - 2e^{12c_1} + \right.\right.\right.$$

✓ **Maple** : cpu = 0.322 (sec), leaf count = 291

$$\left\{\int^{y(x)} 2\left(\frac{\_a^4}{\sqrt[3]{\_a^6+2\_C1+2\sqrt{\_C1\_a^6+\_C1^2}}}-\_a^2+\sqrt[3]{\_a^6+2\_C1+2\sqrt{\_C1\_a^6+\_C1^2}}\right)^{-1} d\_a\right.$$

2.1621 ODE No. 1621

$$ay(x)+y(x)y'(x)+y''(x)-y(x)^3=0$$

✓ **Mathematica** : cpu = 8.61172 (sec), leaf count = 990

$$\left\{\left\{y(x)\to \text{InverseFunction}\left[\int_1^{\#1}\frac{}{\frac{e^{6c_1}(a-K[1]^2)^2}{2\sqrt[3]{e^{18c_1}K[1]^6-3ae^{18c_1}K[1]^4+3a^2e^{18c_1}K[1]^2-2e^{12c_1}-a^3e^{18c_1}+2\sqrt{-e^{30c_1}K[1]^6+3ae^{30c_1}K[1]^4-}}}}\right.\right.\right.$$

✓ **Maple** : cpu = 3.976 (sec), leaf count = 108

$$\left\{\int^{y(x)}\frac{4\left(RootOf\left(\left(-4\_a^6+12\_a^4a-12\_a^2a^2+4a^3+320\_C1\right)\_Z^9+\left(-189\_a^6+567\_a^4a-567\_a^2a\right.\right.\right.}{-63\_a^2+63a}\right.$$

2.1622 ODE No. 1622

$$2a^2y(x)+(3a+y(x))y'(x)+ay(x)^2+y''(x)-y(x)^3=0$$

✗ **Mathematica** : cpu = 24.0319 (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 = 1.328 (sec), leaf count = 817

$$\left\{y(x)=\frac{1}{e^{ax}}RootOf\left(\int^{\_Z}\frac{1}{-\_f^6+\_C1^2}\left(-\left(-\left(-\_C1\_f^{12}+2\_C1^3\_f^6+\left(-\_f^6+\_C1^2\right)^{\frac{5}{2}}-\_C1^5\right)\left(-\right.\right.\right.\right.\right.\right.$$

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 = 0.120074 (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

$$y(x)\left(af(x)^2+3f'(x)+\frac{3f'(x)^2}{f(x)^2}-\frac{f''(x)}{f(x)}\right)+bf(x)^3-\left(\frac{f'(x)}{f(x)}+f(x)\right)\left(3y'(x)+y(x)^2\right)+y(x)y'(x)+y''(x)-y(x)^3$$

✗ **Mathematica** : cpu = 0.62962 (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 = 1.872 (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

$$y'(x)\left(y(x)-\frac{3f'(x)}{2f(x)}\right)+y(x)\left(\frac{f'(x)^2}{f(x)^2}-\frac{f''(x)}{2f(x)}+f(x)\right)-\frac{y(x)^2f'(x)}{2f(x)}+y''(x)-y(x)^3=0$$

✗ **Mathematica** : cpu = 0.332745 (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

$$y(x)f'(x) + f(x)y'(x) + 2y(x)y'(x) + y''(x) = 0$$

✗ **Mathematica** : cpu = 27.2463 (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 = 0.454 (sec), leaf count = 48

$$\left\{ y(x) = \mathit{ODESolStruc}\left(\_b(\_a), [\left\{ \frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a) = -(\_b(\_a))^2 - f(\_a)\,\_b(\_a) - \_C1 \right\}, \{\_a = x, \_b(\_a) =$$

2.1627 ODE No. 1627

$$f(x)\left(y'(x) + y(x)^2\right) - g(x) + 2y(x)y'(x) + y''(x) = 0$$

✗ **Mathematica** : cpu = 0.125603 (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 = 0.991 (sec), leaf count = 58

$$\left\{ y(x) = \mathit{ODESolStruc}\left(\_b(\_a), [\left\{ -\int g(\_a)\, \mathrm{e}^{\int f(\_a)\,\mathrm{d}\_a}\, \mathrm{d}\_a + \left((\_b(\_a))^2 + \frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a) \right) \mathrm{e}^{\int f(\_a)\,\mathrm{d}\_a} + \_C$$

2.1628 ODE No. 1628

$$f(x)y(x) - g(x) + 3y(x)y'(x) + y''(x) + y(x)^3 = 0$$

✗ **Mathematica** : cpu = 2.91085 (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

$$\left\{ y(x) = \frac{\frac{\mathrm{d}}{\mathrm{d}x}\mathit{DESol}\left(\left\{ -g(x)\,\_Y(x) + f(x)\frac{\mathrm{d}}{\mathrm{d}x}\_Y(x) + \frac{\mathrm{d}^3}{\mathrm{d}x^3}\_Y(x) \right\}, \{\_Y(x)\}\right)}{\mathit{DESol}\left(\left\{ -g(x)\,\_Y(x) + f(x)\frac{\mathrm{d}}{\mathrm{d}x}\_Y(x) + \frac{\mathrm{d}^3}{\mathrm{d}x^3}\_Y(x) \right\}, \{\_Y(x)\}\right)} \right\}$$

2.1629 ODE No. 1629

$$(f(x) + 3y(x))y'(x) + f(x)y(x)^2 + y''(x) + y(x)^3 = 0$$

✗ **Mathematica** : cpu = 0.0222855 (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 = 0.173 (sec), leaf count = 38

$$\left\{y(x) = \frac{\int \_C1\, e^{-\int f(x)\,dx}\,dx + \_C2}{\iint \_C1\, e^{-\int f(x)\,dx}\,dx\,dx + \_C2\,x + 1}\right\}$$

2.1630 ODE No. 1630

$$-4a^2y(x) - 3ay(x)^2 - b - 3y(x)y'(x) + y''(x) = 0$$

✓ **Mathematica** : cpu = 7.19286 (sec), leaf count = 3227

$$\left\{\left\{y(x) \to -\frac{2\left((-1)^{\frac{a^{3/2}\sqrt{4a^3-3b}-2a^3}{4a^3}+1} 2^{-\frac{3\left(a^{3/2}\sqrt{4a^3-3b}-2a^3\right)}{4a^3}+\frac{3\sqrt{4a^6-3a^3b}}{4a^3}+1} 3^{\frac{a^{3/2}\sqrt{4a^3-3b}-2a^3}{4a^3}-\frac{\sqrt{4a^6-3a^3b}}{4a^3}} a^{-\frac{a^{3/2}\sqrt{4a^3-3b-2}}{2a^3}}\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.946 (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 = 0.0186553 (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 = 0.303 (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 = 0.048362 (sec), leaf count = 46

$$\left\{\left\{y(x) \to \frac{\sqrt{c_1}\tan\left(\sqrt{a}\sqrt{c_1}x + \sqrt{a}\sqrt{c_1}c_2\right)}{\sqrt{a}}\right\}\right\}$$

✓ **Maple** : cpu = 0.45 (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 = 33.0167 (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 = 1.227 (sec), leaf count = 97

$$\left\{\int^{y(x)}\left(RootOf\left(-2\,a\_a^2\,Artanh\left(\frac{\_a^2a + 4\_Z}{\sqrt{\_a^4\left(a^2 - 8\,b\right)}}\right) - \ln\left(\_a^4b + \_Z\,\_a^2a + 2\_Z^2\right)\sqrt{\_a^4\left(a^2 - 8\,b\right)} + \_C1\right.\right.\right.$$

2.1634 ODE No. 1634

$$y'(x)h(x, y(x)) + j(x, y(x)) + y''(x) = 0$$

✗ **Mathematica** : cpu = 0.109255 (sec), leaf count = 0 , could not solve

```
DSolve[j[x, y[x]] + h[x, y[x]]*Derivative[1][y][x] + Derivative[2][y][x] == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(diff(y(x),x),x)+h(x,y(x))*diff(y(x),x)+j(x,y(x))=0,y(x))
```

2.1635 ODE No. 1635

$$ay'(x)^2 + by(x) + y''(x) = 0$$

✓ **Mathematica** : cpu = 0.537722 (sec), leaf count = 104

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[\int_1^{\#1} -\frac{\sqrt{2}a}{\sqrt{2e^{-2aK[1]}c_1a^2 - 2bK[1]a + b}}dK[1]\&\right][x + c_2]\right\}, \left\{y(x) \to \text{InverseFunctio}\right.\right.$$

✓ **Maple** : cpu = 0.659 (sec), leaf count = 79

$$\left\{\int^{y(x)} -2\frac{a}{\sqrt{4\,e^{-2\_a\,a}\_C1\,a^2 - 4\_a\,ab + 2\,b}}d\_a - x - \_C2 = 0, \int^{y(x)} 2\frac{a}{\sqrt{4\,e^{-2\_a\,a}\_C1\,a^2 - 4\_a\,ab + 2\,b}}d\_c\right.$$

2.1636 ODE No. 1636

$$ay'(x)\left|y'(x)\right| + by'(x) + cy(x) + y''(x) = 0$$

✗ **Mathematica** : cpu = 7.79432 (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 = 6.476 (sec), leaf count = 59

$$\left\{y(x) = ODESolStruc\left(\_a, [\left\{\left(\frac{d}{d\_a}\_b(\_a)\right)\_b(\_a) + a\_b(\_a)\left|\_b(\_a)\right| + \_b(\_a)\,b + c\_a = 0\right\}, \left\{\_a = y(\right.\right.\right.$$

2.1637 ODE No. 1637

$$ay'(x)^2 + by'(x) + cy(x) + y''(x) = 0$$

✗ **Mathematica** : cpu = 18.781 (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 = 0.772 (sec), leaf count = 58

$$\left\{y(x) = ODESolStruc\left(\_a, [\left\{\left(\frac{d}{d\_a}\_b(\_a)\right)\_b(\_a) + a(\_b(\_a))^2 + \_b(\_a)\,b + c\_a = 0\right\}, \left\{\_a = y(x), \_b\right.\right.\right.$$

2.1638 ODE No. 1638

$$ay'(x)^2 + b\sin(y(x)) + y''(x) = 0$$

✓ **Mathematica** : cpu = 3.98017 (sec), leaf count = 146

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[\int_1^{\#1} -\frac{\sqrt{4a^2+1}}{\sqrt{4e^{-2aK[1]}c_1a^2 - 4b\sin(K[1])a + e^{-2aK[1]}c_1 + 2b\cos(K[1])}}dK[1]\&\right][x+c_2$$

✓ **Maple** : cpu = 0.402 (sec), leaf count = 115

$$\left\{\int^{y(x)}(-4\,a^2-1)\frac{1}{\sqrt{16\_C1\,\left(a^2+1/4\right)^2 e^{-2\_a\,a} - 16\,\left(a^2+1/4\right)b\left(a\sin\left(\_a\right) - 1/2\cos\left(\_a\right)\right)}}d\_a - x - \_C2 =$$

2.1639 ODE No. 1639

$$ay'(x)\left|y'(x)\right| + b\sin(y(x)) + y''(x) = 0$$

✗ **Mathematica** : cpu = 40.0442 (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 = 3.682 (sec), leaf count = 56

$$\left\{y(x) = ODESolStruc\left(\_a, [\left\{\left(\frac{d}{d\_a}\_b(\_a)\right)\_b(\_a) + a\_b(\_a)\left|\_b(\_a)\right| + b\sin\left(\_a\right) = 0\right\}, \left\{\_a = y(x), \_$$

2.1640 ODE No. 1640

$$ay(x)y'(x)^2 + by(x) + y''(x) = 0$$

✓ **Mathematica** : cpu = 0.441204 (sec), leaf count = 96

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[\int_1^{\#1} -\frac{\sqrt{a}}{\sqrt{e^{2ac_1-aK[1]^2}-b}}dK[1]\&\right][x+c_2]\right\}, \left\{y(x) \to \text{InverseFunction}\left[\int_1^{\#1} \frac{}{\sqrt{e^{2a}}}\right.\right.$$

✓ **Maple** : cpu = 0.765 (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 = 0.049153 (sec), leaf count = 61

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[\int_1^{\#1} \exp\left(-\int_1^{K[4]} -h(K[1])dK[1]\right) dK[4]\&\right]\left[\int_1^x - \exp\left(-\int_1^{K[5]} g(K[2])dK[2]\right)\right.\right.\right.$$

✓ **Maple** : cpu = 0.1 (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 = 0.312125 (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 = 0.123869 (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 = 81.9496 (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 = 0.66 (sec), leaf count = 56

$$\left\{y(x) = ODESolStruc\left(\_a, [\left\{\left(\frac{d}{d\_a}\_b(\_a)\right)\_b(\_a) + h(\_a)\left(\_b(\_a)\right)^2 + \_b(\_a) + k(\_a) = 0\right\}, \left\{\_a = y(\right.\right.\right.$$

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 = 0.0702246 (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 = 10.6045 (sec), leaf count = 262

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[-\frac{\sqrt{\frac{\#1^2(-a)+1+2c_1}{1+2c_1}}\sqrt{2\#1^2a - 4c_1}E\left(\sin^{-1}\left(\sqrt{\frac{a}{2c_1+1}}\#1\right)|1 + \frac{1}{2c_1}\right)}{\sqrt{\frac{a}{1+2c_1}}\sqrt{\#1^2(-a) + 1 + 2c_1}\sqrt{2 - \frac{\#1^2a}{c_1}}}\&\right][x + c_2]\right\}, \left\{\right.\right.$$

✓ **Maple** : cpu = 0.433 (sec), leaf count = 94

$$\left\{\int^{y(x)} a(\_a^2 + 2\_C1)\frac{1}{\sqrt{-a\left(-1 + a\left(\_a^2 + 2\_C1\right)\right)\left(\_a^2 + 2\_C1\right)}}d\_a - x - \_C2 = 0, \int^{y(x)} -a(\_a^2 + 2\_\right.$$

2.1647 ODE No. 1647

$$y''(x) - a(xy'(x) - y(x))^r = 0$$

✓ **Mathematica** : cpu = 0.403004 (sec), leaf count = 91

$$\left\{\left\{y(x) \to x\left(c_2 - x\left(2 - \frac{a(r-1)x^2}{c_1}\right)^{\frac{1}{r-1}} \left(x^{2r-2}\left(-a(r-1)x^2 + 2c_1\right)\right)^{\frac{1}{1-r}} {}_2F_1\left(-\frac{1}{2}, \frac{1}{r-1}; \frac{1}{2}; \frac{a(r-1)x^2}{2c_1}\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 3.466 (sec), leaf count = 60

$$\left\{y(x) = \left(\int -\frac{x^2(r-1)\,a - \_C1}{2\,x^2} 2^{\frac{r}{r-1}} \left(-\left(x^2(r-1)\,a - \_C1\right)^{-1}\right)^{\frac{r}{r-1}} \mathrm{d}x + \_C2\right) x\right\}$$

2.1648 ODE No. 1648

$$y''(x) - kx^a y(x)^b y'(x)^c = 0$$

✗ **Mathematica** : cpu = 0.0576065 (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 = 2.028 (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 = 1.81163 (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 = 0.0968086 (sec), leaf count = 30

$$\left\{\left\{y(x) \to \frac{\cosh(c_1)\cosh(ax)}{a} + \frac{\sinh(c_1)\sinh(ax)}{a} + c_2\right\}\right\}$$

✓ **Maple** : cpu = 0.913 (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 = 0.311171 (sec), leaf count = 414

$$\left\{\left\{y(x) \to \frac{a\text{InverseFunction}\left[\frac{\frac{b\tan^{-1}\left(\frac{\#1b}{\sqrt{\#1^2+1}\sqrt{a^2-b^2}}\right)}{\sqrt{a^2-b^2}} - \frac{b\tan^{-1}\left(\frac{\#1a}{\sqrt{a^2-b^2}}\right)}{\sqrt{a^2-b^2}} + \sinh^{-1}(\#1)}{a}\&\right][x + c_1]^2 - b\sqrt{1 + \text{InverseFun}}}{a^2\sqrt{1 +}}\right.\right.$$

✓ **Maple** : cpu = 0.577 (sec), leaf count = 31

$$\left\{y(x) = \int RootOf\left(x - \int^{\_Z}\left(\sqrt{\_f^2 + 1}a + b\right)^{-1} d\_f + \_C1\right) dx + \_C2\right\}$$

2.1652 ODE No. 1652

$$y''(x) - a\sqrt{by(x)^2 + y'(x)^2} = 0$$

✗ **Mathematica** : cpu = 0.280423 (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 = 1.034 (sec), leaf count = 36

$$\left\{y(x) = \mathrm{e}^{\int \mathit{RootOf}\left(x - \int^{\_Z} \left(-\_f^2 + a\sqrt{\_f^2 + b}\right)^{-1} d\_f + \_C1\right) \mathrm{d}x + \_C2}\right\}$$

2.1653 ODE No. 1653

$$y''(x) - a\left(y'(x)^2 + 1\right)^{3/2} = 0$$

✓ **Mathematica** : cpu = 0.139914 (sec), leaf count = 75

$$\left\{\left\{y(x) \to c_2 - \frac{i\sqrt{a^2x^2 + 2ac_1x - 1 + c_1{}^2}}{a}\right\}, \left\{y(x) \to \frac{i\sqrt{a^2x^2 + 2ac_1x - 1 + c_1{}^2}}{a} + c_2\right\}\right\}$$

✓ **Maple** : cpu = 0.507 (sec), leaf count = 41

$$\left\{y(x) = \frac{1}{a}\left(\left(-1 + (x + \_C1)^2 a^2\right)\sqrt{-\left(-1 + (x + \_C1)^2 a^2\right)^{-1}} + a\_C2\right)\right\}$$

2.1654 ODE No. 1654

$$y''(x) - 2ax\left(y'(x)^2 + 1\right)^{3/2} = 0$$

✓ **Mathematica** : cpu = 0.437909 (sec), leaf count = 308

$$\left\{\left\{y(x) \to c_2 - \frac{\sqrt{\frac{ax^2 - 1 + c_1}{-1 + c_1}}\sqrt{\frac{ax^2 + 1 + c_1}{1 + c_1}}\left(F\left(i\sinh^{-1}\left(x\sqrt{\frac{a}{c_1 + 1}}\right) | \frac{c_1 + 1}{c_1 - 1}\right) + (-1 + c_1)E\left(i\sinh^{-1}\left(x\sqrt{\frac{a}{c_1 + 1}}\right) | \frac{c_1 + 1}{c_1 - 1}\right)\right.}{\sqrt{\frac{a}{1 + c_1}}\sqrt{a^2x^4 + 2ac_1x^2 - 1 + c_1{}^2}}\right.\right.$$

✓ **Maple** : cpu = 0.505 (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 = 0.800467 (sec), leaf count = 350

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[-\frac{\sqrt{\frac{\#1^2 a-2+2c_1}{-1+c_1}}\sqrt{\frac{\#1^2 a+2+2c_1}{1+c_1}}\left(F\left(i\sinh^{-1}\left(\sqrt{\frac{a}{2c_1+2}}\#1\right)|\frac{c_1+1}{c_1-1}\right)+(-1+c_1)E\left(i\sinh\right.\right.}{\sqrt{\frac{a}{2+2c_1}}\sqrt{\#1^4a^2+4\#1^2ac_1-4+4c_1{}^2}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.476 (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 = 39.1056 (sec), leaf count = 9706

$$\left\{\text{Solve}\left[\int_1^x\left(\frac{1}{b^2+1}-\frac{b\sqrt{-a^2\left(c^2+2bK[1]c+2y(x)c+b^2K[1]^2+y(x)^2-2c_1+2bK[1]y(x)\right)^2\left(a^2c^4+4a^2bK[1\right.}}{\left(b^2+1\right)\left(a^2c^4+4a^2bK[1]c^3+4a^2y(x)c^3+6a^2b^2K[1]^2c^2\right.}\right.\right.\right.$$

✓ **Maple** : cpu = 1.445 (sec), leaf count = 771

$$\left\{y(x) = -bx + RootOf\left(-x+\int^{\_Z}\frac{1}{\left(a^2\_f^4+4\,ca^2\_f^3+4\,a^2c^2\_f^2-4\,a^2\_f^2\_C1-8\,ca^2\_f\,\_C1+4\,\_C1^2a^2\right.}\right.\right.$$

2.1657 ODE No. 1657

$$y(x)^3y'(x) - y(x)y'(x)\sqrt{4y'(x)+y(x)^4} + y''(x) = 0$$

✓ **Mathematica** : cpu = 0.328637 (sec), leaf count = 192

$$\left\{\left\{y(x) \to -\frac{i(\cosh(c_1)+\sinh(c_1))(\cos(2(x+c_2)(\cosh(3c_1)+\sinh(3c_1)))+i\sin(2(x+c_2)(\cosh(3c_1)+\sinh(3c_1)\right.}{\cos(2(x+c_2)(\cosh(3c_1)+\sinh(3c_1)))+i\sin(2(x+c_2)(\cosh(3c_1)+\sinh(3c_1)))+1}\right.\right.$$

✓ **Maple** : cpu = 0.656 (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 = 0.16329 (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 = 0.255 (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 = 7.27348 (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 = 0.151 (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 = 2.29057 (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 = 0.951 (sec), leaf count = 125

$$\left\{y(x) = ODESolStruc\left(\frac{\_a}{\mathrm{e}^{-\left(\int \_b(\_a)\,\mathrm{d}\_a + \_C1\right)n}}, [\left\{\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a) = \left(-\_b(\_a)\, h\left(\_a, \frac{\_b(\_a)\,\_a\, n + 1}{\_b\,(\_a)}\right) + n\_a\,(\right.\right.\right.\right.$$

2.1661 ODE No. 1661

$$9y'(x)^4 + 8y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0644628 (sec), leaf count = 92

$$\left\{\left\{y(x)\to c_2-\frac{1}{3}\sqrt[3]{-\frac{1}{3}}(9x-8c_1)^{2/3}\right\},\left\{y(x)\to\frac{(9x-8c_1)^{2/3}}{3\sqrt[3]{3}}+c_2\right\},\left\{y(x)\to\frac{(-1)^{2/3}(9x-8c_1)^{2/3}}{3\sqrt[3]{3}}+c_2\right\}\right\}$$

✓ **Maple** : cpu = 0.307 (sec), leaf count = 51

$$\left\{y(x)=(x+\_C1)^{\frac{2}{3}}+\_C2, y(x)=\frac{-1+i\sqrt{3}}{2}(x+\_C1)^{\frac{2}{3}}+\_C2, y(x)=-\frac{1+i\sqrt{3}}{2}(x+\_C1)^{\frac{2}{3}}+\_C2\right\}$$

2.1662 ODE No. 1662

$$ay''(x) + cy(x) + h(y'(x)) = 0$$

✗ **Mathematica** : cpu = 0.831771 (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 = 0.589 (sec), leaf count = 56

$$\left\{y(x)=ODESolStruc\left(\_a,[\left\{\left(\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a)\right)\_b(\_a)+\frac{h(\_b(\_a))+c\_a}{a}=0\right\},\left\{\_a=y(x),\_b(\_a)=\frac{\mathrm{d}}{\mathrm{d}x}y\right.\right.\right.$$

2.1663 ODE No. 1663

$$-xy(x)^n + 2y'(x) + xy''(x) = 0$$

✗ **Mathematica** : cpu = 0.0232525 (sec), leaf count = 0 , could not solve

```
DSolve[-(x*y[x]^n) + 2*Derivative[1][y][x] + x*Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 1.118 (sec), leaf count = 125

$$\left\{y(x)=ODESolStruc\left(\_a\,\mathrm{e}^{\int\_b(\_a)\,\mathrm{d}\_a+\_C1},[\left\{\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a)=-\frac{\left(\_b(\_a)\,(n-1)^2\,\_a^n+2\,\_a\,(n-3)\,\_b(\_a\right.}{4}\right.\right.\right.$$

2.1664 ODE No. 1664

$$a x^m y(x)^n + 2y'(x) + x y''(x) = 0$$

✗ **Mathematica** : cpu = 0.16551 (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 = 4.555 (sec), leaf count = 155

$$\left\{ y(x) = ODESolStruc\left(\_a\, e^{\int \_b(\_a)\, d\_a + \_C1}, [\left\{ \frac{d}{d\_a}\_b(\_a) = \frac{\left(a\_b(\_a)\,(n-1)^2\,\_a^n + (\_a\,(m-n+2)\,\_b(\right.}{(m+1)}\right.\right.\right.$$

2.1665 ODE No. 1665

$$2y'(x) + x y''(x) + x e^{y(x)} = 0$$

✗ **Mathematica** : cpu = 0.0929852 (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 = 0.624 (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

$$a y'(x) + b x e^{y(x)} + x y''(x) = 0$$

✗ **Mathematica** : cpu = 0.240117 (sec), leaf count = 0 , could not solve

```
DSolve[b*E^y[x]*x + a*Derivative[1][y][x] + x*Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 1.125 (sec), leaf count = 93

$$\left\{ y(x) = ODESolStruc\left(\_a - 2\int \_b(\_a)\, d\_a - 2\,\_C1, [\left\{ \frac{d}{d\_a}\_b(\_a) = (b e^{-\_a} - 2\,a + 2)\,(\_b(\_a))^3 + (a - 1\right.\right.\right.$$

2.1667 ODE No. 1667

$$bx^{5-2a}e^{y(x)} + ay'(x) + xy''(x) = 0$$

✗ **Mathematica** : cpu = 0.29921 (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 = 1.446 (sec), leaf count = 121

$$\left\{y(x) = ODESolStruc\left((2\,a-6)\int \_b(\_a)\,\mathrm{d}\_a + 2\_C1\,a + \_a - 6\_C1, [\left\{\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a) = (b\mathrm{e}^{-\_a} + 2\,a^2 - 8\,a\right.\right.\right.$$

2.1668 ODE No. 1668

$$xy''(x) - (1-y(x))y'(x) = 0$$

✓ **Mathematica** : cpu = 0.0505709 (sec), leaf count = 60

$$\left\{\left\{y(x) \to 2 + \sqrt{2}\sqrt{2+c_1}\tanh\left(\frac{1}{2}\left(\sqrt{2}\sqrt{2+c_1}\log(x) - 2\sqrt{2}\sqrt{2+c_1}c_2\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.488 (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

$$-x^2y'(x)^2 + 2y'(x) + xy''(x) + y(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.417618 (sec), leaf count = 160

$$\text{Solve}\left[\int_1^{y(x)} -\frac{x}{e^{xK[1]}c_1 + 2xK[1] + 1}dK[1] - \int_1^x\left(\int_1^{y(x)}\left(\frac{\left(e^{K[1]K[2]}c_1K[1] + 2K[1]\right)K[2]}{\left(e^{K[1]K[2]}c_1 + 2K[1]K[2] + 1\right)^2} - \frac{1}{e^{K[1]K[2]}c_1 + 2K[1\right.\right.\right.$$

✓ **Maple** : cpu = 0.39 (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

$$a\left(xy'(x)-y(x)\right)^2-b+xy''(x)=0$$

✓ **Mathematica** : cpu = 6.63036 (sec), leaf count = 51

$$\left\{\left\{y(x)\to x\left(\int_1^x \frac{\sqrt{-\frac{b}{a}}\tan\left(c_1-a\sqrt{-\frac{b}{a}}K[2]\right)}{K[2]^2}dK[2]+c_2\right)\right\}\right\}$$

✓ **Maple** : cpu = 2.748 (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

$$y'(x)^3+y'(x)+2xy''(x)=0$$

✓ **Mathematica** : cpu = 0.096737 (sec), leaf count = 59

$$\left\{\left\{y(x)\to c_2-2ie^{c_1}\sqrt{-x+e^{2c_1}}\right\},\left\{y(x)\to 2ie^{c_1}\sqrt{-x+e^{2c_1}}+c_2\right\}\right\}$$

✓ **Maple** : cpu = 0.279 (sec), leaf count = 35

$$\left\{y(x)=-2\frac{\sqrt{\_C1\,x-1}}{\_C1}+\_C2,y(x)=2\frac{\sqrt{\_C1\,x-1}}{\_C1}+\_C2\right\}$$

