Kamke differential equations. Mathematica 11.3 and Maple 2018.0

Nasser M. Abbasi

February 5, 2024 Compiled on February 5, 2024 at 11:49pm

Contents

1 Introduction and summary of results

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

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

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

Both Maple and Mathematica had a CPU time limit of 60 minutes to complete each problem else the problem is considered not solved and marked as timed out.

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

Table 1 below summarizes the performance of each CAS system

system	% solved	mean CPU (sec)	result mean leaf size	total CPU (minutes)	total leaf s
Mathematica	77.47	26.21	2866.54	656.57	430841
Maple	92.01	1.75	206.62	52.19	36881

Table 1: Summary of final results

Table 2 summarizes the Kamke equations used

The following summarizes which equations are solved by each system

Not solved by Mathematica 16, 22, 47, 48, 49, 50, 55, 56, 63, 74, 79, 80, 81, 82, 83, 86, 87, 110, 121, 188, 202, 203, 205, 206, 219, 234, 237, 250, 253, 265, 266, 269, 331, 340, 365, 367, 368, 370, 383, 385, 394, 395, 402, 404, 413, 414, 416, 428, 429, 451, 452, 460, 461, 465, 467, 468, 480, 482, 485, 489, 494, 503, 504, 506, 508, 509, 510, 513, 515, 524, 527, 528, 530, 531, 532, 533, 534, 535, 537, 538, 541, 542, 543, 544, 546, 550, 555, 561, 566, 567, 570, 572, 575, 576, 620, 638, 639, 640, 672, 696, 701, 702, 703, 704, 706, 707, 710, 714, 730, 733, 735, 743, 745, 746, 752, 759, 766, 769, 776, 782, 783, 784, 785, 786, 788, 789, 790, 791, 792, 807, 835, 837, 854, 855, 862, 885, 889, 892, 894, 909, 913, 915, 916, 917, 918, 919, 922, 923, 925, 929, 932, 942, 953, 961, 996, 1000, 1015, 1019, 1026, 1027, 1028, 1029, 1030, 1031, 1032, 1038, 1072, 1073, 1074, 1075, 1076, 1077, 1080, 1081, 1082, 1083, 1084, 1085, 1099,

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

1126, 1128, 1156, 1157, 1177, 1205, 1212, 1216, 1236, 1248, 1261, 1263, 1268, 1270, 1278, 1303, 1306, 1323, 1329, 1330, 1341, 1343, 1348, 1362, 1367, 1372, 1373, 1398, 1402, 1403, 1407, 1408, 1413, 1418, 1419, 1427, 1439, 1440, 1441, 1442, 1443, 1444, 1445, 1450, 1457, 1458, 1459, 1460, 1461, 1462, 1463, 1470, 1471, 1472, 1473, 1474, 1476, 1484, 1487, 1489, 1500, 1505, 1507, 1510, 1515, 1516, 1520, 1526, 1527, 1529, 1530, 1531, 1540, 1541, 1542, 1543, 1544, 1547, 1552, 1569, 1572, 1573, 1574, 1575, 1576, 1581, 1586, 1590, 1593, 1595, 1596, 1598, 1599, 1601, 1603, 1605, 1606, 1608, 1609, 1611, 1612, 1613, 1614, 1615, 1616, 1617, 1618, 1619, 1620, 1621, 1622, 1623, 1624, 1625, 1626, 1627, 1628, 1629, 1631, 1633, 1634, 1635, 1636, 1637, 1638, 1639, 1640, 1642, 1643, 1644, 1645, 1648, 1649, 1652, 1656, 1658, 1659, 1660, 1662, 1663, 1664, 1665, 1666, 1667, 1672, 1673, 1675, 1677, 1678, 1680, 1681, 1682, 1684, 1685, 1686, 1690, 1691, 1692, 1693, 1695, 1696, 1702, 1704, 1705, 1706, 1708, 1709, 1710, 1713, 1719, 1720, 1721, 1729, 1732, 1734, 1735, 1737, 1738, 1739, 1742, 1746, 1751, 1755, 1756, 1757, 1761, 1762, 1777, 1779, 1780, 1787, 1788, 1789, 1797, 1798, 1801, 1802, 1806, 1807, 1809, 1811, 1813, 1815, 1816, 1817, 1818, 1819, 1820, 1821, 1823, 1825, 1827, 1831, 1832, 1833, 1834, 1836, 1837, 1838, 1839, 1840, 1841, 1844, 1845, 1848, 1850, 1851, 1853, 1854, 1855, 1875, 1880, 1885, 1890, 1905, 1911, 1912, 1915, 1916, 1917, 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, 331, 340, 367, 368, 370, 383, 395, 460, 461, 480, 482, 485, 503, 506, 507, 510, 531, 537, 572, 575, 576, 733, 789, 790, 835, 837, 878, 885, 894, 909, 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 507, 878, 920, 1234, 1582, 1698, 1835

Solved by Maple but not by Mathematica 16, 22, 63, 80, 81, 83, 86, 188, 266, 365, 385, 394, 402, 404, 413, 414, 416, 428, 429, 451, 452, 465, 467, 468, 489, 494, 504, 508, 509, 513, 515, 524, 527, 528, 530, 532, 533, 534, 535, 538, 541, 542, 543, 544, 546, 550, 555, 561, 566, 567, 570, 620, 638, 639, 640, 672, 696, 701, 702, 703, 704, 706, 707, 710, 714, 730, 735, 743, 745, 746, 752, 759, 766, 769, 776, 782, 783, 784, 785, 786, 788, 791, 792, 807, 854, 855, 862, 889, 892, 913, 915, 916, 917, 918, 919, 922, 923, 925, 929, 932, 942, 953, 961, 996, 1000, 1027, 1029, 1032, 1074, 1080, 1082, 1083, 1084, 1085, 1099, 1126, 1128, 1156, 1177, 1248, 1261, 1263, 1268, 1270, 1303, 1306, 1323, 1329, 1330, 1341, 1343, 1348, 1362, 1367, 1372, 1373, 1398, 1402, 1403, 1407, 1413, 1418, 1419, 1427, 1442, 1444, 1445, 1450, 1470, 1471, 1472, 1487, 1500, 1505, 1507, 1516, 1520, 1526, 1527, 1529, 1530, 1544, 1547, 1552, 1569, 1572, 1573, 1574, 1575, 1576, 1590, 1601, 1603, 1605, 1611, 1612, 1613, 1614, 1615, 1616, 1618, 1620, 1621, 1622, 1624, 1626, 1627, 1629, 1631, 1633, 1635, 1636, 1637, 1638, 1639, 1640, 1644, 1648, 1652, 1656, 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, 1719, 1720, 1742, 1746, 1755, 1756, 1762, 1777, 1779, 1780, 1787, 1798, 1806, 1809, 1813, 1815, 1816, 1817, 1818, 1819, 1820, 1821, 1823, 1825, 1827, 1831, 1832, 1833, 1834, 1836, 1837, 1838, 1839, 1840, 1841, 1844, 1845, 1848, 1850, 1853, 1875, 1880, 1885, 1911, 1912, 1915, 1916, 1917, 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, 17, 18, 19, 20, 21, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 51, 52, 53, 54, 57, 58, 59, 60, 61, 62, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 75, 76, 77, 78, 84, 85, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 122, 123, 124, 125, 126, 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, 366, 369, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 384, 386, 387, 388, 389, 390, 391, 392, 393, 396, 397, 398, 399, 400, 401, 403, 405, 406, 407, 408, 409, 410, 411, 412, 415, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 453, 454, 455, 456, 457, 458, 459, 462, 463, 464, 466, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 481, 483, 484, 486, 487, 488, 490, 491, 492, 493, 495, 496, 497, 498, 499, 500, 501, 502, 505, 511, 512, 514, 516, 517, 518, 519, 520, 521, 522, 523, 525, 526, 529, 536, 539, 540, 545, 547, 548, 549, 551, 552, 553, 554, 556, 557, 558, 559, 560, 562, 563, 564, 565, 568, 569, 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, 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, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 697, 698, 699, 700, 705, 708, 709, 711, 712, 713, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 731, 732, 734, 736, 737, 738, 739, 740, 741, 742, 744, 747, 748, 749, 750, 751, 753, 754, 755, 756, 757, 758, 760, 761, 762, 763, 764, 765, 767, 768, 770, 771, 772, 773, 774, 775, 777, 778, 779, 780, 781, 787, 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, 879, 880, 881, 882, 883, 884, 886, 887, 888, 890, 891, 893, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 910, 911, 912, 914, 921, 924, 926, 927, 928, 930, 931, 933, 934, 935, 936, 937, 938, 939, 940, 941, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 954, 955, 956, 957, 958, 959, 960, 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, 1001, 1002, 1003, 1004, 1005, 1006, 1007, 1008, 1009, 1010, 1011, 1012, 1013, 1014, 1016, 1017, 1018, 1020, 1021, 1022, 1023, 1024, 1025, 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, 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, 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, 1158, 1159, 1160, 1161, 1162, 1163, 1164, 1165, 1166, 1167, 1168, 1169, 1170, 1171, 1172, 1173, 1174, 1175, 1176, 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, 1249, 1250, 1251, 1252, 1253, 1254, 1255, 1256, 1257, 1258, 1259, 1260, 1262, 1264, 1265, 1266, 1267, 1269, 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, 1304, 1305, 1307, 1308, 1309, 1310, 1311, 1312, 1313, 1314, 1315, 1316, 1317, 1318, 1319, 1320, 1321, 1322, 1324, 1325, 1326, 1327, 1328, 1331, 1332, 1333, 1334, 1335, 1336, 1337, 1338, 1339, 1340, 1342, 1344, 1345, 1346, 1347, 1349, 1350, 1351, 1352, 1353, 1354, 1355, 1356, 1357, 1358, 1359, 1360, 1361, 1363, 1364, 1365, 1366, 1368, 1369, 1370, 1371, 1374, 1375, 1376, 1377, 1378, 1379, 1380, 1381, 1382, 1383, 1384, 1385, 1386, 1387, 1388, 1389, 1390, 1391, 1392, 1393, 1394, 1395, 1396, 1397, 1399, 1400, 1401, 1404, 1405, 1406, 1409, 1410, 1411, 1412, 1414, 1415, 1416, 1417, 1420, 1421, 1422, 1423, 1424, 1425, 1426, 1428, 1429, 1430, 1431, 1432, 1433, 1434, 1435, 1436, 1437, 1438, 1446, 1447, 1448, 1449, 1451, 1452, 1453, 1454, 1455, 1456, 1464, 1465, 1466, 1467, 1468, 1469, 1475, 1477, 1478, 1479, 1480, 1481, 1482, 1483, 1485, 1486, 1488, 1490, 1491, 1492, 1493, 1494, 1495, 1496, 1497, 1498, 1499, 1501, 1502, 1503, 1504, 1506, 1508, 1509, 1511, 1512, 1513, 1514, 1517, 1518, 1519, 1521, 1522, 1523, 1524, 1525, 1528, 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, 1577, 1578, 1579, 1580, 1583, 1584, 1585, 1587, 1588, 1589, 1591, 1592, 1594, 1597, 1600, 1602, 1604, 1607, 1610, 1630, 1632, 1641, 1646, 1647, 1650, 1651, 1653, 1654, 1655, 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, 1717, 1718, 1722, 1723, 1724, 1725, 1726, 1727, 1728, 1730, 1731, 1733, 1736, 1740, 1741, 1743, 1744, 1745, 1747, 1748, 1749, 1750, 1752, 1753, 1754, 1758, 1759, 1760, 1763, 1764, 1765, 1766, 1767, 1768, 1769, 1770, 1771, 1772, 1773, 1774, 1775, 1776, 1778, 1781, 1782, 1783, 1784, 1785, 1786, 1790, 1791, 1792, 1793, 1794, 1795, 1796, 1799, 1800, 1803, 1804, 1805, 1808, 1810, 1812, 1814, 1822, 1824, 1826, 1828, 1829, 1830, 1842, 1843, 1846, 1847, 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, 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, 331, 340, 367, 368, 370, 383, 395, 460, 461, 480, 482, 485, 503, 506, 510, 531, 537, 572, 575, 576, 733, 789, 790, 835, 837, 885, 894, 909, 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, 1510, 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, 1705, 1706, 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	✓	1.265	1117	✓	0.845	1089	Linear first order, To Do
Kamke 2	✓	0.067	34	✓	0.118	25	Linear first order, integrating factor $y'(x)+ay(x)=f(x)$
Kamke 3	✓	0.045	40	✓	0.244	37	Linear first order, integrating factor $y'(x)+ay(x)=f(x)$
Kamke 4	✓	0.01	30	✓	0.008	18	Linear first order, integrating factor $y'(x)+g(x)y(x)=f(x)$
Kamke 5	✓	5.066	38	✓	1.03	21	Linear first order, integrating factor $y'(x)+g(x)y(x)=f(x)$
Kamke 6	✓	0.027	18	✓	0.044	15	Linear first order, integrating factor $y'(x)+g(x)y(x)=f(x)$
Kamke 7	✓	0.025	23	✓	0.008	13	Linear first order, integrating factor $y'(x)+g(x)y(x)=f(x)$
Kamke 8	✓	0.025	17	✓	0.043	13	Linear first order, integrating factor $y'(x)+g(x)y(x)=f(x)$

Continued on next page

Table 3 – continued from previous page

#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 9	✓	0.019	19	✓	0.04	14	Linear first order, integrating factor $y'(x) + g(x)y(x) = f(x)$
Kamke 10	✓	0.009	18	✓	0.015	15	Linear first order, integrating factor $y'(x) + g(x)y(x) = f(x)$
Kamke 11	✓	0.485	62	✓	0.055	24	Linear first order, integrating factor $y'(x) + g(x)y(x) = f(x)$
Kamke 12	✓	0.091	34	✓	0.329	8	Non-linear first order, Riccati, separable $y'(x) + y^2(x) = 1$
Kamke 13	✓	0.066	79	✓	1.358	79	Non-linear first order, Riccati, transform to second order Airy ODE using $y = -\frac{u'(x)}{uR(x)}$
Kamke 14	✓	0.014	254	✓	0.381	187	Non-linear first order, Riccati, transform to second order Airy ODE using $y = -\frac{u'(x)}{uR(x)}$
Kamke 15	✓	0.019	25	✓	1.072	33	Non-linear first order, Riccati, transform to separable first order
Kamke 16	✗	0	0	✓	0.323	49	Non-linear first order, Riccati, transform to first order separable using $y = y_p + \frac{1}{u}$

Continued on next page

Table 3 – continued from previous page

#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 17	✓	0.025	34	✓	0.158	24	Non-linear first order, Riccati, transform to second order standard ODE using $y = -\frac{u'(x)}{uR(x)}$
Kamke 18	✓	0.064	50	✓	0.108	39	Non-linear first order, Riccati, transform to first order ODE solved using integrating factor using transformtion $y = y_p + \frac{1}{u}$
Kamke 19	✓	0.01	30	✓	0.063	16	Non-linear first order, Riccati, transform to first order separable
Kamke 20	✓	0.998	48	✓	0.14	34	Non-linear first order, Riccati, transform to Bernoulli first order non-linear first order then solve Bernoulli
Kamke 21	✓	8.388	69	✓	0.238	25	Non-linear first order, Riccati, transform to first order ODE solved using integrating factor using transformtion $y = y_p + \frac{1}{u}$
Kamke 22	✗	0	0	✓	1.455	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	✓	0.371	43	✓	0.057	23	Non-linear first order, Riccati, Separable

Continued on next page

Table 3 – continued from previous page

#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 24	✓	0.089	277	✓	0.19	214	Non-linear first order, Riccati, transform to second order Emden-Fowler ODE using $y=-\frac{u'(x)}{uR(x)}$ solution in terms of Bessel functions
Kamke 25	✓	1.377	1835	✓	0.526	348	Non-linear first order, Riccati. To do
Kamke 26	✓	0.094	68	✓	0.181	45	Non-Linear first order, Riccati, transform to second order standard ODE using $y=-\frac{u'(x)}{uR(x)}$
Kamke 27	✓	8.873	120	✓	0.349	72	Non-linear first order, Riccati, transform to Bernoulli first order non-linear first order then solve Bernoulli
Kamke 28	✓	0.361	96	✓	0.395	51	Non-linear first order, Riccati, transform to Bernoulli first order non-linear first order then solve Bernoulli
Kamke 29	✓	0.033	39	✓	0.032	19	Non-linear first order, Bernoulli
Kamke 30	✓	0.477	230	✓	0.098	54	Non-Linear first order, Riccati, transform to second order Bessel like ODE using $y=-\frac{u'(x)}{uR(x)}$, solution uses Bessel functions

Continued on next page

Table 3 – continued from previous page

#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 31	✓	0.215	21	✓	0.057	23	Non-Linear first order, Riccati, separable
Kamke 32	✓	0.419	34	✓	0.503	28	Non-Linear first order, Riccati, has particular solution, solution using $y = y_p + \frac{1}{u}$ leads to first order solved using integrating factor
Kamke 33	✓	37.69	157	✓	0.937	58	Non-Linear first order, Riccati. Complicated algebra, will do later
Kamke 34	✓	0.555	51	✓	0.036	28	Non-Linear first order, Bernoulli. Standard method.
Kamke 35	✓	0.06	60	✓	0.074	35	Non-Linear first order, Riccati. Transform to second order ODE using $y(x) = -\frac{u'(x)}{u(x)R(x)}$
Kamke 36	✓	0.455	195	✓	0.341	62	Non-Linear first order of Abel first kind with None constant invariant. Transform to a reverse Riccati then Solve the resulting second order Airy ODE, and transform solution back. Lots of algebra involved. Hardest ODE so far
Kamke 37	✓	1.108	78	✓	0.112	50	To Do

Continued on next page

Table 3 – continued from previous page

#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 38	✓	0.119	99	✓	0.057	34	Non-Linear first order. smart transformation makes it proper Abel first kind
Kamke 39	✓	0.082	54	✓	0.018	30	To Do
Kamke 40	✓	0.432	185	✓	0.087	48	To Do
Kamke 41	✓	0.151	103	✓	0.435	103	To Do
Kamke 42	✓	1.537	485	✓	0.069	40	To Do
Kamke 43	✓	10.917	490	✓	1.964	373	To Do
Kamke 44	✓	0.018	72	✓	0.029	53	Non-Linear first order Bernoulli. Solved using standard method of solving Bernoulli.
Kamke 45	✓	0.762	133	✓	0.24	123	To Do
Kamke 46	✓	0.302	258	✓	0.136	956	To Do
Kamke 47	✗	0	0	✗	0	0	To Do
Kamke 48	✗	0	0	✗	0	0	To Do
Kamke 49	✗	0	0	✗	0	0	To Do
Kamke 50	✗	0	0	✗	0	0	To Do
Kamke 51	✓	0.841	354	✓	0.227	237	To Do
Kamke 52	✓	173.409	115	✓	0.406	61	To Do
Kamke 53	✓	103.776	95	✓	0.07	281	To Do
Kamke 54	✓	0.157	74	✓	0.25	38	To Do
Kamke 55	✗	0	0	✗	0	0	To Do
Kamke 56	✗	0	0	✗	0	0	To Do

Continued on next page

Table 3 – continued from previous page

#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 57	✓	167.529	263	✓	0.149	31	To Do
Kamke 58	✓	0.231	119	✓	0.108	68	To Do
Kamke 59	✓	0.193	96	✓	0.092	26	To Do
Kamke 60	✓	0.058	173	✓	0.023	29	Non-Linear first order, separable.
Kamke 61	✓	0.19	75	✓	0.016	50	To Do
Kamke 62	✓	3.855	40	✓	0.422	34	Non-Linear first order, special transformation makes it exact differential.
Kamke 63	✗	0	0	✓	7.437	35	To Do
Kamke 64	✓	0.186	269	✓	0.108	124	To Do
Kamke 65	✓	1.568	312	✓	0.059	47	To Do
Kamke 66	✓	755.428	65	✓	0.178	40	To Do
Kamke 67	✓	0.054	14	✓	0.017	51	To Do
Kamke 68	✓	0.919	373	✓	0.068	77	To Do
Kamke 69	✓	98.282	12750	✓	0.175	111	To Do
Kamke 70	✓	308.505	23353	✓	0.174	113	To Do
Kamke 71	✓	3.976	2237	✓	0.134	113	To Do
Kamke 72	✓	1.079	87	✓	0.013	64	To Do
Kamke 73	✓	1.721	733	✓	0.365	91	To Do
Kamke 74	✗	0	0	✗	0	0	To Do
Kamke 75	✓	0.037	18	✓	0.197	20	Non-Linear first order, Separable

Continued on next page

Table 3 – continued from previous page

#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 76	✓	0.105	116	✓	0.069	41	Non-Linear first order, Separable, integral requires the tangent half-angle substitution (Weierstrass substitution)
Kamke 77	✓	0.308	124	✓	0.094	54	Non-Linear first order, transform to Separable, becomes same as problem 76 above. Transform back after soluion.
Kamke 78	✓	0.87	1317	✓	2.305	89	Non-Linear first order, transform to Separable, integral requires the tangent half-angle substitution (Weierstrass substitution). Kamke calls this d'Alembertsche differential equation
Kamke 79	✗	0	0	✗	0	0	To Do
Kamke 80	✗	0	0	✓	1.435	41	To Do
Kamke 81	✗	0	0	✓	1.188	78	To Do
Kamke 82	✗	0	0	✗	0	0	To Do
Kamke 83	✗	0	0	✓	0.457	44	To Do
Kamke 84	✓	10.798	244	✓	0.046	37	To Do
Kamke 85	✓	200.927	235	✓	0.516	153	To Do
Kamke 86	✗	0	0	✓	0.634	52	To Do
Kamke 87	✗	0	0	✗	0	0	To Do

Continued on next page

Table 3 – continued from previous page

#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 88	✓	0.31	2831	✓	0.253	256	Non-Linear first order, Riccati, Solved using $y=-\frac{u'}{uR(x)}$ substitution. Convert to second order Bessel ODE
Kamke 89	✓	0.032	48	✓	0.023	56	Linear first order, separable. Integration tricky. requires tangent half-angle substitution
Kamke 90	✓	0.015	24	✓	0.015	17	Linear first order, separable. integrating factor
Kamke 91	✓	0.007	15	✓	0.007	11	To Do
Kamke 92	✓	0.014	15	✓	0.008	12	Linear first order, separable. integrating factor
Kamke 93	✓	0.021	16	✓	0.017	12	To Do
Kamke 94	✓	0.016	25	✓	0.012	23	Linear first order, separable. integrating factor
Kamke 95	✓	0.016	32	✓	0.086	27	Non-Linear first order, Riccati, conversion to second order linear Lienard ODE using $y=\frac{u'}{uR}$. Solution in terms of Bessel functions
Kamke 96	✓	0.023	33	✓	0.068	11	Non-Linear first order, Riccati, but it is separable, so easy to solve by direct integration

Continued on next page

Table 3 – continued from previous page

#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 97	✓	0.028	46	✓	0.048	25	Non-Linear first order, Riccati, smart substitution transfer it to separable first order, so easy to solve by direct integration
Kamke 98	✓	0.027	442	✓	0.069	38	To Do
Kamke 99	✓	0.019	244	✓	0.121	171	To Do
Kamke 100	✓	0.009	157	✓	0.084	59	Non-Linear first order, Riccati, conversion to second order linear Lienard ODE using $y = \frac{u'}{uR}$. Solution in terms of Bessel functions
Kamke 101	✓	0.01	18	✓	0.014	16	Non-Linear first order, Bernoulli, standard method of solving Bernoulli
Kamke 102	✓	0.02	36	✓	0.051	22	Non-Linear first order, Riccati, but transformed using smart substitution $y = xv$ to separable first order which is easily solved

Continued on next page

Table 3 – continued from previous page

#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 103	✓	0.136	90	✓	0.046	29	Non-Linear first order, Riccati, conversion to second order linear Sturm-Lioville ODE using $y = \frac{u'}{uR}$, then smart substitution $t = \frac{x^2}{2}$ is used to solve Sturm-Lioville by converting it to constant coefficients second order ODE
Kamke 104	✓	0.018	43	✓	0.075	63	Non-Linear first order, Riccati, conversion using smart transformation to separable first order
Kamke 105	✓	0.199	473	✓	0.322	844	To Do
Kamke 106	✓	0.04	40	✓	0.063	41	To Do
Kamke 107	✓	0.271	1415	✓	0.27	174	To Do
Kamke 108	✓	0.012	15	✓	0.029	13	Non-Linear first order, Bernoulli, standard method of solving Bernoulli, leads to first order separable
Kamke 109	✓	0.012	17	✓	0.018	15	Non-Linear first order, Bernoulli, standard method of solving Bernoulli, leads to first order separable

Continued on next page

Table 3 – continued from previous page

#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 110	✗	0	0	✗	0	0	Non-Linear first order, Riccati, has known particular solution. Using $y = y_p + \frac{1}{u}$ convert it to first order separable ODE
Kamke 111	✓	0.5	55	✓	0.163	54	To Do
Kamke 112	✓	0.023	13	✓	0.065	27	Non-Linear first order, smart transformation $y(x) = xv(x)$ makes it separable
Kamke 113	✓	0.025	16	✓	0.033	33	Non-Linear first order, very similar to 112. Smart transformation $y(x) = xv(x)$ makes it separable
Kamke 114	✓	0.021	12	✓	2.571	28	Non-Linear first order, very similar to 113. Smart transformation $y(x) = xv(x)$ makes it separable
Kamke 115	✓	0.142	99	✓	0.25	49	Non-Linear first order, Smart transformation $y(x) = xv(x)$ makes it separable
Kamke 116	✓	0.593	143	✓	0.352	86	To Do
Kamke 117	✓	0.028	21	✓	0.129	20	To Do
Kamke 118	✓	0.012	13	✓	0.066	8	To Do
Kamke 119	✓	0.032	17	✓	0.073	14	To Do

Continued on next page

Table 3 – continued from previous page

#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 120	✓	0.052	20	✓	0.201	17	To Do
Kamke 121	✗	0	0	✗	0	0	To Do
Kamke 122	✓	0.085	21	✓	0.42	16	To Do
Kamke 123	✓	0.068	19	✓	0.079	44	To Do
Kamke 124	✓	0.032	16	✓	0.037	12	To Do
Kamke 125	✓	0.041	16	✓	0.074	14	To Do
Kamke 126	✓	19.681	112	✓	0.028	29	To Do
Kamke 127	✓	466.579	183	✓	0.128	39	To Do
Kamke 128	✓	4.378	39	✓	0.306	33	To Do
Kamke 129	✓	0.031	44	✓	0.037	33	To Do
Kamke 130	✓	0.007	21	✓	0.01	15	To Do
Kamke 131	✓	0.018	20	✓	0.281	31	To Do
Kamke 132	✓	0.013	115	✓	0.039	153	To Do
Kamke 133	✓	0.008	27	✓	0.012	16	To Do
Kamke 134	✓	0.012	27	✓	0.01	17	To Do
Kamke 135	✓	0.008	14	✓	0.008	11	To Do
Kamke 136	✓	0.014	28	✓	0.022	18	To Do
Kamke 137	✓	0.01	16	✓	0.018	14	To Do
Kamke 138	✓	0.015	13	✓	0.043	11	To Do
Kamke 139	✓	0.135	821	✓	0.154	219	To Do
Kamke 140	✓	0.01	17	✓	0.078	20	To Do
Kamke 141	✓	0.028	67	✓	0.076	51	To Do
Kamke 142	✓	0.12	122	✓	0.12	52	To Do

Continued on next page

Table 3 – continued from previous page

#	Mathematica			Maple			note on solution
	solved	cpu	leaf	solved	cpu	leaf	
Kamke 143	✓	0.01	51	✓	0.065	41	To Do
Kamke 144	✓	0.175	1787	✓	0.135	219	To Do
Kamke 145	✓	0.696	267	✓	0.132	117	To Do
Kamke 146	✓	0.954	78	✓	0.177	84	To Do
Kamke 147	✓	0.959	343	✓	0.477	178	To Do
Kamke 148	✓	0.013	30	✓	0.01	16	To Do
Kamke 149	✓	0.013	27	✓	0.011	20	To Do
Kamke 150	✓	0.008	30	✓	0.007	23	To Do
Kamke 151	✓	0.567	203	✓	0.058	85	To Do
Kamke 152	✓	0.243	40	✓	0.96	25	To Do
Kamke 153	✓	0.017	21	✓	0.017	20	To Do
Kamke 154	✓	0.015	26	✓	0.013	16	To Do
Kamke 155	✓	0.019	46	✓	0.112	14	To Do
Kamke 156	✓	0.017	21	✓	0.021	20	To Do
Kamke 157	✓	0.089	158	✓	0.274	231	To Do
Kamke 158	✓	0.041	31	✓	0.022	22	To Do
Kamke 159	✓	0.018	22	✓	0.171	13	To Do
Kamke 160	✓	0.021	27	✓	0.033	21	To Do
Kamke 161	✓	0.015	53	✓	0.014	27	To Do
Kamke 162	✓	0.27	133	✓	0.202	58	To Do
Kamke 163	✓	0.013	43	✓	0.065	26	To Do
Kamke 164	✓	0.085	131	✓	0.231	102	To Do
Kamke 165	✓	0.018	22	✓	0.027	17	To Do

Continued on next page

Table 3 – continued from previous page

#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 166	✓	0.097	71	✓	0.175	97	To Do
Kamke 167	✓	0.025	35	✓	0.043	20	To Do
Kamke 168	✓	0.097	234	✓	0.184	140	To Do
Kamke 169	✓	3.065	149	✓	0.164	153	To Do
Kamke 170	✓	0.022	43	✓	0.022	23	To Do
Kamke 171	✓	0.011	17	✓	0.014	15	To Do
Kamke 172	✓	0.044	35	✓	0.29	26	To Do
Kamke 173	✓	0.016	29	✓	0.052	27	To Do
Kamke 174	✓	0.008	17	✓	0.006	13	To Do
Kamke 175	✓	0.022	24	✓	0.022	20	To Do
Kamke 176	✓	0.13	82	✓	0.131	30	To Do
Kamke 177	✓	0.017	22	✓	0.029	17	To Do
Kamke 178	✓	0.073	62	✓	0.208	63	To Do
Kamke 179	✓	1.735	2816	✓	0.206	112	To Do
Kamke 180	✓	0.141	132	✓	0.073	58	To Do
Kamke 181	✓	0.013	347	✓	0.083	28	To Do
Kamke 182	✓	0.193	96	✓	0.168	18	To Do
Kamke 183	✓	0.024	22	✓	0.013	18	To Do
Kamke 184	✓	1.739	704	✓	0.426	493	To Do
Kamke 185	✓	0.524	123	✓	0.049	63	To Do
Kamke 186	✓	0.034	19	✓	0.061	17	To Do
Kamke 187	✓	0.083	328	✓	0.131	60	To Do
Kamke 188	✗	0	0	✓	0.03	32	To Do

Continued on next page

Table 3 – continued from previous page

#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 189	✓	108.179	90	✓	0.26	60	To Do
Kamke 190	✓	0.058	173	✓	0.008	29	To Do
Kamke 191	✓	0.031	52	✓	0.02	16	To Do
Kamke 192	✓	631.94	167	✓	0.018	36	To Do
Kamke 193	✓	0.01	16	✓	0.007	14	To Do
Kamke 194	✓	0.078	98	✓	0.027	23	To Do
Kamke 195	✓	0.063	27	✓	0.137	28	To Do
Kamke 196	✓	0.071	53	✓	0.149	29	To Do
Kamke 197	✓	0.055	98	✓	0.12	237	To Do
Kamke 198	✓	0.029	15	✓	0.017	13	To Do
Kamke 199	✓	0.197	15	✓	0.204	102	To Do
Kamke 200	✓	0.052	77	✓	0.063	53	To Do
Kamke 201	✓	0.081	38	✓	0.057	23	To Do
Kamke 202	✗	0	0	✗	0	0	To Do
Kamke 203	✗	0	0	✗	0	0	To Do
Kamke 204	✓	0.114	70	✓	0.329	92	To Do
Kamke 205	✗	0	0	✗	0	0	To Do
Kamke 206	✗	0	0	✗	0	0	To Do
Kamke 207	✓	0.013	47	✓	0.028	37	To Do
Kamke 208	✓	0.087	118	✓	0.081	106	To Do
Kamke 209	✓	0.023	84	✓	0.013	21	To Do
Kamke 210	✓	0.018	47	✓	0.029	33	To Do
Kamke 211	✓	54.384	40	✓	0.037	31	To Do

Continued on next page

Table 3 – continued from previous page

#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 212	✓	28.45	92	✓	0.137	30	To Do
Kamke 213	✓	0.152	71	✓	0.79	66	To Do
Kamke 214	✓	0.163	78	✓	0.207	48	To Do
Kamke 215	✓	0.172	80	✓	0.329	51	To Do
Kamke 216	✓	0.148	82	✓	0.212	51	To Do
Kamke 217	✓	0.02	29	✓	0.051	23	To Do
Kamke 218	✓	0.105	257	✓	0.224	57	To Do
Kamke 219	✗	0	0	✗	0	0	To Do
Kamke 220	✓	0.014	57	✓	0.03	43	To Do
Kamke 221	✓	0.019	35	✓	0.077	21	To Do
Kamke 222	✓	0.075	65	✓	0.089	32	To Do
Kamke 223	✓	0.025	55	✓	0.192	51	To Do
Kamke 224	✓	0.019	29	✓	0.065	35	To Do
Kamke 225	✓	0.017	33	✓	0.056	20	To Do
Kamke 226	✓	0.017	35	✓	0.056	21	To Do
Kamke 227	✓	0.013	107	✓	0.203	33	To Do
Kamke 228	✓	0.406	3357	✓	0.44	271	To Do
Kamke 229	✓	0.013	121	✓	0.207	32	To Do
Kamke 230	✓	0.124	96	✓	0.05	100	To Do
Kamke 231	✓	3.723	252	✓	0.263	178	To Do
Kamke 232	✓	0.01	56	✓	0.023	39	To Do
Kamke 233	✓	0.025	38	✓	0.03	30	To Do
Kamke 234	✗	0	0	✗	0	0	To Do

Continued on next page

Table 3 – continued from previous page

#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 235	✓	0.076	40	✓	0.059	30	To Do
Kamke 236	✓	0.018	114	✓	0.073	141	To Do
Kamke 237	✗	0	0	✗	0	0	To Do
Kamke 238	✓	0.045	192	✓	0.085	93	To Do
Kamke 239	✓	0.03	54	✓	0.207	59	To Do
Kamke 240	✓	0.01	41	✓	0.033	34	To Do
Kamke 241	✓	0.01	41	✓	0.02	33	To Do
Kamke 242	✓	0.015	60	✓	0.02	39	To Do
Kamke 243	✓	15.072	487	✓	0.159	391	To Do
Kamke 244	✓	14.993	484	✓	0.135	391	To Do
Kamke 245	✓	0.483	1453	✓	0.349	31	To Do
Kamke 246	✓	0.032	80	✓	0.076	63	To Do
Kamke 247	✓	14.926	693	✓	0.286	517	To Do
Kamke 248	✓	0.015	106	✓	0.026	75	To Do
Kamke 249	✓	6.221	115	✓	0.232	202	To Do
Kamke 250	✗	0	0	✗	0	0	To Do
Kamke 251	✓	0.013	60	✓	0.024	51	To Do
Kamke 252	✓	14.948	819	✓	0.933	1338	To Do
Kamke 253	✗	0	0	✗	0	0	To Do
Kamke 254	✓	0.017	99	✓	0.036	59	To Do
Kamke 255	✓	5.548	30	✓	0.261	74	To Do
Kamke 256	✓	0.02	21	✓	0.062	31	To Do
Kamke 257	✓	0.405	39	✓	0.135	98	To Do

Continued on next page

Table 3 – continued from previous page

#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 258	✓	0.014	43	✓	0.03	33	To Do
Kamke 259	✓	0.02	50	✓	0.033	51	To Do
Kamke 260	✓	0.016	80	✓	0.039	59	To Do
Kamke 261	✓	1.146	32	✓	0.161	18	To Do
Kamke 262	✓	0.07	101	✓	0.351	65	To Do
Kamke 263	✓	0.043	121	✓	0.316	173	To Do
Kamke 264	✓	0.442	680	✓	0.638	574	To Do
Kamke 265	✗	0	0	✗	0	0	To Do
Kamke 266	✗	0	0	✓	1.583	55	To Do
Kamke 267	✓	0.039	36	✓	0.03	32	To Do
Kamke 268	✓	1.003	140	✓	0.087	118	To Do
Kamke 269	✗	0	0	✗	0	0	To Do
Kamke 270	✓	0.079	327	✓	0.032	319	To Do
Kamke 271	✓	0.091	370	✓	0.224	352	To Do
Kamke 272	✓	0.122	42	✓	0.182	43	To Do
Kamke 273	✓	0.019	297	✓	0.03	401	To Do
Kamke 274	✓	0.028	411	✓	0.041	657	To Do
Kamke 275	✓	0.041	18	✓	0.109	30	To Do
Kamke 276	✓	0.034	61	✓	0.072	47	To Do
Kamke 277	✓	0.014	53	✓	0.391	41	To Do
Kamke 278	✓	0.094	39	✓	0.063	28	To Do
Kamke 279	✓	0.696	107	✓	0.185	116	To Do
Kamke 280	✓	0.039	21	✓	0.065	24	To Do

Continued on next page

Table 3 – continued from previous page

#	Mathematica			Maple			note on solution
	solved	cpu	leaf	solved	cpu	leaf	
Kamke 281	✓	0.056	75	✓	0.076	55	To Do
Kamke 282	✓	0.126	2129	✓	0.326	71	To Do
Kamke 283	✓	0.052	477	✓	0.081	407	To Do
Kamke 284	✓	0.041	59	✓	0.163	21	To Do
Kamke 285	✓	0.033	402	✓	0.086	432	To Do
Kamke 286	✓	0.209	3501	✓	1.149	1337	To Do
Kamke 287	✓	2.22	77	✓	0.082	56	To Do
Kamke 288	✓	0.02	534	✓	0.041	579	To Do
Kamke 289	✓	0.014	115	✓	0.041	115	To Do
Kamke 290	✓	0.075	831	✓	0.112	1388	To Do
Kamke 291	✓	0.742	39	✓	0.177	50	To Do
Kamke 292	✓	53.291	760	✓	0.046	115	To Do
Kamke 293	✓	0.093	661	✓	0.391	35	To Do
Kamke 294	✓	0.031	71	✓	0.094	112	To Do
Kamke 295	✓	0.059	31	✓	0.218	29	To Do
Kamke 296	✓	0.502	102	✓	0.795	135	To Do
Kamke 297	✓	0.053	216	✓	0.362	29	To Do
Kamke 298	✓	0.009	72	✓	0.023	73	To Do
Kamke 299	✓	0.021	371	✓	0.234	276	To Do
Kamke 300	✓	0.009	99	✓	0.026	83	To Do
Kamke 301	✓	0.039	64	✓	0.344	25	To Do
Kamke 302	✓	0.016	70	✓	0.237	133	To Do
Kamke 303	✓	0.067	25	✓	0.241	34	To Do

Continued on next page

Table 3 – continued from previous page

#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 304	✓	45.212	59	✓	0.34	44	To Do
Kamke 305	✓	0.099	1277	✓	0.038	21	To Do
Kamke 306	✓	0.05	201	✓	0.355	231	To Do
Kamke 307	✓	0.022	149	✓	0.058	125	To Do
Kamke 308	✓	0.007	55	✓	0.038	37	To Do
Kamke 309	✓	0.013	151	✓	0.048	113	To Do
Kamke 310	✓	0.045	159	✓	0.223	125	To Do
Kamke 311	✓	0.182	2201	✓	0.096	50	To Do
Kamke 312	✓	0.257	204	✓	1.648	240	To Do
Kamke 313	✓	0.089	537	✓	0.221	748	To Do
Kamke 314	✓	0.045	188	✓	0.072	158	To Do
Kamke 315	✓	0.11	368	✓	0.109	370	To Do
Kamke 316	✓	0.08	48	✓	0.076	53	To Do
Kamke 317	✓	0.345	23	✓	0.146	29	To Do
Kamke 318	✓	0.148	4284	✓	0.024	28	To Do
Kamke 319	✓	0.024	302	✓	0.037	35	To Do
Kamke 320	✓	0.056	76	✓	0.115	78	To Do
Kamke 321	✓	0.302	47	✓	0.188	42	To Do
Kamke 322	✓	0.206	2077	✓	0.034	29	To Do
Kamke 323	✓	0.045	463	✓	0.131	630	To Do
Kamke 324	✓	0.034	723	✓	0.14	815	To Do
Kamke 325	✓	0.058	139	✓	0.528	124	To Do
Kamke 326	✓	4.765	13289	✓	0.456	160	To Do

Continued on next page

Table 3 – continued from previous page

#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 327	✓	0.362	669	✓	0.211	583	To Do
Kamke 328	✓	0.12	42	✓	0.203	33	To Do
Kamke 329	✓	0.397	102	✓	0.358	71	To Do
Kamke 330	✓	52.939	49	✓	0.047	22	To Do
Kamke 331	✗	0	0	✗	0	0	To Do
Kamke 332	✓	0.118	24	✓	0.017	33	To Do
Kamke 333	✓	0.266	72	✓	0.115	32	To Do
Kamke 334	✓	0.035	39	✓	0.033	19	To Do
Kamke 335	✓	0.191	75	✓	0.021	50	To Do
Kamke 336	✓	0.074	53	✓	0.042	41	To Do
Kamke 337	✓	0.056	52	✓	0.085	28	To Do
Kamke 338	✓	91.959	17681	✓	0.776	128	To Do
Kamke 339	✓	0.118	27	✓	0.202	27	To Do
Kamke 340	✗	0	0	✗	0	0	To Do
Kamke 341	✓	0.051	33	✓	5.949	33	To Do
Kamke 342	✓	0.276	163	✓	5.217	17	To Do
Kamke 343	✓	0.064	35	✓	6.423	27	To Do
Kamke 344	✓	0.02	23	✓	3.728	19	To Do
Kamke 345	✓	0.072	35	✓	14.534	36	To Do
Kamke 346	✓	0.083	24	✓	9.489	19	To Do
Kamke 347	✓	0.134	32	✓	4.758	16	To Do
Kamke 348	✓	0.055	17	✓	3.774	15	To Do
Kamke 349	✓	0.046	15	✓	0.484	17	To Do

Continued on next page

Table 3 – continued from previous page

#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 350	✓	0.608	53	✓	4.72	226	To Do
Kamke 351	✓	0.401	61	✓	1.124	55	To Do
Kamke 352	✓	0.155	43	✓	0.571	33	To Do
Kamke 353	✓	0.02	14	✓	2.935	12	To Do
Kamke 354	✓	0.066	145	✓	0.579	108	To Do
Kamke 355	✓	0.053	17	✓	0.097	15	To Do
Kamke 356	✓	10.052	21	✓	0.639	19	To Do
Kamke 357	✓	0.318	35	✓	2.586	13	To Do
Kamke 358	✓	0.045	29	✓	0.363	11	To Do
Kamke 359	✓	0.062	45	✓	0.311	28	To Do
Kamke 360	✓	5.406	369	✓	2.819	48	To Do
Kamke 361	✓	0.365	31	✓	0.425	22	To Do
Kamke 362	✓	0.09	23	✓	1.348	23	To Do
Kamke 363	✓	0.045	33	✓	0.096	35	To Do
Kamke 364	✓	0.08	31	✓	0.217	23	To Do
Kamke 365	✗	0	0	✓	10.578	42	To Do
Kamke 366	✓	362.562	88	✓	1.163	45	To Do
Kamke 367	✗	0	0	✗	0	0	To Do
Kamke 368	✗	0	0	✗	0	0	To Do
Kamke 369	✓	0.041	107	✓	0.323	68	To Do
Kamke 370	✗	0	0	✗	0	0	To Do
Kamke 371	✓	0.027	37	✓	0.094	20	To Do
Kamke 372	✓	0.005	27	✓	0.197	232	To Do

Continued on next page

Table 3 – continued from previous page

#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 373	✓	0.236	185	✓	0.451	49	To Do
Kamke 374	✓	0.067	73	✓	0.048	85	To Do
Kamke 375	✓	0.046	71	✓	0.184	49	To Do
Kamke 376	✓	0.347	110	✓	0.809	219	To Do
Kamke 377	✓	0.005	19	✓	0.161	24	To Do
Kamke 378	✓	0.005	18	✓	0.156	20	To Do
Kamke 379	✓	0.005	18	✓	0.163	22	To Do
Kamke 380	✓	0.494	1757	✓	0.182	619	To Do
Kamke 381	✓	0.511	1757	✓	0.171	579	To Do
Kamke 382	✓	0.298	201	✓	0.173	146	To Do
Kamke 383	✗	0	0	✗	0	0	To Do
Kamke 384	✓	2.106	183	✓	0.027	50	To Do
Kamke 385	✗	0	0	✓	2.372	169	To Do
Kamke 386	✓	0.257	119	✓	3.201	27	To Do
Kamke 387	✓	0.897	134	✓	6.373	115	To Do
Kamke 388	✓	0.759	53	✓	0.743	223	To Do
Kamke 389	✓	0.046	57	✓	13.089	71	To Do
Kamke 390	✓	2.219	142	✓	6.155	281	To Do
Kamke 391	✓	0.006	29	✓	0.254	22	To Do
Kamke 392	✓	0.258	27	✓	10.285	50	To Do
Kamke 393	✓	0.036	31	✓	0.926	77	To Do
Kamke 394	✗	0	0	✓	22.549	109	To Do
Kamke 395	✗	0	0	✗	0	0	To Do

Continued on next page

Table 3 – continued from previous page

#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 396	✓	0.008	29	✓	0.241	20	To Do
Kamke 397	✓	0.636	143	✓	3.413	128	To Do
Kamke 398	✓	1.031	258	✓	5.989	138	To Do
Kamke 399	✓	0.005	20	✓	0.022	22	To Do
Kamke 400	✓	0.479	189	✓	1.521	74	To Do
Kamke 401	✓	0.341	1093	✓	0.479	580	To Do
Kamke 402	✗	0	0	✓	0.719	101	To Do
Kamke 403	✓	0.323	116	✓	19.36	197	To Do
Kamke 404	✗	0	0	✓	2.159	389	To Do
Kamke 405	✓	1.302	53	✓	2.196	375	To Do
Kamke 406	✓	0.976	49	✓	0.745	262	To Do
Kamke 407	✓	0.016	51	✓	0.255	39	To Do
Kamke 408	✓	1.101	166	✓	0.399	73	To Do
Kamke 409	✓	30.792	66	✓	0.75	63	To Do
Kamke 410	✓	31.574	80	✓	0.767	64	To Do
Kamke 411	✓	1.298	181	✓	0.482	65	To Do
Kamke 412	✓	27.162	16145	✓	0.702	146	To Do
Kamke 413	✗	0	0	✓	1.06	269	To Do
Kamke 414	✗	0	0	✓	1.07	269	To Do
Kamke 415	✓	0.222	133	✓	2.056	95	To Do
Kamke 416	✗	0	0	✓	0.506	136	To Do
Kamke 417	✓	0.857	430	✓	0.162	35	To Do
Kamke 418	✓	1.081	165	✓	0.374	42	To Do

Continued on next page

Table 3 – continued from previous page

#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 419	✓	1.797	9073	✓	0.262	109	To Do
Kamke 420	✓	1.987	11757	✓	0.808	689	To Do
Kamke 421	✓	0.033	27	✓	0.155	32	To Do
Kamke 422	✓	0.048	49	✓	0.153	30	To Do
Kamke 423	✓	0.077	59	✓	0.165	44	To Do
Kamke 424	✓	0.655	223	✓	1.297	193	To Do
Kamke 425	✓	0.351	59	✓	0.158	45	To Do
Kamke 426	✓	0.47	310	✓	0.152	51	To Do
Kamke 427	✓	0.807	479	✓	0.155	60	To Do
Kamke 428	✗	0	0	✓	0.185	66	To Do
Kamke 429	✗	0	0	✓	0.293	72	To Do
Kamke 430	✓	261.741	478	✓	7.928	1602	To Do
Kamke 431	✓	0.037	111	✓	1.401	62	To Do
Kamke 432	✓	1.817	64	✓	13.877	242	To Do
Kamke 433	✓	0.525	22	✓	1.325	34	To Do
Kamke 434	✓	0.033	27	✓	0.114	7	To Do
Kamke 435	✓	0.037	61	✓	2.39	22	To Do
Kamke 436	✓	0.035	26	✓	18.651	61	To Do
Kamke 437	✓	0.294	47	✓	0.375	36	To Do
Kamke 438	✓	0.007	21	✓	0.119	17	To Do
Kamke 439	✓	0.014	49	✓	0.487	33	To Do
Kamke 440	✓	0.007	19	✓	0.118	15	To Do
Kamke 441	✓	0.095	65	✓	25.824	83	To Do

Continued on next page

Table 3 – continued from previous page

#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 442	✓	0.008	28	✓	0.122	21	To Do
Kamke 443	✓	0.566	1921	✓	35.244	221	To Do
Kamke 444	✓	0.158	75	✓	25.128	120	To Do
Kamke 445	✓	0.01	49	✓	0.246	35	To Do
Kamke 446	✓	0.506	201	✓	0.385	57	To Do
Kamke 447	✓	0.015	89	✓	0.362	33	To Do
Kamke 448	✓	0.1	349	✓	494.224	166	To Do
Kamke 449	✓	0.01	27	✓	0.11	23	To Do
Kamke 450	✓	0.456	26	✓	2.483	51	To Do
Kamke 451	✗	0	0	✓	0.835	78	To Do
Kamke 452	✗	0	0	✓	3.23	37	To Do
Kamke 453	✓	2.292	395	✓	12.662	229	To Do
Kamke 454	✓	0.801	241	✓	1.12	106	To Do
Kamke 455	✓	0.878	123	✓	2.938	66	To Do
Kamke 456	✓	0.574	79	✓	2.967	33	To Do
Kamke 457	✓	2.792	410	✓	16.604	45	To Do
Kamke 458	✓	0.143	139	✓	0.43	90	To Do
Kamke 459	✓	4.408	272	✓	3.381	65	To Do
Kamke 460	✗	0	0	✗	0	0	To Do
Kamke 461	✗	0	0	✗	0	0	To Do
Kamke 462	✓	0.014	43	✓	0.321	27	To Do
Kamke 463	✓	0.037	47	✓	0.761	50	To Do
Kamke 464	✓	0.065	52	✓	6.532	70	To Do

Continued on next page

Table 3 – continued from previous page

#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 465	✗	0	0	✓	0.467	210	To Do
Kamke 466	✓	35.712	145	✓	5.356	71	To Do
Kamke 467	✗	0	0	✓	0.458	148	To Do
Kamke 468	✗	0	0	✓	0.565	181	To Do
Kamke 469	✓	221.659	272	✓	1.261	264	To Do
Kamke 470	✓	12.424	197	✓	2.854	87	To Do
Kamke 471	✓	0.457	47	✓	0.212	33	To Do
Kamke 472	✓	8.644	127	✓	6.171	121	To Do
Kamke 473	✓	22.105	165	✓	8.733	71	To Do
Kamke 474	✓	5.063	135	✓	4.226	152	To Do
Kamke 475	✓	2.399	57	✓	6.422	67	To Do
Kamke 476	✓	3.055	197	✓	2.664	87	To Do
Kamke 477	✓	2.773	146	✓	2.334	622	To Do
Kamke 478	✓	0.976	141	✓	1.636	88	To Do
Kamke 479	✓	1037.127	508	✓	0.623	929	To Do
Kamke 480	✗	0	0	✗	0	0	To Do
Kamke 481	✓	0.02	49	✓	0.218	35	To Do
Kamke 482	✗	0	0	✗	0	0	To Do
Kamke 483	✓	0.483	71	✓	0.272	103	To Do
Kamke 484	✓	0.338	81	✓	0.275	115	To Do
Kamke 485	✗	0	0	✗	0	0	To Do
Kamke 486	✓	0.025	117	✓	1.174	54	To Do
Kamke 487	✓	0.499	215	✓	1.899	100	To Do

Continued on next page

Table 3 – continued from previous page

#	Mathematica			Maple			note on solution
	solved	cpu	leaf	solved	cpu	leaf	
Kamke 488	✓	0.42	85	✓	2.47	111	To Do
Kamke 489	✗	0	0	✓	8.711	551	To Do
Kamke 490	✓	0.659	70	✓	2.657	145	To Do
Kamke 491	✓	1.083	79	✓	3.403	195	To Do
Kamke 492	✓	0.289	111	✓	7.936	122	To Do
Kamke 493	✓	10.769	553	✓	3.279	111	To Do
Kamke 494	✗	0	0	✓	0.855	161	To Do
Kamke 495	✓	0.149	83	✓	11.317	61	To Do
Kamke 496	✓	98.973	65	✓	1.805	130	To Do
Kamke 497	✓	0.189	203	✓	3.07	203	To Do
Kamke 498	✓	0.109	107	✓	4.507	99	To Do
Kamke 499	✓	0.311	212	✓	0.894	189	To Do
Kamke 500	✓	1.44	100	✓	3.251	220	To Do
Kamke 501	✓	32.686	913	✓	5.504	215	To Do
Kamke 502	✓	1.761	100	✓	0.408	195	To Do
Kamke 503	✗	0	0	✗	0	0	To Do
Kamke 504	✗	0	0	✓	0.947	247	To Do
Kamke 505	✓	0.031	73	✓	0.039	52	To Do
Kamke 506	✗	0	0	✗	0	0	To Do
Kamke 507	✓	30.819	443	✗	0	0	To Do
Kamke 508	✗	0	0	✓	2.581	60	To Do
Kamke 509	✗	0	0	✓	1.483	212	To Do
Kamke 510	✗	0	0	✗	0	0	To Do

Continued on next page

Table 3 – continued from previous page

#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 511	✓	4.293	229	✓	4.984	199	To Do
Kamke 512	✓	8.668	713	✓	6.934	137	To Do
Kamke 513	✗	0	0	✓	4.999	1134	To Do
Kamke 514	✓	18.184	605	✓	0.35	87	To Do
Kamke 515	✗	0	0	✓	2.185	113	To Do
Kamke 516	✓	4.347	251	✓	1.271	139	To Do
Kamke 517	✓	4.944	281	✓	1.211	78	To Do
Kamke 518	✓	1.332	236	✓	0.258	126	To Do
Kamke 519	✓	3.353	473	✓	0.511	197	To Do
Kamke 520	✓	237.102	3323	✓	0.168	245	To Do
Kamke 521	✓	0.004	14	✓	0.035	33	To Do
Kamke 522	✓	0.004	20	✓	0.047	44	To Do
Kamke 523	✓	3223.233	389	✓	0.056	231	To Do
Kamke 524	✗	0	0	✓	0.065	261	To Do
Kamke 525	✓	16.415	135	✓	0.069	122	To Do
Kamke 526	✓	1.155	45	✓	0.02	32	To Do
Kamke 527	✗	0	0	✓	0.692	43	To Do
Kamke 528	✗	0	0	✓	0.108	86	To Do
Kamke 529	✓	65.325	1758	✓	0.056	1251	To Do
Kamke 530	✗	0	0	✓	0.135	432	To Do
Kamke 531	✗	0	0	✗	0	0	To Do
Kamke 532	✗	0	0	✓	0.149	848	To Do
Kamke 533	✗	0	0	✓	0.041	76	To Do

Continued on next page

Table 3 – continued from previous page

#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 534	✗	0	0	✓	0.1	84	To Do
Kamke 535	✗	0	0	✓	0.06	51	To Do
Kamke 536	✓	0.017	64	✓	0.047	52	To Do
Kamke 537	✗	0	0	✗	0	0	To Do
Kamke 538	✗	0	0	✓	1.006	1532	To Do
Kamke 539	✓	0.036	45	✓	0.059	32	To Do
Kamke 540	✓	0.02	69	✓	0.076	109	To Do
Kamke 541	✗	0	0	✓	0.553	103	To Do
Kamke 542	✗	0	0	✓	0.528	107	To Do
Kamke 543	✗	0	0	✓	1.394	277	To Do
Kamke 544	✗	0	0	✓	1.019	4201	To Do
Kamke 545	✓	0.873	383	✓	0.178	144	To Do
Kamke 546	✗	0	0	✓	0.144	171	To Do
Kamke 547	✓	1.788	490	✓	0.269	118	To Do
Kamke 548	✓	1.059	569	✓	0.359	250	To Do
Kamke 549	✓	0.451	360	✓	0.522	553	To Do
Kamke 550	✗	0	0	✓	0.33	60	To Do
Kamke 551	✓	0.445	84	✓	0.455	55	To Do
Kamke 552	✓	0.183	39	✓	0.09	43	To Do
Kamke 553	✓	0.185	51	✓	0.058	36	To Do
Kamke 554	✓	0.126	49	✓	0.428	32	To Do
Kamke 555	✗	0	0	✓	0.028	15	To Do
Kamke 556	✓	9.524	60	✓	0.231	581	To Do

Continued on next page

Table 3 – continued from previous page

#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 557	✓	0.07	39	✓	0.129	74	To Do
Kamke 558	✓	1.401	395	✓	0.176	223	To Do
Kamke 559	✓	0.452	212	✓	0.301	215	To Do
Kamke 560	✓	25.466	110	✓	1.006	1120	To Do
Kamke 561	✗	0	0	✓	1.748	50	To Do
Kamke 562	✓	472.437	119	✓	0.167	3306	To Do
Kamke 563	✓	0.162	59	✓	0.189	66	To Do
Kamke 564	✓	0.043	28	✓	0.029	32	To Do
Kamke 565	✓	0.012	25	✓	0.168	17	To Do
Kamke 566	✗	0	0	✓	0.034	16	To Do
Kamke 567	✗	0	0	✓	0.04	18	To Do
Kamke 568	✓	0.056	28	✓	0.068	32	To Do
Kamke 569	✓	0.041	59	✓	0.584	147	To Do
Kamke 570	✗	0	0	✓	0.062	30	To Do
Kamke 571	✓	0.111	114	✓	0.279	169	To Do
Kamke 572	✗	0	0	✗	0	0	To Do
Kamke 573	✓	0.021	42	✓	0.171	16	To Do
Kamke 574	✓	0.015	102	✓	0.148	41	To Do
Kamke 575	✗	0	0	✗	0	0	To Do
Kamke 576	✗	0	0	✗	0	0	To Do
Kamke 577	✓	15.446	240	✓	0.036	28	To Do
Kamke 578	✓	20.068	97	✓	0.051	22	To Do
Kamke 579	✓	16.448	510	✓	0.057	35	To Do

Continued on next page

Table 3 – continued from previous page

#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 580	✓	33.238	200	✓	0.072	31	To Do
Kamke 581	✓	48.206	141	✓	0.103	32	To Do
Kamke 582	✓	20.571	139	✓	0.226	30	To Do
Kamke 583	✓	50.382	123	✓	0.147	31	To Do
Kamke 584	✓	23.866	112	✓	0.078	35	To Do
Kamke 585	✓	154.21	202	✓	0.594	120	To Do
Kamke 586	✓	193.222	972	✓	0.274	39	To Do
Kamke 587	✓	260.988	120	✓	0.14	29	To Do
Kamke 588	✓	41.986	110	✓	0.135	53	To Do
Kamke 589	✓	25.5	242	✓	0.159	38	To Do
Kamke 590	✓	38.534	91	✓	0.148	28	To Do
Kamke 591	✓	25.399	250	✓	0.21	108	To Do
Kamke 592	✓	463.993	238	✓	0.199	33	To Do
Kamke 593	✓	35.213	218	✓	0.358	35	To Do
Kamke 594	✓	23.295	233	✓	0.163	67	To Do
Kamke 595	✓	24.211	201	✓	0.149	72	To Do
Kamke 596	✓	240.482	153	✓	0.101	26	To Do
Kamke 597	✓	32.875	127	✓	0.409	37	To Do
Kamke 598	✓	0.1	36	✓	0.025	29	To Do
Kamke 599	✓	27.794	92	✓	0.105	57	To Do
Kamke 600	✓	25.962	243	✓	0.158	38	To Do
Kamke 601	✓	40.557	187	✓	0.144	61	To Do
Kamke 602	✓	237.176	164	✓	0.147	33	To Do

Continued on next page

Table 3 – continued from previous page

#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 603	✓	20.088	114	✓	0.153	27	To Do
Kamke 604	✓	27.771	140	✓	0.16	30	To Do
Kamke 605	✓	202.972	142	✓	0.141	29	To Do
Kamke 606	✓	77.145	358	✓	0.872	34	To Do
Kamke 607	✓	976.721	118	✓	0.107	22	To Do
Kamke 608	✓	518.843	271	✓	0.195	40	To Do
Kamke 609	✓	61.572	114	✓	0.171	22	To Do
Kamke 610	✓	0.072	24	✓	0.017	20	To Do
Kamke 611	✓	48.104	188	✓	0.092	28	To Do
Kamke 612	✓	58.775	196	✓	0.149	27	To Do
Kamke 613	✓	1501.034	223	✓	0.108	23	To Do
Kamke 614	✓	86.138	174	✓	0.43	60	To Do
Kamke 615	✓	18.998	74	✓	0.139	26	To Do
Kamke 616	✓	55.891	174	✓	0.1	26	To Do
Kamke 617	✓	273.855	612	✓	0.296	47	To Do
Kamke 618	✓	0.097	25	✓	0.464	34	To Do
Kamke 619	✓	258.87	327	✓	0.439	81	To Do
Kamke 620	✗	0	0	✓	0.214	37	To Do
Kamke 621	✓	0.084	445	✓	0.339	59	To Do
Kamke 622	✓	0.4	140	✓	0.24	77	To Do
Kamke 623	✓	0.219	77	✓	0.261	49	To Do
Kamke 624	✓	49.308	9837	✓	1.451	46	To Do
Kamke 625	✓	0.287	76	✓	0.232	53	To Do

Continued on next page

Table 3 – continued from previous page

#	Mathematica			Maple			note on solution
	solved	cpu	leaf	solved	cpu	leaf	
Kamke 626	✓	0.242	88	✓	0.406	115	To Do
Kamke 627	✓	0.817	25	✓	0.35	35	To Do
Kamke 628	✓	0.088	33	✓	0.339	23	To Do
Kamke 629	✓	0.783	47	✓	0.217	62	To Do
Kamke 630	✓	0.611	101	✓	0.348	98	To Do
Kamke 631	✓	0.087	31	✓	0.217	23	To Do
Kamke 632	✓	0.225	65	✓	0.26	54	To Do
Kamke 633	✓	0.262	85	✓	1.007	52	To Do
Kamke 634	✓	0.179	33	✓	0.252	26	To Do
Kamke 635	✓	0.129	33	✓	0.207	22	To Do
Kamke 636	✓	0.06	24	✓	0.205	19	To Do
Kamke 637	✓	15.951	59	✓	0.469	84	To Do
Kamke 638	✗	0	0	✓	0.227	35	To Do
Kamke 639	✗	0	0	✓	0.342	48	To Do
Kamke 640	✗	0	0	✓	0.522	47	To Do
Kamke 641	✓	0.166	35	✓	0.237	26	To Do
Kamke 642	✓	0.128	105	✓	0.28	286	To Do
Kamke 643	✓	0.109	31	✓	0.206	22	To Do
Kamke 644	✓	0.263	34	✓	0.39	27	To Do
Kamke 645	✓	0.034	20	✓	0.114	14	To Do
Kamke 646	✓	0.167	35	✓	0.297	23	To Do
Kamke 647	✓	0.37	115	✓	0.313	460	To Do
Kamke 648	✓	0.342	128	✓	0.672	41	To Do

Continued on next page

Table 3 – continued from previous page

#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 649	✓	0.178	37	✓	0.236	27	To Do
Kamke 650	✓	0.233	40	✓	0.253	28	To Do
Kamke 651	✓	0.031	16	✓	0.072	13	To Do
Kamke 652	✓	1.827	101	✓	0.192	27	To Do
Kamke 653	✓	0.184	34	✓	0.194	24	To Do
Kamke 654	✓	0.154	37	✓	0.265	23	To Do
Kamke 655	✓	20.247	82	✓	0.677	66	To Do
Kamke 656	✓	0.037	20	✓	0.082	15	To Do
Kamke 657	✓	0.176	37	✓	0.222	26	To Do
Kamke 658	✓	0.236	45	✓	0.314	28	To Do
Kamke 659	✓	0.421	60	✓	0.26	41	To Do
Kamke 660	✓	0.249	42	✓	0.24	29	To Do
Kamke 661	✓	0.395	61	✓	0.234	39	To Do
Kamke 662	✓	0.22	37	✓	0.236	26	To Do
Kamke 663	✓	2.188	101	✓	0.174	27	To Do
Kamke 664	✓	0.186	36	✓	0.192	25	To Do
Kamke 665	✓	0.285	41	✓	0.502	28	To Do
Kamke 666	✓	0.067	29	✓	0.191	24	To Do
Kamke 667	✓	1.15	90	✓	0.232	82	To Do
Kamke 668	✓	0.676	78	✓	0.766	58	To Do
Kamke 669	✓	0.825	264	✓	0.214	72	To Do
Kamke 670	✓	0.486	99	✓	0.356	70	To Do
Kamke 671	✓	0.388	192	✓	0.224	237	To Do

Continued on next page

Table 3 – continued from previous page

#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 672	✗	0	0	✓	0.211	36	To Do
Kamke 673	✓	0.088	23	✓	0.439	17	To Do
Kamke 674	✓	0.222	40	✓	0.306	27	To Do
Kamke 675	✓	0.05	48	✓	0.068	37	To Do
Kamke 676	✓	0.302	144	✓	0.541	43	To Do
Kamke 677	✓	0.032	80	✓	0.062	48	To Do
Kamke 678	✓	0.234	101	✓	0.333	37	To Do
Kamke 679	✓	0.031	59	✓	0.056	37	To Do
Kamke 680	✓	0.225	39	✓	0.316	28	To Do
Kamke 681	✓	0.04	84	✓	0.077	45	To Do
Kamke 682	✓	0.117	39	✓	0.292	28	To Do
Kamke 683	✓	0.378	84	✓	0.19	152	To Do
Kamke 684	✓	0.023	20	✓	2.842	30	To Do
Kamke 685	✓	0.035	87	✓	0.088	48	To Do
Kamke 686	✓	15.594	68	✓	0.43	85	To Do
Kamke 687	✓	0.06	130	✓	0.11	39	To Do
Kamke 688	✓	0.127	78	✓	0.102	42	To Do
Kamke 689	✓	0.068	60	✓	0.054	25	To Do
Kamke 690	✓	0.319	127	✓	0.37	40	To Do
Kamke 691	✓	0.076	21	✓	0.665	17	To Do
Kamke 692	✓	0.023	20	✓	3.357	30	To Do
Kamke 693	✓	0.236	146	✓	0.112	40	To Do
Kamke 694	✓	0.279	66	✓	0.34	30	To Do

Continued on next page

Table 3 – continued from previous page

#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 695	✓	0.056	34	✓	0.058	39	To Do
Kamke 696	✗	0	0	✓	0.069	32	To Do
Kamke 697	✓	0.209	114	✓	0.11	40	To Do
Kamke 698	✓	0.217	108	✓	0.097	34	To Do
Kamke 699	✓	0.247	101	✓	0.333	36	To Do
Kamke 700	✓	0.072	76	✓	0.126	62	To Do
Kamke 701	✗	0	0	✓	6.091	71	To Do
Kamke 702	✗	0	0	✓	0.098	35	To Do
Kamke 703	✗	0	0	✓	0.293	44	To Do
Kamke 704	✗	0	0	✓	0.067	38	To Do
Kamke 705	✓	0.055	30	✓	0.21	24	To Do
Kamke 706	✗	0	0	✓	0.66	65	To Do
Kamke 707	✗	0	0	✓	0.547	105	To Do
Kamke 708	✓	1.827	89	✓	27.023	229	To Do
Kamke 709	✓	4.113	217	✓	0.28	39	To Do
Kamke 710	✗	0	0	✓	2.55	31	To Do
Kamke 711	✓	0.168	28	✓	0.141	31	To Do
Kamke 712	✓	0.323	115	✓	0.375	38	To Do
Kamke 713	✓	0.123	649	✓	0.403	86	To Do
Kamke 714	✗	0	0	✓	0.207	96	To Do
Kamke 715	✓	0.254	104	✓	0.327	39	To Do
Kamke 716	✓	3.943	133	✓	0.348	37	To Do
Kamke 717	✓	0.307	46	✓	0.395	33	To Do

Continued on next page

Table 3 – continued from previous page

#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 718	✓	0.196	127	✓	0.067	44	To Do
Kamke 719	✓	0.094	49	✓	0.143	34	To Do
Kamke 720	✓	4.22	314	✓	0.23	48	To Do
Kamke 721	✓	0.017	27	✓	0.08	19	To Do
Kamke 722	✓	38.528	490	✓	0.366	70	To Do
Kamke 723	✓	0.065	663	✓	0.079	856	To Do
Kamke 724	✓	29.244	422	✓	0.093	18	To Do
Kamke 725	✓	0.253	19	✓	0.968	25	To Do
Kamke 726	✓	0.072	625	✓	0.306	83	To Do
Kamke 727	✓	0.406	29	✓	0.809	25	To Do
Kamke 728	✓	0.341	72	✓	0.347	50	To Do
Kamke 729	✓	0.305	327	✓	0.112	404	To Do
Kamke 730	✗	0	0	✓	1.89	41	To Do
Kamke 731	✓	0.303	47	✓	0.196	42	To Do
Kamke 732	✓	0.464	110	✓	0.399	43	To Do
Kamke 733	✗	0	0	✗	0	0	To Do
Kamke 734	✓	0.111	37	✓	0.16	39	To Do
Kamke 735	✗	0	0	✓	0.075	78	To Do
Kamke 736	✓	0.098	31	✓	0.197	43	To Do
Kamke 737	✓	0.03	36	✓	0.093	29	To Do
Kamke 738	✓	0.47	1347	✓	0.815	1054	To Do
Kamke 739	✓	0.221	39	✓	0.193	35	To Do
Kamke 740	✓	0.061	74	✓	0.107	72	To Do

Continued on next page

Table 3 – continued from previous page

#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 741	✓	2.931	175	✓	1.05	246	To Do
Kamke 742	✓	4.361	3913	✓	1.862	239	To Do
Kamke 743	✗	0	0	✓	0.453	296	To Do
Kamke 744	✓	0.046	510	✓	0.307	621	To Do
Kamke 745	✗	0	0	✓	0.075	78	To Do
Kamke 746	✗	0	0	✓	0.417	232	To Do
Kamke 747	✓	3412.192	85	✓	0.366	75	To Do
Kamke 748	✓	0.292	285	✓	0.112	404	To Do
Kamke 749	✓	0.099	126	✓	0.146	192	To Do
Kamke 750	✓	0.326	72	✓	0.33	49	To Do
Kamke 751	✓	0.072	30	✓	0.111	26	To Do
Kamke 752	✗	0	0	✓	1.449	723	To Do
Kamke 753	✓	0.101	41	✓	0.161	38	To Do
Kamke 754	✓	0.029	47	✓	0.022	26	To Do
Kamke 755	✓	0.191	2633	✓	0.109	44	To Do
Kamke 756	✓	0.111	95	✓	0.036	37	To Do
Kamke 757	✓	0.027	36	✓	0.072	26	To Do
Kamke 758	✓	0.932	459	✓	0.236	41	To Do
Kamke 759	✗	0	0	✓	0.592	305	To Do
Kamke 760	✓	1.25	112	✓	1.79	137	To Do
Kamke 761	✓	0.024	33	✓	0.068	18	To Do
Kamke 762	✓	0.055	26	✓	0.123	22	To Do
Kamke 763	✓	0.058	22	✓	0.11	14	To Do

Continued on next page

Table 3 – continued from previous page

#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 764	✓	0.091	50	✓	0.131	36	To Do
Kamke 765	✓	403.502	128	✓	0.243	106	To Do
Kamke 766	✗	0	0	✓	0.165	89	To Do
Kamke 767	✓	0.027	38	✓	0.078	26	To Do
Kamke 768	✓	1.491	66	✓	0.128	26	To Do
Kamke 769	✗	0	0	✓	0.457	251	To Do
Kamke 770	✓	0.128	705	✓	0.14	1105	To Do
Kamke 771	✓	0.035	46	✓	0.133	84	To Do
Kamke 772	✓	0.067	21	✓	0.121	18	To Do
Kamke 773	✓	0.103	61	✓	0.289	48	To Do
Kamke 774	✓	0.032	45	✓	0.12	51	To Do
Kamke 775	✓	0.105	943	✓	0.1	32	To Do
Kamke 776	✗	0	0	✓	0.218	96	To Do
Kamke 777	✓	0.139	39	✓	0.22	51	To Do
Kamke 778	✓	0.098	95	✓	0.028	37	To Do
Kamke 779	✓	0.045	57	✓	0.117	50	To Do
Kamke 780	✓	0.026	15	✓	0.481	27	To Do
Kamke 781	✓	0.545	82	✓	0.402	61	To Do
Kamke 782	✗	0	0	✓	1.433	96	To Do
Kamke 783	✗	0	0	✓	0.187	75	To Do
Kamke 784	✗	0	0	✓	29.257	24	To Do
Kamke 785	✗	0	0	✓	87.583	24	To Do
Kamke 786	✗	0	0	✓	0.091	33	To Do

Continued on next page

Table 3 – continued from previous page

#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 787	✓	42.487	488	✓	0.451	191	To Do
Kamke 788	✗	0	0	✓	0.351	108	To Do
Kamke 789	✗	0	0	✗	0	0	To Do
Kamke 790	✗	0	0	✗	0	0	To Do
Kamke 791	✗	0	0	✓	18.286	306	To Do
Kamke 792	✗	0	0	✓	0.429	112	To Do
Kamke 793	✓	33.137	399	✓	0.151	32	To Do
Kamke 794	✓	0.849	67	✓	0.471	32	To Do
Kamke 795	✓	0.672	111	✓	0.037	37	To Do
Kamke 796	✓	22.414	102	✓	1.394	143	To Do
Kamke 797	✓	3.196	349	✓	0.429	168	To Do
Kamke 798	✓	0.955	27	✓	0.188	30	To Do
Kamke 799	✓	0.653	126	✓	0.403	147	To Do
Kamke 800	✓	0.334	128	✓	0.036	41	To Do
Kamke 801	✓	0.186	126	✓	0.082	63	To Do
Kamke 802	✓	0.149	98	✓	0.129	27	To Do
Kamke 803	✓	0.102	634	✓	0.51	65	To Do
Kamke 804	✓	0.623	43	✓	1.163	38	To Do
Kamke 805	✓	0.068	37	✓	0.699	42	To Do
Kamke 806	✓	0.378	22	✓	0.669	22	To Do
Kamke 807	✗	0	0	✓	0.698	43	To Do
Kamke 808	✓	2.7	149	✓	0.1	45	To Do
Kamke 809	✓	0.284	128	✓	0.036	41	To Do

Continued on next page

Table 3 – continued from previous page

#	Mathematica			Maple			note on solution
	solved	cpu	leaf	solved	cpu	leaf	
Kamke 810	✓	0.016	40	✓	0.05	16	To Do
Kamke 811	✓	2.838	33	✓	2.349	32	To Do
Kamke 812	✓	0.395	70	✓	0.292	30	To Do
Kamke 813	✓	0.574	66	✓	0.572	40	To Do
Kamke 814	✓	0.036	72	✓	0.047	38	To Do
Kamke 815	✓	19.185	103	✓	1.004	168	To Do
Kamke 816	✓	0.267	74	✓	0.734	190	To Do
Kamke 817	✓	0.623	63	✓	0.728	27	To Do
Kamke 818	✓	0.099	34	✓	0.212	34	To Do
Kamke 819	✓	0.252	65	✓	0.303	30	To Do
Kamke 820	✓	0.363	63	✓	0.709	27	To Do
Kamke 821	✓	0.23	2093	✓	0.165	27	To Do
Kamke 822	✓	0.047	32	✓	0.135	25	To Do
Kamke 823	✓	0.566	39	✓	0.208	38	To Do
Kamke 824	✓	0.112	68	✓	0.54	61	To Do
Kamke 825	✓	0.365	148	✓	0.113	48	To Do
Kamke 826	✓	0.79	70	✓	0.501	51	To Do
Kamke 827	✓	0.143	111	✓	0.261	49	To Do
Kamke 828	✓	0.523	56	✓	0.387	54	To Do
Kamke 829	✓	0.426	74	✓	0.344	34	To Do
Kamke 830	✓	0.582	37	✓	0.177	38	To Do
Kamke 831	✓	5.176	145	✓	0.34	35	To Do
Kamke 832	✓	3.791	2497	✓	0.199	31	To Do

Continued on next page

Table 3 – continued from previous page

#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 833	✓	0.141	105	✓	0.207	49	To Do
Kamke 834	✓	1.545	90	✓	0.658	60	To Do
Kamke 835	✗	0	0	✗	0	0	To Do
Kamke 836	✓	20.183	379	✓	0.334	73	To Do
Kamke 837	✗	0	0	✗	0	0	To Do
Kamke 838	✓	0.031	31	✓	0.117	25	To Do
Kamke 839	✓	0.102	28	✓	0.089	19	To Do
Kamke 840	✓	0.138	30	✓	0.08	19	To Do
Kamke 841	✓	1.668	236	✓	0.341	97	To Do
Kamke 842	✓	1.532	186	✓	0.051	43	To Do
Kamke 843	✓	0.166	198	✓	0.039	43	To Do
Kamke 844	✓	24.053	386	✓	0.32	97	To Do
Kamke 845	✓	6.2	227	✓	0.248	44	To Do
Kamke 846	✓	1.729	362	✓	0.224	40	To Do
Kamke 847	✓	0.399	69	✓	0.343	34	To Do
Kamke 848	✓	0.132	154	✓	0.623	27	To Do
Kamke 849	✓	0.353	68	✓	0.326	33	To Do
Kamke 850	✓	0.254	1478	✓	1.171	32	To Do
Kamke 851	✓	0.251	145	✓	0.082	42	To Do
Kamke 852	✓	0.237	145	✓	0.083	42	To Do
Kamke 853	✓	0.022	76	✓	0.059	63	To Do
Kamke 854	✗	0	0	✓	0.268	51	To Do
Kamke 855	✗	0	0	✓	0.343	51	To Do

Continued on next page

Table 3 – continued from previous page

#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 856	✓	1.053	100	✓	0.339	65	To Do
Kamke 857	✓	0.383	69	✓	0.331	32	To Do
Kamke 858	✓	0.241	145	✓	0.08	42	To Do
Kamke 859	✓	1.471	102	✓	0.324	63	To Do
Kamke 860	✓	0.179	33	✓	2.089	29	To Do
Kamke 861	✓	2.19	155	✓	0.197	26	To Do
Kamke 862	✗	0	0	✓	0.237	27	To Do
Kamke 863	✓	0.037	30	✓	5.714	38	To Do
Kamke 864	✓	0.047	137	✓	0.115	162	To Do
Kamke 865	✓	320.617	84	✓	0.342	23	To Do
Kamke 866	✓	0.506	74	✓	0.375	37	To Do
Kamke 867	✓	0.096	77	✓	0.083	30	To Do
Kamke 868	✓	0.067	79	✓	0.076	28	To Do
Kamke 869	✓	0.041	42	✓	0.117	37	To Do
Kamke 870	✓	1.974	35	✓	1.053	30	To Do
Kamke 871	✓	0.027	22	✓	0.095	26	To Do
Kamke 872	✓	0.051	215	✓	0.075	49	To Do
Kamke 873	✓	0.693	53	✓	0.316	50	To Do
Kamke 874	✓	0.101	101	✓	0.064	40	To Do
Kamke 875	✓	0.387	285	✓	0.306	73	To Do
Kamke 876	✓	0.019	135	✓	0.059	41	To Do
Kamke 877	✓	0.019	49	✓	0.062	73	To Do
Kamke 878	✓	0.315	130	✗	0	0	To Do

Continued on next page

Table 3 – continued from previous page

#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 879	✓	0.185	135	✓	0.264	55	To Do
Kamke 880	✓	0.165	131	✓	0.082	41	To Do
Kamke 881	✓	0.02	75	✓	0.063	77	To Do
Kamke 882	✓	0.106	119	✓	0.074	41	To Do
Kamke 883	✓	1.629	164	✓	0.767	352	To Do
Kamke 884	✓	0.604	71	✓	0.497	107	To Do
Kamke 885	✗	0	0	✗	0	0	To Do
Kamke 886	✓	0.081	82	✓	0.046	42	To Do
Kamke 887	✓	0.028	106	✓	0.06	72	To Do
Kamke 888	✓	0.022	78	✓	0.072	79	To Do
Kamke 889	✗	0	0	✓	1.263	49	To Do
Kamke 890	✓	0.15	103	✓	0.88	34	To Do
Kamke 891	✓	0.026	135	✓	0.071	56	To Do
Kamke 892	✗	0	0	✓	0.608	40	To Do
Kamke 893	✓	0.09	80	✓	0.044	41	To Do
Kamke 894	✗	0	0	✗	0	0	To Do
Kamke 895	✓	0.024	81	✓	0.067	79	To Do
Kamke 896	✓	0.254	106	✓	0.64	63	To Do
Kamke 897	✓	0.026	79	✓	0.1	87	To Do
Kamke 898	✓	0.023	106	✓	0.066	87	To Do
Kamke 899	✓	0.091	106	✓	0.052	47	To Do
Kamke 900	✓	0.095	381	✓	0.087	48	To Do
Kamke 901	✓	0.153	33	✓	0.757	30	To Do