2.1672 ODE No. 1672

$$x^2y''(x)-a(y(x)^n-y(x))=0$$

✗ **Mathematica** : cpu = 11.3946 (sec), leaf count = 0 , could not solve

```
DSolve[-(a*(-y[x] + y[x]^n)) + x^2*Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 1.104 (sec), leaf count = 65

$$\left\{y(x)=ODESolStruc\left(\_a,[\left\{\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a)=(\_b(\_a))^2\left(\_a\_b(\_a)\,a-\_b(\_a)\_a^na-1\right)\right\},\left\{\_a=y(x),\_$$

2.1673 ODE No. 1673

$$a\left(e^{y(x)}-1\right)+x^2y''(x)=0$$

✗ **Mathematica** : cpu = 25.3515 (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 = 0.859 (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 = 0.0390209 (sec), leaf count = 106

$$\left\{\left\{y(x)\to c_1 2^{-\frac{a}{b}}c^{a/b}\left(x^{2b}\right)^{\frac{a}{2b}}\cos\left(c\sqrt{x^{2b}}\right)+c_2 2^{-\frac{a+b}{b}}c^{\frac{a+b}{b}-1}\left(x^{2b}\right)^{\frac{a+b}{2b}-\frac{1}{2}}\sin\left(c\sqrt{x^{2b}}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.398 (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 = 1.30121 (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 = 0.290229 (sec), leaf count = 134

$$\left\{\left\{y(x)\to x\left(\int_1^x \frac{i\sqrt{a}\sqrt{b}Y_1\left(-i\sqrt{a}\sqrt{b}K[2]\right)-i\sqrt{a}\sqrt{b}J_1\left(i\sqrt{a}\sqrt{b}K[2]\right)c_1}{a\left(Y_0\left(-i\sqrt{a}\sqrt{b}K[2]\right)+J_0\left(i\sqrt{a}\sqrt{b}K[2]\right)c_1\right)K[2]}dK[2]+c_2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.504 (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 = 45.6468 (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 = 1.629 (sec), leaf count = 101

$$\left\{y(x)=ODESolStruc\left(\_a\,\mathrm{e}^{\int-\_b(\_a)\,\mathrm{d}\_a+\_C1},[\left\{\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a)=\left(\_a^3a+b\right)(\_b(\_a))^3+\left(2\_a^2a+1\right)(\_b(\_a))\right.\right.\right.$$

2.1678 ODE No. 1678

$$x^2y''(x)-\sqrt{ax^2y'(x)^2+by(x)^2}=0$$

✗ **Mathematica** : cpu = 0.855446 (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 = 0.931 (sec), leaf count = 60

$$\left\{y(x)-\mathrm{e}^{\int^{\ln(x)}RootOf\left(\int^{-Z}-y(x)\left(y(x)\_a^2-\_a\,y(x)-\sqrt{(y(x))^2(\_a^2a+b)}\right)^{-1}d\_a-\_b+\_C1\right)d\_b+\_C2}=0\right\}$$

2.1679 ODE No. 1679

$$\left(x^2+1\right)y''(x)+y'(x)^2+1=0$$

✓ **Mathematica** : cpu = 0.153014 (sec), leaf count = 33

$$\left\{\left\{y(x)\to -x\cot(c_1)+\csc^2(c_1)\log(-x\sin(c_1)-\cos(c_1))+c_2\right\}\right\}$$

✓ **Maple** : cpu = 0.33 (sec), leaf count = 27

$$\left\{y(x)=\frac{x}{\_C1}+\ln\left(\_C1\,x-1\right)+\frac{\ln\left(\_C1\,x-1\right)}{\_C1^2}+\_C2\right\}$$

2.1680 ODE No. 1680

$$x^4\left(-y'(x)^2\right)+4x^2y''(x)+4y(x)=0$$

✗ **Mathematica** : cpu = 6.89466 (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 = 0.75 (sec), leaf count = 103

$$\left\{y(x)=ODESolStruc\left(\frac{\_a}{\left(e^{\int \_b(\_a)\,d\_a+\_C1}\right)^2},[\left\{\frac{d}{d\_a}\_b(\_a)=\left(-\_a^2+7\_a\right)\left(\_b(\_a)\right)^3+\left(\_a-5\right)\left(\_b(\_a\right.\right.\right.$$

2.1681 ODE No. 1681

$$ay(x)^3+9x^2y''(x)+2y(x)=0$$

✗ **Mathematica** : cpu = 2.32423 (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 = 0.191 (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 = 21.8291 (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 = 1.024 (sec), leaf count = 94

$$\left\{ y(x) = ODESolStruc\left(\_a\,e^{\int -\_b(\_a)\,d\_a + \_C1}, [\left\{ \frac{d}{d\_a}\_b(\_a) = -((\_a^3 + \_a^2 - 14\_a - 24)\_b(\_a) + \_a - 3\right.\right.\right.$$

2.1683 ODE No. 1683

$$x^3y''(x) - a(xy'(x) - y(x))^2 = 0$$

✓ **Mathematica** : cpu = 0.0648178 (sec), leaf count = 26

$$\left\{ \left\{ y(x) \to -\frac{x\log\left(a\left(-\frac{c_1}{x} - c_2\right)\right)}{a} \right\} \right\}$$

✓ **Maple** : cpu = 0.351 (sec), leaf count = 23

$$\left\{ y(x) = -\frac{x}{a}\ln\left(\frac{a(\_C1\,x - \_C2)}{x}\right) \right\}$$

2.1684 ODE No. 1684

$$xy(x)\left(a - 2x^2y(x)^2 + 3xy(x)\right) + b + x^2(2xy(x) + 9)y'(x) + 2x^3y''(x) = 0$$

✗ **Mathematica** : cpu = 46.8498 (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 = 1.4 (sec), leaf count = 100

$$\left\{ y(x) = ODESolStruc\left(\_a\,e^{\int -\_b(\_a)\,d\_a + \_C1}, [\left\{ \frac{d}{d\_a}\_b(\_a) = \frac{(\_b(\_a))^2\left((-2\_a^3 + \_a^2 + (a-5)\_a + b)\right.}{2}\right.\right.\right.$$

2.1685 ODE No. 1685

$$axy(x)+b+2\left(4x^3-x^k\right)\left(y(x)y'(x)+y''(x)-y(x)^3\right)-\left(kx^{k-1}-12x^2\right)\left(3y'(x)+y(x)^2\right)=0$$

✗ **Mathematica** : cpu = 2.21707 (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 = 0.0222477 (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 = 1.418 (sec), leaf count = 128

$$\left\{y(x)=ODESolStruc\left(\_a\,e^{\int\_b(\_a)\,d\_a+\_C1},\left[\left\{\frac{d}{d\_a}\_b(\_a)=\frac{\left(a^2\_b(\_a)\,(n-1)^2\,\_a^n-2\,\_a\,(n-3)\,\_b(\_a\right.}{4}\right.\right.\right.$$

2.1687 ODE No. 1687

$$-x\left(x^2+2y(x)\right)y'(x)+x^4y''(x)+4y(x)^2=0$$

✓ **Mathematica** : cpu = 0.0665585 (sec), leaf count = 262

$$\left\{\left\{y(x)\to-\frac{x^3\left(i\left(\frac{i}{\sqrt{c_1}}-\frac{\sqrt{-1-c_1}}{\sqrt{c_1}}\right)\sqrt{c_1}c_2x^{-1+i\left(\frac{i}{\sqrt{c_1}}-\frac{\sqrt{-1-c_1}}{\sqrt{c_1}}\right)\sqrt{c_1}}+i\left(\frac{\sqrt{-1-c_1}}{\sqrt{c_1}}+\frac{i}{\sqrt{c_1}}\right)\sqrt{c_1}x^{-1+i\left(\frac{\sqrt{-1-c_1}}{\sqrt{c_1}}+\frac{i}{\sqrt{c_1}}\right)\sqrt{c}}\right.}{c_2x^{i\left(\frac{i}{\sqrt{c_1}}-\frac{\sqrt{-1-c_1}}{\sqrt{c_1}}\right)\sqrt{c_1}}+x^{i\left(\frac{\sqrt{-1-c_1}}{\sqrt{c_1}}+\frac{i}{\sqrt{c_1}}\right)\sqrt{c_1}}}\right.\right.$$

✓ **Maple** : cpu = 0.463 (sec), leaf count = 21

$$\left\{y(x)=x^2(\tanh(\_C1\,(\_C2-\ln(x)))\,\_C1+1)\right\}$$

2.1688 ODE No. 1688

$$-x^2y'(x)\left(y'(x)+x\right)+x^4y''(x)+4y(x)^2=0$$

✓ **Mathematica** : cpu = 0.488832 (sec), leaf count = 189

$$\text{Solve}\left[\int_1^{y(x)}\frac{1}{-e^{\frac{K[1]}{x^2}}c_1x^2+2x^2+4K[1]}dK[1]-\int_1^x\left(\frac{K[2]\left(e^{\frac{y(x)}{K[2]^2}}c_1+2\left(-\frac{y(x)}{K[2]^2}-1\right)\right)}{-e^{\frac{y(x)}{K[2]^2}}c_1K[2]^2+2K[2]^2+4y(x)}+\int_1^{y(x)}-\frac{\frac{2e^{\frac{K[1]}{K[2]^2}}c_1K[1]}{K[2]}}{\left(-e^{\frac{K[1]}{K[2]^2}}c_1K\right.}\right.\right.$$

✓ **Maple** : cpu = 0.376 (sec), leaf count = 32

$$\left\{y(x)=\mathit{RootOf}\left(-\ln(x)+\_C2-\int^{\_Z}\left(\mathrm{e}^{\_f}\_C1+4\_f+2\right)^{-1}d\_f\right)x^2\right\}$$

2.1689 ODE No. 1689

$$x^4y''(x)+\left(xy'(x)-y(x)\right)^3=0$$

✓ **Mathematica** : cpu = 0.246973 (sec), leaf count = 104

$$\left\{\left\{y(x)\to -ix\log\left(\frac{\frac{e^{c_2}}{x}-\frac{\sqrt{e^{2c_2}-8ic_1x^2}}{x}}{4c_1}\right)\right\},\left\{y(x)\to -ix\log\left(\frac{\frac{\sqrt{e^{2c_2}-8ic_1x^2}}{x}+\frac{e^{c_2}}{x}}{4c_1}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.367 (sec), leaf count = 37

$$\left\{y(x)=\left(-\arctan\left(\frac{1}{\sqrt{\_C1\,x^2-1}}\right)+\_C2\right)x,y(x)=\left(\arctan\left(\frac{1}{\sqrt{\_C1\,x^2-1}}\right)+\_C2\right)x\right\}$$

2.1690 ODE No. 1690

$$\sqrt{x}y''(x)-y(x)^{3/2}=0$$

✗ **Mathematica** : cpu = 21.7065 (sec), leaf count = 0 , could not solve

```
DSolve[-y[x]^(3/2) + Sqrt[x]*Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 3.892 (sec), leaf count = 99

$$\left\{y(x)=\mathit{ODESolStruc}\left(\frac{\_a}{\left(\mathrm{e}^{\int\_b(\_a)\,\mathrm{d}\_a+\_C1}\right)^3},[\left\{\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a)=-(\_b(\_a))^3\_a^{\frac{3}{2}}+12\,(\_b(\_a))^3\_a-7\,(\_b(\right.\right.\right.$$

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 = 60.6351 (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 = 1.861 (sec), leaf count = 254

$$\left\{ y(x) = RootOf\left(-2 \int^{\_Z} \frac{a}{\sqrt{4\_C1\, a^2 - 4\, c\_g^2 a + b^2\_g^2 + 8 \int F(\_g)\, \mathrm{d}\_g}} d\_g \sqrt{4\,ac-b^2} + \_C2\, \sqrt{4\,ac-b^2}\right.\right.$$

2.1692 ODE No. 1692

$$x^{\frac{n}{n+1}} y''(x) - y(x)^{\frac{2n+1}{n+1}} = 0$$

✗ **Mathematica** : cpu = 0.0540371 (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 = 17.604 (sec), leaf count = 156

$$\left\{ y(x) = ODESolStruc\left(\_a \left(\mathrm{e}^{\frac{(\int \_b(\_a)\, \mathrm{d}\_a + \_C1)(n+2)}{n}} \right)^{-1}, \left[\left\{ \frac{\mathrm{d}}{\mathrm{d}\_a} \_b(\_a) = 2\, \frac{(\_b(\_a))^2}{n^2} \left(-1/2\, \_a^{\frac{2\,n+1}{n+1}} \_b(\_a)\, n^2 \right.\right.\right.\right.$$

2.1693 ODE No. 1693

$$-h(y(x), f(x)y'(x)) + f(x)f'(x)y'(x) + f(x)^2 y''(x) = 0$$

✗ **Mathematica** : cpu = 0.473015 (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 = 0.342 (sec), leaf count = 68

$$\left\{ y(x) = ODESolStruc\left(\_a, \left[\left\{ \frac{\mathrm{d}}{\mathrm{d}\_a} \_b(\_a) = -h\left(\_a, (\_b(\_a))^{-1} \right) (\_b(\_a))^3 \right\}, \left\{ \_a = y(x), \_b(\_a) = \frac{}{f(x}\right.\right.\right.$$

2.1694 ODE No. 1694

$$y(x)y''(x) - a = 0$$

✓ **Mathematica** : cpu = 0.118923 (sec), leaf count = 115

$$\left\{\left\{y(x)\to \exp\left(\frac{-2a\text{erf}^{-1}\left(-i\sqrt{\frac{2}{\pi}}\sqrt{ae^{\frac{c_1}{a}}(x+c_2)^2}\right)^2-c_1}{2a}\right)\right\},\left\{y(x)\to \exp\left(\frac{-2a\text{erf}^{-1}\left(i\sqrt{\frac{2}{\pi}}\sqrt{ae^{\frac{c_1}{a}}(x+c_2)\right.$$

✓ **Maple** : cpu = 0.697 (sec), leaf count = 54

$$\left\{\int^{y(x)}\frac{1}{\sqrt{2\,a\ln(\_a)-2\,\_C1\,a}}d\_a-x-\_C2=0,\int^{y(x)}-\frac{1}{\sqrt{-2\,a\,(\_C1-\ln(\_a))}}d\_a-x-\_C2=0\right\}$$

2.1695 ODE No. 1695

$$y(x)y''(x) - ax = 0$$

✗ **Mathematica** : cpu = 18.0051 (sec), leaf count = 0 , could not solve

```
DSolve[-(a*x) + y[x]*Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 0.86 (sec), leaf count = 103

$$\left\{y(x)=ODESolStruc\left(\_a\left(e^{\int\_b(\_a)\,d\_a+\_C1}\right)^{\frac{3}{2}},[\left\{\frac{d}{d\_a}\_b(\_a)=\frac{(3\,\_a^2-4\,a)\,(\_b(\_a))^3}{4\,\_a}+2\,(\_b(\_a))^2\right\},\right.$$

2.1696 ODE No. 1696

$$y(x)y''(x) - ax^2 = 0$$

✗ **Mathematica** : cpu = 16.6997 (sec), leaf count = 0 , could not solve

```
DSolve[-(a*x^2) + y[x]*Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 0.68 (sec), leaf count = 100

$$\left\{y(x)=ODESolStruc\left(\_a\left(e^{\int\_b(\_a)\,d\_a+\_C1}\right)^{2},[\left\{\frac{d}{d\_a}\_b(\_a)=\frac{(2\,\_a^2-a)\,(\_b(\_a))^3}{\_a}+3\,(\_b(\_a))^2\right\},\left\{\right.\right.$$

2.1697 ODE No. 1697

$$-a + y'(x)^2 + y(x)y''(x) = 0$$

✓ **Mathematica** : cpu = 0.16745 (sec), leaf count = 94

$$\left\{\left\{y(x) \to -\frac{\sqrt{a^2x^2 + 2a^2c_2x + a^2c_2{}^2 - e^{2c_1}}}{\sqrt{a}}\right\}, \left\{y(x) \to \frac{\sqrt{a^2x^2 + 2a^2c_2x + a^2c_2{}^2 - e^{2c_1}}}{\sqrt{a}}\right\}\right\}$$

✓ **Maple** : cpu = 0.188 (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

$$-ax - b + y'(x)^2 + y(x)y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0290094 (sec), leaf count = 72

$$\left\{\left\{y(x) \to -\frac{\sqrt{ax^3 + 3bx^2 + 3c_2x + 6c_1}}{\sqrt{3}}\right\}, \left\{y(x) \to \frac{\sqrt{ax^3 + 3bx^2 + 3c_2x + 6c_1}}{\sqrt{3}}\right\}\right\}$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(diff(y(x),x),x)*y(x)+y(x)^2-a*x-b=0,y(x))
```

2.1699 ODE No. 1699

$$y'(x)^2 - y'(x) + y(x)y''(x) = 0$$

✓ **Mathematica** : cpu = 0.109502 (sec), leaf count = 40

$$\left\{\left\{y(x) \to c_1\left(-W\left(-\frac{e^{-\frac{x}{c_1}-1-\frac{c_2}{c_1}}}{c_1}\right)\right) - c_1\right\}\right\}$$

✓ **Maple** : cpu = 0.405 (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

$$-y'(x)^2 + y(x)y''(x) + 1 = 0$$

✓ **Mathematica** : cpu = 0.15393 (sec), leaf count = 44

$$\left\{\left\{y(x) \to -e^{-c_1} \sinh\left(e^{c_1}(x+c_2)\right)\right\}, \left\{y(x) \to e^{-c_1} \sinh\left(e^{c_1}(x+c_2)\right)\right\}\right\}$$

✓ **Maple** : cpu = 2.933 (sec), leaf count = 86

$$\left\{y(x) = \frac{1}{2}\left(-\_C1\left(e^{\frac{x}{\_C1}}\right)^2\left(e^{\frac{\_C2}{\_C1}}\right)^2 + \_C1\right)\left(e^{\frac{\_C2}{\_C1}}\right)^{-1}\left(e^{\frac{x}{\_C1}}\right)^{-1}, y(x) = \frac{1}{2}\left(\_C1\left(e^{\frac{x}{\_C1}}\right)^2\left(e^{\frac{\_C2}{\_C1}}\right)^2 - \_C1\right)\right.$$

2.1701 ODE No. 1701

$$-y'(x)^2 + y(x)y''(x) - 1 = 0$$

✓ **Mathematica** : cpu = 0.184532 (sec), leaf count = 80

$$\left\{\left\{y(x) \to -\frac{e^{-c_1}\tanh\left(e^{c_1}(x+c_2)\right)}{\sqrt{-1+\tanh^2\left(e^{c_1}(x+c_2)\right)}}\right\}, \left\{y(x) \to \frac{e^{-c_1}\tanh\left(e^{c_1}(x+c_2)\right)}{\sqrt{-1+\tanh^2\left(e^{c_1}(x+c_2)\right)}}\right\}\right\}$$

✓ **Maple** : cpu = 1.773 (sec), leaf count = 42

$$\left\{y(x) = \frac{\_C1}{2}\left(\left(e^{\frac{\_C2}{\_C1}}\right)^2\left(e^{\frac{x}{\_C1}}\right)^2 + 1\right)\left(e^{\frac{\_C2}{\_C1}}\right)^{-1}\left(e^{\frac{x}{\_C1}}\right)^{-1}\right\}$$

2.1702 ODE No. 1702

$$e^{2x}\left(ay(x)^4 + b\right) + e^x y(x)\left(cy(x)^2 + d\right) - y'(x)^2 + y(x)y''(x) = 0$$

✗ **Mathematica** : cpu = 0.919242 (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

$$-y'(x)^2 + y(x)y''(x) + y(x)^2(-\log(y(x))) = 0$$

✓ **Mathematica** : cpu = 0.335411 (sec), leaf count = 77

$$\left\{\left\{y(x) \to \exp\left(-\frac{1}{2}\sqrt{c_1}e^{-x-c_2}\left(-1+e^{2x+2c_2}\right)\right)\right\}, \left\{y(x) \to \exp\left(\frac{1}{2}\sqrt{c_1}e^{-x-c_2}\left(-1+e^{2x+2c_2}\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.338 (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

$$y(x)^2\left(\frac{f''(x)}{f(x)} - \frac{f'(x)^2}{f(x)^2}\right) + f(x)y(x)^3 - y'(x)^2 - y'(x) + y(x)y''(x) = 0$$

✗ **Mathematica** : cpu = 16.171 (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

$$-y(x)f'(x) + f(x)y'(x) - y'(x)^2 + y(x)y''(x) - y(x)^3 = 0$$

✓ **Mathematica** : cpu = 0.263307 (sec), leaf count = 252

$$\left\{\left\{y(x) \to -\frac{\exp\left(c_2 - \int_1^x \frac{y(K[2])^3 + c_1{}^2 y(K[2])^2 + \int_1^{K[2]} \frac{-y(K[1])^3 - f'(K[1])y(K[1]) + f(K[1])y'(K[1])}{y(K[1])^2} dK[1]^2 y(K[2])^2 + 2c_1 \int_1^{K[2]} \frac{-y(K[1])^3}{\ldots}}{y(K[2])^2\left(c_1 + \int_1^{K[2]} \frac{-y(K[1])^3 - f'(K[1])y(K[1]) + \ldots}{y(K[1])^2}\ldots\right.}\right.}{\int_1^x \frac{-y(K[1])^3 - f'(K[1])y(K[1]) + f(K[1])y'(K[1\ldots}{y(K[1])^2}}\right.\right.$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(diff(y(x),x),x)*y(x)-diff(y(x),x)^2+f(x)*diff(y(x),x)-diff(f(x),x)*y(x)-
y(x)^3=0,y(x))
```

2.1706 ODE No. 1706

$$f'(x)y'(x) - y(x)f''(x) + f(x)y(x)^3 - y'(x)^2 + y(x)y''(x) - y(x)^4 = 0$$

✓ **Mathematica** : cpu = 0.478857 (sec), leaf count = 308

$$\left\{\left\{y(x) \to -\frac{\exp\left(c_2 - \int_1^x \frac{y(K[2])^4 - f(K[2])y(K[2])^3 + c_1{}^2 y(K[2])^2 + \int_1^{K[2]} \frac{-y(K[1])^4 + f(K[1])y(K[1])^3 - f''(K[1])y(K[1]) + f'(K[1])y'(K[1])}{y(K[1])^2} d}{y(K[2])^2\left(c_1 + \int_1^{K[2]} \frac{-y(K[1])}{}\right.}\right.}{\int_1^x \frac{-y(K[1])^4 + f(K[1])y(K[1])}{}}\right.\right.$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(diff(y(x),x),x)*y(x)-diff(y(x),x)^2+diff(f(x),x)*diff(y(x),x)-diff(diff(f(x),x),
y(x)^4=0,y(x))
```

2.1707 ODE No. 1707

$$ay(x)y'(x) + by(x)^2 - y'(x)^2 + y(x)y''(x) = 0$$

✓ **Mathematica** : cpu = 0.056421 (sec), leaf count = 31

$$\left\{\left\{y(x) \to c_2 e^{-\frac{bx}{a} - \frac{c_1 e^{-ax}}{a}}\right\}\right\}$$

✓ **Maple** : cpu = 0.421 (sec), leaf count = 39

$$\left\{y(x) = \mathrm{e}^{\frac{\mathrm{e}^{-ax}\_C1}{a}} \mathrm{e}^{\frac{b}{a^2}} \left(\mathrm{e}^{\frac{bx}{a}}\right)^{-1} \left(\mathrm{e}^{\frac{\_C2}{a}}\right)^{-1}\right\}$$

2.1708 ODE No. 1708

$$ay(x)y'(x) - 2ay(x)^2 + by(x)^3 - y'(x)^2 + y(x)y''(x) = 0$$

✗ **Mathematica** : cpu = 42.8575 (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 = 1.116 (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

$$2a^2y(x)^2 - (ay(x) - 1)y'(x) + ay(x) - 2b^2y(x)^3 - y'(x)^2 + y(x)y''(x) = 0$$

✗ **Mathematica** : cpu = 53.4074 (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 = 1.759 (sec), leaf count = 84

$$\left\{y(x) = ODESolStruc\left(\_a, [\left\{\left(\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a)\right)\_b(\_a) - \frac{2\_a^3b^2 - 2\_a^2a^2 + \_a\_b(\_a)\,a + (\_b(\_a))^2 - \_a}{\_a}\right.\right.\right.$$

2.1710 ODE No. 1710

$$-y(x)(y(x)+1)\left(b^2y(x)^2 - a^2\right) + (ay(x) - 1)y'(x) - y'(x)^2 + y(x)y''(x) = 0$$

✗ **Mathematica** : cpu = 90.4827 (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 = 2.37 (sec), leaf count = 91

$$\left\{y(x) = ODESolStruc\left(\_a, [\left\{\left(\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a)\right)\_b(\_a) - \frac{\_a^4b^2 + \_a^3b^2 - \_a^2a^2 - \_a\_b(\_a)\,a - \_a\,a^2 + (\_}{\_a}\right.\right.\right.$$

2.1711 ODE No. 1711

$$y(x)^2\log(y(x))\left(\cos^2(x) - n^2\cot^2(x)\right) - y'(x)^2 + y(x)y'(x)(\tan(x) + \cot(x)) + y(x)y''(x) = 0$$

✓ **Mathematica** : cpu = 22.1376 (sec), leaf count = 9987

$$\left\{\left\{y(x) \to \frac{(-1)^{1-n}}{c_1 + \int_1^x \frac{(-1)^{1-n}2^{n-2}(\cos^2(K[1])-1)^{-\frac{n}{2}-\frac{1}{2}}\sec(K[1])\left(12\sqrt{2}n^2K_n\left(\sqrt{\cos^2(K[1])-1}\right)\cos^3(K[1])\log(y(K[1]))y(K[1])(2\cos^2(K}{}}\right.\right.$$

✓ **Maple** : cpu = 1.574 (sec), leaf count = 81

$$\left\{y(x)=\mathrm{e}^{\frac{J_n(\sin(x))\_C1}{\sin(x)\left(J_{n+1}(\sin(x))Y_n(\sin(x))-J_n(\sin(x))Y_{n+1}(\sin(x))\right)}}\left(\mathrm{e}^{\frac{Y_n(\sin(x))\_C2}{\sin(x)\left(J_{n+1}(\sin(x))Y_n(\sin(x))-J_n(\sin(x))Y_{n+1}(\sin(x))\right)}}\right)^{-1}\right\}$$

2.1712 ODE No. 1712

$$-f(x)y(x)y'(x)-g(x)y(x)^2-y'(x)^2+y(x)y''(x)=0$$

✓ **Mathematica** : cpu = 0.0587175 (sec), leaf count = 75

$$\left\{\left\{y(x)\to c_2\exp\left(\int_1^x\left(\exp\left(\int_1^{K[3]}f(K[1])dK[1]\right)c_1+\exp\left(\int_1^{K[3]}f(K[1])dK[1]\right)\int_1^{K[3]}\exp\left(-\int_1^{K[2]}f(K[\right.\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.399 (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

$$-y(x)\left(g'(x)-y(x)^2f'(x)\right)+y'(x)\left(f(x)y(x)^2+g(x)\right)-y'(x)^2+y(x)y''(x)=0$$

✗ **Mathematica** : cpu = 20.7906 (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 = 0.546 (sec), leaf count = 54

$$\left\{y(x)=ODESolStruc\left(\_b(\_a),[\left\{\frac{f(\_a)(\_b(\_a))^2+\_b(\_a)\_C1+\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a)-g(\_a)}{\_b(\_a)}=0\right\},\{\_a=x,\_\right.\right.$$

2.1714 ODE No. 1714

$$3y(x)y'(x) - 3y'(x)^2 + y(x)y''(x) - y(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.120968 (sec), leaf count = 25

$$\left\{\left\{y(x) \to \frac{c_2 e^x}{\sqrt{1 - 2e^{x+c_1}}}\right\}\right\}$$

✓ **Maple** : cpu = 0.403 (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 = 0.107333 (sec), leaf count = 26

$$\left\{\left\{y(x) \to c_2(-ax + x - c_1)^{\frac{1}{1-a}}\right\}\right\}$$

✓ **Maple** : cpu = 0.37 (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 = 0.525633 (sec), leaf count = 172

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[-\frac{\#1\sqrt{1 - e^{2c_1}\#1^{-2a}}\,{}_2F_1\left(\frac{1}{2}, -\frac{1}{2a}; 1 - \frac{1}{2a}; e^{2c_1}\#1^{-2a}\right)}{\sqrt{-1 + e^{2c_1}\#1^{-2a}}}\&\right][x + c_2]\right\}, \left\{y(x) \to \text{Invers}\right.$$

✓ **Maple** : cpu = 1.245 (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 = 50.9877 (sec), leaf count = 0 , could not solve