Continued on next page

Table 3 – continued from previous page

#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 902	✓	0.102	295	✓	0.334	183	To Do
Kamke 903	✓	0.057	19	✓	0.12	48	To Do
Kamke 904	✓	0.054	23	✓	0.066	64	To Do
Kamke 905	✓	0.08	85	✓	0.062	46	To Do
Kamke 906	✓	0.055	326	✓	0.355	37	To Do
Kamke 907	✓	0.056	22	✓	0.18	20	To Do
Kamke 908	✓	1.5	1269	✓	0.465	1742	To Do
Kamke 909	✗	0	0	✗	0	0	To Do
Kamke 910	✓	0.083	98	✓	0.036	42	To Do
Kamke 911	✓	3.669	56	✓	0.556	30	To Do
Kamke 912	✓	1.562	201	✓	1346.463	43	To Do
Kamke 913	✗	0	0	✓	0.076	43	To Do
Kamke 914	✓	1.643	401	✓	3.258	71	To Do
Kamke 915	✗	0	0	✓	0.073	43	To Do
Kamke 916	✗	0	0	✓	0.384	73	To Do
Kamke 917	✗	0	0	✓	0.276	38	To Do
Kamke 918	✗	0	0	✓	1.452	41	To Do
Kamke 919	✗	0	0	✓	0.224	82	To Do
Kamke 920	✓	0.237	301	✗	0	0	To Do
Kamke 921	✓	2.797	52	✓	0.171	30	To Do
Kamke 922	✗	0	0	✓	0.179	47	To Do
Kamke 923	✗	0	0	✓	0.387	36	To Do
Kamke 924	✓	0.893	55	✓	0.201	46	To Do

Continued on next page

Table 3 – continued from previous page

#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 925	✗	0	0	✓	0.301	38	To Do
Kamke 926	✓	0.023	128	✓	0.083	67	To Do
Kamke 927	✓	0.163	112	✓	0.141	68	To Do
Kamke 928	✓	1.308	23	✓	0.448	20	To Do
Kamke 929	✗	0	0	✓	0.054	42	To Do
Kamke 930	✓	1.567	39	✓	0.684	36	To Do
Kamke 931	✓	0.022	80	✓	0.057	73	To Do
Kamke 932	✗	0	0	✓	0.174	54	To Do
Kamke 933	✓	0.106	99	✓	0.052	39	To Do
Kamke 934	✓	0.148	102	✓	0.096	39	To Do
Kamke 935	✓	43.841	248	✓	0.246	55	To Do
Kamke 936	✓	0.141	99	✓	0.093	39	To Do
Kamke 937	✓	0.025	124	✓	0.072	79	To Do
Kamke 938	✓	0.08	108	✓	0.047	39	To Do
Kamke 939	✓	0.454	136	✓	0.162	70	To Do
Kamke 940	✓	0.02	80	✓	0.063	63	To Do
Kamke 941	✓	0.364	53	✓	0.073	35	To Do
Kamke 942	✗	0	0	✓	0.761	43	To Do
Kamke 943	✓	0.422	53	✓	0.072	40	To Do
Kamke 944	✓	1.8	233	✓	0.102	47	To Do
Kamke 945	✓	1.409	213	✓	0.087	41	To Do
Kamke 946	✓	0.082	150	✓	0.187	85	To Do
Kamke 947	✓	0.107	30	✓	0.295	44	To Do

Continued on next page

Table 3 – continued from previous page

#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 948	✓	0.343	39	✓	0.257	68	To Do
Kamke 949	✓	0.02	76	✓	0.064	81	To Do
Kamke 950	✓	0.229	141	✓	0.113	42	To Do
Kamke 951	✓	0.208	140	✓	0.099	41	To Do
Kamke 952	✓	0.152	189	✓	0.408	62	To Do
Kamke 953	✗	0	0	✓	0.463	145	To Do
Kamke 954	✓	0.119	115	✓	0.111	53	To Do
Kamke 955	✓	0.038	112	✓	0.122	101	To Do
Kamke 956	✓	0.21	28	✓	0.176	79	To Do
Kamke 957	✓	0.201	28	✓	0.124	79	To Do
Kamke 958	✓	0.074	82	✓	0.06	40	To Do
Kamke 959	✓	0.06	20	✓	0.088	15	To Do
Kamke 960	✓	0.039	14	✓	0.076	11	To Do
Kamke 961	✗	0	0	✓	0.46	45	To Do
Kamke 962	✓	5.223	1191	✓	1.829	79	To Do
Kamke 963	✓	0.151	108	✓	0.259	39	To Do
Kamke 964	✓	4.645	264	✓	3.18	80	To Do
Kamke 965	✓	0.062	29	✓	0.099	26	To Do
Kamke 966	✓	0.46	292	✓	0.791	50	To Do
Kamke 967	✓	0.173	151	✓	0.101	91	To Do
Kamke 968	✓	0.085	30	✓	0.116	22	To Do
Kamke 969	✓	0.057	19	✓	0.125	15	To Do
Kamke 970	✓	0.497	66	✓	0.892	181	To Do

Continued on next page

Table 3 – continued from previous page

#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 971	✓	0.172	157	✓	0.415	86	To Do
Kamke 972	✓	0.026	32	✓	0.122	27	To Do
Kamke 973	✓	0.23	146	✓	0.509	134	To Do
Kamke 974	✓	0.01	39	✓	0.055	57	To Do
Kamke 975	✓	0.011	47	✓	0.054	59	To Do
Kamke 976	✓	0.126	101	✓	0.336	59	To Do
Kamke 977	✓	0.271	139	✓	0.265	122	To Do
Kamke 978	✓	0.085	60	✓	0.248	71	To Do
Kamke 979	✓	0.011	37	✓	0.066	57	To Do
Kamke 980	✓	0.012	43	✓	0.023	35	To Do
Kamke 981	✓	0.016	49	✓	0.034	41	To Do
Kamke 982	✓	0.144	132	✓	0.555	145	To Do
Kamke 983	✓	0.462	238	✓	0.587	188	To Do
Kamke 984	✓	8.752	428	✓	0.352	40	To Do
Kamke 985	✓	0.268	103	✓	0.052	43	To Do
Kamke 986	✓	0.014	44	✓	0.033	36	To Do
Kamke 987	✓	0.092	40	✓	0.078	22	To Do
Kamke 988	✓	0.443	104	✓	0.062	29	To Do
Kamke 989	✓	0.098	55	✓	0.065	29	To Do
Kamke 990	✓	0.437	49	✓	0.599	44	To Do
Kamke 991	✓	0.275	101	✓	0.056	29	To Do
Kamke 992	✓	0.1	42	✓	0.057	25	To Do
Kamke 993	✓	515.344	71	✓	0.042	35	To Do

Continued on next page

Table 3 – continued from previous page

#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 994	✓	0.115	198	✓	0.039	43	To Do
Kamke 995	✓	0.018	17	✓	0.145	14	To Do
Kamke 996	✗	0	0	✓	0.099	15	To Do
Kamke 997	✓	0.03	18	✓	0.076	16	To Do
Kamke 998	✓	0.464	27	✓	0.484	27	To Do
Kamke 999	✓	0.023	24	✓	0.071	36	To Do
Kamke 1000	✗	0	0	✓	0.195	19	To Do
Kamke 1001	✓	0.004	12	✓	0.006	9	Linear second order, homogeneous, constant coefficient. First problem. Direct integration
Kamke 1002	✓	0.005	16	✓	0.03	13	Linear second order, homogeneous, constant coefficient. Direct method
Kamke 1003	✓	0.136	45	✓	0.318	26	Linear second order, Non-homogeneous, constant coefficient. variation of parameters
Kamke 1004	✓	0.119	47	✓	0.058	27	Linear second order, Non-homogeneous, constant coefficient. variation of parameters
Kamke 1005	✓	0.572	1163	✓	0.122	82	Linear second order, Non-homogeneous, constant coefficient. variation of parameters

Continued on next page

Table 3 – continued from previous page

#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1006	✓	0.005	20	✓	0.013	15	Linear second order, homogeneous, constant coefficient
Kamke 1007	✓	0.083	135	✓	0.079	26	Linear second order, Non-homogeneous, constant coefficient. variation of parameters
Kamke 1008	✓	0.044	48	✓	0.114	41	To Do
Kamke 1009	✓	0.005	28	✓	0.023	21	To Do
Kamke 1010	✓	0.007	46	✓	0.168	31	Linear second order, homogeneous, variable coefficient. Airy ODE with plus sign, series solution
Kamke 1011	✓	0.008	33	✓	0.056	17	Linear second order, homogeneous, variable coefficient. power series solution
Kamke 1012	✓	0.009	47	✓	0.503	29	To Do
Kamke 1013	✓	0.02	43	✓	0.481	22	To Do
Kamke 1014	✓	0.047	170	✓	0.215	63	To Do
Kamke 1015	✗	0	0	✗	0	0	To Do
Kamke 1016	✓	0.127	312	✓	0.694	91	To Do
Kamke 1017	✓	0.028	46	✓	0.127	17	To Do
Kamke 1018	✓	0.022	55	✓	0.086	39	To Do
Kamke 1019	✗	0	0	✗	0	0	To Do
Kamke 1020	✓	0.694	180	✓	0.318	58	To Do

Continued on next page

Table 3 – continued from previous page

#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 1021	✓	0.036	44	✓	0.612	39	To Do
Kamke 1022	✓	0.028	28	✓	0.28	21	To Do
Kamke 1023	✓	0.016	44	✓	0.276	29	To Do
Kamke 1024	✓	0.165	84	✓	0.204	30	To Do
Kamke 1025	✓	0.941	615	✓	0.294	102	To Do
Kamke 1026	✗	0	0	✗	0	0	To Do
Kamke 1027	✗	0	0	✓	0.682	69	To Do
Kamke 1028	✗	0	0	✗	0	0	To Do
Kamke 1029	✗	0	0	✓	0.238	22	To Do
Kamke 1030	✗	0	0	✗	0	0	To Do
Kamke 1031	✗	0	0	✗	0	0	To Do
Kamke 1032	✗	0	0	✓	0.192	48	To Do
Kamke 1033	✓	0.018	37	✓	0.036	27	Linear second order, homogeneous, variable coefficient. smart substitution turns it to second order with constant coefficient
Kamke 1034	✓	0.012	20	✓	0.013	15	Linear second order, homogeneous, variable coefficient. smart substitution turns it to second order with constant coefficient
Kamke 1035	✓	0.006	58	✓	0.02	41	To Do
Kamke 1036	✓	0.52	207	✓	0.294	124	To Do

Continued on next page

Table 3 – continued from previous page

#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1037	✓	0.03	101	✓	0.172	64	To Do
Kamke 1038	✗	0	0	✗	0	0	To Do
Kamke 1039	✓	0.016	47	✓	0.023	25	To Do
Kamke 1040	✓	0.051	53	✓	0.083	33	To Do
Kamke 1041	✓	0.01	55	✓	0.108	41	To Do
Kamke 1042	✓	0.009	61	✓	0.119	41	To Do
Kamke 1043	✓	0.057	69	✓	0.823	42	Linear second order, homogeneous, variable coefficient. power series solution
Kamke 1044	✓	0.009	39	✓	0.132	35	To Do
Kamke 1045	✓	0.035	39	✓	0.013	21	To Do
Kamke 1046	✓	0.007	31	✓	0.12	31	To Do
Kamke 1047	✓	0.014	27	✓	0.063	16	Linear second order, homogeneous, variable coefficient. power series solution
Kamke 1048	✓	0.011	45	✓	0.146	37	To Do
Kamke 1049	✓	0.07	109	✓	0.322	66	To Do
Kamke 1050	✓	0.012	23	✓	0.055	14	To Do
Kamke 1051	✓	0.037	44	✓	0.078	27	To Do
Kamke 1052	✓	0.021	78	✓	0.148	58	To Do
Kamke 1053	✓	0.031	57	✓	0.069	35	To Do
Kamke 1054	✓	0.05	172	✓	0.073	98	To Do
Kamke 1055	✓	0.224	421	✓	0.279	262	To Do

Continued on next page

Table 3 – continued from previous page

#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 1056	✓	0.052	66	✓	0.239	47	To Do
Kamke 1057	✓	0.954	55	✓	0.924	50	To Do
Kamke 1058	✓	1.016	55	✓	0.185	29	To Do
Kamke 1059	✓	0.07	72	✓	0.131	56	To Do
Kamke 1060	✓	0.037	83	✓	0.244	81	To Do
Kamke 1061	✓	0.097	70	✓	0.229	28	To Do
Kamke 1062	✓	0.028	35	✓	0.034	19	To Do
Kamke 1063	✓	0.049	28	✓	0.399	61	To Do
Kamke 1064	✓	0.649	1400	✓	0.576	125	To Do
Kamke 1065	✓	0.161	114	✓	0.353	60	To Do
Kamke 1066	✓	0.035	18	✓	0.108	15	To Do
Kamke 1067	✓	0.033	21	✓	0.062	17	To Do
Kamke 1068	✓	0.15	20	✓	0.462	45	To Do
Kamke 1069	✓	0.037	19	✓	0.128	15	To Do
Kamke 1070	✓	0.322	143	✓	0.24	60	To Do
Kamke 1071	✓	0.107	44	✓	0.132	24	To Do
Kamke 1072	✗	0	0	✗	0	0	To Do
Kamke 1073	✗	0	0	✗	0	0	To Do
Kamke 1074	✗	0	0	✓	0.107	21	To Do
Kamke 1075	✗	0	0	✗	0	0	To Do
Kamke 1076	✗	0	0	✗	0	0	To Do
Kamke 1077	✗	0	0	✗	0	0	To Do
Kamke 1078	✓	0.069	74	✓	0.059	33	To Do

Continued on next page

Table 3 – continued from previous page

#	Mathematica			Maple			note on solution
	solved	cpu	leaf	solved	cpu	leaf	
Kamke 1079	✓	0.258	307	✓	0.03	37	To Do
Kamke 1080	✗	0	0	✓	0.389	74	To Do
Kamke 1081	✗	0	0	✗	0	0	To Do
Kamke 1082	✗	0	0	✓	0.24	74	To Do
Kamke 1083	✗	0	0	✓	0.159	31	To Do
Kamke 1084	✗	0	0	✓	0.122	20	To Do
Kamke 1085	✗	0	0	✓	0.101	24	To Do
Kamke 1086	✓	0.005	42	✓	0.056	29	To Do
Kamke 1087	✓	0.009	36	✓	0.147	33	To Do
Kamke 1088	✓	0.109	180	✓	0.17	31	To Do
Kamke 1089	✓	0.047	99	✓	0.07	58	To Do
Kamke 1090	✓	0.035	50	✓	0.098	40	To Do
Kamke 1091	✓	0.031	41	✓	0.056	35	To Do
Kamke 1092	✓	0.096	72	✓	0.116	29	To Do
Kamke 1093	✓	0.006	13	✓	0.021	10	To Do
Kamke 1094	✓	0.024	41	✓	0.014	29	To Do
Kamke 1095	✓	0.01	30	✓	0.061	23	To Do
Kamke 1096	✓	0.014	61	✓	0.109	39	To Do
Kamke 1097	✓	0.03	46	✓	0.013	31	To Do
Kamke 1098	✓	0.011	41	✓	0.012	27	To Do
Kamke 1099	✗	0	0	✓	0.072	25	To Do

Continued on next page

Table 3 – continued from previous page

#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 1100	✓	0.032	44	✓	0.066	23	Linear second order, non-homogeneous, variable coefficient. Singularity, Frobenius series solution and also using smart transformation. Variation of parameters.
Kamke 1101	✓	0.023	52	✓	0.075	29	Linear second order, homogeneous, variable coefficient. Singularity, Frobenius series solution and also using smart transformation
Kamke 1102	✓	0.007	42	✓	0.073	33	Linear second order, homogeneous, variable coefficient. Use smart transformation to convert to Emden-Fowler then use Power series solution
Kamke 1103	✓	0.028	64	✓	0.013	33	To Do
Kamke 1104	✓	0.038	104	✓	0.021	41	To Do
Kamke 1105	✓	0.022	64	✓	0.072	39	To Do
Kamke 1106	✓	0.053	441	✓	0.119	71	To Do
Kamke 1107	✓	0.031	40	✓	0.142	30	To Do
Kamke 1108	✓	0.036	37	✓	0.129	26	To Do
Kamke 1109	✓	0.056	45	✓	0.07	33	To Do
Kamke 1110	✓	0.043	36	✓	0.091	23	To Do

Continued on next page

Table 3 – continued from previous page

#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1111	✓	0.019	20	✓	0.044	13	Linear second order, homogeneous, variable coefficient. Solved using Laplace transform instead of series method
Kamke 1112	✓	0.028	30	✓	0.087	22	To Do
Kamke 1113	✓	0.022	24	✓	0.132	17	To Do
Kamke 1114	✓	0.071	39	✓	0.134	34	To Do
Kamke 1115	✓	0.069	76	✓	1.258	47	To Do
Kamke 1116	✓	0.063	43	✓	0.156	31	To Do
Kamke 1117	✓	0.099	107	✓	0.196	82	To Do
Kamke 1118	✓	0.097	51	✓	0.16	39	To Do
Kamke 1119	✓	0.176	77	✓	0.089	20	To Do
Kamke 1120	✓	0.064	168	✓	0.294	109	To Do
Kamke 1121	✓	11.273	40	✓	0.033	23	To Do
Kamke 1122	✓	10.799	56	✓	0.276	28	To Do
Kamke 1123	✓	0.014	91	✓	0.076	45	To Do
Kamke 1124	✓	0.08	65	✓	0.128	29	To Do
Kamke 1125	✓	0.221	48	✓	0.075	36	To Do
Kamke 1126	✗	0	0	✓	0.069	19	To Do
Kamke 1127	✓	0.052	36	✓	0.026	21	To Do
Kamke 1128	✗	0	0	✓	0.317	32	To Do
Kamke 1129	✓	0.04	42	✓	0.048	30	To Do
Kamke 1130	✓	0.012	46	✓	0.023	31	To Do

Continued on next page

Table 3 – continued from previous page

#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 1131	✓	0.011	58	✓	0.115	33	To Do
Kamke 1132	✓	0.011	48	✓	0.137	29	To Do
Kamke 1133	✓	0.096	92	✓	0.237	37	To Do
Kamke 1134	✓	0.096	78	✓	0.09	21	To Do
Kamke 1135	✓	0.01	27	✓	0.014	17	To Do
Kamke 1136	✓	0.021	30	✓	0.066	16	To Do
Kamke 1137	✓	0.098	74	✓	0.097	25	To Do
Kamke 1138	✓	0.033	38	✓	0.134	26	To Do
Kamke 1139	✓	0.014	74	✓	0.143	37	To Do
Kamke 1140	✓	0.05	190	✓	0.033	66	To Do
Kamke 1141	✓	0.11	79	✓	0.111	55	To Do
Kamke 1142	✓	0.055	108	✓	0.153	53	To Do
Kamke 1143	✓	0.043	93	✓	0.172	57	To Do
Kamke 1144	✓	0.037	88	✓	0.122	60	To Do
Kamke 1145	✓	0.372	386	✓	0.313	248	To Do
Kamke 1146	✓	0.025	18	✓	0.016	15	To Do
Kamke 1147	✓	0.019	18	✓	0.015	15	To Do
Kamke 1148	✓	0.011	77	✓	0.019	35	To Do
Kamke 1149	✓	0.066	212	✓	0.02	45	To Do
Kamke 1150	✓	0.01	53	✓	0.115	27	To Do
Kamke 1151	✓	0.02	129	✓	0.109	43	To Do
Kamke 1152	✓	0.02	114	✓	0.293	53	To Do
Kamke 1153	✓	0.035	56	✓	0.045	31	To Do

Continued on next page

Table 3 – continued from previous page

#	Mathematica			Maple			note on solution
	solved	cpu	leaf	solved	cpu	leaf	
Kamke 1154	✓	0.02	88	✓	0.16	57	To Do
Kamke 1155	✓	0.053	225	✓	0.099	67	To Do
Kamke 1156	✗	0	0	✓	0.207	71	To Do
Kamke 1157	✗	0	0	✗	0	0	To Do
Kamke 1158	✓	17.465	42	✓	0.409	178	To Do
Kamke 1159	✓	0.015	44	✓	0.022	19	To Do
Kamke 1160	✓	0.01	30	✓	0.022	23	To Do
Kamke 1161	✓	0.049	78	✓	0.015	31	To Do
Kamke 1162	✓	0.06	18	✓	0.016	15	To Do
Kamke 1163	✓	0.334	70	✓	0.112	49	To Do
Kamke 1164	✓	0.022	30	✓	0.037	23	To Do
Kamke 1165	✓	0.078	26	✓	0.021	19	To Do
Kamke 1166	✓	0.014	23	✓	0.02	21	To Do
Kamke 1167	✓	0.08	326	✓	0.042	63	To Do
Kamke 1168	✓	0.005	15	✓	0.015	11	To Do
Kamke 1169	✓	0.07	236	✓	0.036	49	To Do
Kamke 1170	✓	0.023	58	✓	0.055	43	To Do
Kamke 1171	✓	0.055	142	✓	0.18	49	To Do
Kamke 1172	✓	0.07	158	✓	0.044	47	To Do
Kamke 1173	✓	0.106	74	✓	0.115	37	To Do
Kamke 1174	✓	0.019	33	✓	0.105	25	To Do
Kamke 1175	✓	0.173	38	✓	0.065	29	To Do
Kamke 1176	✓	0.018	33	✓	0.069	15	To Do

Continued on next page

Table 3 – continued from previous page

#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 1177	✗	0	0	✓	0.099	34	To Do
Kamke 1178	✓	0.067	74	✓	0.037	23	To Do
Kamke 1179	✓	0.023	38	✓	0.048	19	To Do
Kamke 1180	✓	0.215	73	✓	0.069	49	To Do
Kamke 1181	✓	0.045	37	✓	0.026	25	To Do
Kamke 1182	✓	0.017	24	✓	0.02	20	To Do
Kamke 1183	✓	0.031	27	✓	0.018	22	To Do
Kamke 1184	✓	0.02	38	✓	0.04	25	To Do
Kamke 1185	✓	0.038	67	✓	0.037	33	To Do
Kamke 1186	✓	0.034	42	✓	0.04	36	To Do
Kamke 1187	✓	0.012	99	✓	0.025	53	To Do
Kamke 1188	✓	0.136	266	✓	0.213	114	To Do
Kamke 1189	✓	0.07	445	✓	0.06	79	To Do
Kamke 1190	✓	0.034	122	✓	0.145	38	To Do
Kamke 1191	✓	0.01	110	✓	0.023	23	To Do
Kamke 1192	✓	12.102	39	✓	0.282	51	To Do
Kamke 1193	✓	0.048	44	✓	0.05	38	To Do
Kamke 1194	✓	0.059	65	✓	0.08	48	To Do
Kamke 1195	✓	0.031	80	✓	0.142	93	To Do
Kamke 1196	✓	0.03	37	✓	0.049	31	To Do
Kamke 1197	✓	0.018	78	✓	0.075	43	To Do
Kamke 1198	✓	0.029	41	✓	0.056	37	To Do
Kamke 1199	✓	0.014	41	✓	0.032	35	To Do

Continued on next page

Table 3 – continued from previous page

#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1200	✓	0.023	62	✓	0.023	27	To Do
Kamke 1201	✓	0.056	44	✓	1.101	34	To Do
Kamke 1202	✓	0.015	22	✓	0.42	14	To Do
Kamke 1203	✓	0.021	124	✓	0.055	28	To Do
Kamke 1204	✓	0.021	132	✓	0.063	35	To Do
Kamke 1205	✗	0	0	✗	0	0	To Do
Kamke 1206	✓	0.105	120	✓	0.408	76	To Do
Kamke 1207	✓	0.119	294	✓	0.92	110	To Do
Kamke 1208	✓	0.053	59	✓	0.208	35	To Do
Kamke 1209	✓	0.022	67	✓	0.092	40	To Do
Kamke 1210	✓	0.27	252	✓	0.911	81	To Do
Kamke 1211	✓	0.056	68	✓	0.236	36	To Do
Kamke 1212	✗	0	0	✗	0	0	To Do
Kamke 1213	✓	0.087	54	✓	0.12	53	To Do
Kamke 1214	✓	0.329	260	✓	0.651	71	To Do
Kamke 1215	✓	0.155	664	✓	0.234	148	To Do
Kamke 1216	✗	0	0	✗	0	0	To Do
Kamke 1217	✓	0.147	30	✓	0.209	24	To Do
Kamke 1218	✓	0.16	38	✓	0.089	30	To Do
Kamke 1219	✓	381.471	216	✓	0.223	69	To Do
Kamke 1220	✓	189.369	96	✓	0.068	40	To Do
Kamke 1221	✓	0.059	40	✓	0.057	35	To Do
Kamke 1222	✓	0.021	30	✓	0.057	23	To Do

Continued on next page

Table 3 – continued from previous page

#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1223	✓	0.018	25	✓	0.033	39	To Do
Kamke 1224	✓	0.018	30	✓	0.021	23	To Do
Kamke 1225	✓	0.03	29	✓	0.053	23	To Do
Kamke 1226	✓	0.019	30	✓	0.169	25	To Do
Kamke 1227	✓	0.054	21	✓	0.015	16	To Do
Kamke 1228	✓	0.015	82	✓	0.154	53	To Do
Kamke 1229	✓	0.042	48	✓	0.072	31	To Do
Kamke 1230	✓	0.025	82	✓	0.48	36	To Do
Kamke 1231	✓	0.076	58	✓	0.076	52	To Do
Kamke 1232	✓	1311.202	6626	✓	0.763	409	To Do
Kamke 1233	✓	1311.716	6626	✓	0.213	409	To Do
Kamke 1234	✓	0.094	97	✗	0	0	To Do
Kamke 1235	✓	0.065	97	✓	0.025	45	To Do
Kamke 1236	✗	0	0	✗	0	0	To Do
Kamke 1237	✓	0.011	30	✓	0.032	20	To Do
Kamke 1238	✓	0.018	36	✓	0.022	26	To Do
Kamke 1239	✓	0.014	46	✓	0.091	35	To Do
Kamke 1240	✓	0.018	18	✓	0.051	15	To Do
Kamke 1241	✓	0.016	30	✓	0.056	24	To Do
Kamke 1242	✓	0.082	68	✓	0.082	41	To Do
Kamke 1243	✓	0.031	45	✓	0.051	21	To Do
Kamke 1244	✓	0.029	42	✓	0.165	27	To Do
Kamke 1245	✓	0.022	42	✓	0.062	27	To Do

Continued on next page

Table 3 – continued from previous page

#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 1246	✓	0.02	42	✓	0.183	28	To Do
Kamke 1247	✓	0.229	97	✓	0.03	27	To Do
Kamke 1248	✗	0	0	✓	0.542	134	To Do
Kamke 1249	✓	0.179	193	✓	0.091	134	To Do
Kamke 1250	✓	0.053	41	✓	0.032	41	To Do
Kamke 1251	✓	0.038	25	✓	0.043	20	To Do
Kamke 1252	✓	0.168	151	✓	0.06	124	To Do
Kamke 1253	✓	0.027	34	✓	0.01	16	To Do
Kamke 1254	✓	0.097	69	✓	0.096	42	To Do
Kamke 1255	✓	0.218	118	✓	0.052	42	To Do
Kamke 1256	✓	0.024	26	✓	0.125	51	To Do
Kamke 1257	✓	0.05	33	✓	0.315	27	To Do
Kamke 1258	✓	0.168	146	✓	0.06	110	To Do
Kamke 1259	✓	0.145	120	✓	0.065	92	To Do
Kamke 1260	✓	0.185	65	✓	0.577	76	To Do
Kamke 1261	✗	0	0	✓	0.246	105	To Do
Kamke 1262	✓	50.489	87	✓	0.272	53	To Do
Kamke 1263	✗	0	0	✓	0.099	52	To Do
Kamke 1264	✓	0.077	23	✓	0.049	19	To Do
Kamke 1265	✓	0.048	64	✓	0.437	93	To Do
Kamke 1266	✓	0.03	22	✓	0.035	19	To Do
Kamke 1267	✓	0.448	166	✓	0.083	41	To Do
Kamke 1268	✗	0	0	✓	0.146	39	To Do

Continued on next page

Table 3 – continued from previous page

#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 1269	✓	0.094	60	✓	0.099	40	To Do
Kamke 1270	✗	0	0	✓	0.208	46	To Do
Kamke 1271	✓	0.013	27	✓	0.012	14	To Do
Kamke 1272	✓	0.012	32	✓	0.058	23	To Do
Kamke 1273	✓	0.017	20	✓	0.088	17	To Do
Kamke 1274	✓	0.043	38	✓	0.014	19	To Do
Kamke 1275	✓	0.036	120	✓	0.173	53	To Do
Kamke 1276	✓	0.062	55	✓	0.095	31	To Do
Kamke 1277	✓	0.029	51	✓	0.066	27	To Do
Kamke 1278	✗	0	0	✗	0	0	To Do
Kamke 1279	✓	0.216	74	✓	0.434	32	To Do
Kamke 1280	✓	0.04	52	✓	0.064	40	To Do
Kamke 1281	✓	0.02	28	✓	0.066	15	To Do
Kamke 1282	✓	0.024	39	✓	0.05	21	To Do
Kamke 1283	✓	0.108	90	✓	0.171	48	To Do
Kamke 1284	✓	0.044	47	✓	0.024	41	To Do
Kamke 1285	✓	0.332	134	✓	0.141	52	To Do
Kamke 1286	✓	0.104	101	✓	0.022	32	To Do
Kamke 1287	✓	0.019	83	✓	0.03	27	To Do
Kamke 1288	✓	0.037	47	✓	0.035	21	To Do
Kamke 1289	✓	0.082	53	✓	0.112	33	To Do
Kamke 1290	✓	0.164	103	✓	0.029	47	To Do
Kamke 1291	✓	0.081	92	✓	0.077	62	To Do

Continued on next page

Table 3 – continued from previous page

#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 1292	✓	0.039	53	✓	0.076	31	To Do
Kamke 1293	✓	0.337	44	✓	0.072	33	To Do
Kamke 1294	✓	0.17	44	✓	0.069	33	To Do
Kamke 1295	✓	0.294	310	✓	0.321	106	To Do
Kamke 1296	✓	0.566	356	✓	0.371	150	To Do
Kamke 1297	✓	0.035	52	✓	0.027	63	To Do
Kamke 1298	✓	0.08	162	✓	0.164	124	To Do
Kamke 1299	✓	0.015	19	✓	0.021	27	To Do
Kamke 1300	✓	0.036	41	✓	0.05	31	To Do
Kamke 1301	✓	0.033	31	✓	0.033	19	To Do
Kamke 1302	✓	0.084	243	✓	0.08	98	To Do
Kamke 1303	✗	0	0	✓	0.236	501	To Do
Kamke 1304	✓	0.052	50	✓	0.06	38	To Do
Kamke 1305	✓	0.084	47	✓	0.082	44	To Do
Kamke 1306	✗	0	0	✓	0.357	69	To Do
Kamke 1307	✓	0.111	54	✓	0.062	36	To Do
Kamke 1308	✓	0.023	41	✓	0.023	40	To Do
Kamke 1309	✓	0.099	84	✓	0.108	85	To Do
Kamke 1310	✓	0.012	31	✓	0.016	20	To Do
Kamke 1311	✓	0.137	63	✓	0.152	52	To Do
Kamke 1312	✓	0.024	32	✓	0.023	19	To Do
Kamke 1313	✓	0.22	87	✓	0.095	35	To Do
Kamke 1314	✓	0.192	87	✓	0.085	33	To Do

Continued on next page

Table 3 – continued from previous page

#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 1315	✓	0.028	44	✓	0.025	45	To Do
Kamke 1316	✓	0.094	38	✓	0.047	18	To Do
Kamke 1317	✓	0.13	38	✓	0.048	13	To Do
Kamke 1318	✓	0.302	172	✓	0.139	122	To Do
Kamke 1319	✓	0.114	72	✓	0.163	31	To Do
Kamke 1320	✓	0.084	21	✓	0.052	17	To Do
Kamke 1321	✓	0.027	18	✓	0.032	15	To Do
Kamke 1322	✓	0.035	44	✓	0.031	44	To Do
Kamke 1323	✗	0	0	✓	0.024	17	To Do
Kamke 1324	✓	0.03	25	✓	0.033	18	To Do
Kamke 1325	✓	0.265	52	✓	0.152	86	To Do
Kamke 1326	✓	0.025	29	✓	0.032	22	To Do
Kamke 1327	✓	0.18	104	✓	0.336	81	To Do
Kamke 1328	✓	0.023	36	✓	0.033	27	To Do
Kamke 1329	✗	0	0	✓	0.352	64	To Do
Kamke 1330	✗	0	0	✓	1.131	1147	To Do
Kamke 1331	✓	0.044	55	✓	0.029	19	To Do
Kamke 1332	✓	0.025	26	✓	0.023	17	To Do
Kamke 1333	✓	0.114	70	✓	0.084	45	To Do
Kamke 1334	✓	0.21	114	✓	0.1	89	To Do
Kamke 1335	✓	0.339	893	✓	0.07	57	To Do
Kamke 1336	✓	0.054	70	✓	0.053	44	To Do
Kamke 1337	✓	0.085	62	✓	0.046	27	To Do

Continued on next page

Table 3 – continued from previous page

#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 1338	✓	0.069	40	✓	0.039	27	To Do
Kamke 1339	✓	0.27	66	✓	0.155	76	To Do
Kamke 1340	✓	0.038	32	✓	0.033	20	To Do
Kamke 1341	✗	0	0	✓	0.208	201	To Do
Kamke 1342	✓	0.072	52	✓	0.059	31	To Do
Kamke 1343	✗	0	0	✓	0.119	58	To Do
Kamke 1344	✓	0.572	173	✓	0.081	23	To Do
Kamke 1345	✓	0.044	52	✓	0.056	25	To Do
Kamke 1346	✓	0.084	37	✓	0.06	25	To Do
Kamke 1347	✓	0.123	31	✓	0.039	19	To Do
Kamke 1348	✗	0	0	✓	0.217	73	To Do
Kamke 1349	✓	0.111	76	✓	0.083	85	To Do
Kamke 1350	✓	0.01	25	✓	0.014	21	To Do
Kamke 1351	✓	0.04	50	✓	0.045	24	To Do
Kamke 1352	✓	0.014	89	✓	0.068	43	To Do
Kamke 1353	✓	0.126	119	✓	0.286	66	To Do
Kamke 1354	✓	0.089	108	✓	0.313	33	To Do
Kamke 1355	✓	0.147	59	✓	0.137	30	To Do
Kamke 1356	✓	0.307	90	✓	0.095	29	To Do
Kamke 1357	✓	0.717	288	✓	0.134	97	To Do
Kamke 1358	✓	0.066	89	✓	0.078	20	To Do
Kamke 1359	✓	0.109	86	✓	0.099	57	To Do
Kamke 1360	✓	0.105	68	✓	0.083	47	To Do

Continued on next page

Table 3 – continued from previous page

#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 1361	✓	0.517	38	✓	0.037	33	To Do
Kamke 1362	✗	0	0	✓	0.237	109	To Do
Kamke 1363	✓	0.806	236	✓	0.15	161	To Do
Kamke 1364	✓	0.171	42	✓	0.115	25	To Do
Kamke 1365	✓	0.099	72	✓	0.07	59	To Do
Kamke 1366	✓	0.023	31	✓	0.013	17	To Do
Kamke 1367	✗	0	0	✓	0.244	88	To Do
Kamke 1368	✓	0.027	106	✓	0.087	71	To Do
Kamke 1369	✓	0.108	75	✓	0.076	55	To Do
Kamke 1370	✓	0.03	53	✓	0.016	19	To Do
Kamke 1371	✓	0.022	48	✓	0.065	37	To Do
Kamke 1372	✗	0	0	✓	0.293	110	To Do
Kamke 1373	✗	0	0	✓	0.224	84	To Do
Kamke 1374	✓	0.036	32	✓	0.066	23	To Do
Kamke 1375	✓	0.049	54	✓	0.08	29	To Do
Kamke 1376	✓	0.102	82	✓	0.048	73	To Do
Kamke 1377	✓	0.259	109	✓	0.154	83	To Do
Kamke 1378	✓	0.055	65	✓	0.053	48	To Do
Kamke 1379	✓	0.087	99	✓	0.074	59	To Do
Kamke 1380	✓	0.316	132	✓	0.111	67	To Do
Kamke 1381	✓	0.79	589	✓	0.224	177	To Do
Kamke 1382	✓	0.742	154	✓	0.173	104	To Do
Kamke 1383	✓	0.141	50	✓	0.058	39	To Do

Continued on next page

Table 3 – continued from previous page

#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 1384	✓	0.034	110	✓	0.272	73	To Do
Kamke 1385	✓	0.019	78	✓	0.077	55	To Do
Kamke 1386	✓	0.101	108	✓	0.075	58	To Do
Kamke 1387	✓	0.038	50	✓	0.034	28	To Do
Kamke 1388	✓	0.314	235	✓	0.089	76	To Do
Kamke 1389	✓	0.392	217	✓	0.083	68	To Do
Kamke 1390	✓	0.041	51	✓	0.042	25	To Do
Kamke 1391	✓	0.062	27	✓	0.031	20	To Do
Kamke 1392	✓	92.456	1763961	✓	0.244	561	To Do
Kamke 1393	✓	22.442	413606	✓	0.173	272	To Do
Kamke 1394	✓	0.051	115	✓	0.131	79	To Do
Kamke 1395	✓	0.151	54	✓	0.069	39	To Do
Kamke 1396	✓	1.528	211	✓	0.213	178	To Do
Kamke 1397	✓	0.045	38	✓	0.126	27	To Do
Kamke 1398	✗	0	0	✓	0.217	69	To Do
Kamke 1399	✓	0.053	72	✓	0.072	34	To Do
Kamke 1400	✓	0.08	60	✓	0.058	35	To Do
Kamke 1401	✓	0.013	93	✓	0.061	45	To Do
Kamke 1402	✗	0	0	✓	0.28	58	To Do
Kamke 1403	✗	0	0	✓	0.84	298	To Do
Kamke 1404	✓	0.023	33	✓	0.053	19	To Do
Kamke 1405	✓	0.076	77	✓	0.087	42	To Do
Kamke 1406	✓	300.211	81	✓	0.231	44	To Do

Continued on next page

Table 3 – continued from previous page

#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 1407	✗	0	0	✓	2.355	2597	To Do
Kamke 1408	✗	0	0	✗	0	0	To Do
Kamke 1409	✓	0.025	43	✓	0.026	39	To Do
Kamke 1410	✓	0.137	481	✓	0.313	253	To Do
Kamke 1411	✓	0.353	42	✓	0.027	27	To Do
Kamke 1412	✓	0.016	29	✓	0.014	23	To Do
Kamke 1413	✗	0	0	✓	0.091	12	To Do
Kamke 1414	✓	1.206	231	✓	0.335	97	To Do
Kamke 1415	✓	0.876	273	✓	0.188	36	To Do
Kamke 1416	✓	0.198	46	✓	0.234	26	To Do
Kamke 1417	✓	0.149	52	✓	0.198	31	To Do
Kamke 1418	✗	0	0	✓	3.699	59	To Do
Kamke 1419	✗	0	0	✓	0.251	12	To Do
Kamke 1420	✓	0.45	134	✓	0.382	123	To Do
Kamke 1421	✓	0.238	81	✓	0.089	27	To Do
Kamke 1422	✓	0.089	64	✓	0.29	50	To Do
Kamke 1423	✓	0.073	70	✓	0.313	132	To Do
Kamke 1424	✓	0.173	90	✓	0.319	120	To Do
Kamke 1425	✓	1.917	385	✓	0.505	93	To Do
Kamke 1426	✓	6.36	4128	✓	0.625	549	To Do
Kamke 1427	✗	0	0	✓	1.631	179	To Do
Kamke 1428	✓	0.393	104	✓	0.349	183	To Do
Kamke 1429	✓	0.058	51	✓	0.043	25	To Do

Continued on next page

Table 3 – continued from previous page

#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 1430	✓	0.464	22	✓	0.402	101	To Do
Kamke 1431	✓	0.2	80	✓	0.333	30	To Do
Kamke 1432	✓	0.098	37	✓	0.05	22	To Do
Kamke 1433	✓	0.254	46	✓	0.111	28	To Do
Kamke 1434	✓	107.235	1596424	✓	0.687	517	To Do
Kamke 1435	✓	0.143	70	✓	0.16	38	To Do
Kamke 1436	✓	0.53	42	✓	0.296	113	To Do
Kamke 1437	✓	0.293	44	✓	0.184	29	To Do
Kamke 1438	✓	0.957	615	✓	0.231	102	To Do
Kamke 1439	✗	0	0	✗	0	0	To Do
Kamke 1440	✗	0	0	✗	0	0	To Do
Kamke 1441	✗	0	0	✗	0	0	To Do
Kamke 1442	✗	0	0	✓	0.066	30	To Do
Kamke 1443	✗	0	0	✗	0	0	To Do
Kamke 1444	✗	0	0	✓	0.03	37	To Do
Kamke 1445	✗	0	0	✓	0.212	20	To Do
Kamke 1446	✓	0.041	33	✓	0.053	22	To Do
Kamke 1447	✓	0.034	29	✓	0.062	20	To Do
Kamke 1448	✓	0.346	149	✓	0.122	77	To Do
Kamke 1449	✓	0.035	53	✓	0.039	47	To Do
Kamke 1450	✗	0	0	✓	0.359	1616	To Do
Kamke 1451	✓	0.021	168	✓	0.148	114	To Do
Kamke 1452	✓	0.008	54	✓	0.013	35	To Do

Continued on next page

Table 3 – continued from previous page

#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1453	✓	0.78	128	✓	0.148	122	To Do
Kamke 1454	✓	0.011	79	✓	0.064	55	To Do
Kamke 1455	✓	0.028	127	✓	0.143	71	To Do
Kamke 1456	✓	0.036	183	✓	0.069	73	To Do
Kamke 1457	✗	0	0	✗	0	0	To Do
Kamke 1458	✗	0	0	✗	0	0	To Do
Kamke 1459	✗	0	0	✗	0	0	To Do
Kamke 1460	✗	0	0	✗	0	0	To Do
Kamke 1461	✗	0	0	✗	0	0	To Do
Kamke 1462	✗	0	0	✗	0	0	To Do
Kamke 1463	✗	0	0	✗	0	0	To Do
Kamke 1464	✓	0.006	34	✓	0.013	27	To Do
Kamke 1465	✓	0.105	95	✓	0.08	214	To Do
Kamke 1466	✓	0.017	46	✓	0.026	27	To Do
Kamke 1467	✓	0.006	84	✓	0.036	590	To Do
Kamke 1468	✓	0.088	57	✓	0.148	59	To Do
Kamke 1469	✓	0.018	72	✓	0.039	37	To Do
Kamke 1470	✗	0	0	✓	0.108	36	To Do
Kamke 1471	✗	0	0	✓	0.165	36	To Do
Kamke 1472	✗	0	0	✓	0.18	33	To Do
Kamke 1473	✗	0	0	✗	0	0	To Do
Kamke 1474	✗	0	0	✗	0	0	To Do
Kamke 1475	✓	0.029	38	✓	0.032	23	To Do

Continued on next page

Table 3 – continued from previous page

#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1476	✗	0	0	✗	0	0	To Do
Kamke 1477	✓	0.176	48	✓	0.026	41	To Do
Kamke 1478	✓	0.033	104	✓	0.127	48	To Do
Kamke 1479	✓	0.147	153	✓	0.244	92	To Do
Kamke 1480	✓	0.222	93	✓	0.277	35	To Do
Kamke 1481	✓	1.107	424	✓	0.079	44	To Do
Kamke 1482	✓	2980.355	3626	✓	0.412	1616	To Do
Kamke 1483	✓	0.148	112	✓	0.28	37	To Do
Kamke 1484	✗	0	0	✗	0	0	To Do
Kamke 1485	✓	0.147	64	✓	0.381	51	To Do
Kamke 1486	✓	0.182	65	✓	0.261	51	To Do
Kamke 1487	✗	0	0	✓	0.114	38	To Do
Kamke 1488	✓	0.593	102	✓	0.633	135	To Do
Kamke 1489	✗	0	0	✗	0	0	To Do
Kamke 1490	✓	0.019	33	✓	0.079	18	To Do
Kamke 1491	✓	0.046	102	✓	0.093	88	To Do
Kamke 1492	✓	0.417	43	✓	0.148	39	To Do
Kamke 1493	✓	7.884	2582	✓	0.371	1033	To Do
Kamke 1494	✓	0.029	43	✓	0.022	32	To Do
Kamke 1495	✓	0.02	24	✓	0.016	16	To Do
Kamke 1496	✓	0.286	63	✓	0.032	57	To Do
Kamke 1497	✓	0.516	135	✓	0.26	77	To Do
Kamke 1498	✓	12.968	701	✓	0.262	53	To Do

Continued on next page

Table 3 – continued from previous page

#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 1499	✓	0.236	97	✓	0.266	25	To Do
Kamke 1500	✗	0	0	✓	0.243	55	To Do
Kamke 1501	✓	0.19	86	✓	0.242	37	To Do
Kamke 1502	✓	0.077	98	✓	0.502	103	To Do
Kamke 1503	✓	0.114	62	✓	0.029	67	To Do
Kamke 1504	✓	1.248	85	✓	0.21	18	To Do
Kamke 1505	✗	0	0	✓	0.151	79	To Do
Kamke 1506	✓	501.89	318	✓	0.072	43	To Do
Kamke 1507	✗	0	0	✓	0.639	1210	To Do
Kamke 1508	✓	0.954	143	✓	0.154	81	To Do
Kamke 1509	✓	0.01	34	✓	0.063	29	To Do
Kamke 1510	✗	0	0	✗	0	0	To Do
Kamke 1511	✓	0.037	51	✓	0.037	49	To Do
Kamke 1512	✓	0.039	29	✓	0.018	18	To Do
Kamke 1513	✓	0.084	25	✓	0.224	18	To Do
Kamke 1514	✓	0.762	102	✓	0.52	135	To Do
Kamke 1515	✗	0	0	✗	0	0	To Do
Kamke 1516	✗	0	0	✓	0.454	188	To Do
Kamke 1517	✓	0.42	30686	✓	0.598	866	To Do
Kamke 1518	✓	0.255	106	✓	0.448	60	To Do
Kamke 1519	✓	0.031	65	✓	0.158	19	To Do
Kamke 1520	✗	0	0	✓	0.479	288	To Do
Kamke 1521	✓	0.065	35	✓	0.442	28	To Do

Continued on next page

Table 3 – continued from previous page

#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 1522	✓	0.02	44	✓	0.049	34	To Do
Kamke 1523	✓	0.122	74	✓	0.45	23	To Do
Kamke 1524	✓	0.172	96	✓	0.526	98	To Do
Kamke 1525	✓	0.486	102	✓	0.604	291	To Do
Kamke 1526	✗	0	0	✓	0.243	19	To Do
Kamke 1527	✗	0	0	✓	0.563	437	To Do
Kamke 1528	✓	0.667	72	✓	0.348	71	To Do
Kamke 1529	✗	0	0	✓	0.079	25	To Do
Kamke 1530	✗	0	0	✓	0.251	113	To Do
Kamke 1531	✗	0	0	✗	0	0	To Do
Kamke 1532	✓	0.016	103	✓	0.108	58	To Do
Kamke 1533	✓	0.016	113	✓	0.105	58	To Do
Kamke 1534	✓	0.004	24	✓	0.042	21	To Do
Kamke 1535	✓	1.323	219	✓	0.021	36	To Do
Kamke 1536	✓	0.005	76	✓	0.02	50	To Do
Kamke 1537	✓	1.255	1722	✓	0.175	67	To Do
Kamke 1538	✓	0.268	66	✓	0.51	51	To Do
Kamke 1539	✓	0.007	44	✓	0.036	35	To Do
Kamke 1540	✗	0	0	✗	0	0	To Do
Kamke 1541	✗	0	0	✗	0	0	To Do
Kamke 1542	✗	0	0	✗	0	0	To Do
Kamke 1543	✗	0	0	✗	0	0	To Do
Kamke 1544	✗	0	0	✓	0.02	41	To Do

Continued on next page

Table 3 – continued from previous page

#	Mathematica			Maple			note on solution
	solved	cpu	leaf	solved	cpu	leaf	
Kamke 1545	✓	0.192	40	✓	0.1	27	To Do
Kamke 1546	✓	0.848	301	✓	0.06	73	To Do
Kamke 1547	✗	0	0	✓	0.023	87	To Do
Kamke 1548	✓	0.102	50	✓	0.081	32	To Do
Kamke 1549	✓	0.012	34	✓	0.03	26	To Do
Kamke 1550	✓	5.407	262	✓	1.833	157	To Do
Kamke 1551	✓	0.436	110	✓	0.259	62	To Do
Kamke 1552	✗	0	0	✓	0.079	89	To Do
Kamke 1553	✓	0.025	29	✓	0.016	17	To Do
Kamke 1554	✓	0.024	29	✓	0.016	18	To Do
Kamke 1555	✓	0.063	156	✓	0.178	61	To Do
Kamke 1556	✓	0.024	30	✓	0.019	19	To Do
Kamke 1557	✓	0.068	146	✓	0.136	61	To Do
Kamke 1558	✓	0.174	319	✓	0.193	67	To Do
Kamke 1559	✓	0.292	100	✓	0.184	33	To Do
Kamke 1560	✓	0.021	29	✓	0.016	18	To Do
Kamke 1561	✓	4.493	400	✓	0.279	69	To Do
Kamke 1562	✓	1.181	140	✓	0.424	77	To Do
Kamke 1563	✓	2.133	232	✓	0.305	87	To Do
Kamke 1564	✓	1.439	230	✓	0.282	88	To Do
Kamke 1565	✓	0.548	242	✓	0.435	71	To Do
Kamke 1566	✓	0.642	238	✓	0.385	35	To Do
Kamke 1567	✓	0.02	30	✓	0.019	19	To Do

Continued on next page

Table 3 – continued from previous page

#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1568	✓	0.011	122	✓	0.04	89	To Do
Kamke 1569	✗	0	0	✓	0.524	63	To Do
Kamke 1570	✓	0.152	470	✓	0.103	49	To Do
Kamke 1571	✓	0.092	390	✓	0.252	143	To Do
Kamke 1572	✗	0	0	✓	0.482	35	To Do
Kamke 1573	✗	0	0	✓	0.048	41	To Do
Kamke 1574	✗	0	0	✓	0.858	252	To Do
Kamke 1575	✗	0	0	✓	0.513	638	To Do
Kamke 1576	✗	0	0	✓	0.03	67	To Do
Kamke 1577	✓	1.142	44	✓	0.012	21	To Do
Kamke 1578	✓	268.095	139	✓	0.559	89	To Do
Kamke 1579	✓	0.684	80	✓	0.457	69	To Do
Kamke 1580	✓	1.139	234	✓	0.829	147	To Do
Kamke 1581	✗	0	0	✗	0	0	To Do
Kamke 1582	✓	0.651	787	✗	0	0	To Do
Kamke 1583	✓	459.877	117	✓	0.04	40	To Do
Kamke 1584	✓	3.013	216	✓	0.26	118	To Do
Kamke 1585	✓	0.23	214	✓	0.135	679	To Do
Kamke 1586	✗	0	0	✗	0	0	To Do
Kamke 1587	✓	0.368	492	✓	0.919	174	To Do
Kamke 1588	✓	15.455	114	✓	0.163	90	To Do
Kamke 1589	✓	0.047	670	✓	10.253	4353	To Do
Kamke 1590	✗	0	0	✓	2.837	553	To Do

Continued on next page

Table 3 – continued from previous page

#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1591	✓	0.053	26	✓	0.159	12	To Do
Kamke 1592	✓	0.028	14	✓	0.017	10	To Do
Kamke 1593	✗	0	0	✗	0	0	To Do
Kamke 1594	✓	0.518	373	✓	0.336	59	To Do
Kamke 1595	✗	0	0	✗	0	0	To Do
Kamke 1596	✗	0	0	✗	0	0	To Do
Kamke 1597	✓	2.182	242	✓	0.034	21	To Do
Kamke 1598	✗	0	0	✗	0	0	To Do
Kamke 1599	✗	0	0	✗	0	0	To Do
Kamke 1600	✓	2.549	1017	✓	0.125	89	To Do
Kamke 1601	✗	0	0	✓	2.948	151	To Do
Kamke 1602	✓	124.369	46	✓	0.31	73	To Do
Kamke 1603	✗	0	0	✓	36.77	8411	To Do
Kamke 1604	✓	0.064	34	✓	0.549	23	To Do
Kamke 1605	✗	0	0	✓	1.431	107	To Do
Kamke 1606	✗	0	0	✗	0	0	To Do
Kamke 1607	✓	0.111	79	✓	0.134	49	To Do
Kamke 1608	✗	0	0	✗	0	0	To Do
Kamke 1609	✗	0	0	✗	0	0	To Do
Kamke 1610	✓	945.186	734	✓	0.289	92	To Do
Kamke 1611	✗	0	0	✓	0.813	57	To Do
Kamke 1612	✗	0	0	✓	1.357	57	To Do
Kamke 1613	✗	0	0	✓	0.029	27	To Do

Continued on next page

Table 3 – continued from previous page

#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1614	✗	0	0	✓	0.088	33	To Do
Kamke 1615	✗	0	0	✓	4.227	91	To Do
Kamke 1616	✗	0	0	✓	1.213	63	To Do
Kamke 1617	✗	0	0	✗	0	0	To Do
Kamke 1618	✗	0	0	✓	1.633	56	To Do
Kamke 1619	✗	0	0	✗	0	0	To Do
Kamke 1620	✗	0	0	✓	0.137	291	To Do
Kamke 1621	✗	0	0	✓	2.888	1088	To Do
Kamke 1622	✗	0	0	✓	0.404	415	To Do
Kamke 1623	✗	0	0	✗	0	0	To Do
Kamke 1624	✗	0	0	✓	1.833	131	To Do
Kamke 1625	✗	0	0	✗	0	0	To Do
Kamke 1626	✗	0	0	✓	0.249	48	To Do
Kamke 1627	✗	0	0	✓	0.875	58	To Do
Kamke 1628	✗	0	0	✗	0	0	To Do
Kamke 1629	✗	0	0	✓	0.046	38	To Do
Kamke 1630	✓	11.355	3227	✓	0.651	783	To Do
Kamke 1631	✗	0	0	✓	0.066	38	To Do
Kamke 1632	✓	0.06	46	✓	0.138	23	To Do
Kamke 1633	✗	0	0	✓	0.346	97	To Do
Kamke 1634	✗	0	0	✗	0	0	To Do
Kamke 1635	✗	0	0	✓	0.22	79	To Do
Kamke 1636	✗	0	0	✓	1.027	59	To Do

Continued on next page

Table 3 – continued from previous page

#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1637	✗	0	0	✓	0.555	58	To Do
Kamke 1638	✗	0	0	✓	0.226	115	To Do
Kamke 1639	✗	0	0	✓	3.267	56	To Do
Kamke 1640	✗	0	0	✓	0.217	70	To Do
Kamke 1641	✓	1.983	57	✓	0.043	29	To Do
Kamke 1642	✗	0	0	✗	0	0	To Do
Kamke 1643	✗	0	0	✗	0	0	To Do
Kamke 1644	✗	0	0	✓	0.578	56	To Do
Kamke 1645	✗	0	0	✗	0	0	To Do
Kamke 1646	✓	10.801	262	✓	0.178	94	To Do
Kamke 1647	✓	51.986	59	✓	0.71	60	To Do
Kamke 1648	✗	0	0	✓	1.713	205	To Do
Kamke 1649	✗	0	0	✗	0	0	To Do
Kamke 1650	✓	0.025	30	✓	0.369	16	To Do
Kamke 1651	✓	0.277	414	✓	0.207	31	To Do
Kamke 1652	✗	0	0	✓	0.366	36	To Do
Kamke 1653	✓	0.066	75	✓	0.154	41	To Do
Kamke 1654	✓	0.292	308	✓	0.201	38	To Do
Kamke 1655	✓	0.864	350	✓	0.24	84	To Do
Kamke 1656	✗	0	0	✓	0.805	771	To Do
Kamke 1657	✓	0.186	43	✓	0.304	35	To Do
Kamke 1658	✗	0	0	✓	0.151	115	To Do
Kamke 1659	✗	0	0	✓	0.108	60	To Do

Continued on next page

Table 3 – continued from previous page

#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 1660	✗	0	0	✓	0.866	126	To Do
Kamke 1661	✓	0.031	92	✓	0.101	51	To Do
Kamke 1662	✗	0	0	✓	0.398	56	To Do
Kamke 1663	✗	0	0	✓	0.951	125	To Do
Kamke 1664	✗	0	0	✓	2.918	155	To Do
Kamke 1665	✗	0	0	✓	0.633	84	To Do
Kamke 1666	✗	0	0	✓	0.955	93	To Do
Kamke 1667	✗	0	0	✓	1.467	121	To Do
Kamke 1668	✓	0.071	60	✓	0.182	24	To Do
Kamke 1669	✓	137.476	126	✓	0.132	32	To Do
Kamke 1670	✓	84.793	50	✓	0.415	35	To Do
Kamke 1671	✓	0.035	59	✓	0.102	35	To Do
Kamke 1672	✗	0	0	✓	0.961	65	To Do
Kamke 1673	✗	0	0	✓	0.784	60	To Do
Kamke 1674	✓	0.062	106	✓	0.082	25	To Do
Kamke 1675	✗	0	0	✗	0	0	To Do
Kamke 1676	✓	56.675	133	✓	0.294	72	To Do
Kamke 1677	✗	0	0	✓	1.708	101	To Do
Kamke 1678	✗	0	0	✓	0.319	60	To Do
Kamke 1679	✓	0.101	33	✓	0.204	27	To Do
Kamke 1680	✗	0	0	✓	0.667	103	To Do
Kamke 1681	✗	0	0	✓	0.065	31	To Do
Kamke 1682	✗	0	0	✓	0.871	94	To Do

Continued on next page

Table 3 – continued from previous page

#	Mathematica			Maple			note on solution
	solved	cpu	leaf	solved	cpu	leaf	
Kamke 1683	✓	0.079	26	✓	0.066	23	To Do
Kamke 1684	✗	0	0	✓	1.542	100	To Do
Kamke 1685	✗	0	0	✗	0	0	To Do
Kamke 1686	✗	0	0	✓	1.101	128	To Do
Kamke 1687	✓	0.069	262	✓	0.138	21	To Do
Kamke 1688	✓	326.951	166	✓	0.125	32	To Do
Kamke 1689	✓	0.653	329	✓	0.171	37	To Do
Kamke 1690	✗	0	0	✓	0.612	99	To Do
Kamke 1691	✗	0	0	✓	1.144	254	To Do
Kamke 1692	✗	0	0	✓	3.74	156	To Do
Kamke 1693	✗	0	0	✓	0.323	68	To Do
Kamke 1694	✓	0.2	115	✓	0.182	54	To Do
Kamke 1695	✗	0	0	✓	0.628	103	To Do
Kamke 1696	✗	0	0	✓	0.525	100	To Do
Kamke 1697	✓	0.063	94	✓	0.065	39	To Do
Kamke 1698	✓	0.044	72	✗	0	0	To Do
Kamke 1699	✓	0.037	40	✓	0.145	33	To Do
Kamke 1700	✓	0.081	44	✓	0.384	86	To Do
Kamke 1701	✓	0.107	80	✓	0.351	42	To Do
Kamke 1702	✗	0	0	✗	0	0	To Do
Kamke 1703	✓	0.237	77	✓	0.088	21	To Do
Kamke 1704	✗	0	0	✗	0	0	To Do
Kamke 1705	✗	0	0	✗	0	0	To Do

Continued on next page

Table 3 – continued from previous page

#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 1706	✗	0	0	✗	0	0	To Do
Kamke 1707	✓	0.071	31	✓	0.109	39	To Do
Kamke 1708	✗	0	0	✓	1.01	73	To Do
Kamke 1709	✗	0	0	✓	1.824	84	To Do
Kamke 1710	✗	0	0	✓	2.523	91	To Do
Kamke 1711	✓	617.616	915	✓	0.592	81	To Do
Kamke 1712	✓	10.047	70	✓	0.105	61	To Do
Kamke 1713	✗	0	0	✓	0.341	54	To Do
Kamke 1714	✓	0.064	25	✓	0.082	68	To Do
Kamke 1715	✓	0.032	26	✓	0.069	25	To Do
Kamke 1716	✓	0.661	172	✓	0.283	68	To Do
Kamke 1717	✓	1.85	49	✓	0.398	107	To Do
Kamke 1718	✓	1.564	744	✓	0.33	133	To Do
Kamke 1719	✗	0	0	✓	0.598	70	To Do
Kamke 1720	✗	0	0	✓	0.445	173	To Do
Kamke 1721	✗	0	0	✗	0	0	To Do
Kamke 1722	✓	2.025	797	✓	0.454	98	To Do
Kamke 1723	✓	0.865	259	✓	0.135	16	To Do
Kamke 1724	✓	0.255	38	✓	0.696	21	To Do
Kamke 1725	✓	0.378	75	✓	0.645	105	To Do
Kamke 1726	✓	0.709	75	✓	0.132	39	To Do
Kamke 1727	✓	0.183	129	✓	0.434	823	To Do
Kamke 1728	✓	0.006	31	✓	0.044	24	To Do

Continued on next page

Table 3 – continued from previous page

#	Mathematica			Maple			note on solution
	solved	cpu	leaf	solved	cpu	leaf	
Kamke 1729	✗	0	0	✗	0	0	To Do
Kamke 1730	✓	0.483	127	✓	0.109	53	To Do
Kamke 1731	✓	1.344	351	✓	0.118	61	To Do
Kamke 1732	✗	0	0	✗	0	0	To Do
Kamke 1733	✓	2.62	437	✓	0.121	71	To Do
Kamke 1734	✗	0	0	✗	0	0	To Do
Kamke 1735	✗	0	0	✗	0	0	To Do
Kamke 1736	✓	8.442	285	✓	0.115	49	To Do
Kamke 1737	✗	0	0	✗	0	0	To Do
Kamke 1738	✗	0	0	✗	0	0	To Do
Kamke 1739	✗	0	0	✗	0	0	To Do
Kamke 1740	✓	0.027	16	✓	0.046	13	To Do
Kamke 1741	✓	0.097	17	✓	0.096	34	To Do
Kamke 1742	✗	0	0	✓	0.218	60	To Do
Kamke 1743	✓	22.521	2761	✓	0.121	71	To Do
Kamke 1744	✓	1.039	173	✓	0.393	823	To Do
Kamke 1745	✓	0.344	204	✓	0.581	117	To Do
Kamke 1746	✗	0	0	✓	0.609	207	To Do
Kamke 1747	✓	0.027	20	✓	0.023	17	To Do
Kamke 1748	✓	0.095	43	✓	0.166	67	To Do
Kamke 1749	✓	0.531	181	✓	0.55	57	To Do
Kamke 1750	✓	4.661	2281	✓	0.441	87	To Do
Kamke 1751	✗	0	0	✗	0	0	To Do

Continued on next page

Table 3 – continued from previous page

#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 1752	✓	0.136	26	✓	0.121	33	To Do
Kamke 1753	✓	0.323	43	✓	0.171	147	To Do
Kamke 1754	✓	0.032	17	✓	0.052	15	To Do
Kamke 1755	✗	0	0	✓	0.369	418	To Do
Kamke 1756	✗	0	0	✓	0.188	75	To Do
Kamke 1757	✗	0	0	✗	0	0	To Do
Kamke 1758	✓	0.059	36	✓	0.083	42	To Do
Kamke 1759	✓	0.036	18	✓	0.039	31	To Do
Kamke 1760	✓	321.185	118	✓	0.096	114	To Do
Kamke 1761	✗	0	0	✗	0	0	To Do
Kamke 1762	✗	0	0	✓	0.911	108	To Do
Kamke 1763	✓	0.146	35	✓	0.069	148	To Do
Kamke 1764	✓	0.064	52	✓	0.213	18	To Do
Kamke 1765	✓	0.129	24	✓	0.039	27	To Do
Kamke 1766	✓	0.046	21	✓	0.049	64	To Do
Kamke 1767	✓	0.079	55	✓	0.405	50	To Do
Kamke 1768	✓	0.117	87	✓	0.067	43	To Do
Kamke 1769	✓	0.047	18	✓	0.05	21	To Do
Kamke 1770	✓	0.783	28	✓	0.078	26	To Do
Kamke 1771	✓	0.085	21	✓	0.22	22	To Do
Kamke 1772	✓	1.024	37	✓	0.164	37	To Do
Kamke 1773	✓	0.191	44	✓	0.046	30	To Do
Kamke 1774	✓	1.435	93	✓	0.328	136	To Do

Continued on next page

Table 3 – continued from previous page

#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1775	✓	0.13	29	✓	0.117	31	To Do
Kamke 1776	✓	2832.237	134	✓	0.362	49	To Do
Kamke 1777	✗	0	0	✓	0.707	79	To Do
Kamke 1778	✓	0.968	75	✓	0.645	245	To Do
Kamke 1779	✗	0	0	✓	0.637	112	To Do
Kamke 1780	✗	0	0	✓	0.654	160	To Do
Kamke 1781	✓	0.082	19	✓	0.075	11	To Do
Kamke 1782	✓	0.087	93	✓	0.069	33	To Do
Kamke 1783	✓	1.407	26	✓	0.192	23	To Do
Kamke 1784	✓	0.321	74	✓	0.733	82	To Do
Kamke 1785	✓	0.388	95	✓	0.438	83	To Do
Kamke 1786	✓	0.991	95	✓	0.24	42	To Do
Kamke 1787	✗	0	0	✓	0.347	80	To Do
Kamke 1788	✗	0	0	✗	0	0	To Do
Kamke 1789	✗	0	0	✗	0	0	To Do
Kamke 1790	✓	22.76	182	✓	0.329	119	To Do
Kamke 1791	✓	22.61	164	✓	0.359	90	To Do
Kamke 1792	✓	26.792	222	✓	0.526	194	To Do
Kamke 1793	✓	1.328	113	✓	0.076	40	To Do
Kamke 1794	✓	1.256	98	✓	0.102	46	To Do
Kamke 1795	✓	0.331	116	✓	1.332	529	To Do
Kamke 1796	✓	0.341	363	✓	0.258	51	To Do
Kamke 1797	✗	0	0	✗	0	0	To Do

Continued on next page

Table 3 – continued from previous page

#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 1798	✗	0	0	✓	0.255	166	To Do
Kamke 1799	✓	1.818	88	✓	0.165	46	To Do
Kamke 1800	✓	0.487	84	✓	0.06	60	To Do
Kamke 1801	✗	0	0	✗	0	0	To Do
Kamke 1802	✗	0	0	✗	0	0	To Do
Kamke 1803	✓	20.839	10387	✓	2.478	115620	To Do
Kamke 1804	✓	3.057	415	✓	0.04	31	To Do
Kamke 1805	✓	2.521	436	✓	0.061	34	To Do
Kamke 1806	✗	0	0	✓	3.659	733	To Do
Kamke 1807	✗	0	0	✗	0	0	To Do
Kamke 1808	✓	104.637	172	✓	0.163	72	To Do
Kamke 1809	✗	0	0	✓	0.694	336	To Do
Kamke 1810	✓	0.103	1677	✓	0.15	91	To Do
Kamke 1811	✗	0	0	✗	0	0	To Do
Kamke 1812	✓	0.026	29	✓	0.05	19	To Do
Kamke 1813	✗	0	0	✓	0.421	138	To Do
Kamke 1814	✓	13.089	116	✓	0.198	87	To Do
Kamke 1815	✗	0	0	✓	0.896	71	To Do
Kamke 1816	✗	0	0	✓	1.706	46	To Do
Kamke 1817	✗	0	0	✓	0.299	40	To Do
Kamke 1818	✗	0	0	✓	0.425	66	To Do
Kamke 1819	✗	0	0	✓	0.082	42	To Do
Kamke 1820	✗	0	0	✓	1.109	88	To Do

Continued on next page

Table 3 – continued from previous page

#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1821	✗	0	0	✓	3.026	54	To Do
Kamke 1822	✓	1.763	371	✓	1.504	291	To Do
Kamke 1823	✗	0	0	✓	0.447	289	To Do
Kamke 1824	✓	0.388	347	✓	0.902	96	To Do
Kamke 1825	✗	0	0	✓	0.985	49	To Do
Kamke 1826	✓	1.434	119	✓	0.8	173	To Do
Kamke 1827	✗	0	0	✓	3.711	81	To Do
Kamke 1828	✓	0.012	32	✓	0.773	59	To Do
Kamke 1829	✓	0.007	24	✓	0.539	36	To Do
Kamke 1830	✓	0.193	24	✓	0.695	308	To Do
Kamke 1831	✗	0	0	✓	1.238	163	To Do
Kamke 1832	✗	0	0	✓	1.129	117	To Do
Kamke 1833	✗	0	0	✓	3.947	162	To Do
Kamke 1834	✗	0	0	✓	0.645	92	To Do
Kamke 1835	✓	0.121	143	✗	0	0	To Do
Kamke 1836	✗	0	0	✓	6.725	116	To Do
Kamke 1837	✗	0	0	✓	1.372	95	To Do
Kamke 1838	✗	0	0	✓	1.61	73	To Do
Kamke 1839	✗	0	0	✓	1.592	116	To Do
Kamke 1840	✗	0	0	✓	0.953	129	To Do
Kamke 1841	✗	0	0	✓	0.63	60	To Do
Kamke 1842	✓	0.253	286	✓	1.471	190	To Do
Kamke 1843	✓	3.019	409	✓	0.494	77	To Do

Continued on next page

Table 3 – continued from previous page

#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 1844	✗	0	0	✓	0.643	17	To Do
Kamke 1845	✗	0	0	✓	0.218	22	To Do
Kamke 1846	✓	0.051	51	✓	0.031	28	To Do
Kamke 1847	✓	0.132	95	✓	0.638	49	To Do
Kamke 1848	✗	0	0	✓	1.566	789	To Do
Kamke 1849	✓	0.73	426	✓	0.259	197	To Do
Kamke 1850	✗	0	0	✓	1.568	164	To Do
Kamke 1851	✗	0	0	✗	0	0	To Do
Kamke 1852	✓	0.035	28	✓	0.245	28	To Do
Kamke 1853	✗	0	0	✓	1.628	110	To Do
Kamke 1854	✗	0	0	✗	0	0	To Do
Kamke 1855	✗	0	0	✗	0	0	To Do
Kamke 1856	✓	0.015	22	✓	0.074	19	To Do
Kamke 1857	✓	1.438	39	✓	0.108	35	To Do
Kamke 1858	✓	0.026	182	✓	0.051	64	To Do
Kamke 1859	✓	0.005	51	✓	0.085	37	To Do
Kamke 1860	✓	0.049	696	✓	0.071	177	To Do
Kamke 1861	✓	0.013	183	✓	0.151	152	To Do
Kamke 1862	✓	0.22	52	✓	0.033	39	To Do
Kamke 1863	✓	0.008	84	✓	0.031	35	To Do
Kamke 1864	✓	0.013	59	✓	0.034	44	To Do
Kamke 1865	✓	1.297	2062	✓	0.404	224	To Do
Kamke 1866	✓	0.033	132	✓	0.031	39	To Do

Continued on next page

Table 3 – continued from previous page

#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1867	✓	0.084	124	✓	0.032	42	To Do
Kamke 1868	✓	0.046	162	✓	0.118	64	To Do
Kamke 1869	✓	0.454	118	✓	0.109	51	To Do
Kamke 1870	✓	0.173	122	✓	0.21	47	To Do
Kamke 1871	✓	0.205	180	✓	0.066	62	To Do
Kamke 1872	✓	0.06	162	✓	0.054	65	To Do
Kamke 1873	✓	0.047	322	✓	0.053	52	To Do
Kamke 1874	✓	0.17	131	✓	1.424	57	To Do
Kamke 1875	✗	0	0	✓	1.426	1447	To Do
Kamke 1876	✓	0.114	41	✓	0.151	18	To Do
Kamke 1877	✓	0.005	31	✓	0.076	31	To Do
Kamke 1878	✓	0.011	39	✓	0.048	39	To Do
Kamke 1879	✓	0.122	58	✓	0.129	54	To Do
Kamke 1880	✗	0	0	✓	0.064	23	To Do
Kamke 1881	✓	0.049	44	✓	0.023	48	To Do
Kamke 1882	✓	0.595	928	✓	0.277	99	To Do
Kamke 1883	✓	0.676	602	✓	0.098	80	To Do
Kamke 1884	✓	0.309	224	✓	0.095	69	To Do
Kamke 1885	✗	0	0	✓	0.845	47	To Do
Kamke 1886	✓	0.021	115	✓	0.054	49	To Do
Kamke 1887	✓	0.547	5748	✓	0.166	360	To Do
Kamke 1888	✓	26.786	56704	✓	0.219	457	To Do
Kamke 1889	✓	0.109	554	✓	0.047	60	To Do

Continued on next page

Table 3 – continued from previous page

#	Mathematica solved	cpu	leaf	Maple solved	cpu	leaf	note on solution
Kamke 1890	✗	0	0	✗	0	0	To Do
Kamke 1891	✓	0.563	742	✓	0.047	64	To Do
Kamke 1892	✓	0.412	4815	✓	0.139	463	To Do
Kamke 1893	✓	1168.74	5562	✓	1.232	1579	To Do
Kamke 1894	✓	2706.039	3402	✓	0.746	1056	To Do
Kamke 1895	✓	0.461	7517	✓	0.328	1008	To Do
Kamke 1896	✓	0.207	1132	✓	0.049	67	To Do
Kamke 1897	✓	0.131	280	✓	0.342	86	To Do
Kamke 1898	✓	0.045	420	✓	0.062	71	To Do
Kamke 1899	✓	0.014	112	✓	0.091	52	To Do
Kamke 1900	✓	0.01	94	✓	0.065	50	To Do
Kamke 1901	✓	0.011	105	✓	0.055	43	To Do
Kamke 1902	✓	0.016	226	✓	0.048	51	To Do
Kamke 1903	✓	0.106	1304	✓	0.133	299	To Do
Kamke 1904	✓	0.077	1445	✓	0.077	257	To Do
Kamke 1905	✗	0	0	✗	0	0	To Do
Kamke 1906	✓	0.074	278	✓	0.067	120	To Do
Kamke 1907	✓	0.014	179	✓	0.052	66	To Do
Kamke 1908	✓	0.024	551	✓	0.745	1213	To Do
Kamke 1909	✓	0.06	1630	✓	23.997	33085	To Do
Kamke 1910	✓	0.01	39	✓	0.073	37	To Do
Kamke 1911	✗	0	0	✓	0.123	308	To Do
Kamke 1912	✗	0	0	✓	2.355	2956	To Do

Continued on next page

Table 3 – continued from previous page

#	Mathematica solved	Mathematica cpu	Mathematica leaf	Maple solved	Maple cpu	Maple leaf	note on solution
Kamke 1913	✓	0.511	64	✓	0.144	57	To Do
Kamke 1914	✓	0.822	201	✓	0.795	92	To Do
Kamke 1915	✗	0	0	✓	9.725	147	To Do
Kamke 1916	✗	0	0	✓	0.673	180	To Do
Kamke 1917	✗	0	0	✓	1.519	109	To Do
Kamke 1918	✗	0	0	✓	2.696	184	To Do
Kamke 1919	✗	0	0	✓	3.856	203	To Do
Kamke 1920	✗	0	0	✓	3.432	205	To Do
Kamke 1921	✗	0	0	✗	0	0	To Do
Kamke 1922	✗	0	0	✗	0	0	To Do
Kamke 1923	✓	0.03	53	✓	0.172	35	To Do
Kamke 1924	✓	0.071	191	✓	0.418	180	To Do
Kamke 1925	✗	0	0	✓	0.272	194	To Do
Kamke 1926	✗	0	0	✓	0.159	96	To Do
Kamke 1927	✗	0	0	✗	0	0	To Do
Kamke 1928	✗	0	0	✗	0	0	To Do
Kamke 1929	✗	0	0	✓	3.862	116	To Do
Kamke 1930	✓	0.055	308	✓	0.046	45	To Do
Kamke 1931	✓	5.572	10101	✓	0.632	695	To Do
Kamke 1932	✗	0	0	✓	0.932	383	To Do
Kamke 1933	✗	0	0	✓	2.287	17738	To Do
Kamke 1934	✗	0	0	✓	1.29	377	To Do
Kamke 1935	✗	0	0	✓	1.73	741	To Do

Continued on next page

Table 3 – continued from previous page

#	Mathematica			Maple			note on solution
	solved	cpu	leaf	solved	cpu	leaf	
Kamke 1936	✗	0	0	✓	0.611	710	To Do
Kamke 1937	✗	0	0	✓	2.343	242	To Do
Kamke 1938	✓	0.009	137	✓	0.112	101	To Do
Kamke 1939	✗	0	0	✓	1.402	899	To Do
Kamke 1940	✗	0	0	✗	0	0	To Do

ODE No. 1

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

✓ **Mathematica** : cpu = 1.26549 (sec), leaf count = 1117

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

✓ **Maple** : cpu = 0.845 (sec), leaf count = 1089

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

Hand solution

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

To Do.

ODE No. 2

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

✓ **Mathematica** : cpu = 0.0667039 (sec), leaf count = 34

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

✓ **Maple** : cpu = 0.118 (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

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

ODE No. 3

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

✓ **Mathematica** : cpu = 0.0450426 (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 = 0.244 (sec), leaf count = 37

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

Hand solution

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

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

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

Replacing μ by e^{ax}

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

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

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

Therefore (2) becomes

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

ODE No. 4

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

✓ **Mathematica** : cpu = 0.00976303 (sec), leaf count = 30

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

✓ **Maple** : cpu = 0.008 (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

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

ODE No. 5

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

✓ **Mathematica** : cpu = 5.06608 (sec), leaf count = 38

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

✓ **Maple** : cpu = 1.03 (sec), leaf count = 21

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

Hand solution

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

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

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

Integrating both sides

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

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

ODE No. 6

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

✓ **Mathematica** : cpu = 0.026934 (sec), leaf count = 18

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

✓ **Maple** : cpu = 0.044 (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

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

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

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

ODE No. 7

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

✓ **Mathematica** : cpu = 0.0254067 (sec), leaf count = 23

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

✓ **Maple** : cpu = 0.008 (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

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

ODE No. 8

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

✓ **Mathematica** : cpu = 0.024993 (sec), leaf count = 17

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

✓ **Maple** : cpu = 0.043 (sec), leaf count = 13

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

Hand solution

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

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

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

Integrating both sides

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

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

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

ODE No. 9

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

✓ **Mathematica** : cpu = 0.0193053 (sec), leaf count = 19

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

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

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

Hand solution

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

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

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

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

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

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

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

Hence the integration factor is

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

Therefore (1) becomes

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

Integrating

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

ODE No. 10

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

✓ **Mathematica** : cpu = 0.00882996 (sec), leaf count = 18

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

✓ **Maple** : cpu = 0.015 (sec), leaf count = 15

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

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

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

ODE No. 11

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

✓ **Mathematica** : cpu = 0.485153 (sec), leaf count = 62

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

✓ **Maple** : cpu = 0.055 (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

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

ODE No. 12

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

✓ **Mathematica** : cpu = 0.0912406 (sec), leaf count = 34

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

✓ **Maple** : cpu = 0.329 (sec), leaf count = 8

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

Hand solution

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

This is separable. Hence

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

Integrating

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

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

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

Therefore

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

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

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

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

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

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

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

ODE No. 13

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

✓ **Mathematica** : cpu = 0.0661855 (sec), leaf count = 79

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

✓ **Maple** : cpu = 1.358 (sec), leaf count = 79

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

Hand solution

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

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

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

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

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

So we have new second order ODE

$$
u'' - (b + ax)\,u = 0 \qquad (3)
$$

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

ODE No. 14

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

✓ **Mathematica** : cpu = 0.0141455 (sec), leaf count = 254

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

✓ **Maple** : cpu = 0.381 (sec), leaf count = 187

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

Hand solution

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

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

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

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

Since $u' = yu$ then

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

So we have new second order ODE

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

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

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

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

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

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

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

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

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

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

And

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

Therefore

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

Since $u'=yu$ then

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

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

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

ODE No. 15

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

✓ **Mathematica** : cpu = 0.0192765 (sec), leaf count = 25

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

✓ **Maple** : cpu = 1.072 (sec), leaf count = 33

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

Hand solution

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

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

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

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

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

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

Hence

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

This is separable

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

Integrating both sides

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

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

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

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

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

Since $u = y - x^2$ then

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

To obtain same solution as Maple, we divide by C_1

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

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

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

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

ODE No. 16

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

✗ **Mathematica** : cpu = 23.219 (sec), leaf count = 0 , could not solve

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

✓ **Maple** : cpu = 0.323 (sec), leaf count = 49

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

Hand solution

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

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

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

Hence

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

Equating (1) and (2) gives

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

Hence

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

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

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

Integrating both sides

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

Hence

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

Hence

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

ODE No. 17

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

✓ **Mathematica** : cpu = 0.0246266 (sec), leaf count = 34

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

✓ **Maple** : cpu = 0.158 (sec), leaf count = 24

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

Hand solution

$$y' - y^2 - 3y + 4 = 0$$

$$y' = 3y - 4 + y^2 \tag{1}$$

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

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

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

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

Hence

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

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

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

And

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

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

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

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

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

Dividing by e^{-x}

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

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

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

ODE No. 18

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

✓ **Mathematica** : cpu = 0.064359 (sec), leaf count = 50

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

✓ **Maple** : cpu = 0.108 (sec), leaf count = 39

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

Hand solution

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

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

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

ODE No. 19

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

✓ **Mathematica** : cpu = 0.0101979 (sec), leaf count = 30

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

✓ **Maple** : cpu = 0.063 (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

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

ODE No. 20

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

✓ **Mathematica** : cpu = 0.997688 (sec), leaf count = 48

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

✓ **Maple** : cpu = 0.14 (sec), leaf count = 34

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

Hand solution

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

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

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

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

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

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

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

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

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

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

Integrating

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

Therefore

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

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

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

ODE No. 21

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

✓ **Mathematica** : cpu = 8.38784 (sec), leaf count = 69

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

✓ **Maple** : cpu = 0.238 (sec), leaf count = 25

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

Hand solution

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

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

$$
y_p = \sin(x)
$$

Therefore

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

Equating this to (1) gives

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

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

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

Integrating both sides

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

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

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

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

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

ODE No. 22

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

✗ **Mathematica** : cpu = 732.225 (sec), leaf count = 0 , could not solve

```
DSolve[-Cos[2*x] - Sin[2*x]*y[x] - y[x]^2 + Derivative[1][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 1.455 (sec), leaf count = 128

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

Hand solution

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

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

$$y_p = \tan(x)$$

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

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

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

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

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

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

Equating this to (1) gives

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

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

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

Hence

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

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

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

And

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

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

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

Integrating both sides

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

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

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

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

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

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

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

a solution is

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

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

you can now set the other solution

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

ODE No. 23

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

✓ **Mathematica** : cpu = 0.370865 (sec), leaf count = 43

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

✓ **Maple** : cpu = 0.057 (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

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

ODE No. 24

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

✓ **Mathematica** : cpu = 0.0890016 (sec), leaf count = 277

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

✓ **Maple** : cpu = 0.19 (sec), leaf count = 214

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

Hand solution

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

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

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

Hence

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

Therefore (1) becomes

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

Hence

$$\frac{u''}{au} = bx^v$$
$$u'' - abx^v u = 0$$

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

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

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

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

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

Using these, then

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

Hence for $ab < 0$

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

Using derivatives the above becomes

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

Similar result can be found for $ab > 0$

ODE No. 25

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

✓ **Mathematica** : cpu = 1.37692 (sec), leaf count = 1835

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

✓ **Maple** : cpu = 0.526 (sec), leaf count = 348

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

Hand solution

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

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

Need to do this later.

ODE No. 26

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

✓ **Mathematica** : cpu = 0.0936852 (sec), leaf count = 68

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

✓ **Maple** : cpu = 0.181 (sec), leaf count = 45

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

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

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

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
```

ODE No. 27

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

✓ **Mathematica** : cpu = 8.87254 (sec), leaf count = 120

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

✓ **Maple** : cpu = 0.349 (sec), leaf count = 72

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

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
```

ODE No. 28

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

✓ **Mathematica** : cpu = 0.361454 (sec), leaf count = 96

$$\left\{\left\{y(x)\to \frac{c_1 e^{\frac{x^4}{4}}x^3 + \frac{1}{2}\sqrt{\pi}e^{\frac{x^4}{4}}x^3\mathrm{erf}\left(\frac{x^2}{2}\right) + x}{x\left(c_1 e^{\frac{x^4}{4}} + \frac{1}{2}\sqrt{\pi}e^{\frac{x^4}{4}}\mathrm{erf}\left(\frac{x^2}{2}\right)\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.395 (sec), leaf count = 51

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

Hand solution

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

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

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

Integrating both sides gives

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

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

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

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

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

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

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

Verification

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

ODE No. 29

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

✓ **Mathematica** : cpu = 0.0334204 (sec), leaf count = 39

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

✓ **Maple** : cpu = 0.032 (sec), leaf count = 19

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

Hand solution

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

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

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

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

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

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

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

Integrating both sides gives

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

Hence from above

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

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

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

Verification

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

ODE No. 30

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

✓ **Mathematica** : cpu = 0.477257 (sec), leaf count = 230

$$\left\{\left\{y(x)\to \frac{x^{a+1}\left(c_1\left(\frac{1}{2}x^{-\frac{a}{2}-\frac{1}{2}}\Gamma(a+1)\left(I_{a-1}(2\sqrt{x})+I_{a+1}(2\sqrt{x})\right)-\frac{1}{2}ax^{-\frac{a}{2}-1}\Gamma(a+1)I_a(2\sqrt{x})\right)-\frac{1}{2}(-1)\right.}{c_1x^{-a/2}\Gamma(a+1)I_a\left(2\sqrt{x}\right)+(-1)^{-}}\right.\right.$$

✓ **Maple** : cpu = 0.098 (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

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

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

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

Hence

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

Comparing to (1) gives

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

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

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

Hence

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

Substituting in (2) gives

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

Dividing out x^{r}

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

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

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

Expanding the second term

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

Hence for $n=0$

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

Since $c_0\neq 0$ then

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

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

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

For $r=0$, we obtain

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

For $r=-a$

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

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

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

For $n=2$

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

For $n=3$

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

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

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

Since

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

and

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

Then

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

And (5) can now be written as

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

But modified Bessel function of first kind is

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

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

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

Hence

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

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

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

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

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

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

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

For $n = 1$

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

For $n = 2$

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

For $n = 3$

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

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

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

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

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

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

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

But

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

Hence

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

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

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

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

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

Or

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

Verification

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

ODE No. 31

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

✓ **Mathematica** : cpu = 0.214626 (sec), leaf count = 21

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

✓ **Maple** : cpu = 0.057 (sec), leaf count = 23

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

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

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

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
```

ODE No. 32

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

✓ **Mathematica** : cpu = 0.419041 (sec), leaf count = 34

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

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

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

Hand solution

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

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
```

ODE No. 33

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

✓ **Mathematica** : cpu = 37.6899 (sec), leaf count = 157

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

✓ **Maple** : cpu = 0.937 (sec), leaf count = 58

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

Hand solution

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

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

To do.

ODE No. 34

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

✓ **Mathematica** : cpu = 0.555292 (sec), leaf count = 51

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

✓ **Maple** : cpu = 0.036 (sec), leaf count = 28

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

Hand solution

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

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

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

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

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

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

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

Hence

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

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
```

ODE No. 35

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

✓ **Mathematica** : cpu = 0.0603826 (sec), leaf count = 60

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

✓ **Maple** : cpu = 0.074 (sec), leaf count = 35

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

Hand solution

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

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

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

Therefore

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

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
```

ODE No. 36

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

✓ **Mathematica** : cpu = 0.4546 (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 = 0.341 (sec), leaf count = 62

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

Hand solution

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

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

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

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

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

For $g(x) \neq 0$.

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

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

Equating the above to the RHS of (1) gives

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

Writing as

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

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

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

Hence

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

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

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

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

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

We now go back to (3) and find x

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

Since

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

Then

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

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

ODE No. 37

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

✓ **Mathematica** : cpu = 1.1076 (sec), leaf count = 78

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

✓ **Maple** : cpu = 0.112 (sec), leaf count = 50

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

ODE No. 38

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

✓ **Mathematica** : cpu = 0.119385 (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 = 0.057 (sec), leaf count = 34

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

Hand solution

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

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

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

Substituting in (1) gives

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

This is Abel first kind. In general form it is

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

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

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

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

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

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

ODE No. 39

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

✓ **Mathematica** : cpu = 0.0823069 (sec), leaf count = 54

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

✓ **Maple** : cpu = 0.018 (sec), leaf count = 30

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

ODE No. 40

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

✓ **Mathematica** : cpu = 0.432222 (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 = 0.087 (sec), leaf count = 48

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

ODE No. 41

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

✓ **Mathematica** : cpu = 0.151459 (sec), leaf count = 103

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

✓ **Maple** : cpu = 0.435 (sec), leaf count = 103

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

ODE No. 42

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

✓ **Mathematica** : cpu = 1.53652 (sec), leaf count = 485

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

✓ **Maple** : cpu = 0.069 (sec), leaf count = 40

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

ODE No. 43

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

✓ **Mathematica** : cpu = 10.9173 (sec), leaf count = 490

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

✓ **Maple** : cpu = 1.964 (sec), leaf count = 373

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

ODE No. 44

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

✓ **Mathematica** : cpu = 0.0176506 (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 = 0.029 (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

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

Verification

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

ODE No. 45

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

✓ **Mathematica** : cpu = 0.761967 (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 = 0.24 (sec), leaf count = 123

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

ODE No. 46

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

✓ **Mathematica** : cpu = 0.301515 (sec), leaf count = 258

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

✓ **Maple** : cpu = 0.136 (sec), leaf count = 956

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

ODE No. 47

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

✗ **Mathematica** : cpu = 36.068 (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))
```

ODE No. 48

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

✗ **Mathematica** : cpu = 37.6557 (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))
```

ODE No. 49

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

✗ **Mathematica** : cpu = 29.2193 (sec), leaf count = 0 , could not solve

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

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

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

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 = 479.479 (sec), leaf count = 0 , could not solve

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

✗ **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))
```

ODE No. 51

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

✓ **Mathematica** : cpu = 0.84091 (sec), leaf count = 354

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

✓ **Maple** : cpu = 0.227 (sec), leaf count = 237

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

ODE No. 52

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

✓ **Mathematica** : cpu = 173.409 (sec), leaf count = 115

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

✓ **Maple** : cpu = 0.406 (sec), leaf count = 61

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

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 = 103.776 (sec), leaf count = 95

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

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

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

ODE No. 54

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

✓ **Mathematica** : cpu = 0.156711 (sec), leaf count = 74

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

✓ **Maple** : cpu = 0.25 (sec), leaf count = 38

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

ODE No. 55

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

✗ **Mathematica** : cpu = 4.09997 (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))
```

ODE No. 56

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

✗ **Mathematica** : cpu = 2.37947 (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))
```

ODE No. 57

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

✓ **Mathematica** : cpu = 167.529 (sec), leaf count = 263

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

✓ **Maple** : cpu = 0.149 (sec), leaf count = 31

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

ODE No. 58

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

✓ **Mathematica** : cpu = 0.231022 (sec), leaf count = 119

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

✓ **Maple** : cpu = 0.108 (sec), leaf count = 68

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

ODE No. 59

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

✓ **Mathematica** : cpu = 0.19302 (sec), leaf count = 96

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

✓ **Maple** : cpu = 0.092 (sec), leaf count = 26

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

ODE No. 60

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

✓ **Mathematica** : cpu = 0.0583219 (sec), leaf count = 173

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

✓ **Maple** : cpu = 0.023 (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

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

Integrating

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

But $\int \frac{dy}{(y^2-1)^{\frac{1}{2}}} = \tanh^{-1} \frac{y}{(y^2-1)^{\frac{1}{2}}} = \ln\left(y+\sqrt{y^2-1}\right)$, hence

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

For the negative case

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

Integrating

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

But $\int \frac{dy}{(y^2-1)^{\frac{1}{2}}} = \tanh^{-1} \frac{y}{(y^2-1)^{\frac{1}{2}}} = \ln\left(y+\sqrt{y^2-1}\right)$, hence

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

Therefore

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

ODE No. 61

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

✓ **Mathematica** : cpu = 0.190414 (sec), leaf count = 75

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

✓ **Maple** : cpu = 0.016 (sec), leaf count = 50

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

ODE No. 62

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

✓ **Mathematica** : cpu = 3.85506 (sec), leaf count = 40

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

✓ **Maple** : cpu = 0.422 (sec), leaf count = 34

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

Hand solution

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

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

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

Hence

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

Hence

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

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

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

Therefore (2) is exact. Let

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

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

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

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

From (3)

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

From (4)

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

Therefore

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

From (5) we find

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

Since $dU = 0$ then

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

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

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

Hence

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

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 = 3601.63 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 7.437 (sec), leaf count = 35

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

ODE No. 64

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

✓ **Mathematica** : cpu = 0.186375 (sec), leaf count = 269

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

✓ **Maple** : cpu = 0.108 (sec), leaf count = 124

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

ODE No. 65

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

✓ **Mathematica** : cpu = 1.5681 (sec), leaf count = 312

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

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

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

ODE No. 66

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

✓ **Mathematica** : cpu = 755.428 (sec), leaf count = 65

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

✓ **Maple** : cpu = 0.178 (sec), leaf count = 40

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

ODE No. 67

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

✓ **Mathematica** : cpu = 0.0540082 (sec), leaf count = 14

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

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

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

ODE No. 68

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

✓ **Mathematica** : cpu = 0.918519 (sec), leaf count = 373

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

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

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

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 = 98.2818 (sec), leaf count = 12750

Too large to display

✓ **Maple** : cpu = 0.175 (sec), leaf count = 111

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

ODE No. 70

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

✓ **Mathematica** : cpu = 308.505 (sec), leaf count = 23353

Too large to display

✓ **Maple** : cpu = 0.174 (sec), leaf count = 113

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

ODE No. 71

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

✓ **Mathematica** : cpu = 3.97579 (sec), leaf count = 2237

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

✓ **Maple** : cpu = 0.134 (sec), leaf count = 113

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

ODE No. 72

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

✓ **Mathematica** : cpu = 1.07888 (sec), leaf count = 87

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

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

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

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 = 1.72103 (sec), leaf count = 733

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

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

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

ODE No. 74

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

✗ **Mathematica** : cpu = 3.0316 (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] == (
```

✗ **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))
```

ODE No. 75

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

✓ **Mathematica** : cpu = 0.0374346 (sec), leaf count = 18

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

✓ **Maple** : cpu = 0.197 (sec), leaf count = 20

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

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

$$
\begin{aligned}
y' &= e^{x-y} - e^x \\
y' &= e^x\left(e^{-y} - 1\right) \\
\frac{1}{e^{-y}-1} dy &= e^x dx \qquad (1)
\end{aligned}
$$

Integrating both sides. $\int \frac{1}{e^{-y}-1} dy$. Let $e^{-y} = u$, then $\frac{du}{dy} = -e^{-y} = -u$. Hence $dy = -\frac{du}{u}$, therefore the integral becomes

$$
\int \frac{1}{u-1}\left(-\frac{du}{u}\right) = -\int \frac{1}{u(u-1)} du
$$

But $\frac{1}{u(u-1)} = -\left(\frac{1}{u} - \frac{1}{u-1}\right)$, hence

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

But $\ln x - \ln y = \ln\left(\frac{x}{y}\right)$ and the above becomes

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

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

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

Hence

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

Taking logs

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

Let $e^{C_1} = C_2$ then

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

Verification

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

ODE No. 76

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

✓ **Mathematica** : cpu = 0.105433 (sec), leaf count = 116

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

✓ **Maple** : cpu = 0.069 (sec), leaf count = 41

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

Hand solution

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

This is separable.

$$\frac{dy}{a\cos y + b} = dx$$

$$\int\frac{dy}{a\cos y + b} = x + C \qquad (1)$$

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

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

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

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

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

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

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

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

Going back to (1)

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

Verification

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

ODE No. 77

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

✓ **Mathematica** : cpu = 0.307909 (sec), leaf count = 124

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

✓ **Maple** : cpu = 0.094 (sec), leaf count = 54

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

Hand solution

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

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

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

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

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

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

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

Verification

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

ODE No. 78

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

✓ **Mathematica** : cpu = 0.86995 (sec), leaf count = 1317

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

✓ **Maple** : cpu = 2.305 (sec), leaf count = 89

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

Hand solution

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

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

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

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

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

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

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

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

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

Back to (1), therefore after integrating both sides

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

Let

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

Then

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

Verification

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

ODE No. 79

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

✗ **Mathematica** : cpu = 25.3589 (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))
```

ODE No. 80

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

✗ **Mathematica** : cpu = 24.0174 (sec), leaf count = 0 , could not solve

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

✓ **Maple** : cpu = 1.435 (sec), leaf count = 41

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

ODE No. 81

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

✗ **Mathematica** : cpu = 43.5407 (sec), leaf count = 0 , could not solve

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

✓ **Maple** : cpu = 1.188 (sec), leaf count = 78

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

ODE No. 82

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

✗ **Mathematica** : cpu = 50.605 (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))
```

ODE No. 83

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

✗ **Mathematica** : cpu = 40.4081 (sec), leaf count = 0 , could not solve

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

✓ **Maple** : cpu = 0.457 (sec), leaf count = 44

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

ODE No. 84

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

✓ **Mathematica** : cpu = 10.7977 (sec), leaf count = 244

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

✓ **Maple** : cpu = 0.046 (sec), leaf count = 37

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

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 = 200.927 (sec), leaf count = 235

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

✓ **Maple** : cpu = 0.516 (sec), leaf count = 153

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

ODE No. 86

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

✗ **Mathematica** : cpu = 3599.95 (sec), leaf count = 0 , timed out

```
$Aborted
```

✓ **Maple** : cpu = 0.634 (sec), leaf count = 52

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

ODE No. 87

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

✗ **Mathematica** : cpu = 15.7973 (sec), leaf count = 0 , could not solve

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

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

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

ODE No. 88

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

✓ **Mathematica** : cpu = 0.309628 (sec), leaf count = 2831

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

✓ **Maple** : cpu = 0.253 (sec), leaf count = 256

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

Hand solution

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

This is of the form $y' = f_0 + f_1y + f_2y^2$ with $f_0 = \frac{1}{2}b + \frac{1}{2}ce^{-2ax}$, $f_1 = 2a$, $f_3 = \frac{3}{2}$. Hence it is Riccati non-linear first order. Transforming to second order ODE using

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

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

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

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

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

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

But

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

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

Verification

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

ODE No. 89

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

✓ **Mathematica** : cpu = 0.0322515 (sec), leaf count = 48

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

✓ **Maple** : cpu = 0.023 (sec), leaf count = 56

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

Hand solution

$$xy' = \pm\sqrt{a^2-x^2}$$

This is separable. $y' = \frac{\pm\sqrt{a^2-x^2}}{x}$ or $dy = \frac{\pm\sqrt{a^2-x^2}}{x}dx$. Hence

$$y = \pm \int \frac{\sqrt{a^2 - x^2}}{x} dx + C$$

Let $x = a \sin u$, then $dx = a \cos(u)\, du$ and the integral becomes

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

For $\int \frac{1}{\sin u} du$, using half tan angle, let $t = \tan\left(\frac{u}{2}\right), du = \frac{2}{1+t^2} dt, \sin u = \frac{2t}{1+t^2}$, therefore

$$\begin{aligned}
\int \frac{1}{\sin u} du &= \int \frac{1+t^2}{2t} \frac{2}{1+t^2} dt \\
&= \int \frac{1}{t} dt \\
&= \ln(t)
\end{aligned}$$

Hence $\int \frac{1}{\sin u} du = \ln\left(\tan\left(\frac{u}{2}\right)\right)$ and from (1)

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

But $x = a \sin u$, hence $u = \arcsin\left(\frac{x}{a}\right)$ and the integral becomes

$$\int \frac{\sqrt{a^2-x^2}}{x}dx = a\left[\ln\left(\tan\left(\frac{\arcsin\left(\frac{x}{a}\right)}{2}\right)\right)+\cos\left(\arcsin\left(\frac{x}{a}\right)\right)\right]$$

Hence the solution is

$$y = \pm a\left[\ln\left(\tan\left(\frac{\arcsin\left(\frac{x}{a}\right)}{2}\right)\right)+\cos\left(\arcsin\left(\frac{x}{a}\right)\right)\right]+C$$

Maple do not verify the above, but I do not see what is wrong with the solution. Will investigate more later.

ODE No. 90

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

✓ **Mathematica** : cpu = 0.0150332 (sec), leaf count = 24

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

✓ **Maple** : cpu = 0.015 (sec), leaf count = 17

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

Hand solution

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

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

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

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

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

Hence

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

Verification

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

ODE No. 91

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

✓ **Mathematica** : cpu = 0.00705405 (sec), leaf count = 15

$$\{\{y(x) \to c_1x + x\log(\log(x))\}\}$$

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

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

ODE No. 92

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

✓ **Mathematica** : cpu = 0.0135875 (sec), leaf count = 15

$$\{\{y(x) \to c_1x - x\cos(x)\}\}$$

✓ **Maple** : cpu = 0.008 (sec), leaf count = 12

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

Hand solution

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

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

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

Verification

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

ODE No. 93

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

✓ **Mathematica** : cpu = 0.020711 (sec), leaf count = 16

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

✓ **Maple** : cpu = 0.017 (sec), leaf count = 12

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

ODE No. 94

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

✓ **Mathematica** : cpu = 0.0163144 (sec), leaf count = 25

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

✓ **Maple** : cpu = 0.012 (sec), leaf count = 23

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

Hand solution

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

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

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

If $a = -n$ then

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

If $a \neq -n$ then

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

Verification

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

ODE No. 95

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

✓ **Mathematica** : cpu = 0.0160978 (sec), leaf count = 32

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

✓ **Maple** : cpu = 0.086 (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 $y = \frac{-u'}{u f_2}$ changes the ODE to second order linear ODE

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

Hence

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

Equating this to RHS of (1) gives

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

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

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

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

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

And from (2) the solution is

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

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

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

Verification

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

ODE No. 96

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

✓ **Mathematica** : cpu = 0.0232267 (sec), leaf count = 33

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

✓ **Maple** : cpu = 0.068 (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
```

ODE No. 97

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

✓ **Mathematica** : cpu = 0.0280232 (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 = 0.048 (sec), leaf count = 25

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

Hand solution

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

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

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

Which is separable, Hence

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

Integrating

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

Therefore

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

Verification

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

ODE No. 98

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

✓ **Mathematica** : cpu = 0.0265555 (sec), leaf count = 442

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

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

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

ODE No. 99

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

✓ **Mathematica** : cpu = 0.0191408 (sec), leaf count = 244

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

✓ **Maple** : cpu = 0.121 (sec), leaf count = 171

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

ODE No. 100

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

✓ **Mathematica** : cpu = 0.00906643 (sec), leaf count = 157

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

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

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

Hand solution

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

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

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

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

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

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,

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

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
```

ODE No. 101

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

✓ **Mathematica** : cpu = 0.00970096 (sec), leaf count = 18

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

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

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

Hand solution

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

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

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

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

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

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

$$d(xu) = x$$

Integrating

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

Hence

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

Verification

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

ODE No. 102

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

✓ **Mathematica** : cpu = 0.0204582 (sec), leaf count = 36

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

✓ **Maple** : cpu = 0.051 (sec), leaf count = 22

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

Hand solution

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

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

$$y' = v + xv'$$

Therefore the ODE becomes

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

Integrating

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

Therefore

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

Verification

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

ODE No. 103

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

✓ **Mathematica** : cpu = 0.136273 (sec), leaf count = 90

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

✓ **Maple** : cpu = 0.046 (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

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

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

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

Equating the above to RHS of (1) gives

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

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

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

$$
\begin{aligned}
\sqrt{2t}\left(\frac{du}{dt}+2t\frac{d^2u}{dt^2}\right)-\left(2(2t)+1\right)\sqrt{2t}\frac{du}{dt}+u(2t)^{\frac{3}{2}}&=0\\
\sqrt{2t}\frac{du}{dt}+\sqrt{2t}2t\frac{d^2u}{dt^2}-(4t+1)\sqrt{2t}\frac{du}{dt}+u\left(\sqrt{2t}\right)^3&=0\\
\frac{du}{dt}+2t\frac{d^2u}{dt^2}-(4t+1)\frac{du}{dt}+2tu&=0\\
\frac{du}{dt}+2t\frac{d^2u}{dt^2}-4t\frac{du}{dt}-\frac{du}{dt}+2tu&=0\\
2t\frac{d^2u}{dt^2}-4t\frac{du}{dt}+2tu&=0\\
2t\left(\frac{d^2u}{dt^2}-2\frac{du}{dt}+u\right)&=0
\end{aligned}
$$

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
```

ODE No. 104

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

✓ **Mathematica** : cpu = 0.0183328 (sec), leaf count = 43

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

✓ **Maple** : cpu = 0.075 (sec), leaf count = 63

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

Hand solution

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

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

Using transformation suggested by Kamke $y = u(x) - \frac{1}{ax}$ then $y' = u' + \frac{1}{ax^2}$. Equating this to RHS of (1) gives

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

Hence

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

This is separable

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

Integrating

$$
\begin{aligned}
\int \frac{du}{b + au^2} &= -x + C \\
\frac{1}{\sqrt{ba}} \arctan\left(\frac{au}{\sqrt{ba}}\right) &= -x + C \\
\arctan\left(\frac{au}{\sqrt{ba}}\right) &= -\sqrt{ba}x + C \\
u &= \frac{\sqrt{ba}}{a} \tan\left(-\sqrt{ba}x + C\right)
\end{aligned}
$$

Hence

$$
\begin{aligned}
y &= u - \frac{1}{ax} \\
&= \frac{\sqrt{ba}}{a} \tan\left(-\sqrt{ba}x + C\right) - \frac{1}{ax}
\end{aligned}
$$

Verification

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

ODE No. 105

$$axy(x)^2 + by(x) + cx + d + xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.198754 (sec), leaf count = 473

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

✓ **Maple** : cpu = 0.322 (sec), leaf count = 844

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

ODE No. 106

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

✓ **Mathematica** : cpu = 0.0403116 (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 = 0.063 (sec), leaf count = 41

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

ODE No. 107

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

✓ **Mathematica** : cpu = 0.270781 (sec), leaf count = 1415

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

✓ **Maple** : cpu = 0.27 (sec), leaf count = 174

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

ODE No. 108

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

✓ **Mathematica** : cpu = 0.0119559 (sec), leaf count = 15

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

✓ **Maple** : cpu = 0.029 (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
```

ODE No. 109

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

✓ **Mathematica** : cpu = 0.011745 (sec), leaf count = 17

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

✓ **Maple** : cpu = 0.018 (sec), leaf count = 15

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

Hand solution

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

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

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

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

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

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

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

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

Integrating

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

Therefore

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

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

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

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
```

ODE No. 110

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

✗ **Mathematica** : cpu = 17.2078 (sec), leaf count = 0 , could not solve

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

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

```
dsolve(x*diff(y(x),x)+f(x)*(y(x)^2-x^2) = 0,y(x))
```

Hand solution

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

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

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

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

Hence

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

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

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

Integrating

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

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

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

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
```

ODE No. 111

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

✓ **Mathematica** : cpu = 0.499963 (sec), leaf count = 55

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

✓ **Maple** : cpu = 0.163 (sec), leaf count = 54

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

ODE No. 112

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

✓ **Mathematica** : cpu = 0.0227448 (sec), leaf count = 13

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

✓ **Maple** : cpu = 0.065 (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
```

ODE No. 113

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

✓ **Mathematica** : cpu = 0.0246647 (sec), leaf count = 16

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

✓ **Maple** : cpu = 0.033 (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
```

ODE No. 114

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

✓ **Mathematica** : cpu = 0.0211026 (sec), leaf count = 12

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

✓ **Maple** : cpu = 2.571 (sec), leaf count = 28

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

Hand solution

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

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

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

Separable.

$$\frac{dv}{\sqrt{1+v^2}}=dx$$

Integrating

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

Since $y = xv$ then

$$y = x\sinh(x + C)$$

Verification

```
ode:=x*diff(y(x),x)=x*sqrt(x^2+y(x)^2)+y(x);
y0:=x*sinh(x+_C1);
odetest(y(x)=y0,ode) assuming x>0;
0
```

ODE No. 115

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

✓ **Mathematica** : cpu = 0.141841 (sec), leaf count = 99

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

✓ **Maple** : cpu = 0.25 (sec), leaf count = 49

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

Hand solution

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

Let $y = xu$, then $y' = u + xu'$ and the above becomes

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

Separable.

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

But $y = xu$, hence

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

Let $\frac{y}{x} = z$

$$
\begin{aligned}
\frac{-z-1}{\sqrt{z^2-1}} &= \frac{x^2}{2} + C \\
-z - 1 &= \sqrt{z^2-1}\left(\frac{x^2}{2} + C\right) \\
(-z-1)^2 &= \left(z^2 - 1\right)\left(\frac{x^2}{2} + C\right)^2 \\
z^2 + 1 + 2z &= z^2\left(\frac{x^2}{2} + C\right)^2 - \left(\frac{x^2}{2} + C\right)^2 \\
z^2\left(1 - \left(\frac{x^2}{2} + C\right)^2\right) + 2z + 1 + \left(\frac{x^2}{2} + C\right)^2 &= 0
\end{aligned}
$$

Solving for z (quadratic formula, some conditions apply), one of the solutions is

$$
z = \frac{4Cx^2 + 4C^2 + x^4 + 4}{4Cx^2 + 4C^2 + x^4 - 4}
$$

Hence

$$y = x\frac{4Cx^2 + 4C^2 + x^4 + 4}{4Cx^2 + 4C^2 + x^4 - 4}$$

Need to work on verification. Kamke gives the final solution as

$$y = x\frac{-2Cx^2 + C^2 + x^4 + 4}{-2Cx^2 + C^2 + x^4 - 4}$$

I am not sure where my error now is. Need to look at this again.

ODE No. 116

$$-x\sqrt{(y(x)^2 - 4x^2)(y(x)^2 - x^2)} + xy'(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 0.593427 (sec), leaf count = 143

$$\text{Solve}\left[\frac{2\left(\frac{y(x)}{x} - 2\right)^{3/2}\sqrt{-\frac{4}{\frac{y(x)}{x}-2} - 1}\sqrt{-\frac{3}{\frac{y(x)}{x}-2} - 1}\sqrt{\frac{1}{\frac{y(x)}{x}-2} + 1}F\left(\sin^{-1}\left(\frac{\sqrt{-1-\frac{3}{\frac{y(x)}{x}-2}}}{\sqrt{2}}\right)\middle| -8\right)}{\sqrt{\frac{y(x)}{x} - 1}\sqrt{\frac{y(x)}{x} + 1}\sqrt{\frac{y(x)}{x} + 2}} = c_1 + \frac{x^2}{2}\right.$$

✓ **Maple** : cpu = 0.352 (sec), leaf count = 86

$$\left\{\int_{\_b}^{x} 1\left(\_a\sqrt{4\_a^4 - 5\_a^2 (y(x))^2 + (y(x))^4} + y(x)\right)\frac{1}{\sqrt{4\_a^4 - 5\_a^2 (y(x))^2 + (y(x))^4}}\,\mathrm{d}\_a + \int^{y(x)}\right.$$

ODE No. 117

$$xy'(x) + x\left(-e^{\frac{y(x)}{x}}\right) - y(x) - x = 0$$

✓ **Mathematica** : cpu = 0.0278402 (sec), leaf count = 21

$$\left\{\left\{y(x) \to -x\log\left(\frac{e^{-c_1}}{x} - 1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.129 (sec), leaf count = 20

$$\left\{y(x) = \left(\ln\left(-\frac{x}{-1 + x\mathrm{e}^{\_C1}}\right) + \_C1\right)x\right\}$$

ODE No. 118

$$xy'(x) - y(x)\log(y(x)) = 0$$

✓ **Mathematica** : cpu = 0.0120132 (sec), leaf count = 13

$$\left\{\left\{y(x) \to e^{e^{c_1 x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.066 (sec), leaf count = 8

$$\left\{y(x) = \mathrm{e}^{\_C1\,x}\right\}$$

ODE No. 119

$$xy'(x) - y(x)(\log(xy(x)) - 1) = 0$$

✓ **Mathematica** : cpu = 0.0318653 (sec), leaf count = 17

$$\left\{\left\{y(x) \to \frac{e^{e^{c_1 x}}}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.073 (sec), leaf count = 14

$$\left\{y(x) = \frac{1}{x}\mathrm{e}^{\frac{x}{\_C1}}\right\}$$

ODE No. 120

$$xy'(x) - y(x)\left(x\log\left(\frac{x^2}{y(x)}\right) + 2\right) = 0$$

✓ **Mathematica** : cpu = 0.0520704 (sec), leaf count = 20

$$\left\{\left\{y(x) \to x^2 e^{-2c_1 e^{-x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.201 (sec), leaf count = 17

$$\left\{y(x) = x^2\left(\mathrm{e}^{\frac{\_C1}{\mathrm{e}^x}}\right)^{-1}\right\}$$

ODE No. 121

$$xy'(x) - \sin(x - y(x)) = 0$$

✗ **Mathematica** : cpu = 3.21958 (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))
```

ODE No. 122

$$\cos(y(x))\left(\sin(y(x)) - 3x^2\cos(y(x))\right) + xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.0850783 (sec), leaf count = 21

$$\left\{\left\{y(x) \to \tan^{-1}\left(\frac{c_1 + 2x^3}{2x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.42 (sec), leaf count = 16

$$\left\{y(x) = \arctan\left(\frac{x^3 + 2\_C1}{x}\right)\right\}$$

ODE No. 123

$$xy'(x) - y(x) - x\sin\left(\frac{y(x)}{x}\right) = 0$$

✓ **Mathematica** : cpu = 0.0678049 (sec), leaf count = 19

$$\left\{\left\{y(x) \to 2x\cot^{-1}\left(\frac{e^{-c_1}}{x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.079 (sec), leaf count = 44

$$\left\{y(x) = \arctan\left(2\frac{\_C1\,x}{\_C1^2x^2+1}, \frac{-\_C1^2x^2+1}{\_C1^2x^2+1}\right)x\right\}$$

ODE No. 124

$$xy'(x) - y(x) + x\cos\left(\frac{y(x)}{x}\right) + x = 0$$

✓ **Mathematica** : cpu = 0.0316832 (sec), leaf count = 16

$$\left\{\left\{y(x)\to 2x\tan^{-1}\left(c_1-\log(x)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.037 (sec), leaf count = 12

$$\{y(x) = -2\arctan\left(\ln(x) + \_C1\right)x\}$$

ODE No. 125

$$xy'(x) - y(x) + x\tan\left(\frac{y(x)}{x}\right) = 0$$

✓ **Mathematica** : cpu = 0.0412539 (sec), leaf count = 16

$$\left\{\left\{y(x)\to x\sin^{-1}\left(\frac{e^{c_1}}{x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.074 (sec), leaf count = 14

$$\left\{y(x) = \arcsin\left(\frac{1}{\_C1\,x}\right)x\right\}$$

ODE No. 126

$$xy'(x) - y(x)f(xy(x)) = 0$$

✓ **Mathematica** : cpu = 19.6813 (sec), leaf count = 112

$$\text{Solve}\left[\int_1^{y(x)}\left(\frac{1}{K[2](-f(xK[2])-1)} - \int_1^x\left(\frac{f'(K[1]K[2])}{f(K[1]K[2])+1} - \frac{f(K[1]K[2])f'(K[1]K[2])}{(f(K[1]K[2])+1)^2}\right)dK[1]\right)dK$$

✓ **Maple** : cpu = 0.028 (sec), leaf count = 29

$$\left\{y(x) = \frac{1}{x}RootOf\left(-\ln(x) + \_C1 + \int^{\_Z}\frac{1}{\_a\,(1+f(\_a))}d\_a\right)\right\}$$

ODE No. 127

$$xy'(x) - y(x)f\left(x^a y(x)^b\right) = 0$$

✓ **Mathematica** : cpu = 466.579 (sec), leaf count = 183

$$\text{Solve}\left[\int_1^{y(x)} \left(-\int_1^x \left(\frac{b^2 K[1]^{a-1} K[2]^{b-1} f'\left(K[1]^a K[2]^b\right)}{bf\left(K[1]^a K[2]^b\right)+a} - \frac{b^3 K[1]^{a-1} K[2]^{b-1} f\left(K[1]^a K[2]^b\right) f'\left(K[1]^a K[2]^b\right)}{\left(bf\left(K[1]^a K[2]^b\right)+a\right)^2}\right.\right.\right.$$

✓ **Maple** : cpu = 0.128 (sec), leaf count = 39

$$\left\{\int_{\_b}^{y(x)} \frac{1}{\left(f\left(x^a \_a^b\right)b + a\right)\_a} d\_a - \frac{\ln(x)}{b} - \_C1 = 0\right\}$$

ODE No. 128

$$-f(x)g(x^a y(x)) + ay(x) + xy'(x) = 0$$

✓ **Mathematica** : cpu = 4.3782 (sec), leaf count = 39

$$\text{Solve}\left[\int_1^{x^a y(x)} \frac{1}{g(K[1])} dK[1] = \int_1^x K[2]^{a-1} f(K[2]) dK[2] + c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.306 (sec), leaf count = 33

$$\left\{y(x) = \frac{RootOf\left(-\int x^{a-1} f(x)\, dx + \int^{\_Z} (g(\_a))^{-1} d\_a + \_C1\right)}{x^a}\right\}$$

ODE No. 129

$$(x+1)y'(x) + y(x)(y(x) - x) = 0$$

✓ **Mathematica** : cpu = 0.0309482 (sec), leaf count = 44

$$\left\{\left\{y(x) \to -\frac{e^{x+1}}{-ec_1 x - ec_1 - x\text{Ei}(x+1) - \text{Ei}(x+1) + e^{x+1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.037 (sec), leaf count = 33

$$\left\{y(x) = \frac{e^x}{-e^{-1}(1+x)\,Ei(1, -1-x) - e^x + \_C1\,(1+x)}\right\}$$

ODE No. 130

$$-2x^3 + 2xy'(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 0.00704509 (sec), leaf count = 21

$$\left\{\left\{y(x) \to c_1\sqrt{x} + \frac{2x^3}{5}\right\}\right\}$$

✓ **Maple** : cpu = 0.01 (sec), leaf count = 15

$$\left\{y(x) = \frac{2\,x^3}{5} + \sqrt{x}\_C1\right\}$$

ODE No. 131

$$(2x+1)y'(x) - 4e^{-y(x)} + 2 = 0$$

✓ **Mathematica** : cpu = 0.0184727 (sec), leaf count = 20

$$\left\{\left\{y(x) \to \log\left(\frac{e^{c_1}}{2x+1} + 2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.281 (sec), leaf count = 31

$$\left\{y(x) = -\ln\left(\frac{2\,x+1}{-1+(4\,x+2)\,e^{2\_C1}}\right) - 2\_C1\right\}$$

ODE No. 132

$$3xy'(x) - y(x) - 3xy(x)^4\log(x) = 0$$

✓ **Mathematica** : cpu = 0.0130377 (sec), leaf count = 115

$$\left\{\left\{y(x) \to \frac{(-2)^{2/3}\sqrt[3]{x}}{\sqrt[3]{4c_1 + 3x^2 - 6x^2\log(x)}}\right\}, \left\{y(x) \to \frac{2^{2/3}\sqrt[3]{x}}{\sqrt[3]{4c_1 + 3x^2 - 6x^2\log(x)}}\right\}, \left\{y(x) \to -\frac{\sqrt[3]{-1}2^{2/}}{\sqrt[3]{4c_1 + 3x^2 -}}\right.\right.$$

✓ **Maple** : cpu = 0.039 (sec), leaf count = 153

$$\left\{y(x) = \frac{1}{6\,x^2\ln(x) - 3\,x^2 - 4\_C1}\sqrt[3]{-4\,x\,(6\,x^2\ln(x) - 3\,x^2 - 4\_C1)^2}, y(x) = \frac{i\sqrt{3}-1}{12\,x^2\ln(x) - 6\,x^2 - 8\_}\right.$$

ODE No. 133

$$x^2y'(x) + y(x) - x = 0$$

✓ **Mathematica** : cpu = 0.0079772 (sec), leaf count = 27

$$\left\{\left\{y(x) \to c_1 e^{\frac{1}{x}} - e^{\frac{1}{x}} \text{Ei}\left(-\frac{1}{x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.012 (sec), leaf count = 16

$$\left\{y(x) = \left(Ei\left(1, x^{-1}\right) + \_C1\right) e^{x^{-1}}\right\}$$

ODE No. 134

$$x^2y'(x) + e^{x-\frac{1}{x}}x^2 - y(x) = 0$$

✓ **Mathematica** : cpu = 0.0120196 (sec), leaf count = 27

$$\left\{\left\{y(x) \to c_1 e^{-1/x} - e^{x-\frac{1}{x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.01 (sec), leaf count = 17

$$\left\{y(x) = \left(-e^{x} + \_C1\right) e^{-x^{-1}}\right\}$$

ODE No. 135

$$x^2y'(x) - (x-1)y(x) = 0$$

✓ **Mathematica** : cpu = 0.00757626 (sec), leaf count = 14

$$\left\{\left\{y(x) \to c_1 e^{\frac{1}{x}} x\right\}\right\}$$

✓ **Maple** : cpu = 0.008 (sec), leaf count = 11

$$\left\{y(x) = \_C1\, x e^{x^{-1}}\right\}$$

ODE No. 136

$$x^2y'(x) + x^2 + xy(x) + y(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.0137196 (sec), leaf count = 28

$$\left\{\left\{y(x) \to \frac{-c_1x - x + x\log(x)}{c_1 - \log(x)}\right\}\right\}$$

✓ **Maple** : cpu = 0.022 (sec), leaf count = 18

$$\left\{y(x) = -\frac{x(\ln(x) + \_C1 - 1)}{\ln(x) + \_C1}\right\}$$

ODE No. 137

$$x^2y'(x) - xy(x) - y(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.00985871 (sec), leaf count = 16

$$\left\{\left\{y(x) \to \frac{x}{c_1 - \log(x)}\right\}\right\}$$

✓ **Maple** : cpu = 0.018 (sec), leaf count = 14

$$\left\{y(x) = \frac{x}{-\ln(x) + \_C1}\right\}$$

ODE No. 138

$$x^2y'(x) - x^2 - xy(x) - y(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.0148044 (sec), leaf count = 13

$$\{\{y(x) \to x\tan(c_1 + \log(x))\}\}$$

✓ **Maple** : cpu = 0.043 (sec), leaf count = 11

$$\{y(x) = \tan(\ln(x) + \_C1)\,x\}$$

ODE No. 139

$$ax^k-(b-1)b+x^2\left(y'(x)+y(x)^2\right)=0$$

✓ **Mathematica** : cpu = 0.134752 (sec), leaf count = 821

$$\left\{\left\{y(x)\to -\frac{a^{\frac{b}{k}+\frac{1}{2}\left(\frac{1}{k}-\frac{2b}{k}\right)}\left(\frac{b}{k}+\frac{1}{2}\left(\frac{1}{k}-\frac{2b}{k}\right)\right)x^{k-1}\left(x^k\right)^{\frac{b}{k}+\frac{1}{2}\left(\frac{1}{k}-\frac{2b}{k}\right)-1}J_{\frac{2b-1}{k}}\left(\frac{2\sqrt{a}\sqrt{x^k}}{k}\right)\Gamma\left(\frac{2b}{k}-\frac{1}{k}+1\right)k^{1-\frac{1}{k}}+\frac{1}{2}a}{}\right.\right.$$

✓ **Maple** : cpu = 0.154 (sec), leaf count = 219

$$\left\{y(x)=\frac{1}{2\,x}\left(-2\,J_{\frac{\sqrt{(-1+2\,b)^2}+k}{k}}\left(2\,\frac{\sqrt{a}x^{k/2}}{k}\right)\sqrt{a}x^{k/2}-2\,\sqrt{a}x^{k/2}Y_{\frac{\sqrt{(-1+2\,b)^2}+k}{k}}\left(2\,\frac{\sqrt{a}x^{k/2}}{k}\right)\_C1+2\,(1/2+(b\right.\right.$$

ODE No. 140

$$x^2\left(y'(x)+y(x)^2\right)+4xy(x)+2=0$$

✓ **Mathematica** : cpu = 0.0103166 (sec), leaf count = 17

$$\left\{\left\{y(x)\to\frac{1}{c_1+x}-\frac{2}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.078 (sec), leaf count = 20

$$\left\{y(x)=\frac{-2\_C1+x}{x\,(-x+\_C1)}\right\}$$

ODE No. 141

$$axy(x)+b+x^2\left(y'(x)+y(x)^2\right)=0$$

✓ **Mathematica** : cpu = 0.0276217 (sec), leaf count = 67

$$\left\{\left\{y(x)\to -\frac{\sqrt{a^2-2a-4b+1}\left(\frac{2c_1}{x^{\sqrt{a^2-2a-4b+1}}+c_1}-1\right)-1}{2x}-\frac{a}{2x}\right\}\right\}$$

✓ **Maple** : cpu = 0.076 (sec), leaf count = 51

$$\left\{y(x)=\frac{1}{2\,x}\left(-\tanh\left(\frac{-\ln(x)+\_C1}{2}\sqrt{a^2-2\,a-4\,b+1}\right)\sqrt{a^2-2\,a-4\,b+1}-a+1\right)\right\}$$

ODE No. 142

$$-ax^2y(x)+ax+x^2\left(y'(x)-y(x)^2\right)+2=0$$

✓ **Mathematica** : cpu = 0.120273 (sec), leaf count = 122

$$\left\{\left\{y(x)\to -\frac{\frac{e^{ax}\left(a^2x^2-2ax+2\right)}{a^2x}-\frac{e^{ax}\left(a^2x^2-2ax+2\right)}{a^3x^2}+\frac{e^{ax}\left(2a^2x-2a\right)}{a^3x}-\frac{c_1}{x^2}}{\frac{e^{ax}\left(a^2x^2-2ax+2\right)}{a^3x}+\frac{c_1}{x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.12 (sec), leaf count = 52

$$\left\{y(x)=\frac{-(ax-1)\left(a^2x^2+2\right)e^{ax}+\_C1}{\left(\left(a^2x^2-2\,ax+2\right)e^{ax}+\_C1\right)x}\right\}$$

ODE No. 143

$$x^2\left(ay(x)^2+y'(x)\right)-b=0$$

✓ **Mathematica** : cpu = 0.0099227 (sec), leaf count = 51

$$\left\{\left\{y(x)\to -\frac{\sqrt{4ab+1}\left(\frac{2c_1}{x^{\sqrt{4ab+1}}+c_1}-1\right)-1}{2ax}\right\}\right\}$$

✓ **Maple** : cpu = 0.065 (sec), leaf count = 41

$$\left\{y(x)=\frac{1}{2\,ax}\left(-\tanh\left(\frac{-\ln(x)+\_C1}{2}\sqrt{4\,ab+1}\right)\sqrt{4\,ab+1}+1\right)\right\}$$

ODE No. 144

$$x^2\left(ay(x)^2+y'(x)\right)+bx^\alpha+c=0$$

✓ **Mathematica** : cpu = 0.17495 (sec), leaf count = 1787

$$\left\{\left\{y(x)\to \frac{a^{\frac{i\sqrt{4ac-1}\alpha+\alpha}{2\alpha^2}-\frac{\sqrt{\alpha^2-4a\alpha^2c}}{2\alpha^2}}\alpha^{-\frac{i\sqrt{4ac-1}\alpha+\alpha}{\alpha^2}+\frac{\sqrt{\alpha^2-4a\alpha^2c}}{\alpha^2}+1}b^{\frac{i\sqrt{4ac-1}\alpha+\alpha}{2\alpha^2}-\frac{\sqrt{\alpha^2-4a\alpha^2c}}{2\alpha^2}}\left(\frac{i\sqrt{4ac-1}\alpha+\alpha}{2\alpha^2}-\frac{\sqrt{\alpha^2-4a\alpha^2c}}{2\alpha^2}\right)(\cdots}{\cdots}\right.\right.$$

✓ **Maple** : cpu = 0.135 (sec), leaf count = 219

$$\left\{y(x)=\frac{1}{2\,ax}\left(-2\left(Y_{\frac{\sqrt{-4\,ac+1}+\alpha}{\alpha}}\left(2\,\frac{\sqrt{ab}x^{\alpha/2}}{\alpha}\right)\_C1+J_{\frac{\sqrt{-4\,ac+1}+\alpha}{\alpha}}\left(2\,\frac{\sqrt{ab}x^{\alpha/2}}{\alpha}\right)\right)\sqrt{ab}x^{\alpha/2}+(\sqrt{-4\,ac+1}\right.$$

ODE No. 145

$$-ax^2y(x)^2+ay(x)^3+x^2y'(x)=0$$

✓ **Mathematica** : cpu = 0.695765 (sec), leaf count = 267

$$\text{Solve}\left[\frac{\left(-\frac{1}{2^{2/3}a^{2/3}y(x)}-\frac{\sqrt[3]{a}x}{2^{2/3}}\right)\text{Ai}\left(\left(-\frac{\sqrt[3]{a}x}{2^{2/3}}-\frac{1}{2^{2/3}a^{2/3}y(x)}\right)^2+\frac{1}{\sqrt[3]{2}\sqrt[3]{a}x}\right)+\text{Ai}'\left(\left(-\frac{\sqrt[3]{a}x}{2^{2/3}}-\frac{1}{2^{2/3}a^{2/3}y(x)}\right)^2+\frac{1}{\sqrt[3]{2}\sqrt[3]{}}\right.}{\left(-\frac{1}{2^{2/3}a^{2/3}y(x)}-\frac{\sqrt[3]{a}x}{2^{2/3}}\right)\text{Bi}\left(\left(-\frac{\sqrt[3]{a}x}{2^{2/3}}-\frac{1}{2^{2/3}a^{2/3}y(x)}\right)^2+\frac{1}{\sqrt[3]{2}\sqrt[3]{a}x}\right)+\text{Bi}'\left(\left(-\frac{\sqrt[3]{a}x}{2^{2/3}}-\frac{1}{2^{2/3}a^{2/3}y(x)}\right)^2+\frac{1}{\sqrt[3]{2}\sqrt[3]{}}\right.}\right.$$

✓ **Maple** : cpu = 0.132 (sec), leaf count = 117

$$\left\{y(x)=-\left(ax+(-2\,a)^{\frac{2}{3}}\,RootOf\left(\text{Bi}\left(\frac{1}{x}(\_Z^2\sqrt[3]{-2\,a}x-1)\,\frac{1}{\sqrt[3]{-2\,a}}\right)\_C1\,\_Z+\_Z\,\text{Ai}\left(\frac{1}{x}(\_Z^2\sqrt[3]{-2\,a}x\right.\right.\right.\right.$$

ODE No. 146

$$ay(x)^2+x^2y'(x)+xy(x)^3=0$$

✓ **Mathematica** : cpu = 0.953567 (sec), leaf count = 78

$$\text{Solve}\left[-\frac{ia}{x}=\frac{2e^{\frac{1}{2}\left(-\frac{ia}{x}-\frac{i}{y(x)}\right)^2}}{2c_1+\sqrt{2\pi}\text{erfi}\left(\frac{-\frac{ia}{x}-\frac{i}{y(x)}}{\sqrt{2}}\right)},y(x)\right]$$

✓ **Maple** : cpu = 0.177 (sec), leaf count = 84

$$\left\{\frac{1}{2}\left(a\sqrt{\pi}\sqrt{2}Erf\left(\frac{\sqrt{2}(ay(x)+x)}{2\,xy\,(x)}\right)e^{\frac{(ay(x)+x)^2}{2\,x^2(y(x))^2}}+2\,x\right)e^{-\frac{((a-x)y(x)+x)((x+a)y(x)+x)}{2\,x^2(y(x))^2}}+\_C1=0\right\}$$

ODE No. 147

$$a x^2 y(x)^3 + b y(x)^2 + x^2 y'(x) = 0$$

✓ **Mathematica** : cpu = 0.958667 (sec), leaf count = 343

$$\text{Solve}\left[\frac{\left(\frac{b^{2/3}}{2^{2/3}\sqrt[3]{a}x}+\frac{1}{2^{2/3}\sqrt[3]{a}\sqrt[3]{b}y(x)}\right)\text{Ai}\left(\left(\frac{b^{2/3}}{2^{2/3}\sqrt[3]{a}x}+\frac{1}{2^{2/3}\sqrt[3]{a}y(x)\sqrt[3]{b}}\right)^2-\frac{\sqrt[3]{a}x}{\sqrt[3]{2}b^{2/3}}\right)+\text{Ai}'\left(\left(\frac{b^{2/3}}{2^{2/3}\sqrt[3]{a}x}+\frac{1}{2^{2/3}\sqrt[3]{a}y(x)\sqrt[3]{b}}\right)\right.}{\left(\frac{b^{2/3}}{2^{2/3}\sqrt[3]{a}x}+\frac{1}{2^{2/3}\sqrt[3]{a}\sqrt[3]{b}y(x)}\right)\text{Bi}\left(\left(\frac{b^{2/3}}{2^{2/3}\sqrt[3]{a}x}+\frac{1}{2^{2/3}\sqrt[3]{a}y(x)\sqrt[3]{b}}\right)^2-\frac{\sqrt[3]{a}x}{\sqrt[3]{2}b^{2/3}}\right)+\text{Bi}'\left(\left(\frac{b^{2/3}}{2^{2/3}\sqrt[3]{a}x}+\frac{1}{2^{2/3}\sqrt[3]{a}y(x)\sqrt[3]{b}}\right)\right.}\right.$$

✓ **Maple** : cpu = 0.477 (sec), leaf count = 178

$$\left\{y(x)=-\sqrt[3]{2}abx\left(\sqrt[3]{2}ab^2-2\left(a^2b^2\right)^{2/3}RootOf\left(\text{Bi}\left(-1/2\,\frac{a2^{2/3}x-2\_Z^2\sqrt[3]{a^2b^2}}{\sqrt[3]{a^2b^2}}\right)\_C1\,\_Z+\_Z\,\text{Ai}\left(-\right.\right.\right.\right.$$

ODE No. 148

$$\left(x^2+1\right)y'(x)+xy(x)-1=0$$

✓ **Mathematica** : cpu = 0.0134864 (sec), leaf count = 30

$$\left\{\left\{y(x)\to\frac{c_1}{\sqrt{x^2+1}}+\frac{\sinh^{-1}(x)}{\sqrt{x^2+1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.01 (sec), leaf count = 16

$$\left\{y(x)=\left(Arcsinh(x)+\_C1\right)\frac{1}{\sqrt{x^2+1}}\right\}$$

ODE No. 149

$$\left(x^2+1\right)y'(x)-x\left(x^2+1\right)+xy(x)=0$$

✓ **Mathematica** : cpu = 0.0127152 (sec), leaf count = 27

$$\left\{\left\{y(x)\to\frac{c_1}{\sqrt{x^2+1}}+\frac{1}{3}\left(x^2+1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.011 (sec), leaf count = 20

$$\left\{y(x)=\frac{x^2}{3}+\frac{1}{3}+\_C1\frac{1}{\sqrt{x^2+1}}\right\}$$

ODE No. 150

$$\left(x^2+1\right)y'(x)-2x^2+2xy(x)=0$$

✓ **Mathematica** : cpu = 0.00842262 (sec), leaf count = 30

$$\left\{\left\{y(x)\to \frac{c_1}{x^2+1}+\frac{2x^3}{3\left(x^2+1\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.007 (sec), leaf count = 23

$$\left\{y(x)=\frac{2\,x^3+3\_C1}{3\,x^2+3}\right\}$$

ODE No. 151

$$\left(x^2+1\right)y'(x)+(2xy(x)-1)\left(y(x)^2+1\right)=0$$

✓ **Mathematica** : cpu = 0.566833 (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 = 0.058 (sec), leaf count = 85

$$\left\{\_C1+x\frac{1}{\sqrt[4]{\left(x^{-1}+x^2\left(\frac{y(x)x^4}{x^2+1}-\frac{x^3}{x^2+1}\right)^{-1}\right)^2+1}}+\frac{y(x)+x}{2\,xy\,(x)-2}\,{}_2\mathrm{F}_1\left(\frac{1}{2},\frac{5}{4};\ \frac{3}{2};\ -\frac{\left(y(x)+x\right)^2}{\left(xy\,(x)-1\right)^2}\right)=0\right\}$$

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 = 0.243022 (sec), leaf count = 40

$$\left\{\left\{y(x)\to \tan^{-1}\left(\frac{-6c_1\sqrt{x^2+1}+x^4+2x^2+1}{3(x^2+1)}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.96 (sec), leaf count = 25

$$\left\{y(x)=\arctan\left(\frac{1}{3}\left((x^2+1)^{\frac{3}{2}}+3\_C1\right)\frac{1}{\sqrt{x^2+1}}\right)\right\}$$

ODE No. 153

$$a+(x^2-1)\,y'(x)-xy(x)=0$$

✓ **Mathematica** : cpu = 0.0171105 (sec), leaf count = 21

$$\left\{\left\{y(x)\to ax+c_1\sqrt{x^2-1}\right\}\right\}$$

✓ **Maple** : cpu = 0.017 (sec), leaf count = 20

$$\left\{y(x)=\sqrt{x-1}\sqrt{1+x}\_C1+ax\right\}$$

ODE No. 154

$$(x^2-1)\,y'(x)+2xy(x)-\cos(x)=0$$

✓ **Mathematica** : cpu = 0.0147817 (sec), leaf count = 26

$$\left\{\left\{y(x)\to \frac{c_1}{x^2-1}+\frac{\sin(x)}{x^2-1}\right\}\right\}$$

✓ **Maple** : cpu = 0.013 (sec), leaf count = 16

$$\left\{y(x)=\frac{\sin(x)+\_C1}{x^2-1}\right\}$$

ODE No. 155

$$\left(x^2-1\right)y'(x)+y(x)^2-2xy(x)+1=0$$

✓ **Mathematica** : cpu = 0.0188215 (sec), leaf count = 46

$$\left\{\left\{y(x)\to \frac{1}{c_1+\frac{1}{2}\log(1-x)-\frac{1}{2}\log(x+1)}-\frac{x(1-x^2)}{x^2-1}\right\}\right\}$$

✓ **Maple** : cpu = 0.112 (sec), leaf count = 14

$$\left\{y(x)=x+(\_C1-Artanh(x))^{-1}\right\}$$

ODE No. 156

$$\left(x^2-1\right)y'(x)-y(x)(y(x)-x)=0$$

✓ **Mathematica** : cpu = 0.0172225 (sec), leaf count = 21

$$\left\{\left\{y(x)\to \frac{1}{c_1\sqrt{x^2-1}+x}\right\}\right\}$$

✓ **Maple** : cpu = 0.021 (sec), leaf count = 20

$$\left\{y(x)=\left(\sqrt{x-1}\sqrt{1+x}\_C1+x\right)^{-1}\right\}$$

ODE No. 157

$$a\left(y(x)^2-2xy(x)+1\right)+\left(x^2-1\right)y'(x)=0$$

✓ **Mathematica** : cpu = 0.0891885 (sec), leaf count = 158

$$\left\{\left\{y(x)\to \frac{(x^2-1)\left(c_1\left(ax(x^2-1)^{\frac{a}{2}-1}P_{a-1}(x)+(x^2-1)^{\frac{a}{2}-1}(aP_a(x)-axP_{a-1}(x))\right)+ax(x^2-1)^{\frac{a}{2}-1}\right.}{a\left(c_1(x^2-1)^{a/2}P_{a-1}(x)+(x^2-1)^{a/2}Q_{a-1}(x)\right.}\right.\right.$$

✓ **Maple** : cpu = 0.274 (sec), leaf count = 231

$$\left\{y(x)=\frac{1}{4a(1+x)}\left(8\_C1(1+x)((a-1/2)x-a/2+1/2)\,HeunC(0,-2a+1,0,0,a^2-a+1/2,2(1\right.\right.$$

ODE No. 158

$$axy(x)^2 + (x^2 - 1)\, y'(x) + xy(x) = 0$$

✓ **Mathematica** : cpu = 0.0411813 (sec), leaf count = 31

$$\left\{\left\{y(x) \to -\frac{e^{c_1}}{ae^{c_1} - \sqrt{x^2 - 1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.022 (sec), leaf count = 22

$$\left\{y(x) = \left(\sqrt{x-1}\sqrt{1+x}\_C1 - a\right)^{-1}\right\}$$

ODE No. 159

$$(x^2 - 1)\, y'(x) - 2xy(x)\log(y(x)) = 0$$

✓ **Mathematica** : cpu = 0.0177716 (sec), leaf count = 22

$$\left\{\left\{y(x) \to e^{e^{c_1}x^2 - e^{c_1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.171 (sec), leaf count = 13

$$\left\{y(x) = \mathrm{e}^{\_C1\,(x-1)(1+x)}\right\}$$

ODE No. 160

$$(x^2 - 4)\, y'(x) + (x+2)y(x)^2 - 4y(x) = 0$$

✓ **Mathematica** : cpu = 0.0213519 (sec), leaf count = 27

$$\left\{\left\{y(x) \to \frac{2-x}{(x+2)\,(c_1 - \log(x+2))}\right\}\right\}$$

✓ **Maple** : cpu = 0.033 (sec), leaf count = 21

$$\left\{y(x) = \frac{x-2}{(x+2)\,(\ln(x+2) + \_C1)}\right\}$$

ODE No. 161

$$\left(x^2-5x+6\right)y'(x)+x^2+3xy(x)-8y(x)=0$$

✓ **Mathematica** : cpu = 0.01459 (sec), leaf count = 53

$$\left\{\left\{y(x)\to\frac{c_1}{(2-x)^2(3-x)}+\frac{\frac{x^4}{4}-\frac{2x^3}{3}}{(2-x)^2(3-x)}\right\}\right\}$$

✓ **Maple** : cpu = 0.014 (sec), leaf count = 27

$$\left\{y(x)=\frac{1}{(x-2)^2(x-3)}\left(-\frac{x^4}{4}+\frac{2x^3}{3}+\_C1\right)\right\}$$

ODE No. 162

$$k(-a+y(x)+x)(-b+y(x)+x)+(x-a)(x-b)y'(x)+y(x)^2=0$$

✓ **Mathematica** : cpu = 0.270429 (sec), leaf count = 133

$$\left\{\left\{y(x)\to\frac{1}{2}\sqrt{\frac{-a^2k^2+2abk^2-b^2k^2}{(k+1)^2}}\tan\left(\frac{(k+1)\sqrt{\frac{-a^2k^2+2abk^2-b^2k^2}{(k+1)^2}}(\log(x-b)-\log(x-a))}{2(a-b)}+c_1\right)-\right.\right.$$

✓ **Maple** : cpu = 0.202 (sec), leaf count = 58

$$\left\{y(x)=\frac{\left(\_C1\,(a-x)(a-x)^k+(b-x)^k(b-x)\right)k}{(k+1)\left(\_C1\,(a-x)^k+(b-x)^k\right)}\right\}$$

ODE No. 163

$$2a^2x+2x^2y'(x)-2y(x)^2-xy(x)=0$$

✓ **Mathematica** : cpu = 0.0132857 (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 = 0.065 (sec), leaf count = 26

$$\left\{y(x)=i\tan\left(1(\_C1\,\sqrt{x}-2\,ia)\frac{1}{\sqrt{x}}\right)\sqrt{x}a\right\}$$

ODE No. 164

$$2a^2x + 2x^2y'(x) - 2y(x)^2 - 3xy(x) = 0$$

✓ **Mathematica** : cpu = 0.0846569 (sec), leaf count = 131

$$\left\{\left\{y(x) \to -\frac{x^2\left(c_1\left(\frac{ae^{-\frac{2a}{\sqrt{x}}}}{x} + \frac{e^{-\frac{2a}{\sqrt{x}}}}{2\sqrt{x}}\right) - \frac{e^{\frac{2a}{\sqrt{x}}}}{4a\sqrt{x}} + \frac{e^{\frac{2a}{\sqrt{x}}}}{2x}\right)}{c_1\sqrt{x}e^{-\frac{2a}{\sqrt{x}}} - \frac{\sqrt{x}e^{\frac{2a}{\sqrt{x}}}}{2a}}\right\}\right\}$$

✓ **Maple** : cpu = 0.231 (sec), leaf count = 102

$$\left\{y(x) = 1\left(\left(-2\,x\_C1\,\sqrt{-\frac{a^2}{x}} - x\right)\sin\left(2\sqrt{-\frac{a^2}{x}}\right) - x\left(\_C1 - 2\sqrt{-\frac{a^2}{x}}\right)\cos\left(2\sqrt{-\frac{a^2}{x}}\right)\right)\left(2\cos\left(\right.\right.$$

ODE No. 165

$$x(2x-1)y'(x) + y(x)^2 - (4x+1)y(x) + 4x = 0$$

✓ **Mathematica** : cpu = 0.0180177 (sec), leaf count = 22

$$\left\{\left\{y(x) \to \frac{(1-2x)x}{c_1 - x} + 1\right\}\right\}$$

✓ **Maple** : cpu = 0.027 (sec), leaf count = 17

$$\left\{y(x) = \frac{2\,x^2 + \_C1}{x + \_C1}\right\}$$

ODE No. 166

$$2(x-1)xy'(x) + (x-1)y(x)^2 - x = 0$$

✓ **Mathematica** : cpu = 0.096543 (sec), leaf count = 71

$$\left\{\left\{y(x) \to \frac{2x\left(\frac{c_1(E(x)-K(x))}{\pi x} - G_{2,2}^{2,0}\left(x\,\middle|\,\begin{matrix}-\frac{1}{2},\frac{1}{2}\\ -1,0\end{matrix}\right)\right)}{G_{2,2}^{2,0}\left(x\,\middle|\,\begin{matrix}\frac{1}{2},\frac{3}{2}\\ 0,0\end{matrix}\right) + \frac{2c_1E(x)}{\pi}}\right\}\right\}$$

✓ **Maple** : cpu = 0.175 (sec), leaf count = 97

$$\left\{y(x) = \frac{x}{2\,x-2}\left(\mathit{LegendreQ}\left(-\frac{1}{2},1,\frac{2-x}{x}\right)\_C1 - \mathit{LegendreQ}\left(\frac{1}{2},1,\frac{2-x}{x}\right)\_C1 + \mathit{LegendreP}\left(-\frac{1}{2},1\right.\right.\right.$$

ODE No. 167

$$3x^2y'(x) - x^2 - 3xy(x) - 7y(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.0246618 (sec), leaf count = 35

$$\left\{\left\{y(x) \to \frac{x\tan\left(\frac{1}{3}\left(3\sqrt{7}c_1 + \sqrt{7}\log(x)\right)\right)}{\sqrt{7}}\right\}\right\}$$

✓ **Maple** : cpu = 0.043 (sec), leaf count = 20

$$\left\{y(x) = \frac{x\sqrt{7}}{7}\tan\left(\frac{\left(\ln(x) + \_C1\right)\sqrt{7}}{3}\right)\right\}$$

ODE No. 168

$$3\left(x^2-4\right)y'(x) + y(x)^2 - xy(x) - 3 = 0$$

✓ **Mathematica** : cpu = 0.096656 (sec), leaf count = 234

$$\left\{\left\{y(x) \to \frac{3(x^2-4)\left(c_1\left(\frac{xP_{-\frac{1}{6}}^{\frac{1}{3}}\left(\frac{x}{2}\right)}{6(x^2-4)^{11/12}} + \frac{\sqrt[12]{x^2-4}\left(\frac{1}{2}P_{\frac{5}{6}}^{\frac{1}{3}}\left(\frac{x}{2}\right) - \frac{5}{12}xP_{-\frac{1}{6}}^{\frac{1}{3}}\left(\frac{x}{2}\right)\right)}{2\left(\frac{x^2}{4}-1\right)}\right) + \frac{xQ_{-\frac{1}{6}}^{\frac{1}{3}}\left(\frac{x}{2}\right)}{6(x^2-4)^{11/12}} + \frac{\sqrt[12]{x^2-4}\left(\frac{1}{2}Q_{\frac{5}{6}}^{\frac{1}{3}}\left(\frac{x}{2}\right) - \frac{5}{12}x\right.}{2\left(\frac{x^2}{4}-1\right)}\right.}{c_1\sqrt[12]{x^2-4}P_{-\frac{1}{6}}^{\frac{1}{3}}\left(\frac{x}{2}\right) + \sqrt[12]{x^2-4}Q_{-\frac{1}{6}}^{\frac{1}{3}}\left(\frac{x}{2}\right)}\right.\right.$$

✓ **Maple** : cpu = 0.184 (sec), leaf count = 140

$$\left\{y(x) = -3\left(x+2\right)\left(\mathit{HeunC}\left(0,4/3,-1/3,0,\frac{25}{36},4\left(x+2\right)^{-1}\right)\_C1 - 1/3\left(-x/4-1/2\right)^{4/3}\mathit{HeunC}\left(0,-\right.\right.\right.$$

ODE No. 169

$$(ax+b)^2y'(x)+y(x)^3(ax+b)+cy(x)^2=0$$

✓ **Mathematica** : cpu = 3.06516 (sec), leaf count = 149

$$\text{Solve}\left[-\frac{c}{\sqrt{-a(ax+b)^2}}=\frac{2\exp\left(\frac{1}{2}\left(-\frac{c}{\sqrt{-a(ax+b)^2}}-\frac{\sqrt{-a(ax+b)^2}}{y(x)(-ax-b)}\right)^2\right)}{\sqrt{2\pi}\text{erfi}\left(\frac{-\frac{c}{\sqrt{-a(ax+b)^2}}-\frac{\sqrt{-a(ax+b)^2}}{y(x)(-ax-b)}}{\sqrt{2}}\right)+2c_1},y(x)\right]$$

✓ **Maple** : cpu = 0.164 (sec), leaf count = 153

$$\left\{\frac{1}{2}\left(\left(\sqrt{2}\sqrt{\pi}Erf\left(\frac{(cy(x)+a(ax+b))\sqrt{2}}{2\,(ax+b)\,y\,(x)}\frac{1}{\sqrt{a}}\right)e^{\frac{(cy(x)+a(ax+b))^2}{2\,(y(x))^2(ax+b)^2a}}ac+2\,(ax+b)\,a^{3/2}\right)e^{-\frac{((-ax-b+c)y(x)+a(ax+b))(}{2\,(y(x))^2(a}}\right.\right.$$

ODE No. 170

$$-x^4+x^3y'(x)-y(x)^2=0$$

✓ **Mathematica** : cpu = 0.0221074 (sec), leaf count = 43

$$\left\{\left\{y(x)\to-\frac{x^3\left(-\frac{c_1}{x^2}+\frac{1}{x^2}-\frac{\log(x)}{x^2}\right)}{\frac{c_1}{x}+\frac{\log(x)}{x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.022 (sec), leaf count = 23

$$\left\{y(x)=\frac{x^2(\ln(x)-\_C1-1)}{\ln(x)-\_C1}\right\}$$

ODE No. 171

$$x^3y'(x) - x^2y(x) - y(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.0106209 (sec), leaf count = 17

$$\left\{\left\{y(x)\to \frac{x^2}{c_1x+1}\right\}\right\}$$

✓ **Maple** : cpu = 0.014 (sec), leaf count = 15

$$\left\{y(x) = \frac{x^2}{\_C1\,x+1}\right\}$$

ODE No. 172

$$x^4\left(-y(x)^2\right) + x^3y'(x) + x^2y(x) + 20 = 0$$

✓ **Mathematica** : cpu = 0.0440343 (sec), leaf count = 35

$$\left\{\left\{y(x)\to -\frac{5c_1x^4-\frac{4}{x^5}}{x\left(c_1x^5+\frac{1}{x^4}\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.29 (sec), leaf count = 26

$$\left\{y(x) = \frac{5\,x^9+4\,\_C1}{\left(-x^9+\_C1\right)x^2}\right\}$$

ODE No. 173

$$x^6\left(-y(x)^2\right) + x^3y'(x) - (2x-3)x^2y(x) + 3 = 0$$

✓ **Mathematica** : cpu = 0.0164299 (sec), leaf count = 29

$$\left\{\left\{y(x)\to \frac{1}{x^3\left(c_1e^{4x}+\frac{1}{4}\right)} - \frac{3}{x^3}\right\}\right\}$$

✓ **Maple** : cpu = 0.052 (sec), leaf count = 27

$$\left\{y(x) = \frac{-3\left(\mathrm{e}^{x}\right)^4\_C1-3}{x^3\left(\left(\mathrm{e}^{x}\right)^4\_C1-3\right)}\right\}$$

ODE No. 174

$$\left(x^2+1\right)xy'(x)+x^2y(x)=0$$

✓ **Mathematica** : cpu = 0.00791288 (sec), leaf count = 17

$$\left\{\left\{y(x)\to \frac{c_1}{\sqrt{x^2+1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.006 (sec), leaf count = 13

$$\left\{y(x)=\_C1\,\frac{1}{\sqrt{x^2+1}}\right\}$$

ODE No. 175

$$ax^3+\left(x^2-1\right)xy'(x)-\left(2x^2-1\right)y(x)=0$$

✓ **Mathematica** : cpu = 0.0216354 (sec), leaf count = 24

$$\left\{\left\{y(x)\to ax+c_1\sqrt{1-x^2}x\right\}\right\}$$

✓ **Maple** : cpu = 0.022 (sec), leaf count = 20

$$\left\{y(x)=x\left(\sqrt{x-1}\sqrt{1+x}\_C1+a\right)\right\}$$

ODE No. 176

$$\left(x^2-1\right)xy'(x)+\left(x^2-1\right)y(x)^2-x^2=0$$

✓ **Mathematica** : cpu = 0.129873 (sec), leaf count = 82

$$\left\{\left\{y(x)\to \frac{x\left(\frac{2c_1\left(E\left(x^2\right)-K\left(x^2\right)\right)}{\pi x}-2xG_{2,2}^{2,0}\left(x^2\middle|\begin{array}{c}-\frac{1}{2},\frac{1}{2}\\-1,0\end{array}\right)\right)}{G_{2,2}^{2,0}\left(x^2\middle|\begin{array}{c}\frac{1}{2},\frac{3}{2}\\0,0\end{array}\right)+\frac{2c_1E\left(x^2\right)}{\pi}}\right\}\right\}$$

✓ **Maple** : cpu = 0.131 (sec), leaf count = 30

$$\left\{y(x)=\frac{\_C1\ EllipticCE(x)-EllipticK(x)+EllipticE(x)}{\_C1\ EllipticCE\,(x)-\_C1\ EllipticCK\,(x)+EllipticE\,(x)}\right\}$$

ODE No. 177

$$(x-1)x^2y'(x)-(x-2)xy(x)-y(x)^2=0$$

✓ **Mathematica** : cpu = 0.01694 (sec), leaf count = 22

$$\left\{\left\{y(x)\to -\frac{x^2}{c_1x-c_1-1}\right\}\right\}$$

✓ **Maple** : cpu = 0.029 (sec), leaf count = 17

$$\left\{y(x)=\frac{x^2}{1+\_C1\ (x-1)}\right\}$$

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 = 0.0730764 (sec), leaf count = 62

$$\left\{\left\{y(x)\to \frac{\sqrt{x}}{\sqrt{1-x^2}\left(c_1-\frac{2\sqrt{1-\frac{1}{x^2}}\,xF\left(\sin^{-1}\left(\frac{1}{\sqrt{x}}\right)\middle|-1\right)}{\sqrt{1-x^2}}\right)}+1\right\}\right\}$$

✓ **Maple** : cpu = 0.208 (sec), leaf count = 63

$$\left\{y(x)=1-2\,\frac{\sqrt{x}}{\sqrt{x-1}\sqrt{1+x}}\left(\_C1-2\,\frac{\mathit{EllipticF}\left(\sqrt{1+x},1/2\,\sqrt{2}\right)\sqrt{-x}\sqrt{-2\,x+2}\sqrt{2}}{\sqrt{2\,x-2}\sqrt{x}}\right)^{-1}\right\}$$

ODE No. 179

$$3x\left(x^2-1\right)y'(x)-\left(x^2+1\right)y(x)+xy(x)^2-3x=0$$

✓ **Mathematica** : cpu = 1.73514 (sec), leaf count = 2816

$$\left\{\left\{y(x)\to \frac{3(x^2-1)\left(\frac{e^{\int_1^x \text{Root}\left[125K[1]^8-164K[1]^6+70K[1]^4-20K[1]^2+\left(1296K[1]^{12}-5184K[1]^{10}+7776K[1]^8-5184K[1]^6+1296K[1]^4\right)\#1^4+\left(-3\right.}}{}\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.206 (sec), leaf count = 112

$$\left\{y(x) = 35\,\frac{1}{\sqrt[3]{x}\left(8\,x^{2/3}{}_2\mathrm{F}_1(5/6,7/6;\;4/3;\;x^2)\_C1 + 8\,{}_2\mathrm{F}_1(1/2,5/6;\;2/3;\;x^2)\right)}\left(\_C1\left(\frac{8\,x^2}{7} - \frac{16}{35}\right){}_2\mathrm{F}_1(5/\right.\right.$$

ODE No. 180

$$\left(xy'(x) - y(x)\right)\left(ax^2 + bx + c\right) + x^2 - y(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.140739 (sec), leaf count = 132

$$\left\{\left\{y(x) \to -\frac{x\left(\exp\left(\frac{4\tan^{-1}\left(\frac{2ax}{\sqrt{4ac-b^2}}+\frac{b}{\sqrt{4ac-b^2}}\right)}{\sqrt{4ac-b^2}} + 2c_1\right) - 1\right)}{\exp\left(\frac{4\tan^{-1}\left(\frac{2ax}{\sqrt{4ac-b^2}}+\frac{b}{\sqrt{4ac-b^2}}\right)}{\sqrt{4ac-b^2}} + 2c_1\right) + 1}\right\}\right\}$$

✓ **Maple** : cpu = 0.073 (sec), leaf count = 58

$$\left\{y(x) = -\tanh\left(1\left(\_C1\,\sqrt{4\,ac-b^2} + 2\,\arctan\left(\frac{2\,ax+b}{\sqrt{4\,ac-b^2}}\right)\right)\frac{1}{\sqrt{4\,ac-b^2}}\right)x\right\}$$

ODE No. 181

$$a + x^4\left(y'(x) + y(x)^2\right) = 0$$

✓ **Mathematica** : cpu = 0.0133206 (sec), leaf count = 347

$$\left\{\left\{y(x) \to -\frac{\frac{i\sqrt{\frac{2}{\pi}}c_1\sinh\left(\frac{\sqrt{-a}}{x}\right)}{\sqrt{-\frac{i\sqrt{-a}}{x}}} + \frac{i\sqrt{-a}\left(-\frac{\sqrt{\frac{2}{\pi}}c_1\cosh\left(\frac{\sqrt{-a}}{x}\right)}{\sqrt{-\frac{i\sqrt{-a}}{x}}} + \frac{\sqrt{\frac{2}{\pi}}c_1\left(-\frac{\sqrt{-a}x\sinh\left(\frac{\sqrt{-a}}{x}\right)}{a} - \cosh\left(\frac{\sqrt{-a}}{x}\right)\right)}{\sqrt{-\frac{i\sqrt{-a}}{x}}} - \frac{2\sqrt{\frac{2}{\pi}}\left(i\sinh\left(\frac{\sqrt{-a}}{x}\right) + \frac{i\sqrt{-a}}{\cdots}\right.}{\sqrt{-\frac{i\sqrt{-a}}{x}}}\right.}{x}}{2x\left(\frac{\sqrt{\frac{2}{\pi}}\cosh\left(\frac{\sqrt{-a}}{x}\right)}{\sqrt{-\frac{i\sqrt{-a}}{x}}} - \frac{i\sqrt{\frac{2}{\pi}}c_1\sinh\left(\frac{\sqrt{-a}}{x}\right)}{\sqrt{-\frac{i\sqrt{-a}}{x}}}\right)}\right.\right.$$

✓ **Maple** : cpu = 0.083 (sec), leaf count = 28

$$\left\{y(x) = \frac{1}{x^2}\left(-\tan\left(\frac{\_C1\;x - 1}{x}\sqrt{a}\right)\sqrt{a} + x\right)\right\}$$

ODE No. 182

$$\left(x^3-1\right)xy'(x)+x^2-2xy(x)^2+y(x)=0$$

✓ **Mathematica** : cpu = 0.193342 (sec), leaf count = 96

$$\left\{\left\{y(x)\to -\frac{\left(x^3-1\right)\left(\frac{2c_1x^2}{(1-x^3)^{5/3}}+\frac{x}{(1-x^3)^{2/3}}+\frac{x^4}{(1-x^3)^{5/3}}\right)}{2\left(\frac{c_1}{(1-x^3)^{2/3}}+\frac{x^2}{2(1-x^3)^{2/3}}\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.168 (sec), leaf count = 18

$$\left\{y(x)=\frac{x(x+\_C1)}{\_C1\,x^2+1}\right\}$$

ODE No. 183

$$\left(2x^4-x\right)y'(x)-2\left(x^3-1\right)y(x)=0$$

✓ **Mathematica** : cpu = 0.0237015 (sec), leaf count = 22

$$\left\{\left\{y(x)\to \frac{c_1x^2}{\sqrt[3]{1-2x^3}}\right\}\right\}$$

✓ **Maple** : cpu = 0.013 (sec), leaf count = 18

$$\left\{y(x)=\_C1\,x^2\frac{1}{\sqrt[3]{2\,x^3-1}}\right\}$$

ODE No. 184

$$\left(y'(x)+y(x)^2\right)\left(ax^2+bx+c\right)^2+A=0$$

✓ **Mathematica** : cpu = 1.73887 (sec), leaf count = 704

$$\Bigg\{\Bigg\{y(x)\to -\frac{-\frac{2a\sqrt{ax^2+bx+c}\exp\left(-\frac{\sqrt{4ac-b^2}\sqrt{1-\frac{4A}{b^2-4ac}}\tan^{-1}\left(\frac{2ax+b}{\sqrt{4ac-b^2}}\right)}{\sqrt{b^2-4ac}}\right)}{(b^2-4ac)\left(\frac{(2ax+b)^2}{4ac-b^2}+1\right)}+\frac{(2ax+b)\exp\Bigg(-\frac{\sqrt{4ac-b^2}\sqrt{1-\frac{4A}{b^2-4ac}}\tan^{-1}\Big(\frac{2ax+b}{\sqrt{4ac-b^2}}\cdots}{\sqrt{b^2-4ac}}\cdots}{2\sqrt{b^2-4ac}\sqrt{1-\frac{4A}{b^2-4ac}}\sqrt{ax^2+bx+c}}\cdots}{c_1\sqrt{x(ax+b)+c}\Bigg(-\exp\Bigg(\frac{\sqrt{4ac-b^2}\sqrt{1-\frac{4A}{b^2-4ac}}\,\mathrm{t}\cdots}{\sqrt{b^2-4\cdots}}\cdots}$$

✓ **Maple** : cpu = 0.426 (sec), leaf count = 493

$$\left\{y(x) = 2\,\frac{a}{\sqrt{-4\,ac+b^2}\,\left(2\,ax+b+i\sqrt{4\,ac-b^2}\right)\left(i\sqrt{4\,ac-b^2}-2\,ax-b\right)}\left(\_C1\,\left(i\sqrt{\frac{-4\,ac+b^2-4\,A}{a^2}}a\right.\right.\right.$$

ODE No. 185

$$x^7y'(x)+5x^3y(x)^2+2\left(x^2+1\right)y(x)^3=0$$

✓ **Mathematica** : cpu = 0.524291 (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 = 0.049 (sec), leaf count = 63

$$\left\{\_C1+x\frac{1}{\sqrt[4]{\left(x^{-1}+\frac{x^2}{y(x)}\right)^2+1}}+\frac{x^3+y(x)}{2\,xy\,(x)}{}_2\mathrm{F}_1\left(\frac{1}{2},\frac{5}{4};\ \frac{3}{2};\ -\frac{\left(x^3+y(x)\right)^2}{x^2\,(y\,(x))^2}\right)=0\right\}$$

ODE No. 186

$$-(n-1)x^{n-1}y(x)+x^{2n-2}+x^ny'(x)+y(x)^2=0$$

✓ **Mathematica** : cpu = 0.0336905 (sec), leaf count = 19

$$\left\{\left\{y(x)\to x^{n-1}\tan\left(c_1-\log(x)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.061 (sec), leaf count = 17

$$\left\{y(x)=\tan\left(-\ln\left(x\right)+\_C1\right)x^{n-1}\right\}$$

ODE No. 187

$$-ay(x)^2 - bx^{2n-2} + x^n y'(x) = 0$$

✓ **Mathematica** : cpu = 0.0825748 (sec), leaf count = 328

$$\left\{\left\{y(x) \to -\frac{x^n \left(\frac{1}{2}\sqrt{a}\sqrt{b}c_1\left(-\frac{n-1}{\sqrt{a}\sqrt{b}} - \sqrt{\frac{(n-1)^2}{ab} - 4}\right) x^{\frac{1}{2}\sqrt{a}\sqrt{b}\left(-\frac{n-1}{\sqrt{a}\sqrt{b}}-\sqrt{\frac{(n-1)^2}{ab}-4}\right)-1} + \frac{1}{2}\sqrt{a}\sqrt{b}\left(\sqrt{\frac{(n-1)^2}{ab} - \right.\right.}{a\left(c_1 x^{\frac{1}{2}\sqrt{a}\sqrt{b}\left(-\frac{n-1}{\sqrt{a}\sqrt{b}}-\sqrt{\frac{(n-1)^2}{ab}-4}\right)} + x^{\frac{1}{2}\sqrt{a}\sqrt{b}\left(\sqrt{\frac{(n-1)^2}{ab}-4}-\frac{n-}{\sqrt{a}\sqrt{}}\right.}\right.}\right.\right.$$

✓ **Maple** : cpu = 0.131 (sec), leaf count = 60

$$\left\{y(x) = \frac{x^{n-1}}{2\,a}\left(-\sqrt{4\,ab - n^2 + 2\,n - 1}\tan\left(\frac{-\ln(x) + \_C1}{2}\sqrt{4\,ab - n^2 + 2\,n - 1}\right) + n - 1\right)\right\}$$

ODE No. 188

$$-ay(x)^3 - bnx^3 + x^{2n+1}y'(x) = 0$$

✗ **Mathematica** : cpu = 21.2056 (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 = 0.03 (sec), leaf count = 32

$$\left\{y(x) = \mathit{RootOf}\left(-\ln(x) + \_C1 + \int^{\_Z}\left(\_a^3 a - n\_a + b\right)^{-1} d\_a\right) x^n\right\}$$

ODE No. 189

$$-ay(x)^n - bx^{(m+1)n} + x^{m(n-1)+n}y'(x) = 0$$

✓ **Mathematica** : cpu = 108.179 (sec), leaf count = 90

$$\text{Solve}\left[\int_1^{y(x)\left(\frac{ax^{-(m+1)n}}{b}\right)^{\frac{1}{n}}} \frac{1}{-K[1]\left(\frac{b^{1-n}(m+1)^n}{a}\right)^{\frac{1}{n}} + K[1]^n + 1} dK[1] = bx^{m+1}\log(x)\left(\frac{ax^{-(m+1)n}}{b}\right)^{\frac{1}{n}} + c_1, y\right.$$

✓ **Maple** : cpu = 0.26 (sec), leaf count = 60

$$\left\{\int_{\_b}^{y(x)} -\frac{x^{mn}x^n}{(x^m xb - (m+1)\_a)\,x^n x^{mn} + ax^m x\_a^n} d\_a + \ln(x) - \_C1 = 0\right\}$$

ODE No. 190

$$\sqrt{x^2-1}y'(x)-\sqrt{y(x)^2-1}=0$$

✓ **Mathematica** : cpu = 0.058415 (sec), leaf count = 173

$$\left\{\left\{y(x)\to -\frac{1}{2}e^{-c_1}\sqrt{2e^{4c_1}x^2+2e^{4c_1}\sqrt{(x-1)(x+1)}x+2e^{2c_1}-e^{4c_1}+2x^2-2\sqrt{(x-1)(x+1)}x-1}\right\},\right.$$

✓ **Maple** : cpu = 0.008 (sec), leaf count = 29

$$\left\{\ln\left(x+\sqrt{x^2-1}\right)-\ln\left(y(x)+\sqrt{(y(x))^2-1}\right)+\_C1=0\right\}$$

ODE No. 191

$$\sqrt{1-x^2}y'(x)-y(x)\sqrt{y(x)^2-1}=0$$

✓ **Mathematica** : cpu = 0.0307469 (sec), leaf count = 52

$$\left\{\left\{y(x)\to\sqrt{\tan^2\left(c_1+\sin^{-1}(x)\right)+1}\left(-\cot\left(c_1+\sin^{-1}(x)\right)\right)\right\},\left\{y(x)\to\sqrt{\tan^2\left(c_1+\sin^{-1}(x)\right)+1}\cot\left(\right.\right.\right.$$

✓ **Maple** : cpu = 0.02 (sec), leaf count = 16

$$\left\{\arcsin(x)+\arctan\left(\frac{1}{\sqrt{(y(x))^2-1}}\right)+\_C1=0\right\}$$

ODE No. 192

$$\sqrt{a^2+x^2}y'(x)-\sqrt{a^2+x^2}+y(x)+x=0$$

✓ **Mathematica** : cpu = 631.94 (sec), leaf count = 167

$$\left\{\left\{y(x)\to\frac{\sqrt{1-\frac{x}{\sqrt{a^2+x^2}}}\int_1^x\frac{\sqrt{\frac{K[1]}{\sqrt{K[1]^2+a^2}}+1}\left(\sqrt{K[1]^2+a^2}-K[1]\right)}{\sqrt{K[1]^2+a^2}\sqrt{1-\frac{K[1]}{\sqrt{K[1]^2+a^2}}}}dK[1]}{\sqrt{\frac{x}{\sqrt{a^2+x^2}}+1}}+\frac{c_1\sqrt{1-\frac{x}{\sqrt{a^2+x^2}}}}{\sqrt{\frac{x}{\sqrt{a^2+x^2}}+1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.018 (sec), leaf count = 36

$$\left\{y(x)=1\left(a^{2}\ln\left(x+\sqrt{a^{2}+x^{2}}\right)+\_C1\right)\left(x+\sqrt{a^{2}+x^{2}}\right)^{-1}\right\}$$

ODE No. 193

$$-ax(\log(x)+1)+x\log(x)y'(x)+y(x)=0$$

✓ **Mathematica** : cpu = 0.00969104 (sec), leaf count = 16

$$\left\{\left\{y(x)\to ax+\frac{c_1}{\log(x)}\right\}\right\}$$

✓ **Maple** : cpu = 0.007 (sec), leaf count = 14

$$\left\{y(x)=ax+\frac{\_C1}{\ln(x)}\right\}$$

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 = 0.0784908 (sec), leaf count = 98

$$\left\{\left\{y(x)\to-\frac{x\left(\frac{c_1e^{\frac{\log^{2}(x)}{2}}\log(x)}{x}+\frac{e^{\frac{\log^{2}(x)}{2}}\log(x)}{x}+\frac{e^{\frac{\log^{2}(x)}{2}}\log^{3}(x)}{2x}\right)}{c_1e^{\frac{\log^{2}(x)}{2}}+\frac{1}{2}e^{\frac{\log^{2}(x)}{2}}\log^{2}(x)}\right\}\right\}$$

✓ **Maple** : cpu = 0.027 (sec), leaf count = 23

$$\left\{y(x)=-\frac{\ln(x)\left((\ln(x))^{2}+\_C1+2\right)}{(\ln(x))^{2}+\_C1}\right\}$$

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 = 0.0631876 (sec), leaf count = 27

$$\left\{\left\{y(x) \to \frac{\csc(x)}{c_1 e^{5x} + \frac{1}{5}} - 4\csc(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.137 (sec), leaf count = 28

$$\left\{y(x) = \frac{-4\left(e^{x}\right)^{5}\_C1 - 4}{\sin(x)\left(\left(e^{x}\right)^{5}\_C1 - 4\right)}\right\}$$

ODE No. 196

$$\cos(x)y'(x) + y(x) + (\sin(x) + 1)\cos(x) = 0$$

✓ **Mathematica** : cpu = 0.0711363 (sec), leaf count = 53

$$\left\{\left\{y(x) \to c_1 e^{-2\tanh^{-1}\left(\tan\left(\frac{x}{2}\right)\right)} + e^{-2\tanh^{-1}\left(\tan\left(\frac{x}{2}\right)\right)}\left(\sin(x) + 4\log\left(\cos\left(\frac{x}{2}\right) - \sin\left(\frac{x}{2}\right)\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.149 (sec), leaf count = 29

$$\left\{y(x) = \frac{\sin(x) + 2\ln(\cos(x)) - 2\ln(\sec(x) + \tan(x)) + \_C1}{\sec(x) + \tan(x)}\right\}$$

ODE No. 197

$$\cos(x)y'(x) - y(x)^4 - y(x)\sin(x) = 0$$

✓ **Mathematica** : cpu = 0.0552344 (sec), leaf count = 98

$$\left\{\left\{y(x) \to \frac{1}{\sqrt[3]{c_1\cos^3(x) - \sin(x) - 2\sin(x)\cos^2(x)}}\right\}, \left\{y(x) \to -\frac{\sqrt[3]{-1}}{\sqrt[3]{c_1\cos^3(x) - \sin(x) - 2\sin(x)\cos^2(x)}}\right.$$

✓ **Maple** : cpu = 0.12 (sec), leaf count = 237

$$\left\{y(x) = \frac{1}{\_C1\left(\sin(x)\right)^4 + 2\cos(x)\left(\sin(x)\right)^3 - 2\_C1\left(\sin(x)\right)^2 - 3\cos(x)\sin(x) + \_C1}\sqrt[3]{\cos(x)\left(\_C\right.}$$

ODE No. 198

$$\sin(x)\cos(x)y'(x) - y(x) - \sin^3(x) = 0$$

✓ **Mathematica** : cpu = 0.0292629 (sec), leaf count = 15

$$\{\{y(x) \to c_1 \tan(x) - \sin(x)\}\}$$

✓ **Maple** : cpu = 0.017 (sec), leaf count = 13

$$\{y(x) = \tan(x)(-\cos(x) + \_C1)\}$$

ODE No. 199

$$\sin(2x)y'(x) + \sin(2y(x)) = 0$$

✓ **Mathematica** : cpu = 0.197481 (sec), leaf count = 15

$$\left\{\left\{y(x) \to \cot^{-1}\left(e^{-2c_1}\tan(x)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.204 (sec), leaf count = 102

$$\left\{y(x) = \frac{1}{2}\arctan\left(2\,\frac{\_C1\,(2\sin(2x) + \sin(4x))}{-\_C1^2\cos(4x) + \_C1^2 + 4\cos(2x) + \cos(4x) + 3}, \frac{\_C1^2\cos(4x) - \_C1^2 + 4}{\_C1^2\cos(4x) - \_C1^2 - 4}\right.\right.$$

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 = 0.0524748 (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 = 0.063 (sec), leaf count = 53

$$\left\{y(x) = \frac{-A\cos(2x)a - 2A\sin(2x)ax + 2x^2(a + 2c)A - 8\_C1}{4a\cos(2x) - 4a - 8b}\right\}$$

ODE No. 201

$$-y(x)f'(x)+2f(x)y'(x)+2f(x)y(x)^2-2f(x)^2=0$$

✓ **Mathematica** : cpu = 0.0806161 (sec), leaf count = 38

$$\left\{\left\{y(x)\to i\sqrt{f(x)}\tan\left(c_1+i\int_1^x-\sqrt{f(K[1])}\,dK[1]\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.057 (sec), leaf count = 23

$$\left\{y(x)=i\tan\left(-i\int\sqrt{f(x)}\,\mathrm{d}x+\_C1\right)\sqrt{f(x)}\right\}$$

ODE No. 202

$$f(x)y'(x)+g(x)\mathrm{tg}(y(x))+h(x)=0$$

✗ **Mathematica** : cpu = 20.545 (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))
```