```
DSolve[b*y[x]^3 + a*Derivative[1][y][x]^2 + y[x]*Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 1.371 (sec), leaf count = 107

$$\left\{\int^{y(x)} \_a^{2a}(2a+3)\frac{1}{\sqrt{-\_a^{2a}(2a+3)(2\_a^{2a+3}b-\_C1)}}d\_a - x - \_C2 = 0, \int^{y(x)} (-2a-3)\_a^{2a}\frac{}{\sqrt{-\_a^{2}}}$$

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 = 1.17329 (sec), leaf count = 744

$$\left\{\left\{y(x) \to \left(-\frac{ad\exp\left(\frac{1}{2}x\left(\sqrt{-4ac+b^2-4c}+b\right)-\frac{x\left(b\sqrt{-4ac+b^2-4c}-4(a+1)c+b^2\right)}{\sqrt{-4ac+b^2-4c}+b}-\frac{2(a+1)cx}{\sqrt{-4ac+b^2-4c}+b}\right)}{(a+1)c} - \frac{d\exp\left(\frac{1}{2}\right.}{}\right.\right.\right.$$

✓ **Maple** : cpu = 0.972 (sec), leaf count = 133

$$\left\{y(x) = e^{-\frac{x}{2a+2}\sqrt{(-4a-4)c+b^2}}e^{-\frac{bx}{2a+2}}\left(((-4a-4)c^3+b^2c^2)\left(de^{\frac{x}{2}\left(b+\sqrt{(-4a-4)c+b^2}\right)}\sqrt{(-4a-4)c+b^2} + \left(e^{x\sqrt{(-}}\right.\right.\right.\right.$$

2.1719 ODE No. 1719

$$ay'(x)^2 + f(x)y(x)y'(x) + g(x)y(x)^2 + y(x)y''(x) = 0$$

✗ **Mathematica** : cpu = 41.8363 (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 = 0.844 (sec), leaf count = 70

$$\left\{y(x) = ODESolStruc\left(e^{\int -\_b(\_a)\,d\_a + \_C1}, [\left\{\frac{d}{d\_a}\_b(\_a) = (-a-1)(\_b(\_a))^2 - f(\_a)\_b(\_a) - g(\_a)\right\}, \left\{\right.\right.\right.$$

2.1720 ODE No. 1720

$$ay'(x)^2 + by(x)^2y'(x) + cy(x)^4 + y(x)y''(x) = 0$$

✗ **Mathematica** : cpu = 195.722 (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 = 2.924 (sec), leaf count = 173

$$\left\{\int^{y(x)}(2\,a+4)\left(\tan\left(\mathit{RootOf}\left(2\_Z\_a^2b - 2\,a\ln(\_a)\sqrt{4\_a^4ac - \_a^4b^2 + 8\,c\_a^4} - \sqrt{4\_a^4ac - \_a^4b^2 + 8\right.\right.\right.\right.$$

2.1721 ODE No. 1721

$$-\frac{ay(x)^3f'(x)}{a+2} + \frac{af(x)^2y(x)^4}{(a+2)^2} - \frac{(a-1)y'(x)^2}{a} - f(x)y(x)^2y'(x) + y(x)y''(x) = 0$$

✗ **Mathematica** : cpu = 20.9908 (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

$$-2ay(x)\left(y'(x)^2+1\right)^{3/2} - y'(x)^2 + y(x)y''(x) - 1 = 0$$

✓ **Mathematica** : cpu = 1.36425 (sec), leaf count = 697

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[-\frac{\sqrt{1-\frac{2\#1^2a^2}{-2ac_1+\sqrt{1-4ac_1}+1}}\sqrt{1+\frac{2\#1^2a^2}{2ac_1+\sqrt{1-4ac_1}-1}}\left(\left(-2ac_1+\sqrt{1-4ac_1}+1\right)E\left(i\sinh\right.\right.}{2\surd}\right.\right.\right.$$

✓ **Maple** : cpu = 0.666 (sec), leaf count = 98

$$\left\{\int^{y(x)}(\_a^2a+\_C1)\frac{1}{\sqrt{-\_a^4a^2-2\_C1\_a^2a-\_C1^2+\_a^2}}d\_a - x - \_C2 = 0, \int^{y(x)} -(\_a^2a+\_C1)\frac{}{\sqrt{-}}\right.$$

2.1723 ODE No. 1723

$$y'(x)^2 - y'(x) + (y(x) + x)y''(x) = 0$$

✓ **Mathematica** : cpu = 0.732908 (sec), leaf count = 130

$$\left\{\left\{y(x) \to \frac{1}{2}\left(2x - \sqrt{2}e^{-2c_1}\sqrt{4e^{3c_1}x + e^{2c_1} + 4e^{3c_1}c_2} + e^{-c_1} + 4c_2\right)\right\}, \left\{y(x) \to \frac{1}{2}\left(2x + \sqrt{2}e^{-2c_1}\sqrt{4e^{3c_1}x + e^{2c_1}\right.\right.\right.$$

✓ **Maple** : cpu = 0.384 (sec), leaf count = 16

$$\left\{y(x) = \sqrt{2\,x + \_C1}\,\_C2 + \_C1 + x\right\}$$

2.1724 ODE No. 1724

$$2y'(x)\left(y'(x) + 1\right) + (x - y(x))y''(x) = 0$$

✓ **Mathematica** : cpu = 0.339227 (sec), leaf count = 38

$$\left\{\left\{y(x) \to -\frac{e^{-c_1}\left(e^{c_1}c_2x + 1 + e^{c_1}c_2^2\right)}{x + c_2}\right\}\right\}$$

✓ **Maple** : cpu = 3.693 (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 = 1.7203 (sec), leaf count = 75

$$\left\{\left\{y(x) \to -\sqrt{-x^2 - 2c_2x + e^{2c_1} - c_2^2} - c_2\right\}, \left\{y(x) \to \sqrt{-x^2 - 2c_2x + e^{2c_1} - c_2^2} - c_2\right\}\right\}$$

✓ **Maple** : cpu = 3.479 (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

$$(x - y(x))y''(x) - h(y'(x)) = 0$$

✓ **Mathematica** : cpu = 0.274627 (sec), leaf count = 77

$$\text{Solve}\left[\left\{x = \int \frac{\exp\left(-\int_1^{\text{K\$10744129}} \frac{K[3]-1}{h(K[3])} dK[3] - c_1\right)}{h(\text{K\$10744129})} d\text{K\$10744129} + c_2, y(x) = x - \exp\left(-\int_1^{\text{K\$10744129}} \frac{K[3] -}{h(K[3}\right.\right.\right.$$

✓ **Maple** : cpu = 0.449 (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

$$y'(x)^2 + 2y(x)y''(x) + 1 = 0$$

✓ **Mathematica** : cpu = 0.346165 (sec), leaf count = 166

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[-\frac{\sqrt{\#1}(\#1 - e^{2c_1}) + e^{3c_1}\sqrt{1 - \#1e^{-2c_1}} \sin^{-1}\left(\sqrt{\#1}e^{-c_1}\right)}{\sqrt{-\#1 + e^{2c_1}}}\&\right][x + c_2]\right\}, \left\{y(x) \to \text{I}\right.\right.$$

✓ **Maple** : cpu = 1.069 (sec), leaf count = 823

$$\left\{y(x) = \frac{\tan\left(RootOf\left((\tan(\_Z))^2 \_C1^2 \_Z^2 - 4(\tan(\_Z))^2 \_C1 \_C2 \_Z - 4(\tan(\_Z))^2 \_C1 x \_Z + 4(\tan\right.\right.}{}\right.$$

2.1728 ODE No. 1728

$$a - y'(x)^2 + 2y(x)y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0043131 (sec), leaf count = 31

$$\left\{\left\{y(x) \to \frac{x^2(-a + c_1^2)}{4c_2} + c_1x + c_2\right\}\right\}$$

✓ **Maple** : cpu = 0.191 (sec), leaf count = 24

$$\left\{y(x) = \frac{(\_C1^2 - a)x^2}{4\_C2} + \_C1 x + \_C2\right\}$$

2.1729 ODE No. 1729

$$a + f(x)y(x)^2 - y'(x)^2 + 2y(x)y''(x) = 0$$

✗ **Mathematica** : cpu = 0.0162609 (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

$$-y'(x)^2 + 2y(x)y''(x) - 8y(x)^3 = 0$$

✓ **Mathematica** : cpu = 0.740425 (sec), leaf count = 135

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[-\frac{2\sqrt{\#1}\sqrt{1+\frac{4\#1^2}{c_1}}\,{}_2F_1\left(\frac{1}{4},\frac{1}{2};\frac{5}{4};-\frac{4\#1^2}{c_1}\right)}{\sqrt{4\#1^2+c_1}}\&\right][x+c_2]\right\},\left\{y(x) \to \text{InverseFunction}\right.\right.$$

✓ **Maple** : cpu = 0.257 (sec), leaf count = 53

$$\left\{\int^{y(x)} \frac{1}{\sqrt{4\_a^3 + \_a\_C1}} d\_a - x - \_C2 = 0, \int^{y(x)} -\frac{1}{\sqrt{4\_a^3 + \_a\_C1}} d\_a - x - \_C2 = 0\right\}$$

2.1731 ODE No. 1731

$$-y'(x)^2 + 2y(x)y''(x) - 8y(x)^3 - 4y(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.968186 (sec), leaf count = 351

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[-\frac{i\#1\sqrt{4+\frac{2c_1}{\#1-\#1\sqrt{1-c_1}}}\sqrt{2+\frac{c_1}{\#1+\#1\sqrt{1-c_1}}}F\left(i\sinh^{-1}\left(\frac{\sqrt{\frac{c_1}{2\sqrt{1-c_1}+2}}}{\sqrt{\#1}}\right)|\frac{\sqrt{1-c_1}+1}{1-\sqrt{1-c_1}}\right)}{\sqrt{\frac{c_1}{1+\sqrt{1-c_1}}}\sqrt{4\#1^2+4\#1+c_1}}\&\right.\right.\right.$$

✓ **Maple** : cpu = 0.182 (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

$$-y'(x)^2+2y(x)y''(x)-4(2y(x)+x)y(x)^2=0$$

✗ **Mathematica** : cpu = 0.885579 (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

$$y(x)^2(ay(x)+b)-y'(x)^2+2y(x)y''(x)=0$$

✓ **Mathematica** : cpu = 1.82484 (sec), leaf count = 437

$$\left\{\left\{y(x)\to \text{InverseFunction}\left[-\frac{i\sqrt{2}\#1^{3/2}\sqrt{2+\frac{4c_1}{\#1\left(-b+\sqrt{b^2+2ac_1}\right)}}\sqrt{1-\frac{2c_1}{\#1\left(b+\sqrt{b^2+2ac_1}\right)}}F\left(i\sinh^{-1}\left(\frac{\sqrt{2}\sqrt{\frac{c_1}{\sqrt{b^2+2ac}}}}{\sqrt{\#1}}\right.\right.}{\sqrt{\frac{c_1}{-b+\sqrt{b^2+2ac_1}}}\sqrt{-\#1\left(\#1^2a+2\#1b-2c_1\right)}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.214 (sec), leaf count = 71

$$\left\{\int^{y(x)}-2\frac{1}{\sqrt{-2\_a^3a-4b\_a^2+4\_a\_C1}}d\_a-x-\_C2=0,\int^{y(x)}2\frac{1}{\sqrt{-2\_a^3a-4b\_a^2+4\_a\_C1}}d\_a-\right.$$

2.1734 ODE No. 1734

$$ay(x)^3-y'(x)^2+2y(x)y''(x)+2xy(x)^2+1=0$$

✗ **Mathematica** : cpu = 1.20674 (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

$$y(x)^2(ay(x)+bx)-y'(x)^2+2y(x)y''(x)=0$$

✗ **Mathematica** : cpu = 0.734044 (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

$$-y'(x)^2+2y(x)y''(x)-3y(x)^4=0$$

✓ **Mathematica** : cpu = 6.28481 (sec), leaf count = 129

$$\left\{\left\{y(x)\to \text{InverseFunction}\left[-\frac{2\sqrt{\#1}\sqrt{1+\frac{\#1^3}{c_1}}\,{}_2F_1\left(\frac{1}{6},\frac{1}{2};\frac{7}{6};-\frac{\#1^3}{c_1}\right)}{\sqrt{\#1^3+c_1}}\&\right][x+c_2]\right\},\left\{y(x)\to \text{InverseFunction}\left[\frac{2}{-}\right.\right.$$

✓ **Maple** : cpu = 0.291 (sec), leaf count = 49

$$\left\{\int^{y(x)}\frac{1}{\sqrt{\_a^4+\_a\_C1}}d\_a-x-\_C2=0,\int^{y(x)}-\frac{1}{\sqrt{\_a^4+\_a\_C1}}d\_a-x-\_C2=0\right\}$$

2.1737 ODE No. 1737

$$-4\left(a+x^2\right)y(x)^2+b-y'(x)^2+2y(x)y''(x)-3y(x)^4-8xy(x)^3=0$$

✗ **Mathematica** : cpu = 20.6011 (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

$$2y(x)^2\left(f'(x)+f(x)^2\right)+3f(x)y(x)y'(x)-y'(x)^2+2y(x)y''(x)-8y(x)^3=0$$

✗ **Mathematica** : cpu = 0.437387 (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

$$f(x)y(x)^2+4y(x)^2y'(x)-y'(x)^2+2y(x)y''(x)+y(x)^4+1=0$$

✗ **Mathematica** : cpu = 0.0377139 (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 = 0.0894715 (sec), leaf count = 16

$$\left\{\left\{y(x)\to\frac{c_2}{(x+2c_1)^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.23 (sec), leaf count = 13

$$\left\{y(x)=4\left(\_C1\,x+\_C2\right)^{-2}\right\}$$

2.1741 ODE No. 1741

$$-3y'(x)^2 + 2y(x)y''(x) - 4y(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.104442 (sec), leaf count = 17

$$\{\{y(x) \to c_2 \sec^2(x + 2c_1)\}\}$$

✓ **Maple** : cpu = 0.393 (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

$$f(x)y(x)^2 - 3y'(x)^2 + 2y(x)y''(x) = 0$$

✗ **Mathematica** : cpu = 7.12596 (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 = 0.317 (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

$$y(x)^2\left(ay(x)^3 + 1\right) - 6y'(x)^2 + 2y(x)y''(x) = 0$$

✓ **Mathematica** : cpu = 17.7875 (sec), leaf count = 2761

$$\left\{\text{Solve}\left[-\frac{4\left(F\left(\sin^{-1}\left(\sqrt{\frac{(\text{Root}[4c_1\#1^4+4a\#1^3+1\&,2]-\text{Root}[4c_1\#1^4+4a\#1^3+1\&,4])(y(x)-\text{Root}[4c_1\#1^4+4a\#1^3+1\&,1])}{(\text{Root}[4c_1\#1^4+4a\#1^3+1\&,1]-\text{Root}[4c_1\#1^4+4a\#1^3+1\&,4])(y(x)-\text{Root}[4c_1\#1^4+4a\#1^3+1\&,2])}}\right)\right| -\right.\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.219 (sec), leaf count = 71

$$\left\{\int^{y(x)} -2\frac{1}{\sqrt{4\_C1\,\_a^4 + 4\_a^3a + 1}\,\_a}d\_a - x - \_C2 = 0, \int^{y(x)} 2\frac{1}{\sqrt{4\_C1\,\_a^4 + 4\_a^3a + 1}\,\_a}d\_a - x - \right.$$

2.1744 ODE No. 1744

$$2y(x)y''(x) - y'(x)^2 \left(y'(x)^2 + 1\right) = 0$$

✓ **Mathematica** : cpu = 0.532516 (sec), leaf count = 155

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[-ie^{-c_1}\sqrt{-1+\#1e^{2c_1}}\left(\sqrt{\#1} + \frac{e^{-c_1}\sin^{-1}\left(\sqrt{\#1}e^{c_1}\right)}{\sqrt{1-\#1e^{2c_1}}}\right)\&\right][x+c_2]\right\}, \left\{y(x) \to \text{Inve}\right.\right.$$

✓ **Maple** : cpu = 1.03 (sec), leaf count = 823

$$\left\{y(x) = \frac{\tan\left(\mathit{RootOf}\left((\tan(\_Z))^2 \_C1^2 \_Z^2 - 4(\tan(\_Z))^2 \_C1 \_C2 \_Z - 4(\tan(\_Z))^2 \_C1\, x \_Z + 4(\tan\right.\right.}{}\right.$$

2.1745 ODE No. 1745

$$2(y(x) - a)y''(x) + y'(x)^2 + 1 = 0$$

✓ **Mathematica** : cpu = 0.668804 (sec), leaf count = 251

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[-\frac{2\sqrt{a-\#1}\left(2\#1 - 2a + e^{2c_1}\right) - \sqrt{2}e^{3c_1}\sqrt{e^{-2c_1}\left(2\#1 - 2a + e^{2c_1}\right)}\sin^{-1}\left(\sqrt{2}e^{-c_1}\sqrt{a}\right.}{2\sqrt{2}\sqrt{2\#1 - 2a + e^{2c_1}}}\right.\right.\right.$$

✓ **Maple** : cpu = 1.424 (sec), leaf count = 117

$$\left\{-\frac{\_C1}{2}\arctan\left(\left(y(x) - a - \frac{\_C1}{2}\right)\frac{1}{\sqrt{-(-y(x)+a)(a+\_C1-y(x))}}\right) - x - \_C2 + \sqrt{-(-y(x)+a)(a}\right.$$

2.1746 ODE No. 1746

$$-ax^2 - bx - c - 2y'(x)^2 + 3y(x)y''(x) = 0$$

✗ **Mathematica** : cpu = 0.0278308 (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 = 1.181 (sec), leaf count = 207

$$\left\{y(x) = \mathit{RootOf}\left(-2\arctan\left(\frac{2\,ax+b}{\sqrt{4\,ac-b^2}}\right)b - 2\int^{\_Z}\frac{b}{\sqrt{4\_f^{4/3}\_C1\, b^2 - 36\, c\_f^2 a + 9\, b^2 \_f^2 - 2}}d\_f\sqrt{4\,ac-}\right.\right.$$

2.1747 ODE No. 1747

$$3y(x)y''(x) - 5y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.0908726 (sec), leaf count = 20

$$\left\{\left\{y(x)\to \frac{c_2}{(2x+3c_1)^{3/2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.089 (sec), leaf count = 17

$$\left\{-\frac{3}{2}(y(x))^{-\frac{2}{3}} - \_C1\, x - \_C2 = 0\right\}$$

2.1748 ODE No. 1748

$$-3y'(x)^2 + 4y(x)y''(x) + 4y(x) = 0$$

✓ **Mathematica** : cpu = 0.210291 (sec), leaf count = 43

$$\left\{\left\{y(x)\to \frac{\left({c_1}^2x^2 + 2c_2{c_1}^2x - 64 + {c_2}^2{c_1}^2\right)^2}{256{c_1}^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.538 (sec), leaf count = 67

$$\left\{-4\,\frac{\sqrt{\_C1\ (y(x))^{3/2} + 4\,y(x)}}{\sqrt{y(x)}\_C1} - x - \_C2 = 0, 4\,\frac{\sqrt{\_C1\ (y(x))^{3/2} + 4\,y(x)}}{\sqrt{y(x)}\_C1} - x - \_C2 = 0, y(x) = 0\right\}$$

2.1749 ODE No. 1749

$$-3y'(x)^2 + 4y(x)y''(x) - 12y(x)^3 = 0$$

✓ **Mathematica** : cpu = 0.457495 (sec), leaf count = 153

$$\left\{\left\{y(x)\to \text{InverseFunction}\left[-\frac{4\#1\sqrt{1+\frac{4\#1^{3/2}}{c_1}}\,{}_2F_1\left(\frac{1}{6},\frac{1}{2};\frac{7}{6};-\frac{4\#1^{3/2}}{c_1}\right)}{\sqrt{\#1^{3/2}\left(4\#1^{3/2}+c_1\right)}}\&\right][x+c_2]\right\}, \left\{y(x)\to \text{InverseFunction}\right.$$

✓ **Maple** : cpu = 1.408 (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

$$ay(x)^3 + by(x)^2 + cy(x) - 3y'(x)^2 + 4y(x)y''(x) = 0$$

✓ **Mathematica** : cpu = 3.14179 (sec), leaf count = 2281

$$\left\{ \text{Solve} \left[-\frac{4F\left(\sin^{-1}\left(\sqrt{\frac{(\text{Root}[a\#1^4+3b\#1^2-3c_1\#1-3c\&,2]-\text{Root}[a\#1^4+3b\#1^2-3c_1\#1-3c\&,4])\left(\sqrt{y(x)}-\text{Root}[a\#1^4+3b\#1^2-3c_1}{(\text{Root}[a\#1^4+3b\#1^2-3c_1\#1-3c\&,1]-\text{Root}[a\#1^4+3b\#1^2-3c_1\#1-3c\&,4])\left(\sqrt{y(x)}-\text{Root}[a\#1^4+3b\#1^2-3c_1}}\right.\right.\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.875 (sec), leaf count = 87

$$\left\{\int^{y(x)} -3\,\frac{1}{\sqrt{9\_C1\,\_a^{3/2}-3\,\_a^3a-9\,b\_a^2+9\,c\_a}}d\_a - x - \_C2 = 0, \int^{y(x)} 3\,\frac{1}{\sqrt{9\_C1\,\_a^{3/2}-3\,\_a^3a-9}}\right.$$

2.1751 ODE No. 1751

$$y'(x)\left(6y(x)^2 - \frac{2y(x)f'(x)}{f(x)}\right) + f(x)y(x) + g(x)y(x)^2 - 2y(x)^2y'(x) - 3y'(x)^2 + 4y(x)y''(x) + y(x)^4 = 0$$

✗ **Mathematica** : cpu = 9.43998 (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

$$ay(x)^2 - 5y'(x)^2 + 4y(x)y''(x) = 0$$

✓ **Mathematica** : cpu = 0.15646 (sec), leaf count = 26

$$\left\{\left\{y(x) \to c_2 \text{sech}^4\left(\frac{1}{4}\sqrt{a}(x - 4c_1)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.486 (sec), leaf count = 33

$$\left\{y(x) = 16\,\frac{\left(e^{1/4\,\sqrt{a}x}\right)^4 a^2}{\left(e^{1/2\,\sqrt{a}x}\_C1 - \_C2\right)^4}\right\}$$

2.1753 ODE No. 1753

$$-15y'(x)^2 + 12y(x)y''(x) + 8y(x)^3 = 0$$

✓ **Mathematica** : cpu = 0.490315 (sec), leaf count = 43

$$\left\{\left\{y(x) \to \frac{2304c_1{}^2}{\left(3c_1{}^2x^2 + 6c_2c_1{}^2x + 128 + 3c_2{}^2c_1{}^2\right)^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.547 (sec), leaf count = 147

$$\left\{-12\,\frac{y(x)\left(8\sqrt{y(x)} - \_C1\right)\sqrt{8\,y(x) - \sqrt{y(x)}\_C1}}{\sqrt{-24\,(y(x))^3 + 3\,\_C1\,(y(x))^{5/2}\_C1\,\sqrt{\sqrt{y(x)}\left(8\sqrt{y(x)} - \_C1\right)}}} - x - \_C2 = 0, 12\,\frac{y(x)\,(}{\sqrt{-24\,(y(x))^3 +}}\right.$$

2.1754 ODE No. 1754

$$ny(x)y''(x) - (n-1)y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.110376 (sec), leaf count = 17

$$\{\{y(x) \to c_2(x - c_1n)^n\}\}$$

✓ **Maple** : cpu = 0.31 (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 = 5.28716 (sec), leaf count = 716

$$\left\{\left\{y(x) \to \mathrm{InverseFunction}\left[\int_1^{\#1} -\frac{}{\sqrt{4b^5c_1K[1]^{-\frac{2b}{a}} + 20ab^4c_1K[1]^{-\frac{2b}{a}} + 35a^2b^3c_1K[1]^{-\frac{2b}{a}} + 25a^3b^2c_1K[1]^{-\frac{2b}{a}} +}}\right.\right.\right.$$

✓ **Maple** : cpu = 1.007 (sec), leaf count = 418

$$\left\{\int^{y(x)}(2\,a+b)\,(3\,a+2\,b)\,(a+b)\,(a+2\,b)\,b\_a^{2\,\frac{b}{a}}\frac{}{\sqrt{-36\,(a+2\,b)\_a^{2\,\frac{b}{a}}(a+2/3\,b)\left(2/3\,(a+2\,b)\,c3\,(a+b)\,b\,(a\right.}}\right.$$

2.1756 ODE No. 1756

$$ay(x)y''(x) + by'(x)^2 - \frac{y(x)y'(x)}{\sqrt{c^2+x^2}} = 0$$

✓ **Mathematica** : cpu = 0.600543 (sec), leaf count = 211

$$\left\{\left\{y(x) \to c_2 \exp\left(\int_1^x -\frac{\left(\frac{K[2]}{\sqrt{c^2+K[2]^2}}+1\right)^{\frac{1}{2}/a}}{\left(1-\frac{K[2]}{\sqrt{c^2+K[2]^2}}\right)^{\frac{1}{2}/a}\int_1^{K[2]}\frac{\exp\left(\frac{\frac{1}{2}\log\left(\frac{K[1]}{\sqrt{c^2+K[1]^2}}+1\right)-\frac{1}{2}\log\left(1-\frac{K[1]}{\sqrt{c^2+K[1]^2}}\right)}{a}\right)\left(-\sqrt{c^2+K[1]^2}a-b\sqrt{c^2}\right.}{a\sqrt{c^2+K[1]^2}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.653 (sec), leaf count = 75

$$\left\{y(x) = \left(\left(\frac{a}{a+b}\left(\frac{\_C1\,\sqrt[a]{2}ax^{1+a^{-1}}}{a+1}{}_2F_1(-\frac{1}{2\,a},-\frac{1}{2\,a}-\frac{1}{2};\,1-a^{-1};\,-\frac{c^2}{x^2})+\_C2\right)^{-1}\right)^{\frac{a}{a+b}}\right)^{-1}\right\}$$

2.1757 ODE No. 1757

$$(a+2)f(x)y(x)^2y'(x) + ay(x)^3y'(x) - (a-1)y'(x)^2 + ay(x)y''(x) + f(x)^2y(x)^4 = 0$$

✗ **Mathematica** : cpu = 9.56902 (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 = 0.302595 (sec), leaf count = 36

$$\left\{\left\{y(x) \to \frac{-b+(c_1(-(a+c))(-x-c_2))^{\frac{a}{a+c}}}{a}\right\}\right\}$$

✓ **Maple** : cpu = 0.437 (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

$$xy'(x)^2-y(x)y'(x)+xy(x)y''(x)=0$$

✓ **Mathematica** : cpu = 0.122316 (sec), leaf count = 18

$$\left\{\left\{y(x)\to c_2\sqrt{x^2+c_1}\right\}\right\}$$

✓ **Maple** : cpu = 0.095 (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

$$ay(x)y'(x)+f(x)+xy'(x)^2+xy(x)y''(x)=0$$

✓ **Mathematica** : cpu = 0.0775087 (sec), leaf count = 108

$$\left\{\left\{y(x)\to-\sqrt{2}\sqrt{\int_1^x-K[2]^{-a}\left(c_1+\int_1^{K[2]}f(K[1])K[1]^{a-1}dK[1]\right)dK[2]+c_2}\right\},\left\{y(x)\to\sqrt{2}\sqrt{\int_1^x-K[2]^{-a}\right.\right.$$