ODE No. 203

$$x^3+y(x)y'(x)+y(x)=0$$

✗ **Mathematica** : cpu = 3.42221 (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))
```

ODE No. 204

$$ay(x) + y(x)y'(x) + x = 0$$

✓ **Mathematica** : cpu = 0.113969 (sec), leaf count = 70

$$\text{Solve}\left[\frac{1}{2}\log\left(\frac{ay(x)}{x}+\frac{y(x)^2}{x^2}+1\right)-\frac{a\tan^{-1}\left(\frac{a+\frac{2y(x)}{x}}{\sqrt{4-a^2}}\right)}{\sqrt{4-a^2}}=c_1-\log(x),y(x)\right]$$

✓ **Maple** : cpu = 0.329 (sec), leaf count = 92

$$\left\{y(x) = \mathit{RootOf}\left(\_Z^2 - e^{\mathit{RootOf}\left(x^2\left(\left(\tanh\left(\frac{2\_C1+\_Z+2\ln(x)}{2a}\sqrt{(a-2)(a+2)}\right)\right)^2 a^2 - 4\left(\tanh\left(1/2\,\frac{\sqrt{(a-2)(a+2)}(2\_C1+\_Z+2\ln(x))}{a}\right.\right.\right.\right.}\right.\right.$$

ODE No. 205

$$\frac{1}{4}\left(a^2-1\right)x + ay(x) + bx^n + y(x)y'(x) = 0$$

✗ **Mathematica** : cpu = 26.8983 (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))
```

ODE No. 206

$$ay(x) - 2a + be^x + y(x)y'(x) = 0$$

✗ **Mathematica** : cpu = 30.3886 (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))
```

ODE No. 207

$$y(x)y'(x) + y(x)^2 + 4x(x+1) = 0$$

✓ **Mathematica** : cpu = 0.0126739 (sec), leaf count = 47

$$\left\{\left\{y(x) \to -\sqrt{c_1 e^{-2x} - 4x^2}\right\}, \left\{y(x) \to \sqrt{c_1 e^{-2x} - 4x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.028 (sec), leaf count = 37

$$\left\{y(x) = \sqrt{e^{-2x}\_C1 - 4x^2}, y(x) = -\sqrt{e^{-2x}\_C1 - 4x^2}\right\}$$

ODE No. 208

$$ay(x)^2 - b\cos(c+x) + y(x)y'(x) = 0$$

✓ **Mathematica** : cpu = 0.0874859 (sec), leaf count = 118

$$\left\{\left\{y(x) \to -\frac{\sqrt{4a^2 c_1 e^{-2ax} + 4ab\cos(c+x) + c_1 e^{-2ax} + 2b\sin(c+x)}}{\sqrt{4a^2+1}}\right\}, \left\{y(x) \to \frac{\sqrt{4a^2 c_1 e^{-2ax} + 4ab\cos}}{}\right.\right.$$

✓ **Maple** : cpu = 0.081 (sec), leaf count = 106

$$\left\{y(x) = \frac{1}{4a^2+1}\sqrt{16\left(a^2+1/4\right)^2\_C1\, e^{-2ax} + 16\,b\left(a^2+1/4\right)\left(\cos(x+c)\,a + 1/2\sin(x+c)\right)}, y(x) = -\right.$$

ODE No. 209

$$y(x)y'(x) - \sqrt{ay(x)^2 + b} = 0$$

✓ **Mathematica** : cpu = 0.0227934 (sec), leaf count = 84

$$\left\{\left\{y(x) \to -\frac{\sqrt{2a^2c_1x + a^2c_1^2 + a^2x^2 - b}}{\sqrt{a}}\right\}, \left\{y(x) \to \frac{\sqrt{2a^2c_1x + a^2c_1^2 + a^2x^2 - b}}{\sqrt{a}}\right\}\right\}$$

✓ **Maple** : cpu = 0.013 (sec), leaf count = 21

$$\left\{x - \frac{1}{a}\sqrt{a\left(y(x)\right)^2 + b} + \_C1 = 0\right\}$$

ODE No. 210

$$y(x)y'(x) + xy(x)^2 - 4x = 0$$

✓ **Mathematica** : cpu = 0.017625 (sec), leaf count = 47

$$\left\{\left\{y(x) \to -\sqrt{e^{2c_1 - x^2} + 4}\right\}, \left\{y(x) \to \sqrt{e^{2c_1 - x^2} + 4}\right\}\right\}$$

✓ **Maple** : cpu = 0.029 (sec), leaf count = 33

$$\left\{y(x) = \sqrt{\mathrm{e}^{-x^2}\_C1 + 4}, y(x) = -\sqrt{\mathrm{e}^{-x^2}\_C1 + 4}\right\}$$

ODE No. 211

$$y(x)y'(x) - xe^{\frac{x}{y(x)}} = 0$$

✓ **Mathematica** : cpu = 54.3844 (sec), leaf count = 40

$$\text{Solve}\left[\int_1^{\frac{y(x)}{x}} \frac{K[1]}{K[1]^2 - e^{\frac{1}{K[1]}}} \, dK[1] = c_1 - \log(x), y(x)\right]$$

✓ **Maple** : cpu = 0.037 (sec), leaf count = 31

$$\left\{y(x) = \mathit{RootOf}\left(-\int^{\_Z} \frac{\_a}{-\_a^2 + \mathrm{e}^{\_a^{-1}}} d\_a + \ln(x) + \_C1\right) x\right\}$$

ODE No. 212

$$g(x)f\left(x^2 + y(x)^2\right) + y(x)y'(x) + x = 0$$

✓ **Mathematica** : cpu = 28.4496 (sec), leaf count = 92

$$\text{Solve}\left[\int_1^{y(x)} \left(\frac{K[2]}{f\left(K[2]^2 + x^2\right)} - \int_1^x -\frac{2K[1]K[2]f'(K[1]^2 + K[2]^2)}{f\left(K[1]^2 + K[2]^2\right)^2} \, dK[1]\right) dK[2] + \int_1^x \left(\frac{K[1]}{f\left(K[1]^2 + y(x\right.}\right.\right.$$

✓ **Maple** : cpu = 0.137 (sec), leaf count = 30

$$\left\{\int_{\_b}^{y(x)} \frac{\_a}{f\left(\_a^2 + x^2\right)} \mathrm{d}\_a + \int g(x) \, \mathrm{d}x - \_C1 = 0\right\}$$

ODE No. 213

$$(y(x)+1)y'(x)-y(x)-x=0$$

✓ **Mathematica** : cpu = 0.152009 (sec), leaf count = 71

$$\text{Solve}\left[\frac{1}{2}\log\left(\frac{x^2-y(x)^2+(x-3)y(x)-x-1}{(x-1)^2}\right)+\log(1-x)=c_1+\frac{\tanh^{-1}\left(\frac{y(x)+2x-1}{\sqrt{5}(y(x)+1)}\right)}{\sqrt{5}},y(x)\right]$$

✓ **Maple** : cpu = 0.79 (sec), leaf count = 66

$$\left\{-\frac{1}{2}\ln\left(\frac{(y(x))^2+(-x+3)\,y(x)-x^2+x+1}{(x-1)^2}\right)-\frac{\sqrt{5}}{5}\mathit{Artanh}\left(\frac{(-2\,y(x)-3+x)\sqrt{5}}{5\,x-5}\right)-\ln(x-1)-\right.$$

ODE No. 214

$$(y(x)+x-1)y'(x)-y(x)+2x+3=0$$

✓ **Mathematica** : cpu = 0.162827 (sec), leaf count = 78

$$\text{Solve}\left[2\sqrt{2}\tan^{-1}\left(\frac{-y(x)+2x+3}{\sqrt{2}(y(x)+x-1)}\right)=3c_1+2\log\left(\frac{6x^2+3y(x)^2-10y(x)+8x+11}{(3x+2)^2}\right)+4\log(3x+2\right.$$

✓ **Maple** : cpu = 0.207 (sec), leaf count = 48

$$\left\{y(x)=\frac{5}{3}+\frac{(-3\,x-2)\sqrt{2}\tan\left(\mathit{RootOf}\left(\sqrt{2}\ln\left(2\left((\tan(\_Z))^2+1\right)(3\,x+2)^2\right)+2\sqrt{2}\_C1-2\_Z\right)\right)}{3}\right\}$$

ODE No. 215

$$(y(x)+2x-2)y'(x)-y(x)+x+1=0$$

✓ **Mathematica** : cpu = 0.172091 (sec), leaf count = 80

$$\text{Solve}\left[6\sqrt{3}\tan^{-1}\left(\frac{4-3y(x)}{\sqrt{3}(y(x)+2x-2)}\right)=2c_1+3\log\left(\frac{3x^2+3y(x)^2+3(x-3)y(x)-6x+7}{(1-3x)^2}\right)+6\log(\right.$$

✓ **Maple** : cpu = 0.329 (sec), leaf count = 51

$$\left\{y(x)=\frac{3}{2}-\frac{x}{2}+\frac{\sqrt{3}(3\,x-1)}{6}\tan\left(\mathit{RootOf}\left(\sqrt{3}\ln\left(\frac{\left(3\,(\tan(\_Z))^2+3\right)(3\,x-1)^2}{4}\right)+2\sqrt{3}\_C1+6\_\right.\right.\right.$$

ODE No. 216

$$(y(x)-2x+1)y'(x)+y(x)+x=0$$

✓ **Mathematica** : cpu = 0.148202 (sec), leaf count = 82

$$\text{Solve}\left[6\sqrt{3}\tan^{-1}\left(\frac{3y(x)+1}{\sqrt{3}(-y(x)+2x-1)}\right)=2c_1+3\log\left(\frac{3x^2+3y(x)^2-3(x-1)y(x)-3x+1}{(1-3x)^2}\right)+6\log\right.$$

✓ **Maple** : cpu = 0.212 (sec), leaf count = 51

$$\left\{y(x)=\frac{(-3\,x+1)\sqrt{3}}{6}\tan\left(RootOf\left(\sqrt{3}\ln\left(\frac{\left(3\left(\tan\left(\_Z\right)\right)^2+3\right)(3\,x-1)^2}{4}\right)+2\sqrt{3}\_C1+6\_Z\right)\right)\right.$$

ODE No. 217

$$\left(y(x)-x^2\right)y'(x)-x=0$$

✓ **Mathematica** : cpu = 0.0196397 (sec), leaf count = 29

$$\left\{\left\{y(x)\to\frac{1}{2}\left(W\left(-e^{c_1-2x^2-1}\right)+1\right)+x^2\right\}\right\}$$

✓ **Maple** : cpu = 0.051 (sec), leaf count = 23

$$\left\{y(x)=x^2+\frac{lambertW\left(-4\_C1\,e^{-2\,x^2-1}\right)}{2}+\frac{1}{2}\right\}$$

ODE No. 218

$$\left(y(x)-x^2\right)y'(x)+4xy(x)=0$$

✓ **Mathematica** : cpu = 0.104612 (sec), leaf count = 257

$$\left\{\left\{y(x)\to x^2+\frac{1}{-\frac{1}{2x^2}-\frac{\frac{1}{2}-\frac{i}{2}}{\sqrt{2}x^2\sqrt{x^2\sinh\left(\frac{2c_1}{9}\right)+x^2\cosh\left(\frac{2c_1}{9}\right)-i}}}\right\},\left\{y(x)\to x^2+\frac{1}{-\frac{1}{2x^2}+\frac{\frac{1}{2}-\frac{i}{2}}{\sqrt{2}x^2\sqrt{x^2\sinh\left(\frac{2c_1}{9}\right)+x^2\cosh\left(\right.}}}\right.\right.$$

✓ **Maple** : cpu = 0.224 (sec), leaf count = 57

$$\left\{y(x) = -\frac{\_C1}{2}\sqrt{\_C1^2 - 4x^2} + \frac{\_C1^2}{2} - x^2, y(x) = \frac{\_C1}{2}\sqrt{\_C1^2 - 4x^2} + \frac{\_C1^2}{2} - x^2\right\}$$

ODE No. 219

$$-\text{f0}(x) - \text{f1}(x)y(x) - \text{f2}(x)y(x)^2 + (g(x) + y(x))y'(x) = 0$$

✗ **Mathematica** : cpu = 3602.73 (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))
```

ODE No. 220

$$-x^3 + 2y(x)y'(x) - xy(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.0143321 (sec), leaf count = 57

$$\left\{\left\{y(x) \to -\sqrt{c_1 e^{\frac{x^2}{2}} - x^2 - 2}\right\}, \left\{y(x) \to \sqrt{c_1 e^{\frac{x^2}{2}} - x^2 - 2}\right\}\right\}$$

✓ **Maple** : cpu = 0.03 (sec), leaf count = 43

$$\left\{y(x) = \sqrt{e^{\frac{x^2}{2}}\_C1 - x^2 - 2}, y(x) = -\sqrt{e^{\frac{x^2}{2}}\_C1 - x^2 - 2}\right\}$$

ODE No. 221

$$(2y(x) + x + 1)y'(x) - 2y(x) - x + 1 = 0$$

✓ **Mathematica** : cpu = 0.018817 (sec), leaf count = 35

$$\left\{\left\{y(x) \to \frac{2}{3}\left(W\left(-e^{c_1 + \frac{9x}{4} - 1}\right) + 1\right) + \frac{1}{2}(-x - 1)\right\}\right\}$$

✓ **Maple** : cpu = 0.077 (sec), leaf count = 21

$$\left\{y(x) = -\frac{x}{2} + \frac{2}{3}\mathit{lambertW}\left(\frac{e^{-\frac{1}{4}}\_C1}{4}e^{\frac{9x}{4}}\right) + \frac{1}{6}\right\}$$

ODE No. 222

$$(2y(x) + x + 7)y'(x) - y(x) + 2x + 4 = 0$$

✓ **Mathematica** : cpu = 0.0745777 (sec), leaf count = 65

$$\text{Solve}\left[5c_1 + 2\log\left(\frac{4(x^2 + y(x)^2 + 4y(x) + 6x + 13)}{5(x+3)^2}\right) + 2\tan^{-1}\left(\frac{y(x) - 2(x+2)}{2y(x) + x + 7}\right) + 4\log(x+3) = 0, y\right.$$

✓ **Maple** : cpu = 0.089 (sec), leaf count = 32

$$\left\{y(x) = -2 + (-x-3)\tan\left(\mathit{RootOf}\left(\ln\left((\cos(\_Z))^{-2}\right) - \_Z + 2\ln(x+3) + 2\_C1\right)\right)\right\}$$

ODE No. 223

$$(2y(x) - x)y'(x) - y(x) - 2x = 0$$

✓ **Mathematica** : cpu = 0.025072 (sec), leaf count = 55

$$\left\{\left\{y(x) \to \frac{1}{2}\left(x - \sqrt{5x^2 - 4e^{c_1}}\right)\right\}, \left\{y(x) \to \frac{1}{2}\left(\sqrt{5x^2 - 4e^{c_1}} + x\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.192 (sec), leaf count = 51

$$\left\{y(x) = \frac{1}{2\_C1}\left(\_C1\,x - \sqrt{5\_C1^2x^2 + 4}\right), y(x) = \frac{1}{2\_C1}\left(\_C1\,x + \sqrt{5\_C1^2x^2 + 4}\right)\right\}$$

ODE No. 224

$$(2y(x) - 6x)y'(x) - y(x) + 3x + 2 = 0$$

✓ **Mathematica** : cpu = 0.0185735 (sec), leaf count = 29

$$\left\{\left\{y(x) \to 3x - \frac{2}{5}\left(W\left(-e^{c_1 + \frac{25x}{4} - 1}\right) + 1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.065 (sec), leaf count = 35

$$\left\{y(x) = \frac{1}{5}\mathrm{e}^{-\mathit{lambertW}\left(-\frac{\mathrm{e}^{-1}}{2}\mathrm{e}^{\frac{25\,x}{4}}\mathrm{e}^{-\frac{25\_C1}{4}}\right) + \frac{25\,x}{4} - 1 - \frac{25\_C1}{4}} + 3\,x - \frac{2}{5}\right\}$$

ODE No. 225

$$(4y(x)+2x+3)y'(x)-2y(x)-x-1=0$$

✓ **Mathematica** : cpu = 0.0172606 (sec), leaf count = 33

$$\left\{\left\{y(x)\to\frac{1}{8}\left(W\left(-e^{c_1+8x-1}\right)+1\right)+\frac{1}{4}(-2x-3)\right\}\right\}$$

✓ **Maple** : cpu = 0.056 (sec), leaf count = 20

$$\left\{y(x)=-\frac{x}{2}+\frac{\mathit{lambertW}\left(\mathrm{e}^{5}(\mathrm{e}^{x})^{8}\_C1\right)}{8}-\frac{5}{8}\right\}$$

ODE No. 226

$$(4y(x)-2x-3)y'(x)+2y(x)-x-1=0$$

✓ **Mathematica** : cpu = 0.0169908 (sec), leaf count = 35

$$\left\{\left\{y(x)\to\frac{1}{8}\left(-W\left(-e^{c_1+8x-1}\right)-1\right)+\frac{1}{4}(2x+3)\right\}\right\}$$

✓ **Maple** : cpu = 0.056 (sec), leaf count = 21

$$\left\{y(x)=\frac{x}{2}-\frac{\mathit{lambertW}\left(-\mathrm{e}^{5}(\mathrm{e}^{x})^{8}\_C1\right)}{8}+\frac{5}{8}\right\}$$

ODE No. 227

$$(4y(x)-3x-5)y'(x)-3y(x)+7x+2=0$$

✓ **Mathematica** : cpu = 0.0130214 (sec), leaf count = 107

$$\left\{\left\{y(x)\to\frac{1}{4}(3x+5)-\frac{1}{2}i\sqrt{-4c_1-2\left(-\frac{7x^2}{2}-2x\right)-\frac{1}{4}(3x+5)^2}\right\},\left\{y(x)\to\frac{1}{4}(3x+5)+\frac{1}{2}i\sqrt{-4c_1 -}\right.\right.$$

✓ **Maple** : cpu = 0.203 (sec), leaf count = 33

$$\left\{y(x)=\frac{1}{76\_C1}\left(-\sqrt{4-6859\left(x-\frac{7}{19}\right)^{2}\_C1^{2}}+(57x+95)\_C1\right)\right\}$$

ODE No. 228

$$(4y(x) + 11x - 11)y'(x) - 25y(x) - 8x + 62 = 0$$

✓ **Mathematica** : cpu = 0.406 (sec), leaf count = 3357

$$\left\{\left\{y(x) \to \frac{}{4\left(-\frac{}{81(9x-1)\left(81\cosh\left(\frac{3c_1}{8}\right)x^2+81\sinh\left(\frac{3c_1}{8}\right)x^2-18\cosh\left(\frac{3c_1}{8}\right)x-18\sinh\left(\frac{3c_1}{8}\right)x+\cosh\left(\frac{3c_1}{8}\right)+\sinh\left(\frac{3c_1}{8}\right)-1\right)\sqrt[3]{-258280}}\right.}\right.\right.$$

✓ **Maple** : cpu = 0.44 (sec), leaf count = 271

$$\left\{y(x) = 1\left((-76\,x+28)\sqrt[3]{64-8748\,(9\,x-1)^2\_C1+108\sqrt{43046721}\sqrt{\left(-\frac{32}{177147}+(x-1/9)^2\_C1\right.}}\right.\right.$$

ODE No. 229

$$(12y(x) - 5x - 8)y'(x) - 5y(x) + 2x + 3 = 0$$

✓ **Mathematica** : cpu = 0.0133206 (sec), leaf count = 121

$$\left\{\left\{y(x) \to \frac{1}{12}(5x+8) - \frac{i\sqrt{-12c_1 - 24\left(-\frac{x^2}{12} - \frac{x}{4}\right) - \frac{1}{12}(5x+8)^2}}{2\sqrt{3}}\right\}, \left\{y(x) \to \frac{1}{12}(5x+8) + \frac{i\sqrt{-12c_1}}{}\right.\right.$$

✓ **Maple** : cpu = 0.207 (sec), leaf count = 32

$$\left\{y(x) = \frac{1}{12\_C1}\left(-\sqrt{(x+4)^2\_C1^2 + 24} + (5\,x+8)\_C1\right)\right\}$$

ODE No. 230

$$ay(x)y'(x) + by(x)^2 + f(x) = 0$$

✓ **Mathematica** : cpu = 0.124338 (sec), leaf count = 96

$$\left\{\left\{y(x) \to -e^{-\frac{bx}{a}}\sqrt{2\int_1^x -\frac{f(K[1])e^{\frac{2bK[1]}{a}}}{a}\,dK[1] + c_1}\right\}, \left\{y(x) \to e^{-\frac{bx}{a}}\sqrt{2\int_1^x -\frac{f(K[1])e^{\frac{2bK[1]}{a}}}{a}\,dK[1] +\right.\right.$$

✓ **Maple** : cpu = 0.05 (sec), leaf count = 100

$$\left\{y(x) = \frac{1}{a}\sqrt{\mathrm{e}^{2\frac{bx}{a}}a\left(\_C1\,a - 2\int\left(\mathrm{e}^{\frac{bx}{a}}\right)^2 f(x)\,\mathrm{d}x\right)}\left(\mathrm{e}^{2\frac{bx}{a}}\right)^{-1}, y(x) = -\frac{1}{a}\sqrt{\mathrm{e}^{2\frac{bx}{a}}a\left(\_C1\,a - 2\int\left(\mathrm{e}^{\frac{bx}{a}}\right)^2\right.}\right.$$

ODE No. 231

$$y'(x)(ay(x) + bx + c) + \alpha y(x) + \beta x + \gamma = 0$$

✓ **Mathematica** : cpu = 3.72281 (sec), leaf count = 252

$$\text{Solve}\left[\frac{(\alpha-b)^2\left(-\log\left(\frac{(ay(x)+bx+c)^2\left(-\frac{(\alpha(bx+c)-a(\beta x+\gamma))\left(a(\alpha-b)y(x)+a(\beta x+\gamma)+b^2(-x)-bc\right)}{(ay(x)+bx+c)^2}+a\beta-\alpha b\right)}{(\alpha(bx+c)-a(\beta x+\gamma))^2}\right) - \frac{2\tan^{-1}\left(\frac{\frac{2a(\beta x+\gamma)}{ay(x)}}{(\alpha-b)\sqrt{}}\right.}{\sqrt{\frac{4(a\beta-}{(\alpha-b}}}\right.}{2(a\beta-\alpha b)}\right.$$

✓ **Maple** : cpu = 0.263 (sec), leaf count = 178

$$\left\{y(x) = \frac{1}{-a\beta + b\alpha}\left(-b\gamma + \beta\,c + \frac{x(a\beta - b\alpha) + a\gamma - \alpha\,c}{2\,a}\left(\sqrt{4\,a\beta - \alpha^2 - 2\,b\alpha - b^2}\tan\left(RootOf\left(\sqrt{4\,a\beta}\right.\right.\right.\right.\right.$$

ODE No. 232

$$x^2 + xy(x)y'(x) + y(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.00984591 (sec), leaf count = 56

$$\left\{\left\{y(x) \to -\frac{\sqrt{2c_1 - x^4}}{\sqrt{2}x}\right\}, \left\{y(x) \to \frac{\sqrt{2c_1 - x^4}}{\sqrt{2}x}\right\}\right\}$$

✓ **Maple** : cpu = 0.023 (sec), leaf count = 39

$$\left\{y(x) = -\frac{1}{2\,x}\sqrt{-2\,x^4 + 4\_C1}, y(x) = \frac{1}{2\,x}\sqrt{-2\,x^4 + 4\_C1}\right\}$$

ODE No. 233

$$ax^3\cos(x) + xy(x)y'(x) - y(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.0246346 (sec), leaf count = 38

$$\left\{\left\{y(x) \to -x\sqrt{c_1 - 2a\sin(x)}\right\}, \left\{y(x) \to x\sqrt{c_1 - 2a\sin(x)}\right\}\right\}$$

✓ **Maple** : cpu = 0.03 (sec), leaf count = 30

$$\left\{y(x) = \sqrt{-2\,a\sin(x) + \_C1}x, y(x) = -\sqrt{-2\,a\sin(x) + \_C1}x\right\}$$

ODE No. 234

$$x^3 - 2x^2 + xy(x)y'(x) + xy(x) - y(x)^2 = 0$$

✗ **Mathematica** : cpu = 29.4748 (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))
```

ODE No. 235

$$(a + xy(x))y'(x) + by(x) = 0$$

✓ **Mathematica** : cpu = 0.0755633 (sec), leaf count = 40

$$\text{Solve}\left[x = c_1 e^{-\frac{y(x)}{b}} - \frac{a e^{-\frac{y(x)}{b}} \text{Ei}\left(\frac{y(x)}{b}\right)}{b}, y(x)\right]$$

✓ **Maple** : cpu = 0.059 (sec), leaf count = 30

$$\left\{\_C1 + \left(-\mathrm{e}^{\frac{y(x)}{b}} bx + aEi\left(1, -\frac{y(x)}{b}\right)\right)^{-1} = 0\right\}$$

ODE No. 236

$$x(y(x) + 4)y'(x) - y(x)^2 - 2y(x) - 2x = 0$$

✓ **Mathematica** : cpu = 0.0180209 (sec), leaf count = 114

$$\left\{\left\{y(x) \to \frac{1}{x\left(\frac{1}{x^2+4x} - \frac{e^{-2\left(\frac{\log(x)}{4} + \frac{3}{4}\log(x+4)\right)}}{\sqrt{c_1 - \frac{4}{x+4}}}\right)} - 4\right\}, \left\{y(x) \to \frac{1}{x\left(\frac{e^{-2\left(\frac{\log(x)}{4} + \frac{3}{4}\log(x+4)\right)}}{\sqrt{c_1 - \frac{4}{x+4}}} + \frac{1}{x^2+4x}\right)} - 4\right\}\right\}$$

✓ **Maple** : cpu = 0.073 (sec), leaf count = 141

$$\left\{y(x) = 1\left(-(x+4)^{\frac{3}{2}}\sqrt{\frac{\_C1\ (x+4) - 4}{x+4}}x - 16\sqrt{x} - 4x^{3/2}\right)\left(-(x+4)^{\frac{3}{2}}\sqrt{\frac{\_C1\ (x+4) - 4}{x+4}} + 4\sqrt{x}\right.$$

ODE No. 237

$$x(a+y(x))y'(x)+by(x)+cx=0$$

✗ **Mathematica** : cpu = 8.65041 (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))
```

ODE No. 238

$$(a+x(y(x)+x))y'(x)-b-y(x)(y(x)+x)=0$$

✓ **Mathematica** : cpu = 0.044855 (sec), leaf count = 192

$$\left\{\left\{y(x)\to \frac{1}{x\left(-\frac{x}{\left(a^2+ax^2+bx^2\right)^{3/2}\sqrt{c_1-\frac{1}{(a+b)\left(a^2+ax^2+bx^2\right)}}}-\frac{a}{-a^2-ax^2-bx^2}\right)}-\frac{a+x^2}{x}\right\},\left\{y(x)\to \frac{}{x\left(\frac{}{(a^2+ax^2+bx^2}\right.}\right.$$

✓ **Maple** : cpu = 0.085 (sec), leaf count = 93

$$\left\{y(x)=\frac{1}{-a^2+\_C1}\left(-abx-\_C1\;x+\sqrt{\_C1\;(a+b)\left(ax^2+bx^2+a^2-\_C1\right)}\right),y(x)=\frac{1}{a^2-\_C1}\left(ab\right.$$

ODE No. 239

$$\left(xy(x)-x^2\right)y'(x)-2x^2-3xy(x)+y(x)^2=0$$

✓ **Mathematica** : cpu = 0.0295422 (sec), leaf count = 54

$$\left\{\left\{y(x)\to x-\frac{\sqrt{e^{2c_1}+2x^4}}{x}\right\},\left\{y(x)\to \frac{\sqrt{e^{2c_1}+2x^4}}{x}+x\right\}\right\}$$

✓ **Maple** : cpu = 0.207 (sec), leaf count = 59

$$\left\{y(x)=\frac{1}{\_C1\;x}\left(\_C1\;x^2-\sqrt{2\,\_C1^2x^4+1}\right),y(x)=\frac{1}{\_C1\;x}\left(\_C1\;x^2+\sqrt{2\,\_C1^2x^4+1}\right)\right\}$$

ODE No. 240

$$ax + 2xy(x)y'(x) - y(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.0102574 (sec), leaf count = 41

$$\left\{\left\{y(x) \to -\sqrt{c_1 x - ax\log(x)}\right\}, \left\{y(x) \to \sqrt{c_1 x - ax\log(x)}\right\}\right\}$$

✓ **Maple** : cpu = 0.033 (sec), leaf count = 34

$$\left\{y(x) = \sqrt{-ax\ln(x) + \_C1\,x}, y(x) = -\sqrt{-x\left(a\ln(x) - \_C1\right)}\right\}$$

ODE No. 241

$$ax^2 + 2xy(x)y'(x) - y(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.0100865 (sec), leaf count = 41

$$\left\{\left\{y(x) \to -\sqrt{c_1 x - ax^2}\right\}, \left\{y(x) \to \sqrt{c_1 x - ax^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.02 (sec), leaf count = 33

$$\left\{y(x) = \sqrt{-ax^2 + \_C1\,x}, y(x) = -\sqrt{-ax^2 + \_C1\,x}\right\}$$

ODE No. 242

$$2xy(x)y'(x) + 2y(x)^2 + 1 = 0$$

✓ **Mathematica** : cpu = 0.0148341 (sec), leaf count = 60

$$\left\{\left\{y(x) \to -\frac{\sqrt{e^{4c_1} - x^2}}{\sqrt{2}x}\right\}, \left\{y(x) \to \frac{\sqrt{e^{4c_1} - x^2}}{\sqrt{2}x}\right\}\right\}$$

✓ **Maple** : cpu = 0.02 (sec), leaf count = 39

$$\left\{y(x) = -\frac{1}{2\,x}\sqrt{-2\,x^2 + 4\_C1}, y(x) = \frac{1}{2\,x}\sqrt{-2\,x^2 + 4\_C1}\right\}$$

ODE No. 243

$$x(2y(x)+x-1)y'(x)-y(x)(y(x)+2x+1)=0$$

✓ **Mathematica** : cpu = 15.0716 (sec), leaf count = 487

$$\left\{\left\{y(x)\to -\frac{\sqrt[3]{2}x}{\sqrt[3]{-27c_1^2x^2+\sqrt{108c_1^3x^3+(27c_1^2x-27c_1^2x^2)^2}+27c_1^2x}}+\frac{\sqrt[3]{-27c_1^2x^2+\sqrt{108c_1^3x^3+(27c_1^2x}}}{3\sqrt[3]{2}c_1}\right.\right.$$

✓ **Maple** : cpu = 0.159 (sec), leaf count = 391

$$\left\{y(x)=\frac{1}{80\_C1}\left(-3\left(x\left(\sqrt{5}\sqrt{\frac{80\,(x-1)^2\_C1-x}{\_C1}}+20\,x-20\right)\_C1^2\right)^{2/3}\left(1+i\sqrt{3}\right)\sqrt[3]{5}+3\left(x\left(\right.\right.\right.\right.$$

ODE No. 244

$$x(2y(x)-x-1)y'(x)+(-y(x)+2x-1)y(x)=0$$

✓ **Mathematica** : cpu = 14.9929 (sec), leaf count = 484

$$\left\{\left\{y(x)\to -\frac{\sqrt[3]{2}x}{\sqrt[3]{27c_1^2x^2+\sqrt{(27c_1^2x^2+27c_1^2x)^2-108c_1^3x^3}+27c_1^2x}}-\frac{\sqrt[3]{27c_1^2x^2+\sqrt{(27c_1^2x^2+27c_1^2x)^2-}}}{3\sqrt[3]{2}c_1}\right.\right.$$

✓ **Maple** : cpu = 0.135 (sec), leaf count = 391

$$\left\{y(x)=-\frac{3}{80\_C1}\left(\left(\left(x\left(\sqrt{5}\sqrt{\frac{80\,(1+x)^2\_C1-x}{\_C1}}-20\,x-20\right)\_C1^2\right)^{\frac{2}{3}}\left(1+i\sqrt{3}\right)\sqrt[3]{5}-\_C1\left(x\right.\right.\right.\right.$$

ODE No. 245

$$\left(4x^3+2xy(x)\right)y'(x)+112x^2y(x)+y(x)^2=0$$

✓ **Mathematica** : cpu = 0.483408 (sec), leaf count = 1453

$$\left\{\left\{y(x)\to \text{Root}\left[-1521681143169024\#1x^{22}-697437190619136\#1^2x^{20}-145299414712320\#1^3x^{18}-18\right.\right.\right.$$

✓ **Maple** : cpu = 0.349 (sec), leaf count = 31

$$\left\{y(x)=\frac{\_C1}{x^{28}\left(RootOf\left(x^{30}\_Z^{360}-24\,x^{30}\_Z^{330}-\_C1\right)\right)^{330}}\right\}$$

ODE No. 246

$$x(3y(x)+2x)y'(x)+3(y(x)+x)^2=0$$

✓ **Mathematica** : cpu = 0.0323849 (sec), leaf count = 80

$$\left\{\left\{y(x)\to \frac{1}{6}\left(-\frac{\sqrt{2}\sqrt{3e^{4c_1}-x^4}}{x}-4x\right)\right\},\left\{y(x)\to \frac{1}{6}\left(\frac{\sqrt{2}\sqrt{3e^{4c_1}-x^4}}{x}-4x\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.076 (sec), leaf count = 63

$$\left\{y(x)=\frac{1}{6\_C1\,x}\left(-4\_C1\,x^2-\sqrt{-2\_C1^2x^4+6}\right),y(x)=\frac{1}{6\_C1\,x}\left(-4\_C1\,x^2+\sqrt{-2\_C1^2x^4+6}\right)\right.$$

ODE No. 247

$$-7x^2+(3x+2)(y(x)-2x-1)y'(x)+xy(x)-y(x)^2-9x-3=0$$

✓ **Mathematica** : cpu = 14.9264 (sec), leaf count = 693

$$\left\{\left\{y(x)\to \frac{\sqrt[3]{\sqrt{\left(-324e^{2c_1}x-216e^{2c_1}+1458x^3+2916x^2+1944x+432\right)^2+4\left(-81x^2-108x-36\right)^3}-}}{6\sqrt[3]{2}}\right.\right.$$

✓ **Maple** : cpu = 0.286 (sec), leaf count = 517

$$\left\{ y(x) = -\frac{1}{3} + \frac{3\,x+2}{6} \left(7 \left(-1/4\,\sqrt[3]{2\,(3\,x+2)\,\_C1 - 27\,(3\,x+2)^3\,\_C1^3 + 2\,\sqrt{-27\,(3\,x+2)^4\,\_C1^4 +}} \right.\right.\right.$$

ODE No. 248

$$\left(x^2+6xy(x)+3\right)y'(x)+3y(x)^2+2xy(x)+2x=0$$

✓ **Mathematica** : cpu = 0.0145516 (sec), leaf count = 106

$$\left\{\left\{y(x)\to -\frac{\sqrt{6c_1x-2x^3+\frac{1}{6}\left(x^2+3\right)^2}}{\sqrt{6}x}-\frac{x^2+3}{6x}\right\},\left\{y(x)\to \frac{\sqrt{6c_1x-2x^3+\frac{1}{6}\left(x^2+3\right)^2}}{\sqrt{6}x}-\frac{x^2+3}{6x}\right\}\right.$$

✓ **Maple** : cpu = 0.026 (sec), leaf count = 75

$$\left\{ y(x) = \frac{1}{6\,x}\left(-x^2-3-\sqrt{x^4-12\,x^3-12\,\_C1\,x+6\,x^2+9}\right), y(x) = \frac{1}{6\,x}\left(-x^2-3+\sqrt{x^4-12\,x^3-12}\right.\right.$$

ODE No. 249

$$y'(x)\left(axy(x)+bx^n\right)+\alpha y(x)^3+\beta y(x)^2=0$$

✓ **Mathematica** : cpu = 6.22092 (sec), leaf count = 115

$$\text{Solve}\left[\frac{(a(-n)+a+\alpha y(x))y(x)^{\frac{a-an}{\beta}-1}(\alpha y(x)+\beta)^{\frac{a(n-1)}{\beta}}}{a^2(n-1)^2(a(n-1)+\beta)}+\frac{x^{1-n}\exp\left(-\frac{a(n-1)(\log(y(x))-\log(\alpha y(x)+\beta))}{\beta}\right)}{ab(1-n)(n-1)}=c_1,\right.$$

✓ **Maple** : cpu = 0.232 (sec), leaf count = 202

$$\left\{ y(x) = \beta\left(RootOf\left(-x^{1-n}\_Z^{\frac{a(n-1)}{\beta}}a^2\beta\,n + \_C1\,a^2bn^2 + x^{1-n}\_Z^{\frac{a(n-1)}{\beta}}a^2\beta - x^{1-n}\_Z^{\frac{a(n-1)}{\beta}}a\beta^2 - \_Z^{\frac{an-}{\beta}}\right.\right.\right.$$

ODE No. 250

$$y'(x)\left(ax+Ax^2+by(x)+Bxy(x)+c\right)+Axy(x)+\alpha x-By(x)^2+\beta y(x)+\gamma=0$$

✗ **Mathematica** : cpu = 3601.71 (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)+
```

ODE No. 251

$$\left(x^2y(x)-1\right)y'(x)+xy(x)^2-1=0$$

✓ **Mathematica** : cpu = 0.0132006 (sec), leaf count = 60

$$\left\{\left\{y(x)\to\frac{1}{x^2}-\frac{\sqrt{c_1x^2+2x^3+1}}{x^2}\right\},\left\{y(x)\to\frac{\sqrt{c_1x^2+2x^3+1}}{x^2}+\frac{1}{x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.024 (sec), leaf count = 51

$$\left\{y(x)=\frac{1}{x^2}\left(1-\sqrt{-2\_C1\,x^2+2\,x^3+1}\right),y(x)=\frac{1}{x^2}\left(1+\sqrt{-2\_C1\,x^2+2\,x^3+1}\right)\right\}$$

ODE No. 252

$$\left(x^2y(x)-1\right)y'(x)-xy(x)^2+1=0$$

✓ **Mathematica** : cpu = 14.9476 (sec), leaf count = 819

$$\left\{\left\{y(x)\to\frac{6xc_1-x}{6c_1-1}+\frac{\sqrt[3]{-1944c_1^2x^3+648c_1x^3-54x^3+1944c_1^2-648c_1+\sqrt{4\left(54x^2c_1-9x^2\right)^3+(-19}}}{3\sqrt[3]{2}\left(6c_1-1\right)}\right.\right.$$

✓ **Maple** : cpu = 0.933 (sec), leaf count = 1338

$$\left\{y(x)=1\left(\left(\left(-\_C1+80\right)x^7-160\,x^4+80\,x\right)\sqrt[3]{4}\sqrt[3]{\left(-80+\left(\_C1-80\right)x^6+160\,x^3\right)^2\_C1\left(-\frac{1}{4}+\sqrt{\right.}}\right.\right.$$

ODE No. 253

$$\left(x^2y(x)-1\right)y'(x)+8xy(x)^2-8=0$$

✗ **Mathematica** : cpu = 19.95 (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))
```

ODE No. 254

$$x^2y(x)^3+x(xy(x)-2)y'(x)+xy(x)^2-2y(x)=0$$

✓ **Mathematica** : cpu = 0.0169368 (sec), leaf count = 99

$$\left\{\left\{y(x)\to -\frac{2x}{\frac{\sqrt{2}\sqrt{-2x(c_1-\log(x))-\frac{x}{2}}}{\sqrt{-\frac{1}{x^3}}}-x^2}\right\},\left\{y(x)\to \frac{2x}{\frac{\sqrt{2}\sqrt{-2x(c_1-\log(x))-\frac{x}{2}}}{\sqrt{-\frac{1}{x^3}}}+x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.036 (sec), leaf count = 59

$$\left\{y(x)=\frac{1}{(-2\ln(x)+2\_C1)\,x}\left(-1+\sqrt{1-4\ln(x)+4\_C1}\right),y(x)=\frac{1}{(2\ln(x)-2\_C1)\,x}\left(1+\sqrt{1-\right.\right.$$

ODE No. 255

$$x(xy(x)-3)y'(x)+xy(x)^2-y(x)=0$$

✓ **Mathematica** : cpu = 5.54785 (sec), leaf count = 30

$$\left\{\left\{y(x)\to -\frac{3W\left(e^{\frac{9c_1}{2^{2/3}}-1}x^{2/3}\right)}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.261 (sec), leaf count = 74

$$\left\{y(x)=-3\,\frac{\mathit{lambertW}\left(2/3\sqrt[3]{-1/8\,x^2}\_C1\right)}{x},y(x)=-3\,\frac{\mathit{lambertW}\left(-1/3\sqrt[3]{-1/8\,x^2}\_C1\,(1+i\sqrt{3})\right)}{x},y\right.$$

ODE No. 256

$$x^2(y(x)-1)y'(x)+(x-1)y(x)=0$$

✓ **Mathematica** : cpu = 0.0202732 (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 = 0.062 (sec), leaf count = 31

$$\left\{y(x)=\mathrm{e}^{\frac{\_C1\,x+x\ln(x)-\mathit{lambertW}\left(-x\mathrm{e}^{\_C1+x^{-1}}\right)x+1}{x}}\right\}$$

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 = 0.40527 (sec), leaf count = 39

$$\mathrm{Solve}\left[\frac{x\left(c_1-2\log\left(\frac{1}{1-xy(x)}\right)-2\right)}{y(x)}+2x^2+\frac{y(x)}{x}=0,y(x)\right]$$

✓ **Maple** : cpu = 0.135 (sec), leaf count = 98

$$\left\{y(x)=\frac{-\_C1+\mathrm{e}^{\mathit{RootOf}\left(-2\_Z\,x^4\left(\mathrm{e}^{\_Z}\right)^2+2\,x^4\left(\mathrm{e}^{\_Z}\right)^2-2\,\mathrm{e}^{\_Z}\_C1\,x^4+\left(\mathrm{e}^{\_Z}\right)^2-2\,\mathrm{e}^{\_Z}\_C1+\_C1^2\right)}}{x\mathrm{e}^{\mathit{RootOf}\left(-2\_Z\,x^4\left(\mathrm{e}^{\_Z}\right)^2+2\,x^4\left(\mathrm{e}^{\_Z}\right)^2-2\,\mathrm{e}^{\_Z}\_C1\,x^4+\left(\mathrm{e}^{\_Z}\right)^2-2\,\mathrm{e}^{\_Z}\_C1+\_C1^2\right)}}\right\}$$

ODE No. 258

$$-2x^3+2x^2y(x)y'(x)-x^2+y(x)^2=0$$

✓ **Mathematica** : cpu = 0.0138671 (sec), leaf count = 43

$$\left\{\left\{y(x)\to -\sqrt{c_1e^{\frac{1}{x}}+x^2}\right\},\left\{y(x)\to \sqrt{c_1e^{\frac{1}{x}}+x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.03 (sec), leaf count = 33

$$\left\{y(x)=\sqrt{\mathrm{e}^{x^{-1}}\_C1+x^2},y(x)=-\sqrt{\mathrm{e}^{x^{-1}}\_C1+x^2}\right\}$$

ODE No. 259

$$2x^2y(x)y'(x) - e^{x-\frac{1}{x}}x^2 - y(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.0204886 (sec), leaf count = 50

$$\left\{\left\{y(x) \to -e^{-\frac{1}{2}/x}\sqrt{c_1 + e^x}\right\}, \left\{y(x) \to e^{-\frac{1}{2}/x}\sqrt{c_1 + e^x}\right\}\right\}$$

✓ **Maple** : cpu = 0.033 (sec), leaf count = 51

$$\left\{y(x) = \sqrt{\mathrm{e}^{-x^{-1}}\_C1 + \mathrm{e}^{\frac{x^2-1}{x}}}, y(x) = -\sqrt{\mathrm{e}^{-x^{-1}}\_C1 + \mathrm{e}^{\frac{x^2-1}{x}}}\right\}$$

ODE No. 260

$$\left(2x^2y(x) + x\right)y'(x) - x^2y(x)^3 + 2xy(x)^2 + y(x) = 0$$

✓ **Mathematica** : cpu = 0.0155723 (sec), leaf count = 80

$$\left\{\left\{y(x) \to \frac{x}{\frac{\sqrt{x(c_1-2\log(x))+4x}}{\sqrt{\frac{1}{x^3}}} - 2x^2}\right\}, \left\{y(x) \to -\frac{x}{\frac{\sqrt{x(c_1-2\log(x))+4x}}{\sqrt{\frac{1}{x^3}}} + 2x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.039 (sec), leaf count = 59

$$\left\{y(x) = \frac{1}{(2\ln(x) - 2\_C1)x}\left(-2 + \sqrt{4 - 2\ln(x) + 2\_C1}\right), y(x) = \frac{1}{(-2\ln(x) + 2\_C1)x}\left(2 + \sqrt{4 -\right.\right.$$

ODE No. 261

$$\left(2x^2y(x) - x\right)y'(x) - 2xy(x)^2 - y(x) = 0$$

✓ **Mathematica** : cpu = 1.14585 (sec), leaf count = 32

$$\left\{\left\{y(x) \to -\frac{1}{2xW\left(\frac{e^{\frac{9c_1}{2^{2/3}}-1}}{x^2}\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.161 (sec), leaf count = 18

$$\left\{y(x) = -\frac{1}{2x}\left(lambertW\left(-\frac{\_C1}{2x^2}\right)\right)^{-1}\right\}$$

ODE No. 262

$$2x^3+\left(2x^2y(x)-x^3\right)y'(x)-4xy(x)^2+y(x)^3=0$$

✓ **Mathematica** : cpu = 0.0699715 (sec), leaf count = 101

$$\left\{\left\{y(x)\to\frac{2x^3-\sqrt{e^{4c_1}x^2-3e^{2c_1}x^4}}{e^{2c_1}+x^2}\right\},\left\{y(x)\to\frac{\sqrt{e^{4c_1}x^2-3e^{2c_1}x^4}+2x^3}{e^{2c_1}+x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.351 (sec), leaf count = 65

$$\left\{y(x)=\frac{x}{\_C1\,x^2-1}\left(2\_C1\,x^2-\sqrt{3\_C1\,x^2+1}\right),y(x)=\frac{x}{\_C1\,x^2-1}\left(2\_C1\,x^2+\sqrt{3\_C1\,x^2+1}\right)\right\}$$

ODE No. 263

$$2x^3+3x^2y(x)^2+y(x)y'(x)+7=0$$

✓ **Mathematica** : cpu = 0.0427159 (sec), leaf count = 121

$$\left\{\left\{y(x)\to-\sqrt{c_1e^{-2x^3}+\frac{20\ 2^{2/3}e^{-2x^3}x\Gamma\left(\frac{1}{3},-2x^3\right)}{9\sqrt[3]{-x^3}}-\frac{2x}{3}}\right\},\left\{y(x)\to\sqrt{c_1e^{-2x^3}+\frac{20\ 2^{2/3}e^{-2x^3}x\Gamma\left(\frac{1}{3},-\right.}{9\sqrt[3]{-x^3}}}\right.\right.$$

✓ **Maple** : cpu = 0.316 (sec), leaf count = 173

$$\left\{y(x)=-\frac{2^{\frac{2}{3}}}{18\,\Gamma(2/3)}\sqrt{-240\,\Gamma(2/3)\sqrt[3]{2}\left(\frac{9\,\Gamma(2/3)\sqrt[3]{2}\,(-3/2\,\mathrm{e}^{-2\,x^3}\_C1+x)\sqrt[3]{-x^3}}{40}+\mathrm{e}^{-2\,x^3}x\left(\pi\sqrt{3}-\right.\right.}\right.$$

ODE No. 264

$$2x\left(x^3y(x)+1\right)y'(x)+y(x)\left(3x^3y(x)-1\right)=0$$

✓ **Mathematica** : cpu = 0.442371 (sec), leaf count = 680

$$\left\{\left\{y(x)\to\mathrm{Root}\left[81\#1^7e^{\frac{21c_1}{2}}x^{12}+756\#1^6e^{\frac{21c_1}{2}}x^9+2646\#1^5e^{\frac{21c_1}{2}}x^6+4116\#1^4e^{\frac{21c_1}{2}}x^3+2401\#1^3e^{\frac{21c_1}{2}}-\right.\right.\right.$$

✓ **Maple** : cpu = 0.638 (sec), leaf count = 574

$$\left\{y(x) = \frac{-40353607\left(RootOf\left(9\,x^7\_Z^{98} - 49\_C1\,\_Z^{42} + 14\_C1\,\_Z^{21} - \_C1\right)\right)^{91}\_C1 + 756315\left(Roo\right.}{3\,x^3\left(RootOf\left(9\,x^7\_Z^{98} - 49\_C1\,\_Z^{42} + 14\_C1\,\_Z^{21} - \_C1\right)\right)^7\left(5764801\_C1\,\left(RootOf\right.\right.}\right.$$

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 = 454.554 (sec), leaf count = 0 , could not solve

```
DSolve[2*(1 + n)^2*x^(-1 + n)*(-1 + x^n^2*y[x]^2) + (-1 + x^(n*(1 + n))*y[x])*Derivati
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve((x^(n*(n+1))*y(x)-1)*diff(y(x),x)+2*(n+1)^2*x^(n-1)*(x^(n^2)*y(x)^2-
1) = 0,y(x))
```

ODE No. 266

$$\sqrt{x^2+1}(y(x) - x)y'(x) - a\sqrt{\left(y(x)^2+1\right)^3} = 0$$

✗ **Mathematica** : cpu = 3600.04 (sec), leaf count = 0 , timed out

```
$Aborted
```

✓ **Maple** : cpu = 1.583 (sec), leaf count = 55

$$\left\{y(x) = \tan\left(RootOf\left(-\arctan(x) + \int^{-\arctan(x)+\_Z} -\frac{1}{2\,a^2 + \cos(2\_a) - 1}\left(\cos(2\_a) - 1 + \sqrt{-2\,a^2\,(}\right.\right.\right.\right.$$

ODE No. 267

$$y(x)\sin^2(x)y'(x) + y(x)^2\sin(x)\cos(x) - 1 = 0$$

✓ **Mathematica** : cpu = 0.0387437 (sec), leaf count = 36

$$\left\{\left\{y(x) \to -\sqrt{c_1 + 2x}\csc(x)\right\}, \left\{y(x) \to \sqrt{c_1 + 2x}\csc(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.03 (sec), leaf count = 32

$$\left\{y(x) = \frac{1}{\sin(x)}\sqrt{2\,x + \_C1}, y(x) = -\frac{1}{\sin(x)}\sqrt{2\,x + \_C1}\right\}$$

ODE No. 268

$$f(x)y(x)y'(x)+g(x)y(x)^2+h(x)=0$$

✓ **Mathematica** : cpu = 1.00287 (sec), leaf count = 140

$$\left\{\left\{y(x)\to -e^{\int_1^x -\frac{g(K[1])}{f(K[1])}\,dK[1]}\sqrt{2\int_1^x -\frac{h(K[2])\exp\left(-2\int_1^{K[2]} -\frac{g(K[1])}{f(K[1])}\,dK[1]\right)}{f(K[2])}\,dK[2]+c_1}\right\},\left\{y(x)\to e^{\int_1^x}\right.\right.$$

✓ **Maple** : cpu = 0.087 (sec), leaf count = 118

$$\left\{y(x)=1\sqrt{\mathrm{e}^{2\int\frac{g(x)}{f(x)}\,\mathrm{d}x}\left(-2\int\frac{h(x)}{f(x)}\left(\mathrm{e}^{\int\frac{g(x)}{f(x)}\,\mathrm{d}x}\right)^2\mathrm{d}x+\_C1\right)}\left(\mathrm{e}^{2\int\frac{g(x)}{f(x)}\,\mathrm{d}x}\right)^{-1},y(x)=-1\sqrt{\mathrm{e}^{2\int\frac{g(x)}{f(x)}\,\mathrm{d}x}\left(-2\int\right.}\right.$$

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 = 0 (sec), leaf count = 0 , timed out

```
timed out
```