✓ **Maple** : cpu = 0.49 (sec), leaf count = 106

$$\left\{y(x)=\frac{1}{a-1}\sqrt{-2\,(a-1)\left(-x^{1-a}\int\frac{x^af\,(x)}{x}\,\mathrm{d}x-x^{1-a}\_C1+\int f\,(x)\,\mathrm{d}x+\_C2\right)},y(x)=-\frac{1}{a-1}\sqrt{-2\,(a-\right.$$

2.1761 ODE No. 1761

$$x\left(ay(x)^4+d\right)+y(x)\left(by(x)^2+c\right)-xy'(x)^2+y(x)y'(x)+xy(x)y''(x)=0$$

✗ **Mathematica** : cpu = 1.07989 (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

$$ay(x)y'(x) + bxy(x)^3 - xy'(x)^2 + xy(x)y''(x) = 0$$

✗ **Mathematica** : cpu = 48.1884 (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 = 1.019 (sec), leaf count = 108

$$\left\{ y(x) = ODESolStruc\left(\frac{\_a}{\left(e^{\int \_b(\_a)\,d\_a + \_C1}\right)^2}, [\left\{ \frac{d}{d\_a}\_b(\_a) = -2\frac{\_b(\_a)\left(1/2 + \_a^2(-1/2\,\_a\,b + a - 1)(\_\right.}{\_a}\right.\right.\right.$$

2.1763 ODE No. 1763

$$ay(x)y'(x) + 2xy'(x)^2 + xy(x)y''(x) = 0$$

✓ **Mathematica** : cpu = 0.211698 (sec), leaf count = 40

$$\left\{\left\{y(x) \to c_2\left(3x^{1-a} - (a-1)c_1\right)^{-\frac{a-1}{3(1-a)}}\right\}\right\}$$

✓ **Maple** : cpu = 0.354 (sec), leaf count = 148

$$\left\{ y(x) = \frac{\sqrt[3]{3}}{(a-1)\,x^a}\sqrt[3]{(a-1)^2\,(x^a)^2\,(\_C2\ (a-1)\,x^a - \_C1\ x)}, y(x) = \frac{\sqrt[3]{3}(-1+i\sqrt{3})}{(2\,a-2)\,x^a}\sqrt[3]{(a-1)^2\,(x^a)^2\,(\_C2\ (a\right.$$

2.1764 ODE No. 1764

$$-2xy'(x)^2 + (y(x)+1)y'(x) + xy(x)y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0494697 (sec), leaf count = 52

$$\left\{\left\{y(x) \to \frac{\tan\left(\frac{1}{2}\left(\sqrt{2}\sqrt{c_1}\log(x) - \sqrt{2}\sqrt{c_1}c_2\right)\right)}{\sqrt{2}\sqrt{c_1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.482 (sec), leaf count = 18

$$\left\{ y(x) = \_C1\ \tanh\left(\frac{\ln(x) - \_C2}{2\,\_C1}\right) \right\}$$

2.1765 ODE No. 1765

$$ay(x)y'(x) - 2xy'(x)^2 + xy(x)y''(x) = 0$$

✓ **Mathematica** : cpu = 0.227891 (sec), leaf count = 34

$$\left\{\left\{y(x) \to c_2\left(x^{1-a} + (a-1)c_1\right)^{\frac{a-1}{1-a}}\right\}\right\}$$

✓ **Maple** : cpu = 0.288 (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

$$-4xy'(x)^2 + 4y(x)y'(x) + xy(x)y''(x) = 0$$

✓ **Mathematica** : cpu = 0.134145 (sec), leaf count = 21

$$\left\{\left\{y(x) \to \frac{c_2 x}{\sqrt[3]{1 + c_1 x^3}}\right\}\right\}$$

✓ **Maple** : cpu = 0.225 (sec), leaf count = 64

$$\left\{y(x) = x\frac{1}{\sqrt[3]{-3\_C2\ x^3 + \_C1}}, y(x) = \frac{\left(-1 + i\sqrt{3}\right)x}{2}\frac{1}{\sqrt[3]{-3\_C2\ x^3 + \_C1}}, y(x) = -\frac{\left(1 + i\sqrt{3}\right)x}{2}\frac{1}{\sqrt[3]{-3\_C2\ x^3}}\right.$$

2.1767 ODE No. 1767

$$\left(\frac{ax}{\sqrt{b^2 - x^2}} - x\right)y'(x)^2 - y(x)y'(x) + xy(x)y''(x) = 0$$

✓ **Mathematica** : cpu = 0.245954 (sec), leaf count = 55

$$\left\{\left\{y(x) \to c_2 \exp\left(\frac{\sqrt{b^2 - x^2}}{a} + \frac{c_1 \log\left(a\sqrt{b^2 - x^2} - c_1\right)}{a^2}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.932 (sec), leaf count = 50

$$\left\{y(x) = \_C2\ e^{\int -x\sqrt{b^2-x^2}\left(\_C1\ \sqrt{b^2-x^2}+a\left(b^2-x^2\right)\right)^{-1} dx}\right\}$$

2.1768 ODE No. 1768

$$xy'(x)^2 + (x - y(x))y'(x) + x(y(x) + x)y''(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 0.0363576 (sec), leaf count = 53

$$\left\{\left\{y(x) \to -x - \sqrt{x^2 + 2c_2x^2 + c_1}\right\}, \left\{y(x) \to -x + \sqrt{x^2 + 2c_2x^2 + c_1}\right\}\right\}$$

✓ **Maple** : cpu = 0.245 (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

$$-xy'(x)^2 + y(x)y'(x) + 2xy(x)y''(x) = 0$$

✓ **Mathematica** : cpu = 0.133207 (sec), leaf count = 18

$$\left\{\left\{y(x) \to c_2\left(\sqrt{x} + c_1\right)^2\right\}\right\}$$

✓ **Maple** : cpu = 0.229 (sec), leaf count = 21

$$\left\{y(x) = \_C1\,\sqrt{x}\_C2 + x\_C1^2 + \frac{\_C2^2}{4}\right\}$$

2.1770 ODE No. 1770

$$-2x^2y'(x)^2 + x^2(y(x) - 1)y''(x) - 2x(y(x) - 1)y'(x) - 2(y(x) - 1)^2y(x) = 0$$

✓ **Mathematica** : cpu = 0.633634 (sec), leaf count = 28

$$\left\{\left\{y(x) \to 1 + \frac{1}{x^2\left(-\frac{1}{x^2} - \frac{c_1}{x} + c_2\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.319 (sec), leaf count = 26

$$\left\{y(x) = \frac{x(\_C1\,x - \_C2)}{\_C1\,x^2 - \_C2\,x - 1}\right\}$$

2.1771 ODE No. 1771

$$x^2(y(x)+x)y''(x)-(xy'(x)-y(x))^2=0$$

✓ **Mathematica** : cpu = 0.0972717 (sec), leaf count = 21

$$\left\{\left\{y(x)\to -x+c_2xe^{\frac{c_1}{x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.944 (sec), leaf count = 22

$$\left\{y(x)=-\frac{x}{\_C1}\left(-\mathrm{e}^{\frac{\_C2}{x}}\mathrm{e}^{-1}+\_C1\right)\right\}$$

2.1772 ODE No. 1772

$$a(xy'(x)-y(x))^2+x^2(x-y(x))y''(x)=0$$

✓ **Mathematica** : cpu = 0.542325 (sec), leaf count = 37

$$\left\{\left\{y(x)\to x\left(1+\left((a-1)\left(\frac{(-1)^{a+1}c_1}{x}-c_2\right)\right)^{\frac{1}{1-a}}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.546 (sec), leaf count = 35

$$\left\{\left(-x^a y(x)+x^{a+1}\right)(x-y(x))^{-a}+x(a-1)\_C2+\_C1=0\right\}$$

2.1773 ODE No. 1773

$$x^2\left(-\left(y'(x)^2+1\right)\right)+2x^2y(x)y''(x)+y(x)^2=0$$

✓ **Mathematica** : cpu = 0.324443 (sec), leaf count = 44

$$\left\{\left\{y(x)\to \frac{x\left(c_1{}^2\log^2(x)-2c_2c_1{}^2\log(x)+4+c_2{}^2c_1{}^2\right)}{4c_1}\right\}\right\}$$

✓ **Maple** : cpu = 0.088 (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 = 1.19989 (sec), leaf count = 92

$$\left\{\left\{y(x)\to c_2\exp\left(-\frac{\log(x)\left(a\left(\sqrt{\frac{a^2-2a(c+2d)-4bd+c^2}{a^2}}-1\right)+c\right)-2a\log\left(x^{\sqrt{\frac{a^2-2a(c+2d)-4bd+c^2}{a^2}}}+c_1\right)}{2(a+b)}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.914 (sec), leaf count = 136

$$\left\{y(x)=\left(\frac{a^2+(-2\,c-4\,d)\,a-4\,bd+c^2}{(a+b)^2}\left(x^{\frac{1}{a}\sqrt{(-4\,a-4\,b)d+(a-c)^2}}\_C1-\_C2\right)^{-2}\right)^{-\frac{a}{2\,a+2\,b}}x^{-\frac{1}{2\,a+2\,b}\sqrt{(-4\,a-4\,b)d+(a}}$$

2.1775 ODE No. 1775

$$-a(x+2)y(x)^2-x(x+1)^2y'(x)^2+2(x+1)^2y(x)y'(x)+x(x+1)^2y(x)y''(x)=0$$

✓ **Mathematica** : cpu = 0.103474 (sec), leaf count = 29

$$\left\{\left\{y(x)\to c_2e^{a\log(x+1)+\frac{-a-c_1}{x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.295 (sec), leaf count = 31

$$\left\{y(x)=\frac{(1+x)^a}{\_C1\,\mathrm{e}^a}\mathrm{e}^{\frac{\_C2}{x}}\left(\mathrm{e}^{\frac{a}{x}}\right)^{-1}\right\}$$

2.1776 ODE No. 1776

$$-12x^2y(x)y'(x)-4\left(1-x^3\right)y'(x)^2+8\left(1-x^3\right)y(x)y''(x)+3xy(x)^2=0$$

✓ **Mathematica** : cpu = 6.69576 (sec), leaf count = 1743

$$\left\{\left\{y(x) \to e^{\int_1^x -\frac{2\left(-\frac{3(1-K[2])^{3/4}\sqrt[4]{K[2]^2+K[2]+1}\int_1^{K[2]}\frac{\sqrt{\sqrt{3}K[1]+\sqrt{2K[1]-i\sqrt{3}+1}\sqrt{2K[1]+i\sqrt{3}+1}+\sqrt{3}}}{2(1-K[1])^{3/2}\sqrt{K[1]^2+K[1]+1}}dK[1]K[2]^2}{2\sqrt{2}\left(K[2]^3-1\right)^{5/4}\sqrt[4]{\sqrt{3}K[2]+\sqrt{2K[2]-i\sqrt{3}+1}\sqrt{2K[2]+i\sqrt{3}+1}+\sqrt{3}}}+c_1\left(-\frac{3(1-K[2])}{2\sqrt{2}\left(K[2]^3-1\right)^{5/4}\sqrt[4]{\sqrt{3}K}}\right.\right.}{}}\right.\right.$$

✓ **Maple** : cpu = 0.62 (sec), leaf count = 49

$$\left\{y(x) = \frac{x}{\_C1}\left(\_C1\ LegendreQ\left(-\frac{1}{6}, \frac{1}{3}, \sqrt{-(x-1)(x^2+x+1)}\right) + \frac{\_C2}{2} LegendreP\left(-\frac{1}{6}, \frac{1}{3}, \sqrt{-(x-1)(x^2+\right.\right.\right.$$

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 = 45.8224 (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 = 0.721 (sec), leaf count = 79

$$\left\{y(x) = ODESolStruc\left(e^{\int \_b(\_a)\,\mathrm{d}\_a + \_C1}, [\left\{\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a) = \frac{(-f1(\_a) - f0(\_a))(\_b(\_a))^2 - f2(\_a)\_b(\_a)}{f0(\_a)}\right.\right.\right.$$

2.1778 ODE No. 1778

$$y(x)^2y''(x) - a = 0$$

✓ **Mathematica** : cpu = 0.183982 (sec), leaf count = 65

$$\mathrm{Solve}\left[\left(\frac{y(x)\sqrt{-\frac{2a}{y(x)}+c_1}}{c_1} + \frac{2a\tanh^{-1}\left(\frac{\sqrt{-\frac{2a}{y(x)}+c_1}}{\sqrt{c_1}}\right)}{c_1{}^{3/2}}\right)^2 = (x+c_2)^2, y(x)\right]$$

✓ **Maple** : cpu = 4.185 (sec), leaf count = 245

$$\left\{y(x)=\frac{\_C1\left(\_C1\,a+\mathrm{e}^{RootOf\left(csgn(\_C1^{-1})\_C1^4a^2-2\_Z\_C1^3a\mathrm{e}^{\_Z}-csgn(\_C1^{-1})(\mathrm{e}^{\_Z})^2\_C1^2-2\,csgn(\_C1^{-1})\mathrm{e}^{\_Z}\_C2-2\right.}}{2\,\mathrm{e}^{RootOf\left(csgn(\_C1^{-1})\_C1^4a^2-2\_Z\_C1^3a\mathrm{e}^{\_Z}-csgn(\_C1^{-1})(\mathrm{e}^{\_Z})^2\_C1^2-2\,csgn(\_C1^{-1})\mathrm{e}^{\_Z}\_C2-2\,csgn(\_\right.}}\right.$$

2.1779 ODE No. 1779

$$ax+y(x)y'(x)^2+y(x)^2y''(x)=0$$

✗ **Mathematica** : cpu = 22.0149 (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 = 3.522 (sec), leaf count = 117

$$\left\{\ln(x)-\frac{\sqrt{3}}{6}\int^{\frac{y(x)}{x}}\frac{1}{\_g^3+a}\left(3\_g^2\sqrt[3]{\frac{a}{\_g^3}}\tan\left(RootOf\left(-2\sqrt{3}\_Z+\ln\left(\frac{(\tan(\_Z))^2+1}{(\tan(\_Z))^2+2\sqrt{3}\tan(\_Z)+3}\right)+\right.\right.\right.\right.$$

2.1780 ODE No. 1780

$$-ax-b+y(x)y'(x)^2+y(x)^2y''(x)=0$$

✗ **Mathematica** : cpu = 20.2972 (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 = 3.84 (sec), leaf count = 156

$$\left\{\frac{b\ln(ax+b)}{a}-\frac{\sqrt{3}}{6}\int^{\frac{y(x)}{ax+b}}-2\frac{\_g^2b}{\_g^3a^2-1}\left(-3/2\,b\sqrt[3]{-\frac{a}{\_g^3b^3}}\tan\left(RootOf\left(6\,b^2\int\frac{\_g^2}{\_g^3a^2-1}\left(-\frac{a}{\_g^3b^3}\right)^{2/3}d\_g\right.\right.\right.\right.$$

2.1781 ODE No. 1781

$$(1-2y(x))y'(x)^2+\left(y(x)^2+1\right)y''(x)=0$$

✓ **Mathematica** : cpu = 0.176411 (sec), leaf count = 46

$$\left\{\left\{y(x)\to\frac{i\left(1-c_1{}^{2i}(x+c_2)^{2i}\right)}{1+c_1{}^{2i}(x+c_2)^{2i}}\right\}\right\}$$

✓ **Maple** : cpu = 0.256 (sec), leaf count = 11

$$\{y(x)=\tan(\ln(\_C1\,x+\_C2))\}$$

2.1782 ODE No. 1782

$$(y(x)^2+1)\,y''(x)-3y(x)y'(x)^2=0$$

✓ **Mathematica** : cpu = 0.157387 (sec), leaf count = 93

$$\left\{\left\{y(x)\to -\frac{ic_1(x+c_2)}{\sqrt{c_1{}^2x^2+2c_2c_1{}^2x-1+c_2{}^2c_1{}^2}}\right\},\left\{y(x)\to \frac{ic_1(x+c_2)}{\sqrt{c_1{}^2x^2+2c_2c_1{}^2x-1+c_2{}^2c_1{}^2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.24 (sec), leaf count = 33

$$\left\{y(x)=\sqrt{-\left(\_C1^2x^2+2\,\_C2\,\_C1\,x+\_C2^2-1\right)^{-1}}(\_C1\,x+\_C2)\right\}$$

2.1783 ODE No. 1783

$$-2(x-y(x)^2)\,y'(x)^3+(4y(x)y'(x)+1)\,y'(x)+(y(x)^2+x)\,y''(x)=0$$

✓ **Mathematica** : cpu = 1.03242 (sec), leaf count = 26

$$\text{Solve}\left[x=-y(x)^2+c_2e^{e^{-c_1y(x)}},y(x)\right]$$

✓ **Maple** : cpu = 0.385 (sec), leaf count = 23

$$\left\{\frac{-y(x)\,\_C1+\ln\left(x+(y(x))^2\right)+\_C2+2}{y\,(x)}=0\right\}$$

2.1784 ODE No. 1784

$$(x^2+y(x)^2)\,y''(x)-(xy'(x)-y(x))\,(y'(x)^2+1)=0$$

✓ **Mathematica** : cpu = 0.257552 (sec), leaf count = 74

$$\text{Solve}\left[\frac{1}{2}\left(\log\left(1-\frac{iy(x)}{x}\right)+\log\left(1+\frac{iy(x)}{x}\right)+i\cot(c_1)\left(\log\left(1-\frac{iy(x)}{x}\right)-\log\left(1+\frac{iy(x)}{x}\right)\right)\right)=-\log(x)+$$

✓ **Maple** : cpu = 2.132 (sec), leaf count = 82

$$\left\{y(x)=\tan\left(\mathit{RootOf}\left(-\left(\mathrm{e}^{\frac{i\_C1\,\_Z}{-1+\_C1}}\right)^2\left(x^{\frac{\_C1}{-1+\_C1}}\right)^2\left(\mathrm{e}^{\frac{\_C2\,\_C1}{-1+\_C1}}\right)^2\left(\mathrm{e}^{\frac{i\_Z}{-1+\_C1}}\right)^2+(\cos(\_Z))^2\left(x^{(-1+\_C1)^{-1}}\right)^2\left(\mathrm{e}^{\frac{-}{-1+}}\right.\right.\right.$$

2.1785 ODE No. 1785

$$\left(x^2+y(x)^2\right)y''(x)-2\left(xy'(x)-y(x)\right)\left(y'(x)^2+1\right)=0$$

✓ **Mathematica** : cpu = 0.319178 (sec), leaf count = 95

$$\left\{\left\{y(x)\to\frac{1}{2}\left(-\sqrt{4x\left(-x+e^{c_2}\right)+e^{2c_2}\cot^2(c_1)}-e^{c_2}\cot(c_1)\right)\right\},\left\{y(x)\to\frac{1}{2}\left(\sqrt{4x\left(-x+e^{c_2}\right)+e^{2c_2}\cot^2(c_1)}-\right.\right.$$

✓ **Maple** : cpu = 0.861 (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

$$f(x)(1-y(x))y(x)y'(x)-(1-2y(x))y'(x)^2+2(1-y(x))y(x)y''(x)=0$$

✓ **Mathematica** : cpu = 0.0596991 (sec), leaf count = 53

$$\left\{\left\{y(x)\to 1-\sin^2\left(\frac{1}{2}\left(-\int_1^x-\exp\left(-\int_1^{K[3]}\frac{1}{2}f(K[1])dK[1]\right)c_1dK[3]-c_2\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 1.088 (sec), leaf count = 42

$$\left\{y(x)=\frac{1}{8\_C2}\left(2\,\mathrm{e}^{\_C1}\int\mathrm{e}^{-1/2\int f(x)\,\mathrm{d}x}\,\mathrm{d}x\_C2+1\right)^2\left(\mathrm{e}^{\_C1}\int\mathrm{e}^{-\frac{\int f(x)\,\mathrm{d}x}{2}}\,\mathrm{d}x\right)^{-1}\right\}$$

2.1787 ODE No. 1787

$$h(y(x))-(1-3y(x))y'(x)^2+2(1-y(x))y(x)y''(x)=0$$

✓ **Mathematica** : cpu = 0.84065 (sec), leaf count = 170

$$\left\{\left\{y(x)\to\text{InverseFunction}\left[\int_1^{\#1}-\frac{1}{(K[2]-1)\sqrt{K[2]}\sqrt{c_1+2\int_1^{K[2]}\frac{e^{-2\left(\log(1-K[1])+\frac{1}{2}\log(K[1])\right)}h(K[1])}{2(K[1]-1)K[1]}dK[1]}}dK[2]\&\right]\right.\right.$$

✓ **Maple** : cpu = 1.471 (sec), leaf count = 80

$$\left\{\int^{y(x)}\frac{1}{\_b-1}\frac{1}{\sqrt{\_b\left(\_C1+\int\frac{h(\_b)}{(\_b-1)^3\_b^2}\,\mathrm{d}\_b\right)}}d\_b-x-\_C2=0,\int^{y(x)}-\frac{1}{\_b-1}\frac{1}{\sqrt{\_b\left(\_C1+\int\frac{h(\_b)}{(\_b-1)^3\_b^2}\right.}}\right.$$

2.1788 ODE No. 1788

$-4(1-y(x))y(x)^2\left(-f'(x)-f(x)^2-g'(x)+g(x)^2\right)+4y(x)y'(x)(f(x)y(x)+g(x))+(1-3y(x))y'(x)^2-2(1-y(x))y$

✗ **Mathematica** : cpu = 1.14848 (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

$$\left\{\sqrt{y(x)}-2\,\frac{\frac{\partial}{\partial x}DESol\left(\left\{-1/4\,e^{2\int g(x)\,dx-2\int f(x)\,dx}\_C1^2\_Y(x)-2\,g(x)\frac{d}{dx}\_Y(x)+\frac{d^2}{dx^2}\_Y(x)\right\},\{\_\right.}{DESol\left(\left\{-1/4\,e^{2\int g(x)\,dx-2\int f(x)\,dx}\_C1^2\_Y(x)-2\,g(x)\frac{d}{dx}\_Y(x)+\frac{d^2}{dx^2}\_Y(x)\right\},\{\_Y(x)\}\right)e^{\int g}}$$

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 = 2.20994 (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

$$-h(y(x))-2(1-2y(x))y'(x)^2+3(1-y(x))y(x)y''(x)=0$$

✓ **Mathematica** : cpu = 0.585538 (sec), leaf count = 186

$$\left\{\left\{y(x)\to \text{InverseFunction}\left[\int_1^{\#1}-\frac{1}{(1-K[2])^{2/3}K[2]^{2/3}\sqrt{c_1+2\int_1^{K[2]}-\frac{\exp\left(-2\left(\frac{2}{3}\log(1-K[1])+\frac{2}{3}\log(K[1])\right)\right)h(K[1])}{3(K[1]-1)K[1]}dK\right.}}\right.\right.\right.$$

✓ **Maple** : cpu = 1.339 (sec), leaf count = 119

$$\left\{\int^{y(x)}-\frac{\sqrt{9}}{3}\frac{1}{\sqrt{\_b\,(\_b-1)\left(\_C1-\frac{2}{3}\int\frac{h(\_b)}{\_b\,(\_b-1)}\left(\_b^2-\_b\right)^{-\frac{4}{3}}d\_b\right)\sqrt[3]{\_b\,(\_b-1)}}}d\_b-x-\_C2=0,\int^{y(x}\right.$$

2.1791 ODE No. 1791

$$-h(y(x)) - 3(1 - 2y(x))y'(x)^2 + (1 - y(x))y''(x) = 0$$

✓ **Mathematica** : cpu = 0.663668 (sec), leaf count = 168

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[\int_1^{\#1} -\frac{e^{\frac{1}{2}(12-12K[2])}}{(K[2]-1)^3\sqrt{c_1 + 2\int_1^{K[2]} -\frac{\exp(-2(6(K[1]-1)+3\log(K[1]-1)))h(K[1])}{K[1]-1}dK[1]}}dK[2]\&$$

✓ **Maple** : cpu = 1.458 (sec), leaf count = 90

$$\left\{\int^{y(x)} \frac{1}{(\_b-1)^3 (\mathrm{e}^{\_b})^6} \frac{1}{\sqrt{-2\int \frac{h(\_b)}{(\mathrm{e}^{\_b})^{12}(\_b-1)^7}\,\mathrm{d}\_b + \_C1}} d\_b - x - \_C2 = 0, \int^{y(x)} -\frac{1}{(\_b-1)^3 (\mathrm{e}^{\_b})^6} \frac{}{\sqrt{-2\int}}$$

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 = 0.996556 (sec), leaf count = 226

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[\int_1^{\#1} -\frac{(1-K[2])^{\frac{1}{2}\left(\frac{2b}{a}+\frac{2c}{a}\right)}K[2]^{-\frac{c}{a}}}{\sqrt{c_1 + 2\int_1^{K[2]} -\frac{\exp\left(-\frac{2(c\log(K[1])-(b+c)\log(1-K[1]))}{a}\right)h(K[1])}{a(K[1]-1)K[1]}dK[1]}}dK[2]\&\right][x + c_2$$

✓ **Maple** : cpu = 3.834 (sec), leaf count = 194

$$\left\{\int^{y(x)} a \frac{1}{\sqrt{a\left(\_C1\, a - 2\int \frac{h(\_b)}{\_b\,(\_b-1)}\left((\_b-1)^{\frac{b}{a}}\right)^2\left((\_b-1)^{\frac{c}{a}}\right)^2\left(\_b^{\frac{c}{a}}\right)^{-2}\mathrm{d}\_b\right)}}\left(\_b^{\frac{c}{a}}\right)^{-1}\left((\_b-1)^{\frac{-c-b}{a}}\right)^{-1} d\_$$

2.1793 ODE No. 1793

$$-(a-1)(2y(x)-1)y'(x)^2+a(y(x)-1)y(x)y''(x)+f(x)(y(x)-1)y(x)y'(x)=0$$

✓ **Mathematica** : cpu = 0.122435 (sec), leaf count = 83

$$\left\{\left\{y(x)\to \text{InverseFunction}\left[a\#1^{-1/a}(-(\#1-1)\#1)^{\frac{1}{a}}\,{}_2F_1\left(\frac{1}{a},\frac{a-1}{a};1+\frac{1}{a};1-\#1\right)\&\right]\left[\int_1^x \exp\left(-\int_1^{K[3]} f(K\right.\right.\right.$$

✓ **Maple** : cpu = 0.272 (sec), leaf count = 40

$$\left\{\_C1\,e^{-\frac{fx}{a}}-\_C2+\int^{y(x)}\frac{\sqrt[a]{\_a\,(\_a-1)}}{\_a\,(\_a-1)}d\_a=0\right\}$$

2.1794 ODE No. 1794

$$y'(x)^2(-((2ab-a-b)y(x)+(1-a)b))+ab(y(x)-1)y(x)y''(x)+f(x)(y(x)-1)y(x)y'(x)=0$$

✓ **Mathematica** : cpu = 0.140087 (sec), leaf count = 69

$$\left\{\left\{y(x)\to \text{InverseFunction}\left[-a\#1^{\frac{1}{a}}\,{}_2F_1\left(\frac{1}{a},1-\frac{1}{b};1+\frac{1}{a};\#1\right)\&\right]\left[\int_1^x \exp\left(-\int_1^{K[3]}\frac{f(K[1])}{ab}dK[1]\right)c_1dK[3]\right.\right.\right.$$

✓ **Maple** : cpu = 0.29 (sec), leaf count = 46

$$\left\{\_C1\,e^{-\frac{fx}{ab}}-\_C2+\int^{y(x)}\frac{\sqrt[a]{\_a}\sqrt[b]{\_a-1}}{\_a\,(\_a-1)}d\_a=0\right\}$$

2.1795 ODE No. 1795

$$xy(x)^2y''(x)-a=0$$

✓ **Mathematica** : cpu = 0.232431 (sec), leaf count = 116

$$\text{Solve}\left[-\frac{\sqrt{-\frac{2ay(x)}{x}-\frac{2c_1y(x)^2}{x^2}}}{2c_1}-\frac{a\tan^{-1}\left(\frac{\sqrt{2}\sqrt{c_1}\left(\frac{y(x)}{x}+\frac{a}{2c_1}\right)}{\sqrt{-\frac{2ay(x)}{x}-\frac{2c_1y(x)^2}{x^2}}}\right)}{2\sqrt{2}{c_1}^{3/2}}-\frac{1}{x}-c_2=0,y(x)\right]$$