✗ **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))
```

ODE No. 270

$$x^2+\left(y(x)^2-x\right)y'(x)-y(x)=0$$

✓ **Mathematica** : cpu = 0.0786457 (sec), leaf count = 327

$$\left\{\left\{y(x)\to -\frac{3\sqrt[3]{2}x}{\sqrt[3]{\sqrt{\left(81c_1+27x^3\right)^2-2916x^3}+81c_1+27x^3}}-\frac{\sqrt[3]{\sqrt{\left(81c_1+27x^3\right)^2-2916x^3}+81c_1+27x}}{3\sqrt[3]{2}}\right.\right.$$

✓ **Maple** : cpu = 0.032 (sec), leaf count = 319

$$\left\{y(x)=\frac{1}{2}\left(\left(-4x^3-12\_C1+4\sqrt{x^6+(6\_C1-4)x^3+9\_C1^2}\right)^{\frac{2}{3}}+4x\right)\frac{}{\sqrt[3]{-4x^3-12\_C1+4\sqrt{}}}\right.$$

ODE No. 271

$$\left(x^2+y(x)^2\right)y'(x)+2x(y(x)+2x)=0$$

✓ **Mathematica** : cpu = 0.0913654 (sec), leaf count = 370

$$\left\{\left\{y(x)\to\frac{\sqrt[3]{\sqrt{-8e^{3c_1}x^3+e^{6c_1}+20x^6}+e^{3c_1}-4x^3}}{\sqrt[3]{2}}-\frac{\sqrt[3]{2}x^2}{\sqrt[3]{\sqrt{-8e^{3c_1}x^3+e^{6c_1}+20x^6}+e^{3c_1}-4x^3}}\right\},\left\{y(x\right.\right.$$

✓ **Maple** : cpu = 0.224 (sec), leaf count = 352

$$\left\{y(x)=1\left(\frac{1}{2}\sqrt[3]{4-16\,x^3\_C1^{3/2}+4\,\sqrt{20\_C1^3x^6-8\,x^3\_C1^{3/2}+1}}-2\,\frac{\_C1\,x}{\sqrt[3]{4-16\,x^3\_C1^{3/2}+4\,\sqrt{20\_}}}\right.\right.$$

ODE No. 272

$$\left(x^2+y(x)^2\right)y'(x)-y(x)^2=0$$

✓ **Mathematica** : cpu = 0.122145 (sec), leaf count = 42

$$\text{Solve}\left[\log\left(\frac{y(x)}{x}\right)+\frac{2\tan^{-1}\left(\frac{\frac{2y(x)}{x}-1}{\sqrt{3}}\right)}{\sqrt{3}}=c_1-\log(x),y(x)\right]$$

✓ **Maple** : cpu = 0.182 (sec), leaf count = 43

$$\left\{y(x)=\mathrm{e}^{\frac{2\sqrt{3}}{3}RootOf\left(-\sqrt{3}x\mathrm{e}^{-\_C1}+3\tan(\_Z)x\mathrm{e}^{-\_C1}+2\sqrt{3}\mathrm{e}^{2/3\sqrt{3}\_Z}\right)-\_C1}\right\}$$

ODE No. 273

$$\left(a+x^2+y(x)^2\right)y'(x)+2xy(x)=0$$

✓ **Mathematica** : cpu = 0.0186768 (sec), leaf count = 297

$$\left\{\left\{y(x)\to\frac{\sqrt[3]{\sqrt{2916\left(a+x^2\right)^3+6561c_1^2}+81c_1}}{3\sqrt[3]{2}}-\frac{3\sqrt[3]{2}(a+x^2)}{\sqrt[3]{\sqrt{2916\left(a+x^2\right)^3+6561c_1^2}+81c_1}}\right\},\left\{y(x)\to\frac{}{2^{2/3}}\right.\right.$$

✓ **Maple** : cpu = 0.03 (sec), leaf count = 401

$$\left\{y(x) = \frac{1}{2}\left(\left(-12\_C1 + 4\sqrt{4x^6 + 12ax^4 + 12a^2x^2 + 4a^3 + 9\_C1^2}\right)^{\frac{2}{3}} - 4x^2 - 4a\right)\frac{}{\sqrt[3]{-12\_C1 + 4}}\right.$$

ODE No. 274

$$(a + x^2 + y(x)^2)\, y'(x) + b + x^2 + 2xy(x) = 0$$

✓ **Mathematica** : cpu = 0.0276901 (sec), leaf count = 411

$$\left\{\left\{y(x) \to \frac{\sqrt[3]{\sqrt{2916\,(a + x^2)^3 + (-81bx + 81c_1 - 27x^3)^2} - 81bx + 81c_1 - 27x^3}}{3\sqrt[3]{2}} - \frac{}{\sqrt[3]{\sqrt{2916\,(a + x^2)^3 -}}}\right.\right.$$

✓ **Maple** : cpu = 0.041 (sec), leaf count = 657

$$\left\{y(x) = \frac{1}{2}\left(\left(-4x^3 - 12bx - 12\_C1 + 4\sqrt{5x^6 + (12a + 6b)x^4 + 6x^3\_C1 + (12a^2 + 9b^2)x^2 + 18bx}\right.\right.\right.$$

ODE No. 275

$$(x^2 + y(x)^2 + x)\, y'(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 0.0408303 (sec), leaf count = 18

$$\text{Solve}\left[y(x) - \tan^{-1}\left(\frac{x}{y(x)}\right) = c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.109 (sec), leaf count = 30

$$\left\{\_C1 + \frac{(ix + y(x))\, e^{-2\,iy(x)}}{2\,iy\,(x) + 2\,x} = 0\right\}$$

ODE No. 276

$$\left(y(x)^2 - x^2\right) y'(x) + 2xy(x) = 0$$

✓ **Mathematica** : cpu = 0.0341071 (sec), leaf count = 61

$$\left\{\left\{y(x) \to \frac{1}{2}\left(e^{c_1} - \sqrt{e^{2c_1} - 4x^2}\right)\right\}, \left\{y(x) \to \frac{1}{2}\left(\sqrt{e^{2c_1} - 4x^2} + e^{c_1}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.072 (sec), leaf count = 47

$$\left\{y(x) = \frac{1}{2\_C1}\left(1 + \sqrt{-4\_C1^2 x^2 + 1}\right), y(x) = \frac{1}{2\_C1}\left(1 - \sqrt{-4\_C1^2 x^2 + 1}\right)\right\}$$

ODE No. 277

$$\left(x^4 + y(x)^2\right) y'(x) - 4x^3 y(x) = 0$$

✓ **Mathematica** : cpu = 0.0138671 (sec), leaf count = 53

$$\left\{\left\{y(x) \to \frac{1}{2}\left(c_1 - \sqrt{c_1^2 + 4x^4}\right)\right\}, \left\{y(x) \to \frac{1}{2}\left(\sqrt{c_1^2 + 4x^4} + c_1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.391 (sec), leaf count = 41

$$\left\{y(x) = -\frac{1}{2}\sqrt{4\,x^4 + \_C1^2} + \frac{\_C1}{2}, y(x) = \frac{1}{2}\sqrt{4\,x^4 + \_C1^2} + \frac{\_C1}{2}\right\}$$

ODE No. 278

$$y'(x)\left(y(x)^2 + 4\sin(x)\right) - \cos(x) = 0$$

✓ **Mathematica** : cpu = 0.0939371 (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 = 0.063 (sec), leaf count = 28

$$\left\{\frac{\left(-8\left(y(x)\right)^2 - 4\,y(x) - 32\,\sin(x) - 1\right)e^{-4\,y(x)}}{32} + \_C1 = 0\right\}$$

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 = 0.695511 (sec), leaf count = 107

$$\left\{\left\{y(x)\to\frac{-\sqrt{\left(-c_1x+x^2-1\right)^2+4\left(x-c_1\right)}+c_1x-x^2+1}{2\left(x-c_1\right)}\right\},\left\{y(x)\to\frac{\sqrt{\left(-c_1x+x^2-1\right)^2+4\left(x-\right.}}{2\left(x-c_1\right)}\right.$$

✓ **Maple** : cpu = 0.185 (sec), leaf count = 116

$$\left\{y(x)=\frac{1}{-2\_C1+4x}\left(-2x^2+\_C1\,x+\sqrt{4x^4-4\_C1\,x^3+\left(\_C1^2-8\right)x^2+\left(4\_C1+16\right)x-8\_C}\right.\right.$$

ODE No. 280

$$(y(x)+x)^2y'(x)-a^2=0$$

✓ **Mathematica** : cpu = 0.039072 (sec), leaf count = 21

$$\mathrm{Solve}\left[y(x)-a\tan^{-1}\left(\frac{y(x)+x}{a}\right)=c_1,y(x)\right]$$

✓ **Maple** : cpu = 0.065 (sec), leaf count = 24

$$\{y(x)=aRootOf(\tan(\_Z)\,a-\_Z\,a+\_C1-x)-\_C1\}$$

ODE No. 281

$$\left(-x^2+2xy(x)+y(x)^2\right)y'(x)+x^2+2xy(x)-y(x)^2=0$$

✓ **Mathematica** : cpu = 0.0561198 (sec), leaf count = 75

$$\left\{\left\{y(x)\to\frac{1}{2}\left(e^{c_1}-\sqrt{4e^{c_1}x+e^{2c_1}-4x^2}\right)\right\},\left\{y(x)\to\frac{1}{2}\left(\sqrt{4e^{c_1}x+e^{2c_1}-4x^2}+e^{c_1}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.076 (sec), leaf count = 55

$$\left\{y(x)=\frac{1}{2\_C1}\left(1+\sqrt{-4\_C1^2x^2+4\_C1\,x+1}\right),y(x)=\frac{1}{2\_C1}\left(1-\sqrt{-4\_C1^2x^2+4\_C1\,x+1}\right)\right\}$$

ODE No. 282

$$(y(x)+3x-1)^2y'(x)-(2y(x)-1)(4y(x)+6x-3)=0$$

✓ **Mathematica** : cpu = 0.126001 (sec), leaf count = 2129

$$\left\{\left\{y(x)\to\frac{1}{6}(12x+4e^{c_1}+1)-\frac{1}{6}\sqrt{36x^2+96e^{c_1}x-12x-16e^{c_1}+16e^{2c_1}+3\,2^{2/3}\sqrt[3]{-7776e^{c_1}x^5+6480e}\right.\right.$$

✓ **Maple** : cpu = 0.326 (sec), leaf count = 71

$$\left\{-\ln\left(\frac{-6\,y(x)+4-6\,x}{6\,x-1}\right)+3\,\ln\left(\frac{-6\,y(x)+3}{6\,x-1}\right)-3\,\ln\left(\frac{-6\,y(x)+18\,x}{6\,x-1}\right)-\ln(6\,x-1)-\_C1=0\right\}$$

ODE No. 283

$$3\left(y(x)^2-x^2\right)y'(x)+2y(x)^3-6x(x+1)y(x)-3e^x=0$$

✓ **Mathematica** : cpu = 0.0520704 (sec), leaf count = 477

$$\left\{\left\{y(x)\to-\frac{e^{-2x}\sqrt[3]{\sqrt{(27c_1e^{4x}-27e^{7x})^2-2916e^{12x}x^6}+27c_1e^{4x}-27e^{7x}}}{3\sqrt[3]{2}}-\frac{3\sqrt[3]{2}}{\sqrt[3]{\sqrt{(27c_1e^{4x}-27e^{7x})^2-2}}}\right.\right.$$

✓ **Maple** : cpu = 0.081 (sec), leaf count = 407

$$\left\{y(x)=\frac{1}{4\,e^{2\,x}}\left(-4\,x^2\left(1+i\sqrt{3}\right)\left(e^{2\,x}\right)^2+\left(i\sqrt{3}-1\right)\left(\left(4\,e^{3\,x}-4\_C1+4\sqrt{-4\,x^6\left(e^{2\,x}\right)^2+\left(e^{3\,x}\right)^2-2\,e}\right.\right.\right.\right.$$

ODE No. 284

$$\left(x^2+4y(x)^2\right)y'(x)-xy(x)=0$$

✓ **Mathematica** : cpu = 0.0414213 (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 = 0.163 (sec), leaf count = 21

$$\left\{y(x)=e^{\frac{1}{2}\mathit{lambertW}\left(\frac{\left(e^{-\_C1}\right)^2x^2}{4}\right)-\_C1}\right\}$$

ODE No. 285

$$\left(3x^2+2xy(x)+4y(x)^2\right)y'(x)+2x^2+6xy(x)+y(x)^2=0$$

✓ **Mathematica** : cpu = 0.0330934 (sec), leaf count = 402

$$\left\{\left\{y(x)\to \frac{\sqrt[3]{\sqrt{\left(432e^{3c_1}+54x^3\right)^2+3881196x^6}+432e^{3c_1}+54x^3}}{12\sqrt[3]{2}}-\frac{33x^2}{2\ 2^{2/3}\sqrt[3]{\sqrt{\left(432e^{3c_1}+54x^3\right)^2+3881}}}\right.\right.$$

✓ **Maple** : cpu = 0.086 (sec), leaf count = 432

$$\left\{y(x)=\frac{1}{\_C1}\left(\frac{1}{4}\sqrt[3]{x^3\_C1^3+8+2\sqrt{333\_C1^6x^6+4x^3\_C1^3+16}}-\frac{11\_C1^2x^2}{4}\frac{}{\sqrt[3]{x^3\_C1^3+8+2\sqrt{}}}\right.\right.$$

ODE No. 286

$$(2y(x)-3x+1)^2y'(x)-(3y(x)-2x-4)^2=0$$

✓ **Mathematica** : cpu = 0.208628 (sec), leaf count = 3501

✓ **Maple** : cpu = 1.149 (sec), leaf count = 1337

$$\left\{y(x)=\frac{(5\,x+3)\left(RootOf\left((115330078125\_C1\,x^9-2283535546875\_C1\,x^8+20095112812500\_C1\,x^7\right.\right.}{5\,\left(RootOf\left((115330078125\_C1\,x^9-2283535546875\_C1\,x^8+20095112812500\_C1\right.\right.}\right.$$

ODE No. 287

$$(2y(x)-4x+1)^2y'(x)-(y(x)-2x)^2=0$$

✓ **Mathematica** : cpu = 2.22001 (sec), leaf count = 77

$$\text{Solve}\left[\frac{y(x)}{2}+\frac{1}{196}\left(14y(x)-\left(8-9\sqrt{2}\right)\log\left(-7y(x)+14x+\sqrt{2}-4\right)-\left(8+9\sqrt{2}\right)\log\left(7y(x)-14x+\right.\right.\right.$$

✓ **Maple** : cpu = 0.082 (sec), leaf count = 56

$$\left\{-\frac{x}{7}-\frac{9\sqrt{2}}{98}Artanh\left(\frac{(7\,y(x)-14\,x+4)\sqrt{2}}{2}\right)-\frac{2\,\ln\left(7\,(y(x)-2\,x)^2+8\,y(x)-16\,x+2\right)}{49}+\frac{4\,y(x)}{7}-\right.$$

ODE No. 288

$$\left(-3x^2y(x)+6y(x)^2+1\right)y'(x)-3xy(x)^2+x=0$$

✓ **Mathematica** : cpu = 0.0204143 (sec), leaf count = 534

$$\left\{\left\{y(x)\to-\frac{\sqrt[3]{4\sqrt{3}\sqrt{-54c_1x^6+648c_1x^2+432c_1^2-27x^8+207x^4+32}+144c_1-9x^6+108x^2}}{4\;3^{2/3}}+\frac{}{3\sqrt[3]{3}\sqrt[3]{}}\right.\right.$$

✓ **Maple** : cpu = 0.041 (sec), leaf count = 579

$$\left\{y(x)=-\frac{1}{24}\left(-6\,x^2\sqrt[3]{-324\,x^2-432\_C1+27\,x^6+12\sqrt{-81\,x^8-162\_C1\,x^6+621\,x^4+1944\_C1\,x}}\right.\right.$$

ODE No. 289

$$a+(6y(x)-x)^2y'(x)-6y(x)^2+2xy(x)=0$$

✓ **Mathematica** : cpu = 0.0137875 (sec), leaf count = 115

$$\left\{\left\{y(x)\to \frac{1}{6}\left(\sqrt[3]{-18ax+18c_1-x^3}+x\right)\right\},\left\{y(x)\to \frac{x}{6}-\frac{1}{12}\left(1-i\sqrt{3}\right)\sqrt[3]{-18ax+18c_1-x^3}\right\},\left\{y(x)\right.\right.$$

✓ **Maple** : cpu = 0.041 (sec), leaf count = 115

$$\left\{y(x)=\frac{1}{6}\sqrt[3]{-x^3-18\,ax-18\_C1}+\frac{x}{6},y(x)=-\frac{1}{12}\sqrt[3]{-x^3-18\,ax-18\_C1}-\frac{i}{12}\sqrt{3}\sqrt[3]{-x^3-18\,ax-\right.$$

ODE No. 290

$$y'(x)\left(ay(x)^2+2bxy(x)+cx^2\right)+by(x)^2+2cxy(x)+dx^2=0$$

✓ **Mathematica** : cpu = 0.0749188 (sec), leaf count = 831

$$\left\{\left\{y(x)\to -\frac{bx}{a}+\frac{\sqrt[3]{-54b^3x^3+81abcx^3-27a^2dx^3+27a^2e^{3c_1}+\sqrt{4\left(9acx^2-9b^2x^2\right)^3+\left(-54b^3x^3+81\right.}}}{3\sqrt[3]{2}a}\right.\right.$$

✓ **Maple** : cpu = 0.112 (sec), leaf count = 1388

$$\left\{y(x)=\frac{1}{\_C1}\left(\frac{1}{2\,a}\sqrt[3]{-4\_C1^3a^2dx^3+12\,cx^3\_C1^3ba-8\,b^3x^3\_C1^3+4\sqrt{\_C1^6a^2d^2x^6-6\_C1^6abcdx}}\right.\right.$$

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 = 0.742133 (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 = 0.177 (sec), leaf count = 50

$$\left\{y(x)=\frac{-ax+\mathrm{e}^{RootOf(\_C1\,a\beta\,x-\_C1\,\alpha\,bx-\_Z\,a\beta\,x+\_Z\,\alpha\,bx-\_C1\,\beta\,\mathrm{e}^{-\_Z}+\mathrm{e}^{-\_Z}\_Z\,\beta+b)}}{b}\right\}$$

ODE No. 292

$$y'(x)(ay(x)+bx+c)^2+(\alpha y(x)+\beta x+\gamma)^2=0$$

✓ **Mathematica** : cpu = 53.2907 (sec), leaf count = 760

$$\text{Solve}\left[(\alpha b-a\beta)\text{RootSum}\left[\#1^3a\beta^3-\#1^3\alpha b\beta^2+2\#1^2a\alpha\beta^2y(x)+\#1^2ab^2\beta y(x)+3\gamma\#1^2a\beta^2-2\#1^2\alpha^2b\right.\right.$$

✓ **Maple** : cpu = 0.046 (sec), leaf count = 115

$$\left\{y(x)=\frac{1}{a\beta-b\alpha}\left(((bx+c)\,\alpha-a(\beta\,x+\gamma))\,RootOf\left(\int^{\_Z}\frac{(\_a\,a-b)^2}{\_a^3a^2-2\,\_a^2ab-\_a^2\alpha^2+2\,\_a\,\alpha\,\beta+\_a\,b\right.\right.\right.$$

ODE No. 293

$$x\left(y(x)^2-3x\right)y'(x)+2y(x)^3-5xy(x)=0$$

✓ **Mathematica** : cpu = 0.0926159 (sec), leaf count = 661

$$\left\{\left\{y(x)\to\text{Root}\left[-\#1^{15}-\frac{25\#1^2e^{\frac{65c_1}{2}}}{x^{26}}+\frac{65e^{\frac{65c_1}{2}}}{x^{25}}\&,1\right]\right\},\left\{y(x)\to\text{Root}\left[-\#1^{15}-\frac{25\#1^2e^{\frac{65c_1}{2}}}{x^{26}}+\frac{65e^{\frac{65c}{2}}}{x^{25}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.391 (sec), leaf count = 35

$$\left\{\ln(x)-\_C1-\frac{2}{65}\ln\left(\frac{5\,(y(x))^2-13\,x}{x}\right)+\frac{6}{13}\ln\left(y(x)\frac{1}{\sqrt{x}}\right)=0\right\}$$

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 = 0.0310423 (sec), leaf count = 71

$$\left\{\left\{y(x)\to\frac{1}{2}\left(c_1x-\sqrt{-4a+c_1^2x^2+4x^2}\right)\right\},\left\{y(x)\to\frac{1}{2}\left(\sqrt{-4a+c_1^2x^2+4x^2}+c_1x\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.094 (sec), leaf count = 112

$$\left\{\left((y(x))^{-2}-\left(-x^2+a\right)^{-1}\right)^{-1}=-x\sqrt{x^2-a}\frac{1}{\sqrt{\_C1+4\frac{a}{x^2-a}}}+\frac{x^2}{2}-\frac{a}{2},\left((y(x))^{-2}-\left(-x^2+a\right)^{-1}\right)^{-1}=\right.$$

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 = 0.0593193 (sec), leaf count = 31

$$\text{Solve}\left[\frac{x}{y(x)}+\frac{y(x)}{x}+\log\left(\frac{y(x)}{x}\right)=c_1-2\log(x),y(x)\right]$$

✓ **Maple** : cpu = 0.218 (sec), leaf count = 29

$$\left\{y(x)=\mathrm{e}^{RootOf\left(\left(\mathrm{e}^{\_Z}\right)^2+2\,\mathrm{e}^{\_Z}\ln(x)+2\,\mathrm{e}^{\_Z}\_C1+\_Z\,\mathrm{e}^{\_Z}+1\right)}x\right\}$$

ODE No. 296

$$x^4+x\left(x^2y(x)+x^2+y(x)^2\right)y'(x)-2x^2y(x)^2-2y(x)^3=0$$

✓ **Mathematica** : cpu = 0.502288 (sec), leaf count = 102

$$\left\{\left\{y(x)\to-e^{-c_1}x^2-e^{-c_1}\sqrt{-e^{c_1}x^4+e^{2c_1}x^2+x^4}\right\},\left\{y(x)\to e^{-c_1}\sqrt{-e^{c_1}x^4+e^{2c_1}x^2+x^4}-e^{-c_1}x^2\right\}\right\}$$

✓ **Maple** : cpu = 0.795 (sec), leaf count = 135

$$\left\{y(x)=-x\left(-x^3+\_C1\,x+x^2+\sqrt{-\_C1\,x^4+\_C1^2x^2+x^4}\right)\left(\_C1\,x-x^2+\sqrt{-\_C1\,x^4+\_C1^2x^2\right.\right.$$

ODE No. 297

$$2x\left(5x^2+y(x)^2\right)y'(x)-x^2y(x)+y(x)^3=0$$

✓ **Mathematica** : cpu = 0.0525817 (sec), leaf count = 216

$$\left\{\left\{y(x)\to \text{Root}\left[-\#1^5+\frac{\#1^2e^{3c_1}}{x^{3/2}}+3e^{3c_1}\sqrt{x}\&,1\right]\right\},\left\{y(x)\to \text{Root}\left[-\#1^5+\frac{\#1^2e^{3c_1}}{x^{3/2}}+3e^{3c_1}\sqrt{x}\&,2\right]\right\}$$

✓ **Maple** : cpu = 0.362 (sec), leaf count = 29

$$\left\{y(x)=\left(\mathit{RootOf}\left(x^9\_C1\,\_Z^{45}-\_Z^{18}-6\_Z^9-9\right)\right)^{\frac{9}{2}}x\right\}$$

ODE No. 298

$$3xy(x)^2y'(x)+y(x)^3-2x=0$$

✓ **Mathematica** : cpu = 0.00913714 (sec), leaf count = 72

$$\left\{\left\{y(x)\to \frac{\sqrt[3]{c_1+x^2}}{\sqrt[3]{x}}\right\},\left\{y(x)\to -\frac{\sqrt[3]{-1}\sqrt[3]{c_1+x^2}}{\sqrt[3]{x}}\right\},\left\{y(x)\to \frac{(-1)^{2/3}\sqrt[3]{c_1+x^2}}{\sqrt[3]{x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.023 (sec), leaf count = 73

$$\left\{y(x)=\frac{1}{x}\sqrt[3]{\left(x^2+\_C1\right)x^2},y(x)=-\frac{1+i\sqrt{3}}{2\,x}\sqrt[3]{\left(x^2+\_C1\right)x^2},y(x)=\frac{i\sqrt{3}-1}{2\,x}\sqrt[3]{\left(x^2+\_C1\right)x^2}\right\}$$

ODE No. 299

$$\left(3xy(x)^2-x^2\right)y'(x)+y(x)^3-2xy(x)=0$$

✓ **Mathematica** : cpu = 0.0205039 (sec), leaf count = 371

$$\left\{\left\{y(x)\to -\frac{\sqrt[3]{\frac{2}{3}}x^2}{\sqrt[3]{9c_1x^2+\sqrt{3}\sqrt{27c_1^2x^4-4x^9}}}-\frac{\sqrt[3]{9c_1x^2+\sqrt{3}\sqrt{27c_1^2x^4-4x^9}}}{\sqrt[3]{2}3^{2/3}x}\right\},\left\{y(x)\to \frac{(1}{2^{2/3}\sqrt[3]{3}\sqrt[3]{9c_1x^2}}\right.$$

✓ **Maple** : cpu = 0.234 (sec), leaf count = 276

$$\left\{ y(x) = -\frac{12^{\frac{2}{3}}}{144\,x}\left(\left(-12\,ix^3 + i\left(\left(12\sqrt{-12\,x^5+81\_C1^2}+108\_C1\right)x^2\right)^{\frac{2}{3}}\right)\sqrt{3}+12\,x^3+\left(\left(12\sqrt{-12\right.\right.\right.\right.$$

ODE No. 300

$$6xy(x)^2y'(x) + 2y(x)^3 + x = 0$$

✓ **Mathematica** : cpu = 0.00944593 (sec), leaf count = 99

$$\left\{\left\{y(x)\to\frac{\sqrt[3]{4c_1-x^2}}{2^{2/3}\sqrt[3]{x}}\right\},\left\{y(x)\to-\frac{\sqrt[3]{-1}\sqrt[3]{4c_1-x^2}}{2^{2/3}\sqrt[3]{x}}\right\},\left\{y(x)\to\frac{(-1)^{2/3}\sqrt[3]{4c_1-x^2}}{2^{2/3}\sqrt[3]{x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.026 (sec), leaf count = 83

$$\left\{ y(x) = \frac{1}{2\,x}\sqrt[3]{-2\,\left(x^2-4\_C1\right)x^2}, y(x) = -\frac{1+i\sqrt{3}}{4\,x}\sqrt[3]{-2\,\left(x^2-4\_C1\right)x^2}, y(x) = \frac{i\sqrt{3}-1}{4\,x}\sqrt[3]{-2\,\left(x^2-\right.}\right.$$

ODE No. 301

$$\left(x^2+6xy(x)^2\right)y'(x) - y(x)\left(3y(x)^2-x\right) = 0$$

✓ **Mathematica** : cpu = 0.0387824 (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 = 0.344 (sec), leaf count = 25

$$\left\{ y(x) = \frac{1}{x}\mathrm{e}^{-\frac{1}{2}lambertW\left(6\,\frac{\mathrm{e}^{3\_C1}}{x^3}\right)+\frac{3\_C1}{2}} \right\}$$

ODE No. 302

$$\left(x^2y(x)^2+x\right)y'(x)+y(x)=0$$

✓ **Mathematica** : cpu = 0.015525 (sec), leaf count = 70

$$\left\{\left\{y(x)\to \frac{c_1x-\sqrt{x}\sqrt{c_1^2x+4}}{2x}\right\},\left\{y(x)\to \frac{c_1x+\sqrt{x}\sqrt{c_1^2x+4}}{2x}\right\}\right\}$$

✓ **Maple** : cpu = 0.237 (sec), leaf count = 133

$$\left\{y(x)=-\frac{1}{2\_C1\,x}\sqrt{-2\,x\_C1\,\left(-2\_C1-x+\sqrt{x\,(4\_C1+x)}\right)},y(x)=\frac{1}{2\_C1\,x}\sqrt{-2\,x\_C1\,\left(-2\_\right.}\right.$$

ODE No. 303

$$y(x)\left(x^2y(x)^2+1\right)+x(xy(x)-1)^2y'(x)=0$$

✓ **Mathematica** : cpu = 0.0667557 (sec), leaf count = 25

$$\text{Solve}\left[xy(x)-\frac{1}{xy(x)}-2\log(y(x))=c_1,y(x)\right]$$

✓ **Maple** : cpu = 0.241 (sec), leaf count = 34

$$\left\{y(x)=\frac{\mathrm{e}^{\mathit{RootOf}\left(-\mathrm{e}^{2\_Z}-2\ln(x)\mathrm{e}^{\_Z}+2\_C1\,\mathrm{e}^{\_Z}+2\_Z\,\mathrm{e}^{\_Z}+1\right)}}{x}\right\}$$

ODE No. 304

$$5x^2y(x)^3+\left(10x^3y(x)^2+x^2y(x)+2x\right)y'(x)+xy(x)^2=0$$

✓ **Mathematica** : cpu = 45.2124 (sec), leaf count = 59

$$\text{Solve}\left[-y(x)\left(\frac{\log\left(5x^2y(x)^2+2\right)}{2y(x)}+\frac{\tan^{-1}\left(\sqrt{\frac{5}{2}}xy(x)\right)}{\sqrt{10}y(x)}\right)-\log(y(x))=c_1,y(x)\right]$$

✓ **Maple** : cpu = 0.34 (sec), leaf count = 44

$$\left\{y(x)=\frac{\sqrt{10}}{5\,x}\tan\left(\mathit{RootOf}\left(\sqrt{10}\ln\left(\frac{4\left(\tan\left(\_Z\right)\right)^2\left(\left(\tan\left(\_Z\right)\right)^2+1\right)}{5\,x^2}\right)+2\sqrt{10}\_C1+2\_Z\right)\right)\right\}$$

ODE No. 305

$$x^2 + \left(y(x)^3 - 3x\right) y'(x) - 3y(x) = 0$$

✓ **Mathematica** : cpu = 0.0992539 (sec), leaf count = 1277

$$\left\{\left\{y(x) \to -\frac{1}{2}\sqrt{\frac{16\sqrt[3]{2}\left(x^3+3c_1\right)}{\sqrt[3]{104976x^2-\sqrt{11019960576x^4-4\left(144x^3+432c_1\right)^3}}} + \frac{\sqrt[3]{104976x^2-\sqrt{11019960576}}}{9\sqrt[3]{2}}}\right.\right.$$

✓ **Maple** : cpu = 0.038 (sec), leaf count = 21

$$\left\{\frac{x^3}{3} - 3\,xy(x) + \frac{(y(x))^4}{4} + \_C1 = 0\right\}$$

ODE No. 306

$$\left(y(x)^3 - x^3\right) y'(x) - x^2 y(x) = 0$$

✓ **Mathematica** : cpu = 0.0501501 (sec), leaf count = 201

$$\left\{\left\{y(x) \to \sqrt[3]{x^3 - \sqrt{x^6 - e^{6c_1}}}\right\}, \left\{y(x) \to -\sqrt[3]{-1}\sqrt[3]{x^3 - \sqrt{x^6 - e^{6c_1}}}\right\}, \left\{y(x) \to (-1)^{2/3}\sqrt[3]{x^3 - \sqrt{x^6 - e}}\right.\right.$$

✓ **Maple** : cpu = 0.355 (sec), leaf count = 231

$$\left\{y(x) = x\frac{1}{\sqrt[3]{-\left(x^3\_C1 - \sqrt{\_C1^2x^6+1}\right)x^3\_C1}}, y(x) = x\frac{1}{\sqrt[3]{-\left(x^3\_C1 + \sqrt{\_C1^2x^6+1}\right)x^3\_C1}}, y(\right.$$

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 = 0.0216674 (sec), leaf count = 149

$$\left\{\left\{y(x)\to -\sqrt{-\sqrt{a^2+4ax^2+4c_1}-a-x^2}\right\},\left\{y(x)\to \sqrt{-\sqrt{a^2+4ax^2+4c_1}-a-x^2}\right\},\left\{y(x)\to -\right.\right.$$

✓ **Maple** : cpu = 0.058 (sec), leaf count = 125

$$\left\{y(x)=\sqrt{-x^2-a-\sqrt{4\,ax^2+a^2-4\_C1}},y(x)=\sqrt{-x^2-a+\sqrt{4\,ax^2+a^2-4\_C1}},y(x)=-\sqrt{-x\right.$$

ODE No. 308

$$2y(x)^3y'(x)+xy(x)^2=0$$

✓ **Mathematica** : cpu = 0.0072518 (sec), leaf count = 55

$$\left\{\{y(x)\to 0\},\left\{y(x)\to -\frac{\sqrt{4c_1-x^2}}{\sqrt{2}}\right\},\left\{y(x)\to \frac{\sqrt{4c_1-x^2}}{\sqrt{2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.038 (sec), leaf count = 37

$$\left\{y(x)=0,y(x)=-\frac{1}{2}\sqrt{-2\,x^2+4\_C1},y(x)=\frac{1}{2}\sqrt{-2\,x^2+4\_C1}\right\}$$

ODE No. 309

$$-2x^3+\left(2y(x)^3+y(x)\right)y'(x)-x=0$$

✓ **Mathematica** : cpu = 0.0129258 (sec), leaf count = 151

$$\left\{\left\{y(x)\to -\frac{\sqrt{-\sqrt{8c_1+4x^4+4x^2+1}-1}}{\sqrt{2}}\right\},\left\{y(x)\to \frac{\sqrt{-\sqrt{8c_1+4x^4+4x^2+1}-1}}{\sqrt{2}}\right\},\left\{y(x)\to -\right.\right.$$

✓ **Maple** : cpu = 0.048 (sec), leaf count = 113

$$\left\{y(x)=-\frac{1}{2}\sqrt{-2-2\sqrt{4\,x^4+4\,x^2+8\_C1+1}},y(x)=\frac{1}{2}\sqrt{-2-2\sqrt{4\,x^4+4\,x^2+8\_C1+1}},y(x)=-\right.$$

ODE No. 310

$$x^3 + (5x^2y(x) + 2y(x)^3)\, y'(x) + 5xy(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.045263 (sec), leaf count = 159

$$\left\{\left\{y(x) \to -\frac{\sqrt{-\sqrt{2e^{4c_1} + 23x^4} - 5x^2}}{\sqrt{2}}\right\}, \left\{y(x) \to \frac{\sqrt{-\sqrt{2e^{4c_1} + 23x^4} - 5x^2}}{\sqrt{2}}\right\}, \left\{y(x) \to -\frac{\sqrt{\sqrt{2e^{4c_1} +}}}{\sqrt{}}\right.\right.$$

✓ **Maple** : cpu = 0.223 (sec), leaf count = 125

$$\left\{y(x) = -\frac{1}{2}\sqrt{-10\_C1\, x^2 - 2\sqrt{23\_C1^2x^4 + 2}\frac{1}{\sqrt{\_C1}}}, y(x) = \frac{1}{2}\sqrt{-10\_C1\, x^2 - 2\sqrt{23\_C1^2x^4 + 2}-}\right.$$

ODE No. 311

$$4x^3 + 9x^2y(x) + (3x^3 + 6x^2y(x) - 3xy(x)^2 + 20y(x)^3)\, y'(x) + 6xy(x)^2 - y(x)^3 = 0$$

✓ **Mathematica** : cpu = 0.181597 (sec), leaf count = 2201

$$\left\{\left\{y(x) \to \frac{x}{20} + \frac{1}{2}\sqrt{-\frac{39x^2}{100} + \frac{\sqrt[3]{99x^6 + 351e^{c_1}x^2 + \sqrt{3}\sqrt{-67037x^{12} + 185406e^{c_1}x^8 - 83733e^{2c_1}x^4 + 320}}}{5\sqrt[3]{2}23^{2/3}}}\right.\right.$$

✓ **Maple** : cpu = 0.096 (sec), leaf count = 50

$$\left\{y(x) = \frac{RootOf\left(\_C1^4x^4 + 3\,x^3\_C1^3\_Z + 3\_C1^2x^2\_Z^2 - x\_C1\,\_Z^3 + 5\_Z^4 - 1\right)}{\_C1}\right\}$$

ODE No. 312

$$(y(x)y'(x) + x)\left(\frac{x^2}{a} + \frac{y(x)^2}{b}\right) + \frac{(a-b)\,(y(x)y'(x) - x)}{a+b} = 0$$

✓ **Mathematica** : cpu = 0.25656 (sec), leaf count = 204

$$\left\{\left\{y(x) \to -\frac{\sqrt{b}\sqrt{a^2 + 2a^2 W\left(\frac{c_1(a+b)e^{\frac{bx^2}{2a^2} - \frac{b}{2a} - \frac{x^2}{2b} - \frac{1}{2}}}{2a^3b^2}\right) + ab - ax^2 - bx^2}}{\sqrt{a}\sqrt{a+b}}\right\}, \left\{y(x) \to \frac{\sqrt{b}\sqrt{a^2 + 2a^2 W\left(\right.}}{}\right.\right.$$

✓ **Maple** : cpu = 1.648 (sec), leaf count = 240

$$\left\{y(x) = \frac{1}{a}\sqrt{a\left(e^{\frac{1}{2a^2b}\left(-2\,\mathit{lambertW}\left(1/2\,\frac{(a+b)e^{-1/2}}{a^2b}e^{-1/2\,\frac{x^2}{b}}e^{1/2\,\frac{bx^2}{a^2}}e^{-1/2\,\frac{b}{a}}\left(e^{-\frac{\_C1}{ab}}\right)^{-1}\right)a^2b+(-x^2-b)a^2+(-b^2-2\_C1)a+b^2x^2\right)}\right.}\right.$$

ODE No. 313

$$y'(x)\left(3axy(x)^2 + 2ay(x)^3 - bx^3 + cx^2\right) - ay(x)^3 + 2bx^3 + 3bx^2y(x) + cy(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.0892051 (sec), leaf count = 537

$$\left\{\left\{y(x) \to \frac{\sqrt[3]{2}(3acx + 3ac_1)}{3a\sqrt[3]{\sqrt{(27a^2bx^3 + 27a^2c_1x)^2 + 4(3acx + 3ac_1)^3} + 27a^2bx^3 + 27a^2c_1x}} - \frac{\sqrt[3]{\sqrt{(27a^2bx^3 + 27a}}}{}\right.\right.$$

✓ **Maple** : cpu = 0.221 (sec), leaf count = 748

$$\left\{y(x) = \frac{1}{6\,a}\left((-12\,cx + 12\,\_C1)\,a + \left(\left(-108\,bx^3 + 108\,\_C1\,x + 12\sqrt{\frac{81\,ab^2x^6 - 162\,\_C1\,abx^4 + 12\,c}{}}\right.\right.\right.\right.$$

ODE No. 314

$$xy(x)^3y'(x) + y(x)^4 - x\sin(x) = 0$$

✓ **Mathematica** : cpu = 0.0445975 (sec), leaf count = 188

$$\left\{\left\{y(x)\to -\frac{\sqrt[4]{c_1 - 4x^4\cos(x) + 16x^3\sin(x) + 48x^2\cos(x) - 96x\sin(x) - 96\cos(x)}}{x}\right\},\left\{y(x)\to -\frac{i\sqrt[4]{c_1}}{}\right.\right.$$

✓ **Maple** : cpu = 0.072 (sec), leaf count = 158

$$\left\{y(x) = \frac{1}{x}\sqrt[4]{(-4\,x^4 + 48\,x^2 - 96)\cos(x) + (16\,x^3 - 96\,x)\sin(x) + \_C1}, y(x) = \frac{-i}{x}\sqrt[4]{(-4\,x^4 + 48\,x^2 - 9}\right.$$

ODE No. 315

$$\left(2xy(x)^3 - x^4\right)y'(x) + 2x^3y(x) - y(x)^4 = 0$$

✓ **Mathematica** : cpu = 0.109868 (sec), leaf count = 368

$$\left\{\left\{y(x)\to \frac{\sqrt[3]{\frac{2}{3}}e^{c_1}x}{\sqrt[3]{\sqrt{3}\sqrt{27x^6 - 4e^{3c_1}x^3} - 9x^3}} + \frac{\sqrt[3]{\sqrt{3}\sqrt{27x^6 - 4e^{3c_1}x^3} - 9x^3}}{\sqrt[3]{2}3^{2/3}}\right\},\left\{y(x)\to -\frac{(1+i}{2^{2/3}\sqrt[3]{3}\sqrt[3]{\sqrt{3}\sqrt{2}}}\right.\right.$$

✓ **Maple** : cpu = 0.109 (sec), leaf count = 370

$$\left\{y(x) = \frac{1}{6\_C1}\left(\left(-12\,x\left(9\_C1\,x^2 - \sqrt{3}\sqrt{\frac{27\_C1^3x^4 - 4\,x}{\_C1}}\right)\_C1^2\right)^{\frac{2}{3}} + 12\_C1\,x\right)\frac{}{\sqrt[3]{-108\,x\left(\_C\right.}}\right.$$

ODE No. 316

$$\left(2xy(x)^3+y(x)\right)y'(x)+2y(x)^2=0$$

✓ **Mathematica** : cpu = 0.0798283 (sec), leaf count = 48

$$\left\{\{y(x)\to 0\},\text{Solve}\left[x=c_1e^{-\frac{1}{2}y(x)^2}-\frac{1}{4}e^{-\frac{1}{2}y(x)^2}\text{Ei}\left(\frac{y(x)^2}{2}\right),y(x)\right]\right\}$$

✓ **Maple** : cpu = 0.076 (sec), leaf count = 53

$$\left\{y(x)=0,y(x)=\sqrt{-2\,RootOf\left(\mathrm{e}^{\_Z}Ei\left(1,\_Z\right)+4\_C1\,\mathrm{e}^{\_Z}-4\,x\right)},y(x)=-\sqrt{-2\,RootOf\left(\mathrm{e}^{\_Z}Ei\left(1,\_Z\right.\right.}$$

ODE No. 317

$$\left(x^2+2xy(x)^3+xy(x)\right)y'(x)+y(x)^2-xy(x)=0$$

✓ **Mathematica** : cpu = 0.345117 (sec), leaf count = 23

$$\text{Solve}\left[y(x)^2-\frac{x}{y(x)}+\log(y(x))+\log(x)=c_1,y(x)\right]$$

✓ **Maple** : cpu = 0.146 (sec), leaf count = 29

$$\left\{y(x)=\mathrm{e}^{RootOf\left(-\left(\mathrm{e}^{\_Z}\right)^3-\ln(x)\mathrm{e}^{\_Z}+\_C1\,\mathrm{e}^{\_Z}-\_Z\,\mathrm{e}^{\_Z}+x\right)}\right\}$$

ODE No. 318

$$\left(3xy(x)^3-4xy(x)+y(x)\right)y'(x)+\left(y(x)^2-2\right)y(x)^2=0$$

✓ **Mathematica** : cpu = 0.148029 (sec), leaf count = 4284

$$\left\{\{y(x)\to 0\},\left\{y(x)\to -\sqrt{\frac{4\sqrt[3]{2}x^2}{3\sqrt[3]{16x^6+24x^5-27c_1^2x^4+12x^4+2x^3+3\sqrt{3}\sqrt{-32c_1^2x^{10}-48c_1^2x^9+27c_1^4x}}}}\right.\right.$$

✓ **Maple** : cpu = 0.024 (sec), leaf count = 28

$$\left\{x+\left(y(x)\right)^{-2}-\frac{\_C1}{\left(y\left(x\right)\right)^2}\frac{1}{\sqrt{\left(y\left(x\right)\right)^2-2}}=0,y(x)=0\right\}$$

ODE No. 319

$$\left(7xy(x)^3+y(x)-5x\right)y'(x)+y(x)^4-5y(x)=0$$

✓ **Mathematica** : cpu = 0.0237982 (sec), leaf count = 302

$$\left\{\left\{y(x)\to \text{Root}\left[10\#1^7x+2\#1^5-100\#1^4x-25\#1^2+250\#1x-10c_1\&,1\right]\right\},\left\{y(x)\to \text{Root}\left[10\#1^7x+\right.\right.$$

✓ **Maple** : cpu = 0.037 (sec), leaf count = 35

$$\left\{x+\frac{2\,(y(x))^5-25\,(y(x))^2-10\_C1}{10\,\left((y(x))^3-5\right)^2y(x)}=0\right\}$$

ODE No. 320

$$\left(x^2y(x)^3+xy(x)\right)y'(x)-1=0$$

✓ **Mathematica** : cpu = 0.0561591 (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 = 0.115 (sec), leaf count = 78

$$\left\{y(x)=\frac{1}{x}\sqrt{2\,x^2\mathit{lambertW}\left(1/2\_C1\,\mathrm{e}^{-1/2\,\frac{2\,x-1}{x}}\right)+2\,x^2-x},y(x)=-\frac{1}{x}\sqrt{2\,x^2\mathit{lambertW}\left(1/2\_C1\,\mathrm{e}^{-1/2\right.}}\right.$$

ODE No. 321

$$\left(2x^2y(x)^3+x^2y(x)^2-2x\right)y'(x)-2y(x)-1=0$$

✓ **Mathematica** : cpu = 0.301699 (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 = 0.188 (sec), leaf count = 42

$$\left\{y(x) = \frac{e^{RootOf\left(x(e^{-Z})^3-4x(e^{-Z})^2+16\_C1\, xe^{-Z}+2\_Z\, xe^{-Z}+3\, xe^{-Z}+16\right)}}{2} - \frac{1}{2}\right\}$$

ODE No. 322

$$\left(10x^2y(x)^3 - 3y(x)^2 - 2\right)y'(x) + 5xy(x)^4 + x = 0$$

✓ **Mathematica** : cpu = 0.205842 (sec), leaf count = 2077

$$\left\{\left\{y(x) \to -\frac{1}{2}\sqrt{\frac{4\sqrt[3]{2}\left(5x^4 - 10c_1x^2 - 2\right)}{5x^2\sqrt[3]{2268x^2 - 216c_1 + \sqrt{\left(2160x^2 + 108\left(x^2 - 2c_1\right)\right)^2 - 4\left(60x^4 - 120c_1x^2 - 24\right)^3}}} + \frac{\sqrt[3]{}}{}\right.\right.$$

✓ **Maple** : cpu = 0.034 (sec), leaf count = 29

$$\left\{\frac{5\,x^2(y(x))^4}{2} - (y(x))^3 + \frac{x^2}{2} - 2\,y(x) + \_C1 = 0\right\}$$

ODE No. 323

$$xy'(x)\left(axy(x)^3 + c\right) + y(x)\left(bx^3y(x) + c\right) = 0$$

✓ **Mathematica** : cpu = 0.0448074 (sec), leaf count = 463

$$\left\{\left\{y(x) \to \frac{\sqrt[3]{54a^2cx^2 + \sqrt{2916a^4c^2x^4 + 108a^3x^3\left(bx^3 - 2c_1x\right)^3}}}{3\sqrt[3]{2}ax} - \frac{\sqrt[3]{2}(bx^3 - 2c_1x)}{\sqrt[3]{54a^2cx^2 + \sqrt{2916a^4c^2x^4 + 108a^3x^3}}}\right.\right.$$

✓ **Maple** : cpu = 0.131 (sec), leaf count = 630

$$\left\{y(x) = -\frac{3^{\frac{2}{3}}}{18\,ax}\left(\left(\left(3\,ix^2\left(bx^2 - 2\_C1\right)a + i\left(\left(27\,c + 3\sqrt{\frac{3\,b^3x^8 - 18\_C1\,b^2x^6 + 36\_C1^2bx^4 - 24\_}{a}}\right.\right.\right.\right.\right.\right.$$

ODE No. 324

$$\left(2x^3y(x)^3-x\right)y'(x)+2x^3y(x)^3-y(x)=0$$

✓ **Mathematica** : cpu = 0.0337618 (sec), leaf count = 723

$$\left\{\left\{y(x)\to -\frac{2x^3-c_1x^2}{6x^2}+\frac{\sqrt[3]{12c_1x^8-6c_1^2x^7+c_1^3x^6+3\sqrt{3}\sqrt{-24c_1x^{12}+12c_1^2x^{11}-2c_1^3x^{10}+16x^{13}+27}}}{6x^2}\right.\right.$$

✓ **Maple** : cpu = 0.14 (sec), leaf count = 815

$$\left\{y(x)=-\frac{1}{12\,x}\left(\left(-2\,\_C1\,x+4\,x^2\right)\sqrt[3]{\left(\_C1^3x^2-6\,\_C1^2x^3+12\,\_C1\,x^4-8\,x^5+3\,\sqrt{-6\,\_C1^3x^2+36}\right.}\right.\right.$$

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 = 0.0579187 (sec), leaf count = 139

$$\text{Solve}\left[\frac{1}{7}\text{RootSum}\left[\#1^4+\#1^3+3\#1^2+\#1+1\&,\frac{8\#1^3\log\left(\frac{y(x)}{x}-\#1\right)+9\#1^2\log\left(\frac{y(x)}{x}-\#1\right)+12\#}{4\#1^3+3\#1^2+6\#1}\right.\right.$$

✓ **Maple** : cpu = 0.528 (sec), leaf count = 124

$$\left\{-\frac{2}{7}\ln\left(\frac{4\,x^4+4\,x^3y(x)+12\,x^2(y(x))^2+4\,x(y(x))^3+4\,(y(x))^4}{x^4}\right)-\frac{2\,\sqrt{3}}{7}\arctan\left(\frac{\sqrt{3}(x+2\,y(x))}{3\,x}\right)+\right.$$

ODE No. 326

$$y(x)y'(x)\left((ay(x)+bx)^3+bx^3\right)+x\left((ay(x)+bx)^3+ay(x)^3\right)=0$$

✓ **Mathematica** : cpu = 4.76511 (sec), leaf count = 13289

Too large to display

✓ **Maple** : cpu = 0.456 (sec), leaf count = 160

$$\left\{y(x)=\frac{x\left(\_C1\,x-bRootOf\left(b^2\_Z^4-2\,bx\_C1\,\_Z^3+\left(a^2x^2\_C1^2+b^2x^2\_C1^2+\_C1^2x^2-a^2\right)\_Z^2\right.\right.}{aRootOf\left(b^2\_Z^4-2\,bx\_C1\,\_Z^3+\left(a^2x^2\_C1^2+b^2x^2\_C1^2+\_C1^2x^2-a^2\right)\_Z^2-2\,bx\right.}\right.$$

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 = 0.362222 (sec), leaf count = 669

$$\left\{\left\{y(x)\to\frac{\sqrt[3]{9c_1^2x^2+3\sqrt{3}\sqrt{-4c_1^3x^6-c_1^4x^4+18c_1^2x^4+4c_1^3x^2+27x^4}+2c_1^3+27x^2}}{3\sqrt[3]{2}x}-\frac{}{3x\sqrt[3]{9c_1^2x^2+3\sqrt{3}}}\right.\right.$$

✓ **Maple** : cpu = 0.211 (sec), leaf count = 583

$$\left\{y(x)=\frac{1}{12\,\_C1\,x}\left(\left(\left(-12\,ix^2\_C1-i\left(108\,\_C1^3x^2+12\,\sqrt{3}\sqrt{27\,\_C1^4x^2+18\,\_C1^2x^2+\left(4\,x^4-4\right)\_C\right.\right.\right.\right.\right.\right.$$

ODE No. 328

$$ax^2y(x)^ny'(x)-2xy'(x)+y(x)=0$$

✓ **Mathematica** : cpu = 0.119899 (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 = 0.203 (sec), leaf count = 33

$$\left\{\frac{x^n}{\left((y\left(x\right))^n\,ax-n-2\right)^n\left((y\left(x\right))^n\right)^2}-\_C1=0\right\}$$

ODE No. 329

$$x^n y(x)^m (axy'(x) + by(x)) + \alpha xy'(x) + \beta y(x) = 0$$

✓ **Mathematica** : cpu = 0.397302 (sec), leaf count = 102

$$\text{Solve}\left[\frac{m((a\beta - \alpha b)\log\left(x^n y(x)^m (bm - an) - \alpha n + \beta m\right) + \beta \log(x)(bm - an))}{(bm - an)(\beta m - \alpha n)} + \frac{\alpha m \log(\beta m y(x) - \alpha n y($$

✓ **Maple** : cpu = 0.358 (sec), leaf count = 71

$$\left\{x^{\beta\, m(an - bm)}((y(x))^m)^{\alpha\,(an-bm)}\left(x^n (an - bm)\,(y(x))^m - \beta\, m + \alpha\, n\right)^{-a\beta\, m + \alpha\, bm} - \_C1 = 0\right\}$$

ODE No. 330

$$(f(y(x) + x) + 1)y'(x) + f(y(x) + x) = 0$$

✓ **Mathematica** : cpu = 52.9386 (sec), leaf count = 49

$$\text{Solve}\left[\int_1^{y(x)}\left(-\int_1^x f'(K[1] + K[2])\, dK[1] + f(K[2] + x) + 1\right) dK[2] + \int_1^x f(K[1] + y(x))\, dK[1] = c_1, y$$

✓ **Maple** : cpu = 0.047 (sec), leaf count = 22

$$\left\{y(x) = -x + \mathit{RootOf}\left(-x + \int^{\_Z} f(\_a) + 1 d\_a + \_C1\right)\right\}$$

ODE No. 331

$$y'(x)\left(\sum_{\nu=1}^{p} y(x)^\nu f(\nu)(x)\right) - \sum_{\nu=1}^{q} y(x)^\nu g(\nu)(x) = 0$$

✗ **Mathematica** : cpu = 55.1581 (sec), leaf count = 0 , could not solve

```
DSolve[-Sum[y[x]^nu*g[nu][x], {nu, 1, q}] + Sum[y[x]^nu*f[nu][x], {nu, 1, p}]*Derivati
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(y(x),x)*sum(f[nu](x)*y(x)^nu,nu = 1 .. p)-sum(g[nu](x)*y(x)^nu,nu = 1 .. c
```

ODE No. 332

$$x\left(\sqrt{xy(x)}-1\right)y'(x)-y(x)\left(\sqrt{xy(x)}+1\right)=0$$

✓ **Mathematica** : cpu = 0.117916 (sec), leaf count = 24

$$\text{Solve}\left[\frac{2}{\sqrt{xy(x)}}+\log(y(x))-\log(x)=c_1,y(x)\right]$$

✓ **Maple** : cpu = 0.017 (sec), leaf count = 33

$$\left\{-1\left(1+\left(\_C1-\ln(x)+\frac{\ln(xy(x))}{2}\right)\sqrt{xy(x)}\right)\frac{1}{\sqrt{xy(x)}}=0\right\}$$

ODE No. 333

$$-x^{3/2}y(x)^{5/2}+\left(2x^{5/2}y(x)^{3/2}+x^2y(x)-x\right)y'(x)+xy(x)^2-y(x)=0$$

✓ **Mathematica** : cpu = 0.266369 (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 = 0.115 (sec), leaf count = 32

$$\left\{\ln(y(x))+\frac{1}{3}(y(x))^{-\frac{3}{2}}x^{-\frac{3}{2}}-1\frac{1}{\sqrt{x}}\frac{1}{\sqrt{y(x)}}-\frac{\ln(x)}{2}-\_C1=0\right\}$$

ODE No. 334

$$\left(\sqrt{y(x)+x}+1\right)y'(x)+1=0$$

✓ **Mathematica** : cpu = 0.0353691 (sec), leaf count = 39

$$\left\{\left\{y(x)\to-2\sqrt{c_1+x+1}+c_1+2\right\},\left\{y(x)\to2\sqrt{c_1+x+1}+c_1+2\right\}\right\}$$

✓ **Maple** : cpu = 0.033 (sec), leaf count = 19

$$\left\{-y(x)-2\sqrt{y(x)+x}-\_C1=0\right\}$$

ODE No. 335

$$\sqrt{y(x)^2-1}y'(x)-\sqrt{x^2-1}=0$$

✓ **Mathematica** : cpu = 0.191005 (sec), leaf count = 75

$$\left\{\left\{y(x)\to \text{InverseFunction}\left[\frac{1}{2}\#1\sqrt{\#1^2-1}-\frac{1}{2}\log\left(\sqrt{\#1^2-1}+\#1\right)\&\right]\left[c_1+\frac{1}{2}\sqrt{x^2-1}x-\frac{1}{2}\log\left(\sqrt{\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.021 (sec), leaf count = 50

$$\left\{\_C1+x\sqrt{x^2-1}-\ln\left(x+\sqrt{x^2-1}\right)-y(x)\sqrt{(y(x))^2-1}+\ln\left(y(x)+\sqrt{(y(x))^2-1}\right)=0\right\}$$

ODE No. 336

$$\left(ax+\sqrt{y(x)^2+1}\right)y'(x)+ay(x)+\sqrt{x^2+1}=0$$

✓ **Mathematica** : cpu = 0.0740581 (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 = 0.042 (sec), leaf count = 41

$$\left\{\frac{x}{2}\sqrt{x^2+1}+\frac{Arcsinh(x)}{2}+axy(x)+\frac{y(x)}{2}\sqrt{(y(x))^2+1}+\frac{Arcsinh(y(x))}{2}+\_C1=0\right\}$$

ODE No. 337

$$\left(\sqrt{x^2+y(x)^2}+x\right)y'(x)-y(x)=0$$

✓ **Mathematica** : cpu = 0.0562078 (sec), leaf count = 52

$$\left\{\left\{y(x)\to -e^{\frac{c_1}{2}}\sqrt{e^{c_1}+2x}\right\},\left\{y(x)\to e^{\frac{c_1}{2}}\sqrt{e^{c_1}+2x}\right\}\right\}$$

✓ **Maple** : cpu = 0.085 (sec), leaf count = 28

$$\left\{-\_C1+\frac{1}{(y(x))^2}\sqrt{(y(x))^2+x^2}+\frac{x}{(y(x))^2}=0\right\}$$

ODE No. 338

$$y'(x)\left(\sin(\alpha)\left(y(x)^2-x^2\right)-2x\cos(\alpha)y(x)+\sqrt{x^2+y(x)^2}y(x)\right)+\cos(\alpha)\left(y(x)^2-x^2\right)+2x\sin(\alpha)y(x)+x\sqrt{}$$

✓ **Mathematica** : cpu = 91.9586 (sec), leaf count = 17681

Too large to display

✓ **Maple** : cpu = 0.776 (sec), leaf count = 128

$$\left\{y(x)=\mathit{RootOf}\left(-\ln(x)+\int^{\_Z}-\frac{1}{(\_a^2+1)(\cos(2\alpha)\_a^2+2\_a\sin(2\alpha)+\_a^2-\cos(2\alpha)+1)}\left(\cos\right.\right.\right.$$

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 = 0.118246 (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 = 0.202 (sec), leaf count = 27

$$\left\{\arctan\left(\frac{y(x)}{x}\right)-\sqrt{x^2+(y(x))^2+1}-\_C1=0\right\}$$

ODE No. 340

$$y'(x)\left(\frac{\text{e1}(a+x)}{\left((a+x)^2+y(x)^2\right)^{3/2}}+\frac{\text{e2}(x-a)}{\left((x-a)^2+y(x)^2\right)^{3/2}}\right)-y(x)\left(\frac{\text{e1}}{\left((a+x)^2+y(x)^2\right)^{3/2}}+\frac{\text{e2}}{\left((x-a)^2+y(x)^2\right.}\right.$$

✗ **Mathematica** : cpu = 298.903 (sec), leaf count = 0 , could not solve

```
DSolve[-(y[x]*(e2/((-a + x)^2 + y[x]^2)^(3/2) + e1/((a + x)^2 + y[x]^2)^(3/2))) + ((e2
a + x))/((-a + x)^2 + y[x]^2)^(3/2) + (e1*(a + x))/((a + x)^2 + y[x]^2)^(3/2))*Derivat
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , exception

```
Maple was unable to allocate enough memory to complete this computation.  Please see ?
```

ODE No. 341

$$\left(xe^{y(x)}+e^x\right)y'(x)+e^xy(x)+e^{y(x)}=0$$

✓ **Mathematica** : cpu = 0.0510119 (sec), leaf count = 33

$$\left\{\left\{y(x)\to c_1e^{-x}-W\left(xe^{c_1e^{-x}-x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 5.949 (sec), leaf count = 33

$$\left\{y(x)=\frac{1}{\mathrm{e}^x}\left(-\mathit{lambertW}\left(\frac{x}{\mathrm{e}^x}\left(\mathrm{e}^{\frac{\_C1}{\mathrm{e}^x}}\right)^{-1}\right)\mathrm{e}^x-\_C1\right)\right\}$$

ODE No. 342

$$x\left(2e^{-xy(x)}+3e^{xy(x)}\right)\left(xy'(x)+y(x)\right)+1=0$$

✓ **Mathematica** : cpu = 0.275931 (sec), leaf count = 163

$$\left\{\left\{y(x)\to-\frac{\cosh^{-1}\left(\frac{1}{24}\left(-5\sqrt{\log^2\left(\frac{c_1}{x}\right)+24}-\log\left(\frac{c_1}{x}\right)\right)\right)}{x}\right\},\left\{y(x)\to\frac{\cosh^{-1}\left(\frac{1}{24}\left(-5\sqrt{\log^2\left(\frac{c_1}{x}\right)+24}\right.\right.}{x}\right.$$

✓ **Maple** : cpu = 5.217 (sec), leaf count = 17

$$\left\{y(x)=\frac{1}{x}\ln\left(-\frac{\ln(x)}{5}+\frac{\_C1}{5}\right)\right\}$$

ODE No. 343

$$y'(x)(\log(y(x))+x)-1=0$$

✓ **Mathematica** : cpu = 0.0635984 (sec), leaf count = 35

$$\mathrm{Solve}\left[x=c_1e^{y(x)}+e^{y(x)}\left(\mathrm{Ei}(-y(x))-e^{-y(x)}\log(y(x))\right),y(x)\right]$$

✓ **Maple** : cpu = 6.423 (sec), leaf count = 27

$$\left\{y(x)=\mathrm{e}^{\mathit{RootOf}\left(-x-\_Z-\mathit{Ei}(1,\mathrm{e}^{\_Z})\mathrm{e}^{\mathrm{e}^{\_Z}}+\mathrm{e}^{\mathrm{e}^{\_Z}}\_C1\right)}\right\}$$

ODE No. 344

$$y'(x)(\log(y(x)) + 2x - 1) - 2y(x) = 0$$

✓ **Mathematica** : cpu = 0.01976 (sec), leaf count = 23

$$\left\{\left\{y(x) \to -\frac{W(-2c_1e^{-2x})}{2c_1}\right\}\right\}$$

✓ **Maple** : cpu = 3.728 (sec), leaf count = 19

$$\left\{y(x) = e^{-lambertW\left(-2\_C1\,e^{-2\,x}\right)-2\,x}\right\}$$

ODE No. 345

$$xy'(x)\left(2x^2y(x)\log(y(x)) + 1\right) - 2y(x) = 0$$

✓ **Mathematica** : cpu = 0.0723733 (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 = 14.534 (sec), leaf count = 36

$$\left\{y(x) = e^{RootOf\left(2\_Z\left(e^{\_Z}\right)^2x^2-\left(e^{\_Z}\right)^2x^2+2\_C1\,x^2+2\,e^{\_Z}\right)}\right\}$$

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 = 0.0828397 (sec), leaf count = 24

$$\text{Solve}[ax\log(xy(x)) - y(x)\log(xy(x)) = c_1, y(x)]$$

✓ **Maple** : cpu = 9.489 (sec), leaf count = 19

$$\left\{(xy(x))^{-ax+y(x)} - \_C1 = 0\right\}$$

ODE No. 347

$$(\sin(x)+1)y'(x)\sin(y(x))+\cos(x)(\cos(y(x))-1)=0$$

✓ **Mathematica** : cpu = 0.134473 (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 = 4.758 (sec), leaf count = 16

$$\{y(x)=\pi-\arccos(\sin(x)\_C1+\_C1-1)\}$$

ODE No. 348

$$y'(x)(x\cos(y(x))+\sin(x))+\sin(y(x))+y(x)\cos(x)=0$$

✓ **Mathematica** : cpu = 0.0546101 (sec), leaf count = 17

$$\text{Solve}[x\sin(y(x))+y(x)\sin(x)=c_1,y(x)]$$

✓ **Maple** : cpu = 3.774 (sec), leaf count = 15

$$\{y(x)\sin(x)+x\sin(y(x))+\_C1=0\}$$

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 = 0.0461862 (sec), leaf count = 15

$$\left\{\left\{y(x)\to x\csc^{-1}(2(c_1+\log(x)))\right\}\right\}$$

✓ **Maple** : cpu = 0.484 (sec), leaf count = 17

$$\left\{y(x)=\arcsin\left((2\ln(x)+2\_C1)^{-1}\right)x\right\}$$

ODE No. 350

$$y'(x)\cos(y(x)) - \sin(y(x)) - \cos(x)\sin^2(y(x)) = 0$$

✓ **Mathematica** : cpu = 0.607875 (sec), leaf count = 53

$$\left\{\left\{y(x) \to \csc^{-1}\left(\frac{1}{2}(-2c_1e^{-x} - \sin(x) - \cos(x))\right)\right\}, \left\{y(x) \to -\csc^{-1}\left(\frac{1}{2}(2c_1e^{-x} + \sin(x) + \cos(x))\right)\right.$$

✓ **Maple** : cpu = 4.72 (sec), leaf count = 226

$$\left\{y(x) = \arctan\left(-2\frac{e^x}{e^x(\cos(x) + \sin(x)) + 2\_C1}, \frac{\sqrt{16}}{4\_C1^2 + 4e^x(\cos(x) + \sin(x))\_C1 + (e^x)^2(2\cos\right.\right.$$

ODE No. 351

$$y'(x)\cos(y(x)) - \sin^3(y(x)) + x\sin(y(x))\cos^2(y(x)) = 0$$

✓ **Mathematica** : cpu = 0.401134 (sec), leaf count = 61

$$\left\{\left\{y(x) \to -\cot^{-1}\left(\sqrt{e^{x^2}(4c_1 - \sqrt{\pi}\operatorname{erf}(x))}\right)\right\}, \left\{y(x) \to \cot^{-1}\left(\sqrt{e^{x^2}(4c_1 - \sqrt{\pi}\operatorname{erf}(x))}\right)\right\}\right\}$$

✓ **Maple** : cpu = 1.124 (sec), leaf count = 55

$$\left\{y(x) = -\arcsin\left(\frac{1}{\sqrt{1 - \sqrt{\pi}\mathit{Erf}(x)e^{x^2} - 2\_C1e^{x^2}}}\right), y(x) = \arcsin\left(\frac{1}{\sqrt{1 - \sqrt{\pi}\mathit{Erf}(x)e^{x^2} - 2\_C1e^{x^2}}}\right.\right.$$

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 = 0.155312 (sec), leaf count = 43

$$\text{Solve}\left[4\sin(\alpha)\sin(x)\sin(y(x)) - 4\left(\frac{y(x)}{2} + \frac{1}{4}\sin(2y(x))\right) - 2x - \sin(2x) = c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.571 (sec), leaf count = 33

$$\left\{\frac{(-2\sin(\alpha)\sin(x) + \cos(y(x)))\sin(y(x))}{2} + \frac{\cos(x)\sin(x)}{2} + \frac{x}{2} + \_C1 + \frac{y(x)}{2} = 0\right\}$$

ODE No. 353

$$xy'(x)\cos(y(x))+\sin(y(x))=0$$

✓ **Mathematica** : cpu = 0.0201132 (sec), leaf count = 14

$$\left\{\left\{y(x)\to\sin^{-1}\left(\frac{e^{c_1}}{x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 2.935 (sec), leaf count = 12

$$\left\{y(x)=\arcsin\left(\frac{1}{\_C1\,x}\right)\right\}$$

ODE No. 354

$$y'(x)(x\sin(y(x))-1)+\cos(y(x))=0$$

✓ **Mathematica** : cpu = 0.0659989 (sec), leaf count = 145

$$\left\{\left\{y(x)\to-\cos^{-1}\left(\frac{c_1x-\sqrt{c_1^2-x^2+1}}{c_1^2+1}\right)\right\},\left\{y(x)\to\cos^{-1}\left(\frac{c_1x-\sqrt{c_1^2-x^2+1}}{c_1^2+1}\right)\right\},\left\{y(x)\to-\mathrm{co}\right.\right.$$

✓ **Maple** : cpu = 0.579 (sec), leaf count = 108

$$\left\{y(x)=\arctan\left(\frac{1}{\_C1^2+1}\left(-\_C1\,\sqrt{\_C1^2-x^2+1}+x\right),\frac{1}{\_C1^2+1}\left(\_C1\,x+\sqrt{\_C1^2-x^2+1}\right)\right),\right.$$

ODE No. 355

$$y'(x)(x\cos(y(x))+\cos(x))+\sin(y(x))-y(x)\sin(x)=0$$

✓ **Mathematica** : cpu = 0.0532876 (sec), leaf count = 17

$$\mathrm{Solve}[x\sin(y(x))+y(x)\cos(x)=c_1,y(x)]$$

✓ **Maple** : cpu = 0.097 (sec), leaf count = 15

$$\{y(x)\cos(x)+x\sin(y(x))+\_C1=0\}$$

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 = 10.0522 (sec), leaf count = 21

$$\text{Solve}\left[x^2\sin(y(x))+y(x)^2\sin(x)=c_1,y(x)\right]$$

✓ **Maple** : cpu = 0.639 (sec), leaf count = 19

$$\left\{(y(x))^2\sin(x)+x^2\sin(y(x))+\_C1=0\right\}$$

ODE No. 357

$$x\log(x)y'(x)\sin(y(x))+\cos(y(x))(1-x\cos(y(x)))=0$$

✓ **Mathematica** : cpu = 0.317829 (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 = 2.586 (sec), leaf count = 13

$$\left\{y(x)=\arccos\left(\frac{\ln(x)}{x+\_C1}\right)\right\}$$

ODE No. 358

$$\cos(x)y'(x)\sin(y(x))+\sin(x)\cos(y(x))=0$$

✓ **Mathematica** : cpu = 0.0454368 (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 = 0.363 (sec), leaf count = 11

$$\left\{y(x)=\arccos\left(\frac{\_C1}{\cos(x)}\right)\right\}$$

ODE No. 359

$$3\sin(x)y'(x)\sin(y(x)) + 5y(x)\cos^4(x) = 0$$

✓ **Mathematica** : cpu = 0.061548 (sec), leaf count = 45

$$\left\{\left\{y(x)\to \text{SinIntegral}^{(-1)}\left(c_1 - \frac{5}{3}\left(\frac{5\cos(x)}{4} + \frac{1}{12}\cos(3x) + \log\left(\sin\left(\frac{x}{2}\right)\right) - \log\left(\cos\left(\frac{x}{2}\right)\right)\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.311 (sec), leaf count = 28

$$\left\{\frac{\cos(3x)}{12} + \frac{5\cos(x)}{4} + \ln(\csc(x) - \cot(x)) + \frac{3\,Si(y(x))}{5} + \_C1 = 0\right\}$$

ODE No. 360

$$y'(x)\cos(ay(x)) - b(1 - c\cos(ay(x)))\sqrt{c\cos(ay(x)) + \cos^2(ay(x)) - 1} = 0$$

✓ **Mathematica** : cpu = 5.4059 (sec), leaf count = 369

$$\left\{\left\{y(x)\to \text{InverseFunction}\left[-\frac{i(\cos(\#1a)+1)\sqrt{\frac{2c\cos(\#1a)+\cos(2\#1a)-1}{(\cos(\#1a)+1)^2}}\sqrt{\frac{c\tan^2\left(\frac{\#1a}{2}\right)+\sqrt{c^2+4}+2}{\sqrt{c^2+4}+2}}\sqrt{1-\frac{c\tan^2\left(\frac{\#\cdots}{}\right.}{\sqrt{c^2+4\cdots}}}\cdots}{a\left(c^2-1\right)\sqrt{\frac{\cdots}{4-2\sqrt{\cdots}}}\cdots}\right.\right.\right.$$

✓ **Maple** : cpu = 2.819 (sec), leaf count = 48

$$\left\{x + \int^{y(x)} 2\frac{\cos(a\_a)}{b(c\cos(a\_a) - 1)\sqrt{2\cos(2a\_a) - 2 + 4c\cos(a\_a)}}d\_a + \_C1 = 0\right\}$$

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 = 0.364734 (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 = 0.425 (sec), leaf count = 22

$$\{-\cos(xy(x)) + \sin(x) + \sin(y(x)+x) + \cos(y(x)) + \_C1 = 0\}$$

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 = 0.0904182 (sec), leaf count = 23

$$\text{Solve}[-4\log(y(x))-\cos(xy(x))-\log(x)=c_1,y(x)]$$

✓ **Maple** : cpu = 1.348 (sec), leaf count = 23

$$\left\{y(x)=\frac{1}{x}\mathit{RootOf}\left(-\_Z+\mathrm{e}^{-\frac{\cos(\_Z)}{4}}\_C1\,x^{\frac{3}{4}}\right)\right\}$$

ODE No. 363

$$(xy'(x)-y(x))\cos^2\left(\frac{y(x)}{x}\right)+x=0$$

✓ **Mathematica** : cpu = 0.0454605 (sec), leaf count = 33

$$\text{Solve}\left[\frac{y(x)}{2x}+\frac{1}{4}\sin\left(\frac{2y(x)}{x}\right)=c_1-\log(x),y(x)\right]$$

✓ **Maple** : cpu = 0.096 (sec), leaf count = 35

$$\left\{-\frac{1}{2\,x}\left(\cos\left(\frac{y(x)}{x}\right)\sin\left(\frac{y(x)}{x}\right)x+y(x)\right)-\ln(x)-\_C1=0\right\}$$

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 = 0.0795675 (sec), leaf count = 31

$$\text{Solve}\left[-\log\left(\frac{y(x)}{x}\right)-\log\left(\cos\left(\frac{y(x)}{x}\right)\right)=c_1+2\log(x),y(x)\right]$$

✓ **Maple** : cpu = 0.217 (sec), leaf count = 23

$$\left\{y(x)=\frac{\_C1}{\cos\left(\mathit{RootOf}\left(-\_Z\,\cos(\_Z)\,x^2+\_C1\right)\right)x}\right\}$$

ODE No. 365

$$\left(y(x)f\left(x^2+y(x)^2\right)-x\right)y'(x)+xf\left(x^2+y(x)^2\right)+y(x)=0$$

✗ **Mathematica** : cpu = 3599.95 (sec), leaf count = 0 , timed out

```
$Aborted
```

✓ **Maple** : cpu = 10.578 (sec), leaf count = 42

$$\left\{y(x)=x\left(\tan\left(RootOf\left(-2\_Z-\int^{\frac{x^2\left((\tan(\_Z))^2+1\right)}{(\tan(\_Z))^2}}\frac{f(\_a)}{\_a}d\_a+2\_C1\right)\right)\right)^{-1}\right\}$$

ODE No. 366

$$f\left(ay(x)^2+x^2\right)\left(ay(x)y'(x)+x\right)-xy'(x)-y(x)=0$$

✓ **Mathematica** : cpu = 362.562 (sec), leaf count = 88

$$\text{Solve}\left[\int_1^{y(x)}\left(-\int_1^x\left(1-2aK[1]K[2]f'\left(aK[2]^2+K[1]^2\right)\right)dK[1]-aK[2]f\left(aK[2]^2+x^2\right)+x\right)dK[2]+\right.$$

✓ **Maple** : cpu = 1.163 (sec), leaf count = 45

$$\left\{-ax(y(x))^2\frac{1}{\sqrt{a^2\left(y\left(x\right)\right)^2}}-\int^{-\frac{a(y(x))^2}{2}-\frac{x^2}{2}}f(-2\_a)\,d\_a+\_C1=0\right\}$$

ODE No. 367

$$f\left(x^cy(x)\right)\left(bxy'(x)-a\right)-x^ay(x)^b\left(cy(x)+xy'(x)\right)=0$$

✗ **Mathematica** : cpu = 13.7606 (sec), leaf count = 0 , could not solve

```
DSolve[-(x^a*y[x]^b*(c*y[x] + x*Derivative[1][y][x])) + f[x^c*y[x]]*(-a + b*x*Derivati
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(f(x^c*y(x))*(b*x*diff(y(x),x)-a)-x^a*y(x)^b*(x*diff(y(x),x)+c*y(x)) = 0,y(x))
```

ODE No. 368

$$ay(x) + bx^2 + y'(x)^2 = 0$$

✗ **Mathematica** : cpu = 3599.95 (sec), leaf count = 0 , timed out

```
$Aborted
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , exception

```
time expired
```

ODE No. 369

$$-a^2 + y'(x)^2 + y(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.0413855 (sec), leaf count = 107

$$\left\{\left\{y(x)\to -\frac{a\tan(x-c_1)}{\sqrt{\tan^2(x-c_1)+1}}\right\},\left\{y(x)\to \frac{a\tan(x-c_1)}{\sqrt{\tan^2(x-c_1)+1}}\right\},\left\{y(x)\to -\frac{a\tan(c_1+x)}{\sqrt{\tan^2(c_1+x)+1}}\right\},$$

✓ **Maple** : cpu = 0.323 (sec), leaf count = 68

$$\left\{y(x)=a, y(x)=\tan(-x+\_C1)\sqrt{\frac{a^2}{(\tan(-x+\_C1))^2+1}}, y(x)=-a, y(x)=-\tan(-x+\_C1)\sqrt{\vphantom{\frac{a^2}{1}}}\right.$$

ODE No. 370

$$-f(x)^2 + y'(x)^2 + y(x)^2 = 0$$

✗ **Mathematica** : cpu = 17.7076 (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))
```

ODE No. 371

$$y'(x)^2 - y(x)^3 + y(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.0274511 (sec), leaf count = 37

$$\left\{\left\{y(x) \to \tan^2\left(\frac{1}{2}(c_1 - x)\right) + 1\right\}, \left\{y(x) \to \tan^2\left(\frac{1}{2}(c_1 + x)\right) + 1\right\}\right\}$$

✓ **Maple** : cpu = 0.094 (sec), leaf count = 20

$$\left\{y(x) = 1, y(x) = \left(\tan\left(-\frac{x}{2} + \frac{\_C1}{2}\right)\right)^2 + 1\right\}$$

ODE No. 372

$$ay(x) + b + y'(x)^2 - 4y(x)^3 = 0$$

✓ **Mathematica** : cpu = 0.00545573 (sec), leaf count = 27

$$\{\{y(x) \to \wp(x - c_1; a, b)\}, \{y(x) \to \wp(x + c_1; a, b)\}\}$$

✓ **Maple** : cpu = 0.197 (sec), leaf count = 232

$$\left\{y(x) = \frac{1}{6}\left(\left(27\,b + 3\sqrt{-3\,a^3 + 81\,b^2}\right)^{\frac{2}{3}} + 3\,a\right)\frac{1}{\sqrt[3]{27\,b + 3\sqrt{-3\,a^3 + 81\,b^2}}}, y(x) = -\frac{1}{12}\left(\left(i\left(27\,b + 3\sqrt{-\right.\right.\right.\right.$$

ODE No. 373

$$a^2 y(x)^2 \left(\log^2(y(x)) - 1\right) + y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.236061 (sec), leaf count = 185

$$\left\{\left\{y(x) \to \exp\left(-\frac{1}{2}\sqrt{-e^{-2c_1+2iax} - e^{2c_1-2iax} + 2}\right)\right\}, \left\{y(x) \to \exp\left(\frac{1}{2}\sqrt{-e^{-2c_1+2iax} - e^{2c_1-2iax} + 2}\right)\right\},\right.$$

✓ **Maple** : cpu = 0.451 (sec), leaf count = 49

$$\left\{y(x) = \left(\mathrm{e}^{-\sin(a(x-\_C1))}\right)^{-1}, y(x) = \mathrm{e}^{-\sin(a(x-\_C1))}, y(x) = \mathrm{e}^{RootOf\left(a^2\left(\mathrm{e}^{\_Z}\right)^2\left(\_Z^2-1\right)\right)}\right\}$$

ODE No. 374

$$y'(x)^2 - 2y'(x) - y(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.0672734 (sec), leaf count = 73

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[-\frac{\sqrt{\#1^2+1}}{\#1} - \frac{1}{\#1} + \sinh^{-1}(\#1)\&\right][c_1 - x]\right\}, \left\{y(x) \to \text{InverseFunction}\left[\right.\right.$$

✓ **Maple** : cpu = 0.048 (sec), leaf count = 85

$$\left\{x - (y(x))^{-1} - \frac{1}{y(x)}\left((y(x))^2+1\right)^{\frac{3}{2}} + y(x)\sqrt{(y(x))^2+1} + \mathit{Arcsinh}(y(x)) - \_\mathit{C1} = 0, x + \frac{1}{y(x)}\left((y(x)\right.\right.$$

ODE No. 375

$$ay'(x) + bx + y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.0463263 (sec), leaf count = 71

$$\left\{\left\{y(x) \to \frac{1}{2}\left(-\frac{(a^2-4bx)^{3/2}}{6b} - ax\right) + c_1\right\}, \left\{y(x) \to \frac{1}{2}\left(\frac{(a^2-4bx)^{3/2}}{6b} - ax\right) + c_1\right\}\right\}$$

✓ **Maple** : cpu = 0.184 (sec), leaf count = 49

$$\left\{y(x) = -\frac{ax}{2} - \frac{1}{12\,b}\left(a^2 - 4\,bx\right)^{\frac{3}{2}} + \_\mathit{C1}, y(x) = -\frac{ax}{2} + \frac{1}{12\,b}\left(a^2 - 4\,bx\right)^{\frac{3}{2}} + \_\mathit{C1}\right\}$$

ODE No. 376

$$ay'(x) + by(x) + y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.346911 (sec), leaf count = 110

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[-\frac{\sqrt{a^2-4\#1b} + a\log\left(\sqrt{a^2-4\#1b} - a\right)}{2b}\&\right]\left[c_1 + \frac{x}{2}\right]\right\}, \left\{y(x) \to \text{InverseF}\right.\right.$$

✓ **Maple** : cpu = 0.809 (sec), leaf count = 219

$$\left\{y(x) = -\frac{1}{4\,b}\mathrm{e}^{\frac{1}{2\,a}\left(-2\,a\mathit{lambertW}\left(2\,\frac{\mathrm{e}^{-1}}{a}\mathrm{e}^{-\frac{\mathit{C1}\,b}{a}}\frac{1}{\sqrt{-b^{-1}}}\left(\mathrm{e}^{\frac{bx}{a}}\right)^{-1}\right) - a\ln\left(-\frac{1}{4\,b}\right) - 2\,a + (-2\,x + 2\_\mathit{C1})b\right)}\left(\mathrm{e}^{\frac{1}{2\,a}\left(-2\,a\mathit{lambertW}\left(2\,\frac{\mathrm{e}^{-1}}{a}\mathrm{e}^{-\right.\right.}\right.\right.$$

ODE No. 377

$$y'(x)^2 + (x-2)y'(x) - y(x) + 1 = 0$$

✓ **Mathematica** : cpu = 0.00547941 (sec), leaf count = 19

$$\{\{y(x) \to c_1 x + c_1^2 - 2c_1 + 1\}\}$$

✓ **Maple** : cpu = 0.161 (sec), leaf count = 24

$$\left\{y(x) = -\frac{x^2}{4} + x, y(x) = 1 + \_C1^2 + (x-2)\_C1\right\}$$

ODE No. 378

$$(a+x)y'(x) + y'(x)^2 - y(x) = 0$$

✓ **Mathematica** : cpu = 0.00540005 (sec), leaf count = 18

$$\{\{y(x) \to ac_1 + c_1 x + c_1^2\}\}$$

✓ **Maple** : cpu = 0.156 (sec), leaf count = 20

$$\left\{y(x) = \_C1\left(\_C1 + a + x\right), y(x) = -\frac{(x+a)^2}{4}\right\}$$

ODE No. 379

$$y'(x)^2 - (x+1)y'(x) + y(x) = 0$$

✓ **Mathematica** : cpu = 0.00523942 (sec), leaf count = 18

$$\{\{y(x) \to c_1 x - c_1^2 + c_1\}\}$$

✓ **Maple** : cpu = 0.163 (sec), leaf count = 22

$$\left\{y(x) = \_C1\left(-\_C1 + x + 1\right), y(x) = \frac{(1+x)^2}{4}\right\}$$

ODE No. 380

$$y'(x)^2+2xy'(x)-y(x)=0$$

✓ **Mathematica** : cpu = 0.493827 (sec), leaf count = 1757

$$\left\{\left\{y(x)\to -\frac{x^2}{4}-\frac{1}{4}\sqrt[3]{x^6-20\cosh\left(3c_1\right)x^3-20\sinh\left(3c_1\right)x^3-8\cosh\left(6c_1\right)-8\sinh\left(6c_1\right)+8\sqrt{-\cosh\left(\right.}}\right.\right.$$

✓ **Maple** : cpu = 0.182 (sec), leaf count = 619

$$\left\{y(x)=\frac{1}{16}\left(i\left(6\_C1-x^3+2\sqrt{-3\_C1\,x^3+9\_C1^2}\right)^{\frac{2}{3}}\sqrt{3}-i\sqrt{3}x^2-\left(6\_C1-x^3+2\sqrt{-3\_C1\,x^3}\right.\right.\right.$$

ODE No. 381

$$y'(x)^2-2xy'(x)+y(x)=0$$

✓ **Mathematica** : cpu = 0.510642 (sec), leaf count = 1757

$$\left\{\left\{y(x)\to \frac{x^2}{4}+\frac{1}{4}\sqrt[3]{x^6-20\cosh\left(3c_1\right)x^3-20\sinh\left(3c_1\right)x^3-8\cosh\left(6c_1\right)-8\sinh\left(6c_1\right)+8\sqrt{-\cosh\left(3c\right.}}\right.\right.$$

✓ **Maple** : cpu = 0.171 (sec), leaf count = 579

$$\left\{y(x)=-\frac{1}{16}\left(i\left(-6\_C1+x^3+2\sqrt{-3\_C1\,x^3+9\_C1^2}\right)^{\frac{2}{3}}\sqrt{3}-i\sqrt{3}x^2-\left(-6\_C1+x^3+2\sqrt{-3\_}\right.\right.\right.$$

ODE No. 382

$$axy'(x) - bx^2 - c + y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.298234 (sec), leaf count = 201

$$\left\{\left\{y(x) \to \frac{1}{2}\left(\frac{1}{2}x\sqrt{a^2x^2+4bx^2+4c} + \frac{2c\log\left(\sqrt{a^2+4b}\sqrt{a^2x^2+4bx^2+4c}+a^2x+4bx\right)}{\sqrt{a^2+4b}} - \frac{ax^2}{2}\right) + c_1\right\}\right.$$

✓ **Maple** : cpu = 0.173 (sec), leaf count = 146

$$\left\{y(x) = -\frac{x}{4}\sqrt{(a^2+4b)\,x^2+4c} - c\ln\left(\sqrt{a^2+4b}x + \sqrt{(a^2+4b)\,x^2+4c}\right)\frac{1}{\sqrt{a^2+4b}} - \frac{ax^2}{4} + \_C1, y(\right.$$

ODE No. 383

$$axy'(x) + by(x) + cx^2 + y'(x)^2 = 0$$

✗ **Mathematica** : cpu = 3599.95 (sec), leaf count = 0 , timed out

`$Aborted`

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , exception

`time expired`

ODE No. 384

$$(ax+b)y'(x) - ay(x) + c + y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 2.10627 (sec), leaf count = 183

$$\left\{\left\{y(x) \to \frac{-2\sqrt{-a^4e^{2c_1}x^2 - 2a^4e^{2c_1}x + a^4\left(-e^{2c_1}\right)} + 2a^3x + a^3 - 2a^2bx - ab^2 - ae^{2c_1} + 4ac}{4a^2}\right\}, \left\{y(x) \to\right.\right.$$

✓ **Maple** : cpu = 0.027 (sec), leaf count = 50

$$\left\{y(x) = \frac{\_C1^2 + (ax+b)\_C1 + c}{a}, y(x) = \frac{-a^2x^2 - 2abx - b^2 + 4c}{4a}\right\}$$

ODE No. 385

$$-2x^2y'(x) + y'(x)^2 + 2xy(x) = 0$$

✗ **Mathematica** : cpu = 3610.43 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 2.372 (sec), leaf count = 169

$$\left\{y(x) = \frac{x^4 - \left(RootOf\left(x^{16} - 12\_Z^2x^{12} - 16\_Z^3x^{10} + 30\_Z^4x^8 + 96\_Z^5x^6 + 100\_Z^6x^4 + 48\_Z^7x^2\right.\right.}{2\,x}\right.$$

ODE No. 386

$$ax^3y'(x) - 2ax^2y(x) + y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.25678 (sec), leaf count = 119

$$\left\{\left\{y(x) \to \frac{1}{2}(\sinh(2c_1) + \cosh(2c_1))\left(-\sqrt{2}\sqrt{a}x^2 + 2\sinh(2c_1) + 2\cosh(2c_1)\right)\right\}, \left\{y(x) \to \frac{\sqrt{a}x^2\sinh(2\right.\right.}{\sqrt{2}}$$

✓ **Maple** : cpu = 3.201 (sec), leaf count = 27

$$\left\{y(x) = -\frac{ax^4}{8}, y(x) = \_C1\,x^2 + 2\frac{\_C1^2}{a}\right\}$$

ODE No. 387

$$y'(x)^2 + e^x(y'(x) - y(x)) = 0$$

✓ **Mathematica** : cpu = 0.896739 (sec), leaf count = 134

$$\left\{\text{Solve}\left[-\frac{-e^{x/2}\sqrt{4y(x)+e^x} - 4y(x)\log\left(\sqrt{4y(x)+e^x} + e^{x/2}\right) + e^x}{2y(x)} = c_1, y(x)\right], \text{Solve}\left[2\log(y(x)) - \frac{e}{}\right.\right.$$

✓ **Maple** : cpu = 6.373 (sec), leaf count = 115

$$\left\{\ln(y(x)) - \frac{1}{2\,y(x)}\sqrt{e^{2\,x} + 4\,y(x)\,e^x} - 2\,Artanh\left(\sqrt{e^{2\,x} + 4\,y(x)\,e^x}e^{-x}\right) - \frac{e^x}{2\,y(x)} - \_C1 = 0, \ln(y(x))\right.$$

ODE No. 388

$$y'(x)^2 - 2y(x)y'(x) - 2x = 0$$

✓ **Mathematica** : cpu = 0.759271 (sec), leaf count = 53

$$\text{Solve}\left[\left\{x = \frac{c_1 \text{K\$1394440}}{\sqrt{\text{K\$1394440}^2+1}} + \frac{\text{K\$1394440}\sinh^{-1}(\text{K\$1394440})}{2\sqrt{\text{K\$1394440}^2+1}}, y(x) = \frac{\text{K\$1394440}}{2} - \frac{x}{\text{K\$1394440}}\right\},\right.$$

✓ **Maple** : cpu = 0.743 (sec), leaf count = 223

$$\left\{1\left(\left(\frac{y(x)}{2} - \frac{1}{2}\sqrt{(y(x))^2+2x}\right) Arcsinh\left(-y(x)+\sqrt{(y(x))^2+2x}\right) + x\sqrt{2\,(y(x))^2+2x-2\,y(x)\,\sqrt{(}\right.\right.\right.$$

ODE No. 389

$$y'(x)^2 - (4y(x)+1)y'(x) + y(x)(4y(x)+1) = 0$$

✓ **Mathematica** : cpu = 0.0463695 (sec), leaf count = 57

$$\left\{\left\{y(x) \to -\frac{1}{4}e^{x-4c_1}\left(2e^{2c_1} - e^x\right)\right\}, \left\{y(x) \to \frac{1}{4}e^{2c_1+x}\left(e^{2c_1+x} - 2\right)\right\}\right\}$$

✓ **Maple** : cpu = 13.089 (sec), leaf count = 71

$$\left\{y(x) = -\frac{1}{4}, y(x) = \frac{1}{\_C1}\left(-(\mathrm{e}^x)^2\sqrt{-\frac{\_C1}{(\mathrm{e}^x)^2}} + \_C1\right)\frac{1}{\sqrt{-\frac{\_C1}{(\mathrm{e}^x)^2}}}, y(x) = -\frac{1}{\_C1}\left((\mathrm{e}^x)^2\sqrt{-\frac{\_C1}{(\mathrm{e}^x)^2}} + \_C1\right.\right.$$

ODE No. 390

$$ay(x)y'(x) - bx - c + y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 2.21864 (sec), leaf count = 142

$$\text{Solve}\left[\left\{x = c_1 e^{b\left(\frac{\log(\text{K\$1394876})}{b} - \frac{\log\left(b-a\text{K\$1394876}^2\right)}{2b}\right)} + e^{b\left(\frac{\log(\text{K\$1394876})}{b} - \frac{\log\left(b-a\text{K\$1394876}^2\right)}{2b}\right)}\left(\frac{\tan^{-1}\left(\frac{\sqrt{a}\text{K\$1394876}}{\sqrt{b-a\text{K\$1394876}^2}}\right)}{\sqrt{a}}\right.\right.\right.$$

✓ **Maple** : cpu = 6.155 (sec), leaf count = 281

$$\left\{ y(x) = 2\,\frac{\left(-1/4\left(e^{2\,RootOf\left(\sqrt{a}\_C1\,be^{2\,\_Z}-e^{2\,\_Z}abx+\sqrt{a}\_C1\,b^{2}-e^{2\,\_Z}\_Z\,b-e^{2\,\_Z}ac+ab^{2}x-\_Z\,b^{2}+abc\right)}+b\right)^{2}e^{-2\,RootOf(\sqrt{a}}}{a^{3/2}\left(e^{2\,RootOf(\sqrt{a}\_}\right.}\right.$$

ODE No. 391

$$y'(x)(ay(x)+bx)+abxy(x)+y'(x)^2=0$$

✓ **Mathematica** : cpu = 0.00559588 (sec), leaf count = 29

$$\left\{\left\{y(x)\to c_1e^{-ax}\right\},\left\{y(x)\to c_1-\frac{bx^2}{2}\right\}\right\}$$