✓ **Maple** : cpu = 9.478 (sec), leaf count = 529

$$\left\{ y(x) = \frac{\_C1 \left(9\_C1\, a + \mathrm{e}^{RootOf\left(243\, csgn(\_C1^{-1})\_C1^4 a^2 x - 54\_Z\, \mathrm{e}^{-\_Z} a x\_C1^3 - 3\left(\mathrm{e}^{-\_Z}\right)^2 csgn(\_C1^{-1})\_C1^2 x - 6\,\mathrm{e}^{-\_Z} csgn(\_C1\right.}\right.}{2\,\mathrm{e}^{RootOf\left(243\, csgn(\_C1^{-1})\_C1^4 a^2 x - 54\_Z\, \mathrm{e}^{-\_Z} a x\_C1^3 - 3\left(\mathrm{e}^{-\_Z}\right)^2 csgn(\_C1^{-1})\_C1^2 x - 6\,\mathrm{e}^{-\_Z} csgn(\_C1^{-1})\_C\right.}}\right.$$

2.1796 ODE No. 1796

$$(a^2 - x^2)\, y(x) y'(x)^2 + (a^2 - x^2)\,(a^2 - y(x)^2)\, y''(x) - x(a^2 - y(x)^2)\, y'(x) = 0$$

✓ **Mathematica** : cpu = 0.241704 (sec), leaf count = 363

$$\left\{\left\{y(x) \to -\frac{1}{2} e^{-c_2}\left(1 - \frac{x}{\sqrt{x^2 - a^2}}\right)^{-\frac{c_1}{2}}\left(\frac{x}{\sqrt{x^2 - a^2}} + 1\right)^{-\frac{c_1}{2}}\sqrt{2a^2 e^{2c_2}\left(1 - \frac{x}{\sqrt{x^2 - a^2}}\right)^{c_1}\left(\frac{x}{\sqrt{x^2 - a^2}} + 1\right)^{c_1}\right.}\right.\right.$$

✓ **Maple** : cpu = 1.084 (sec), leaf count = 51

$$\left\{ y(x) = \frac{1}{2\_C2}\left(\left(\left(x + \sqrt{-a^2 + x^2}\right)^{\_C1}\right)^2 \_C2^2 + a^2\right)\left(\left(x + \sqrt{-a^2 + x^2}\right)^{\_C1}\right)^{-1} \right\}$$

2.1797 ODE No. 1797

$$(y(x)-1)^3\left(ay(x)^2 + b\right) + cxy(x)^2(y(x)-1) + dx^2 y(x)^2(y(x)+1) - x^2(3y(x)-1)y'(x)^2 + 2x^2 y(x)(y(x)-1)y''(x) + 2xy$$

✗ **Mathematica** : cpu = 11.1244 (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 = 35.37 (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 = 0.276 (sec), leaf count = 166

$$\left\{y(x) = RootOf\left(-2\ln(x) - \int^{\_Z}\left(i\sqrt{3}Y_{i\sqrt{3}}\left(2\sqrt{\_f}\right)\_C1\sqrt{\_f} + i\sqrt{3}J_{i\sqrt{3}}\left(2\sqrt{\_f}\right)\sqrt{\_f} + Y_{i\sqrt{3}}\left(2\sqrt{\_f}\right)\_C\right.\right.\right.$$

2.1799 ODE No. 1799

$$y(x)^3y''(x) - a = 0$$

✓ **Mathematica** : cpu = 1.44388 (sec), leaf count = 88

$$\left\{\left\{y(x) \to -\frac{\sqrt{a + c_1{}^2x^2 + 2c_2c_1{}^2x + c_2{}^2c_1{}^2}}{\sqrt{c_1}}\right\}, \left\{y(x) \to \frac{\sqrt{a + c_1{}^2x^2 + 2c_2c_1{}^2x + c_2{}^2c_1{}^2}}{\sqrt{c_1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.495 (sec), leaf count = 46

$$\left\{y(x) = \frac{1}{\_C1}\sqrt{\_C1\left((\_C2 + x)^2\_C1^2 + a\right)}, y(x) = -\frac{1}{\_C1}\sqrt{\_C1\left((\_C2 + x)^2\_C1^2 + a\right)}\right\}$$

2.1800 ODE No. 1800

$$\left(1 - 3y(x)^2\right)y'(x)^2 + y(x)\left(y(x)^2 + 1\right)y''(x) = 0$$

✓ **Mathematica** : cpu = 0.467093 (sec), leaf count = 84

$$\left\{\left\{y(x) \to -\frac{\sqrt{-2c_1x - 1 - 2c_2c_1}}{\sqrt{2}\sqrt{c_1x + c_2c_1}}\right\}, \left\{y(x) \to \frac{\sqrt{-2c_1x - 1 - 2c_2c_1}}{\sqrt{2}\sqrt{c_1x + c_2c_1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.213 (sec), leaf count = 60

$$\left\{y(x) = \frac{1}{2\_C1\,x + 2\_C2}\sqrt{-4\left(\_C1\,x + \_C2 + 1/2\right)\left(\_C1\,x + \_C2\right)}, y(x) = -\frac{1}{2\_C1\,x + 2\_C2}\sqrt{-4\left(\_C1\right.}\right.$$

2.1801 ODE No. 1801

$$-a^2xy(x)^2+2y(x)^3y''(x)+y(x)^4-1=0$$

✗ **Mathematica** : cpu = 3.37769 (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

$$-ax^2-bx-c+y(x)^2y'(x)^2+2y(x)^3y''(x)=0$$

✗ **Mathematica** : cpu = 0.249663 (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

$-\mathrm{a0}(a-y(x))^2(b-y(x))^2(c-y(x))^2-\mathrm{a2}(a-y(x))^2(c-y(x))^2-\mathrm{a3}(a-y(x))^2(b-y(x))^2+y'(x)^2((a-y(x))(b-y(x))+($

✓ **Mathematica** : cpu = 18.739 (sec), leaf count = 10387

$$\left\{\text{Solve}\left[-\frac{2F\left(\sin^{-1}\left(\sqrt{\frac{(\text{Root}\left[\mathrm{a0}\#1^4+(-a\mathrm{a0}-b\mathrm{a0}-c\mathrm{a0}-c_1)\#1^3+(-\mathrm{a1}-\mathrm{a2}-\mathrm{a3}+a\mathrm{a0}b+a\mathrm{a0}c+\mathrm{a0}bc+ac_1+bc_1+cc_1)\#1^2+(a\mathrm{a2}+c\mathrm{a2}+a\mathrm{a}\right.}{(\text{Root}\left[\mathrm{a0}\#1^4+(-a\mathrm{a0}-b\mathrm{a0}-c\mathrm{a0}-c_1)\#1^3+(-\mathrm{a1}-\mathrm{a2}-\mathrm{a3}+a\mathrm{a0}b+a\mathrm{a0}c+\mathrm{a0}bc+ac_1+bc_1+cc_1)\#1^2+(a\mathrm{a2}+c\mathrm{a2}+a\mathrm{a}\right.}}\right.\right.}{}\right.\right.$$

✓ **Maple** : cpu = 2.299 (sec), leaf count = 115620

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 = 2.40264 (sec), leaf count = 415

$$\text{Solve}\left[\frac{2\sqrt{\frac{y(x)-\text{Root}[4\#1^3-\#1a-b\&,1]}{\text{Root}[4\#1^3-\#1a-b\&,3]-\text{Root}[4\#1^3-\#1a-b\&,1]}}\sqrt{\frac{y(x)-\text{Root}[4\#1^3-\#1a-b\&,2]}{\text{Root}[4\#1^3-\#1a-b\&,3]-\text{Root}[4\#1^3-\#1a-b\&,2]}}(y(x)-\text{Root}[4\#1}{c_1\sqrt{2ay(x)+2b-8y(x)^3}\sqrt{}}\right.$$

✓ **Maple** : cpu = 0.101 (sec), leaf count = 31

$$\left\{\int^{y(x)}\frac{1}{\sqrt{4\_a^3-\_a\,a-b}}d\_a-\_C1\,x-\_C2=0\right\}$$

2.1805 ODE No. 1805

$$\left(-ay(x)-b+4y(x)^3\right)\left(f(x)y'(x)+y''(x)\right)-\left(6y(x)^2-\frac{a}{2}\right)y'(x)^2=0$$

✓ **Mathematica** : cpu = 0.315411 (sec), leaf count = 438

$$\text{Solve}\left[\frac{2\sqrt{\frac{y(x)-\text{Root}[4\#1^3-\#1a-b\&,1]}{\text{Root}[4\#1^3-\#1a-b\&,3]-\text{Root}[4\#1^3-\#1a-b\&,1]}}\sqrt{\frac{y(x)-\text{Root}[4\#1^3-\#1a-b\&,2]}{\text{Root}[4\#1^3-\#1a-b\&,3]-\text{Root}[4\#1^3-\#1a-b\&,2]}}(y(x)-\text{Root}[4\#1}{\sqrt{ay(x)+b-4y(x)^3}\sqrt{\frac{}{\text{Ro}}}}\right.$$

✓ **Maple** : cpu = 0.236 (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

$$-f(x)((y(x)-1)y(x)(y(x)-x))^{3/2}+2(1-y(x))\left(x^2-2xy(x)+y(x)\right)y(x)y'(x)+(1-x)x\left(3y(x)^2-2xy(x)-2y(x)\right.$$

✗ **Mathematica** : cpu = 14.1791 (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 = 7.063 (sec), leaf count = 733

$$\left\{-\frac{\_C1}{2}\,eval\left(\int\frac{1}{x-1}e^{\int\frac{1}{x(x-1)}EllipticE\left(\sqrt{x}\right)\left(EllipticK\left(\sqrt{x}\right)\right)^{-1}\mathrm{d}x}\int\int\frac{1}{y\left(y-1\right)\left(-y+x\right)^2}\sqrt{-y\left(y-1\right)\left(-y+x\right)}\,dye^{-}\right.\right.$$

2.1807 ODE No. 1807

$$a(1-y(x))^2(x-y(x))^2y(x)^2+bx(1-y(x))^2(x-y(x))^2-c(1-x)(x-y(x))^2y(x)^2-d(1-x)x(1-y(x))^2y(x)^2-(1-x)^2x$$

✗ **Mathematica** : cpu = 22.2402 (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

$$b\sqrt{\left(1-y(x)^2\right)\left(1-a^2y(x)^2\right)}y'(x)^2+y(x)\left(-2a^2y(x)^2+a^2+1\right)y'(x)^2+\left(y(x)^2-1\right)\left(a^2y(x)^2-1\right)y''(x)=0$$

✓ **Mathematica** : cpu = 0.972327 (sec), leaf count = 124

$$\left\{\left\{y(x)\to\text{InverseFunction}\left[\int_1^{\#1}\frac{\exp\left(\frac{b\sqrt{1-K[1]^2}\sqrt{1-a^2K[1]^2}F\left(\sin^{-1}(K[1])|a^2\right)}{\sqrt{(K[1]^2-1)(a^2K[1]^2-1)}}+\frac{1}{2}(-\log(1-K[1])-\log(K[1]+1\right.}{c_1}\right.\right.\right.$$

✓ **Maple** : cpu = 0.341 (sec), leaf count = 72

$$\left\{\int^{y(x)}e^{\int\frac{1}{(\_b^2-1)(\_b^2a^2-1)}\left(-2\_b^3a^2+\_b\,a^2+b\sqrt{(\_b^2-1)(\_b^2a^2-1)}+\_b\right)\mathrm{d}\_b}d\_b-\_C1\,x-\_C2=0\right\}$$

2.1809 ODE No. 1809

$$y''(x)\left(ax^2+2bx+c+y(x)^2\right)^2+dy(x)=0$$

✗ **Mathematica** : cpu = 17.9443 (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 = 2.358 (sec), leaf count = 336

$$\left\{y(x)=RootOf\left(-\int^{\_Z}\frac{a}{-\_f^4ac+\_f^4b^2+\_C1\,\_f^2a^2-c\_f^2a+b^2\_f^2+\_C1\,a^2+d}\sqrt{(-\_f^4ac+\_f^4b^2+\right.\right.$$

2.1810 ODE No. 1810

$$\sqrt{y(x)}y''(x)-a=0$$

✓ **Mathematica** : cpu = 0.074181 (sec), leaf count = 1677

$$\left\{\left\{y(x)\to\frac{3c_1{}^2}{16a^2}+\frac{\sqrt[3]{-\frac{221184c_1{}^6}{a^6}+\frac{159252480x^2c_1{}^3}{a^2}+\frac{159252480c_2{}^2c_1{}^3}{a^2}+\frac{318504960xc_2c_1{}^3}{a^2}+2293235712a^2x^4+2293235}}{}\right.\right.$$

✓ **Maple** : cpu = 0.542 (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 = 300.064 (sec), leaf count = 0 , timed out

```
$Aborted
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve((y(x)^2+x^2)^(1/2)*diff(diff(y(x),x),x)-a*(diff(y(x),x)^2+1)^(3/2)=0,y(x))
```

2.1812 ODE No. 1812

$$y'(x)^2(\log(y(x))+1)+y(x)y''(x)(1-\log(y(x)))=0$$

✓ **Mathematica** : cpu = 0.252 (sec), leaf count = 29

$$\left\{\left\{y(x)\to e^{\frac{c_1x-1+c_2c_1}{c_1(x+c_2)}}\right\}\right\}$$

✓ **Maple** : cpu = 0.269 (sec), leaf count = 19

$$\left\{y(x)=\mathrm{e}^{\frac{\_C1\,x+\_C2-1}{\_C1\,x+\_C2}}\right\}$$

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 = 26.4505 (sec), leaf count = 176

$$\left\{\left\{y(x)\to \text{InverseFunction}\left[\int_1^{\#1}-\frac{\sqrt{2}\sqrt{\cos(2K[1])a-a-2b}}{\sqrt{2aAK[1]^2+4AcK[1]^2-2aA\sin(2K[1])K[1]+2c_1-aA\cos(2K[1])}}dK[1]\right.\right.\right.$$

✓ **Maple** : cpu = 0.944 (sec), leaf count = 138

$$\left\{\int^{y(x)}\sqrt{2}\left(b+a(\sin(\_a))^2\right)\frac{1}{\sqrt{-\left(b+a(\sin(\_a))^2\right)\left(Aa(\sin(\_a))^2-2\,Aa\_a\cos(\_a)\sin(\_a)+\_a^2(a+2\right.}}\right.$$

2.1814 ODE No. 1814

$$ah(y(x))y'(x)^2+h(y(x))y''(x)+j(y(x))=0$$

✓ **Mathematica** : cpu = 0.341949 (sec), leaf count = 120

$$\left\{\left\{y(x)\to \text{InverseFunction}\left[\int_1^{\#1}-\frac{e^{aK[2]}}{\sqrt{c_1+2\int_1^{K[2]}-\frac{e^{2aK[1]}j(K[1])}{h(K[1])}dK[1]}}dK[2]\&\right][x+c_2]\right\},\left\{y(x)\to \text{InverseFun}\right.\right.$$

✓ **Maple** : cpu = 0.81 (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

$$h(y(x))^2\left(-j\left(x,\frac{y'(x)}{h(y(x))}\right)\right)-h(y(x))y'(x)^2+h(y(x))y''(x)=0$$

✗ **Mathematica** : cpu = 0.907828 (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 = 0.795 (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 = 54.67 (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 = 1.753 (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

$$(xy'(x)-y(x))\,y''(x)+4y'(x)^2=0$$

✗ **Mathematica** : cpu = 9.8947 (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 = 1.223 (sec), leaf count = 40

$$\left\{y(x)=\mathrm{e}^{\int^{\ln(x)}\mathrm{e}^{RootOf\left(\ln\left(\mathrm{e}^{\_Z}-1\right)\mathrm{e}^{\_Z}+\mathrm{e}^{\_Z}\_C1-\_Z\,\mathrm{e}^{\_Z}-\_b\,\mathrm{e}^{\_Z}+2\right)}-1d\_b+\_C2}\right\}$$

2.1818 ODE No. 1818

$$\left(xy'(x) - y(x)\right) y''(x) - \left(y'(x)^2 + 1\right)^2 = 0$$

✗ **Mathematica** : cpu = 0.820965 (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 = 0.93 (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 = 21.085 (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 = 0.355 (sec), leaf count = 42

$$\left\{y(x) = e^{\int^{\ln(x)} \mathit{RootOf}\left(-\int^{-\_Z} \frac{\_a\,a}{\_a^3a - \_a^2a + b} d\_a - \_b + \_C1\right) d\_b + \_C2}\right\}$$

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 = 321.619 (sec), leaf count = 0 , timed out

```
$Aborted
```

✓ **Maple** : cpu = 1.332 (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

$$\left(x^2+2y(x)^2y'(x)\right)y''(x)+2y(x)y'(x)^3+3xy'(x)+y(x)=0$$

✗ **Mathematica** : cpu = 41.8225 (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 = 2.853 (sec), leaf count = 54

$$\left\{y(x)=ODESolStruc\left(\_b(\_a),[\left\{(\_b(\_a))^2\left(\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a)\right)^2+\left(\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a)\right)\_a^2+\_b(\_a)\,\_a+\_C1=\right.\right.\right.$$

2.1822 ODE No. 1822

$$\left(y'(x)^2+y(x)^2\right)y''(x)+y(x)^3=0$$

✓ **Mathematica** : cpu = 0.834221 (sec), leaf count = 371

$$\left\{\left\{y(x)\to c_2\exp\left(\frac{1}{12}\left(-2\sqrt{3}\tan^{-1}\left(\frac{1+2\text{InverseFunction}\left[\frac{\left(\sqrt{3}-i\right)\tan^{-1}\left(\frac{\#1}{\sqrt{\frac{1}{2}\left(1-i\sqrt{3}\right)}}\right)}{\sqrt{6\left(1-i\sqrt{3}\right)}}+\frac{\left(\sqrt{3}+i\right)\tan^{-1}\left(\frac{\#1}{\sqrt{\frac{1}{2}\left(1+i\sqrt{\right.}\right.}}\right.}{\sqrt{6\left(1+i\sqrt{3}\right)}}\right.}{\sqrt{3}}\right.\right.\right.\right.\right.$$

✓ **Maple** : cpu = 7.146 (sec), leaf count = 293

$$\left\{y(x)=\left(\_C1+\tan\left(\sqrt{3}x\right)\right)^{\left(2\_C1^2+2\right)^{-1}}\_C2\left(\_C1+\tan\left(\sqrt{3}x\right)\right)^{\frac{\_C1^2}{2\_C1^2+2}}\left(1+\left(\tan\left(\sqrt{3}x\right)\right)^2\right)^{-\frac{\_C1^2}{4\_C1^2+4}}\left(1\right.\right.$$

2.1823 ODE No. 1823

$$y''(x)\left(a\left(xy'(x)-y(x)\right)+y'(x)^2\right)-b=0$$

✗ **Mathematica** : cpu = 0.110996 (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 = 0.752 (sec), leaf count = 289

$$\left\{y(x)=-\frac{ax^2}{4}+RootOf\left(-x-\int^{\_Z}\frac{1}{a^2\_f^2-4\_f\,b+2\_C1}\sqrt{\left(a^2\_f^2-4\_f\,b+2\_C1\right)\left(a\_f+\sqrt{4\_f\,b-2\right.}\right.}\right.\right.$$

2.1824 ODE No. 1824

$$y''(x)\left(a\sqrt{y'(x)^2+1}-xy'(x)\right)-y'(x)^2-1=0$$

✓ **Mathematica** : cpu = 0.659107 (sec), leaf count = 347

$$\left\{\left\{y(x)\to\frac{-2\sqrt{x^2\left(a^2-x^2+c_1{}^2\right)}+c_1x\log\left(-c_1\left(\sqrt{x^2\left(a^2-x^2+c_1{}^2\right)}+c_1x\right)+a^2(-x)+ax^2\right)+c_1x\log\left(c_1\left(\right.\right.}{}\right.\right.$$

✓ **Maple** : cpu = 1.071 (sec), leaf count = 96

$$\left\{y(x)=\int\frac{1}{a^3-ax^2}\left(-\_C1\;a^2-x\sqrt{a^2\left(\_C1^2+a^2-x^2\right)}\right)\mathrm{d}x+\_C2,y(x)=\int\frac{1}{a^3-ax^2}\left(-\_C1\;a^2+x\sqrt{a^2}\right.\right.$$

2.1825 ODE No. 1825

$$f(x)+y''(x)h(y'(x))+j(y(x))y'(x)=0$$

✗ **Mathematica** : cpu = 0.0279592 (sec), leaf count = 0 , could not solve

```
DSolve[f[x] + j[y[x]]*Derivative[1][y][x] + h[Derivative[1][y][x]]*Derivative[2][y][x] == 0,
```

✓ **Maple** : cpu = 1.146 (sec), leaf count = 49

$$\left\{y(x)=ODESolStruc\left(\_f(\_b),[\left\{\int^{\_f(\_b)}1d\_a+\int^{\frac{\mathrm{d}}{\mathrm{d}\_b}\_f(\_b)}h(\_a)\,d\_a+\_b\,f+\_C1=0\right\},\{\_b=x,\_f(\right.\right.$$

2.1826 ODE No. 1826

$$-ay(x)-b+y''(x)^2=0$$

✓ **Mathematica** : cpu = 0.59255 (sec), leaf count = 201

$$\left\{\text{Solve}\left[\frac{(ay(x)+b)^2\left(1-\frac{4(ay(x)+b)^{3/2}}{3ac_1}\right)\,{}_2F_1\left(\frac{1}{2},\frac{2}{3};\frac{5}{3};\frac{4(b+ay(x))^{3/2}}{3ac_1}\right)^2}{a^2\left(-\frac{4(ay(x)+b)^{3/2}}{3a}+c_1\right)}=(x+c_2)^2,y(x)\right],\text{Solve}\left[\frac{(ay(x)+b)^2\left(1-\right.}{}\right.\right.$$

✓ **Maple** : cpu = 1.428 (sec), leaf count = 173

$$\left\{\int^{y(x)}\sqrt{3}a\frac{1}{\sqrt{a\left(4\_a\sqrt{\_a\,a+b}a+4\,b\sqrt{\_a\,a+b}-\_C1\right)}}d\_a-x-\_C2=0,\int^{y(x)}-3\frac{a}{\sqrt{-12\,a\left((\_a\,a+b)^{3/}\right.}}\right.$$

2.1827 ODE No. 1827

$$a^2y''(x)^2 - 2axy''(x) + y'(x) = 0$$

✗ **Mathematica** : cpu = 0.795138 (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 = 19.836 (sec), leaf count = 81

$$\left\{y(x) = \int RootOf\left(-\int_{\_g}^{\_Z}\left(x\sqrt{x^2-\_f}-x^2+2\,a\_f\right)^{-1}\mathrm{d}\_f+\_C1\right)\mathrm{d}x+\_C2, y(x) = \int RootOf\left(-\int_{\_g}^{\_Z}\left(\right.\right.$$

2.1828 ODE No. 1828

$$2(x^2+1)\,y''(x)^2 - x(4y'(x)+x)\,y''(x) + 2y'(x)\,(y'(x)+x) - 2y(x) = 0$$

✓ **Mathematica** : cpu = 0.0073533 (sec), leaf count = 32

$$\left\{\left\{y(x) \to -\frac{1}{2}\sqrt{c_2 - c_1{}^2}x^2 + c_1x + c_2\right\}\right\}$$

✓ **Maple** : cpu = 1.424 (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

$$3x^2y''(x)^2 - 2(3xy'(x)+y(x))\,y''(x) + 4y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.0047277 (sec), leaf count = 24

$$\left\{\left\{y(x) \to \frac{c_1{}^2x^2}{c_2} + c_1x + c_2\right\}\right\}$$

✓ **Maple** : cpu = 2.731 (sec), leaf count = 36

$$\left\{y(x) = 0, y(x) = x^{\frac{2\sqrt{3}}{3}}\_C1\,x, y(x) = \frac{\_C1^2x^2}{\_C2} + \_C1\,x + \_C2\right\}$$

2.1830 ODE No. 1830

$$(2-9x)x^2y''(x)^2-6(1-6x)xy'(x)y''(x)-36xy'(x)^2+6y(x)y''(x)=0$$

✓ **Mathematica** : cpu = 0.0221828 (sec), leaf count = 24

$$\left\{\left\{y(x)\to\frac{c_1{}^2x^3}{c_2}+c_1x+c_2\right\}\right\}$$

✓ **Maple** : cpu = 1.432 (sec), leaf count = 308

$$\left\{y(x)=0, y(x)=\frac{27\sqrt{5}\_C1\sqrt{4x}}{4}\left((9x-1)\sqrt{9}+9\sqrt{9x^2-2x}\right)^{-\frac{5\sqrt{9}}{18}}\sqrt{\left(\frac{4}{5}+\sqrt{16}\left(x-\frac{1}{5}\right)\frac{1}{\sqrt{9x^2-2x}}\right)\frac{}{\sqrt{}}}\right.$$

2.1831 ODE No. 1831

$$y'(x)\left((xF(1,2)+xF(2,1))y''(x)+y(x)(xF(0,1)+xF(1,0))\right)+y(x)(xF(0,2)+xF(2,0))y''(x)+xF(2,2)y''(x)^2+$$

✗ **Mathematica** : cpu = 300.003 (sec), leaf count = 0 , timed out

```
$Aborted
```

✓ **Maple** : cpu = 3.775 (sec), leaf count = 163

$$\left\{y(x)=ODESolStruc\left(e^{\int\_b(\_a)\,d\_a+\_C1},[\left\{\frac{d}{d\_a}\_b(\_a)=\frac{1}{2\,(F_{2,2})\,(\_a)}\left(\sqrt{\left(((F_{2,1})\,(\_a))^2+2\,(F_{2,1})\,(\_a)\,(F\right.}\right.\right.\right.\right.$$

2.1832 ODE No. 1832

$$y(x)y''(x)^2-ae^{2x}=0$$

✗ **Mathematica** : cpu = 20.2112 (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 = 3.276 (sec), leaf count = 117

$$\left\{y(x)=ODESolStruc\left(\_a\left(e^{-\frac{2\int\_b(\_a)\,d\_a}{3}-\frac{2\_C1}{3}}\right)^{-1},[\left\{\frac{d}{d\_a}\_b(\_a)=-\frac{(\_b(\_a))^3}{9\_a}\left(-4\_a^2+9\sqrt{\_a\,a}\right)+\frac{4\,(}{}\right.\right.\right.$$

2.1833 ODE No. 1833

$$y''(x)^2\left(a^2y(x)^2-b^2\right)-2a^2y(x)y'(x)^2y''(x)+y'(x)^2\left(a^2y'(x)^2-1\right)=0$$

✗ **Mathematica** : cpu = 300.032 (sec), leaf count = 0 , timed out

```
$Aborted
```

✓ **Maple** : cpu = 7.275 (sec), leaf count = 162

$$\left\{y(x)=\_C1, y(x)=\frac{b}{a}, y(x)=b\left(e^{\frac{\_C2+x}{b}\sqrt{\_C1^2a^2-1}}-\_C1\right)\frac{1}{\sqrt{\_C1^2a^2-1}}, y(x)=\frac{b}{a}\tan\left(\frac{-x+\_C1}{ab}\sqrt{a^2}\right)\right.$$

2.1834 ODE No. 1834

$$\left(x^2\left(-y'(x)^2\right)+x^2y(x)y''(x)+y(x)^2\right)^2-4xy(x)\left(xy'(x)-y(x)\right)^3=0$$

✗ **Mathematica** : cpu = 14.8484 (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 = 1.007 (sec), leaf count = 92

$$\left\{y(x)=0, y(x)=\_C1\,x, y(x)=ODESolStruc\left(e^{\int\_b(\_a)\,d\_a+\_C1},[\left\{\frac{d}{d\_a}\_b(\_a)=\frac{1}{\_a^2}\left(-2\sqrt{\_a\left(-1+\_b(\right.}\right.\right.\right.$$