✓ **Maple** : cpu = 0.254 (sec), leaf count = 22

$$\left\{y(x)=\_C1\,e^{-ax},y(x)=-\frac{bx^2}{2}+\_C1\right\}$$

ODE No. 392

$$y(x)^2\log(ay(x))-xy(x)y'(x)+y'(x)^2=0$$

✓ **Mathematica** : cpu = 0.258455 (sec), leaf count = 27

$$\left\{\left\{y(x)\to\frac{e^{\frac{c_1x}{2}-\frac{c_1^2}{4}}}{a}\right\}\right\}$$

✓ **Maple** : cpu = 10.285 (sec), leaf count = 50

$$\left\{y(x)=\frac{1}{a}e^{\frac{x^2}{4}},y(x)=\frac{1}{e^{\_C1^2}e^{\_C1\,x}a},y(x)=\frac{e^{\_C1\,x}}{e^{\_C1^2}a}\right\}$$

ODE No. 393

$$y'(x)^2 + 2y(x)\cot(x)y'(x) - y(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.03641 (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 = 0.926 (sec), leaf count = 77

$$\left\{y(x) = \frac{\_C1}{\tan(x)}\left(1 + \sqrt{(\tan(x))^2 + 1}\right)\frac{1}{\sqrt{\frac{(\tan(x))^2}{(\tan(x))^2+1}}}, y(x) = \frac{\_C1\,((\tan(x))^2 + 1)}{\tan(x)}\sqrt{\frac{(\tan(x))^2}{(\tan(x))^2+1}}\left(1 +\right.\right.$$

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 = 53.9638 (sec), leaf count = 0 , could not solve

```
DSolve[-((-f[x]^2 + g[x])/E^(2*Integrate[f[xp], {xp, a, x}])) + g[x]*y[x]^2 + 2*f[x]*y
```

✓ **Maple** : cpu = 22.549 (sec), leaf count = 109

$$\left\{y(x) = \tan\left(-\int\left(e^{\int_a^x f(xp)\,dxp}\right)^2\sqrt{\frac{g(x) - (f(x))^2}{\left(e^{\int_a^x f(xp)\,dxp}\right)^4}}\,dx + \_C1\right)\sqrt{e^{-2\int_a^x f(xp)\,dxp}\left(\left(\tan\left(-\int\left(e^{\int_a^x f(xp)}\right.\right.\right.\right.}\right.$$

ODE No. 395

$$2f(x)y(x)y'(x) + g(x)y(x)^2 + h(x) + y'(x)^2 = 0$$

✗ **Mathematica** : cpu = 32.0936 (sec), leaf count = 0 , could not solve

```
DSolve[h[x] + g[x]*y[x]^2 + 2*f[x]*y[x]*Derivative[1][y][x] + Derivative[1][y][x]^2 ==
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(y(x),x)^2+2*f(x)*y(x)*diff(y(x),x)+g(x)*y(x)^2+h(x) = 0,y(x))
```

ODE No. 396

$$(y(x)-x)y(x)y'(x)+y'(x)^2-xy(x)^3=0$$

✓ **Mathematica** : cpu = 0.00849782 (sec), leaf count = 29

$$\left\{\left\{y(x)\to \frac{1}{x-c_1}\right\},\left\{y(x)\to c_1e^{\frac{x^2}{2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.241 (sec), leaf count = 20

$$\left\{y(x)=(x+\_C1)^{-1},y(x)=\_C1\,\mathrm{e}^{\frac{x^2}{2}}\right\}$$

ODE No. 397

$$-2x^3y(x)^2y'(x)-4x^2y(x)^3+y'(x)^2=0$$

✓ **Mathematica** : cpu = 0.635548 (sec), leaf count = 143

$$\left\{\text{Solve}\left[-\frac{x\sqrt{x^4y(x)+4}y(x)^{3/2}\sinh^{-1}\left(\frac{1}{2}x^2\sqrt{y(x)}\right)}{2\sqrt{x^2y(x)^3\left(x^4y(x)+4\right)}}-\frac{1}{4}\log(y(x))=c_1,y(x)\right],\text{Solve}\left[\frac{xy(x)^{3/2}\sqrt{x^4y(x}}{2\sqrt{x^2y(}}\right.\right.$$

✓ **Maple** : cpu = 3.413 (sec), leaf count = 128

$$\left\{y(x)=\frac{-2\sqrt{2}x^2-2\_C1}{2\_C1\,x^4-\_C1^3},y(x)=\frac{2\sqrt{2}x^2-2\_C1}{2\_C1\,x^4-\_C1^3},y(x)=\frac{\left(\sqrt{2}x^2\_C1-2\right)\_C1^2}{2\_C1^2x^4-4},y(x)=-4\,x^{-4},y\right.$$

ODE No. 398

$$y'(x)^2-3xy(x)^{2/3}y'(x)+9y(x)^{5/3}=0$$

✓ **Mathematica** : cpu = 1.03085 (sec), leaf count = 258

$$\left\{\text{Solve}\left[-\frac{\left(x^2-4\sqrt[3]{y(x)}\right)^{3/2}y(x)^2\log(y(x))}{6\left(\left(x^2-4\sqrt[3]{y(x)}\right)y(x)^{4/3}\right)^{3/2}}+\frac{\sqrt{\left(x^2-4\sqrt[3]{y(x)}\right)y(x)^{4/3}}\log\left(\sqrt{x^2-4\sqrt[3]{y(x)}}+x\right)}{\sqrt{x^2-4\sqrt[3]{y(x)}}y(x)^{2/3}}+\right.\right.$$

✓ **Maple** : cpu = 5.989 (sec), leaf count = 138

$$\left\{\ln(x) + \frac{1}{6}\ln\left(64\frac{y(x)}{x^6} - 1\right) - \frac{1}{6}\ln\left(16\left(\frac{y(x)}{x^6}\right)^{2/3} + 4\sqrt[3]{\frac{y(x)}{x^6}} + 1\right) - \frac{1}{6}\ln\left(4\sqrt[3]{\frac{y(x)}{x^6}} - 1\right) + \frac{1}{6}\ln\left(\right.\right.$$

ODE No. 399

$$2y'(x)^2 + (x-1)y'(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 0.00477384 (sec), leaf count = 20

$$\{\{y(x) \to c_1x + 2c_1^2 - c_1\}\}$$

✓ **Maple** : cpu = 0.022 (sec), leaf count = 22

$$\left\{y(x) = \_C1\,(2\_C1 + x - 1)\,, y(x) = -\frac{(x-1)^2}{8}\right\}$$

ODE No. 400

$$-2x^2y'(x) + 2y'(x)^2 + 3xy(x) = 0$$

✓ **Mathematica** : cpu = 0.479202 (sec), leaf count = 189

$$\left\{\text{Solve}\left[\frac{1}{3}\log(y(x)) - \frac{\sqrt{x^4 - 6xy(x)}\left(\log\left(\frac{x^{3/2}}{\sqrt{x^3-6y(x)}} + 1\right) - \log\left(1 - \frac{x^{3/2}}{\sqrt{x^3-6y(x)}}\right)\right)}{3\sqrt{x}\sqrt{x^3 - 6y(x)}} = c_1, y(x)\right], \text{Solve}\left[\right.\right.$$

✓ **Maple** : cpu = 1.521 (sec), leaf count = 74

$$\left\{y(x) = \frac{x^3}{6}, y(x) = \frac{1}{3\_C1}\left(-\sqrt{-6\_C1\,xx + 3}\right), y(x) = \frac{1}{3\_C1}\left(\sqrt{-6\_C1\,xx + 3}\right), y(x) = -\frac{x}{3}\sqrt{-6\_\right.$$

ODE No. 401

$$3y'(x)^2 - 2xy'(x) + y(x) = 0$$

✓ **Mathematica** : cpu = 0.340612 (sec), leaf count = 1093

$$\{\{y(x) \to \text{Root}[-16e^{6c_1}x^6 + 3\#1^4x^4 + 144e^{6c_1}\#1x^4 - 24\#1^5x^2 - 378e^{6c_1}\#1^2x^2 + 243e^{12c_1} + 48\#1^6 + 2$$

✓ **Maple** : cpu = 0.479 (sec), leaf count = 580

$$\left\{y(x) = -\frac{1}{48}\left(i\left(-54\_C1 + x^3 + 6\sqrt{-3\_C1\,x^3 + 81\_C1^2}\right)^{\frac{2}{3}}\sqrt{3} - i\sqrt{3}x^2 - \left(-54\_C1 + x^3 + 6\sqrt{-\right.\right.\right.$$

ODE No. 402

$$x^2 + 4xy'(x) + 3y'(x)^2 - y(x) = 0$$

✗ **Mathematica** : cpu = 3601.76 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.719 (sec), leaf count = 101

$$\left\{y(x) = -\frac{x^2}{3}, y(x) = \frac{-3\_C1^2x^2 - 2\sqrt{3}\_C1\,x + 3}{12\_C1^2}, y(x) = \frac{-3\_C1^2x^2 + 2\sqrt{3}\_C1\,x + 3}{12\_C1^2}, y(x) = -\frac{\sqrt{}}{}\right.$$

ODE No. 403

$$ay'(x)^2 + by'(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 0.322532 (sec), leaf count = 116

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[\frac{\sqrt{4\#1a + b^2} + b\log\left(\sqrt{4\#1a + b^2} - b\right)}{2a}\&\right]\left[\frac{x}{2a} + c_1\right]\right\}, \left\{y(x) \to \text{InverseFu}\right.\right.$$

✓ **Maple** : cpu = 19.36 (sec), leaf count = 197

$$\left\{y(x) = \frac{1}{4\,a}\mathrm{e}^{-\frac{1}{2\,b}\left(b\ln\left(\frac{1}{4\,a}\right)+2\,b\mathit{lambertW}\left(2\,\frac{\mathrm{e}^{-1}}{b\sqrt{a-1}}\mathrm{e}^{\frac{x}{b}}\left(\mathrm{e}^{\frac{\_C1}{b}}\right)^{-1}\right)+2\_C1+2\,b-2\,x\right)}\left(\mathrm{e}^{-\frac{1}{2\,b}\left(b\ln\left(\frac{1}{4\,a}\right)+2\,b\mathit{lambertW}\left(2\,\frac{\mathrm{e}^{-1}}{b\sqrt{a-1}}\mathrm{e}^{\frac{x}{b}}\right.\right.}\right.\right.$$

ODE No. 404

$$ay'(x)^2 + bx^2y'(x) + cxy(x) = 0$$

✗ **Mathematica** : cpu = 3599.95 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 2.159 (sec), leaf count = 389

$$\left\{ \int_{\_b}^{x} 1 \left(-b\_a^2 - \sqrt{\_a^4b^2 - 4\_a\,acy\,(x)} \right) \left(b\_a^3 + \sqrt{\_a^4b^2 - 4\_a\,acy\,(x)}\_a + 6\,ay(x) \right)^{-1} \mathrm{d}\_a + \int^{y(x)}$$

ODE No. 405

$$ay'(x)^2 + y(x)y'(x) - x = 0$$

✓ **Mathematica** : cpu = 1.30212 (sec), leaf count = 53

$$\text{Solve}\left[\left\{ x = \frac{a\text{K\$1835372}\sin^{-1}(\text{K\$1835372})}{\sqrt{1-\text{K\$1835372}^2}} + \frac{c_1\text{K\$1835372}}{\sqrt{1-\text{K\$1835372}^2}}, y(x) = \frac{x}{\text{K\$1835372}} - a\text{K\$1835372} \right\},\right.$$

✓ **Maple** : cpu = 2.196 (sec), leaf count = 375

$$\left\{ \_C1 \left(y(x) - \sqrt{4\,ax + (y\,(x))^2} \right) \frac{1}{\sqrt{\frac{1}{a}\left(2\,a - y\,(x) + \sqrt{4\,ax + (y\,(x))^2} \right)}} \frac{1}{\sqrt{\frac{1}{a}\left(-y\,(x) + \sqrt{4\,ax + (y\,(x))\right.}}}\right.$$

ODE No. 406

$$ay'(x)^2 - y(x)y'(x) - x = 0$$

✓ **Mathematica** : cpu = 0.976201 (sec), leaf count = 49

$$\text{Solve}\left[\left\{ x = \frac{a\text{K\$1835576}\sinh^{-1}(\text{K\$1835576})}{\sqrt{\text{K\$1835576}^2+1}} + \frac{c_1\text{K\$1835576}}{\sqrt{\text{K\$1835576}^2+1}}, y(x) = a\text{K\$1835576} - \frac{x}{\text{K\$1835576}} \right\}\right.$$

✓ **Maple** : cpu = 0.745 (sec), leaf count = 262

$$\left\{1\left(-\frac{\sqrt{2}}{2}\left(y(x)+\sqrt{4\,ax+(y\,(x))^2}\right)Arcsinh\left(\frac{1}{2\,a}\left(y(x)+\sqrt{4\,ax+(y\,(x))^2}\right)\right)+x\sqrt{\frac{1}{a^2}\left(y\,(x)\sqrt{4\,ax\right.}}\right.\right.$$

ODE No. 407

$$xy'(x)^2-y(x)=0$$

✓ **Mathematica** : cpu = 0.016347 (sec), leaf count = 51

$$\left\{\left\{y(x)\to\frac{1}{4}(-4c_1\sqrt{x}+c_1^2+4x)\right\},\left\{y(x)\to\frac{1}{4}(4c_1\sqrt{x}+c_1^2+4x)\right\}\right\}$$

✓ **Maple** : cpu = 0.255 (sec), leaf count = 39

$$\left\{y(x)=0,y(x)=\frac{1}{x}\left(-x+\sqrt{\_C1\,x}\right)^2,y(x)=\frac{1}{x}\left(x+\sqrt{\_C1\,x}\right)^2\right\}$$

ODE No. 408

$$xy'(x)^2-2y(x)+x=0$$

✓ **Mathematica** : cpu = 1.10146 (sec), leaf count = 166

$$\left\{\text{Solve}\left[\frac{\left(\sqrt{\frac{2y(x)}{x}-1}-1\right)\left(\left(\sqrt{\frac{2y(x)}{x}-1}-1\right)\log\left(\sqrt{\frac{2y(x)}{x}-1}-1\right)-1\right)}{\sqrt{\frac{2y(x)}{x}-1}-\frac{y(x)}{x}}=c_1+\log(x),y(x)\right],\text{Solve}\right.$$

✓ **Maple** : cpu = 0.399 (sec), leaf count = 73

$$\left\{y(x)=\left(\frac{1}{2}\left(lambertW\left(\frac{1}{\_C1}\sqrt{\_C1\,x}\right)+1\right)^2\left(lambertW\left(\frac{1}{\_C1}\sqrt{\_C1\,x}\right)\right)^{-2}+\frac{1}{2}\right)x,y(x)=\left(\frac{1}{2}\right.\right.$$

ODE No. 409

$$xy'(x)^2 - 2y'(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 30.7922 (sec), leaf count = 66

$$\text{Solve}\left[\left\{x = \frac{y(\text{K\$1836194}) + 2\text{K\$1836194}}{\text{K\$1836194}^2}, y(x) = c_1 e^{2(\log(\text{K\$1836194})-\log(1-\text{K\$1836194}))} + e^{2(\log(\text{K\$1836194})-\log(1\right.\right.$$

✓ **Maple** : cpu = 0.75 (sec), leaf count = 63

$$\left\{y(x) = x\mathrm{e}^{2\,RootOf\left(-x\mathrm{e}^{2\_Z}+2\,x\mathrm{e}^{\_Z}+2\,\mathrm{e}^{\_Z}+\_C1-2\_Z-x\right)} - 2\,\mathrm{e}^{RootOf\left(-x\mathrm{e}^{2\_Z}+2\,x\mathrm{e}^{\_Z}+2\,\mathrm{e}^{\_Z}+\_C1-2\_Z-x\right)}\right\}$$

ODE No. 410

$$xy'(x)^2 + 4y'(x) - 2y(x) = 0$$

✓ **Mathematica** : cpu = 31.574 (sec), leaf count = 80

$$\text{Solve}\left[\left\{x = -\frac{2(2\text{K\$1836546} - y(\text{K\$1836546}))}{\text{K\$1836546}^2}, y(x) = c_1 e^{-4\left(\frac{1}{2}\log(2-\text{K\$1836546})-\frac{\log(\text{K\$1836546})}{2}\right)} + 4e^{-4\left(\frac{1}{2}\log(2-\right.}\right.\right.$$

✓ **Maple** : cpu = 0.767 (sec), leaf count = 64

$$\left\{y(x) = \frac{x\mathrm{e}^{2\,RootOf\left(-x\mathrm{e}^{2\_Z}+4\,x\mathrm{e}^{\_Z}-4\,\mathrm{e}^{\_Z}+\_C1+8\_Z-4\,x\right)}}{2} + 2\,\mathrm{e}^{RootOf\left(-x\mathrm{e}^{2\_Z}+4\,x\mathrm{e}^{\_Z}-4\,\mathrm{e}^{\_Z}+\_C1+8\_Z-4\,x\right)}\right\}$$

ODE No. 411

$$xy'(x)^2 + xy'(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 1.29837 (sec), leaf count = 181

$$\left\{\text{Solve}\left[\frac{\left(\sqrt{\frac{4y(x)}{x}+1}-1\right)\left(\left(\sqrt{\frac{4y(x)}{x}+1}-1\right)\log\left(\sqrt{\frac{4y(x)}{x}+1}-1\right)-1\right)}{2\left(-\frac{2y(x)}{x}+\sqrt{\frac{4y(x)}{x}+1}-1\right)} = c_1 + \frac{\log(x)}{2}, y(x)\right], \text{Solve}\right.$$

✓ **Maple** : cpu = 0.482 (sec), leaf count = 65

$$\left\{y(x) = \frac{x}{4}\left(1 + 2\, lambertW\left(-1/2\, \frac{1}{\sqrt{\frac{\_C1}{x}}}\right)\right)\left(lambertW\left(-\frac{1}{2}\frac{1}{\sqrt{\frac{\_C1}{x}}}\right)\right)^{-2}, y(x) = \frac{x}{4}\left(1 + 2\, lamber\right.\right.$$

ODE No. 412

$$a + xy'(x)^2 + y(x)y'(x) = 0$$

✓ **Mathematica** : cpu = 27.162 (sec), leaf count = 16145

Too large to display

✓ **Maple** : cpu = 0.702 (sec), leaf count = 146

$$\left\{-\_C1\, x^2\left(\frac{1}{x}\left(-y(x) + \sqrt{(y(x))^2 - 4\, ax}\right)\right)^{\frac{3}{2}}\left(-y(x) + \sqrt{(y(x))^2 - 4\, ax}\right)^{-2} + x + \frac{4\, ax^2}{3}\left(-y(x) + \sqrt{}\right.\right.$$

ODE No. 413

$$-x^2 + xy'(x)^2 + y(x)y'(x) = 0$$

✗ **Mathematica** : cpu = 3599.96 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 1.06 (sec), leaf count = 269

$$\left\{\int_{\_b}^{x}\frac{1}{\_a}\left(-y(x) - \sqrt{4\_a^3 + (y(x))^2}\right)\left(\sqrt{4\_a^3 + (y(x))^2} + 4\, y(x)\right)^{-1} d\_a + \int^{y(x)} 1\left(-2 + \left(-48\_f\right.\right.\right.$$

ODE No. 414

$$x^3 + xy'(x)^2 + y(x)y'(x) = 0$$

✗ **Mathematica** : cpu = 3599.97 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 1.07 (sec), leaf count = 269

$$\left\{\int_{\_b}^{x}\frac{1}{\_a}\left(-y(x) - \sqrt{-4\_a^4 + (y(x))^2}\right)\left(\sqrt{-4\_a^4 + (y(x))^2} + 5\, y(x)\right)^{-1} d\_a + \int^{y(x)} 1\left(-2 + \left(80\_\right.\right.\right.$$

ODE No. 415

$$y(x)y'(x) + xy'(x)^2 - y(x)^4 = 0$$

✓ **Mathematica** : cpu = 0.222116 (sec), leaf count = 133

$$\left\{\left\{y(x) \to -\frac{\sqrt{\tanh^2\left(\frac{1}{2}\left(c_1 - \log(x)\right)\right) - 1}}{2\sqrt{x}}\right\}, \left\{y(x) \to \frac{\sqrt{\tanh^2\left(\frac{1}{2}\left(c_1 - \log(x)\right)\right) - 1}}{2\sqrt{x}}\right\}, \left\{y(x) \to -\frac{\sqrt{}}{}\right.\right.$$

✓ **Maple** : cpu = 2.056 (sec), leaf count = 95

$$\left\{y(x) = -\frac{1}{2}\frac{1}{\sqrt{-x}}, y(x) = \frac{1}{2}\frac{1}{\sqrt{-x}}, y(x) = -\frac{1}{2\,x}\sqrt{-\left(\tanh\left(-\frac{\ln(x)}{2} + \frac{\_C1}{2}\right)\right)^2 x + x\left(\tanh\left(-\frac{\ln(x)}{2}\right.\right.}\right.$$

ODE No. 416

$$xy'(x)^2 + (y(x) - 3x)y'(x) + y(x) = 0$$

✗ **Mathematica** : cpu = 3651.55 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.506 (sec), leaf count = 136

$$\left\{-\frac{\_C1}{x}\left(-y(x) + 5\,x + \sqrt{9\,x^2 - 10\,xy(x) + (y(x))^2}\right)\left(\frac{1}{x}\left(-y(x) + 3\,x + \sqrt{9\,x^2 - 10\,xy(x) + (y(x))^2}\right.\right.\right.$$

ODE No. 417

$$a + xy'(x)^2 - y(x)y'(x) = 0$$

✓ **Mathematica** : cpu = 0.857251 (sec), leaf count = 430

$$\left\{\left\{y(x) \to -\frac{8a^2}{4a - \sinh(c_1) - \cosh(c_1)} - \frac{\sqrt{16a^3\sinh(c_1) + 16a^3\cosh(c_1) - 8a^2x\sinh(c_1) - 8a^2x\cosh(\right.}}{}\right.\right.$$

✓ **Maple** : cpu = 0.162 (sec), leaf count = 35

$$\left\{y(x) = \frac{\_C1^2 x + a}{\_C1}, y(x) = -2\sqrt{ax}, y(x) = 2\sqrt{ax}\right\}$$

ODE No. 418

$$ay(x) + xy'(x)^2 - y(x)y'(x) = 0$$

✓ **Mathematica** : cpu = 1.08089 (sec), leaf count = 165

$$\left\{\text{Solve}\left[-\frac{\sqrt{\frac{y(x)}{x}}\sqrt{\frac{y(x)}{x}-4a}-4a\log\left(\sqrt{\frac{y(x)}{x}-4a}+\sqrt{\frac{y(x)}{x}}\right)+\frac{y(x)}{x}}{4a}=c_1+\frac{\log(x)}{2},y(x)\right],\text{Solve}\left[\frac{y(x)}{4ax}-\right.\right.$$

✓ **Maple** : cpu = 0.374 (sec), leaf count = 42

$$\left\{y(x)=0,y(x)=-ax\left(\mathit{lambertW}\left(-\frac{x\mathrm{e}}{\_C1\ a}\right)-1\right)^2\left(\mathit{lambertW}\left(-\frac{x\mathrm{e}}{\_C1\ a}\right)\right)^{-1}\right\}$$

ODE No. 419

$$xy'(x)^2 + 2y(x)y'(x) - x = 0$$

✓ **Mathematica** : cpu = 1.79749 (sec), leaf count = 9073

✓ **Maple** : cpu = 0.262 (sec), leaf count = 109

$$\left\{x+\frac{\_C1}{x}\left(y(x)-\sqrt{(y(x))^2+x^2}\right)\left(\frac{1}{x^2}\left(2x^2+6(y(x))^2-6y(x)\sqrt{(y(x))^2+x^2}\right)\right)^{-\frac{2}{3}}=0,\frac{\_C1}{x}\left(y(\right.\right.$$

ODE No. 420

$$a + xy'(x)^2 - 2y(x)y'(x) = 0$$

✓ **Mathematica** : cpu = 1.98725 (sec), leaf count = 11757

$$\left\{\left\{y(x) \to -\sqrt{\frac{}{16\sqrt[3]{27a^6x^{12} - 144a^5\cosh(3c_1)\,x^9 - 144a^5\sinh(3c_1)\,x^9 + 272a^4\cosh(6c_1)\,x^6 + 272a^4 \sin}}}\right.\right.$$

✓ **Maple** : cpu = 0.808 (sec), leaf count = 689

$$\left\{y(x) = \frac{x}{12\_C1}\left(4\frac{x^2}{\sqrt[3]{-36\,a\_C1^2 + 8\,x^3 + 12\sqrt{a\left(9\,a\_C1^2 - 4\,x^3\right)}\_C1}} + 2\,x + \sqrt[3]{-36\,a\_C1^2 + 8\,x^3}\right.\right.$$

ODE No. 421

$$xy'(x)^2 - 2y(x)y'(x) - x = 0$$

✓ **Mathematica** : cpu = 0.0334534 (sec), leaf count = 27

$$\{\{y(x) \to x\sinh(c_1 - \log(x))\}, \{y(x) \to x\sinh(c_1 + \log(x))\}\}$$

✓ **Maple** : cpu = 0.155 (sec), leaf count = 32

$$\left\{y(x) = -ix, y(x) = ix, y(x) = -\frac{\_C1^2 - x^2}{2\_C1}\right\}$$

ODE No. 422

$$xy'(x)^2 - 2y(x)y'(x) + 4x = 0$$

✓ **Mathematica** : cpu = 0.0475903 (sec), leaf count = 49

$$\left\{\left\{y(x) \to 2\left(2x\sinh^2\left(\frac{1}{2}(c_1 - \log(x))\right) + x\right)\right\}, \left\{y(x) \to 2\left(2x\sinh^2\left(\frac{1}{2}(c_1 + \log(x))\right) + x\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.153 (sec), leaf count = 30

$$\left\{y(x) = -2\,x, y(x) = 2\,x, y(x) = \frac{4\_C1^2 + x^2}{2\_C1}\right\}$$

ODE No. 423

$$xy'(x)^2 - 2y(x)y'(x) + 2y(x) + x = 0$$

✓ **Mathematica** : cpu = 0.0772595 (sec), leaf count = 59

$$\left\{\left\{y(x) \to \frac{1}{2}\left(-2e^{-c_1}x^2 - e^{c_1} + 2x\right)\right\}, \left\{y(x) \to \frac{1}{2}\left(-e^{c_1}x^2 - 2e^{-c_1} + 2x\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.165 (sec), leaf count = 44

$$\left\{y(x) = \left(1-\sqrt{2}\right)x, y(x) = \left(1+\sqrt{2}\right)x, y(x) = \frac{2\_C1^2 + 2\_C1\,x + x^2}{2\_C1}\right\}$$

ODE No. 424

$$ay(x)y'(x) + bx + xy'(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.655086 (sec), leaf count = 223

$$\left\{\text{Solve}\left[\frac{-2a\tan^{-1}\left(\frac{ay(x)}{x\sqrt{4b-\frac{a^2y(x)^2}{x^2}}}\right) + (a+2)\left(2\tan^{-1}\left(\frac{(a+2)y(x)}{x\sqrt{4b-\frac{a^2y(x)^2}{x^2}}}\right) - i\log\left(\frac{(a+1)y(x)^2}{x^2} + b\right)\right)}{8(a+1)} = c_1 +\right.\right.$$

✓ **Maple** : cpu = 1.297 (sec), leaf count = 193

$$\left\{\frac{1}{x}\left(-\_C1\left(ay(x) - \sqrt{a^2\left(y\left(x\right)\right)^2 - 4\,bx^2}\right)\left(\frac{a}{2\,x^2}\left(-y(x)\left(a+1\right)\sqrt{a^2\left(y\left(x\right)\right)^2 - 4\,bx^2} + \left(a^2+a\right)\left(y(x)\right.\right.\right.\right.\right.$$

ODE No. 425

$$(x+1)y'(x)^2 - (y(x)+x)y'(x) + y(x) = 0$$

✓ **Mathematica** : cpu = 0.350856 (sec), leaf count = 59

$$\left\{\left\{y(x) \to -\frac{e^{c_1}\left(e^{c_1} - 2x\right)}{2\left(e^{c_1} + 2\right)}\right\}, \left\{y(x) \to -\frac{2e^{c_1}\left(2e^{c_1} - x\right)}{2e^{c_1} + 1}\right\}\right\}$$

✓ **Maple** : cpu = 0.158 (sec), leaf count = 45

$$\left\{y(x)=\frac{\_C1\,(\_C1\,x+\_C1-x)}{\_C1-1},y(x)=x+2-2\sqrt{1+x},y(x)=x+2+2\sqrt{1+x}\right\}$$

ODE No. 426

$$(3x+1)y'(x)^2-3(y(x)+2)y'(x)+9=0$$

✓ **Mathematica** : cpu = 0.47024 (sec), leaf count = 310

$$\left\{\left\{y(x)\to-\frac{\sqrt{9x^2\sinh(c_1)+9x^2\cosh(c_1)-210x\sinh(c_1)+6x\sinh(2c_1)-210x\cosh(c_1)+6x\cosh(2}}{\sinh(c_1)+c}\right.\right.$$

✓ **Maple** : cpu = 0.152 (sec), leaf count = 51

$$\left\{y(x)=\frac{9+(3\,x+1)\,\_C1^2-6\,\_C1}{3\,\_C1},y(x)=-2-2\sqrt{3\,x+1},y(x)=-2+2\sqrt{3\,x+1}\right\}$$

ODE No. 427

$$(3x+5)y'(x)^2-(3y(x)+x)y'(x)+y(x)=0$$

✓ **Mathematica** : cpu = 0.80716 (sec), leaf count = 479

$$\left\{\left\{y(x)\to\frac{-\sqrt{5}\sqrt{-144e^{\frac{4c_1}{3}}x^2-360e^{\frac{4c_1}{3}}x+24e^{\frac{8c_1}{3}}x-225e^{\frac{4c_1}{3}}+30e^{\frac{8c_1}{3}}-e^{4c_1}}+6e^{\frac{4c_1}{3}}x+15e^{\frac{4c_1}{3}}-30x}{18\left(e^{\frac{4c_1}{3}}+5\right)}\right.\right.$$

✓ **Maple** : cpu = 0.155 (sec), leaf count = 60

$$\left\{y(x)=\frac{(3\,x+5)\,\_C1^2-\_C1\,x}{3\,\_C1-1},y(x)=\frac{x}{3}+\frac{10}{9}-\frac{2}{9}\sqrt{15\,x+25},y(x)=\frac{x}{3}+\frac{10}{9}+\frac{2}{9}\sqrt{15\,x+25}\right\}$$

ODE No. 428

$$y'(x)(-ay(x)+bx+c)+axy'(x)^2-by(x)=0$$

✗ **Mathematica** : cpu = 3624.54 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.185 (sec), leaf count = 66

$$\left\{y(x)=\frac{1}{a}\left(-bx+c-2\sqrt{-bcx}\right),y(x)=\frac{1}{a}\left(-bx+c+2\sqrt{-bcx}\right),y(x)=\frac{\_C1\,(\_C1\,ax+bx+c)}{\_C1\,a+b}\right\}$$

ODE No. 429

$$-y'(x)(ay(x)-a+bx-b)+axy'(x)^2+by(x)=0$$

✗ **Mathematica** : cpu = 3600.88 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.293 (sec), leaf count = 72

$$\left\{y(x)=\frac{1}{a}\left(bx+a+b-2\sqrt{bx\,(a+b)}\right),y(x)=\frac{1}{a}\left(bx+a+b+2\sqrt{bx\,(a+b)}\right),y(x)=\frac{\_C1\,(\_C1\,ax -}{\_C1\,a}\right.$$

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 = 261.741 (sec), leaf count = 478

$$\text{Solve}\left[\left\{x=c_1(\mathrm{b0}+\mathrm{b1K\$12526494})\exp\left(\frac{(\mathrm{b1}(\mathrm{b0}-\mathrm{a1})+2\mathrm{a2b0})\tan^{-1}\left(\frac{\mathrm{a1}+2\mathrm{K\$12526494}(\mathrm{a2}+\mathrm{b1})+\mathrm{b0}}{\sqrt{4\mathrm{a0}(\mathrm{a2}+\mathrm{b1})-\mathrm{a1}^2-2\mathrm{a1b0}-\mathrm{b0}^2}}\right)}{(\mathrm{a2}+\mathrm{b1})\sqrt{4\mathrm{a0}(\mathrm{a2}+\mathrm{b1})-\mathrm{a1}^2-2\mathrm{a1b0}-\mathrm{b0}^2}}-\right.\right.\right.$$

✓ **Maple** : cpu = 7.928 (sec), leaf count = 1602

$$\left\{\frac{1}{2\,a2\,x+2\,c2}\left(-2\left(\_C1-1/2\int^{\frac{-a1\,x-b1\,y(x)-c1+\sqrt{b1^2(y(x))^2+((2\,b1\,a1-4\,a2\,b0)x-4\,b0\,c2+2\,b1\,c1)y(x)+\left(-4\,a0\,a2+a1^2\right)x^2+(-4}}{2\,a2\,x+2\,c2}}\right.\right.\right.$$

ODE No. 431

$$x^2y'(x)^2 - y(x)^4 + y(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.036977 (sec), leaf count = 111

$$\left\{\left\{y(x) \to \sqrt{\tan^2(c_1 - \log(x)) + 1}(-\cot(c_1 - \log(x)))\right\}, \left\{y(x) \to \sqrt{\tan^2(c_1 - \log(x)) + 1}\cot(c_1 - \log$$

✓ **Maple** : cpu = 1.401 (sec), leaf count = 62

$$\left\{y(x) = -1, y(x) = 1, y(x) = \frac{1}{\tan(-\ln(x) + \_C1)}\sqrt{(\tan(-\ln(x) + \_C1))^2 + 1}, y(x) = -\frac{1}{\tan(-\ln(x}$$

ODE No. 432

$$(a + xy'(x))^2 - 2ay(x) + x^2 = 0$$

✓ **Mathematica** : cpu = 1.8173 (sec), leaf count = 64

$$\text{Solve}\left[\left\{y(x) = \frac{a^2 + 2a\text{K\$12529020}x + \text{K\$12529020}^2x^2 + x^2}{2a}, x = \frac{c_1}{\sqrt{\text{K\$12529020}^2 + 1}} - \frac{a\sinh^{-1}(\text{K\$125}}{\sqrt{\text{K\$1252902}}}\right.\right.$$

✓ **Maple** : cpu = 13.877 (sec), leaf count = 242

$$\left\{y(x) = \frac{1}{2a\left(\left(RootOf\left((Arcsinh(\_Z))^2a^2 - x^2\_Z^2 - 2\,Arcsinh(\_Z)\_C1\,a + \_C1^2 - x^2\right)\right)^2 + 1\right)}\left(-\right.\right.$$

ODE No. 433

$$-4a - 4x^2 + (xy'(x) + y(x) + 2x)^2 - 4xy(x) = 0$$

✓ **Mathematica** : cpu = 0.525331 (sec), leaf count = 22

$$\left\{\left\{y(x) \to \frac{-a - 2c_1x + c_1^2}{x}\right\}\right\}$$

✓ **Maple** : cpu = 1.325 (sec), leaf count = 34

$$\left\{y(x) = \frac{-x^2 - a}{x}, y(x) = \_C1 + \frac{\_C1^2 - 4a}{4x}\right\}$$

ODE No. 434

$$x^2y'(x)^2 - x^2 - 2xy(x)y'(x) = 0$$

✓ **Mathematica** : cpu = 0.0332022 (sec), leaf count = 27

$$\{\{y(x) \to x \sinh(c_1 - \log(x))\}, \{y(x) \to x \sinh(c_1 + \log(x))\}\}$$

✓ **Maple** : cpu = 0.114 (sec), leaf count = 7

$$\{y(x) = x + \_C1\}$$

ODE No. 435

$$x^2y'(x)^2 - 2xy(x)y'(x) + y(x)(y(x)+1) - x = 0$$

✓ **Mathematica** : cpu = 0.0372186 (sec), leaf count = 61

$$\left\{\left\{y(x) \to \frac{1}{4}\left(c_1^2x - 4ic_1\sqrt{x} + 4x - 4\right)\right\}, \left\{y(x) \to \frac{1}{4}\left(c_1^2x + 4ic_1\sqrt{x} + 4x - 4\right)\right\}\right\}$$

✓ **Maple** : cpu = 2.39 (sec), leaf count = 22

$$\left\{y(x) = x, y(x) = \sqrt{x}\_C1 - \frac{x\_C1^2}{4} + x - 1\right\}$$

ODE No. 436

$$-x^4 + x^2y'(x)^2 + \left(1 - x^2\right)y(x)^2 - 2xy(x)y'(x) = 0$$

✓ **Mathematica** : cpu = 0.0345087 (sec), leaf count = 26

$$\{\{y(x) \to -x \sinh(x - c_1)\}, \{y(x) \to x \sinh(c_1 + x)\}\}$$

✓ **Maple** : cpu = 18.651 (sec), leaf count = 61

$$\left\{y(x) = -ix, y(x) = ix, y(x) = -\frac{x\left((e^x)^2 - \_C1^2\right)}{2\,e^x\_C1}, y(x) = \frac{x\left((e^x)^2\_C1^2 - 1\right)}{2\,e^x\_C1}\right\}$$

ODE No. 437

$$-(a+2xy(x))y'(x)+x^2y'(x)^2+y(x)^2=0$$

✓ **Mathematica** : cpu = 0.29433 (sec), leaf count = 47

$$\left\{\left\{y(x)\to \frac{x-2\sqrt{a}c_1}{4c_1^2}\right\},\left\{y(x)\to \frac{2\sqrt{a}c_1+x}{4c_1^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.375 (sec), leaf count = 36

$$\left\{y(x)=-\frac{a}{4\,x},y(x)=\_C1\,x-\sqrt{\_C1\,a},y(x)=\_C1\,x+\sqrt{\_C1\,a}\right\}$$

ODE No. 438

$$x^2y'(x)^2+3xy(x)y'(x)+2y(x)^2=0$$

✓ **Mathematica** : cpu = 0.00658623 (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 = 0.119 (sec), leaf count = 17

$$\left\{y(x)=\frac{\_C1}{x^2},y(x)=\frac{\_C1}{x}\right\}$$

ODE No. 439

$$x^2y'(x)^2+3xy(x)y'(x)+3y(x)^2=0$$

✓ **Mathematica** : cpu = 0.014127 (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 = 0.487 (sec), leaf count = 33

$$\left\{y(x)=\_C1\,x^{-\frac{i}{2}\sqrt{3}}x^{-\frac{3}{2}},y(x)=\_C1\,x^{\frac{i}{2}\sqrt{3}}x^{-\frac{3}{2}}\right\}$$

ODE No. 440

$$x^2y'(x)^2+4xy(x)y'(x)-5y(x)^2=0$$

✓ **Mathematica** : cpu = 0.00650528 (sec), leaf count = 19

$$\left\{\left\{y(x)\to \frac{c_1}{x^5}\right\},\{y(x)\to c_1x\}\right\}$$

✓ **Maple** : cpu = 0.118 (sec), leaf count = 15

$$\left\{y(x)=\frac{\_C1}{x^5},y(x)=\_C1\;x\right\}$$

ODE No. 441

$$x^2y'(x)^2-4x(y(x)+2)y'(x)+4y(x)(y(x)+2)=0$$

✓ **Mathematica** : cpu = 0.0945806 (sec), leaf count = 65

$$\left\{\left\{y(x)\to -e^{-c_1}x\left(2\sqrt{2}e^{\frac{c_1}{2}}-x\right)\right\},\left\{y(x)\to e^{\frac{c_1}{2}}x\left(e^{\frac{c_1}{2}}x-2\sqrt{2}\right)\right\}\right\}$$

✓ **Maple** : cpu = 25.824 (sec), leaf count = 83

$$\Bigg\{y(x)=-2,y(x)=\frac{1}{\_C1}\left(x^2-2\sqrt{2}\sqrt{\_C1\;x^2}\right),y(x)=\frac{1}{\_C1}\left(2\sqrt{2}\sqrt{\_C1\;x^2}+x^2\right),y(x)=\frac{x\left(-2\sqrt{2}\_\right.}{\_C}$$

ODE No. 442

$$x^2y'(x)^2+(1-x)\left(y(x)^2-x^2y(x)\right)+\left(x^3+x^2y(x)-2xy(x)\right)y'(x)=0$$

✓ **Mathematica** : cpu = 0.0084015 (sec), leaf count = 28

$$\left\{\left\{y(x)\to c_1e^{-x}x\right\},\left\{y(x)\to c_1x-x^2\right\}\right\}$$

✓ **Maple** : cpu = 0.122 (sec), leaf count = 21

$$\{y(x)=(-x+\_C1)\,x,y(x)=\_C1\;\mathrm{e}^{-x}x\}$$

ODE No. 443

$$x(xy'(x)-y(x))^2-y'(x)=0$$

✓ **Mathematica** : cpu = 0.565562 (sec), leaf count = 1921

$$\{\{y(x)\to \text{Root}\left[1024x^{12}-576e^{12c_1}\#1^4x^8-2176e^{12c_1}\#1^3x^6+81e^{24c_1}\#1^8x^4-1536e^{12c_1}\#1^2x^4+36e^{24c_1}\right.$$

✓ **Maple** : cpu = 35.244 (sec), leaf count = 221

$$\left\{y(x)=-\frac{2}{9\,x^2},y(x)=\frac{\left(RootOf\left(-729\_C1\,x^{12}+\_Z^8-12\_Z^7+60\_Z^6-160\_Z^5+240\_Z^4-192\right.\right.}{}\right.$$

ODE No. 444

$$x^2y'(x)^2-(y(x)-2x)y(x)y'(x)+y(x)^2=0$$

✓ **Mathematica** : cpu = 0.157985 (sec), leaf count = 75

$$\left\{\left\{y(x)\to -\frac{\cosh(2c_1)-\sinh(2c_1)}{x\sinh(2c_1)+x\cosh(2c_1)-1}\right\},\left\{y(x)\to -\frac{\cosh(2c_1)-\sinh(2c_1)}{x\sinh(2c_1)+x\cosh(2c_1)+1}\right\}\right\}$$

✓ **Maple** : cpu = 25.128 (sec), leaf count = 120

$$\left\{y(x)=\frac{\_C1^3\sqrt{2}-2\_C1^2x}{-2\_C1^2+4x^2},y(x)=\frac{\_C1^2(\_C1\sqrt{2}+2x)}{2\_C1^2-4x^2},y(x)=4x,y(x)=-2\frac{\_C1^2(-\_C1\sqrt{2}+}{-2\_C1^2+x^2}\right.$$

ODE No. 445

$$y'(x)\left(ax^2y(x)^3+b\right)+aby(x)^3+x^2y'(x)^2=0$$

✓ **Mathematica** : cpu = 0.0096184 (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 = 0.246 (sec), leaf count = 35

$$\left\{y(x)=\frac{1}{\sqrt{2\,ax+\_C1}},y(x)=-\frac{1}{\sqrt{2\,ax+\_C1}},y(x)=\frac{b}{x}+\_C1\right\}$$

ODE No. 446

$$\left(x^2+1\right)y'(x)^2-2xy(x)y'(x)+y(x)^2-1=0$$

✓ **Mathematica** : cpu = 0.506068 (sec), leaf count = 201

$$\left\{\left\{y(x)\to\frac{e^{2c_1}x-2e^{c_1}-x}{e^{2c_1}+1}\right\},\left\{y(x)\to\frac{e^{2c_1}x+2e^{c_1}-x}{e^{2c_1}+1}\right\},\left\{y(x)\to\frac{-e^{4c_1}x-2\sqrt{-e^{2c_1}+2e^{4c_1}-e^{6c_1}}}{2e^{2c_1}-e^{4c_1}-1}\right.\right.$$

✓ **Maple** : cpu = 0.385 (sec), leaf count = 57

$$\left\{y(x)=\sqrt{x^2+1},y(x)=-\sqrt{x^2+1},y(x)=\_C1\,x-\sqrt{-\_C1^2+1},y(x)=\_C1\,x+\sqrt{-\_C1^2+1}\right\}$$

ODE No. 447

$$\left(x^2-1\right)y'(x)^2-1=0$$

✓ **Mathematica** : cpu = 0.0145327 (sec), leaf count = 89

$$\left\{\left\{y(x)\to c_1+\frac{1}{2}\log\left(1-\frac{x}{\sqrt{x^2-1}}\right)-\frac{1}{2}\log\left(\frac{x}{\sqrt{x^2-1}}+1\right)\right\},\left\{y(x)\to c_1-\frac{1}{2}\log\left(1-\frac{x}{\sqrt{x^2-1}}\right)+\right.\right.$$

✓ **Maple** : cpu = 0.362 (sec), leaf count = 33

$$\left\{y(x)=-\ln\left(x+\sqrt{x^2-1}\right)+\_C1,y(x)=\ln\left(x+\sqrt{x^2-1}\right)+\_C1\right\}$$

ODE No. 448

$$\left(x^2-1\right)y'(x)^2-y(x)^2+1=0$$

✓ **Mathematica** : cpu = 0.0999598 (sec), leaf count = 349

$$\left\{\left\{y(x)\to-\frac{1}{2}e^{-c_1}\sqrt{2e^{4c_1}x^2+2e^{4c_1}\sqrt{(x-1)(x+1)}x+2e^{2c_1}-e^{4c_1}+2x^2-2\sqrt{(x-1)(x+1)}x-1}\right\},\right.$$

✓ **Maple** : cpu = 494.224 (sec), leaf count = 166

$$\left\{1\sqrt{(-1+y(x))(1+y(x))}\ln\left(y(x)+\sqrt{(y(x))^2-1}\right)\frac{1}{\sqrt{-1+y(x)}}\frac{1}{\sqrt{1+y(x)}}+\int^x\frac{1}{\_a^2-1}\sqrt{(\_a^2\right.$$

ODE No. 449

$$\left(x^2-a^2\right)y'(x)^2+2xy(x)y'(x)+y(x)^2=0$$

✓ **Mathematica** : cpu = 0.0103156 (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 = 0.11 (sec), leaf count = 23

$$\left\{y(x)=\frac{\_C1}{a-x},y(x)=\frac{\_C1}{x+a}\right\}$$

ODE No. 450

$$\left(x^2-a^2\right)y'(x)^2-x^2-2xy(x)y'(x)=0$$

✓ **Mathematica** : cpu = 0.456369 (sec), leaf count = 26

$$\left\{\left\{y(x)\to\frac{a^2+c_1^2-x^2}{2c_1}\right\}\right\}$$

✓ **Maple** : cpu = 2.483 (sec), leaf count = 51

$$\left\{y(x)=\sqrt{a^2-x^2},y(x)=-\sqrt{a^2-x^2},y(x)=\_C1\,x^2-\_C1\,a^2-\frac{1}{4\_C1}\right\}$$

ODE No. 451

$$\left(a+x^2\right)y'(x)^2+b-2xy(x)y'(x)+y(x)^2=0$$

✗ **Mathematica** : cpu = 3668.57 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.835 (sec), leaf count = 78

$$\left\{y(x)=\frac{1}{a}\sqrt{-ab\left(x^2+a\right)},y(x)=-\frac{1}{a}\sqrt{-ab\left(x^2+a\right)},y(x)=\_C1\,x-\sqrt{-a\_C1^2-b},y(x)=\_C1\,x+\right.$$

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 = 3606.6 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 3.23 (sec), leaf count = 37

$$\left\{y(x)=-3\,x-2\,\sqrt{2\,x^2+1},y(x)=-3\,x+2\,\sqrt{2\,x^2+1}\right\}$$

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 = 2.2925 (sec), leaf count = 395

$$\left\{\text{Solve}\left[\frac{a\left(-\log\left(\frac{(a^2-1)\left(a\sqrt{a^2-\frac{y(x)^2}{x^2}-1}+a^2-\frac{iy(x)}{x}-1\right)}{a^3\left(\frac{y(x)}{x}-i\right)}\right)+\log\left(-\frac{(a^2-1)\left(a\sqrt{a^2-\frac{y(x)^2}{x^2}-1}+a^2+\frac{iy(x)}{x}-1\right)}{a^3\left(\frac{y(x)}{x}+i\right)}\right)+\log\left(\frac{y}{\right.}\right.}{2\left(a^2-1\right)}\right.\right.$$

✓ **Maple** : cpu = 12.662 (sec), leaf count = 229

$$\left\{\frac{1}{2\,a}\left(-2\_C1\,a+2\,a\ln(x)+\ln\left(\frac{(y(x))^2+x^2}{x^2}\right)a-2\,\sqrt{-a^2}\arctan\left(\frac{a^2y(x)}{\sqrt{-a^2}x}\frac{1}{\sqrt{\frac{(y(x))^2+(-a^2+1)x^2}{x^2}}}\right)+2\right.\right.$$

ODE No. 454

$$ax^2y'(x)^2-(a-1)ax^2-2axy(x)y'(x)+y(x)^2=0$$

✓ **Mathematica** : cpu = 0.801369 (sec), leaf count = 241

$$\left\{\left\{y(x)\to-\frac{1}{2}\sqrt{a}e^{-c_1}x^{1-\sqrt{\frac{a-1}{a}}}\left(e^{2c_1}-x^{2\sqrt{\frac{a-1}{a}}}\right)\right\},\left\{y(x)\to\frac{1}{2}\sqrt{a}e^{-c_1}x^{1-\sqrt{\frac{a-1}{a}}}\left(e^{2c_1}-x^{2\sqrt{\frac{a-1}{a}}}\right)\right\},\left\{y(x)\right.\right.$$

✓ **Maple** : cpu = 1.12 (sec), leaf count = 106

$$\left\{y(x)=\sqrt{-a}x, y(x)=RootOf\left(-\ln(x)-\int^{\_Z}\frac{1}{(a-1)(\_a^2+a)}\sqrt{(a-1)(\_a^2+a)\,a}d\_a+\_C1\right)x,\right.$$

ODE No. 455

$$a+x^3y'(x)^2+x^2y(x)y'(x)=0$$

✓ **Mathematica** : cpu = 0.877737 (sec), leaf count = 123

$$\left\{\left\{y(x)\to-\frac{e^{-\frac{c_1}{2}}(2ae^{c_1}+x)}{\sqrt{2}x}\right\},\left\{y(x)\to\frac{e^{-\frac{c_1}{2}}(2ae^{c_1}+x)}{\sqrt{2}x}\right\},\left\{y(x)\to-\frac{e^{-\frac{c_1}{2}}(2ax+e^{c_1})}{\sqrt{2}x}\right\},\left\{y(x)\to\right.\right.$$

✓ **Maple** : cpu = 2.938 (sec), leaf count = 66

$$\left\{y(x)=-2\,\frac{\sqrt{ax}}{x}, y(x)=2\,\frac{\sqrt{ax}}{x}, y(x)=\frac{\_C1^2+4\,ax}{2\,\_C1\,x}, y(x)=\frac{\_C1^2x+4\,a}{2\,\_C1\,x}\right\}$$

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 = 0.574123 (sec), leaf count = 79

$$\left\{\left\{y(x)\to x+2x\sinh^2\left(\frac{1}{2}\left(c_1-2i\tan^{-1}\left(\frac{\sqrt{x-1}}{\sqrt{x+1}}\right)\right)\right)\right\},\left\{y(x)\to x+2x\sinh^2\left(\frac{1}{2}\left(c_1+2i\tan^{-1}\left(\right.\right.\right.\right.\right.$$

✓ **Maple** : cpu = 2.967 (sec), leaf count = 33

$$\left\{y(x)=x, y(x)=-x, y(x)=\sqrt{-\_C1^2+1}+\sqrt{x^2-1}\_C1\right\}$$

ODE No. 457

$$x^4y'(x)^2 - xy'(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 2.79231 (sec), leaf count = 410

$$\left\{\text{Solve}\left[\frac{x\sqrt{4x^2y(x)+1}\left(\log(x)-\log\left(\sqrt{4x^2y(x)+1}+1\right)\right)}{\sqrt{4x^4y(x)+x^2}}+\frac{x\sqrt{4x^2y(x)+1}\log(y(x))-x\sqrt{4x^2y(x)}\right.\right.$$

✓ **Maple** : cpu = 16.604 (sec), leaf count = 45

$$\left\{y(x)=\frac{i\_C1-x}{x\_C1^2}, y(x)=\frac{-i\_C1-x}{x\_C1^2}, y(x)=-\frac{1}{4x^2}\right\}$$

ODE No. 458

$$x^2\left(x^2-a^2\right)y'(x)^2-1=0$$

✓ **Mathematica** : cpu = 0.143482 (sec), leaf count = 139

$$\left\{\left\{y(x)\to c_1-\frac{ix\sqrt{x^2-a^2}\log\left(\frac{2\left(\sqrt{x^2-a^2}-ia\right)}{x}\right)}{a\sqrt{x^4-a^2x^2}}\right\},\left\{y(x)\to c_1+\frac{ix\sqrt{x^2-a^2}\log\left(\frac{2\left(\sqrt{x^2-a^2}-ia\right)}{x}\right)}{a\sqrt{x^4-a^2x^2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.43 (sec), leaf count = 90

$$\left\{y(x)=-1\ln\left(\frac{1}{x}\left(-2a^2+2\sqrt{-a^2}\sqrt{-a^2+x^2}\right)\right)\frac{1}{\sqrt{-a^2}}+\_C1, y(x)=1\ln\left(\frac{1}{x}\left(-2a^2+2\sqrt{-a^2}\sqrt{-a^2}\right.\right.\right.$$

ODE No. 459

$$-\left(y'(x)-1\right)^2+e^{-2x}y'(x)^2+e^{-2y(x)}=0$$

✓ **Mathematica** : cpu = 4.40849 (sec), leaf count = 272

$$\left\{\left\{y(x)\to\log\left(-\frac{ie^{-c_1}\left(e^x+1\right)\left(e^{2c_1+x}-e^{2c_1}+e^x+1\right)}{\sqrt{8e^x+4e^{2x}+4}}\right)\right\},\left\{y(x)\to\log\left(\frac{ie^{-c_1}\left(e^x+1\right)\left(e^{2c_1+x}-e^{2c_1}+\right.}{\sqrt{8e^x+4e^{2x}+4}}\right.\right.\right.$$

✓ **Maple** : cpu = 3.381 (sec), leaf count = 65

$$\left\{y(x)=x+\ln\left(\frac{1}{e^x}\left(-1-\sqrt{(e^x)^2-\frac{(e^x)^2}{(e^{\_C1})^2}}\right)\right)+\_C1, y(x)=x+\ln\left(\frac{1}{e^x}\left(-1+\sqrt{(e^x)^2-\frac{(e^x)^2}{(e^{\_C1})^2}}\right)\right.\right.$$

ODE No. 460

$$\cos^4(x)\left(y'(x)^2+y(x)^2\right)-a^2=0$$

✗ **Mathematica** : cpu = 60.0862 (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))
```

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 = 1314.53 (sec), leaf count = 0 , could not solve

```
DSolve[f[x] + 2*e[x]*y[x] + c[x]*y[x]^2 + 2*d[x]*Derivative[1][y][x] + 2*b[x]*y[x]*Der
```

✗ **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
```

ODE No. 462

$$y(x)y'(x)^2-1=0$$

✓ **Mathematica** : cpu = 0.0143423 (sec), leaf count = 43

$$\left\{\left\{y(x)\to\left(\frac{3}{2}\right)^{2/3}(c_1-x)^{2/3}\right\},\left\{y(x)\to\left(\frac{3}{2}\right)^{2/3}(c_1+x)^{2/3}\right\}\right\}$$

✓ **Maple** : cpu = 0.321 (sec), leaf count = 27

$$\left\{x-\frac{2}{3}(y(x))^{\frac{3}{2}}-\_C1=0, x+\frac{2}{3}(y(x))^{\frac{3}{2}}-\_C1=0\right\}$$

ODE No. 463

$$y(x)y'(x)^2 - e^{2x} = 0$$

✓ **Mathematica** : cpu = 0.0370401 (sec), leaf count = 47

$$\left\{\left\{y(x)\to \left(\frac{3}{2}\right)^{2/3}\left(c_1-e^x\right)^{2/3}\right\},\left\{y(x)\to \left(\frac{3}{2}\right)^{2/3}\left(c_1+e^x\right)^{2/3}\right\}\right\}$$

✓ **Maple** : cpu = 0.761 (sec), leaf count = 50

$$\left\{-1\sqrt{\left(e^x\right)^2 y(x)}\frac{1}{\sqrt{y(x)}}+\frac{2}{3}(y(x))^{\frac{3}{2}}+\_C1=0, 1\sqrt{\left(e^x\right)^2 y(x)}\frac{1}{\sqrt{y(x)}}+\frac{2}{3}(y(x))^{\frac{3}{2}}+\_C1=0\right\}$$

ODE No. 464

$$y(x)y'(x)^2 + 2xy'(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 0.0653308 (sec), leaf count = 52

$$\left\{\left\{y(x)\to -e^{\frac{c_1}{2}}\sqrt{e^{c_1}-2x}\right\},\left\{y(x)\to e^{\frac{c_1}{2}}\sqrt{e^{c_1}-2x}\right\}\right\}$$

✓ **Maple** : cpu = 6.532 (sec), leaf count = 70

$$\left\{y(x)=\sqrt{\_C1^2-2\_C1\,x}, y(x)=\sqrt{\_C1^2+2\_C1\,x}, y(x)=-ix, y(x)=ix, y(x)=-\sqrt{\_C1\,(\_C1$$

ODE No. 465

$$y(x)y'(x)^2 + 2xy'(x) - 9y(x) = 0$$

✗ **Mathematica** : cpu = 3980.3 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.467 (sec), leaf count = 210

$$\left\{\_C1\,x\left(x+\sqrt{x^2+9\,(y(x))^2}\right)\left(\frac{1}{y(x)}\left(-x-\sqrt{x^2+9\,(y(x))^2}\right)\right)^{\frac{2}{7}}\left(x\sqrt{x^2+9\,(y(x))^2}+x^2+(y(x)\right.\right.$$

ODE No. 466

$$y(x)y'(x)^2 - 2xy'(x) + y(x) = 0$$

✓ **Mathematica** : cpu = 35.7116 (sec), leaf count = 145

$$\left\{\left\{y(x) \to -\sqrt{-2x\sinh(c_1) - 2x\cosh(c_1) - \sinh(2c_1) - \cosh(2c_1)}\right\}, \left\{y(x) \to \sqrt{-2x\sinh(c_1) - 2x\cos$$

✓ **Maple** : cpu = 5.356 (sec), leaf count = 71

$$\left\{y(x) = x, y(x) = \sqrt{\_C1^2 - 2\,ix\_C1}, y(x) = \sqrt{\_C1^2 + 2\,ix\_C1}, y(x) = -x, y(x) = -\sqrt{\_C1^2 - 2\,ix\_$$

ODE No. 467

$$y(x)y'(x)^2 - 4xy'(x) + y(x) = 0$$

✗ **Mathematica** : cpu = 3602.65 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.458 (sec), leaf count = 148

$$\left\{-\frac{\_C1\,x}{y(x)} \frac{1}{\sqrt[3]{\frac{1}{(y(x))^2}\left(8\,x^2 - 4\,(y(x))^2 - 4\,x\sqrt{4\,x^2 - (y(x))^2}\right)}} \frac{1}{\sqrt[3]{\frac{1}{y(x)}\left(2\,x - \sqrt{4\,x^2 - (y(x))^2}\right)}} + x = 0,\right.$$

ODE No. 468

$$-4a^2xy'(x) + a^2y(x) + y(x)y'(x)^2 = 0$$

✗ **Mathematica** : cpu = 3781.85 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.565 (sec), leaf count = 181

$$\left\{-\frac{\_C1\,x}{ay(x)} \frac{1}{\sqrt[3]{\frac{a^2}{(y(x))^2}\left(2\,a^2x^2 + \sqrt{4\,a^2x^2 - (y(x))^2}ax - (y(x))^2\right)}} \frac{1}{\sqrt[3]{\frac{a}{y(x)}\left(2\,ax + \sqrt{4\,a^2x^2 - (y(x))^2}\right)}} + x\right.$$

ODE No. 469

$$axy'(x) + by(x) + y(x)y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 221.659 (sec), leaf count = 272

$$\left\{ \text{Solve}\left[\frac{-2a\tanh^{-1}\left(\frac{\sqrt{a^2-\frac{4by(x)^2}{x^2}}}{a}\right) + 2(a+2b)\tanh^{-1}\left(\frac{\sqrt{a^2-\frac{4by(x)^2}{x^2}}}{a+2b}\right) + a\log\left(a+b+\frac{y(x)^2}{x^2}\right) + 2b\log\left(a\right.}{8(a+b)} \right.\right.$$

✓ **Maple** : cpu = 1.261 (sec), leaf count = 264

$$\left\{ \frac{x}{(y(x))^2}\left(\_C1\left(-\frac{1}{2\,y(x)}\left(ax+\sqrt{a^2x^2-4\,b\,(y(x))^2}\right)\right)^{-\frac{a}{a+b}}\left(ax+\sqrt{a^2x^2-4\,b\,(y(x))^2}\right)\left(\frac{a}{2\,(y(x))^2}\right.\right.\right.$$

ODE No. 470

$$x^3y'(x) - x^2y(x) + y(x)y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 12.4242 (sec), leaf count = 197

$$\left\{ \text{Solve}\left[\frac{1}{2}\log(y(x)) - \frac{\sqrt{x^6+4x^2y(x)^2}\left(\log\left(\frac{x^2}{\sqrt{x^4+4y(x)^2}}+1\right)-\log\left(1-\frac{x^2}{\sqrt{x^4+4y(x)^2}}\right)\right)}{4x\sqrt{x^4+4y(x)^2}} = c_1, y(x)\right], \text{Solve}\right.$$

✓ **Maple** : cpu = 2.854 (sec), leaf count = 87

$$\left\{ y(x) = -\frac{i}{2}x^2, y(x) = \frac{i}{2}x^2, y(x) = -\frac{1}{4}\sqrt{-4\_C1\,x^2+\_C1^2}, y(x) = \frac{1}{4}\sqrt{-4\_C1\,x^2+\_C1^2}, y(x) = -\right.$$

ODE No. 471

$$y(x)y'(x)^2-(y(x)-x)y'(x)-x=0$$

✓ **Mathematica** : cpu = 0.456639 (sec), leaf count = 47

$$\left\{\{y(x)\to c_1+x\},\left\{y(x)\to -\sqrt{2c_1-x^2}\right\},\left\{y(x)\to \sqrt{2c_1-x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.212 (sec), leaf count = 33

$$\left\{y(x)=\sqrt{-x^2+\_C1},y(x)=-\sqrt{-x^2+\_C1},y(x)=x+\_C1\right\}$$

ODE No. 472

$$(y(x)+x)y'(x)^2+2xy'(x)-y(x)=0$$

✓ **Mathematica** : cpu = 8.64353 (sec), leaf count = 127

$$\left\{\left\{y(x)\to \frac{1}{3}\left(-2\sqrt{e^{2c_1}-3e^{c_1}x}-e^{c_1}\right)\right\},\left\{y(x)\to \frac{1}{3}\left(2\sqrt{e^{2c_1}-3e^{c_1}x}-e^{c_1}\right)\right\},\left\{y(x)\to e^{c_1}-2\sqrt{e^{c_1}x+\right.\right.$$

✓ **Maple** : cpu = 6.171 (sec), leaf count = 121

$$\left\{\ln(x)-Artanh\left(\frac{y(x)+2\,x}{2\,x}\frac{1}{\sqrt{\frac{(y(x))^2+xy(x)+x^2}{x^2}}}\right)+\ln\left(\frac{y(x)}{x}\right)-\_C1=0,\ln(x)+Artanh\left(\frac{y(x)+2\,x}{2\,x}\right.\right.$$

ODE No. 473

$$(y(x)-2x)y'(x)^2-2(x-1)y'(x)+y(x)-2=0$$

✓ **Mathematica** : cpu = 22.1049 (sec), leaf count = 165

$$\left\{\left\{y(x)\to \frac{1}{2}\left(-\sqrt{-4e^{c_1}x+4e^{c_1}-e^{2c_1}}-e^{c_1}+4\right)\right\},\left\{y(x)\to \frac{1}{2}\left(\sqrt{-4e^{c_1}x+4e^{c_1}-e^{2c_1}}-e^{c_1}+4\right)\right\},\{\right.$$

✓ **Maple** : cpu = 8.733 (sec), leaf count = 71

$$\left\{y(x)=2+\_C1-\sqrt{\_C1\,\left(-\_C1+2\,x-2\right)},y(x)=2+\frac{\_C1}{2}-\frac{1}{2}\sqrt{\_C1\,\left(-\_C1+4\,x-4\right)},y(x)=\right.$$

ODE No. 474

$$2y(x)y'(x)^2-(4x-5)y'(x)+2y(x)=0$$

✓ **Mathematica** : cpu = 5.06311 (sec), leaf count = 135

$$\left\{\left\{y(x)\to -i\sqrt{2}e^{\frac{c_1}{2}}\sqrt{8e^{c_1}+4x-5}\right\},\left\{y(x)\to i\sqrt{2}e^{\frac{c_1}{2}}\sqrt{8e^{c_1}+4x-5}\right\},\left\{y(x)\to -\frac{1}{4}ie^{\frac{c_1}{2}}\sqrt{e^{c_1}+8x-1\right.\right.$$

✓ **Maple** : cpu = 4.226 (sec), leaf count = 152

$$\left\{\ln\left(x-\frac{5}{4}\right)-\frac{1}{2}\ln\left(4\,\frac{y(x)}{4\,x-5}+1\right)+\ln\left(\frac{y(x)}{4\,x-5}\right)-\frac{1}{2}\ln\left(4\,\frac{y(x)}{4\,x-5}-1\right)+\sqrt{-16\,\frac{(y\,(x))^2}{(4\,x-5)^2}+1-\right.$$

ODE No. 475

$$4y(x)y'(x)^2+2xy'(x)-y(x)=0$$

✓ **Mathematica** : cpu = 2.39851 (sec), leaf count = 57

$$\left\{\left\{y(x)\to -\frac{1}{2}e^{2c_1}\sqrt{e^{4c_1}-2x}\right\},\left\{y(x)\to \frac{1}{2}e^{2c_1}\sqrt{e^{4c_1}-2x}\right\}\right\}$$

✓ **Maple** : cpu = 6.422 (sec), leaf count = 67

$$\left\{y(x)=\sqrt{\_C1^2-\_C1\,x},y(x)=\sqrt{\_C1^2+\_C1\,x},y(x)=-\frac{i}{2}x,y(x)=\frac{i}{2}x,y(x)=-\sqrt{\_C1\,(x+\_C\right.$$

ODE No. 476

$$4x^3y'(x)-4x^2y(x)+9y(x)y'(x)^2=0$$

✓ **Mathematica** : cpu = 3.0552 (sec), leaf count = 197

$$\left\{\text{Solve}\left[\frac{1}{2}\log(y(x))-\frac{\sqrt{x^6+9x^2y(x)^2}\left(\log\left(\frac{x^2}{\sqrt{x^4+9y(x)^2}}+1\right)-\log\left(1-\frac{x^2}{\sqrt{x^4+9y(x)^2}}\right)\right)}{4x\sqrt{x^4+9y(x)^2}}=c_1,y(x)\right],\text{Solve}\right.$$

✓ **Maple** : cpu = 2.664 (sec), leaf count = 87

$$\left\{y(x)=-\frac{i}{3}x^2,y(x)=\frac{i}{3}x^2,y(x)=-\frac{1}{6}\sqrt{-4\_C1\,x^2+\_C1^2},y(x)=\frac{1}{6}\sqrt{-4\_C1\,x^2+\_C1^2},y(x)=-\right.$$

ODE No. 477

$$ay(x)y'(x)^2 + (2x - b)y'(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 2.77313 (sec), leaf count = 146

$$\left\{\left\{y(x) \to -\frac{e^{\frac{c_1}{2}}\sqrt{2b + e^{c_1} - 4x}}{2\sqrt{a}}\right\}, \left\{y(x) \to \frac{e^{\frac{c_1}{2}}\sqrt{2b + e^{c_1} - 4x}}{2\sqrt{a}}\right\}, \left\{y(x) \to -\sqrt{2}e^{\frac{c_1}{2}}\sqrt{2ae^{c_1} - b + 2x}\right\},\right.$$

✓ **Maple** : cpu = 2.334 (sec), leaf count = 622

$$\left\{\int_{\_b}^{x} 1\left(-4\_a + 2\,b - 2\,\sqrt{4\,a\,(y\,(x))^2 + (b - 2\_a)^2}\right)\left((-b + 2\_a)\,\sqrt{4\,a\,(y\,(x))^2 + (b - 2\_a)^2} + 4\,a(y(x$$

ODE No. 478

$$\left(y'(x)^2 + 1\right)(ay(x) + b) - c = 0$$

✓ **Mathematica** : cpu = 0.975811 (sec), leaf count = 141

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[\frac{c\tan^{-1}\left(\frac{\sqrt{\#1a+b}}{\sqrt{-\#1a-b+c}}\right) - \sqrt{\#1a+b}\sqrt{-\#1a-b+c}}{a}\&\right][c_1 - x]\right\}, \left\{y(x) \to\right.\right.$$

✓ **Maple** : cpu = 1.636 (sec), leaf count = 88

$$\left\{x - \int^{y(x)}(a\_a + b)\frac{1}{\sqrt{-(a\_a + b)(a\_a + b - c)}}d\_a - \_C1 = 0, x - \int^{y(x)} -(a\_a + b)\frac{1}{\sqrt{-(a\_a + b)}}\right.$$

ODE No. 479

$$\text{a0}x + y'(x)(\text{a1}x + \text{b1}y(x) + \text{c1}) + y'(x)^2(\text{a2}x + \text{b2}y(x) + \text{c2}) + \text{b0}y(x) + \text{c0} = 0$$

✓ **Mathematica** : cpu = 1037.13 (sec), leaf count = 508

$$\text{Solve}\left[\left\{x = c_1\left(\text{b0} + \text{b1K\$12542503} + \text{b2K\$12542503}^2\right)\exp\left(-\text{RootSum}\left[\#1^3\text{b2} + \#1^2\text{a2} + \#1^2\text{b1} + \#\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.623 (sec), leaf count = 929

$$\left\{ x - \mathrm{e}^{\int \frac{1}{2\,b2\,y(x)+2\,a2\,x+2\,c2} \left(-a1\,x - b1\,y(x) - c1 + \sqrt{-4\,a0\,a2\,x^2 - 4\,a0\,b2\,xy(x) + a1^2 x^2 + 2\,a1\,b1\,xy(x) - 4\,a2\,b0\,xy(x) - 4\,b0\,b2\,(y(x))^2 + b1^2 (y(x))^2 - 4\,a0\,c2\,x} \right.} \right.$$

ODE No. 480

$$\left(ay(x) - x^2\right) y'(x)^2 + 2xy(x)y'(x)^2 - y(x)^2 = 0$$

✗ **Mathematica** : cpu = 31.8605 (sec), leaf count = 0 , could not solve

```
DSolve[-y[x]^2 + 2*x*y[x]*Derivative[1][y][x]^2 + (-x^2 + a*y[x])*Derivative[1][y][x]^
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve((a*y(x)-x^2)*diff(y(x),x)^2+2*x*y(x)*diff(y(x),x)^2-y(x)^2 = 0,y(x))
```

ODE No. 481

$$\left(x^2 + y(x)^2\right) y'(x) + xy(x)y'(x)^2 + xy(x) = 0$$

✓ **Mathematica** : cpu = 0.0202153 (sec), leaf count = 49

$$\left\{\left\{y(x) \to \frac{c_1}{x}\right\}, \left\{y(x) \to -\sqrt{2c_1 - x^2}\right\}, \left\{y(x) \to \sqrt{2c_1 - x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.218 (sec), leaf count = 35

$$\left\{ y(x) = \sqrt{-x^2 + \_C1}, y(x) = \frac{\_C1}{x}, y(x) = -\sqrt{-x^2 + \_C1} \right\}$$

ODE No. 482

$$\left(a + x^{22} - y(x)^2\right) y'(x) + xy(x)y'(x)^2 - xy(x) = 0$$

✗ **Mathematica** : cpu = 65.0882 (sec), leaf count = 0 , could not solve

```
DSolve[-(x*y[x]) + (a + x^22 - y[x]^2)*Derivative[1][y][x] + x*y[x]*Derivative[1][y][x
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(x*y(x)*diff(y(x),x)^2+(x^22-y(x)^2+a)*diff(y(x),x)-x*y(x) = 0,y(x))
```

ODE No. 483

$$\left(2xy(x)-x^2\right)y'(x)^2+2xy(x)y'(x)-y(x)^2+2xy(x)=0$$

✓ **Mathematica** : cpu = 0.48326 (sec), leaf count = 71

$$\left\{\left\{y(x)\to e^{\frac{c_1}{2}}-\sqrt{2e^{\frac{c_1}{2}}x-x^2}\right\},\left\{y(x)\to\sqrt{2e^{\frac{c_1}{2}}x-x^2}+e^{\frac{c_1}{2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.272 (sec), leaf count = 103

$$\left\{y(x)=0,y(x)=RootOf\left(-2\ln(x)+\int^{\_Z}\frac{1}{\_a\left(\_a^2+1\right)}\left(-2\_a^2+\sqrt{2}\sqrt{\_a\left(\_a-1\right)^2}\right)d\_a+2\_C$$

ODE No. 484

$$\left(2xy(x)-x^2\right)y'(x)^2-6xy(x)y'(x)-y(x)^2+2xy(x)=0$$

✓ **Mathematica** : cpu = 0.338445 (sec), leaf count = 81

$$\left\{\left\{y(x)\to-\sqrt{3x^2-2e^{\frac{c_1}{2}}x}-e^{\frac{c_1}{2}}+2x\right\},\left\{y(x)\to\sqrt{3x^2-2e^{\frac{c_1}{2}}x}-e^{\frac{c_1}{2}}+2x\right\}\right\}$$

✓ **Maple** : cpu = 0.275 (sec), leaf count = 115

$$\left\{y(x)=0,y(x)=RootOf\left(-2\ln(x)+\int^{\_Z}\frac{1}{\_a\left(\_a^2-4\_a+1\right)}\left(-2\_a^2+\sqrt{2}\sqrt{\_a\left(\_a+1\right)^2}+4\_$$

ODE No. 485

$$-y'(x)\left(ay(x)^2+bx^2+c\right)+axy(x)y'(x)^2+bxy(x)=0$$

✗ **Mathematica** : cpu = 3599.95 (sec), leaf count = 0 , timed out

```
$Aborted
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , exception