2.1835 ODE No. 1835

$$32y''(x)\left(xy''(x)-y'(x)\right)^3+\left(2y(x)y''(x)-y'(x)^2\right)^3=0$$

✓ **Mathematica** : cpu = 0.0770229 (sec), leaf count = 143

$$\left\{\left\{y(x)\to\frac{1}{4}\left(-\frac{8c_1{}^3}{\sqrt[3]{3}\sqrt[3]{\sqrt{3}\sqrt{27c_1{}^{10}c_2{}^{10}-64c_1{}^9c_2{}^9}-9c_1{}^5c_2{}^5}}+\frac{c_1{}^2}{c_2}-\frac{2\sqrt[3]{\sqrt{3}\sqrt{27c_1{}^{10}c_2{}^{10}-64c_1{}^9c_2{}^9}-9c_1{}^5c_2{}^5}}{3^{2/3}c_2{}^3}\right)\right.\right.$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve((2*diff(diff(y(x),x),x)*y(x)-diff(y(x),x)^2)^3+32*diff(diff(y(x),x),x)*(x*diff(diff(y
diff(y(x),x))^3=0,y(x))
```

2.1836 ODE No. 1836

$$\sqrt{ay''(x)^2 + by'(x)^2} + cy(x)y''(x) + dy'(x)^2 = 0$$

✗ **Mathematica** : cpu = 9.49023 (sec), leaf count = 0 , could not solve

```
DSolve[d*Derivative[1][y][x]^2 + c*y[x]*Derivative[2][y][x] + Sqrt[b*Derivative[1][y][x]^2 +
```

✓ **Maple** : cpu = 1.715 (sec), leaf count = 116

$$\left\{y(x) = 0, y(x) = \_C1, y(x) = \_C1\, x + \_C2, y(x) = ODESolStruc\left(\_a, [\left\{\frac{\_b(\_a)}{-c^2\_a^2 + a}\left(\left(\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a)\right)(-c^2\right.\right.\right.$$

2.1837 ODE No. 1837

$$y^{(3)}(x) - a^2\left(y'(x)^5 + 2y'(x)^3 + y'(x)\right) = 0$$

✗ **Mathematica** : cpu = 10.6181 (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 = 0.744 (sec), leaf count = 95

$$\left\{y(x) = \int RootOf\left(-3\int^{\_Z}\frac{1}{\sqrt{3\,a^2\_f^6 + 9\,a^2\_f^4 + 9\,a^2\_f^2 + 9\_C1}}d\_f + x + \_C2\right)\mathrm{d}x + \_C3, y(x) = \int R\right.$$

2.1838 ODE No. 1838

$$-y'(x)^2 + y(x)y''(x) + y^{(3)}(x) + 1 = 0$$

✗ **Mathematica** : cpu = 0.0167334 (sec), leaf count = 0 , could not solve

```
DSolve[1 - Derivative[1][y][x]^2 + y[x]*Derivative[2][y][x] + Derivative[3][y][x] == 0, y[x]
```

✓ **Maple** : cpu = 0.816 (sec), leaf count = 73

$$\left\{y(x) = ODESolStruc\left(\_a, [\left\{\left(\frac{\mathrm{d}^2}{\mathrm{d}\_a^2}\_b(\_a)\right)(\_b(\_a))^2 + \left(\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a)\right)^2\_b(\_a) + \left(\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a)\right)\_b(\_\right.\right.\right.$$

2.1839 ODE No. 1839

$$y'(x)^2 - y(x)y''(x) + y^{(3)}(x) = 0$$

✗ **Mathematica** : cpu = 0.0161299 (sec), leaf count = 0 , could not solve

```
DSolve[Derivative[1][y][x]^2 - y[x]*Derivative[2][y][x] + Derivative[3][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 1.006 (sec), leaf count = 116

$$\left\{y(x) = ODESolStruc\left(e^{\int \_g(\_f)\,d\_f + \_C2}, [\left\{\frac{d}{d\_f}\_g(\_f) = 6\,\frac{(\_g(\_f)\,\_f + 1)\,(1/6 + (\_f - 1/6)\,\_g(\_f))\,\_g(\_\right.}{\_f}\right.\right.$$