```
time expired
```

ODE No. 486

$$-a^2+y(x)^2y'(x)^2+y(x)^2=0$$

✓ **Mathematica** : cpu = 0.0251184 (sec), leaf count = 117

$$\left\{\left\{y(x)\to -\sqrt{a^2-2c_1x-c_1^2-x^2}\right\},\left\{y(x)\to \sqrt{a^2-2c_1x-c_1^2-x^2}\right\},\left\{y(x)\to -\sqrt{a^2+2c_1x-c_1^2-\right.\right.$$

✓ **Maple** : cpu = 1.174 (sec), leaf count = 54

$$\left\{y(x)=a,y(x)=\sqrt{-\_C1^2+2\_C1\,x+a^2-x^2},y(x)=-a,y(x)=-\sqrt{(-\_C1+a+x)\,(\_C1+a-\right.$$

ODE No. 487

$$-6x^3y'(x)+4x^2y(x)+y(x)^2y'(x)^2=0$$

✓ **Mathematica** : cpu = 0.498908 (sec), leaf count = 215

$$\left\{\text{Solve}\left[\frac{3}{4}\log(y(x))-\frac{\sqrt{9x^6-4x^2y(x)^3}\left(\log\left(\frac{3x^2}{\sqrt{9x^4-4y(x)^3}}+1\right)-\log\left(1-\frac{3x^2}{\sqrt{9x^4-4y(x)^3}}\right)\right)}{4x\sqrt{9x^4-4y(x)^3}}=c_1,y(x)\right],\text{Sc}\right.$$

✓ **Maple** : cpu = 1.899 (sec), leaf count = 100

$$\left\{y(x)=\mathit{RootOf}\left(-\ln(x)+\int^{\_Z}\frac{3}{4\_a\,(4\_a^3-9)}\left(-4\_a^3+3\sqrt{-4\_a^3+9}+9\right)d\_a+\_C1\right)x^{\frac{4}{3}},y(x\right.$$

ODE No. 488

$$4a^2-4ay(x)y'(x)-4ax+y(x)^2y'(x)^2+y(x)^2=0$$

✓ **Mathematica** : cpu = 0.419551 (sec), leaf count = 85

$$\left\{\left\{y(x)\to -\frac{\sqrt{16a^3x-4a^2x^2-4ac_1x-c_1^2}}{2a}\right\},\left\{y(x)\to \frac{\sqrt{16a^3x-4a^2x^2-4ac_1x-c_1^2}}{2a}\right\}\right\}$$

✓ **Maple** : cpu = 2.47 (sec), leaf count = 111

$$\left\{y(x)=-2\sqrt{ax},y(x)=2\sqrt{ax},y(x)=-\frac{1}{4a}\sqrt{-16a^4+32a^3x+(-16x^2+8\_C1)a^2+8xa\_C1-\_C\right.$$

ODE No. 489

$$ay(x)^2 + bx + c + y(x)^2 y'(x)^2 + 2xy(x)y'(x) = 0$$

✗ **Mathematica** : cpu = 3602.89 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 8.711 (sec), leaf count = 551

$$\left\{ y(x) = -\frac{\sqrt{16}}{2\,a\,(a+1)} \sqrt{a\left(a\,(a+1)^2\left(ax - \frac{b}{2} + x\right)^2 RootOf\left(-b\ln(2\,ax - b + 2\,x) + 2\int^{\_Z} 1/4\,\frac{}{(a+}\right.\right.}\right.$$

ODE No. 490

$$a - x^2 - 2xy(x)y'(x) + y(x)^2 y'(x)^2 + 2y(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.658609 (sec), leaf count = 70

$$\left\{\left\{y(x) \to -\frac{\sqrt{-a + 8c_1x - 4c_1^2 - 2x^2}}{\sqrt{2}}\right\}, \left\{y(x) \to \frac{\sqrt{-a + 8c_1x - 4c_1^2 - 2x^2}}{\sqrt{2}}\right\}\right\}$$

✓ **Maple** : cpu = 2.657 (sec), leaf count = 145

$$\left\{ y(x) = \sqrt{-2\sqrt{a + 2\_C1x} - \_C1 - x^2 - a}, y(x) = \sqrt{2\sqrt{a + 2\_C1x} - \_C1 - x^2 - a}, y(x) = -\sqrt{-\right.$$

ODE No. 491

$$(a-1)b + ax^2 + 2axy(x)y'(x) + (1-a)y(x)^2 + y(x)^2 y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 1.08255 (sec), leaf count = 79

$$\left\{\left\{y(x) \to -\sqrt{-2ac_1x + ac_1^2 + b + 2c_1x - c_1^2 - x^2}\right\}, \left\{y(x) \to \sqrt{-2ac_1x + ac_1^2 + b + 2c_1x - c_1^2 - x^2}\right\}\right\}$$

✓ **Maple** : cpu = 3.403 (sec), leaf count = 195

$$\left\{ y(x) = \sqrt{-ax^2 + b}, y(x) = \frac{1}{a}\sqrt{a\left(-2\,x\sqrt{-a\,(b - \_C1)\,(a-1)} + (-x^2 + b)\,a - b + \_C1\right)}, y(x) = \frac{1}{a}\sqrt{\right.$$

ODE No. 492

$$\left(y(x)^2-a^2\right)y'(x)^2+y(x)^2=0$$

✓ **Mathematica** : cpu = 0.289029 (sec), leaf count = 111

$$\left\{\left\{y(x)\to \text{InverseFunction}\left[\sqrt{a^2-\#1^2}-a\log\left(a\sqrt{a^2-\#1^2}+a^2\right)+a\log(\#1)\&\right][c_1-x]\right\},\left\{y(x)-\right.\right.$$

✓ **Maple** : cpu = 7.936 (sec), leaf count = 122

$$\left\{x-\sqrt{a^2-\left(y\left(x\right)\right)^2}+a^2\ln\left(\frac{1}{y\left(x\right)}\left(2\,a^2+2\,\sqrt{a^2}\sqrt{a^2-\left(y\left(x\right)\right)^2}\right)\right)\frac{1}{\sqrt{a^2}}-\_C1=0,x+\sqrt{a^2-\left(y\left(x\right)\right)\right.$$

ODE No. 493

$$\left(a^2-2ax+y(x)^2\right)y'(x)^2+2ay(x)y'(x)+y(x)^2=0$$

✓ **Mathematica** : cpu = 10.7695 (sec), leaf count = 553

$$\left\{\text{Solve}\left[\left\{y(x)=\frac{-\sqrt{-a\text{K\$12555530}^2\left(a\text{K\$12555530}^2-2\text{K\$12555530}^2x-2x\right)}-a\text{K\$12555530}}{\text{K\$12555530}^2+1},x=-\right.\right.\right.$$

✓ **Maple** : cpu = 3.279 (sec), leaf count = 111

$$\left\{\left[x(\_T)=\frac{1}{2\,a}\left(\left(Artanh\left(\frac{1}{\sqrt{\_T^2+1}}\right)\right)^2\sqrt{\_T^2+1}a^2+\left(-2\,a\_C1\,\sqrt{\_T^2+1}-2\,a^2\right)Artanh\left(\right.\right.\right.\right.$$

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 = 3603.57 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.855 (sec), leaf count = 161

$$\left\{y(x)=\sqrt{a^2-1}x,y(x)=RootOf\left(-\ln\left(x\right)+\int^{\_Z}\frac{1}{\left(\_a^2+1\right)\left(\_a^2-a^2+1\right)}\left(-\_a^3+\_a\,a^2+\sqrt{\_a^2a^2}\right.\right.\right.$$

ODE No. 495

$$((1-a)x^2+y(x)^2)\,y'(x)^2+2axy(x)y'(x)+(1-a)y(x)^2+x^2=0$$

✓ **Mathematica** : cpu = 0.148599 (sec), leaf count = 83

$$\left\{\text{Solve}\left[\sqrt{a-1}\tan^{-1}\left(\frac{y(x)}{x}\right)-\frac{1}{2}\log\left(\frac{y(x)^2}{x^2}+1\right)=c_1+\log(x),y(x)\right],\text{Solve}\left[\sqrt{a-1}\tan^{-1}\left(\frac{y(x)}{x}\right)+\right.\right.$$

✓ **Maple** : cpu = 11.317 (sec), leaf count = 61

$$\left\{y(x)=\tan\left(\mathit{RootOf}\left(-2\_Z\sqrt{a-1}-\ln\left(\frac{x^2}{(\cos(\_Z))^2}\right)+2\_C1\right)\right)x,y(x)=\tan\left(\mathit{RootOf}\left(2\_Z\sqrt{}\right.\right.\right.$$

ODE No. 496

$$(y(x)-x)^2\left(y'(x)^2+1\right)-a^2(y'(x)+1)^2=0$$

✓ **Mathematica** : cpu = 98.9735 (sec), leaf count = 65

$$\left\{\left\{y(x)\to c_1-\sqrt{a^2+2c_1x-c_1^2-x^2}\right\},\left\{y(x)\to\sqrt{a^2+2c_1x-c_1^2-x^2}+c_1\right\}\right\}$$

✓ **Maple** : cpu = 1.805 (sec), leaf count = 130

$$\left\{y(x)=x-\sqrt{2}a,y(x)=x+\sqrt{2}a,y(x)=x+\mathit{RootOf}\left(-x+\int^{\_Z}-\frac{1}{2\_a^2-4a^2}\left(\_a^2-2a^2+\sqrt{-\_a}\right.\right.\right.$$

ODE No. 497

$$-x^2-2xy(x)y'(x)+3y(x)^2y'(x)^2+4y(x)^2=0$$

✓ **Mathematica** : cpu = 0.188942 (sec), leaf count = 203

$$\left\{\left\{y(x)\to-\frac{\sqrt{-4ix\sinh(3c_1)-4ix\cosh(3c_1)+\sinh(6c_1)+\cosh(6c_1)-3x^2}}{\sqrt{3}}\right\},\left\{y(x)\to\frac{\sqrt{-4ix\sinh}}{}\right.\right.$$

✓ **Maple** : cpu = 3.07 (sec), leaf count = 203

$$\left\{\ln(x)-\frac{\sqrt{3}}{6}\sqrt{\frac{\left(\sqrt{3}x+3\,y(x)\right)\left(\sqrt{3}x-3\,y(x)\right)}{x^2}}+\frac{1}{2}\sqrt{\frac{x^2-3\,(y(x))^2}{x^2}}-\mathit{Artanh}\left(\frac{1}{2}\sqrt{\frac{x^2-3\,(y(x))^2}{x^2}}\right)\right.$$

ODE No. 498

$$(3y(x)-2)y'(x)^2+4y(x)-4=0$$

✓ **Mathematica** : cpu = 0.109447 (sec), leaf count = 107

$$\left\{\left\{y(x)\to \text{InverseFunction}\left[-\sqrt{1-\#1}\sqrt{3\#1-2}-\frac{\sin^{-1}\left(\sqrt{3-3\#1}\right)}{\sqrt{3}}\&\right][c_1-2x]\right\},\left\{y(x)\to \text{Invers}\right.\right.$$

✓ **Maple** : cpu = 4.507 (sec), leaf count = 99

$$\left\{y(x)=1,y(x)=\frac{\sin\left(RootOf\left(-8\sqrt{3}\_C1\,\_Z+8\sqrt{3}x\_Z-(\cos(\_Z))^2+48\,\_C1^2-96\,\_C1\,x+48\,x\right.\right.}{6}\right.$$

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 = 0.31073 (sec), leaf count = 212

$$\left\{\left\{y(x)\to -\frac{\sqrt{a^6\left(-x^2\right)+3a^4x^2+2a^2xe^{a^2c_1-c_1}-2xe^{a^2c_1-c_1}+e^{2a^2c_1-2c_1}-3a^2x^2+x^2}}{\sqrt{a^6-3a^4+3a^2-1}}\right\},\left\{y(x)\to \frac{\sqrt{a^6}}{}\right.\right.$$

✓ **Maple** : cpu = 0.894 (sec), leaf count = 189

$$\left\{y(x)=RootOf\left(-\ln(x)+\int^{\_Z}\frac{\_a}{\left(\_a^2+1\right)\left(\_a^2a^2-\_a^2+a^2\right)}\left(-\_a^2a^2+\_a^2-a^2+\sqrt{\_a^2a^2-\_a^2}\right.\right.\right.$$

ODE No. 500

$$(a-b)y(x)^2y'(x)^2-ab+ay(x)^2-bx^2-2bxy(x)y'(x)=0$$

✓ **Mathematica** : cpu = 1.44004 (sec), leaf count = 100

$$\left\{\left\{y(x)\to -\frac{\sqrt{-ab-2ac_1x+ac_1^2+ax^2+b^2-bx^2}}{\sqrt{b-a}}\right\},\left\{y(x)\to \frac{\sqrt{-ab-2ac_1x+ac_1^2+ax^2+b^2-bx^2}}{\sqrt{b-a}}\right.\right.$$

✓ **Maple** : cpu = 3.251 (sec), leaf count = 220

$$\left\{y(x)=\frac{1}{b}\sqrt{b\left(-2\,x\sqrt{-ab\,(b-\_C1)}+(-x^2+\_C1+a)\,b-\_C1\,a\right)},y(x)=\frac{1}{b}\sqrt{\left(2\,x\sqrt{-ab\,(b-\_C1}\right.}\right.$$

ODE No. 501

$$y'(x)^2\left(ay(x)^2+bx+c\right)-by(x)y'(x)+dy(x)^2=0$$

✓ **Mathematica** : cpu = 32.6863 (sec), leaf count = 913

$$\left\{\text{Solve}\left[\left\{y(x)=\frac{b\text{K\$12626199}-\sqrt{-\text{K\$12626199}^2\left(-b^2+4a\text{K\$12626199}^2xb+4dxb+4ac\text{K\$12626199}\right.}}{2\left(a\text{K\$12626199}^2+d\right)}\right.\right.\right.$$

✓ **Maple** : cpu = 5.504 (sec), leaf count = 215

$$\left\{\left[x(\_T)=-\frac{1}{4\,bd}\left(\left(\ln\left(\frac{1}{\_T}\left(\sqrt{d}\sqrt{\_T^2a+d}+d\right)\right)\right)^2\sqrt{\_T^2a+d}b^2+\left(\left(2\,b^2\ln(2)+4\sqrt{d}\_C1\,b\right)\sqrt{\right.\right.\right.\right.$$

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 = 1.76129 (sec), leaf count = 100

$$\left\{\left\{y(x)\to\frac{bc_1}{a}-\frac{\sqrt{2b^2c_1x-b^2c_1^2+b^2\left(-x^2\right)+c^2}}{a}\right\},\left\{y(x)\to\frac{\sqrt{2b^2c_1x-b^2c_1^2+b^2\left(-x^2\right)+c^2}}{a}+\frac{bc_1}{a}\right\}\right\}$$

✓ **Maple** : cpu = 0.408 (sec), leaf count = 195

$$\left\{y(x)=\frac{bx-\sqrt{2}c}{a},y(x)=\frac{bx+\sqrt{2}c}{a},y(x)=\frac{1}{a}\left(RootOf\left(-x+\int^{\_Z}\frac{a}{\left(2\,a^2\_a^2-4\,c^2\right)b}\left(-a^2\_a^2+2\,c^2\right.\right.\right.\right.$$

ODE No. 503

$$\text{a0}+y'(x)(\text{a1}x+\text{b1}y(x)+\text{c1})+y'(x)^2(\text{a2}x+\text{b2}y(x)+\text{c2})^2+\text{b0}y(x)+\text{c0}=0$$

✗ **Mathematica** : cpu = 3600.08 (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
```

ODE No. 504

$$-\left(-a+x^3+y(x)^3\right)y'(x)+x^2y(x)+xy(x)^2y'(x)^2=0$$

✗ **Mathematica** : cpu = 3599.95 (sec), leaf count = 0 , timed out

```
$Aborted
```

✓ **Maple** : cpu = 0.947 (sec), leaf count = 247

$$\left\{\int_{\_b}^{y(x)}\_a^2\frac{1}{\sqrt{x^6+\left(-2\_a^3-2\,a\right)x^3+\left(-\_a^3+a\right)^2}}\,\mathrm{d}\_a-\frac{\ln(x)}{2}-\_C1=0,\int_{\_b}^{y(x)}\_a^2\frac{}{\sqrt{x^6+(-2\_a^3}}\right.$$

ODE No. 505

$$-x^3+xy(x)^2y'(x)^2-2y(x)^3y'(x)+2xy(x)^2=0$$

✓ **Mathematica** : cpu = 0.031146 (sec), leaf count = 73

$$\left\{\left\{y(x)\to-\sqrt{2c_1+x^2}\right\},\left\{y(x)\to\sqrt{2c_1+x^2}\right\},\left\{y(x)\to-\sqrt{c_1x^4+x^2}\right\},\left\{y(x)\to\sqrt{c_1x^4+x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.039 (sec), leaf count = 52

$$\left\{y(x)=\sqrt{x^2+\_C1},y(x)=\sqrt{\_C1\,x^2+1}x,y(x)=-\sqrt{x^2+\_C1},y(x)=-\sqrt{\_C1\,x^2+1}x\right\}$$

ODE No. 506

$$2x^2(y(x)-x)y(x)^2y'(x)+x^2\left(xy(x)^2-1\right)y'(x)^2-\left(x^2y(x)-1\right)y(x)^2=0$$

✗ **Mathematica** : cpu = 63.5063 (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))
```

ODE No. 507

$$\left(y(x)^4-a^2x^2\right)y'(x)^2+2a^2xy(x)y'(x)+y(x)^2\left(y(x)^2-a^2\right)=0$$

✓ **Mathematica** : cpu = 30.8191 (sec), leaf count = 443

$$\left\{\text{Solve}\left[\left\{x=\frac{a^2\text{K\$12637961}y(\text{K\$12637961})-\sqrt{a^2\text{K\$12637961}^2\left(\text{K\$12637961}^2+1\right)y(\text{K\$12637961})^4}}{a^2\text{K\$12637961}^2},y\right.\right.\right.$$

✗ **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))
```

ODE No. 508

$$\left(x^2y(x)^2-x^2+y(x)^4\right)y'(x)^2+2xy(x)y'(x)-y(x)^2=0$$

✗ **Mathematica** : cpu = 55.2787 (sec), leaf count = 0 , could not solve

```
DSolve[-y[x]^2 + 2*x*y[x]*Derivative[1][y][x] + (-x^2 + x^2*y[x]^2 + y[x]^4)*Derivativ
```

✓ **Maple** : cpu = 2.581 (sec), leaf count = 60

$$\left\{y(x)=-ix,y(x)=ix,y(x)=-\mathit{Artanh}\left(\mathit{RootOf}\left(\left(\mathit{Artanh}(\_Z)\right)^2\_Z^2-2\,\mathit{Artanh}(\_Z)\_\mathit{C1}\,\_Z^2+\_C\right.\right.\right.$$

ODE No. 509

$$9\left(x^2-1\right)y(x)^4y'(x)^2-4x^2-6xy(x)^5y'(x)=0$$

✗ **Mathematica** : cpu = 4273.64 (sec), leaf count = 0 , timed out

```
$Aborted
```

✓ **Maple** : cpu = 1.483 (sec), leaf count = 212

$$\left\{y(x)=\sqrt[6]{-4\,x^2+4},y(x)=-\sqrt[6]{-4\,x^2+4},y(x)=-\frac{i\sqrt{3}-1}{2}\sqrt[6]{-4\,x^2+4},y(x)=\frac{i\sqrt{3}-1}{2}\sqrt[6]{-4\,x^2+4},y\right.$$

ODE No. 510

$$-\left(x^4y(x)^2-1\right)y(x)^2+x^2\left(x^2y(x)^4-1\right)y'(x)^2+2x^3\left(y(x)^2-x^2\right)y(x)^3y'(x)=0$$

✗ **Mathematica** : cpu = 82.9815 (sec), leaf count = 0 , could not solve

```
DSolve[-(y[x]^2*(-1 + x^4*y[x]^2)) + 2*x^3*y[x]^3*(-x^2 + y[x]^2)*Derivative[1][y][x]
1 + x^2*y[x]^4)*Derivative[1][y][x]^2 == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(x^2*(x^2*y(x)^4-1)*diff(y(x),x)^2+2*x^3*y(x)^3*(y(x)^2-x^2)*diff(y(x),x)-
y(x)^2*(x^4*y(x)^2-1)=0,y(x))
```

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 = 4.2926 (sec), leaf count = 229

$$\left\{\text{Solve}\left[\tan^{-1}\left(\frac{x}{y(x)}\right)-\frac{2\sqrt{a^2\left(x^2+y(x)^2\right)\left(\sqrt{x^2+y(x)^2}-a^2\right)}\tan^{-1}\left(\frac{\sqrt{\sqrt{x^2+y(x)^2}-a^2}}{a}\right)}{a\sqrt{x^2+y(x)^2}\sqrt{\sqrt{x^2+y(x)^2}-a^2}}=c_1,y(x)\right],\text{S}\right.$$

✓ **Maple** : cpu = 4.984 (sec), leaf count = 199

$$\left\{\arctan\left(\frac{x}{y\left(x\right)}\right)-2\,\frac{\sqrt{a^2\left(\left(y\left(x\right)\right)^2+x^2\right)\left(-a^2+\sqrt{\left(y\left(x\right)\right)^2+x^2}\right)}}{a\sqrt{\left(y\left(x\right)\right)^2+x^2}\sqrt{-a^2+\sqrt{\left(y\left(x\right)\right)^2+x^2}}}\arctan\left(\frac{\sqrt{-a^2+\sqrt{\left(y\left(x\right)\right)^2+x^2}}}{a}\right)\right.$$

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 = 8.66812 (sec), leaf count = 713

$$\left\{\text{Solve}\left[\tan^{-1}\left(\frac{x}{y(x)}\right)-\frac{i\sqrt{a\left((x^2+y(x)^2)^{5/2}-a\left(x^2+y(x)^2\right)^3\right)}\left(\sqrt{2}\left(\log\left(\frac{a^{3/2}\left(3i\sqrt{2}a\sqrt{x^2+y(x)^2}+4\sqrt{a}\sqrt{\sqrt{}\right.}{4a\sqrt{x^2+y}}\right.\right.\right.}{}\right.\right.$$

✓ **Maple** : cpu = 6.934 (sec), leaf count = 137

$$\left\{y(x)=x\left(\tan\left(\mathit{RootOf}\left(-\_Z+\int^{\frac{x^2\left((\tan(\_Z))^2+1\right)}{(\tan(\_Z))^2}}-\frac{1}{(2\_a\,a^2-2)\_a^2}(\sqrt{\_a}a+1)\sqrt{-\_a^3a^2+\_a^{\frac{5}{2}}ad\_}\right.\right.\right.\right.$$

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 = 3600.4 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 4.999 (sec), leaf count = 1134

$$\left\{\left[x(\_T)=\frac{1}{2\_T}\left(\left(\left(\cos\left(\frac{1}{2}\arctan\left(1\left(\_C1^2\_T^2-2\_C1\_T\sqrt[3]{\_C1^3\_T^3+54\_C1\_T+6\sqrt{3}\sqrt{\_}}\right.\right.\right.\right.\right.\right.\right.\right.$$

ODE No. 514

$$y'(x)^2(a\cos(y(x))+b)-c\cos(y(x))+d=0$$

✓ **Mathematica** : cpu = 18.1843 (sec), leaf count = 605

$$\left\{\left\{y(x)\to\text{InverseFunction}\left[\frac{4\sin^2\left(\frac{\#1}{2}\right)\csc(\#1)\sqrt{a\cos(\#1)+b}\sqrt{\frac{\cot^2\left(\frac{\#1}{2}\right)(c-d)}{c+d}}\sqrt{\frac{\csc^2\left(\frac{\#1}{2}\right)(a+b)(d-c\cos(\#1))}{ad+bc}}}{}\right.\right.\right.$$

✓ **Maple** : cpu = 0.35 (sec), leaf count = 87

$$\left\{x-\int^{y(x)}(a\cos(\_a)+b)\frac{1}{\sqrt{(a\cos(\_a)+b)(c\cos(\_a)-d)}}d\_a-\_C1=0, x-\int^{y(x)}-(a\cos(\_a)+\right.$$

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 = 3599.98 (sec), leaf count = 0 , timed out

```
$Aborted
```

✓ **Maple** : cpu = 2.185 (sec), leaf count = 113

$$\left\{y(x)=x\left(\tan\left(RootOf\left(-\_Z+\int^{\frac{x^2\left((\tan(\_Z))^2+1\right)}{(\tan(\_Z))^2}}-\frac{1}{2\_a\left(f(\_a)-\_a\right)}\sqrt{-(f(\_a)-\_a)f(\_a)}d\_a\right.\right.\right.\right.$$

ODE No. 516

$$\left(x^2+y(x)^2\right)f\left(\frac{x}{\sqrt{x^2+y(x)^2}}\right)\left(y'(x)^2+1\right)-\left(xy'(x)-y(x)\right)^2=0$$

✓ **Mathematica** : cpu = 4.34688 (sec), leaf count = 251

$$\left\{\text{Solve}\left[\int_1^{\frac{y(x)}{x}}\frac{K[1]^2f\left(\frac{1}{\sqrt{K[1]^2+1}}\right)+f\left(\frac{1}{\sqrt{K[1]^2+1}}\right)-1}{(K[1]-i)(K[1]+i)\sqrt{f\left(\frac{1}{\sqrt{K[1]^2+1}}\right)}\left(K[1]\sqrt{f\left(\frac{1}{\sqrt{K[1]^2+1}}\right)}+i\sqrt{f\left(\frac{1}{\sqrt{K[1]^2+1}}\right)-1}\right)}dK[1]\right.\right.$$

✓ **Maple** : cpu = 1.271 (sec), leaf count = 139

$$\left\{y(x)=RootOf\left(-\ln(x)+\int^{\_Z}\frac{1}{\_a^2+1}\left(-\_a\,f\left(\frac{1}{\sqrt{\_a^2+1}}\right)+\sqrt{-\left(f\left(\frac{1}{\sqrt{\_a^2+1}}\right)\right)^2+f\left(\frac{1}{\sqrt{\_a^2+1}}\right.\right.\right.\right.\right.$$

ODE No. 517

$$\left(x^2+y(x)^2\right) f\left(\frac{y(x)}{\sqrt{x^2+y(x)^2}}\right)\left(y'(x)^2+1\right)-\left(xy'(x)-y(x)\right)^2=0$$

✓ **Mathematica** : cpu = 4.94434 (sec), leaf count = 281

$$\left\{\text{Solve}\left[\int_1^{\frac{y(x)}{x}} \frac{K[1]^2 f\left(\frac{K[1]}{\sqrt{K[1]^2+1}}\right)+f\left(\frac{K[1]}{\sqrt{K[1]^2+1}}\right)-1}{(K[1]-i)(K[1]+i)\sqrt{f\left(\frac{K[1]}{\sqrt{K[1]^2+1}}\right)}\left(K[1]\sqrt{f\left(\frac{K[1]}{\sqrt{K[1]^2+1}}\right)}+i\sqrt{f\left(\frac{K[1]}{\sqrt{K[1]^2+1}}\right)-1}\right)} dK[1\right.$$

✓ **Maple** : cpu = 1.211 (sec), leaf count = 78

$$\left\{y(x)=RootOf\left(-\ln(x)+\int^{\_Z}-\frac{1}{\_a^2+1}\left(\_a\, f\left(\_a\frac{1}{\sqrt{\_a^2+1}}\right)+\sqrt{-\left(f\left(\_a\frac{1}{\sqrt{\_a^2+1}}\right)\right)^2+f\right.\right.\right.$$

ODE No. 518

$$y'(x)^3-(y(x)-a)^2(y(x)-b)^2=0$$

✓ **Mathematica** : cpu = 1.33212 (sec), leaf count = 236

$$\left\{\left\{y(x)\to\text{InverseFunction}\left[-\frac{3\sqrt[3]{a-\#1}\left(\frac{\#1-b}{a-b}\right)^{2/3}\,{}_2F_1\left(\frac{1}{3},\frac{2}{3};\frac{4}{3};\frac{a-\#1}{a-b}\right)}{(b-\#1)^{2/3}}\&\right][c_1+x]\right\},\left\{y(x)\to\text{InverseFu}\right.\right.$$

✓ **Maple** : cpu = 0.258 (sec), leaf count = 126

$$\left\{x-\int^{y(x)}\frac{1}{\sqrt[3]{(\_a-a)^2(\_a-b)^2}}d\_a-\_C1=0, x-\int^{y(x)}2\frac{1}{\left(i\sqrt{3}-1\right)\sqrt[3]{(-\_a+a)^2(-\_a+b)^2}}d\_a\right.$$

ODE No. 519

$$y'(x)^3 - f(x)\left(ay(x)^2 + by(x) + c\right)^2 = 0$$

✓ **Mathematica** : cpu = 3.35254 (sec), leaf count = 473

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[\frac{3\left(2\#1a - \sqrt{b^2-4ac} + b\right)\left(\frac{2\#1a+\sqrt{b^2-4ac}+b}{\sqrt{b^2-4ac}}\right)^{2/3} {}_2F_1\left(\frac{1}{3}, \frac{2}{3}; \frac{4}{3}; \frac{-b-2a\#1+\sqrt{b^2-4ac}}{2\sqrt{b^2-4ac}}\right.}{2\, 2^{2/3} a (\#1(\#1a+b)+c)^{2/3}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.511 (sec), leaf count = 197

$$\left\{\int^{y(x)} \left(\_a^2 a + \_a\, b + c\right)^{-\frac{2}{3}} d\_a + \int^{x} -1\sqrt[3]{f(\_a)\left(a\left(y(x)\right)^2 + by(x) + c\right)^2}\left(a(y(x))^2 + by(x) + c\right)^{-\frac{2}{3}} d\_\right.$$

ODE No. 520

$$y'(x)^3 + y'(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 237.102 (sec), leaf count = 3323

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[\frac{\left(243\#1^2 - 27\sqrt{81\#1^2+12}\#1 - 24\sqrt[3]{2}\sqrt[6]{3}\tan^{-1}\left(\frac{1}{\sqrt{3}} - \left(\frac{2}{3}\right)^{2/3}\sqrt[3]{\sqrt{81\#1^2}\right.\right.\right.}{}\right.\right.\right.$$

✓ **Maple** : cpu = 0.168 (sec), leaf count = 245

$$\left\{x - \int^{y(x)} 6\frac{\sqrt[3]{108\_a + 12\sqrt{81\_a^2+12}}}{\left(108\_a + 12\sqrt{81\_a^2+12}\right)^{2/3} - 12} d\_a - \_C1 = 0, x - \int^{y(x)} -12\frac{}{\left(i\sqrt{3}-1\right)\left(-\sqrt[3]{108\_\right.}}\right.$$

ODE No. 521

$$y'(x)^3 + xy'(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 0.00400812 (sec), leaf count = 14

$$\{\{y(x) \to c_1 x + c_1^3\}\}$$

✓ **Maple** : cpu = 0.035 (sec), leaf count = 33

$$\left\{ y(x) = \_C1 \left(\_C1^2 + x\right), y(x) = -\frac{2x}{9}\sqrt{-3x}, y(x) = \frac{2x}{9}\sqrt{-3x} \right\}$$

ODE No. 522

$$y'(x)^3 - (x+5)y'(x) + y(x) = 0$$

✓ **Mathematica** : cpu = 0.0039886 (sec), leaf count = 20

$$\{\{y(x) \to c_1 x - c_1^3 + 5c_1\}\}$$

✓ **Maple** : cpu = 0.047 (sec), leaf count = 44

$$\left\{ y(x) = \_C1 \left(-\_C1^2 + x + 5\right), y(x) = -\frac{2x+10}{9}\sqrt{3x+15}, y(x) = \frac{2x+10}{9}\sqrt{3x+15} \right\}$$

ODE No. 523

$$-axy'(x) + x^3 + y'(x)^3 = 0$$

✓ **Mathematica** : cpu = 3223.23 (sec), leaf count = 389

$$\left\{\left\{y(x) \to \int_1^x \left(\frac{\sqrt[3]{\frac{2}{3}} aK[1]}{\sqrt[3]{\sqrt{3}\sqrt{27K[1]^6 - 4a^3K[1]^3} - 9K[1]^3}} + \frac{\sqrt[3]{\sqrt{3}\sqrt{27K[1]^6 - 4a^3K[1]^3} - 9K[1]^3}}{\sqrt[3]{2}3^{2/3}} \right) dK[1$$

✓ **Maple** : cpu = 0.056 (sec), leaf count = 231

$$\left\{ y(x) = \int i\left(\left(\frac{i}{12} - \frac{\sqrt{3}}{12}\right)\left(-108x^3 + 12\sqrt{-12a^3x^3 + 81x^6}\right)^{\frac{2}{3}} + ax\left(\sqrt{3} + i\right)\right) \frac{1}{\sqrt[3]{-108x^3 + 12\sqrt{-12}}}$$

ODE No. 524

$$y'(x)^3-2y(x)y'(x)+y(x)^2=0$$

✗ **Mathematica** : cpu = 6698.89 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.065 (sec), leaf count = 261

$$\left\{x-\int^{y(x)}6\,\frac{\sqrt[3]{-108\_a^2+12\sqrt{3}\sqrt{27\_a^4-32\_a^3}}}{\left(-108\_a^2+12\sqrt{3}\sqrt{27\_a^4-32\_a^3}\right)^{2/3}+24\_a}d\_a-\_C1=0,x-\int^{y(x)}24\,\frac{}{(i\sqrt{3}-1)}\right.$$

ODE No. 525

$$-axy(x)y'(x)+2ay(x)^2+y'(x)^2=0$$

✓ **Mathematica** : cpu = 16.4155 (sec), leaf count = 135

$$\left\{\left\{y(x)\to c_1\exp\left(\frac{1}{2}\left(\frac{ax^2}{2}+\frac{1}{2}\sqrt{a}x\sqrt{ax^2-8}-4\log\left(\sqrt{a}\sqrt{ax^2-8}+ax\right)\right)\right)\right\},\left\{y(x)\to c_1\exp\left(\frac{1}{2}\left(\frac{ax}{2}\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.069 (sec), leaf count = 122

$$\left\{y(x)=\_C1\left(a^2x\frac{1}{\sqrt{a^2}}+\sqrt{a^2x^2-8\,a}\right)^{-2\,\frac{a}{\sqrt{a^2}}}\mathrm{e}^{\frac{x}{4}\left(ax+\sqrt{a^2x^2-8\,a}\right)},y(x)=\_C1\left(a^2x\frac{1}{\sqrt{a^2}}+\sqrt{a^2x^2-8\,a}\right)^{2}\right.$$

ODE No. 526

$$-x^3y(x)^3-\left(x^2+xy(x)+y(x)^2\right)y'(x)^2+\left(x^3y(x)+x^2y(x)^2+xy(x)^3\right)y'(x)+y'(x)^3=0$$

✓ **Mathematica** : cpu = 1.15531 (sec), leaf count = 45

$$\left\{\left\{y(x)\to\frac{1}{-c_1-x}\right\},\left\{y(x)\to c_1e^{\frac{x^2}{2}}\right\},\left\{y(x)\to c_1+\frac{x^3}{3}\right\}\right\}$$

✓ **Maple** : cpu = 0.02 (sec), leaf count = 32

$$\left\{y(x)=(-x+\_C1)^{-1},y(x)=\_C1\,\mathrm{e}^{\frac{x^2}{2}},y(x)=\frac{x^3}{3}+\_C1\right\}$$

ODE No. 527

$$-xy(x)^4y'(x) + y'(x)^3 - y(x)^5 = 0$$

✗ **Mathematica** : cpu = 5541.33 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.692 (sec), leaf count = 43

$$\left\{ y(x) = \_C1\,\sqrt{\frac{\_C1^{10}}{\left(\_C1^{4}x-1\right)^{2}}}, y(x) = -\frac{3\sqrt{3}}{2}x^{-\frac{3}{2}}, y(x) = \frac{3\sqrt{3}}{2}x^{-\frac{3}{2}} \right\}$$

ODE No. 528

$$abx + ay'(x)^2 + by(x) + y'(x)^3 = 0$$

✗ **Mathematica** : cpu = 0 (sec), leaf count = 0 , timed out

`timed out`

✓ **Maple** : cpu = 0.108 (sec), leaf count = 86

$$\left\{ y(x) = -ax - \frac{\left(e^{RootOf\left(-2\_Z\,a^{2}-3\,e^{2\,\_Z}+8\,a e^{\_Z}+2\,\_C1\,b-5\,a^{2}-2\,bx\right)} - a\right)^{2} e^{RootOf\left(-2\_Z\,a^{2}-3\,e^{2\,\_Z}+8\,a e^{\_Z}+2\,\_C1\,b-5\,\right.}}{b}\right.$$

ODE No. 529

$$y'(x)^3 + xy'(x)^2 - y(x) = 0$$

✓ **Mathematica** : cpu = 65.325 (sec), leaf count = 1758

$$\left\{\left\{y(x) \to \frac{1}{2}\left(\frac{4\ 2^{2/3}x^4}{3\left(-16x^3 - 72x^2 - 108x + 216c_1 + \sqrt{4\left(-4x^2-12x-9\right)^3 + \left(-16x^3 - 72x^2 - 108x + 2\right.}\right.}\right.\right.\right.$$

✓ **Maple** : cpu = 0.056 (sec), leaf count = 1251

$$\left\{ y(x) = 0, y(x) = 1\left(\left(4\,x-6\right)\sqrt[3]{-36\,x^{2}-54\,x+108\,\_C1-8\,x^{3}+27+6\,\sqrt{-6\,\left(1+2\,\_C1\right)\left(4\,x^{3}+18\right.}}\right.\right.$$

ODE No. 530

$$y'(x)^3 - y(x)y'(x)^2 + y(x)^2 = 0$$

✗ **Mathematica** : cpu = 3599.96 (sec), leaf count = 0 , timed out

```
$Aborted
```

✓ **Maple** : cpu = 0.135 (sec), leaf count = 432

$$\left\{x - \int^{y(x)} 6 \frac{\sqrt[3]{-108\_a^2 + 8\_a^3 + 12\sqrt{-12\_a^5 + 81\_a^4}}}{4\_a^2 + 2\_a\sqrt[3]{-108\_a^2 + 8\_a^3 + 12\sqrt{-12\_a^5 + 81\_a^4}} + \left(-108\_a^2 + 8\_a^3 + 12\sqrt{-\right.}}\right.$$

ODE No. 531

$$-x^3y(x)^6 - \left(x^2 + y(x)^4 + xy(x)^2\right)y'(x)^2 + \left(x^3y(x)^2 + x^2y(x)^4 + xy(x)^6\right)y'(x) + y'(x)^2 = 0$$

✗ **Mathematica** : cpu = 68.7092 (sec), leaf count = 0 , could not solve

```
DSolve[-(x^3*y[x]^6) + (x^3*y[x]^2 + x^2*y[x]^4 + x*y[x]^6)*Derivative[1][y][x] + Deri
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(y(x),x)^2-(y(x)^4+x*y(x)^2+x^2)*diff(y(x),x)^2+(x*y(x)^6+x^2*y(x)^4+x^3*y(
x^3*y(x)^6=0,y(x))
```

ODE No. 532

$$ay'(x)^3 + by'(x)^2 + cy'(x) - d - y(x) = 0$$

✗ **Mathematica** : cpu = 3599.96 (sec), leaf count = 0 , timed out

```
$Aborted
```

✓ **Maple** : cpu = 0.149 (sec), leaf count = 848

$$\left\{x - \int^{y(x)} 6 \frac{a\sqrt[3]{12\sqrt{3}\sqrt{27\,(d+}}}{\left(12\sqrt{3}\sqrt{27\,(d+\_a)^2a^2 + 18\,((d+\_a)\,b + 2/9\,c^2)\,ca + (-4\,d - 4\_a)\,b^3 - b^2c^2a + (108\,d\right.}}\right.$$

ODE No. 533

$$a + xy'(x)^3 - y(x)y'(x)^2 = 0$$

✗ **Mathematica** : cpu = 3599.95 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.041 (sec), leaf count = 76

$$\left\{ y(x) = \frac{x\_C1^3 + a}{\_C1^2}, y(x) = \frac{3\sqrt[3]{2}}{2}\sqrt[3]{ax^2}, y(x) = \frac{3\sqrt[3]{2}(i\sqrt{3}-1)}{4}\sqrt[3]{ax^2}, y(x) = -\frac{3\sqrt[3]{2}(i\sqrt{3}+1)}{4}\sqrt[3]{ax^2} \right\}$$

ODE No. 534

$$4xy'(x)^3 - 6y(x)y'(x)^2 + 3y(x) - x = 0$$

✗ **Mathematica** : cpu = 3599.95 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.1 (sec), leaf count = 84

$$\left\{ y(x) = x, y(x) = -\frac{(1+\sqrt{3})\,x}{2}, y(x) = \frac{(\sqrt{3}-1)\,x}{2}, y(x) = \frac{1}{3\_C1}\left(-\sqrt{2}(\_C1 + x)\sqrt{\_C1\ (\_C1 + x}\right.\right.$$

ODE No. 535

$$8xy'(x)^3 - 12y(x)y'(x)^2 + 9y(x) = 0$$

✗ **Mathematica** : cpu = 3599.98 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.06 (sec), leaf count = 51

$$\left\{ y(x) = 0, y(x) = -\frac{3\,x}{2}, y(x) = \frac{3\,x}{2}, y(x) = -\frac{1}{3\_C1^2}(\_C1\ (3\_C1 + x))^{\frac{3}{2}}, y(x) = \frac{1}{3\_C1^2}(\_C1\ (3\_C\right.$$

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 = 0.0168187 (sec), leaf count = 64

$$\left\{\left\{y(x)\to c_1-\frac{bx^2}{2}\right\},\left\{y(x)\to c_1-\tan^{-1}\left(\frac{x}{\sqrt{a^2-x^2}}\right)\right\},\left\{y(x)\to \tan^{-1}\left(\frac{x}{\sqrt{a^2-x^2}}\right)+c_1\right\}\right\}$$

✓ **Maple** : cpu = 0.047 (sec), leaf count = 52

$$\left\{y(x)=-\frac{bx^2}{2}+\_C1,y(x)=-\arctan\left(x\frac{1}{\sqrt{a^2-x^2}}\right)+\_C1,y(x)=\arctan\left(x\frac{1}{\sqrt{a^2-x^2}}\right)+\_C1\right\}$$

ODE No. 537

$$\left(x^6+3xy(x)^2\right)y'(x)-2x^5y(x)+x^3y'(x)^3-3x^2y(x)y'(x)^2-y(x)^3=0$$

✗ **Mathematica** : cpu = 3599.96 (sec), leaf count = 0 , timed out

```
$Aborted
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(x^3*diff(y(x),x)^3-3*x^2*y(x)*diff(y(x),x)^2+(3*x*y(x)^2+x^6)*diff(y(x),x)-
y(x)^3-2*x^5*y(x)=0,y(x))
```

ODE No. 538

$$2(xy'(x)+y(x))^3-y(x)y'(x)=0$$

✗ **Mathematica** : cpu = 3599.95 (sec), leaf count = 0 , timed out

```
$Aborted
```

✓ **Maple** : cpu = 1.006 (sec), leaf count = 1532

$$\left\{\int_{\_b}^{x}1\left(-6^{\frac{2}{3}}\left(-9\,y(x)\left(-1/9\sqrt{3}\sqrt{\frac{27\_a\,(y\,(x))^2-2\,y\,(x)}{\_a}}+y(x)\right)\_a^2\right)^{\frac{2}{3}}+6\_a\,y(x)\left(\sqrt[3]{6}\sqrt[3]{-9\,y\,(x}\right.\right.\right.$$

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 = 0.0362379 (sec), leaf count = 45

$$\left\{\{y(x)\to c_1e^x\},\{y(x)\to c_1-\cos(x)\},\left\{y(x)\to c_1-\log\left(\sin\left(\frac{x}{2}\right)\right)+\log\left(\cos\left(\frac{x}{2}\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.059 (sec), leaf count = 32

$$\{y(x)=\_C1\,e^x,y(x)=-\cos(x)+\_C1,y(x)=-\ln(\csc(x)-\cot(x))+\_C1\}$$

ODE No. 540

$$2y(x)y'(x)^3-y(x)y'(x)^2+2xy'(x)-x=0$$

✓ **Mathematica** : cpu = 0.0204015 (sec), leaf count = 69

$$\left\{\left\{y(x)\to c_1+\frac{x}{2}\right\},\left\{y(x)\to\frac{\left(3c_1-2ix^{3/2}\right)^{2/3}}{2^{2/3}}\right\},\left\{y(x)\to\frac{\left(3c_1+2ix^{3/2}\right)^{2/3}}{2^{2/3}}\right\}\right\}$$

✓ **Maple** : cpu = 0.076 (sec), leaf count = 109

$$\left\{x+\frac{x\_C1}{y(x)}\left(\frac{1}{y(x)}\left(-x-\sqrt{-xy(x)}+y(x)\right)\right)^{-\frac{2}{3}}\left(\frac{1}{y(x)}\left(\sqrt{-xy(x)}+y(x)\right)\right)^{-\frac{2}{3}}=0,x+\frac{x\_C1}{y(x)}\left(\frac{1}{y(x}\right.\right.$$

ODE No. 541

$$y(x)^2y'(x)^3+2xy'(x)-y(x)=0$$

✗ **Mathematica** : cpu = 3600. (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.553 (sec), leaf count = 103

$$\left\{y(x)=\sqrt{\_C1^3+2x\_C1},y(x)=-\frac{2i}{3}\sqrt[4]{2}\sqrt[4]{3}\sqrt[4]{-x^3},y(x)=\frac{2i}{3}\sqrt[4]{2}\sqrt[4]{3}\sqrt[4]{-x^3},y(x)=-\sqrt{\_C1^3+2x\_\right.$$

ODE No. 542

$$16y(x)^2y'(x)^3+2xy'(x)-y(x)=0$$

✗ **Mathematica** : cpu = 3600. (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.528 (sec), leaf count = 107

$$\left\{y(x)=\sqrt{16\_C1^3+2\,x\_C1},y(x)=-\frac{i}{3}\sqrt[4]{2}\sqrt[4]{3}\sqrt[4]{-x^3},y(x)=\frac{i}{3}\sqrt[4]{2}\sqrt[4]{3}\sqrt[4]{-x^3},y(x)=-\sqrt{16\_C1^3+2\,x\right.$$

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 = 399.146 (sec), leaf count = 0 , could not solve

`DSolve[-(x^2*y[x]) + x*(1 + x^2)*Derivative[1][y][x] - y[x]^3*Derivative[1][y][x]^2 +`

✓ **Maple** : cpu = 1.394 (sec), leaf count = 277

$$\left\{y(x)=-\frac{i}{2}\sqrt[4]{-16\,x^4+40\,x^2+2-2\,\sqrt{-\left(8\,x^2-1\right)^3}},y(x)=-\frac{i}{2}\sqrt[4]{-16\,x^4+40\,x^2+2+2\,\sqrt{-\left(8\,x^2-1\right.}}\right.$$

ODE No. 544

$$x^7y(x)^2y'(x)^3-\left(3x^6y(x)^3-1\right)y'(x)^2+3x^5y(x)^4y'(x)-x^4y(x)^5=0$$

✗ **Mathematica** : cpu = 3599.95 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 1.019 (sec), leaf count = 4201

$$\left\{\int_{\_b}^{x}\frac{1}{\_a}\left(\left(-1-i\sqrt{3}\right)\left(-108\,(y\,(x))^6\,\_a^{12}+12\,\sqrt{3}\sqrt{\frac{27\,\_a^6\,(y\,(x))^3-4}{y\,(x)}}(y\,(x))^5\,\_a^9+72\,\_a^6(y(x))^3-\right.\right.\right.$$

ODE No. 545

$$y'(x)^4-(y(x)-a)^3(y(x)-b)^2=0$$

✓ **Mathematica** : cpu = 0.872664 (sec), leaf count = 383

$$\left\{\left\{y(x)\to \text{InverseFunction}\left[-\frac{\sqrt[4]{a-\#1}\sqrt{\frac{\#1-b}{a-b}}B_{\frac{a-\#1}{a-b}}\left(\frac{1}{4},\frac{1}{2}\right)}{\sqrt{b-\#1}\sqrt[4]{\frac{a-\#1}{a-b}}}\&\right]\left[c_1-\sqrt[4]{-1}x\right]\right\},\left\{y(x)\to \text{InverseFunct}\right.\right.$$

✓ **Maple** : cpu = 0.178 (sec), leaf count = 144

$$\left\{x-\int^{y(x)}\frac{1}{\sqrt[4]{(\_a-a)^3(\_a-b)^2}}d\_a-\_C1=0,x-\int^{y(x)}-i\frac{1}{\sqrt[4]{-(-\_a+a)^3(-\_a+b)^2}}d\_a-\_C\right.$$

ODE No. 546

$$y'(x)^4+3(x-1)y'(x)^2-3(2y(x)-1)y'(x)+3x=0$$

✗ **Mathematica** : cpu = 3601.65 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.144 (sec), leaf count = 171

$$\left\{y(x)=1\left(\left(-6+\_C1^3+(6x-6)\_C1\right)\sqrt{\_C1^2+4x}-2\_C1^4+(-14x+6)\_C1^2+\left(\left(\_C1^2+4x\right.\right.\right.\right.$$

ODE No. 547

$$y'(x)^4-4y(x)\left(xy'(x)-2y(x)\right)^2=0$$

✓ **Mathematica** : cpu = 1.78752 (sec), leaf count = 490

$$\left\{\text{Solve}\left[\frac{\sqrt{\left(x^2-4\sqrt{y(x)}\right)y(x)}\log\left(\sqrt{x^2-4\sqrt{y(x)}}+x\right)}{\sqrt{x^2-4\sqrt{y(x)}}\sqrt{y(x)}}-\frac{\sqrt{x^2-4\sqrt{y(x)}}\sqrt{y(x)}\log(y(x))}{4\sqrt{\left(x^2-4\sqrt{y(x)}\right)y(x)}}+\frac{1}{4}\log(y\right.\right.$$

✓ **Maple** : cpu = 0.269 (sec), leaf count = 118

$$\left\{1\left(\sqrt{x^2-4\sqrt{y(x)}}-x\right)^{1\sqrt{x^2y(x)-4(y(x))^{3/2}}\frac{1}{\sqrt{x^2-4\sqrt{y(x)}}}\frac{1}{\sqrt{y(x)}}}\frac{1}{\sqrt{y(x)}}\left(\left(\sqrt{x^2-4\sqrt{y(x)}}+x\right)^{1\sqrt{x^2y(x)-4(y(}}\right.\right.$$

ODE No. 548

$$y'(x)^6-(y(x)-a)^4(y(x)-b)^3=0$$

✓ **Mathematica** : cpu = 1.05915 (sec), leaf count = 569

$$\left\{\left\{y(x)\to \text{InverseFunction}\left[-\frac{\sqrt[3]{a-\#1}\sqrt{\frac{\#1-b}{a-b}}B_{\frac{a-\#1}{a-b}}\left(\frac{1}{3},\frac{1}{2}\right)}{\sqrt{b-\#1}\sqrt[3]{\frac{a-\#1}{a-b}}}\&\right]\left[c_1-ix\right]\right\},\left\{y(x)\to \text{InverseFunction}\left[\right.\right.\right.$$

✓ **Maple** : cpu = 0.359 (sec), leaf count = 250

$$\left\{x-\int^{y(x)}\frac{1}{\sqrt[6]{(\_a-a)^4(\_a-b)^3}}d\_a-\_C1=0,x-\int^{y(x)}\frac{-2\,i}{-\sqrt{3}+i}\frac{1}{\sqrt[6]{-(-\_a+a)^4(-\_a+b)^3}}d\_a\right.$$

ODE No. 549

$$x^2\left(y'(x)^2+1\right)^3-a^2=0$$

✓ **Mathematica** : cpu = 0.450958 (sec), leaf count = 360

$$\left\{\left\{y(x)\to c_1-\frac{1}{4}\sqrt[3]{x}\sqrt{-4+\frac{2i\left(\sqrt{3}+i\right)a^{2/3}}{x^{2/3}}}\left(2x^{2/3}+\left(1-i\sqrt{3}\right)a^{2/3}\right)\right\},\left\{y(x)\to c_1+\frac{1}{4}\sqrt[3]{x}\sqrt{-4+}\right.\right.$$

✓ **Maple** : cpu = 0.522 (sec), leaf count = 553

$$\left\{y(x)=1\sqrt{-\frac{1}{a^4}\left(a^2x\right)^{\frac{4}{3}}\left(\left(a^2x\right)^{\frac{2}{3}}-a^2\right)}\left(a^2-\left(a^2x\right)^{\frac{2}{3}}\right)\left(a^2x\right)^{-\frac{2}{3}}+\_C1,y(x)=1\sqrt{-\frac{1}{a^4}\left(a^2x\right)^{\frac{4}{3}}\left(\left(a^2x\right)^{\frac{2}{3}}-\right.}\right.$$

ODE No. 550

$$-ay(x)^s - bx^{\frac{rs}{r-s}} + y'(x)^r = 0$$

✗ **Mathematica** : cpu = 3599.99 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.33 (sec), leaf count = 60

$$\left\{(-r+s)\int_{\_b}^{y(x)}\left(x(r-s)\sqrt[r]{a\_a^s + bx^{\frac{rs}{r-s}}} - r\_a\right)^{-1} \mathrm{d}\_a + \ln(x) - \_C1 = 0\right\}$$

ODE No. 551

$$y'(x)^n - f(x)^n(y(x)-a)^{n+1}(y(x)-b)^{n-1} = 0$$

✓ **Mathematica** : cpu = 0.44487 (sec), leaf count = 84

$$\left\{\left\{y(x) \to \frac{-a(a-b)^n \left(\int_1^x (-1)^{\frac{1}{n}+1} f(K[1])\,dK[1] + c_1\right)^n - bn^n}{-(a-b)^n \left(\int_1^x (-1)^{\frac{1}{n}+1} f(K[1])\,dK[1] + c_1\right)^n - n^n}\right\}\right\}$$

✓ **Maple** : cpu = 0.455 (sec), leaf count = 55

$$\left\{y(x) = 1\left(b\left(-\frac{n}{(a-b)\left(\int f(x)\,\mathrm{d}x + \_C1\right)}\right)^n - a\right)\left(-1 + \left(-\frac{n}{(a-b)\left(\int f(x)\,\mathrm{d}x + \_C1\right)}\right)^n\right)^{-1}\right\}$$

ODE No. 552

$$y'(x)^n - f(x)g(y(x)) = 0$$

✓ **Mathematica** : cpu = 0.183 (sec), leaf count = 39

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[\int_1^{\#1} g(K[1])^{-1/n}\,dK[1]\&\right]\left[\int_1^x f(K[2])^{\frac{1}{n}}\,dK[2] + c_1\right]\right\}\right\}$$

✓ **Maple** : cpu = 0.09 (sec), leaf count = 43

$$\left\{\int^{y(x)} (g(\_a))^{-n^{-1}}\,d\_a + \int^x -\frac{\sqrt[n]{f(\_a)\,g(y(x))}}{\sqrt[n]{g(y(x))}}\,d\_a + \_C1 = 0\right\}$$

ODE No. 553

$$a y'(x)^m + b y'(x)^n - y(x) = 0$$

✓ **Mathematica** : cpu = 0.184976 (sec), leaf count = 51

$$\text{Solve}\left[\left\{x=\frac{am\text{K\$3193499}^{m-1}}{m-1}+\frac{bn\text{K\$3193499}^{n-1}}{n-1}+c_1,y(x)=a\text{K\$3193499}^m+b\text{K\$3193499}^n\right\},\{y(x),$$

✓ **Maple** : cpu = 0.058 (sec), leaf count = 36

$$\left\{x-\int^{y(x)}(RootOf(-a\_Z^m-b\_Z^n+\_a))^{-1}\,d\_a-\_C1=0,y(x)=0\right\}$$

ODE No. 554

$$x^{n-1} y'(x)^n - n x y'(x) + y(x) = 0$$

✓ **Mathematica** : cpu = 0.126223 (sec), leaf count = 49

$$\text{Solve}\left[\left\{y(x)=\frac{\text{K\$3193678}nx^2-\text{K\$3193678}^n x^n}{x},x=c_1(\text{K\$3193678}-\text{K\$3193678}n)^{\frac{n}{1-n}}\right\},\{y(x),\text{K\$319}$$

✓ **Maple** : cpu = 0.428 (sec), leaf count = 32

$$\left\{y(x)=\frac{1}{\_C1}\left(\_C1^2 n\sqrt[n]{\frac{x}{\_C1}}-\left(\_C1^{-1}\right)^{-n}\right)\right\}$$

ODE No. 555

$$x y'(x) + \sqrt{y'(x)^2+1} - y(x) = 0$$

✗ **Mathematica** : cpu = 3630.72 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.028 (sec), leaf count = 15

$$\left\{y(x)=\sqrt{\_C1^2+1}+x\_C1\right\}$$

ODE No. 556

$$xy'(x)^2+\sqrt{y'(x)^2+1}+y(x)=0$$

✓ **Mathematica** : cpu = 9.52374 (sec), leaf count = 60

$$\text{Solve}\left[\left\{x=\frac{c_1}{(\text{K\$3193905}+1)^2}+\frac{-\sqrt{\text{K\$3193905}^2+1}-\sinh^{-1}(\text{K\$3193905})}{(\text{K\$3193905}+1)^2},y(x)=\text{K\$3193905}^2(-x)-\right.\right.$$

✓ **Maple** : cpu = 0.231 (sec), leaf count = 581

$$\left\{x^2\_C1\left(\sqrt{-4\,xy\,(x)+2+2\,\sqrt{4\,x^2-4\,xy\,(x)+1}}-2\,x\right)^{-2}+x+2\,\frac{x^2}{\left(\sqrt{-4\,xy\,(x)+2+2\,\sqrt{4\,x^2-4\,x}}\right.}\right.$$

ODE No. 557

$$x\left(y'(x)+\sqrt{y'(x)^2+1}\right)-y(x)=0$$

✓ **Mathematica** : cpu = 0.0700445 (sec), leaf count = 39

$$\left\{\left\{y(x)\to-\sqrt{c_1x-x^2}\right\},\left\{y(x)\to\sqrt{c_1x-x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.129 (sec), leaf count = 74

$$\left\{2\,xy(x)\_C1\frac{1}{\sqrt{\frac{\left((y(x))^2+x^2\right)^2}{x^2(y(x))^2}}}\left(\sqrt{\frac{x^4+2\,x^2\,(y\,(x))^2+(y\,(x))^4}{x^2\,(y\,(x))^2}}xy(x)+(y(x))^2-x^2\right)^{-1}+x=0\right\}$$

ODE No. 558

$$ax\sqrt{y'(x)^2+1}+xy'(x)-y(x)=0$$

✓ **Mathematica** : cpu = 1.40118 (sec), leaf count = 395

$$\left\{\text{Solve}\left[\frac{a\left(-\log\left(\frac{(a^2-1)\left(a\sqrt{a^2-\frac{y(x)^2}{x^2}-1}+a^2-\frac{iy(x)}{x}-1\right)}{a^3\left(\frac{y(x)}{x}-i\right)}\right)+\log\left(-\frac{(a^2-1)\left(a\sqrt{a^2-\frac{y(x)^2}{x^2}-1}+a^2+\frac{iy(x)}{x}-1\right)}{a^3\left(\frac{y(x)}{x}+i\right)}\right)+\log\left(\frac{y}{}\right.\right.}{2\left(a^2-1\right)}\right.\right.$$

✓ **Maple** : cpu = 0.176 (sec), leaf count = 223

$$\left\{x-\_C1\,\mathrm{e}^{\frac{1}{a}\mathit{Arcsinh}\left(\frac{1}{(a^2-1)x}\left(\sqrt{-a^2x^2+x^2+(y(x))^2}a+y(x)\right)\right)}\frac{1}{\sqrt{\frac{1}{(a^2-1)^2x^2}\left(-a^2x^2+a^2\left(y\left(x\right)\right)^2+2\sqrt{-a^2x^2+x^2+\right.}}}\right.$$

ODE No. 559

$$-ay(x)y'(x)-ax+y(x)\sqrt{y'(x)^2+1}=0$$

✓ **Mathematica** : cpu = 0.45179 (sec), leaf count = 212

$$\left\{\left\{y(x)\to-\frac{\sqrt{a^6\left(-x^2\right)+3a^4x^2+2a^2xe^{a^2c_1-c_1}-2xe^{a^2c_1-c_1}+e^{2a^2c_1-2c_1}-3a^2x^2+x^2}}{\sqrt{a^6-3a^4+3a^2-1}}\right\},\left\{y(x)\to\frac{\sqrt{a^6}}{}\right.\right.$$

✓ **Maple** : cpu = 0.301 (sec), leaf count = 215

$$\left\{-\mathrm{e}^{\int\frac{1}{\left(a^2-1\right)y(x)}\left(-a^2x-\sqrt{\left(a^2-1\right)(y(x))^2+a^2x^2}\right)a\left(a\sqrt{\_a^2+1}-\_a\right)\frac{1}{\sqrt{\_a^2+1}}\left(\_a\,a-\sqrt{\_a^2+1}\right)^{-1}\left(\_a^2a-\sqrt{\_a^2+1}\_a+a\right)^{-1}d\_a}\_C1+\right.$$

ODE No. 560

$$ay(x)\sqrt{y'(x)^2+1}-x^2-2xy(x)y'(x)+y(x)^2=0$$

✓ **Mathematica** : cpu = 25.4659 (sec), leaf count = 110

$$\left\{\left\{y(x)\to-\frac{\sqrt{a^2c_1^2\left(-x^2\right)-4a^2c_1x-4a^2+4x^2}}{\sqrt{a^2c_1^2-4}}\right\},\left\{y(x)\to\frac{\sqrt{a^2c_1^2\left(-x^2\right)-4a^2c_1x-4a^2+4x^2}}{\sqrt{a^2c_1^2-4}}\right\}\right\}$$

✓ **Maple** : cpu = 1.006 (sec), leaf count = 1120

$$\left\{\int_{\_b}^{x}1\left(2\_a^3-2\left(y(x)\right)^2\_a+\sqrt{a^2\left(\_a^4+2\_a^2\left(y\left(x\right)\right)^2-a^2\left(y\left(x\right)\right)^2+\left(y\left(x\right)\right)^4\right)}\right)\left(-2\,a^2\_a\left(y(x)\right)^2+\right.\right.$$

ODE No. 561

$$f\left(x^2+y(x)^2\right)\sqrt{y'(x)^2+1}-xy'(x)+y(x)=0$$

✗ **Mathematica** : cpu = 3599.99 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 1.748 (sec), leaf count = 50

$$\left\{y(x)=x\left(\tan\left(RootOf\left(-2\_Z+\int^{\frac{x^2\left((\tan(\_Z))^2+1\right)}{(\tan(\_Z))^2}}\frac{f(\_a)}{\_a}\frac{1}{\sqrt{-\left(f\left(\_a\right)\right)^2+\_a}}d\_a+2\_C1\right)\right)\right)^{-1}\right\}$$

ODE No. 562

$$a\sqrt[3]{y'(x)^3+1}+bxy'(x)-y(x)=0$$

✓ **Mathematica** : cpu = 472.437 (sec), leaf count = 119

$$\text{Solve}\left[\left\{x=\frac{a(b-1)\text{K\$3585817}^3(\text{K\$3585817}-b\text{K\$3585817})^{\frac{b}{1-b}+\frac{1}{b-1}}\,{}_2F_1\left(\frac{2}{3},\frac{2-3b}{3-3b};\frac{5-6b}{3-3b};-\text{K\$3585817}^3\right)}{3b-2}+\right.\right.$$

✓ **Maple** : cpu = 0.167 (sec), leaf count = 3306

$$\left\{\left(\left(-\int^{\frac{1}{2b^3x^3+2a^3}}\left(2b^2x^2y(x)\sqrt[3]{-4b^6x^6-8a^3b^3x^3-4b^3x^3(y(x))^3+4\sqrt{b^6x^6+2a^3b^3x^3+2b^3x^3(y(x))^3+a^6-2(y(x))^3a^3+(y(x))^6}b^3x^3-4a^6\right.\right.\right.\right.$$

ODE No. 563

$$ay(x)+b+xy'(x)+\log(y'(x))=0$$

✓ **Mathematica** : cpu = 0.162182 (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 = 0.189 (sec), leaf count = 66

$$\left\{-\left(e^{-ay(x)-lambertW\left(xe^{-ay(x)-b}\right)-b}\right)^{-(a+1)^{-1}}\_C1+x-\frac{e^{ay(x)+lambertW\left(xe^{-ay(x)-b}\right)+b}}{a}=0\right\}$$

ODE No. 564

$$a(xy'(x)-y(x))+\log(y'(x))=0$$

✓ **Mathematica** : cpu = 0.0426596 (sec), leaf count = 28

$$\left\{\left\{y(x)\to-\frac{e^{-c_1}\left(e^{c_1}c_1-ax\right)}{a}\right\}\right\}$$

✓ **Maple** : cpu = 0.029 (sec), leaf count = 32

$$\left\{y(x)=\frac{1}{a}\left(\ln\left(-\frac{1}{ax}\right)-1\right),y(x)=x\_C1+\frac{\ln(\_C1)}{a}\right\}$$

ODE No. 565

$$y'(x) + y(x)\log(y'(x)) - xy(x) - y(x)\log(y(x)) = 0$$

✓ **Mathematica** : cpu = 0.0117793 (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 = 0.168 (sec), leaf count = 17

$$\left\{y(x) = \_C1\, e^{\frac{lambertW(e^x)(lambertW(e^x)+2)}{2}}\right\}$$

ODE No. 566

$$y'(x) + \sin(y'(x)) - x = 0$$

✗ **Mathematica** : cpu = 0.0213973 (sec), leaf count = 0 , could not solve

```
DSolve[-x + Sin[Derivative[1][y][x]] + Derivative[1][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 0.034 (sec), leaf count = 16

$$\left\{y(x) = \int RootOf(\sin(\_Z) + \_Z - x)\, dx + \_C1\right\}$$

ODE No. 567

$$a\cos(y'(x)) + by'(x) + x = 0$$

✗ **Mathematica** : cpu = 0.0122231 (sec), leaf count = 0 , could not solve

```
DSolve[x + a*Cos[Derivative[1][y][x]] + b*Derivative[1][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 0.04 (sec), leaf count = 18

$$\left\{y(x) = \int RootOf(a\cos(\_Z) + b\_Z + x)\, dx + \_C1\right\}$$

ODE No. 568

$$y'(x)^2 \sin(y'(x)) - y(x) = 0$$

✓ **Mathematica** : cpu = 0.0559306 (sec), leaf count = 28

$$\text{Solve}\left[\left\{x = c_1 + \text{K\$3587056} \sin(\text{K\$3587056}) - \cos(\text{K\$3587056}), y(x) = \text{K\$3587056}^2 \sin(\text{K\$3587056})\right\}, \{y$$

✓ **Maple** : cpu = 0.068 (sec), leaf count = 32

$$\left\{x - \int^{y(x)} \left(\mathit{RootOf}\left(\sin(\_Z)\_Z^2 - \_a\right)\right)^{-1} d\_a - \_\mathit{C1} = 0, y(x) = 0\right\}$$

ODE No. 569

$$\left(y'(x)^2 + 1\right) \sin^2(y(x) - xy'(x)) - 1 = 0$$

✓ **Mathematica** : cpu = 0.0414463 (sec), leaf count = 59

$$\left\{\left\{y(x) \to c_1 x - \frac{1}{2} \cos^{-1}\left(\frac{c_1^2 - 1}{c_1^2 + 1}\right)\right\}, \left\{y(x) \to c_1 x + \frac{1}{2} \cos^{-1}\left(\frac{c_1^2 - 1}{c_1^2 + 1}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.584 (sec), leaf count = 147

$$\left\{y(x) = x\_\mathit{C1} - \arcsin\left(\frac{1}{\sqrt{\_\mathit{C1}^2 + 1}}\right), y(x) = x\_\mathit{C1} + \arcsin\left(\frac{1}{\sqrt{\_\mathit{C1}^2 + 1}}\right), y(x) = -x\sqrt{x^{-1}}\sqrt{1 -$$

ODE No. 570

$$\left(y'(x)^2 + 1\right)\left(ax + \tan^{-1}(y'(x))\right) + y'(x) = 0$$

✗ **Mathematica** : cpu = 0.112349 (sec), leaf count = 0 , could not solve

```
DSolve[Derivative[1][y][x] + (a*x + ArcTan[Derivative[1][y][x]])*(1 + Derivative[1][y
```

✓ **Maple** : cpu = 0.062 (sec), leaf count = 30

$$\left\{y(x) = \int \tan\left(\mathit{RootOf}\left(ax(\tan(\_Z))^2 + (\tan(\_Z))^2\_Z + ax + \tan(\_Z) + \_Z\right)\right) dx + \_\mathit{C1}\right\}$$

ODE No. 571

$$ax^n f(y'(x)) + xy'(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 0.111471 (sec), leaf count = 114

$$\text{Solve}\left[\left\{y(x) = af(\text{K\$3587414})x^n + \text{K\$3587414}x, x = \left(nf(\text{K\$3587414})^{\frac{1}{n}-1}\left(\int_1^{\text{K\$3587414}} -\frac{f(K[1])^{\frac{n-1}{n}-1}}{an}\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.279 (sec), leaf count = 169

$$\left\{\left[y(\_T) = a\left(\left(\frac{1}{af(\_T)n}\left((1-n)\int (f(\_T))^{-n^{-1}}\, d\_T + \_C1\, an\right)\right)^{(n-1)^{-1}} (f(\_T))^{\frac{1}{n(n-1)}}\right)^n f(\_T)\right.\right.$$

ODE No. 572

$$f(y'(x))\,(xy'(x) - y(x))^n + y(x)g(y'(x)) + xh(y'(x)) = 0$$

✗ **Mathematica** : cpu = 0.0311008 (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))=
```

ODE No. 573

$$f\left(xy'(x)^2\right) + 2xy'(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 0.0210873 (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 = 0.171 (sec), leaf count = 16

$$\left\{y(x) = f\left(\frac{\_C1^2}{4}\right) + \_C1\,\sqrt{x}\right\}$$

ODE No. 574

$$f\left(x-\frac{3}{2}y'(x)^2\right)+y'(x)^3-y(x)=0$$

✓ **Mathematica** : cpu = 0.0150463 (sec), leaf count = 102

$$\left\{\left\{y(x)\to\frac{1}{9}\left(9f(c_1)+2\sqrt{6}x\sqrt{x-c_1}-2\sqrt{6}c_1\sqrt{x-c_1}\right),y(x)\to\frac{1}{9}\left(9f(c_1)-2\sqrt{6}x\sqrt{x-c_1}+2\sqrt{6}c_1\sqrt{x\right.\right.$$

✓ **Maple** : cpu = 0.148 (sec), leaf count = 41

$$\left\{y(x)=f(\_C1)-\frac{2\sqrt{6}}{9}\sqrt{(-\_C1+x)^3},y(x)=f(\_C1)+\frac{2\sqrt{6}}{9}\sqrt{(-\_C1+x)^3}\right\}$$

ODE No. 575

$$y'(x)f\left(xy(x)y'(x)-y(x)^2\right)+x^2(-y'(x))+xy(x)=0$$

✗ **Mathematica** : cpu = 0.0267708 (sec), leaf count = 0 , could not solve

```
DSolve[x*y[x] - x^2*Derivative[1][y][x] + f[-y[x]^2 + x*y[x]*Derivative[1][y][x]]*Deri
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(y(x),x)*f(x*y(x)*diff(y(x),x)-y(x)^2)-x^2*diff(y(x),x)+x*y(x)=0,y(x))
```

ODE No. 576

$$\phi(f(x,y(x),y'(x)),g(x,y(x),y'(x)))=0$$

✗ **Mathematica** : cpu = 0.00712796 (sec), leaf count = 0 , could not solve