2.1840 ODE No. 1840

$$ay(x)y''(x) + y^{(3)}(x) = 0$$

✗ **Mathematica** : cpu = 0.0201772 (sec), leaf count = 0 , could not solve

```
DSolve[a*y[x]*Derivative[2][y][x] + Derivative[3][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 1.031 (sec), leaf count = 129

$$\left\{y(x) = ODESolStruc\left(e^{\int \_g(\_f)\,d\_f + \_C2}, [\left\{\frac{d}{d\_f}\_g(\_f) = \frac{\_g(\_f)\left(6\,(\_g(\_f))^2\,\_f^2 + 2\,(\_g(\_f))^2\,\_f\,a + 7\,\_\right.}{\_f}\right.\right.$$

2.1841 ODE No. 1841

$$-f(x) + x^2y^{(3)}(x) + (2xy(x) - 1)y'(x) + xy''(x) + y(x)^2 = 0$$

✗ **Mathematica** : cpu = 0.0763858 (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 = 0.731 (sec), leaf count = 60

$$\left\{y(x) = ODESolStruc\left(\_b(\_a), [\left\{\_a^2\frac{d^2}{d\_a^2}\_b(\_a) + \_a\,(\_b(\_a))^2 - \_a\,\frac{d}{d\_a}\_b(\_a) - \int f(\_a)\,d\_a + \_C\right.\right.\right.$$

2.1842 ODE No. 1842

$$x^2 y^{(3)}(x) + xy'(x)^2 + (1 - y(x))y'(x) + x(y(x) - 1)y''(x) = 0$$

✓ **Mathematica** : cpu = 0.15299 (sec), leaf count = 286

$$\left\{\left\{y(x) \to \frac{2x\left(c_3\left(J_{\frac{\sqrt{c_2+2}}{\sqrt{2}}}\left(-\frac{1}{2}ix\sqrt{c_1}\right) - \frac{1}{4}i\sqrt{c_1}x\left(J_{\frac{\sqrt{c_2+2}}{\sqrt{2}}-1}\left(-\frac{1}{2}ix\sqrt{c_1}\right) - J_{\frac{\sqrt{c_2+2}}{\sqrt{2}}+1}\left(-\frac{1}{2}ix\sqrt{c_1}\right)\right)\right) + Y_{\frac{\sqrt{c_2+2}}{\sqrt{2}}}\left(-\frac{1}{2}\right.\right.}{c_3 x J_{\frac{\sqrt{c_2+2}}{\sqrt{2}}}\left(-\frac{1}{2}ix\sqrt{c_1}\right) + xY_{\frac{\sqrt{c_2+2}}{\sqrt{2}}}\left(-\frac{1}{2}i\right.}\right.\right.$$

✓ **Maple** : cpu = 1.368 (sec), leaf count = 190

$$\left\{\ln(x) + 2\int^{y(x)}\left(2\left(RootOf\left(-2\sqrt{4+\_C1}Y_{1/2\sqrt{4+\_C1}}\left(1/2\sqrt{2}\_Z\right)\_C2 + 2Y_{1/2\sqrt{4+\_C1}}\left(1/2\sqrt{2}\_Z\right)\_C2\right.\right.\right.\right.$$

2.1843 ODE No. 1843

$$-y'(x)y''(x) + y(x)^3 y'(x) + y^{(3)}(x)y(x) = 0$$

✓ **Mathematica** : cpu = 2.00802 (sec), leaf count = 409

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[-\frac{2i\sqrt{1+\frac{\#1^2}{2\left(\sqrt{c_2{}^2-c_1}-c_2\right)}}\sqrt{1-\frac{\#1^2}{2\left(c_2+\sqrt{c_2{}^2-c_1}\right)}}F\left(i\sinh^{-1}\left(\frac{\sqrt{\frac{1}{\sqrt{c_2{}^2-c_1}-c_2}}\#1}{\sqrt{2}}\right)|\frac{c_2-\sqrt{c}}{c_2+\sqrt{c}}\right.}{\sqrt{\frac{1}{\sqrt{c_2{}^2-c_1}-c_2}}\sqrt{-\frac{\#1^4}{2}+2\#1^2 c_2 - 2c_1}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.596 (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

$$-18y(x)y'(x)y''(x)+15y'(x)^3+4y(x)^2y^{(3)}(x)=0$$

✗ **Mathematica** : cpu = 0.0760898 (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 = 0.738 (sec), leaf count = 22

$$\left\{y(x)=\frac{\_C3}{(\_C2^2+2\_C2\,x+x^2-4\_C1)^2}\right\}$$

2.1845 ODE No. 1845

$$-45y(x)y'(x)y''(x)+40y'(x)^3+9y(x)^2y^{(3)}(x)=0$$

✗ **Mathematica** : cpu = 0.0736903 (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 = 0.813 (sec), leaf count = 17

$$\left\{y(x)=\_C3\left(-9+(\_C2+x)^2\_C1\right)^{-\frac{3}{2}}\right\}$$

2.1846 ODE No. 1846

$$2y^{(3)}(x)y'(x)-3y'(x)^2=0$$

✓ **Mathematica** : cpu = 0.0323886 (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 = 0.044 (sec), leaf count = 28

$$\left\{y(x)=\_C1,y(x)=\_C1+\_C2\,\mathrm{e}^{\frac{\sqrt{6}x}{2}}+\_C3\,\mathrm{e}^{-\frac{\sqrt{6}x}{2}}\right\}$$

2.1847 ODE No. 1847

$$y^{(3)}(x)\left(y'(x)^2+1\right)-3y'(x)y''(x)^2=0$$

✓ **Mathematica** : cpu = 0.173889 (sec), leaf count = 95

$$\left\{\left\{y(x)\to c_3-\frac{i\sqrt{c_1{}^2x^2+2c_2c_1{}^2x-1+c_2{}^2c_1{}^2}}{c_1}\right\},\left\{y(x)\to \frac{i\sqrt{c_1{}^2x^2+2c_2c_1{}^2x-1+c_2{}^2c_1{}^2}}{c_1}+c_3\right\}\right\}$$

✓ **Maple** : cpu = 1.056 (sec), leaf count = 49

$$\left\{y(x)=-\sqrt{-\_C2^2-2\_C2\,x-x^2+\_C1}+\_C3,y(x)=\sqrt{-\_C2^2-2\_C2\,x-x^2+\_C1}+\_C3\right\}$$

2.1848 ODE No. 1848

$$y^{(3)}(x)\left(y'(x)^2+1\right)-y''(x)^2\left(a+3y'(x)\right)=0$$

✓ **Mathematica** : cpu = 0.39685 (sec), leaf count = 187

$$\left\{\left\{y(x)\to c_3-\frac{\left(1-i\text{InverseFunction}\left[\frac{(\#1-a)e^{-a\tan^{-1}(\#1)}}{\sqrt{\#1^2+1}(a^2+1)c_1}\&\right][x+c_2]\right)^{-\frac{1}{2}-\frac{ia}{2}}\left(1+i\text{InverseFunction}\left[\frac{(\#1-a)e^{-a\,t}}{\sqrt{\#1^2+1}(a}\right.\right.}{(a^2+1)\,c_1}\right.\right.$$

✓ **Maple** : cpu = 3.541 (sec), leaf count = 789

$$\left\{y(x)=\int\frac{\sin\left(RootOf\left(e^{2\_Z\,a}\_C1^2\_C2^2a^4+2\,e^{2\_Z\,a}\_C1^2\_C2\,a^4x+e^{2\_Z\,a}\_C1^2a^4x^2+2\,e^{2\_Z\,a}\_C1^2\_C\right.\right.}{\cos\left(RootOf\left(e^{2\_Z\,a}\_C1^2\_C2^2a^4+2\,e^{2\_Z\,a}\_C1^2\_C2\,a^4x+e^{2\_Z\,a}\_C1^2a^4x^2+2\,e^{2\_Z\,a}\_C1^2\_C\right.\right.}\right.$$

2.1849 ODE No. 1849

$$y^{(3)}(x)y''(x)-a\sqrt{b^2y''(x)^2+1}=0$$

✓ **Mathematica** : cpu = 0.555936 (sec), leaf count = 426

$$\left\{\left\{y(x)\to\frac{\frac{(a^2b^4x^2+2ab^4c_1x+b^4c_1{}^2-1)^{3/2}}{3ab^2}+\frac{\sqrt{a^2b^4x^2+2ab^4c_1x+b^4c_1{}^2-1}}{ab^2}-\frac{c_1\log\left(\sqrt{a^2b^4x^2+2ab^4c_1x+b^4c_1{}^2-1}+ab^2x+b^2c_1\right)}{a}-x\,\mathrm{lo}}{2ab^3}\right.\right.$$

✓ **Maple** : cpu = 0.523 (sec), leaf count = 197

$$\left\{y(x)=\_C2\,x+\int\frac{1}{2\,b}\left(-\ln\left(\sqrt{(-1+b^2\,(x+\_C1)\,a)\,(1+b^2\,(x+\_C1)\,a)}+(x+\_C1)\,b^4a^2\frac{1}{\sqrt{a^2b^4}}\right)\frac{1}{\sqrt{a^2b^4}}\right.\right.$$

2.1850 ODE No. 1850

$$y^{(3)}(x)y'(x)^3 + y^{(4)}(x)y'(x) - y^{(3)}(x)y''(x) = 0$$

✗ **Mathematica** : cpu = 0.0960456 (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 = 1.661 (sec), leaf count = 164

$$\left\{ y(x) = ODESolStruc\left(\left(\int \frac{\_j(\_h)}{e^{\int \_j(\_h)\,d\_h + \_C2}\,\_h}\,d\_h + \_C3, [\left\{ \frac{d}{d\_h}\_j(\_h) = \frac{\_j(\_h)\left(12\,(\_j(\_h))^2\,\_h^2 + 3\,\_\right.}{} \right.\right.\right.$$

2.1851 ODE No. 1851

$$y'(x)^3\left(f'(x)y'(x) + f(x)y''(x)\right) + y'(x)\left(f^{(3)}(x)y'(x) + 3y^{(3)}(x)f'(x) + 3f''(x)y''(x) + f(x)y^{(4)}(x)\right) - y''(x)\left(f''(x\right.$$

✗ **Mathematica** : cpu = 0.325464 (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 = 0.0987539 (sec), leaf count = 28

$$\left\{\left\{y(x) \to c_2\left(-\sqrt{2x + 3c_1}\right) + c_4x + c_3\right\}\right\}$$

✓ **Maple** : cpu = 0.812 (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

$$-45y^{(4)}(x)y^{(3)}(x)y''(x)+9y^{(5)}(x)y''(x)^2+40y^{(3)}(x)^3=0$$

✗ **Mathematica** : cpu = 0.065138 (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 = 3.56 (sec), leaf count = 110

$$\left\{y(x)=\iint RootOf\left(-\int^{\_Z}\left(RootOf\left(-20\ln\left(\_f\right)+\int^{\_Z}\_k\left(\mathrm{e}^{RootOf\left(81\_k^2\mathrm{e}^{\_Z}+20\,\mathrm{e}^{\_Z}\ln\left(\mathrm{e}^{\_Z}+27\right)-40\,\mathrm{e}^{\_Z}\ln(2)-20\right.}\right.\right.\right.\right.$$

2.1854 ODE No. 1854

$$y^{(n)}(x)-f\left(\frac{\partial^{n-1}y(x)}{\partial x^{n-1}}\right)=0$$

✗ **Mathematica** : cpu = 0.0071698 (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 = 0.0026398 (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 = 0.0070033 (sec), leaf count = 22

$$\{\{x(t) \to c_1 e^{at}, y(t) \to bt + c_2\}\}$$

✓ **Maple** : cpu = 0.1 (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 = 0.009591 (sec), leaf count = 39

$$\{\{x(t) \to c_1 \cos(at) + c_2 \sin(at), y(t) \to c_2 \cos(at) - c_1 \sin(at)\}\}$$

✓ **Maple** : cpu = 0.042 (sec), leaf count = 35

$$\{\{x(t) = \_C1\ \sin(at) + \_C2\ \cos(at), y(t) = \cos(at)\,\_C1 - \sin(at)\,\_C2\}\}$$

2.1858 ODE No. 1858

$$\{x'(t) = ay(t), y'(t) = bx(t)\}$$

✓ **Mathematica** : cpu = 0.0072151 (sec), leaf count = 182

$$\left\{\left\{x(t) \to \frac{1}{2} c_1 e^{-\sqrt{a}\sqrt{b}t}\left(e^{2\sqrt{a}\sqrt{b}t} + 1\right) + \frac{\sqrt{a} c_2 e^{-\sqrt{a}\sqrt{b}t}\left(e^{2\sqrt{a}\sqrt{b}t} - 1\right)}{2\sqrt{b}}, y(t) \to \frac{\sqrt{b} c_1 e^{-\sqrt{a}\sqrt{b}t}\left(e^{2\sqrt{a}\sqrt{b}t} - 1\right)}{2\sqrt{a}} + \frac{1}{2} c_2 e\right.\right.$$

✓ **Maple** : cpu = 0.047 (sec), leaf count = 64

$$\left\{\left\{x(t) = \_C1\, e^{\sqrt{a}\sqrt{b}t} + \_C2\, e^{-\sqrt{a}\sqrt{b}t}, y(t) = \sqrt{b}\left(\_C1\, e^{\sqrt{a}\sqrt{b}t} - \_C2\, e^{-\sqrt{a}\sqrt{b}t}\right) \frac{1}{\sqrt{a}}\right\}\right\}$$

2.1859 ODE No. 1859

$$\{x'(t) = ax(t) - y(t), y'(t) = ay(t) + x(t)\}$$

✓ **Mathematica** : cpu = 0.0040987 (sec), leaf count = 51

$$\{\{x(t) \to c_1 e^{at} \cos(t) - c_2 e^{at} \sin(t), y(t) \to c_2 e^{at} \cos(t) + c_1 e^{at} \sin(t)\}\}$$

✓ **Maple** : cpu = 0.036 (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 = 0.0301451 (sec), leaf count = 696

$$\left\{\left\{x(t) \to \frac{c_1\left(a\left(-e^{\frac{1}{2}t\left(-\sqrt{a^2-2ab+b^2+4bc}+a+b\right)}\right) + ae^{\frac{1}{2}t\left(\sqrt{a^2-2ab+b^2+4bc}+a+b\right)} + be^{\frac{1}{2}t\left(-\sqrt{a^2-2ab+b^2+4bc}+a+b\right)} + \sqrt{a^2\cdots}\right.}{2\cdots}\right.\right.$$

✓ **Maple** : cpu = 0.185 (sec), leaf count = 177

$$\left\{\left\{x(t) = \_C1\, e^{\frac{t}{2}\left(a+b+\sqrt{b^2+(-2a+4c)b+a^2}\right)} + \_C2\, e^{\frac{t}{2}\left(a+b-\sqrt{b^2+(-2a+4c)b+a^2}\right)}, y(t) = \frac{1}{2b}\left(-\_C2\left(a - b + \sqrt{b^2 + \cdots}\right.\right.\right.\right.$$

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 = 0.0095604 (sec), leaf count = 183

$$\left\{\left\{x(t) \to c_1 e^{\frac{t(a\alpha+b\beta)}{a^2+b^2}} \cos\left(\frac{t(a\beta-\alpha b)}{a^2+b^2}\right) + c_2 e^{\frac{t(a\alpha+b\beta)}{a^2+b^2}} \sin\left(\frac{t(a\beta-\alpha b)}{a^2+b^2}\right), y(t) \to c_2 e^{\frac{t(a\alpha+b\beta)}{a^2+b^2}} \cos\left(\frac{t(a\beta-\alpha b)}{a^2+b^2}\right) - \cdots\right.\right.$$

✓ **Maple** : cpu = 0.244 (sec), leaf count = 152

$$\left\{\left\{x(t) = \_C1\, e^{\frac{t((i\beta+\alpha)a-(i\alpha-\beta)b)}{a^2+b^2}} + \_C2\, e^{-\frac{t((i\beta-\alpha)a-(i\alpha+\beta)b)}{a^2+b^2}}, y(t) = i\left(\_C1\, e^{\frac{t((i\beta+\alpha)a-(i\alpha-\beta)b)}{a^2+b^2}} - \_C2\, e^{-\frac{t((i\beta-\alpha)a-(i\alpha+\cdots}{a^2+b^2}}\right.\right.\right.$$

2.1862 ODE No. 1862

$$\{x'(t) = -y(t), y'(t) = 2x(t) + 2y(t)\}$$

✓ **Mathematica** : cpu = 0.011661 (sec), leaf count = 52

$$\{\{x(t) \to c_1 e^t(\cos(t) - \sin(t)) - c_2 e^t \sin(t), y(t) \to 2c_1 e^t \sin(t) + c_2 e^t(\sin(t) + \cos(t))\}\}$$

✓ **Maple** : cpu = 0.037 (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 = 0.0053396 (sec), leaf count = 84

$$\left\{\left\{x(t) \to \frac{1}{3}c_1 e^{-7t}(2e^{6t} + 1) - \frac{2}{3}c_2 e^{-7t}(e^{6t} - 1), y(t) \to \frac{1}{3}c_2 e^{-7t}(e^{6t} + 2) - \frac{1}{3}c_1 e^{-7t}(e^{6t} - 1)\right\}\right\}$$

✓ **Maple** : cpu = 0.033 (sec), leaf count = 35

$$\left\{\left\{x(t) = \_C1\, e^{-7t} + \_C2\, e^{-t}, y(t) = \_C1\, e^{-7t} - \frac{\_C2\, e^{-t}}{2}\right\}\right\}$$

2.1864 ODE No. 1864

$$\{x'(t) = -5x(t) - 2y(t), y'(t) = x(t) - 7y(t)\}$$

✓ **Mathematica** : cpu = 0.0084302 (sec), leaf count = 59

$$\{\{x(t) \to c_1 e^{-6t}(\sin(t) + \cos(t)) - 2c_2 e^{-6t}\sin(t), y(t) \to c_1 e^{-6t}\sin(t) + c_2 e^{-6t}(\cos(t) - \sin(t))\}\}$$

✓ **Maple** : cpu = 0.037 (sec), leaf count = 44

$$\left\{\left\{x(t) = e^{-6t}(\sin(t)\_C1 + \cos(t)\_C2), y(t) = -\frac{((\_C1 - \_C2)\cos(t) - \sin(t)(\_C1 + \_C2))e^{-6t}}{2}\right\}\right\}$$

2.1865 ODE No. 1865

$$\{x'(t) = \mathrm{a1}x(t) + \mathrm{b1}y(t) + \mathrm{c1}, y'(t) = \mathrm{a2}x(t) + \mathrm{b2}y(t) + \mathrm{c2}\}$$

✓ **Mathematica** : cpu = 0.720661 (sec), leaf count = 2062

$$\left\{\left\{x(t) \to -\frac{\mathrm{b1}e^{-\frac{1}{2}\left(\mathrm{a1}+\mathrm{b2}+\sqrt{\mathrm{a1}^2-2\mathrm{b2}\mathrm{a1}+\mathrm{b2}^2+4\mathrm{a2}\mathrm{b1}}\right)t}\left(\frac{2\left(\left(\mathrm{a1}-\mathrm{b2}+\sqrt{\mathrm{a1}^2-2\mathrm{b2}\mathrm{a1}+\mathrm{b2}^2+4\mathrm{a2}\mathrm{b1}}\right)\mathrm{c2}-2\mathrm{a2}\mathrm{c1}\right)e^{\sqrt{\mathrm{a1}^2-2\mathrm{b2}\mathrm{a1}+\mathrm{b2}^2+4\mathrm{a2}\mathrm{b1}}t}}{-\mathrm{a1}-\mathrm{b2}+\sqrt{\mathrm{a1}^2-2\mathrm{b2}\mathrm{a1}+\mathrm{b2}^2+4\mathrm{a2}\mathrm{b1}}}\right.}{2\left(\mathrm{a1}^2\right.}\right.\right.$$

✓ **Maple** : cpu = 0.242 (sec), leaf count = 224

$$\left\{\left\{x(t) = \mathrm{e}^{\frac{t}{2}\left(a1+b2+\sqrt{a1^2-2\,a1\,b2+4\,a2\,b1+b2^2}\right)}\_C2 + \mathrm{e}^{\frac{t}{2}\left(a1+b2-\sqrt{a1^2-2\,a1\,b2+4\,a2\,b1+b2^2}\right)}\_C1 + \frac{c2\,b1 - b2\,c1}{a1\,b2 - a2\,b1}, y\right.\right.$$

2.1866 ODE No. 1866

$$\{x'(t) + 2y(t) = 3t, y'(t) - 2x(t) = 4\}$$

✓ **Mathematica** : cpu = 0.0355605 (sec), leaf count = 132

$$\left\{\left\{x(t) \to \cos(2t)\left(\frac{3}{2}t\sin(2t) - \frac{5}{4}\cos(2t)\right) - \sin(2t)\left(\frac{5}{4}\sin(2t) + \frac{3}{2}t\cos(2t)\right) + c_1\cos(2t) - c_2\sin(2t), y(t) \to \mathrm{co}\right.\right.$$

✓ **Maple** : cpu = 0.037 (sec), leaf count = 39

$$\left\{\left\{x(t) = \sin(2\,t)\,\_C2 + \cos(2\,t)\,\_C1 - \frac{5}{4}, y(t) = -\cos(2\,t)\,\_C2 + \sin(2\,t)\,\_C1 + \frac{3\,t}{2}\right\}\right\}$$

2.1867 ODE No. 1867

$$\{-t^2 + x'(t) + y(t) + 6t + 1 = 0, y'(t) - x(t) = -3t^2 + 3t + 1\}$$

✓ **Mathematica** : cpu = 0.0836089 (sec), leaf count = 124

$$\{\{x(t) \to \cos(t)\left(\left(3t^2 - t - 13\right)\cos(t) + (t-12)t\sin(t)\right) - \sin(t)\left(\left(-3t^2 + t + 13\right)\sin(t) + (t-12)t\cos(t)\right) + c_1\,\mathrm{c}$$

✓ **Maple** : cpu = 0.036 (sec), leaf count = 42

$$\{\{x(t) = \sin(t)\,\_C2 + \cos(t)\,\_C1 + 3\,t^2 - t - 13, y(t) = t^2 - \cos(t)\,\_C2 + \sin(t)\,\_C1 - 12\,t\}\}$$

2.1868 ODE No. 1868

$$\{x'(t) + 3x(t) - y(t) = e^{2t}, x(t) + y'(t) + 5y(t) = e^t\}$$

✓ **Mathematica** : cpu = 0.0777104 (sec), leaf count = 162

$$\left\{\left\{x(t) \to -e^t(t+1)\left(\frac{t}{5} + \frac{1}{36}e^t(6t-7) - \frac{1}{25}\right) + e^t t\left(\frac{t}{5} + \frac{1}{36}e^t(6t-1) + \frac{4}{25}\right) + c_1 e^{-4t}(t+1) + c_2 e^{-4t}t, y(t) -\right.\right.$$

✓ **Maple** : cpu = 0.116 (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 = 0.0947238 (sec), leaf count = 118

$$\left\{\left\{x(t) \to \frac{1}{5}(t - e^t + e^{2t} + 1) + \frac{5}{72}\left(\frac{12(5712t + 833e^t + 2352e^{2t} - 5508)}{20825} + c_1 e^{-7t/5}\right), y(t) \to \frac{1}{5}(-t + e^t - e^{2t}\right.\right.$$

✓ **Maple** : cpu = 0.088 (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 = 0.132132 (sec), leaf count = 122

$$\left\{\left\{x(t) \to -\frac{3}{4}c_2(e^{4t} - 1) + \frac{1}{68}e^{-4t}(e^{4t} - 1)(34e^t + 3\sin(t) - 12\cos(t)) + \frac{1}{4}\left(2e^{-3t} + 2e^t + \frac{3}{17}e^{-4t}\sin(t) + \sin(\right.\right.\right.$$

✓ **Maple** : cpu = 0.194 (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 = 0.307059 (sec), leaf count = 180

$$\left\{\left\{x(t)\to\frac{1}{442}\left(3\left(153e^t-754\right)\sin(t)+31\left(17e^t-78\right)\cos(t)\right)(\cos(t)-\sin(t))+\frac{1}{221}\sin(t)\left(\left(493e^t-2340\right)\sin(t\right.\right.\right.$$

✓ **Maple** : cpu = 0.101 (sec), leaf count = 62

$$\left\{\left\{x(t)=\mathrm{e}^{-4t}\sin(t)\_C2+\mathrm{e}^{-4t}\cos(t)\_C1-\frac{93}{17}+\frac{31\,\mathrm{e}^t}{26}, y(t)=\frac{((-221\_C1-221\_C2)\cos(t)+221\sin(t)}{221}\right.\right.$$

2.1872 ODE No. 1872

$$\{4x'(t)+11x(t)+9y'(t)+31y(t)=e^t, 3x'(t)+8x(t)+7y'(t)+24y(t)=e^{2t}\}$$

✓ **Mathematica** : cpu = 0.107911 (sec), leaf count = 162

$$\left\{\left\{x(t)\to -e^t t\left(-\frac{4t}{5}+\frac{1}{36}e^t(30t+19)-\frac{11}{25}\right)-e^t(t-1)\left(\frac{4t}{5}-\frac{1}{36}e^t(30t+49)+\frac{31}{25}\right)-c_1e^{-4t}(t-1)-c_2e^{-4t}\right.\right.$$

✓ **Maple** : cpu = 0.092 (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

$$\{4x'(t)+44x(t)+9y'(t)+49y(t)=t, 3x'(t)+34x(t)+7y'(t)+38y(t)=e^t\}$$

✓ **Mathematica** : cpu = 0.0865288 (sec), leaf count = 322

$$\left\{\left\{x(t)\to -\frac{1}{5}e^{-6t}\left(e^{5t}-1\right)\left(\frac{16}{5}e^{6t}\left(\frac{t}{6}-\frac{1}{36}\right)+4e^{2t}-\frac{4e^{7t}}{7}-\frac{31}{5}e^t(t-1)\right)+\frac{1}{25}e^{-6t}\left(4e^{5t}+1\right)\left(e^{6t}\left(\frac{2t}{3}-\frac{1}{9}\right)\right.\right.\right.$$

✓ **Maple** : cpu = 0.093 (sec), leaf count = 52

$$\left\{\left\{x(t)=\mathrm{e}^{-6t}\_C2+\_C1\,\mathrm{e}^{-t}-\frac{56}{9}-\frac{29\,\mathrm{e}^t}{7}+\frac{19\,t}{3}, y(t)=4\,\mathrm{e}^{-6t}\_C2-\_C1\,\mathrm{e}^{-t}+\frac{24\,\mathrm{e}^t}{7}+\frac{55}{9}-\frac{17\,t}{3}\right\}\right\}$$

2.1874 ODE No. 1874

$$\{x'(t) = f(t)x(t) + g(t)y(t), y'(t) = f(t)y(t) - g(t)x(t)\}$$

✓ **Mathematica** : cpu = 0.0065051 (sec), leaf count = 115

$$\left\{\left\{x(t) \to c_1 \exp\left(\int_1^t f(K[2])dK[2]\right) \cos\left(\int_1^t g(K[1])dK[1]\right) + c_2 \exp\left(\int_1^t f(K[2])dK[2]\right) \sin\left(\int_1^t g(K[1])dK[\right.\right.$$

✓ **Maple** : cpu = 0.741 (sec), leaf count = 57

$$\left\{\left\{x(t) = \mathrm{e}^{\int \tan(\_C1 - \int g(t)\,\mathrm{d}t)g(t) + f(t)\,\mathrm{d}t}\_C2, y(t) = \mathrm{e}^{\int \tan(\_C1 - \int g(t)\,\mathrm{d}t)g(t) + f(t)\,\mathrm{d}t}\_C2\, \tan\left(\_C1 - \int g(t)\,\mathrm{d}t\right)\right\}\right\}$$

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 = 0.0049443 (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 = 1.922 (sec), leaf count = 2601

$$\left\{\left\{x(t) = \mathrm{e}^{\int -\frac{f(t)}{2a+2d}\left(\tan\left(\frac{-1+(a+d)\int f(t)\,\mathrm{d}t}{2(a+d)^2}\sqrt{-a^4-4a^2bc+2a^2d^2-8abcd-4bcd^2-d^4}\right)\sqrt{-a^4-4a^2bc+2a^2d^2-8abcd-4bcd^2-d^4}+(a+d)^2\right)\right.\right.$$

2.1876 ODE No. 1876

$$\left\{x'(t) = x(t)\cos(t), y'(t) = x(t)e^{-\sin(t)}\right\}$$

✓ **Mathematica** : cpu = 0.0164845 (sec), leaf count = 39

$$\left\{\left\{x(t) \to c_1 e^{\sin(t)}, y(t) \to c_1 \int_1^t e^{\sin(K[1]) - \sin(K[1])} dK[1] + c_2\right\}\right\}$$

✓ **Maple** : cpu = 0.308 (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 = 0.0038664 (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 = 0.033 (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 = 0.0085369 (sec), leaf count = 39

$$\left\{\left\{x(t)\to \frac{t}{3}+\frac{c_1}{t^2},y(t)\to -\frac{c_1}{t^2}-\frac{t}{3}+c_2e^t\right\}\right\}$$

✓ **Maple** : cpu = 0.152 (sec), leaf count = 39

$$\left\{\left\{x(t)=\frac{t}{3}+\frac{\_C2}{t^2},y(t)=\frac{3\_C1\,\mathrm{e}^t t^2-t^3-3\_C2}{3\,t^2}\right\}\right\}$$

2.1879 ODE No. 1879

$$\{tx'(t)+2(x(t)-y(t))=t,x(t)+ty'(t)+5y(t)=t^2\}$$

✓ **Mathematica** : cpu = 0.0225606 (sec), leaf count = 58

$$\left\{\left\{x(t)\to \frac{c_1}{t^4}+\frac{c_2}{t^3}+\frac{1}{30}t(2t+9),y(t)\to -\frac{c_1}{t^4}-\frac{c_2}{2t^3}+\frac{1}{60}t(8t-3)\right\}\right\}$$

✓ **Maple** : cpu = 0.048 (sec), leaf count = 54

$$\left\{\left\{x(t)=\frac{2\,t^6+9\,t^5+30\_C2\,t+30\_C1}{30\,t^4},y(t)=\frac{8\,t^6-3\,t^5-30\_C2\,t-60\_C1}{60\,t^4}\right\}\right\}$$

2.1880 ODE No. 1880

$\{t^2(1-\sin(t))x'(t) = t^2y(t) + tx(t)(1-2\sin(t)), t^2(1-\sin(t))y'(t) = x(t)(t\cos(t)-\sin(t)) + ty(t)(1-t\cos(t))$

✗ **Mathematica** : cpu = 0.0149678 (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 = 0.074 (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 = 0.0090748 (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 = 1.53659 (sec), leaf count = 928

$$\left\{\left\{x(t) \to \frac{1}{46}e^{t/2}c_1\left(23\cos\left(\frac{\sqrt{23}t}{2}\right) + 23e^{t/2} - 3\sqrt{23}\sin\left(\frac{\sqrt{23}t}{2}\right)\right) + \frac{e^{3t/2}\left(23e^{t/2}\cos\left(\frac{\sqrt{23}t}{2}\right) - 7\sqrt{23}e^{t/2}\sin\left(\right.\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.07 (sec), leaf count = 99

$$\left\{\left\{x(t) = \frac{e^{2t}}{4} + \_C1\,e^{t} + \_C2\,e^{\frac{t}{2}}\cos\left(\frac{\sqrt{23}t}{2}\right) + \_C3\,e^{\frac{t}{2}}\sin\left(\frac{\sqrt{23}t}{2}\right), y(t) = -\frac{7}{4}\left(\frac{\_C3\,\sqrt{23}}{7} + \_C2\right)e^{\frac{t}{2}}\cos\right.\right.$$

2.1883 ODE No. 1883

$$\{x'(t) + x(t) - y'(t) = 2t, x''(t) - 9x(t) + y'(t) + 3y(t) = \sin(2t)\}$$

✓ **Mathematica** : cpu = 0.866423 (sec), leaf count = 602

$$\left\{\left\{x(t) \to \frac{e^{-4t}\left(20e^{4t}t + 7e^{4t} + 9\right)\left(10400\left(t^2 + 2t + 2\right) + \left(260t - 225e^{4t} - 351\right)\sin(2t) + 2\left(260t + 75e^{4t} - 91\right)\text{co}\right.}{83200}\right.\right.$$

✓ **Maple** : cpu = 0.126 (sec), leaf count = 80

$$\left\{\left\{x(t) = 4 + 2\,t - \frac{36\,\sin(2\,t)}{325} - \frac{2\,\cos(2\,t)}{325} + \_C1\,e^{t} + \_C2\,e^{-3\,t} + \_C3\,te^{t}, y(t) = -\frac{37\,\sin(2\,t)}{325} + \frac{16\,\cos(2\,t)}{325}\right.\right.$$

2.1884 ODE No. 1884

$$\{x'(t) - x(t) + 2y(t) = 0, x''(t) - 2y'(t) = 2t - \cos(2t)\}$$

✓ **Mathematica** : cpu = 0.40112 (sec), leaf count = 224

$$\left\{\left\{x(t) \to 7\left(t^2 - \frac{1}{2}\sin(2t) + c_2\right) + 8\left(\frac{1}{136}e^{-t/2}\left(2e^{t/2}\cos(2t) - 4\left(34e^{t/2}t^2 + 17e^{t/2}(t+2) - 15e^{t/2}\sin(2t)\right)\right) +\right.\right.\right.$$

✓ **Maple** : cpu = 0.184 (sec), leaf count = 69

$$\left\{\left\{x(t) = 2\,\_C1\,e^{t/2} - t^2 + \frac{\sin(2\,t)}{34} + \frac{2\,\cos(2\,t)}{17} - 4\,t + \_C2, y(t) = \frac{\_C1}{2}e^{\frac{t}{2}} - t + \frac{\cos(2\,t)}{34} + \frac{9\,\sin(2\,t)}{68} + 2 -\right.\right.$$

2.1885 ODE No. 1885

$$\{tx'(t) - ty'(t) - 2y(t) = 0, 2x'(t) + tx''(t) + tx(t) = 0\}$$

✗ **Mathematica** : cpu = 0.0163489 (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 = 0.218 (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

$$\{ay(t)+x''(t)=0,y''(t)-a^2y(t)=0\}$$

✓ **Mathematica** : cpu = 0.0147767 (sec), leaf count = 115

$$\left\{\left\{x(t)\to-\frac{c_4e^{-at}\left(-2ate^{at}+e^{2at}-1\right)}{2a^2}-\frac{c_3e^{-at}\left(e^{at}-1\right)^2}{2a}+c_2t+c_1,y(t)\to\frac{1}{2}c_3e^{-at}\left(e^{2at}+1\right)+\frac{c_4e^{-at}\left(e^{2at}\right.}{2a}\right.\right.$$

✓ **Maple** : cpu = 0.186 (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 = 0.332427 (sec), leaf count = 5748

$$\left\{\left\{x(t)\to\frac{e^{-\frac{\sqrt{a+d-\sqrt{a^2-2da+d^2+4bc}t}}{\sqrt{2}}-\frac{\sqrt{a+d+\sqrt{a^2-2da+d^2+4bc}t}}{\sqrt{2}}}\left(e^{\frac{\sqrt{a+d-\sqrt{a^2-2da+d^2+4bc}t}}{\sqrt{2}}}a-e^{\frac{\sqrt{a+d+\sqrt{a^2-2da+d^2+4bc}t}}{\sqrt{2}}}a-e^{\sqrt{2}\sqrt{}}\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.249 (sec), leaf count = 360

$$\left\{\left\{x(t)=\_C1\,e^{-\frac{t}{2}\sqrt{-2\sqrt{a^2-2\,ad+4\,bc+d^2}+2\,a+2\,d}}+\_C2\,e^{\frac{t}{2}\sqrt{-2\sqrt{a^2-2\,ad+4\,bc+d^2}+2\,a+2\,d}}+\_C3\,e^{-\frac{t}{2}\sqrt{2\sqrt{a^2-2\,ad+4\,bc+}}}\right.\right.$$

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 = 9.05439 (sec), leaf count = 15664

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✓ **Maple** : cpu = 0.315 (sec), leaf count = 457

$$\left\{\left\{x(t)=\_C4\,e^{\frac{t}{2}\sqrt{2\sqrt{a1^2-2\,a1\,b2+4\,a2\,b1+b2^2}+2\,a1+2\,b2}}+\_C3\,e^{-\frac{t}{2}\sqrt{2\sqrt{a1^2-2\,a1\,b2+4\,a2\,b1+b2^2}+2\,a1+2\,b2}}+\_C2\,e^{\frac{t}{2}}\right.\right.$$

2.1889 ODE No. 1889

$$\{x''(t)+x(t)+y(t)=-5,-4x(t)+y''(t)-3y(t)=-3\}$$

✓ **Mathematica** : cpu = 0.19674 (sec), leaf count = 554

$$\left\{\left\{x(t)\to -\frac{1}{8}e^{-t}(e^{-t}(-13t-10)+e^{t}(10-13t))\left(e^{2t}t+t-e^{2t}+1\right)-\frac{1}{8}e^{-t}\left(e^{2t}-1\right)t(e^{-t}(-13t-23)+e^{t}(13t\right.\right.$$

✓ **Maple** : cpu = 0.046 (sec), leaf count = 60

$$\{\{x(t)=(\_C4\,t+\_C2)\,\mathrm{e}^{-t}+18+(\_C3\,t+\_C1)\,\mathrm{e}^{t},y(t)=((-2\,t+2)\,\_C4\,-2\,\_C2)\,\mathrm{e}^{-t}-23+((-2\,t-2)$$

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 = 0.0066622 (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

$$\left\{\left\{x(t)=DESol\left(\left\{\frac{\mathrm{d}^4}{\mathrm{d}t^4}\_Y(t)+\left(2\,\frac{\sin(atb)\,ab}{\cos(atb)}-2\,\frac{ab\cos(atb)}{\sin(atb)}\right)\frac{\mathrm{d}^3}{\mathrm{d}t^3}\_Y(t)+\left(2\,c^2-3\,(\cos(at))^2\,c^2(\cos(b))^2\right.\right.\right.\right.$$

2.1891 ODE No. 1891

$$\{x''(t)+6x(t)+7y(t)=0,3x(t)+y''(t)+2y(t)=2t\}$$

✓ **Mathematica** : cpu = 0.878495 (sec), leaf count = 742

$$\left\{\left\{x(t)\to -\frac{7}{200}e^{-t}\left(e^{2t}-2e^{t}\cos(3t)+1\right)\left(-7e^{-t}\left(e^{2t}(t-1)+t+1\right)-\frac{2}{9}\sin(3t)+\frac{2}{3}t\cos(3t)\right)+\frac{7}{600}e^{-t}(3e^{2t}\right.\right.$$

✓ **Maple** : cpu = 0.047 (sec), leaf count = 64

$$\left\{\left\{x(t)=\frac{14\,t}{9}+\_C1\,\mathrm{e}^{t}+\_C2\,\cos(3\,t)+\_C3\,\mathrm{e}^{-t}+\_C4\,\sin(3\,t)\,,y(t)=-\_C1\,\mathrm{e}^{t}+\frac{3\,\_C2\,\cos(3\,t)}{7}-\_C3\right.\right.$$

2.1892 ODE No. 1892

$$\{-ay'(t)+bx(t)+x''(t)=0,ax'(t)+by(t)+y''(t)=0\}$$

✓ **Mathematica** : cpu = 0.250139 (sec), leaf count = 4815

$$\left\{\left\{x(t)\to \frac{e^{-\frac{\sqrt{-a^2-2b-\sqrt{a^2\left(a^2+4b\right)}}\,t}{\sqrt{2}}-\frac{\sqrt{-a^2-2b+\sqrt{a^2\left(a^2+4b\right)}}\,t}{\sqrt{2}}}\left(e^{\frac{\sqrt{-a^2-2b-\sqrt{a^2\left(a^2+4b\right)}}\,t}{\sqrt{2}}}a^2-e^{\frac{\sqrt{-a^2-2b+\sqrt{a^2\left(a^2+4b\right)}}\,t}{\sqrt{2}}}a^2-e^{\sqrt{2}\sqrt{-}}\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.182 (sec), leaf count = 463

$$\left\{\left\{x(t)=\_C1\,e^{-\frac{t}{2}\sqrt{-2\,a^2-2\,\sqrt{a^2(a^2+4\,b)}-4\,b}}+\_C2\,e^{\frac{t}{2}\sqrt{-2\,a^2-2\,\sqrt{a^2(a^2+4\,b)}-4\,b}}+\_C3\,e^{-\frac{t}{2}\sqrt{-2\,a^2+2\,\sqrt{a^2(a^2+4\,b)}-4\,b}}+\right.\right.$$

2.1893 ODE No. 1893

$$\{-\mathrm{A0}y'(t)+\mathrm{a1}x''(t)+\mathrm{b1}x'(t)+\mathrm{c1}x(t)=\mathrm{B0}e^{i\omega t},\mathrm{A0}x'(t)+\mathrm{a2}y''(t)+\mathrm{b2}y'(t)+\mathrm{c2}y(t)=0\}$$

✓ **Mathematica** : cpu = 0.438235 (sec), leaf count = 5546

$$\left\{\left\{x(t)\to -\mathrm{A0}\mathrm{a1}^2\mathrm{c2}c_3\mathrm{RootSum}\left[\#1^4+\mathrm{a2}\mathrm{b1}\#1^3+\mathrm{a1}\mathrm{b2}\#1^3+\mathrm{A0}^2\mathrm{a1}\mathrm{a2}\#1^2+\mathrm{a1}\mathrm{a2}\mathrm{b1}\mathrm{b2}\#1^2+\mathrm{a1}\mathrm{a2}^2\mathrm{c1}\#1^2+\right.\right.\right.$$

✓ **Maple** : cpu = 0.84 (sec), leaf count = 1579

$$\left\{\left\{x(t)=\frac{\left(-a1\;a2\,\omega^4+\left(ia1\;b2+ia2\;b1\right)\omega^3+\left(A^2+a1\;c2+a2\;c1+b2\;b1\right)\omega^2+\left(-ib1\;c2-ib2\;c1\right)\omega-c1\right.}{}\right.\right.$$

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 = 0.428619 (sec), leaf count = 3386

$$\left\{\left\{x(t)\to -a\mathrm{b2}c_3\mathrm{RootSum}\left[\#1^4+2a\#1^3+\mathrm{b1}\#1^2+\mathrm{b2}\#1^2+a\mathrm{b1}\#1+a\mathrm{b2}\#1+\mathrm{b1}\mathrm{b2}\&,\frac{}{4\#1^3+6a\#1^2+2\mathrm{b}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.635 (sec), leaf count = 1056

$$\left\{\left\{x(t)=\frac{\mathrm{e}^{i\omega t}\left(-c1\,\omega^2+ia(c1+c2)\,\omega+b2\,c1\right)}{\omega^4-2\,ia\omega^3+(-b1-b2)\,\omega^2+ia\,(b1+b2)\,\omega+b2\,b1}+\_C1\,\mathrm{e}^{RootOf\left(\_Z^4+2\,a\_Z^3+(b1+b2)\_Z^2+(ab1+b2\right.}\right.\right.$$

2.1895 ODE No. 1895

$$\{\mathrm{a11}x''(t)+\mathrm{a12}y''(t)+\mathrm{b11}x'(t)+\mathrm{b12}y'(t)+\mathrm{c11}x(t)+\mathrm{c12}y(t)=0,\mathrm{a21}x''(t)+\mathrm{a22}y''(t)+\mathrm{b21}x'(t)+\mathrm{b22}y'(t)+$$

✓ **Mathematica** : cpu = 0.289762 (sec), leaf count = 7517

✓ **Maple** : cpu = 0.198 (sec), leaf count = 1008

$$\left\{\left\{x(t)=\sum_{\_a=1}^{4}\mathrm{e}^{RootOf\left((a22\,a11-a21\,a12)\_Z^4+(a11\,b22-a12\,b21-a21\,b12+b11\,a22)\_Z^3+(a11\,c22-a12\,c21-a21\,c12+a22\,c11+b\right.}\right.\right.$$

2.1896 ODE No. 1896

$$\left\{-2x'(t)+x''(t)-y'(t)+y(t)=0,2x'(t)-x(t)-y''(t)+y^{(3)}(t)=t\right\}$$

✓ **Mathematica** : cpu = 0.469399 (sec), leaf count = 1132

$$\left\{\left\{x(t)\to\frac{1}{64}e^{-t}\left(2e^{2t}t^2-6e^{2t}t+7e^{2t}+1\right)\left(e^t(1-t)+e^{-t}\left(-2t^3-8t^2-17t-17\right)\right)+\frac{1}{64}e^{-t}\left(2e^{2t}t^2+6e^{2t}t+e\right.\right.\right.$$

✓ **Maple** : cpu = 0.053 (sec), leaf count = 67

$$\left\{\left\{x(t)=-\frac{2\_C2\,\mathrm{e}^{-t}}{3}+\frac{\left(-9\_C5\,t^2-6\_C4\,t-3\_C3-18\_C5\right)\mathrm{e}^t}{3}-t-2,y(t)=\_C2\,\mathrm{e}^{-t}-2+\left(\_C5\,t^3\right.\right.\right.$$

2.1897 ODE No. 1897

$$\{x''(t) + y'(t) + y''(t) = \sinh(2t), 2x''(t) + y''(t) = 2t\}$$

✓ **Mathematica** : cpu = 0.206402 (sec), leaf count = 280

$$\left\{\left\{x(t) \to t\left(\frac{t^2}{2} + \frac{t}{2} - \frac{e^{4t}}{8} + e^{2t}\left(\frac{t}{2} - \frac{1}{4}\right)\right) + \frac{1}{48}\left(-4\left(4t^2 - 3t + 3\right)t - 12e^{2t}t - 6e^{-2t} + 3e^{4t}\right) + \frac{1}{4}e^{-2t}\left(-2e^{2t}\left(\frac{t}{2}\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.296 (sec), leaf count = 90

$$\left\{\left\{x(t) = \frac{(6\_C2 - 6\,t - 9)\cosh(2\,t)}{24} + \frac{(-6\_C2 + 6\,t + 6)\sinh(2\,t)}{24} + \frac{t^3}{6} + \frac{t^2}{4} + \_C3\,t + \_C4, y(t) = \frac{(-2\_C\right.\right.$$

2.1898 ODE No. 1898

$$\{-x'(t) + x''(t) + y'(t) = 0, x''(t) - x(t) + y''(t) = 0\}$$

✓ **Mathematica** : cpu = 0.0248989 (sec), leaf count = 420

$$\left\{\left\{x(t) \to -\frac{1}{5}c_1 e^{\frac{t}{2} - \frac{\sqrt{5}t}{2}}\left(\sqrt{5}e^{\sqrt{5}t} - 5e^{\frac{\sqrt{5}t}{2} + \frac{t}{2}} - \sqrt{5}\right) + \frac{c_2 e^{\frac{t}{2} - \frac{\sqrt{5}t}{2}}\left(e^{\sqrt{5}t} - 1\right)}{\sqrt{5}} - \frac{1}{10}c_4 e^{\frac{t}{2} - \frac{\sqrt{5}t}{2}}\left(5e^{\sqrt{5}t} + \sqrt{5}e^{\sqrt{5}t} - 10e\right.\right.\right.$$

✓ **Maple** : cpu = 0.195 (sec), leaf count = 71

$$\left\{\left\{x(t) = \frac{\_C4\left(\sqrt{5} - 1\right)}{2}e^{-\frac{(\sqrt{5}-1)t}{2}} - \frac{\_C3\left(\sqrt{5} + 1\right)}{2}e^{\frac{(\sqrt{5}+1)t}{2}} + \_C1\,e^{t}, y(t) = \_C2 + \_C3\,e^{\frac{(\sqrt{5}+1)t}{2}} + \_C4\,e^{-\left(\right.}\right.\right.$$

2.1899 ODE No. 1899

$$\{x'(t) = 2x(t), y'(t) = 3x(t) - 2y(t), z'(t) = 2y(t) + 3z(t)\}$$

✓ **Mathematica** : cpu = 0.0073227 (sec), leaf count = 112

$$\left\{\left\{x(t) \to c_1 e^{2t}, y(t) \to \frac{3}{4}c_1 e^{-2t}\left(e^{4t} - 1\right) + c_2 e^{-2t}, z(t) \to \frac{3}{10}c_1 e^{-2t}\left(2e^t + 3e^{2t} + 4e^{3t} + 1\right)\left(e^t - 1\right)^2 + \frac{2}{5}c_2 e^{-2t}\left(e\right.\right.\right.$$

✓ **Maple** : cpu = 0.235 (sec), leaf count = 52

$$\left\{\left\{x(t) = \_C3\,e^{2\,t}, y(t) = \frac{3\_C3\,e^{2\,t}}{4} + \_C2\,e^{-2\,t}, z(t) = \_C1\,e^{3\,t} - \frac{3\_C3\,e^{2\,t}}{2} - \frac{2\_C2\,e^{-2\,t}}{5}\right\}\right\}$$

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 = 0.0069895 (sec), leaf count = 94

$$\left\{\left\{x(t) \to c_1 e^{4t}, y(t) \to \frac{1}{6}c_1 e^{-2t}(e^{6t} - 1) + c_2 e^{-2t}, z(t) \to \frac{1}{9}c_1 e^{-2t}(e^{3t} + e^{6t} - 2) - \frac{4}{3}c_2 e^{-2t}(e^{3t} - 1) + c_3 e^t\right\}\right\}$$

✓ **Maple** : cpu = 0.24 (sec), leaf count = 50

$$\left\{\left\{x(t) = \_C3\,e^{4t}, y(t) = \frac{\_C3\,e^{4t}}{6} + \_C2\,e^{-2t}, z(t) = \frac{\_C3\,e^{4t}}{9} + \_C1\,e^t + \frac{4\_C2\,e^{-2t}}{3}\right\}\right\}$$

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 = 0.0072498 (sec), leaf count = 105

$$\{\{x(t) \to c_2(e^t - 1) + c_3(1 - e^t) + c_1, y(t) \to c_1(e^t - 1) + c_2(e^t t + 1) + c_3(-e^t t + e^t - 1), z(t) \to c_1(e^t - 1) +$$

✓ **Maple** : cpu = 0.199 (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 = 0.0161429 (sec), leaf count = 226

$$\{\{x(t) \to e^{-t}(1 - e^t)(-t - 1) + e^{-t}(e^t - 1)(-t - 1) + c_2(e^t - 1) + c_3(1 - e^t) + c_1, y(t) \to e^{-t}(-t - 1)(-e^t t +$$

✓ **Maple** : cpu = 0.188 (sec), leaf count = 51

$$\{\{x(t) = \_C2 + \_C3\,e^t, y(t) = (\_C3\,t + \_C1)\,e^t - t - \_C2 - 1, z(t) = ((t-1)\_C3 + \_C1)\,e^t - t - \_C2 -$$

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 = 0.0590731 (sec), leaf count = 1304

$$\left\{\left\{x(t) \to \frac{e^{-i\sqrt{a^2+b^2+c^2}t}\left(2e^{i\sqrt{a^2+b^2+c^2}t}a^2 + b^2e^{2i\sqrt{a^2+b^2+c^2}t} + c^2e^{2i\sqrt{a^2+b^2+c^2}t} + b^2 + c^2\right)c_1}{2(a^2+b^2+c^2)} - \frac{be^{-i\sqrt{a^2+b^2+c^2}t}\left(-\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.235 (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 = 0.0425405 (sec), leaf count = 1445

$$\left\{\left\{x(t) \to \frac{e^{-\sqrt{-a^2-b^2-c^2}t}\left(2e^{\sqrt{-a^2-b^2-c^2}t}a^2 + b^2e^{2\sqrt{-a^2-b^2-c^2}t} + c^2e^{2\sqrt{-a^2-b^2-c^2}t} + b^2 + c^2\right)c_1}{2(a^2+b^2+c^2)} - \frac{e^{-\sqrt{-a^2-b^2-c^2}t}}{}\right.\right.$$

✓ **Maple** : cpu = 0.079 (sec), leaf count = 257

$$\left\{\left\{x(t) = \_C1 + \_C2\,\sin\left(\sqrt{a^2+b^2+c^2}t\right) + \_C3\,\cos\left(\sqrt{a^2+b^2+c^2}t\right), y(t) = \frac{1}{a(b^2+c^2)}\left(\left(-\_C3\,a^2b + \sqrt{\right.\right.\right.\right.$$

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 = 0.0050269 (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

$$\left\{\left\{x(t) = DESol\left(\left\{\frac{d^3}{dt^3}\_Y(t) + \left(-2\frac{\left(\frac{d}{dt}h(t)\right)f(t)h(t)}{f(t)(h(t))^2 + f(t)(g(t))^2 + \left(\frac{d}{dt}h(t)\right)g(t) - \left(\frac{d}{dt}g(t)\right)h(t)} - 2\frac{}{f(t)(h\right.\right.\right.\right.\right.$$

2.1906 ODE No. 1906

$$\{x'(t) = x(t) + y(t) - z(t), y'(t) = -x(t) + y(t) + z(t), z'(t) = x(t) - y(t) + z(t)\}$$

✓ **Mathematica** : cpu = 0.0393308 (sec), leaf count = 278

$$\left\{\left\{x(t) \to \frac{1}{3}c_1e^t\left(2\cos\left(\sqrt{3}t\right)+1\right) - \frac{1}{3}c_2e^t\left(-\sqrt{3}\sin\left(\sqrt{3}t\right)+\cos\left(\sqrt{3}t\right)-1\right) - \frac{1}{3}c_3e^t\left(\sqrt{3}\sin\left(\sqrt{3}t\right)+\cos\left(\sqrt{3}\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.069 (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 = 0.0092997 (sec), leaf count = 179

$$\{\{x(t) \to c_1\left(-e^t\right)\left(2e^{2t}-3\right) + 6c_2e^t\left(2e^t+3e^{2t}-5\right) - 2c_3e^t\left(4e^t+5e^{2t}-9\right), y(t) \to -2c_1e^t\left(e^{2t}-1\right) + c_2e^t\left(3e^t\right.$$

✓ **Maple** : cpu = 0.06 (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 = 0.0807017 (sec), leaf count = 25202

Too large to display

✓ **Maple** : cpu = 0.323 (sec), leaf count = 1285

$$\left\{\left\{\left\{x(t) = \_C2\,e^{\frac{\left(-3542+\left(263474+18\sqrt{351406311}\right)^{\frac{2}{3}}+80\sqrt[3]{263474+18\sqrt{351406311}}\right)t}{6\sqrt[3]{263474+18\sqrt{351406311}}}}\sin\left(\frac{\sqrt{3}\left(\left(263474+18\sqrt{351406311}\right)^{\frac{2}{3}}+354\right.}{1580844+108\right.}\right.\right.\right.$$

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 = 0.0381046 (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 = 16.392 (sec), leaf count = 33085

Too large to display

2.1910 ODE No. 1910

$$\{tx'(t) = 2x(t) - t, t^3y'(t) = t^2y(t) - x(t) + t, t^4z'(t) = -t^2y(t) + t^3z(t) - x(t) + t\}$$

✓ **Mathematica** : cpu = 0.006471 (sec), leaf count = 39

$$\left\{\left\{x(t) \to t + c_3t^2, y(t) \to c_2t + c_3, z(t) \to c_1t + \frac{c_3}{t} + c_2\right\}\right\}$$

✓ **Maple** : cpu = 0.253 (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 = 0.0210641 (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 = 0.215 (sec), leaf count = 308

$$\left\{\left\{x(t) = \_C1 + \_C2\, \sin\left(\sqrt{a^2+b^2+c^2}\ln(t)\right) + \_C3\, \cos\left(\sqrt{a^2+b^2+c^2}\ln(t)\right), y(t) = \frac{1}{b\left(b^2+c^2\right)}\left(\_C1\, b^3\right.\right.\right.$$

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 = 0.0079245 (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]}, {x1[t], x2[t], x3[t], x4[t]}, t]
```

✓ **Maple** : cpu = 1.153 (sec), leaf count = 2788

$$\left\{\left\{x1(t) = \_C2 + \_C3 \sin(ct) + \_C4 \cos(ct), x2(t) = -\cos(ct)\_C3 + \sin(ct)\_C4 + \_C1, x3(t) = \frac{(\cos(ct}{}\right.\right.$$

2.1913 ODE No. 1913

$$\{x'(t) = -x(t)(x(t) + y(t)), y'(t) = y(t)(x(t) + y(t))\}$$

✓ **Mathematica** : cpu = 0.0204338 (sec), leaf count = 64

$$\left\{\left\{y(t) \to -\sqrt{c_1}\cot\left(\sqrt{c_1}t - \sqrt{c_1}c_2\right), x(t) \to -\sqrt{c_1}\tan\left(\sqrt{c_1}t - \sqrt{c_1}c_2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.342 (sec), leaf count = 57

$$\left\{[\{x(t) = 0\}, \left\{y(t) = (-t + \_C1)^{-1}\right\}], [\left\{x(t) = \frac{1}{\_C1}\tanh\left(\frac{\_C2 + t}{\_C1}\right)\right\}, \left\{y(t) = \frac{-(x(t))^2 - \frac{d}{dt}x(t)}{x(t)}\right\}]\right\}$$

2.1914 ODE No. 1914

$$\{x'(t) = x(t)(ay(t) + b), y'(t) = y(t)(cx(t) + d)\}$$

✓ **Mathematica** : cpu = 0.239057 (sec), leaf count = 204

$$\left\{\left\{y(t)\to\frac{bW\left(\frac{a\,\text{InverseFunction}\left[\int_1^{\#1}\frac{1}{K[1]\left(W\left(\frac{ae^{\frac{c_1}{b}+\frac{cK[1]}{b}}K[1]^{\frac{d}{b}}}{b}\right)+1\right)}dK[1]\&\right][bt+c_2]^{\frac{d}{b}}\exp\left(\frac{c\,\text{InverseFunction}\left[\int_1^{\#1}\frac{1}{K[1]\left(W\left(\frac{ae^{\frac{c_1}{b}+\frac{cK}{}}}{}\right.\right.}\right.}{b}\right.}{b}\right.}{a}\right.\right.$$

✓ **Maple** : cpu = 1.461 (sec), leaf count = 92

$$\left\{[\{x(t)=0\},\left\{y(t)=\_C1\,e^{dt}\right\}],\left[\left\{x(t)=RootOf\left(-\int^{\_Z}\frac{1}{\_a\,b}\left(lambertW\left(\frac{e^{-1}}{b}e^{\frac{c\_a}{b}}\_a^{\frac{d}{b}}e^{\frac{\_C1}{b}}\right)+1\right)^{-1}d\_a+\right.\right.\right.\right.$$

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 = 300.057 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 7.549 (sec), leaf count = 147

$$\left\{[\{x(t) = 0\}, \left\{y(t) = \frac{\beta}{e^{-\beta t}\_C1\,\beta - qb}\right\}], [\left\{x(t) = ODESolStruc\left(\_b(\_a), [\left\{\left(\left(\frac{d}{d\_a}\_b(\_a)\right)(\_b(\_a))^{\frac{-a-b}{a}}\right.\right.\right.\right.\right.$$

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 = 0.311989 (sec), leaf count = 557

$$\left\{\left\{y(t) \to b\left(ah - h\text{InverseFunction}\left[\int_1^{\#1} \frac{(h(a - K[1]))^{\frac{k}{h}}}{(a - K[1])\left(c_1(ah - hK[1])^{\frac{k}{h}}(h(a - K[1]))^{\frac{k}{h}} - c(h(a - K[1]))^{\frac{k}{h}} + K\right.}\right.\right.\right.\right.$$

✓ **Maple** : cpu = 3.299 (sec), leaf count = 180

$$\left\{[\{x(t) = a\}, \left\{y(t) = \frac{(c - a)\,e^{k(t + \_C1)(-c + a + b)} - b}{-1 + e^{k(t + \_C1)(-c + a + b)}}\right\}], [\left\{x(t) = RootOf\left(-\int^{\_Z} \frac{1}{\_a - a}\left((\_a - a)^{-\frac{k}{h}} h\_a + (\right.\right.\right.\right.$$

2.1917 ODE No. 1917

$$\{x'(t) = y(t)^2 - \cos(x(t)), y'(t) = y(t)(-\sin(x(t)))\}$$

✓ **Mathematica** : cpu = 209.692 (sec), leaf count = 3406

$$\left\{\left\{\left\{y(t) \to \frac{3\sqrt[3]{2}\cos\left(\text{InverseFunction}\left[\int_1^{\#1} \frac{\left(3c_1 + \sqrt{9c\right.}{2\,2^{2/3}\cos^2(K[1]) + 2\left(3c_1 + \sqrt{9c_1{}^2 - 4\cos^3(K[1])}\right)^{2/3}\cos(K[1]) + 3\sqrt[3]{2}c_1}\right.\right.}{\sqrt[3]{81c_1 + \sqrt{6561c_1{}^2 - 2916\cos^3\left(\text{InverseFunction}\left[\int_1^{\#1} \frac{}{2\,2^{2/3}\cos^2(K[1]) + 2\left(3c_1 + \sqrt{9c_1{}^2 - 4\cos^3(K[1])}\right)^{2/3}\cos\right.\right.}}}\right.\right.\right.$$

✓ **Maple** : cpu = 1.614 (sec), leaf count = 108

$$\left\{[\left\{x(t) = RootOf\left(-2\int^{\_Z}\left(-\tan\left(RootOf\left(-3\sqrt{-(\cos(\_f))^2}\ln\left(9/4\frac{(\cos(\_f))^2}{(\cos(\_Z))^2}\right) + 3\_C1\sqrt{-(\cos(\_\right.\right.\right.\right.\right.\right.$$

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 = 0.281872 (sec), leaf count = 0 , could not solve

```
DSolve[{Derivative[1][x][t] == x[t] + y[t] - x[t]*y[t]^2, Derivative[1][y][t] == -
x[t] - y[t] + x[t]^2*y[t]}, {x[t], y[t]}, t]
```

✓ **Maple** : cpu = 2.128 (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

$$\{x'(t) = x(t)\left(-(x(t)^2 + y(t)^2)\right) + x(t) + y(t), y'(t) = -y(t)\left(x(t)^2 + y(t)^2\right) - x(t) + y(t)\}$$

✗ **Mathematica** : cpu = 0.325861 (sec), leaf count = 0 , could not solve

```
DSolve[{Derivative[1][x][t] == x[t] + y[t] - x[t]*(x[t]^2 + y[t]^2), Derivative[1][y][t] ==
x[t] + y[t] - y[t]*(x[t]^2 + y[t]^2)}, {x[t], y[t]}, t]
```

✓ **Maple** : cpu = 4.391 (sec), leaf count = 200

$$\left\{ [\{x(t) = 0\}, \{y(t) = 0\}], [\left\{ x(t) = ODESolStruc\left(\_a, [\left\{ \left(\frac{d}{d\_a}\_b(\_a)\right)\_b(\_a) + \frac{1}{2\_a^3}\left(4\_a^4 + 4\_b(\_a)\right.\right.\right.\right.\right.$$

2.1920 ODE No. 1920

$$\{x'(t) = x(t)\left(x(t)^2 + y(t)^2 - 1\right) - y(t), y'(t) = y(t)\left(x(t)^2 + y(t)^2 - 1\right) + x(t)\}$$

✗ **Mathematica** : cpu = 0.136798 (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 = 4.421 (sec), leaf count = 202

$$\left\{ [\{x(t) = 0\}, \{y(t) = 0\}], [\left\{ x(t) = ODESolStruc\left(\_a, [\left\{ \left(\frac{d}{d\_a}\_b(\_a)\right)\_b(\_a) - \frac{1}{2\_a^3}\left(6(\_b(\_a))^2\_a^2 +\right.\right.\right.\right.\right.$$

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 = 2.1366 (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

$$\left\{x'(t) = \left(\begin{cases} \sin\left(\frac{1}{x(t)^2+y(t)^2}\right)x(t)\left(x(t)^2+y(t)^2-1\right) & x(t)^2+y(t)^2 \neq 1 \\ 0 & \text{True} \end{cases} \right) - y(t), y'(t) = \left(\begin{cases} \sin\left(\frac{1}{x(t)^2 \ldots}\right. \end{cases}\right.\right.$$

✗ **Mathematica** : cpu = 8.96099 (sec), leaf count = 0 , could not solve

```
DSolve[{Derivative[1][x][t] == Piecewise[{{Sin[(x[t]^2 + y[t]^2)^(-1)]*x[t]*(-
1 + x[t]^2 + y[t]^2), x[t]^2 + y[t]^2 != 1}}, 0] - y[t], Derivative[1][y][t] == Piecewise[{{
1)]*y[t]*(-1 + x[t]^2 + y[t]^2), x[t]^2 + y[t]^2 != 1}}, 0] + x[t]}, {x[t], y[t]}, t]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve({diff(x(t),t) = -y(t)+piecewise(x(t)^2+y(t)^2 <> 1,x(t)*(x(t)^2+y(t)^2-
1)*sin(1/(x(t)^2+y(t)^2))), diff(y(t),t) = x(t)+piecewise(x(t)^2+y(t)^2 <> 1,y(t)*(x(t)^2+y(
1)*sin(1/(x(t)^2+y(t)^2)))})
```

2.1923 ODE No. 1923

$$\left\{\left(t^2+1\right)x'(t) = y(t) - tx(t), \left(t^2+1\right)y'(t) = -x(t) - ty(t)\right\}$$

✓ **Mathematica** : cpu = 0.0089058 (sec), leaf count = 53

$$\left\{\left\{x(t) \to \frac{c_1}{t^2+1} + \frac{c_2 t}{t^2+1}, y(t) \to \frac{c_2}{t^2+1} - \frac{c_1 t}{t^2+1}\right\}\right\}$$

✓ **Maple** : cpu = 0.068 (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 = 0.0548189 (sec), leaf count = 191

$$\left\{\left\{y(t)\to\frac{c_1\left(e^{c_2}-\sqrt{-4t^2-4c_1{}^2t^2+e^{2c_2}}\right)}{2\left(1+c_1{}^2\right)},x(t)\to\frac{e^{c_2}-\sqrt{-4t^2-4c_1{}^2t^2+e^{2c_2}}}{2\left(1+c_1{}^2\right)}\right\},\left\{y(t)\to\frac{c_1\left(\sqrt{-4t^2-4c_1{}^2t^2}\right.}{2\left(1+c\right.}\right.\right.$$

✓ **Maple** : cpu = 0.679 (sec), leaf count = 180

$$\left\{[\{x(t)=0\},\left\{y(t)=\frac{1}{2\_C1}\left(1+\sqrt{-4\_C1^2t^2+1}\right),y(t)=\frac{1}{2\_C1}\left(1-\sqrt{-4\_C1^2t^2+1}\right)\right\}],[\left\{x(t)=\frac{1}{2\_C\right.\right.$$

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 = 5.45375 (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 = 0.357 (sec), leaf count = 194

$$\left\{[\left\{x(t)=-\frac{t^2}{3}\right\},\left\{y(t)=-\frac{t^3}{27a}\right\}],[\{x(t)=\_C1\,t+\_C2\},\left\{y(t)=-\frac{\left(\frac{d}{dt}x(t)+t\right)\left(\left(\frac{d}{dt}x(t)\right)^2+t\frac{d}{dt}x(t)-x(t\right.}{a}\right.\right.$$

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 = 0.0043051 (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 = 0.268 (sec), leaf count = 96

$$\left\{[\left\{\int RootOf\left(g\left(\_Z,\frac{d}{dt}y(t)\right)-y(t)+t\frac{d}{dt}y(t)\right)\,dt+\_C1=tRootOf\left(g\left(\_Z,\frac{d}{dt}y(t)\right)-y(t)+t\frac{d}{dt}y(t)\right)+f\right.\right.$$

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 = 0.0071193 (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 = 0.0054971 (sec), leaf count = 0 , could not solve

```
DSolve[{Derivative[2][x][t] == (k*x[t])/(x[t]^2 + y[t]^2)^(3/2), Derivative[2][y][t] == (k*y
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve({diff(diff(x(t),t),t) = k*x(t)/(x(t)^2+y(t)^2)^(3/2), diff(diff(y(t),t),t) = k*y(t)/(
```

2.1929 ODE No. 1929

$$\left\{x''(t) = -\frac{cy(t)x'(t)f\left(\sqrt{x'(t)^2 + y'(t)^2}\right)}{\sqrt{x'(t)^2 + y'(t)^2}}, y''(t) = -\frac{cy(t)y'(t)f\left(\sqrt{x'(t)^2 + y'(t)^2}\right)}{\sqrt{x'(t)^2 + y'(t)^2}} - g\right\}$$

✗ **Mathematica** : cpu = 0.0064623 (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 = 11.667 (sec), leaf count = 116

$$\left\{\left[\left\{y(t) = ODESolStruc\left(\_a, \left[\left\{\left(\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a)\right)\_b(\_a) + \left(C(\_a)\, f\left(\sqrt{(\_b(\_a))^2}\right)\_b(\_a) + g\sqrt{(\_b(\_a))\right.\right.\right.\right.\right.$$

2.1930 ODE No. 1930

$$\left\{x'(t)=y(t)-z(t),y'(t)=x(t)^2+y(t),z'(t)=x(t)^2+z(t)\right\}$$

✓ **Mathematica** : cpu = 0.030861 (sec), leaf count = 308

$$\left\{\left\{x(t)\to e^{-c_3}\left(e^t+e^{c_3}c_1\right),y(t)\to c_2\left(e^{-c_3}\left(e^t+e^{c_3}c_1\right)-c_1\right)+\left(e^{-c_3}\left(e^t+e^{c_3}c_1\right)-c_1\right)\left(-\frac{{c_1}^2}{e^{-c_3}\left(e^t+e^{c_3}c_1\right)-c_1}\right.\right.\right.$$

✓ **Maple** : cpu = 0.084 (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

$$\left\{ax'(t)=(b-c)y(t)z(t),by'(t)=(c-a)x(t)z(t),cz'(t)=(a-b)x(t)y(t)\right\}$$

✓ **Mathematica** : cpu = 3.93815 (sec), leaf count = 10101

$$\left\{\left\{x(t)\to\frac{\frac{\sqrt{2}b^2\sqrt{a(a-c)}c_1\operatorname{sn}\left(\frac{\frac{\sqrt{2}\sqrt{a}\sqrt{a-c}c\sqrt{c_2}t}{\sqrt{b}\sqrt{b-c}}-\frac{\sqrt{2}\sqrt{a}\sqrt{b}\sqrt{a-c}\sqrt{c_2}t}{\sqrt{b-c}}-\frac{\sqrt{2}\sqrt{a}\sqrt{a-c}c\sqrt{c_2}c_3}{\sqrt{b}\sqrt{b-c}}+\frac{\sqrt{2}\sqrt{a}\sqrt{b}\sqrt{a-c}\sqrt{c_2}c_3}{\sqrt{b-c}}}{a}\middle|-\frac{(a-b)bc_1}{(a-c)cc_2}\right)}{(a-c)\sqrt{b(b-c)c_1}}-\frac{\sqrt{2}b\sqrt{a(a-}{}}{a}\right.\right.$$

✓ **Maple** : cpu = 1.405 (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 = 1.5664 (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 = 3.804 (sec), leaf count = 383

$$\left\{[\{x(t) = 0\}, \{y(t) = 0\}, \{z(t) = \_C1\}], [\{x(t) = 0\}, \left\{y(t) = \frac{\_C1\, e^{\_C2\,\_C1} e^{\_C1\,t}}{-1 + e^{\_C2\,\_C1} e^{\_C1\,t}}\right\}, \left\{z(t) = \frac{\frac{d}{dt}y(t)}{y(t)}\right\}], [\{x(t\right.$$

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 = 125.04 (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 = 2.724 (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 = 63.5154 (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 = 1.915 (sec), leaf count = 377

$$\left\{[\{y(t) = 0\}, \left\{x(t) = -2\,(t - 2\,\_C1)^{-1}\right\}, \{z(t) = 0\}], [\left\{y(t) = 256\,(\_C1\,t + \_C2)^{-4}\right\}, \left\{x(t) = \frac{1}{6\,y(t)}\left(-\sqrt{3}\right.\right.\right.$$

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 = 0.0359181 (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 = 8.43 (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 = 0.0346893 (sec), leaf count = 0 , could not solve

```
DSolve[{Derivative[1][x][t] == x[t]*(y[t]^2 - z[t]^2), Derivative[1][y][t] == -
(y[t]*(x[t]^2 + z[t]^2)), Derivative[1][z][t] == (x[t]^2 + y[t]^2)*z[t]}, {x[t], y[t], z[t]}
```

✓ **Maple** : cpu = 1.534 (sec), leaf count = 704

$$\left\{[\{x(t)=0\},\{y(t)=0\},\{z(t)=\_C1\}],[\{x(t)=0\},\left\{y(t)=\frac{1}{\left(e^{\_C2\_C1}\right)^2\left(e^{\_C1\,t}\right)^2-1}\sqrt{-\left(e^{\_C1\,t}\right)^4\_C1\,\left(e^{-\right.}}\right.\right.$$

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 = 0.466119 (sec), leaf count = 0 , could not solve

```
DSolve[{Derivative[1][x][t] == x[t] + y[t] - x[t]*y[t]^2, Derivative[1][y][t] == -
x[t] - y[t] + x[t]^2*y[t], Derivative[1][z][t] == -x[t]^2 + y[t]^2}, {x[t], y[t], z[t]}, t]
```

✓ **Maple** : cpu = 1.718 (sec), leaf count = 240

$$\left\{[\{x(t)=0\},\{y(t)=0\},\{z(t)=\_C1\}],[\left\{x(t)=ODESolStruc\left(\_a,[\left\{\left(\frac{d}{d\_a}\_b(\_a)\right)\_b(\_a)-\frac{1}{2\_a^2}\left(4\_\right.\right.\right.\right.\right.$$

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 = 0.0067014 (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 = 0.194 (sec), leaf count = 101

$$\left\{\left\{x(t)=\_C5\,e^{t\sqrt{\frac{d}{dr}F(r)}\frac{1}{\sqrt{r}}}+\_C6\,e^{-t\sqrt{\frac{d}{dr}F(r)}\frac{1}{\sqrt{r}}},y(t)=\_C3\,e^{t\sqrt{\frac{d}{dr}F(r)}\frac{1}{\sqrt{r}}}+\_C4\,e^{-t\sqrt{\frac{d}{dr}F(r)}\frac{1}{\sqrt{r}}},z(t)=\_C1\,e^{t\sqrt{}}\right.\right.$$

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 = 0.0068637 (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 = 4.342 (sec), leaf count = 899

$$\left\{\left[\left\{x(t)=\int-3\frac{f(t)}{\_C1^3+11664\,\_C2^2-23328\,\_C2\,\int f(t)\,dt+11664\,\left(\int f(t)\,dt\right)^2}\left(\left(1-i\sqrt{3}\right)\left(\left(1+108\sqrt{\right.\right.\right.\right.\right.\right.$$

2.1940 ODE No. 1940

$$\{x1'(t)\sin(x2(t))=x4(t)\sin(x3(t))+x5(t)\cos(x3(t)),x2'(t)=x4(t)\cos(x3(t))-x5(t)\sin(x3(t)),x1'(t)\cos(x2(t$$

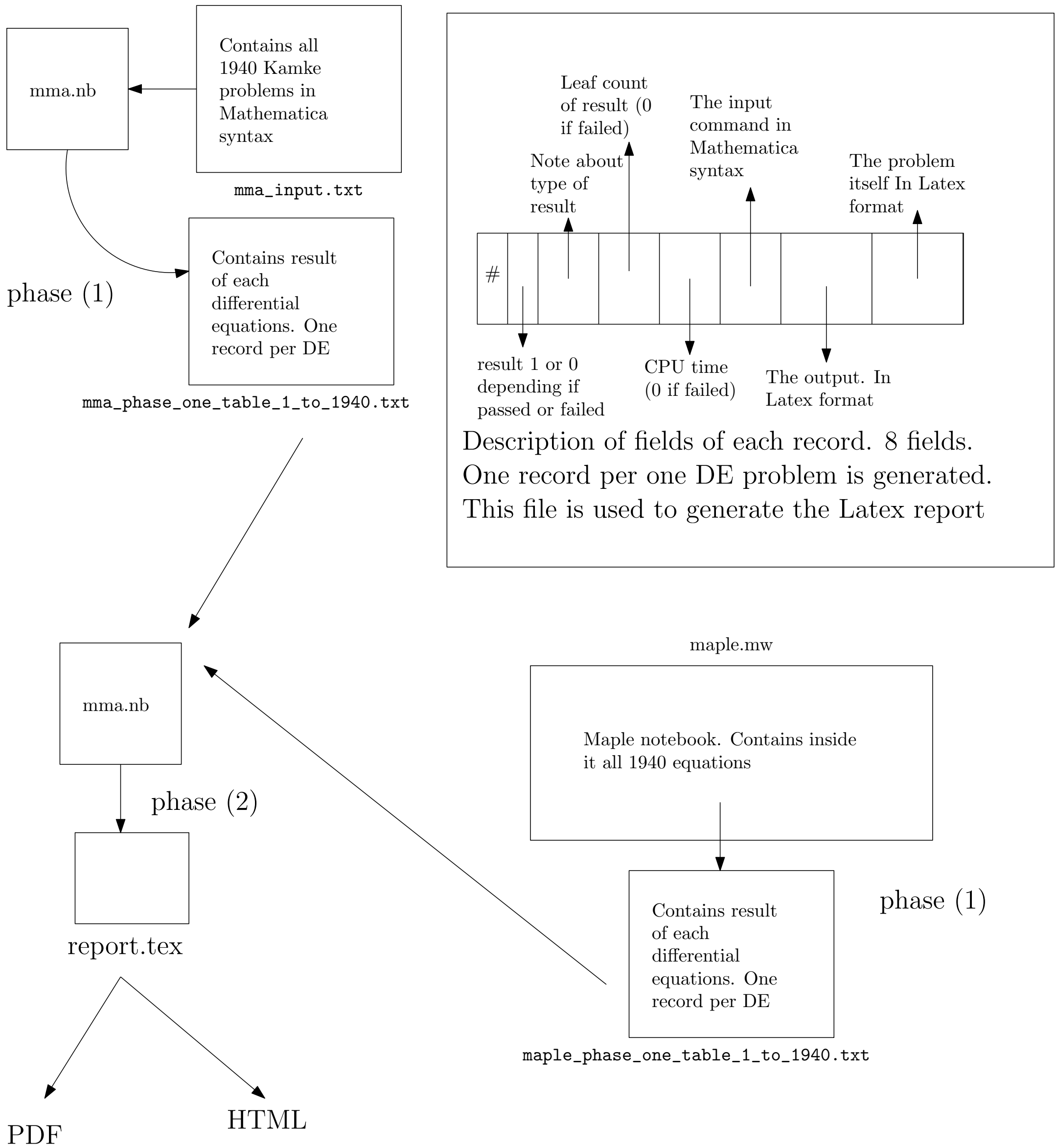
✗ **Mathematica** : cpu = 0.006597 (sec), leaf count = 0 , could not solve

```
DSolve[{Sin[x2[t]]*Derivative[1][x1][t] == Sin[x3[t]]*x4[t] + Cos[x3[t]]*x5[t], Derivative[1
(a*(1 - lambda)*x5[t]) + Derivative[1][x4][t] == -(m*Cos[x3[t]]*Sin[x2[t]]), a*(1 - lambda)*
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve({diff(x1(t),t)*sin(x2(t)) = x4(t)*sin(x3(t))+x5(t)*cos(x3(t)), diff(x3(t),t)+diff(x1(
(1-lambda)*a*x5(t) = -m*sin(x2(t))*cos(x3(t)), diff(x5(t),t)+(1-lambda)*a*x4(t) = m*sin(x2(t
x5(t)*sin(x3(t))})
```

3 Appendix



Kamke Differential equations build process

Nasser M. Abbasi (design.ipe)