```
DSolve[phi[f[x, y[x], Derivative[1][y][x]], g[x, y[x], Derivative[1][y][x]]] == 0, y[x
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(phi(f(x,y(x),diff(y(x),x)),g(x,y(x),diff(y(x),x)))=0,y(x))
```

ODE No. 577

$$y'(x) = F\left(\frac{y(x)}{a+x}\right)$$

✓ **Mathematica** : cpu = 15.4464 (sec), leaf count = 240

$$\text{Solve}\left[\int_1^{y(x)}\left(\frac{1}{-aF\left(\frac{K[2]}{a+x}\right)-xF\left(\frac{K[2]}{a+x}\right)+K[2]}-\int_1^x\left(\frac{F'\left(\frac{K[2]}{K[1]+a}\right)}{(K[1]+a)\left(aF\left(\frac{K[2]}{K[1]+a}\right)+K[1]F\left(\frac{K[2]}{K[1]+a}\right)-K\right.}\right.\right.\right.$$

✓ **Maple** : cpu = 0.036 (sec), leaf count = 28

$$\left\{y(x) = -RootOf\left(\int^{\_Z}(F(-\_a)+\_a)^{-1}\,d\_a+\ln(x+a)+\_C1\right)(x+a)\right\}$$

ODE No. 578

$$y'(x) = F\left(y(x)-x^2\right)+2x$$

✓ **Mathematica** : cpu = 20.0676 (sec), leaf count = 97

$$\text{Solve}\left[\int_1^{y(x)} -\frac{F(K[2]-x^2)\int_1^x -\frac{2K[1]F'(K[2]-K[1]^2)}{F(K[2]-K[1]^2)^2}\,dK[1]+1}{F\left(K[2]-x^2\right)}\,dK[2]+\int_1^x\left(\frac{2K[1]}{F\left(y(x)-K[1]^2\right)}+1\right)dK[1\right.$$

✓ **Maple** : cpu = 0.051 (sec), leaf count = 22

$$\left\{y(x) = x^2+RootOf\left(-x+\int^{\_Z}(F(\_a))^{-1}\,d\_a+\_C1\right)\right\}$$

ODE No. 579

$$y'(x)=F\left(\frac{ax^2}{4}+\frac{bx}{2}+y(x)\right)-\frac{ax}{2}$$

✓ **Mathematica** : cpu = 16.4478 (sec), leaf count = 510

$$\text{Solve}\left[\int_1^{y(x)} -\frac{2F\left(K[2]+\frac{ax^2}{4}+\frac{bx}{2}\right)\int_1^x\left(\frac{2aK[1]F'\left(\frac{1}{4}aK[1]^2+\frac{1}{2}bK[1]+K[2]\right)}{\left(2F\left(\frac{1}{4}aK[1]^2+\frac{1}{2}bK[1]+K[2]\right)+b\right)^2}+\frac{2F'\left(\frac{1}{4}aK[1]^2+\frac{1}{2}bK[1]+K[2]\right)}{2F\left(\frac{1}{4}aK[1]^2+\frac{1}{2}bK[1]+K[2]\right)+b}-\frac{4F\left(\frac{1}{4}aK[\right.}{}\right.}{}\right.$$

✓ **Maple** : cpu = 0.057 (sec), leaf count = 35

$$\left\{y(x)=-\frac{ax^2}{4}-\frac{bx}{2}+RootOf\left(-x+2\int^{\_Z}(2F(\_a)+b)^{-1}d\_a+\_C1\right)\right\}$$

ODE No. 580

$$y'(x)=e^{bx}F\left(e^{-bx}y(x)\right)$$

✓ **Mathematica** : cpu = 33.2383 (sec), leaf count = 200

$$\text{Solve}\left[\int_1^{y(x)}\left(\frac{1}{bK[2]-e^{bx}F\left(e^{-bx}K[2]\right)}-\int_1^x\left(\frac{F'\left(K[2]e^{-bK[1]}\right)}{e^{bK[1]}F\left(K[2]e^{-bK[1]}\right)-bK[2]}-\frac{e^{bK[1]}F\left(K[2]e^{-bK[1]}\right)\left(F'\right.}{\left(e^{bK[1]}F\left(K[2]e^{-bK\right.\right.}\right.\right.\right.$$

✓ **Maple** : cpu = 0.072 (sec), leaf count = 31

$$\left\{y(x)=\frac{RootOf\left(-x+\int^{\_Z}(F(\_a)-\_a\,b)^{-1}d\_a+\_C1\right)}{e^{-bx}}\right\}$$

ODE No. 581

$$y'(x) = \frac{xF\left(\frac{x^2y(x)+\frac{1}{4}}{x^2}\right)+\frac{1}{2}}{x^3}$$

✓ **Mathematica** : cpu = 48.2061 (sec), leaf count = 141

$$\text{Solve}\left[\int_1^{y(x)} -\frac{F\left(\frac{x^2K[2]+\frac{1}{4}}{x^2}\right)\int_1^x -\frac{F'\left(\frac{K[2]K[1]^2+\frac{1}{4}}{K[1]^2}\right)}{2K[1]^3F\left(\frac{K[2]K[1]^2+\frac{1}{4}}{K[1]^2}\right)^2}dK[1]+1}{F\left(\frac{x^2K[2]+\frac{1}{4}}{x^2}\right)}dK[2]+\int_1^x\left(\frac{1}{2K[1]^3F\left(\frac{y(x)K[1]^2+\frac{1}{4}}{K[1]^2}\right)}+\right.\right.$$

✓ **Maple** : cpu = 0.103 (sec), leaf count = 32

$$\left\{y(x) = \frac{4\,RootOf\left(\int^{-Z}(F(\_a))^{-1}\,d\_a x + x\_C1 + 1\right)x^2 - 1}{4\,x^2}\right\}$$

ODE No. 582

$$y'(x) = \frac{ax^2F\left(\frac{axy(x)+1}{ax}\right)+1}{ax^2}$$

✓ **Mathematica** : cpu = 20.5709 (sec), leaf count = 139

$$\text{Solve}\left[\int_1^{y(x)} -\frac{F\left(\frac{axK[2]+1}{ax}\right)\int_1^x \frac{F'\left(\frac{aK[1]K[2]+1}{aK[1]}\right)}{aK[1]^2F\left(\frac{aK[1]K[2]+1}{aK[1]}\right)^2}dK[1]-1}{F\left(\frac{axK[2]+1}{ax}\right)}dK[2]+\int_1^x\left(-\frac{1}{aK[1]^2F\left(\frac{ay(x)K[1]+1}{aK[1]}\right)}-1\right)\right.$$

✓ **Maple** : cpu = 0.226 (sec), leaf count = 30

$$\left\{y(x) = \frac{RootOf\left(-x+\int^{-Z}(F(\_a))^{-1}\,d\_a+\_C1\right)xa-1}{ax}\right\}$$

ODE No. 583

$$y'(x) = -\frac{1}{2}x\left(ax^2 - 2F\left(\frac{ax^4}{8} + y(x)\right)\right)$$

✓ **Mathematica** : cpu = 50.3817 (sec), leaf count = 123

$$\text{Solve}\left[\int_1^{y(x)} -\frac{F\left(K[2]+\frac{ax^4}{8}\right)\int_1^x \frac{aK[1]^3F'\left(\frac{1}{8}aK[1]^4+K[2]\right)}{2F\left(\frac{1}{8}aK[1]^4+K[2]\right)^2}\,dK[1]+1}{F\left(K[2]+\frac{ax^4}{8}\right)}\,dK[2] + \int_1^x \left(K[1] - \frac{aK[1]^3}{2F\left(\frac{1}{8}aK[1]^4+y(x)\right)}\right.\right.$$

✓ **Maple** : cpu = 0.147 (sec), leaf count = 31

$$\left\{y(x) = -\frac{ax^4}{8} + \mathit{RootOf}\left(-x^2 + 2\int^{\_Z}(F(\_a))^{-1}\,d\_a + 2\_C1\right)\right\}$$

ODE No. 584

$$y'(x) = \frac{2a}{2aF\left(y(x)^2 - 4ax\right) + y(x)}$$

✓ **Mathematica** : cpu = 23.8658 (sec), leaf count = 112

$$\text{Solve}\left[\int_1^{y(x)}\left(\frac{K[2]}{4a^2F\left(K[2]^2-4ax\right)} - \frac{2a\int_1^x \frac{K[2]F'\left(K[2]^2-4aK[1]\right)}{aF\left(K[2]^2-4aK[1]\right)^2}\,dK[1]-1}{2a}\right)dK[2] + \int_1^x -\frac{1}{2aF\left(y(x)^2-4\right.}\right.$$

✓ **Maple** : cpu = 0.078 (sec), leaf count = 35

$$\left\{\frac{y(x)}{2\,a} + \frac{\int^{(y(x))^2-4\,ax}(F(\_a))^{-1}\,d\_a}{8\,a^2} - \_C1 = 0\right\}$$

ODE No. 585

$$y'(x) = y(x)F(\log(\log(y(x))) - \log(x))$$

✓ **Mathematica** : cpu = 154.21 (sec), leaf count = 202

$$\text{Solve}\left[\int_1^{y(x)} \left(\frac{1}{K[2](xF(\log(\log(K[2])) - \log(x)) - \log(K[2]))} - \int_1^x \left(\frac{F(\log(\log(K[2])) - \log(K[1]))\left(\right.}{(K[1]F(\log(\log(K[2])) -}\right.\right.\right.$$

✓ **Maple** : cpu = 0.594 (sec), leaf count = 120

$$\left\{\int_{\_b}^x \frac{F(\ln(\ln(y(x))) - \ln(\_a))}{-\_a\, F(\ln(\ln(y(x))) - \ln(\_a)) + \ln(y(x))}\, \mathrm{d}\_a + \int^{y(x)} -\frac{1}{\_f\,(-xF(\ln(\ln(\_f)) - \ln(x)) + \ln(\_\right.$$

ODE No. 586

$$y'(x) = \frac{xF\left(\frac{y(x)}{\sqrt{x^2+1}}\right)}{\sqrt{x^2+1}}$$

✓ **Mathematica** : cpu = 193.222 (sec), leaf count = 972

$$\text{Solve}\left[\int_1^{y(x)} \left(-\frac{\sqrt{x^2+1}F\left(\frac{K[2]}{\sqrt{x^2+1}}\right)}{-x^2F\left(\frac{K[2]}{\sqrt{x^2+1}}\right)^2 - F\left(\frac{K[2]}{\sqrt{x^2+1}}\right)^2 + K[2]^2} - \int_1^x \left(\frac{K[1]\sqrt{K[1]^2+1}\left(\frac{2F\left(\frac{K[2]}{\sqrt{K[1]^2+1}}\right)F'\left(\frac{K[2]}{\sqrt{K[1]^2}}\right.}{\sqrt{K[1]^2+1}}\right.}{K[2]\left(K[1]^2F\left(\right.\right.}\right.\right.\right.$$

✓ **Maple** : cpu = 0.274 (sec), leaf count = 39

$$\left\{y(x) = RootOf\left(-\ln\left(x^2+1\right) + 2\int^{\_Z} (F(\_a) - \_a)^{-1}\, d\_a + 2\_C1\right)\sqrt{x^2+1}\right\}$$

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 = 260.988 (sec), leaf count = 120

$$\text{Solve}\left[\int_1^{y(x)} -\frac{F\left(K[2] - \frac{x^3}{6}\right)\int_1^x -\frac{K[1]^2 F'\left(K[2]-\frac{K[1]^3}{6}\right)}{2F\left(K[2]-\frac{K[1]^3}{6}\right)^2} dK[1] + 1}{F\left(K[2] - \frac{x^3}{6}\right)} dK[2] + \int_1^x \left(\frac{K[1]^2}{2F\left(y(x) - \frac{K[1]^3}{6}\right)} + \sqrt{K[\right.\right.$$

✓ **Maple** : cpu = 0.14 (sec), leaf count = 29

$$\left\{\int_{\_b}^{y(x)} \left(F\left(\_a - \frac{x^3}{6}\right)\right)^{-1} \mathrm{d}\_a - \frac{2}{3}x^{\frac{3}{2}} - \_C1 = 0\right\}$$

ODE No. 588

$$y'(x) = \frac{F(-(x - y(x))(y(x) + x)) + x}{y(x)}$$

✓ **Mathematica** : cpu = 41.9862 (sec), leaf count = 110

$$\text{Solve}\left[\int_1^{y(x)} \left(-\int_1^x -\frac{2K[1]K[2]F'(-(K[1] - K[2])(K[1] + K[2]))}{F(-(K[1] - K[2])(K[1] + K[2]))^2} dK[1] - \frac{K[2]}{F(-(x - K[2])(K[2] + x))}\right.\right.$$

✓ **Maple** : cpu = 0.135 (sec), leaf count = 53

$$\left\{y(x) = \sqrt{x^2 + RootOf\left(-2x + \int^{\_Z} (F(\_a))^{-1} d\_a + 2\_C1\right)}, y(x) = -\sqrt{x^2 + RootOf\left(-2x + \int^{-}\right.}\right.$$

ODE No. 589

$$y'(x) = \frac{y(x)^2 F\left(\frac{1-y(x)\log(x)}{y(x)}\right)}{x}$$

✓ **Mathematica** : cpu = 25.5005 (sec), leaf count = 242

$$\text{Solve}\left[\int_1^{y(x)}\left(\frac{1}{K[2]^2\left(-F\left(\frac{1-\log(x)K[2]}{K[2]}\right)-1\right)} - \int_1^x\left(\frac{\left(-\frac{\log(K[1])}{K[2]}-\frac{1-K[2]\log(K[1])}{K[2]^2}\right)F'\left(\frac{1-K[2]\log(K[1])}{K[2]}\right)}{K[1]\left(F\left(\frac{1-K[2]\log(K[1])}{K[2]}\right)+1\right)} - \right.\right.$$

✓ **Maple** : cpu = 0.159 (sec), leaf count = 38

$$\left\{\int_{\_b}^{y(x)}\frac{1}{\_a^2}\left(F\left(\frac{1-\_a\ln(x)}{\_a}\right)+1\right)^{-1}\mathrm{d}\_a-\ln(x)-\_C1=0\right\}$$

ODE No. 590

$$y'(x) = \frac{x}{F(x^2+y(x)^2)-y(x)}$$

✓ **Mathematica** : cpu = 38.5338 (sec), leaf count = 91

$$\text{Solve}\left[\int_1^{y(x)}\left(-\int_1^x\frac{2K[1]K[2]F'(K[1]^2+K[2]^2)}{F(K[1]^2+K[2]^2)^2}\,dK[1]-\frac{K[2]}{F(K[2]^2+x^2)}+1\right)dK[2]+\int_1^x-\frac{K[}{F(K[1]^2}\right.$$

✓ **Maple** : cpu = 0.148 (sec), leaf count = 28

$$\left\{-y(x)+\frac{\int^{(y(x))^2+x^2}(F(\_a))^{-1}\,d\_a}{2}-\_C1=0\right\}$$

ODE No. 591

$$y'(x) = \frac{xF\left(\frac{ay(x)^2+bx^2}{a}\right)}{\sqrt{a}y(x)}$$

✓ **Mathematica** : cpu = 25.3988 (sec), leaf count = 250

$$\text{Solve}\left[\int_1^{y(x)}\left(-\int_1^x\left(\frac{2bK[1]K[2]F'\left(\frac{aK[2]^2+bK[1]^2}{a}\right)}{\sqrt{a}\left(\sqrt{a}F\left(\frac{aK[2]^2+bK[1]^2}{a}\right)+b\right)}-\frac{2bK[1]K[2]F\left(\frac{aK[2]^2+bK[1]^2}{a}\right)F'\left(\frac{aK[2]^2+bK[1]^2}{a}\right)}{\left(\sqrt{a}F\left(\frac{aK[2]^2+bK[1]^2}{a}\right)+b\right)^2}\right)\right.\right.$$

✓ **Maple** : cpu = 0.21 (sec), leaf count = 108

$$\left\{y(x)=\frac{1}{a}\sqrt{a\left(-bx^2+RootOf\left(\int^{\_Z}\left(F(\_a)\,a+b\sqrt{a}\right)^{-1}d\_aba^{\frac{3}{2}}-bx^2+2\_C1\;a\right)a\right)},y(x)=-\frac{1}{a}\sqrt{\right.$$

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 = 463.993 (sec), leaf count = 238

$$\text{Solve}\left[\int_1^{y(x)}-\frac{F\left(K[2]-\frac{2x^3}{5}-2\sqrt{x}\right)\int_1^x\left(-\frac{6K[1]^2F'\left(-\frac{2}{5}K[1]^3-2\sqrt{K[1]}+K[2]\right)}{5F\left(-\frac{2}{5}K[1]^3-2\sqrt{K[1]}+K[2]\right)^2}-\frac{F'\left(-\frac{2}{5}K[1]^3-2\sqrt{K[1]}+K[2]\right)}{\sqrt{K[1]}F\left(-\frac{2}{5}K[1]^3-2\sqrt{K[1]}+K[2]\right)^2}\right)}{F\left(K[2]-\frac{2x^3}{5}-2\sqrt{x}\right)}\right.$$

✓ **Maple** : cpu = 0.199 (sec), leaf count = 33

$$\left\{\int_{\_b}^{y(x)}\left(F\left(\_a-\frac{2\,x^3}{5}-2\,\sqrt{x}\right)\right)^{-1}d\_a-\ln(x)-\_C1=0\right\}$$

ODE No. 593

$$y'(x) = \frac{e^x F\left(y(x)^{3/2} - \frac{3e^x}{2}\right)}{\sqrt{y(x)}}$$

✓ **Mathematica** : cpu = 35.2127 (sec), leaf count = 218

$$\text{Solve}\left[\int_1^{y(x)} \left(\frac{\sqrt{K[2]}}{F\left(K[2]^{3/2} - \frac{3e^x}{2}\right) - 1} - \int_1^x \left(\frac{3e^{K[1]}\sqrt{K[2]}F\left(K[2]^{3/2} - \frac{3e^{K[1]}}{2}\right)F'\left(K[2]^{3/2} - \frac{3e^{K[1]}}{2}\right)}{2\left(F\left(K[2]^{3/2} - \frac{3e^{K[1]}}{2}\right) - 1\right)^2} - \frac{3e\right.\right.\right.$$

✓ **Maple** : cpu = 0.358 (sec), leaf count = 35

$$\left\{\int_{\_b}^{y(x)} 1\sqrt{\_a}\left(F\left(\_a^{\frac{3}{2}} - \frac{3\,\mathrm{e}^x}{2}\right) - 1\right)^{-1} \mathrm{d}\_a - \mathrm{e}^x - \_C1 = 0\right\}$$

ODE No. 594

$$y'(x) = \frac{xF\left(\frac{y(x)^2 - b}{x^2}\right)}{y(x)}$$

✓ **Mathematica** : cpu = 23.2946 (sec), leaf count = 233

$$\text{Solve}\left[\int_1^{y(x)} \left(-\int_1^x \left(\frac{K[1]F\left(\frac{K[2]^2-b}{K[1]^2}\right)\left(2K[2]F'\left(\frac{K[2]^2-b}{K[1]^2}\right) - 2K[2]\right)}{\left(K[1]^2F\left(\frac{K[2]^2-b}{K[1]^2}\right) - K[2]^2 + b\right)^2} - \frac{2K[2]F'\left(\frac{K[2]^2-b}{K[1]^2}\right)}{K[1]\left(K[1]^2F\left(\frac{K[2]^2-b}{K[1]^2}\right) - K[2]^2\right.}\right.\right.\right.$$

✓ **Maple** : cpu = 0.163 (sec), leaf count = 67

$$\left\{y(x) = \sqrt{RootOf\left(-2\ln(x) + \int^{\_Z} (F(\_a) - \_a)^{-1} d\_a + 2\_C1\right)x^2 + b}, y(x) = -\sqrt{RootOf\left(-2\right.}\right.$$

ODE No. 595

$$y'(x) = \frac{F\left(\frac{xy(x)^2+1}{x}\right)}{x^2y(x)}$$

✓ **Mathematica** : cpu = 24.2109 (sec), leaf count = 201

$$\text{Solve}\left[\int_1^{y(x)}\left(\frac{K[2]}{2F\left(\frac{xK[2]^2+1}{x}\right)-1}-\int_1^x\left(\frac{4K[2]F\left(\frac{K[1]K[2]^2+1}{K[1]}\right)F'\left(\frac{K[1]K[2]^2+1}{K[1]}\right)}{K[1]^2\left(2F\left(\frac{K[1]K[2]^2+1}{K[1]}\right)-1\right)^2}-\frac{2K[2]F'\left(\frac{K[1]K[2]^2+}{K[1]}\right.}{K[1]^2\left(2F\left(\frac{K[1]K[2]^2+1}{K[1]}\right.\right.}\right.\right.\right.$$

✓ **Maple** : cpu = 0.149 (sec), leaf count = 72

$$\left\{y(x) = \frac{1}{x}\sqrt{x\left(RootOf\left(\int^{\_Z}(-1+2F(\_a))^{-1}d\_ax+x\_C1+1\right)x-1\right)}, y(x) = -\frac{1}{x}\sqrt{x\left(RootOf\right.}\right.$$

ODE No. 596

$$y'(x) = \frac{F(x^2+y(x)-x)-2x^2+x}{x}$$

✓ **Mathematica** : cpu = 240.482 (sec), leaf count = 153

$$\text{Solve}\left[\int_1^{y(x)}-\frac{F(K[2]+x^2-x)\int_1^x\left(\frac{2K[1]F'(K[1]^2-K[1]+K[2])}{F(K[1]^2-K[1]+K[2])^2}-\frac{F'(K[1]^2-K[1]+K[2])}{F(K[1]^2-K[1]+K[2])^2}\right)dK[1]+1}{F(K[2]+x^2-x)}dK[2]+\int_1^x\right.$$

✓ **Maple** : cpu = 0.101 (sec), leaf count = 26

$$\left\{y(x) = -x^2+RootOf\left(-\ln(x)+\int^{\_Z}(F(\_a))^{-1}d\_a+\_C1\right)+x\right\}$$

ODE No. 597

$$y'(x) = \frac{2a}{x^2 \left(2aF\left(\frac{xy(x)^2-4a}{x}\right) - y(x)\right)}$$

✓ **Mathematica** : cpu = 32.8748 (sec), leaf count = 127

$$\text{Solve}\left[\int_1^{y(x)} \left(-\int_1^x \frac{2K[2]F'\left(\frac{K[1]K[2]^2-4a}{K[1]}\right)}{K[1]^2 F\left(\frac{K[1]K[2]^2-4a}{K[1]}\right)^2} dK[1] - \frac{K[2]}{2aF\left(\frac{xK[2]^2-4a}{x}\right)} + 1\right) dK[2] + \int_1^x - \frac{1}{K[1]^2 F\left(\frac{y(x)^2}{\right.}\right.$$

✓ **Maple** : cpu = 0.409 (sec), leaf count = 37

$$\left\{ -\frac{y(x)}{2\,a} + \frac{1}{8\,a^2} \int^{(y(x))^2 - 4\,\frac{a}{x}} (F(\_a))^{-1}\, d\_a - \_C1 = 0 \right\}$$

ODE No. 598

$$y'(x) = \frac{F\left(\frac{y(x)}{x}\right) + y(x)}{x-1}$$

✓ **Mathematica** : cpu = 0.0996651 (sec), leaf count = 36

$$\text{Solve}\left[\int_1^{\frac{y(x)}{x}} \frac{1}{F(K[1]) + K[1]} dK[1] = c_1 + \log(1-x) - \log(x), y(x)\right]$$

✓ **Maple** : cpu = 0.025 (sec), leaf count = 29

$$\left\{ y(x) = \mathit{RootOf}\left(-\int^{\_Z} (F(\_a) + \_a)^{-1}\, d\_a - \ln(x) + \ln(x-1) + \_C1 \right) x \right\}$$

ODE No. 599

$$y'(x) = \frac{F(x^2 + y(x)^2) - x}{y(x)}$$

✓ **Mathematica** : cpu = 27.7945 (sec), leaf count = 92

$$\text{Solve}\left[\int_1^{y(x)} \left(-\int_1^x \frac{2K[1]K[2]F'(K[1]^2+K[2]^2)}{F\left(K[1]^2+K[2]^2\right)^2}\, dK[1] - \frac{K[2]}{F\left(K[2]^2+x^2\right)}\right) dK[2] + \int_1^x \left(1 - \frac{K[}{F\left(K[1]^2\right.}\right.\right.$$

✓ **Maple** : cpu = 0.105 (sec), leaf count = 57

$$\left\{ y(x) = \sqrt{-x^2 + RootOf\left(-2\,x + \int^{\_Z} (F(\_a))^{-1}\, d\_a + 2\_C1\right)}, y(x) = -\sqrt{-x^2 + RootOf\left(-2\,x + \right.}\right.$$

ODE No. 600

$$y'(x) = \frac{y(x)^2 F\left(\frac{1-2y(x)\log(x)}{y(x)}\right)}{x}$$

✓ **Mathematica** : cpu = 25.9618 (sec), leaf count = 243

$$\text{Solve}\left[\int_1^{y(x)} \left(-\int_1^x \left(\frac{2\left(-\frac{2\log(K[1])}{K[2]} - \frac{1-2K[2]\log(K[1])}{K[2]^2}\right) F'\left(\frac{1-2K[2]\log(K[1])}{K[2]}\right)}{K[1]\left(F\left(\frac{1-2K[2]\log(K[1])}{K[2]}\right)+2\right)} - \frac{2\left(-\frac{2\log(K[1])}{K[2]} - \frac{1-2K[2]\log(K[\right.}{K[2]^2}}{K[1]\left(F\right.}\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.158 (sec), leaf count = 38

$$\left\{ \int_{\_b}^{y(x)} \frac{1}{\_a^2} \left(F\left(\frac{-2\_a\ln(x)+1}{\_a}\right)+2\right)^{-1} d\_a - \ln(x) - \_C1 = 0 \right\}$$

ODE No. 601

$$y'(x) = \frac{xF(-(x-y(x))(y(x)+x))}{y(x)}$$

✓ **Mathematica** : cpu = 40.5569 (sec), leaf count = 187

$$\text{Solve}\left[\int_1^{y(x)} \left(\frac{K[2]}{F(-(x-K[2])(K[2]+x))-1} - \int_1^x \left(\frac{2K[1]K[2]F(-(K[1]-K[2])(K[1]+K[2]))F'(-(\right.\right.\right.}{(F(-(K[1]-K[2])(K[1]+K[2}$$

✓ **Maple** : cpu = 0.144 (sec), leaf count = 61

$$\left\{y(x) = \sqrt{x^2 + RootOf\left(-x^2 + \int^{\_Z} (F(\_a)-1)^{-1} d\_a + 2\_C1\right)}, y(x) = -\sqrt{x^2 + RootOf\left(-x^2 + \right.}\right.$$

ODE No. 602

$$y'(x) = \frac{y(x)^2 \left(x^2 F\left(\frac{x^2-y(x)}{x^2 y(x)}\right)+2\right)}{x^3}$$

✓ **Mathematica** : cpu = 237.176 (sec), leaf count = 164

$$\text{Solve}\left[\int_1^{y(x)} \left(-\int_1^x -\frac{2\left(-\frac{K[1]^2-K[2]}{K[1]^2K[2]^2} - \frac{1}{K[1]^2K[2]}\right)F'\left(\frac{K[1]^2-K[2]}{K[1]^2K[2]}\right)}{K[1]^3F\left(\frac{K[1]^2-K[2]}{K[1]^2K[2]}\right)^2} dK[1] - \frac{1}{K[2]^2F\left(\frac{x^2-K[2]}{x^2K[2]}\right)}\right) dK[2] + \int\right.$$

✓ **Maple** : cpu = 0.147 (sec), leaf count = 33

$$\left\{y(x) = \frac{x^2}{RootOf\left(-\ln(x) - \int^{\_Z} (F(\_a))^{-1} d\_a + \_C1\right)x^2+1}\right\}$$

ODE No. 603

$$y'(x) = \frac{2xF(y(x) + \log(2x+1)) + F(y(x) + \log(2x+1)) - 2}{2x+1}$$

✓ **Mathematica** : cpu = 20.0878 (sec), leaf count = 114

$$\text{Solve}\left[\int_1^{y(x)} -\frac{F(K[2] + \log(2x+1)) \int_1^x -\frac{2F'(K[2]+\log(2K[1]+1))}{(2K[1]+1)F(K[2]+\log(2K[1]+1))^2} \, dK[1] - 1}{F(K[2] + \log(2x+1))} \, dK[2] + \int_1^x \left(\frac{}{(2K[1]+1}\right.\right.$$

✓ **Maple** : cpu = 0.153 (sec), leaf count = 27

$$\left\{ y(x) = -\ln(2x+1) + \mathit{RootOf}\left(-x + \int^{\_Z} (F(\_a))^{-1} \, d\_a + \_C1\right)\right\}$$

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 = 27.771 (sec), leaf count = 140

$$\text{Solve}\left[\int_1^{y(x)} \left(-\int_1^x \frac{\left(\frac{8K[1]}{K[2]} - \frac{2(4K[1]K[2]^2+1)}{K[2]^3}\right) F'\left(\frac{4K[1]K[2]^2+1}{K[2]^2}\right)}{F\left(\frac{4K[1]K[2]^2+1}{K[2]^2}\right)^2} \, dK[1] + \frac{1}{2K[2]^3 F\left(\frac{4xK[2]^2+1}{K[2]^2}\right)} + \frac{1}{K[2]^2}\right) d\right.$$

✓ **Maple** : cpu = 0.16 (sec), leaf count = 30

$$\left\{ -\_C1 - (y(x))^{-1} - \frac{\int^{4x+(y(x))^{-2}} (F(\_a))^{-1} \, d\_a}{4} = 0 \right\}$$

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 = 202.972 (sec), leaf count = 142

$$\text{Solve}\left[\int_1^{y(x)} \left(-\int_1^x \frac{2\left(-\frac{K[1]}{2K[2]} - \frac{1-\frac{1}{2}K[1]K[2]}{K[2]^2}\right) F'\left(\frac{1-\frac{1}{2}K[1]K[2]}{K[2]}\right)}{F\left(\frac{1-\frac{1}{2}K[1]K[2]}{K[2]}\right)^2} dK[1] - \frac{4}{K[2]^2 F\left(\frac{1-\frac{1}{2}xK[2]}{K[2]}\right)}\right) dK[2] + \int_1^x\right.$$

✓ **Maple** : cpu = 0.141 (sec), leaf count = 29

$$\left\{y(x) = 2\left(2\,RootOf\left(-\ln(x) - 4\int^{\_Z} (F(\_a))^{-1} d\_a + \_C1\right) + x\right)^{-1}\right\}$$

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 = 77.145 (sec), leaf count = 358

$$\text{Solve}\left[\int_1^{y(x)} -\frac{F\left(K[2] - \frac{1}{2}e^{-x^2}x^2\right) \int_1^x \left(\frac{e^{-K[1]^2}K[1]^3 F'\left(K[2]-\frac{1}{2}e^{-K[1]^2}K[1]^2\right)}{F\left(K[2]-\frac{1}{2}e^{-K[1]^2}K[1]^2\right)^2} - \frac{e^{-K[1]^2}K[1]\left(e^{K[1]^2}F\left(K[2]-\frac{1}{2}e^{-K[1]^2}K[1\right.\right.}{F\left(K[2]-\frac{1}{2}e^{-K[1]}\right.}\right.}{F\left(K[2] - \frac{1}{2}e^{-x^2}x^2\right)}\right.$$

✓ **Maple** : cpu = 0.872 (sec), leaf count = 34

$$\left\{y(x) = \frac{x^2 e^{-x^2}}{2} + RootOf\left(x^2 - 2\int^{\_Z} (F(\_a))^{-1} d\_a + 2\_C1\right)\right\}$$

ODE No. 607

$$y'(x) = \frac{x^3 F\left(\frac{y(x)}{x^2}\right) + 2y(x)}{x}$$

✓ **Mathematica** : cpu = 976.721 (sec), leaf count = 118

$$\text{Solve}\left[\int_1^{y(x)} -\frac{x^2 F\left(\frac{K[2]}{x^2}\right)\left(\int_1^x \left(\frac{2}{K[1]^3 F\left(\frac{K[2]}{K[1]^2}\right)} - \frac{2K[2]F'\left(\frac{K[2]}{K[1]^2}\right)}{K[1]^5 F\left(\frac{K[2]}{K[1]^2}\right)^2}\right) dK[1]\right) + 1}{x^2 F\left(\frac{K[2]}{x^2}\right)} dK[2] + \int_1^x \left(\frac{2y(x)}{K[1]^3 F\left(\frac{y(x)}{K[1]^2}\right.}\right.\right.$$

✓ **Maple** : cpu = 0.107 (sec), leaf count = 22

$$\left\{y(x) = \mathit{RootOf}\left(-x + \int^{\_Z} (F(\_a))^{-1} d\_a + \_C1\right) x^2\right\}$$

ODE No. 608

$$y'(x) = \frac{\sqrt{y(x)}}{F\left(\frac{x-y(x)}{\sqrt{y(x)}}\right) + \sqrt{y(x)}}$$

✓ **Mathematica** : cpu = 518.843 (sec), leaf count = 271

$$\text{Solve}\left[\int_1^{y(x)} \left(-\int_1^x -\frac{-2\left(-\frac{K[1]-K[2]}{2K[2]^{3/2}} - \frac{1}{\sqrt{K[2]}}\right)\sqrt{K[2]}F'\left(\frac{K[1]-K[2]}{\sqrt{K[2]}}\right) - \frac{F\left(\frac{K[1]-K[2]}{\sqrt{K[2]}}\right)}{\sqrt{K[2]}} - 1}{\left(-2\sqrt{K[2]}F\left(\frac{K[1]-K[2]}{\sqrt{K[2]}}\right) + K[1] - K[2]\right)^2} dK[1] - \frac{F\left(\frac{x-K[}{\sqrt{K[}}\right.}{x\sqrt{K[}}\right.\right.$$

✓ **Maple** : cpu = 0.195 (sec), leaf count = 40

$$\left\{\frac{\ln(y(x))}{2} - \int^{x\frac{1}{\sqrt{y(x)}} - \sqrt{y(x)}} (2F(\_a) - \_a)^{-1} d\_a - \_C1 = 0\right\}$$

ODE No. 609

$$y'(x) = \frac{F(x^3y(x)) - 3x^2y(x)}{x^3}$$

✓ **Mathematica** : cpu = 61.5717 (sec), leaf count = 114

$$\text{Solve}\left[\int_1^{y(x)} -\frac{F(x^3K[2]) \int_1^x \left(\frac{3K[1]^5K[2]F'(K[1]^3K[2])}{F(K[1]^3K[2])^2} - \frac{3K[1]^2}{F(K[1]^3K[2])}\right) dK[1] + x^3}{F\left(x^3K[2]\right)} dK[2] + \int_1^x \left(1 - \frac{3y(x)K}{F\left(y(x)K\right.}\right.\right.$$

✓ **Maple** : cpu = 0.171 (sec), leaf count = 22

$$\left\{y(x) = \frac{\mathit{RootOf}\left(x - \int^{\_Z} (F(\_a))^{-1}\, d\_a + \_C1\right)}{x^3}\right\}$$

ODE No. 610

$$y'(x) = \frac{x^2F\left(\frac{y(x)}{x}\right) + y(x)}{x}$$

✓ **Mathematica** : cpu = 0.0723586 (sec), leaf count = 24

$$\text{Solve}\left[\int_1^{\frac{y(x)}{x}} \frac{1}{F(K[1])}\, dK[1] = c_1 + x, y(x)\right]$$

✓ **Maple** : cpu = 0.017 (sec), leaf count = 20

$$\left\{y(x) = \mathit{RootOf}\left(x - \int^{\_Z} (F(\_a))^{-1}\, d\_a + \_C1\right) x\right\}$$

ODE No. 611

$$y'(x) = \frac{F(x(y(x)+x)) - y(x) - 2x}{x}$$

✓ **Mathematica** : cpu = 48.1036 (sec), leaf count = 188

$$\text{Solve}\left[\int_1^{y(x)} -\frac{F(x(K[2]+x)) \int_1^x \left(\frac{2K[1]^2 F'(K[1](K[1]+K[2]))}{F(K[1](K[1]+K[2]))^2} + \frac{K[1](K[2]-F(K[1](K[1]+K[2])))F'(K[1](K[1]+K[2]))}{F(K[1](K[1]+K[2]))^2} - \frac{1\text{-}}{}\right.}{F(x(K[2]+x))}\right.$$

✓ **Maple** : cpu = 0.092 (sec), leaf count = 28

$$\left\{ y(x) = \frac{-x^2 + RootOf\left(-x + \int^{\_Z} (F(\_a))^{-1} d\_a + \_C1\right)}{x} \right\}$$

ODE No. 612

$$y'(x) = \frac{1}{2} e^{\frac{x^2}{4}} \left(2F\left(e^{-\frac{x^2}{4}} y(x)\right) + e^{-\frac{x^2}{4}} x y(x)\right)$$

✓ **Mathematica** : cpu = 58.775 (sec), leaf count = 196

$$\text{Solve}\left[\int_1^{y(x)} -\frac{e^{-\frac{x^2}{4}} \left(e^{\frac{x^2}{4}} F\left(e^{-\frac{x^2}{4}} K[2]\right) \int_1^x \left(\frac{e^{-\frac{1}{4}K[1]^2} K[1]}{2F\left(e^{-\frac{1}{4}K[1]^2} K[2]\right)} - \frac{e^{-\frac{1}{2}K[1]^2} K[1] K[2] F'\left(e^{-\frac{1}{4}K[1]^2} K[2]\right)}{2F\left(e^{-\frac{1}{4}K[1]^2} K[2]\right)^2}\right) dK[1] + 1\right)}{F\left(e^{-\frac{x^2}{4}} K[2]\right)}\right.$$

✓ **Maple** : cpu = 0.149 (sec), leaf count = 27

$$\left\{ y(x) = RootOf\left(-x + \int^{\_Z} (F(\_a))^{-1} d\_a + \_C1\right) \left(e^{-\frac{x^2}{4}}\right)^{-1} \right\}$$

ODE No. 613

$$y'(x) = \frac{x^2 F\left(\frac{y(x)-x\log(x)}{x}\right) + y(x) + x}{x}$$

✓ **Mathematica** : cpu = 1501.03 (sec), leaf count = 223

$$\text{Solve}\left[\int_1^{y(x)} -\frac{xF\left(\frac{K[2]-x\log(x)}{x}\right)\int_1^x\left(-\frac{K[2]F'\left(\frac{K[2]-K[1]\log(K[1])}{K[1]}\right)}{K[1]^3F\left(\frac{K[2]-K[1]\log(K[1])}{K[1]}\right)^2} - \frac{F'\left(\frac{K[2]-K[1]\log(K[1])}{K[1]}\right)}{K[1]^2F\left(\frac{K[2]-K[1]\log(K[1])}{K[1]}\right)^2} + \frac{1}{K[1]^2F\left(\frac{K[2]-K[1]\log}{K[1]}\right.}\right.}{xF\left(\frac{K[2]-x\log(x)}{x}\right)}\right.$$

✓ **Maple** : cpu = 0.108 (sec), leaf count = 23

$$\left\{y(x) = \left(\ln(x) + RootOf\left(-x + \int^{\_Z}(F(\_a))^{-1}\,d\_a + \_C1\right)\right)x\right\}$$

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 = 86.1376 (sec), leaf count = 174

$$\text{Solve}\left[\int_1^{y(x)}\left(-\int_1^x \frac{K[1]K[2]F'\left(-\frac{1}{2}a^2K[1]^2 + \frac{K[1]^2}{2} + \frac{K[2]^2}{2}\right)}{F\left(-\frac{1}{2}a^2K[1]^2 + \frac{K[1]^2}{2} + \frac{K[2]^2}{2}\right)^2}dK[1] + \frac{K[2]}{(a-1)(a+1)F\left(\frac{K[2]^2}{2} - \frac{1}{2}a^2x^2 + \right.}\right.\right.$$

✓ **Maple** : cpu = 0.43 (sec), leaf count = 60

$$\left\{\frac{y(x)}{(a-1)(a+1)} + \frac{1}{2a^4 - 4a^2 + 2}\int^{-a^2x^2+x^2+(y(x))^2}\left(F\left(\frac{\_a}{2}\right)\right)^{-1}d\_a - \_C1 = 0\right\}$$

ODE No. 615

$$y'(x) = \frac{y(x)}{x(y(x)F(xy(x)) - 1)}$$

✓ **Mathematica** : cpu = 18.9984 (sec), leaf count = 74

$$\text{Solve}\left[\int_1^{y(x)} \left(-\int_1^x \frac{F'(K[1]K[2])}{F(K[1]K[2])^2}\, dK[1] - \frac{1}{K[2]F(xK[2])} + 1\right) dK[2] + \int_1^x -\frac{1}{K[1]F(y(x)K[1])}\, dK[1]\right.$$

✓ **Maple** : cpu = 0.139 (sec), leaf count = 26

$$\left\{-y(x) + \int^{xy(x)} \frac{1}{F(\_a)\,\_a} d\_a - \_C1 = 0\right\}$$

ODE No. 616

$$y'(x) = \frac{F(x(xy(x) - 1)) - 2x^3 y(x) + x^2}{x^4}$$

✓ **Mathematica** : cpu = 55.8913 (sec), leaf count = 174

$$\text{Solve}\left[\int_1^{y(x)} -\frac{F(x(xK[2]-1)) \int_1^x \left(\frac{2K[2]K[1]^3F'(K[1](K[1]K[2]-1))}{F(K[1](K[1]K[2]-1))^2} - \frac{K[1]^2F'(K[1](K[1]K[2]-1))}{F(K[1](K[1]K[2]-1))^2} - \frac{2K[1]}{F(K[1](K[1]K[2]-1)}\right.}{F(x(xK[2]-1))}\right.$$

✓ **Maple** : cpu = 0.1 (sec), leaf count = 26

$$\left\{y(x) = \frac{RootOf\left(\int^{\_Z} (F(\_a))^{-1}\, d\_a x + x\_C1 + 1\right) + x}{x^2}\right\}$$

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 = 273.855 (sec), leaf count = 612

$$\text{Solve}\left[\int_1^{y(x)}\left(-\int_1^x\left(-\frac{K[2]\left(\frac{e^{\frac{3K[1]^2}{2}}}{3K[2]}-\frac{e^{\frac{3K[1]^2}{2}}(K[2]+3)}{3K[2]^2}\right)K[1]F'\left(\frac{e^{\frac{3K[1]^2}{2}}(K[2]+3)}{3K[2]}\right)}{K[2]F\left(\frac{e^{\frac{3K[1]^2}{2}}(K[2]+3)}{3K[2]}\right)-9e^{\frac{3K[1]^2}{2}}K[2]-27e^{\frac{3K[1]^2}{2}}}+\frac{K[2]K[1]F\left(\frac{e^{\frac{3K[1]^2}{2}}(K}{3K[2}\right.}{}\right.\right.\right.$$

✓ **Maple** : cpu = 0.296 (sec), leaf count = 47

$$\left\{y(x) = -3\,\frac{e^{3/2\,x^2}}{e^{3/2\,x^2}-3\,RootOf\left(-x^2-18\,\int^{-Z}(F(\_a)-27\,\_a)^{-1}\,d\_a+2\,\_C1\right)}\right\}$$

ODE No. 618

$$y'(x) = \frac{(y(x)+1)(x(y(x)-\log(y(x)+1)-\log(x))+1)}{xy(x)}$$

✓ **Mathematica** : cpu = 0.0973913 (sec), leaf count = 25

$$\left\{\left\{y(x)\to -W\left(-\frac{e^{c_1e^x-1}}{x}\right)-1\right\}\right\}$$

✓ **Maple** : cpu = 0.464 (sec), leaf count = 34

$$\left\{y(x) = \frac{1}{x}\left(e^{-lambertW\left(-\frac{e^{\_C1\,e^x-1}}{x}\right)+\_C1\,e^x-1}-x\right)\right\}$$

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 = 258.87 (sec), leaf count = 327

$$\text{Solve}\left[\int_1^{y(x)}\left(-\frac{F\left(-\frac{1}{3}K[2]^4 - \frac{K[2]^3}{2} - K[2]^2 - K[2] + x\right)\int_1^x -\frac{6\left(-\frac{4}{3}K[2]^3 - \frac{3K[2]^2}{2} - 2K[2] - 1\right)F'\left(-\frac{1}{3}K[2]^4 - \frac{K[2]^3}{2} - \right.}{F\left(-\frac{1}{3}K[2]^4 - \frac{K[2]^3}{2} - K[2]^2 - K[2] + K[1]\right.}}{F\left(-\frac{1}{3}K[2]^4 - \frac{K[2]^3}{2} - K[2]^2 - K[2] + x\right)}\right.\right.$$

✓ **Maple** : cpu = 0.439 (sec), leaf count = 81

$$\left\{\int_{\_b}^{y(x)} \frac{1}{\_a}\left(-8\_a^4 - 9\_a^3 - 12\_a^2 + F\left(-\frac{\_a^4}{3} - \frac{\_a^3}{2} - \_a^2 - \_a + x\right) - 6\_a\right)\left(F\left(-\frac{\_a^4}{3} - \frac{\_a}{2}\right.\right.\right.$$

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 = 3599.95 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.214 (sec), leaf count = 37

$$\left\{y(x) = e^{RootOf\left(-\_Z + \int^{\left(e^{\_Z}\right)^2 - 2e^{\_Z}x}\left(e^{2F(\_a)} + \_a\right)^{-1}d\_a + \_C1\right)} - x\right\}$$

ODE No. 621

$$y'(x) = \frac{1}{y(x) + \sqrt{x}}$$

✓ **Mathematica** : cpu = 0.0844444 (sec), leaf count = 445

$$\left\{\left\{y(x) \to \frac{1}{\text{Root}\left[\#1^6\left(16e^{12c_1} + 16x^3\right) - 24\#1^4x^2 + 8\#1^3x^{3/2} + 9\#1^2x - 6\#1\sqrt{x} + 1\&, 1\right]} - \sqrt{x}\right\}, \left\{y\right.\right.$$

✓ **Maple** : cpu = 0.339 (sec), leaf count = 59

$$\left\{y(x) = 1\left(\sqrt{x}\left(RootOf\left(\_Z^{18}\_C1 - 9\,x\_Z^6 - 6\sqrt{x}\_Z^3 - 1\right)\right)^3 + 1\right)\left(RootOf\left(\_Z^{18}\_C1 - 9\,x\_Z^6 - 6\right.\right.\right.$$

ODE No. 622

$$y'(x) = \frac{1}{y(x) + \sqrt{3x+1} + 2}$$

✓ **Mathematica** : cpu = 0.400205 (sec), leaf count = 140

$$\text{Solve}\left[44c_1 + 6\sqrt{33}\tanh^{-1}\left(\frac{3y(x) + 7\sqrt{3x+1} + 6}{\sqrt{33}\left(y(x) + \sqrt{3x+1} + 2\right)}\right) = 33\left(\log\left(\frac{-3\sqrt{3x+1}y(x)^2 - 3\left(3x + 4\sqrt{3x\right.}{}\right.\right.\right.$$

✓ **Maple** : cpu = 0.24 (sec), leaf count = 77

$$\left\{\ln\left(\left(3\,y(x) + 6\right)\sqrt{3\,x+1} + 3\left(y(x)\right)^2 - 6\,x + 12\,y(x) + 10\right) - 6\,\frac{\sqrt{3\,x+1}}{\sqrt{99\,x+33}}Artanh\left(\frac{3\sqrt{3\,x+1} + 6\,y(x}{\sqrt{99\,x+33}}\right.\right.$$

ODE No. 623

$$y'(x) = \frac{x^2}{x^{3/2} + y(x)}$$

✓ **Mathematica** : cpu = 0.2192 (sec), leaf count = 77

$$\text{Solve}\left[44c_1 + 6\sqrt{33}\tanh^{-1}\left(\frac{7x^{3/2} + 3y(x)}{\sqrt{33}\left(x^{3/2} + y(x)\right)}\right) = 33\left(\log\left(-\frac{3y(x)}{2x^{3/2}} - \frac{3y(x)^2}{2x^3} + 1\right) + 3\log(x)\right), y(x)\right]$$

✓ **Maple** : cpu = 0.261 (sec), leaf count = 49

$$\left\{\ln\left(3\,x^{3/2}y(x)-2\,x^{3}+3\,(y(x))^{2}\right)-\frac{2\sqrt{33}}{11}Artanh\left(\frac{\sqrt{33}}{11}\left(x^{\frac{3}{2}}+2\,y(x)\right)x^{-\frac{3}{2}}\right)-\_C1=0\right\}$$

ODE No. 624

$$y'(x)=\frac{x^{5/3}}{x^{4/3}+y(x)}$$

✓ **Mathematica** : cpu = 49.308 (sec), leaf count = 9837

✓ **Maple** : cpu = 1.451 (sec), leaf count = 46

$$\left\{y(x)=\frac{1}{2}\left(RootOf\left(\_Z^{192}+12\,x^{4/3}\_Z^{176}+48\,x^{8/3}\_Z^{160}+64\,x^{4}\_Z^{144}-\_C1\right)\right)^{16}+\frac{1}{2}x^{\frac{4}{3}}\right\}$$

ODE No. 625

$$y'(x)=\frac{1}{2}ix^{2}\left(-2\sqrt{6y(x)-x^{3}}+i\right)$$

✓ **Mathematica** : cpu = 0.287358 (sec), leaf count = 76

$$\text{Solve}\left[-y(x)+\frac{1}{12}\left(2i\sqrt{6y(x)-x^{3}}-\log\left(-x^{3}+6y(x)+1\right)-2i\tan^{-1}\left(\sqrt{6y(x)-x^{3}}\right)-2x^{3}+12y(x)\right)\right.$$

✓ **Maple** : cpu = 0.232 (sec), leaf count = 53

$$\left\{\ln\left(x^3-6\,y(x)-1\right)-2\,i\sqrt{-x^3+6\,y\left(x\right)}+2\,i\arctan\left(\sqrt{-x^3+6\,y\left(x\right)}\right)+2\,x^3-\_C1=0\right\}$$

ODE No. 626

$$y'(x)=\frac{x}{\sqrt{x^2+1}+y(x)}$$

✓ **Mathematica** : cpu = 0.241506 (sec), leaf count = 88

$$\text{Solve}\left[\frac{1}{2}\left(\log\left(-\frac{y(x)^2}{x^2+1}-\frac{y(x)}{\sqrt{x^2+1}}+1\right)+\log\left(x^2+1\right)\right)=c_1+\frac{\tanh^{-1}\left(\frac{3\sqrt{x^2+1}+y(x)}{\sqrt{5}\left(\sqrt{x^2+1}+y(x)\right)}\right)}{\sqrt{5}},y(x)\right]$$

✓ **Maple** : cpu = 0.406 (sec), leaf count = 115

$$\left\{\frac{2}{3}\ln\left(-\frac{1296}{11}\left(\sqrt{x^2+1}y(x)-x^2+\left(y(x)\right)^2-1\right)\left(y(x)+\sqrt{x^2+1}\right)^{-2}\right)-\frac{4\sqrt{5}}{15}Artanh\left(\sqrt{5}\left(3\sqrt{x^2+1}\right.\right.\right.$$

ODE No. 627

$$y'(x)=\frac{(y(x)\log(x)-1)^2}{x}$$

✓ **Mathematica** : cpu = 0.816601 (sec), leaf count = 25

$$\left\{\left\{y(x)\to\frac{\tan\left(c_1+\log(x)\right)}{\log(x)\tan\left(c_1+\log(x)\right)+1}\right\}\right\}$$

✓ **Maple** : cpu = 0.35 (sec), leaf count = 35

$$\left\{y(x)=\frac{\sin\left(\ln\left(x\right)\right)\_C1+\cos\left(\ln\left(x\right)\right)}{\left(\_C1+\ln\left(x\right)\right)\cos\left(\ln\left(x\right)\right)+\sin\left(\ln\left(x\right)\right)\left(\ln\left(x\right)\_C1-1\right)}\right\}$$

ODE No. 628

$$y'(x) = \frac{1}{3}x\left(3\sqrt{x^2+3y(x)}-2\right)$$

✓ **Mathematica** : cpu = 0.0882638 (sec), leaf count = 33

$$\left\{\left\{y(x)\to \frac{1}{48}\left(-54c_1x^2+81c_1^2+9x^4-16x^2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.339 (sec), leaf count = 23

$$\left\{\_C1+\frac{3\,x^2}{4}+\frac{2}{3}-\sqrt{x^2+3\,y\left(x\right)}=0\right\}$$

ODE No. 629

$$y'(x) = \frac{(2y(x)\log(x)-1)^2}{x}$$

✓ **Mathematica** : cpu = 0.78266 (sec), leaf count = 47

$$\left\{\left\{y(x)\to \frac{1}{\sqrt{2}\left(\sqrt{2}\log(x)-\tan\left(\frac{1}{2}\left(\sqrt{2}c_1+2\sqrt{2}\log(x)\right)\right)\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.217 (sec), leaf count = 62

$$\left\{y(x)=\frac{\sin\left(\ln\left(x\right)\sqrt{2}\right)\_C1+\cos\left(\ln\left(x\right)\sqrt{2}\right)}{\sin\left(\ln\left(x\right)\sqrt{2}\right)\left(2\_C1\,\ln\left(x\right)-\sqrt{2}\right)+\left(\sqrt{2}\_C1+2\,\ln\left(x\right)\right)\cos\left(\ln\left(x\right)\sqrt{2}\right)}\right\}$$

ODE No. 630

$$y'(x) = \frac{e^{bx}}{e^{-bx}y(x)+1}$$

✓ **Mathematica** : cpu = 0.610794 (sec), leaf count = 101

$$\text{Solve}\left[\frac{1}{2}b\left(\log\left(-be^{-2bx}y(x)^2-be^{-bx}y(x)+1\right)+2bx\right)=\frac{b\tan^{-1}\left(\frac{(b+2)\left(-e^{bx}\right)-by(x)}{b\sqrt{-\frac{b+4}{b}}\left(e^{bx}+y(x)\right)}\right)}{\sqrt{-\frac{b+4}{b}}}+c_1,y(x)\right]$$

✓ **Maple** : cpu = 0.348 (sec), leaf count = 98

$$\left\{y(x) = \frac{1}{\mathrm{e}^{-bx}} RootOf\left(-\mathrm{e}^{RootOf\left(\left(\tanh\left(\frac{2\_C1\,b-2\,bx-\_Z}{2\,b}\sqrt{b^2+4\,b}\right)\right)^2 b+4\left(\tanh\left(1/2\,\frac{\sqrt{b^2+4\,b}(2\_C1\,b-2\,bx-\_Z)}{b}\right)\right)^2-4\,\mathrm{e}^{\_Z}-b-4\right)}\right.\right.$$

ODE No. 631

$$y'(x) = \frac{1}{2}x^2\left(2\sqrt{x^3-6y(x)}+1\right)$$

✓ **Mathematica** : cpu = 0.0872513 (sec), leaf count = 31

$$\left\{\left\{y(x)\to\frac{1}{6}\left(-12c_1x^3-36c_1^2-x^6+x^3\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.217 (sec), leaf count = 23

$$\left\{\_C1-x^3-\frac{1}{2}-\sqrt{x^3-6\,y\left(x\right)}=0\right\}$$

ODE No. 632

$$y'(x) = \frac{e^x}{e^{-x}y(x)+1}$$

✓ **Mathematica** : cpu = 0.224997 (sec), leaf count = 65

$$\text{Solve}\left[\frac{1}{2}\log\left(-e^{-2x}y(x)^2-e^{-x}y(x)+1\right)+x=c_1+\frac{\tanh^{-1}\left(\frac{y(x)+3e^x}{\sqrt{5}(y(x)+e^x)}\right)}{\sqrt{5}},y(x)\right]$$

✓ **Maple** : cpu = 0.26 (sec), leaf count = 54

$$\left\{x-\frac{\sqrt{5}}{5}Artanh\left(\frac{2\,y(x)\,\sqrt{5}\mathrm{e}^{-x}}{5}+\frac{\sqrt{5}}{5}\right)+\frac{\ln\left(\left(y(x)\right)^2\left(\mathrm{e}^{-x}\right)^2+y(x)\,\mathrm{e}^{-x}-1\right)}{2}-\_C1=0\right\}$$

ODE No. 633

$$y'(x) = \frac{e^{2x/3}}{e^{-2x/3}y(x) + 1}$$

✓ **Mathematica** : cpu = 0.261812 (sec), leaf count = 85

$$\text{Solve}\left[7\left(-9c_1 + 3\log\left(-\frac{2}{3}e^{-4x/3}y(x)^2 - \frac{2}{3}e^{-2x/3}y(x) + 1\right) + 4x\right) = 6\sqrt{7}\tanh^{-1}\left(\frac{y(x) + 4e^{2x/3}}{\sqrt{7}\left(y(x) + e^{2x/3}\right)}\right),$$

✓ **Maple** : cpu = 1.007 (sec), leaf count = 52

$$\left\{y(x) = 1 RootOf\left(-e^{RootOf\left(-343\left(\tanh\left(1/6\left(4\_C1 - 4x - 3\_Z\right)\sqrt{7}\right)\right)^2 + 343 + 98e^{-Z}\right)} - 3 + 2\_Z + 2\_Z^2\right)\left(e^{-\frac{2x}{3}}\right)^{-}\right.$$

ODE No. 634

$$y'(x) = \frac{x^5\sqrt{4x^2y(x) + 1} + \frac{1}{2}}{x^3}$$

✓ **Mathematica** : cpu = 0.179013 (sec), leaf count = 33

$$\left\{\left\{y(x) \to \frac{-8c_1x^6 + 16c_1^2x^2 + x^{10} - 4}{16x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.252 (sec), leaf count = 26

$$\left\{\_C1 + \frac{x^4}{2} - \frac{1}{x}\sqrt{4x^2y(x) + 1} = 0\right\}$$

ODE No. 635

$$y'(x) = \frac{1}{2}x\left(2\sqrt{x^3 - 6y(x)} + x\right)$$

✓ **Mathematica** : cpu = 0.1291 (sec), leaf count = 33

$$\left\{\left\{y(x) \to \frac{1}{24}\left(36c_1x^2 - 36c_1^2 - 9x^4 + 4x^3\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.207 (sec), leaf count = 22

$$\left\{\_C1 - \frac{3x^2}{2} - \sqrt{x^3 - 6y(x)} = 0\right\}$$

ODE No. 636

$$y'(x) = y(x)\left(x^2 - \log(y(x))\right)$$

✓ **Mathematica** : cpu = 0.0602213 (sec), leaf count = 24

$$\left\{\left\{y(x) \to e^{-2c_1e^{-x}+x^2-2x+2}\right\}\right\}$$

✓ **Maple** : cpu = 0.205 (sec), leaf count = 19

$$\left\{y(x) = \mathrm{e}^{\frac{\_C1}{\mathrm{e}^x}+x^2-2\,x+2}\right\}$$

ODE No. 637

$$y'(x) = \frac{e^{-x^2}x}{e^{x^2}y(x)+1}$$

✓ **Mathematica** : cpu = 15.9507 (sec), leaf count = 59

$$\mathrm{Solve}\left[-\frac{1}{4}\log\left(2e^{2x^2}y(x)^2+2e^{x^2}y(x)+1\right)-\frac{1}{2}\tan^{-1}\left(2e^{x^2}y(x)+1\right)+\frac{x^2}{2}=c_1,y(x)\right]$$

✓ **Maple** : cpu = 0.469 (sec), leaf count = 84

$$\left\{y(x) = -\frac{1}{\mathrm{e}^{x^2}}\tan\left(\mathit{RootOf}\left(2\,x^2-\ln\left(\frac{81\,(\tan(\_Z))^2}{10}+\frac{81}{10}\right)+2\,\ln(9/2\,\tan(\_Z)-9/2)+6\,\_C1-\right.\right.\right.$$

ODE No. 638

$$y'(x) = y(x)(-(\log(x) - \log(\log(y(x)))))$$

✗ **Mathematica** : cpu = 2.68244 (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 = 0.227 (sec), leaf count = 35

$$\left\{\int_{\_b}^{y(x)}\frac{1}{\_a\left(-\ln(\ln(\_a))\,x+x\ln(x)+\ln(\_a)\right)}\mathrm{d}\_a+\ln(x)-\_C1=0\right\}$$

ODE No. 639

$$y'(x) = y(x)(\log(x) - \log(\log(y(x))))^2$$

✗ **Mathematica** : cpu = 0.310579 (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 = 0.342 (sec), leaf count = 48

$$\left\{\int_{\_b}^{y(x)} \frac{1}{\_a\ \left(-\left(\ln\left(\ln\left(\_a\right)\right)\right)^2 x + 2\ \ln\left(\ln\left(\_a\right)\right)\ln\left(x\right)x - x\left(\ln\left(x\right)\right)^2 + \ln\left(\_a\right)\right)} d\_a + \ln\left(x\right) - \_C1 = 0\right\}$$

ODE No. 640

$$y'(x) = \frac{y(x)}{\log(\log(y(x))) - \log(x) + 1}$$

✗ **Mathematica** : cpu = 3.54432 (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 = 0.522 (sec), leaf count = 47

$$\left\{\int_{\_b}^{y(x)} \frac{-\ln\left(\ln\left(\_a\right)\right) + \ln\left(x\right) - 1}{\_a\ \left(\ln\left(\_a\right)\ln\left(x\right) - \ln\left(\_a\right)\ln\left(\ln\left(\_a\right)\right) - \ln\left(\_a\right) + x\right)} d\_a - \_C1 = 0\right\}$$

ODE No. 641

$$y'(x) = \frac{x^4\sqrt{4x^2y(x)+1} + \frac{1}{2}}{x^3}$$

✓ **Mathematica** : cpu = 0.166212 (sec), leaf count = 35

$$\left\{\left\{y(x) \to \frac{-24c_1x^5 + 36c_1^2x^2 + 4x^8 - 9}{36x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.237 (sec), leaf count = 26

$$\left\{\_C1 - \frac{1}{x}\sqrt{4\,x^2y\left(x\right)+1} + \frac{2\,x^3}{3} = 0\right\}$$

ODE No. 642

$$y'(x) = \frac{\left(4ax - y(x)^2\right)^2}{y(x)}$$

✓ **Mathematica** : cpu = 0.127889 (sec), leaf count = 105

$$\left\{\left\{y(x) \to -\sqrt{4ax - \sqrt{2}\sqrt{a}\tanh\left(\frac{2\sqrt{2}ax - \sqrt{2}c_1}{\sqrt{a}}\right)}\right\}, \left\{y(x) \to \sqrt{4ax - \sqrt{2}\sqrt{a}\tanh\left(\frac{2\sqrt{2}ax - \sqrt{2}c}{\sqrt{a}}\right.}\right.\right.$$

✓ **Maple** : cpu = 0.28 (sec), leaf count = 286

$$\left\{y(x) = \sqrt{4}\sqrt{\left(\_C1\left(ax - \frac{\sqrt{2}}{4}\sqrt{a}\right)e^{2x\left(\sqrt{2}\sqrt{a} - 2ax\right)} + e^{-2x\left(\sqrt{2}\sqrt{a} + 2ax\right)}\left(ax + \frac{\sqrt{2}}{4}\sqrt{a}\right)\right)\left(\_C1\, e^{2x\left(\sqrt{2}\right.}\right.}\right.$$

ODE No. 643

$$y'(x) = \frac{1}{3}x\left(3x\sqrt{x^2 + 3y(x)} - 2\right)$$

✓ **Mathematica** : cpu = 0.109259 (sec), leaf count = 31

$$\left\{\left\{y(x) \to \frac{1}{12}\left(-6c_1x^3 + 9c_1^2 + x^6 - 4x^2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.206 (sec), leaf count = 22

$$\left\{\_C1 + \frac{x^3}{2} - \sqrt{x^2 + 3\,y(x)} = 0\right\}$$

ODE No. 644

$$y'(x) = -\frac{1}{2}x^2\left(ax - 2\sqrt{a\left(ax^4 + 8y(x)\right)}\right)$$

✓ **Mathematica** : cpu = 0.263068 (sec), leaf count = 34

$$\left\{\left\{y(x) \to \frac{1}{72}a\left(-96c_1x^3 + 144c_1^2 + 16x^6 - 9x^4\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.39 (sec), leaf count = 27

$$\left\{\_C1 + \frac{4\,a x^3}{3} - \sqrt{a\,(a x^4 + 8\,y\,(x))} = 0\right\}$$

ODE No. 645

$$y'(x) = y(x)(x - \log(y(x)))$$

✓ **Mathematica** : cpu = 0.0338799 (sec), leaf count = 20

$$\left\{\left\{y(x) \to e^{-e^{c_1 - x} + x - 1}\right\}\right\}$$

✓ **Maple** : cpu = 0.114 (sec), leaf count = 14

$$\left\{y(x) = \mathrm{e}^{\frac{\_C1}{\mathrm{e}^{x}} - 1 + x}\right\}$$

ODE No. 646

$$y'(x) = \frac{\sqrt{x^3 - 6y(x)} + \frac{x^3}{2} + \frac{x^2}{2}}{x + 1}$$

✓ **Mathematica** : cpu = 0.167127 (sec), leaf count = 35

$$\left\{\left\{y(x) \to \frac{1}{6}\left(18c_1 \log(x+1) - 9c_1^2 + x^3 - 9\log^2(x+1)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.297 (sec), leaf count = 23

$$\left\{\_C1 - 3\,\ln(1+x) - \sqrt{x^3 - 6\,y\,(x)} = 0\right\}$$

ODE No. 647

$$y'(x) = \frac{x\left(ay(x)^2 + bx^2\right)^2}{a^{5/2}y(x)}$$

✓ **Mathematica** : cpu = 0.369848 (sec), leaf count = 115

$$\left\{\left\{y(x) \to -\sqrt{\frac{\sqrt{b}\tan\left(\frac{a^{3/2}bx^2+2c_1}{a^{9/4}\sqrt{b}}\right)}{\sqrt[4]{a}} - \frac{bx^2}{a}}\right\}, \left\{y(x) \to \sqrt{\frac{\sqrt{b}\tan\left(\frac{a^{3/2}bx^2+2c_1}{a^{9/4}\sqrt{b}}\right)}{\sqrt[4]{a}} - \frac{bx^2}{a}}\right\}\right\}$$

✓ **Maple** : cpu = 0.313 (sec), leaf count = 460

$$\left\{y(x) = \frac{1}{a}\sqrt{-a\left(\_C1\,e^{\frac{x^2}{2}\left(2\,a^{3/2}\sqrt{-\frac{b}{a^{3/2}}}+bx^2\right)a^{-\frac{3}{2}}} + e^{\frac{x^2}{2}\left(-2\,a^{3/2}\sqrt{-\frac{b}{a^{3/2}}}+bx^2\right)a^{-\frac{3}{2}}}\right)\left(\left(bx^2 - a^{\frac{3}{2}}\sqrt{-ba^{-\frac{3}{2}}}\right)e^{\frac{x^2}{2}\left(\right.}\right.}\right.$$

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 = 0.341816 (sec), leaf count = 128

$$\left\{\left\{y(x) \to \frac{1}{72}\left(-96ac_1x^3 + 144ac_1x^2 - 288ac_1x + 288ac_1\log(x+1) + 144ac_1^2 - 432ac_1 + 16ax^6 - 48ax^5\right.\right.\right.$$

✓ **Maple** : cpu = 0.672 (sec), leaf count = 41

$$\left\{\frac{1}{4}\sqrt{ax^4+8\,y\left(x\right)}\frac{1}{\sqrt{a}} - \frac{x^3}{3} + \frac{x^2}{2} - x + \ln\left(1+x\right) - \_C1 = 0\right\}$$

ODE No. 649

$$y'(x) = x\sqrt{x^2 + 8y(x) - 2x + 1} - \frac{x}{4} + \frac{1}{4}$$

✓ **Mathematica** : cpu = 0.178096 (sec), leaf count = 37

$$\left\{\left\{y(x) \to \frac{1}{8}\left(-16c_1x^2 + 16c_1^2 + 4x^4 - x^2 + 2x - 1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.236 (sec), leaf count = 27

$$\left\{\_C1 + 2\,x^2 + \frac{1}{4} - \sqrt{x^2 - 2\,x + 1 + 8\,y\left(x\right)} = 0\right\}$$

ODE No. 650

$$y'(x) = x\sqrt{a^2 + 2ax + x^2 + 4y(x)} - \frac{a}{2} - \frac{x}{2}$$

✓ **Mathematica** : cpu = 0.233242 (sec), leaf count = 40

$$\left\{\left\{y(x) \to \frac{1}{4}\left(-a^2 - 2ax - 4c_1x^2 + 4c_1^2 + x^4 - x^2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.253 (sec), leaf count = 28

$$\left\{\_C1 + x^2 + \frac{1}{2} - \sqrt{x^2 + 2\,ax + a^2 + 4\,y\left(x\right)} = 0\right\}$$

ODE No. 651

$$y'(x) = \frac{y(x)\left(x^2 + \log(y(x))\right)}{x}$$

✓ **Mathematica** : cpu = 0.0310528 (sec), leaf count = 16

$$\left\{\left\{y(x) \to e^{2c_1x + x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.072 (sec), leaf count = 13

$$\left\{y(x) = e^{x\_C1}e^{x^2}\right\}$$

ODE No. 652

$$y'(x) = \frac{x\sqrt{4ax - y(x)^2} + 2a}{y(x)}$$

✓ **Mathematica** : cpu = 1.82672 (sec), leaf count = 101

$$\left\{\left\{y(x) \to -\frac{\sqrt{4096a^5x - 256a^4x^4 + 32a^2e^{c_1}x^2 - e^{2c_1}}}{32a^2}\right\}, \left\{y(x) \to \frac{\sqrt{4096a^5x - 256a^4x^4 + 32a^2e^{c_1}x^2 - e}}{32a^2}\right.$$

✓ **Maple** : cpu = 0.192 (sec), leaf count = 27

$$\left\{-\sqrt{-\left(y\left(x\right)\right)^2 + 4\,ax} - \frac{x^2}{2} - \_C1 = 0\right\}$$

ODE No. 653

$$y'(x) = x\sqrt{x^2 + 4y(x) - 4x} - \frac{x}{2} + 1$$

✓ **Mathematica** : cpu = 0.184434 (sec), leaf count = 34

$$\left\{\left\{y(x) \to \frac{1}{4}\left(-4c_1x^2 + 4c_1^2 + x^4 - x^2 + 4x\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.194 (sec), leaf count = 24

$$\left\{\_C1 + x^2 + \frac{1}{2} - \sqrt{x^2 - 4\,x + 4\,y\left(x\right)} = 0\right\}$$

ODE No. 654

$$y'(x) = \frac{\sqrt{x^2 + 3y(x)} - \frac{2x^2}{3} - \frac{2x}{3}}{x + 1}$$

✓ **Mathematica** : cpu = 0.153723 (sec), leaf count = 37

$$\left\{\left\{y(x) \to \frac{1}{12}\left(-18c_1\log(x + 1) + 9c_1^2 - 4x^2 + 9\log^2(x + 1)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.265 (sec), leaf count = 23

$$\left\{\_C1 + \frac{3\,\ln\left(1 + x\right)}{2} - \sqrt{x^2 + 3\,y\left(x\right)} = 0\right\}$$

ODE No. 655

$$y'(x) = \frac{e^{-4x/3}y(x)^3}{e^{-2x/3}y(x)+1}$$

✓ **Mathematica** : cpu = 20.2468 (sec), leaf count = 82

$$\text{Solve}\left[\frac{3}{2}\log(y(x)) + \frac{1}{28}\left(-21\log\left(-3y(x)^2+2e^{2x/3}y(x)+2e^{4x/3}\right)+6\sqrt{7}\tanh^{-1}\left(\frac{y(x)+2e^{2x/3}}{\sqrt{7}y(x)}\right)+28x\right.\right.$$

✓ **Maple** : cpu = 0.677 (sec), leaf count = 66

$$\left\{x+\frac{3\sqrt{7}}{14}\mathit{Artanh}\left(\frac{3\,y(x)\,\sqrt{7}}{7}e^{-\frac{2\,x}{3}}-\frac{\sqrt{7}}{7}\right)+\frac{3}{2}\ln\left(y(x)\,e^{-\frac{2\,x}{3}}\right)-\frac{3}{4}\ln\left(3\,(y(x))^2\left(e^{-2/3\,x}\right)^2-2\,y(x)\,e^{-2/3\,x}\right.\right.$$

ODE No. 656

$$y'(x) = \frac{y(x)\left(x^3+\log(y(x))\right)}{x}$$

✓ **Mathematica** : cpu = 0.0370343 (sec), leaf count = 20

$$\left\{\left\{y(x)\to e^{3c_1x+\frac{x^3}{2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.082 (sec), leaf count = 15

$$\left\{y(x) = e^{\frac{x^3}{2}}e^{x\_C1}\right\}$$

ODE No. 657

$$y'(x) = x^2\sqrt{x^2+8y(x)-2x+1}-\frac{x}{4}+\frac{1}{4}$$

✓ **Mathematica** : cpu = 0.176088 (sec), leaf count = 37

$$\left\{\left\{y(x)\to\frac{1}{72}\left(-96c_1x^3+144c_1^2+16x^6-9x^2+18x-9\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.222 (sec), leaf count = 26

$$\left\{\_C1+\frac{4\,x^3}{3}-\sqrt{x^2-2\,x+1+8\,y\,(x)}=0\right\}$$

ODE No. 658

$$y'(x) = \frac{\sqrt{x^2 + 8y(x) - 2x + 1} - \frac{x^2}{4} + \frac{1}{4}}{x + 1}$$

✓ **Mathematica** : cpu = 0.236188 (sec), leaf count = 45

$$\left\{\left\{y(x) \to \frac{1}{8}\left(-32c_1 \log(4(x+1)) + 16c_1^2 - x^2 + 2x + 16\log^2(4(x+1)) - 1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.314 (sec), leaf count = 28

$$\left\{\_C1 + 4\ln(1+x) - \frac{1}{4} - \sqrt{x^2 - 2x + 1 + 8y(x)} = 0\right\}$$

ODE No. 659

$$y'(x) = x\sqrt{a^2x^2 + 2abx + 4ay(x) + b^2 - 4c} - \frac{ax}{2} - \frac{b}{2}$$

✓ **Mathematica** : cpu = 0.420991 (sec), leaf count = 60

$$\left\{\left\{y(x) \to \frac{-4a^2c_1x^2 + 4a^2c_1^2 + a^2x^4 - a^2x^2 - 2abx - b^2 + 4c}{4a}\right\}\right\}$$

✓ **Maple** : cpu = 0.26 (sec), leaf count = 41

$$\left\{\_C1 + ax^2 + \frac{a}{2} - \sqrt{a^2x^2 + 2abx + b^2 + 4ay(x) - 4c} = 0\right\}$$

ODE No. 660

$$y'(x) = x^2\sqrt{a^2 + 2ax + x^2 + 4y(x)} - \frac{a}{2} - \frac{x}{2}$$

✓ **Mathematica** : cpu = 0.249334 (sec), leaf count = 42

$$\left\{\left\{y(x) \to \frac{1}{36}\left(-9a^2 - 18ax - 24c_1x^3 + 36c_1^2 + 4x^6 - 9x^2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.24 (sec), leaf count = 29

$$\left\{\_C1 + \frac{2x^3}{3} - \sqrt{x^2 + 2ax + a^2 + 4y(x)} = 0\right\}$$

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 = 0.395165 (sec), leaf count = 61

$$\left\{\left\{y(x)\to \frac{-24a^2c_1x^3+36a^2c_1^2+4a^2x^6-9a^2x^2-18abx-9b^2+36c}{36a}\right\}\right\}$$

✓ **Maple** : cpu = 0.234 (sec), leaf count = 39

$$\left\{\_C1+\frac{2\,ax^3}{3}-\sqrt{a^2x^2+2\,abx+b^2+4\,ay\,(x)-4\,c}=0\right\}$$

ODE No. 662

$$y'(x) = x^2\sqrt{x^2-4y(x)+2x+1}+\frac{x}{2}+\frac{1}{2}$$

✓ **Mathematica** : cpu = 0.219905 (sec), leaf count = 37

$$\left\{\left\{y(x)\to \frac{1}{36}\left(24c_1x^3-36c_1^2-4x^6+9x^2+18x+9\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.236 (sec), leaf count = 26

$$\left\{\_C1-\frac{2\,x^3}{3}-\sqrt{x^2+2\,x+1-4\,y\,(x)}=0\right\}$$

ODE No. 663

$$y'(x) = \frac{x^2\sqrt{4ax-y(x)^2}+2a}{y(x)}$$

✓ **Mathematica** : cpu = 2.18849 (sec), leaf count = 101

$$\left\{\left\{y(x)\to -\frac{\sqrt{147456a^7x-4096a^6x^6+128a^3e^{c_1}x^3-e^{2c_1}}}{192a^3}\right\},\left\{y(x)\to \frac{\sqrt{147456a^7x-4096a^6x^6+128a^3}}{192a^3}\right.$$

✓ **Maple** : cpu = 0.174 (sec), leaf count = 27

$$\left\{-\sqrt{-\left(y\,(x)\right)^2+4\,ax}-\frac{x^3}{3}-\_C1=0\right\}$$

ODE No. 664

$$y'(x) = x^2\sqrt{x^2+4y(x)-4x} - \frac{x}{2} + 1$$

✓ **Mathematica** : cpu = 0.18603 (sec), leaf count = 36

$$\left\{\left\{y(x)\to \frac{1}{36}\left(-24c_1x^3+36c_1^2+4x^6-9x^2+36x\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.192 (sec), leaf count = 25

$$\left\{\_C1 + \frac{2\,x^3}{3} - \sqrt{x^2-4\,x+4\,y\left(x\right)} = 0\right\}$$

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 = 0.284582 (sec), leaf count = 41

$$\left\{\left\{y(x)\to \frac{1}{8}\left(-32ac_1\log(x+1)+16ac_1^2-ax^4+16a\log^2(x+1)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.502 (sec), leaf count = 28

$$\left\{-\frac{1}{4}\sqrt{ax^4+8\,y\left(x\right)}\frac{1}{\sqrt{a}} + \ln\left(1+x\right) - \_C1 = 0\right\}$$

ODE No. 666

$$y'(x) = y(x)\left(x^3+x^2-\log(y(x))+1\right)$$

✓ **Mathematica** : cpu = 0.0670853 (sec), leaf count = 29

$$\left\{\left\{y(x)\to e^{-c_1e^{-x}+x^3-2x^2+4x-3}\right\}\right\}$$

✓ **Maple** : cpu = 0.191 (sec), leaf count = 24

$$\left\{y(x) = \mathrm{e}^{-\frac{\_C1}{\mathrm{e}^{x}}+x^3-2\,x^2+4\,x-3}\right\}$$

ODE No. 667

$$y'(x) = \frac{e^{-2bx}y(x)^3}{e^{-bx}y(x) + 1}$$

✓ **Mathematica** : cpu = 1.15029 (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 = 0.232 (sec), leaf count = 82

$$\left\{bx - b\mathit{Artanh}\left(\left(-2\,y(x)\,\mathrm{e}^{-bx} + b\right)\frac{1}{\sqrt{b^2+4\,b}}\right)\frac{1}{\sqrt{b^2+4\,b}} - \frac{\ln\left(-by(x)\,\mathrm{e}^{-bx} + (y(x))^2\left(\mathrm{e}^{-bx}\right)^2 - b\right)}{2} + \ln\left(\right.\right.$$

ODE No. 668

$$y'(x) = \frac{e^{-2x}y(x)^3}{e^{-x}y(x) + 1}$$

✓ **Mathematica** : cpu = 0.676431 (sec), leaf count = 78

$$\text{Solve}\left[\log(y(x)) + y(x)^2\left(\frac{x}{y(x)^2} - \frac{\log\left(-y(x)^2 + e^x y(x) + e^{2x}\right)}{2y(x)^2} + \frac{\tanh^{-1}\left(\frac{y(x)+2e^x}{\sqrt{5}y(x)}\right)}{\sqrt{5}y(x)^2}\right) = c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.766 (sec), leaf count = 58

$$\left\{y(x) = \mathrm{e}^{\mathit{RootOf}\left(2\sqrt{5}\mathit{Artanh}\left(1/5\,\frac{\left(-2\,\mathrm{e}^{\_Z}+\mathrm{e}^{x}\right)\sqrt{5}}{\mathrm{e}^{x}}\right)+5\,\ln\left(-(\mathrm{e}^{x})^2-\mathrm{e}^{\_Z+x}+(\mathrm{e}^{\_Z})^2\right)+10\_C1-10\_Z-10\,x\right)}\right\}$$

ODE No. 669

$$y'(x) = \frac{e^x \left(3e^x - 2y(x)^{3/2}\right)^2}{4\sqrt{y(x)}}$$

✓ **Mathematica** : cpu = 0.825163 (sec), leaf count = 264

$$\left\{\left\{y(x) \to \frac{\left(3e^{3c_1+x} + 2e^{3c_1} - 2e^{3e^x} + 3e^{x+3e^x}\right)^{2/3}}{\sqrt[3]{8e^{3c_1+3e^x} + 4e^{6c_1} + 4e^{6e^x}}}\right\}, \left\{y(x) \to -\frac{\sqrt[3]{-1}\left(3e^{3c_1+x} + 2e^{3c_1} - 2e^{3e^x} + 3e^{x+3e^x}\right)}{\sqrt[3]{8e^{3c_1+3e^x} + 4e^{6c_1} + 4e^{6e^x}}}\right.$$

✓ **Maple** : cpu = 0.214 (sec), leaf count = 72

$$\left\{\_C1 + 1\mathrm{e}^{-\frac{3\,\mathrm{e}^x}{2} - \frac{9\,\mathrm{e}^{2\,x}}{8}} \left(-2\left(y(x)\right)^{3/2}\mathrm{e}^x + 3\,\mathrm{e}^{2\,x} + 2\,\mathrm{e}^x\right)\left(\mathrm{e}^{\frac{3\,\mathrm{e}^x}{2} - \frac{9\,\mathrm{e}^{2\,x}}{8}}\right)^{-1}\left(-2\left(y(x)\right)^{3/2}\mathrm{e}^x + 3\,\mathrm{e}^{2\,x} - 2\,\mathrm{e}^x\right)^{-1} =\right.$$

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 = 0.485755 (sec), leaf count = 99

$$\text{Solve}\left[-\log(y(x)) + \frac{1}{4}\left(-\frac{1}{2}\log\left(4\log(a) - x^2 + 4\log(y(x)) + 1\right) + i\sqrt{4\log(a) - x^2 + 4\log(y(x))} - i\tan^{-}\right.\right.$$

✓ **Maple** : cpu = 0.356 (sec), leaf count = 70

$$\left\{\frac{1}{2}\sqrt{-x^2 + 4\,\ln(a) + 4\,\ln(y(x))} - \frac{1}{2}\arctan\left(\sqrt{-x^2 + 4\,\ln(a) + 4\,\ln(y(x))}\right) + \frac{i}{4}\ln\left(x^2 - 4\,\ln(a) - 4\right.\right.$$

ODE No. 671

$$y'(x) = \frac{\left(xy(x)^2 + 1\right)^2}{x^4 y(x)}$$

✓ **Mathematica** : cpu = 0.388032 (sec), leaf count = 192

$$\left\{\left\{y(x) \to -\frac{\sqrt{\frac{\sqrt{2}e^{\frac{2\sqrt{2}(c_1x+1)}{x}} - 2e^{\frac{2\sqrt{2}(c_1x+1)}{x}}}{x} - \frac{2}{x} - \sqrt{2}}}{\sqrt{2e^{\frac{2\sqrt{2}(c_1x+1)}{x}} + 2}}\right\}, \left\{y(x) \to \frac{\sqrt{\frac{\sqrt{2}e^{\frac{2\sqrt{2}(c_1x+1)}{x}} - 2e^{\frac{2\sqrt{2}(c_1x+1)}{x}}}{x} - \frac{2}{x} - \sqrt{}}}{\sqrt{2e^{\frac{2\sqrt{2}(c_1x+1)}{x}} + 2}}\right.$$

✓ **Maple** : cpu = 0.224 (sec), leaf count = 237

$$\left\{y(x) = -\frac{\sqrt{2}}{2\,x}\sqrt{-\left(\_C1\,\mathrm{e}^{\frac{-1-\sqrt{2}x}{x^2}}+\mathrm{e}^{\frac{-1+\sqrt{2}x}{x^2}}\right)x\left(\_C1\,\left(\sqrt{2}x+2\right)\mathrm{e}^{\frac{-1-\sqrt{2}x}{x^2}}+\left(2-\sqrt{2}x\right)\mathrm{e}^{\frac{-1+\sqrt{2}x}{x^2}}\right)\left(\_C1\,\mathrm{e}\right.}\right.$$

ODE No. 672

$$y'(x) = \frac{x^2\left(\sqrt{4y(x)^3-9x^4}+3x\right)}{y(x)^2}$$

✗ **Mathematica** : cpu = 3599.96 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.211 (sec), leaf count = 36

$$\left\{\int_{\_b}^{y(x)}\_a^2\frac{1}{\sqrt{-9\,x^4+4\,\_a^3}}\,\mathrm{d}\_a-\frac{x^3}{3}-\_C1=0\right\}$$

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 = 0.0876103 (sec), leaf count = 23

$$\left\{\left\{y(x)\to\tan^{-1}\left(\frac{3c_1+2x^3}{6x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.439 (sec), leaf count = 17

$$\left\{y(x)=\arctan\left(\frac{x^3+6\,\_C1}{3\,x}\right)\right\}$$

ODE No. 674

$$y'(x) = \frac{\sqrt{x^2 + 4y(x) - 4x} - \frac{x^2}{2} + \frac{x}{2} + 1}{x + 1}$$

✓ **Mathematica** : cpu = 0.221651 (sec), leaf count = 40

$$\left\{\left\{y(x) \to \frac{1}{4}\left(-8c_1 \log(x+1) + 4c_1^2 - x^2 + 4x + 4\log^2(x+1)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.306 (sec), leaf count = 27

$$\left\{\_C1 + 2\ln(1+x) - 1 - \sqrt{x^2 - 4x + 4y(x)} = 0\right\}$$

ODE No. 675

$$y'(x) = \frac{ax^4 + ae^x x^3 + ax^3 - x^2 y(x)^2 - e^x x y(x)^2 - xy(x)^2 + y(x)}{x}$$

✓ **Mathematica** : cpu = 0.050114 (sec), leaf count = 48

$$\left\{\left\{y(x) \to \sqrt{a}x \tanh\left(\frac{1}{6}\sqrt{a}\left(6c_1 + 2x^3 + 3x^2 + 6e^x x - 6e^x\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.068 (sec), leaf count = 37

$$\left\{y(x) = \tanh\left(\frac{(6x-6)e^x + 2x^3 + 3x^2 + 6\_C1}{6}\sqrt{a}\right)x\sqrt{a}\right\}$$

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 = 0.302039 (sec), leaf count = 144

$$\left\{\left\{y(x) \to \frac{-72c_1x^6 + 96c_1x^5 - 144c_1x^4 + 288c_1x^3 + 144c_1^2x^2 - 288c_1x^2\log(x+1) + 9x^{10} - 24x^9 + 52x^8}{}\right.\right.$$

✓ **Maple** : cpu = 0.541 (sec), leaf count = 43

$$\left\{\_C1 + 2\ln(1+x) - \frac{1}{x}\sqrt{4x^2y(x)+1} - 2x + x^2 - \frac{2x^3}{3} + \frac{x^4}{2} = 0\right\}$$

ODE No. 677

$$y'(x) = \frac{ax^4 + ax^3 + ax^3 \log(x+1) - x^2 y(x)^2 - xy(x)^2 + y(x) - xy(x)^2 \log(x+1)}{x}$$

✓ **Mathematica** : cpu = 0.0319926 (sec), leaf count = 80

$$\left\{\left\{y(x) \to \sqrt{a}x \tanh\left(\frac{1}{12}(12\sqrt{a}c_1 + 4\sqrt{a}x^3 + 3\sqrt{a}x^2 + 6\sqrt{a}x^2 \log(x+1) + 6\sqrt{a}x - 6\sqrt{a}\log(x+1))\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.062 (sec), leaf count = 48

$$\left\{y(x) = \tanh\left(\frac{6\ln(1+x)x^2 + 4x^3 + 3x^2 - 6\ln(1+x) + 12\_C1 + 6x + 9}{12}\sqrt{a}\right)x\sqrt{a}\right\}$$

ODE No. 678

$$y'(x) = \frac{x^2\left(2x\sqrt{x^3 - 6y(x)} + x + 1\right)}{2(x+1)}$$

✓ **Mathematica** : cpu = 0.233676 (sec), leaf count = 101

$$\left\{\left\{y(x) \to \frac{1}{24}(24c_1x^3 - 36c_1x^2 + 72c_1x - 72c_1\log(x+1) - 36c_1^2 - 4x^6 + 12x^5 - 33x^4 + 40x^3 + 24x^3 \log\right.\right.$$

✓ **Maple** : cpu = 0.333 (sec), leaf count = 37

$$\left\{\_C1 - x^3 + \frac{3x^2}{2} - 3x + 3\ln(1+x) - \frac{1}{2} - \sqrt{x^3 - 6y(x)} = 0\right\}$$

ODE No. 679

$$y'(x) = \frac{x^4 + x^3 + x^3\log(x) + 7x^2y(x)^2 + 7xy(x)^2 + y(x) + 7xy(x)^2\log(x)}{x}$$

✓ **Mathematica** : cpu = 0.0306791 (sec), leaf count = 59

$$\left\{\left\{y(x) \to \frac{x\tan\left(\frac{1}{12}(12\sqrt{7}c_1 + 4\sqrt{7}x^3 + 3\sqrt{7}x^2 + 6\sqrt{7}x^2\log(x))\right)}{\sqrt{7}}\right\}\right\}$$

✓ **Maple** : cpu = 0.056 (sec), leaf count = 37

$$\left\{y(x) = \frac{x\sqrt{7}}{7}\tan\left(\frac{(6\,x^2\ln{(x)} + 4\,x^3 + 3\,x^2 + 12\_C1)\sqrt{7}}{12}\right)\right\}$$

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 = 0.225076 (sec), leaf count = 39

$$\left\{\left\{y(x) \to \frac{1}{4}\left(8c_1\log(x+1) - 4c_1^2 + x^2 + 2x - 4\log^2(x+1) + 1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.316 (sec), leaf count = 28

$$\left\{\_C1 - 2\,\ln{(1+x)} - \frac{1}{2} - \sqrt{x^2 + 2\,x + 1 - 4\,y\,(x)} = 0\right\}$$

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 = 0.0399785 (sec), leaf count = 84

$$\left\{\left\{y(x) \to \frac{\sqrt{b}x\tan\left(\frac{1}{12}\left(12\sqrt{a}\sqrt{b}c_1 + 4\sqrt{a}\sqrt{b}x^3 + 9\sqrt{a}\sqrt{b}x^2 - 6\sqrt{a}\sqrt{b}x^2\log(x)\right)\right)}{\sqrt{a}}\right\}\right\}$$

✓ **Maple** : cpu = 0.077 (sec), leaf count = 45

$$\left\{y(x) = \frac{x}{a}\tan\left(\frac{4\,x^3 + 6\,x^2\ln{(x^{-1})} + 9\,x^2 + 12\_C1}{12}\sqrt{ab}\right)\sqrt{ab}\right\}$$

ODE No. 682

$$y'(x) = \frac{2a}{x\left(-8a^2 + 2axy(x)^2 - xy(x)\right)}$$

✓ **Mathematica** : cpu = 0.117025 (sec), leaf count = 39

$$\text{Solve}\left[\frac{y(x)^2 e^{-4ay(x)}}{8a} - \frac{e^{-4ay(x)}}{2x} = c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.292 (sec), leaf count = 28

$$\left\{\_C1 + \frac{-x(y(x))^2 + 4a}{e^{4ay(x)}x} = 0\right\}$$

ODE No. 683

$$y'(x) = \frac{y(x)\left(x^4 y(x)\log(x(x+1)) - x^3\log(x(x+1)) - 1\right)}{x}$$

✓ **Mathematica** : cpu = 0.377537 (sec), leaf count = 84

$$\left\{\left\{y(x) \to \frac{e^{\frac{2x^3}{9}+\frac{x}{3}}}{c_1 e^{\frac{x^2}{6}} x\sqrt[3]{x+1}(x(x+1))^{\frac{x^3}{3}} + e^{\frac{x^2}{6}+\frac{1}{18}(4x^2-3x+6)x}x}\right\}\right\}$$

✓ **Maple** : cpu = 0.19 (sec), leaf count = 152

$$\Bigg\{y(x) = \frac{1}{x}(x(1+x))^{-\frac{x^3}{3}} e^{\frac{2x^3}{9}} e^{-\frac{x^2}{6}} e^{\frac{x}{3}} \Bigg((1+x)^{-\frac{x^3}{3}} x^{-\frac{x^3}{3}} e^{\frac{x}{6}\big(ix^2\pi\,(csgn(ix(1+x)))^3 - ix^2(csgn(ix)+csgn(i+ix))\pi\,(csgn(ix(1+}$$

ODE No. 684

$$y'(x) = \frac{x^2\sqrt{x^2 + y(x)^2} + y(x)}{x}$$

✓ **Mathematica** : cpu = 0.0231988 (sec), leaf count = 20

$$\left\{\left\{y(x) \to x\sinh\left(\frac{1}{2}(2c_1 + x^2)\right)\right\}\right\}$$

✓ **Maple** : cpu = 2.842 (sec), leaf count = 30

$$\left\{\ln\left(\sqrt{(y(x))^2 + x^2} + y(x)\right) - \frac{x^2}{2} - \ln(x) - \_C1 = 0\right\}$$

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 = 0.0352075 (sec), leaf count = 87

$$\left\{\left\{y(x) \to \frac{x \tan\left(\frac{1}{2}\left(2\sqrt{7}c_1 - \sqrt{7}x^2 + \sqrt{7}x^2 \log(x-1) + \sqrt{7}x^2 \log(x+1) - \sqrt{7}\log(1-x) - \sqrt{7}\log(x+\right.\right.}{\sqrt{7}}\right.\right.$$

✓ **Maple** : cpu = 0.088 (sec), leaf count = 48

$$\left\{y(x) = \frac{x\sqrt{7}}{7} \tan\left(\frac{\left(x^2 \ln\left((x-1)(1+x)\right) - x^2 - \ln\left((x-1)(1+x)\right) + 2\_C1 + 1\right)\sqrt{7}}{2}\right)\right\}$$

ODE No. 686

$$y'(x) = \frac{e^{2x^2} x y(x)^3}{e^{x^2} y(x) + 1}$$

✓ **Mathematica** : cpu = 15.5944 (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 = 0.43 (sec), leaf count = 85

$$\left\{y(x) = \frac{1}{e^{x^2}}\left(1 - \tan\left(RootOf\left(-2\,x^2 - \ln\left(\frac{81\left(\tan\left(\_Z\right)\right)^2}{10} + \frac{81}{10}\right) + 2\,\ln\left(9/2\,\tan\left(\_Z\right) - 9/2\right) + 6\_\right.\right.\right.\right.$$

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 = 0.0601512 (sec), leaf count = 130

$$\left\{\left\{y(x) \to \frac{-x^2(x+1)^{x^2}e^{2c_1+2x} + x(x+1)^{x^2}e^{2c_1+2x} - x^2(x-1)^{x^2} - x(x-1)^{x^2}}{-(x+1)^{x^2}e^{2c_1+2x} + x(x+1)^{x^2}e^{2c_1+2x} - x(x-1)^{x^2} - (x-1)^{x^2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.11 (sec), leaf count = 39

$$\left\{y(x) = -\tanh\left(\frac{x^2}{2}\ln\left(\frac{1+x}{x-1}\right) - \frac{1}{2}\ln\left(\frac{1+x}{x-1}\right) + \_C1 + x - 1\right)x\right\}$$

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 = 0.127344 (sec), leaf count = 78

$$\left\{\left\{y(x) \to x\tan\left(\frac{1}{2}\left(2c_1 - 8e\text{Ei}\left(\frac{2}{x-1}\right) + e^{\frac{x}{x-1}+\frac{1}{x-1}}x^2 + 2e^{\frac{x}{x-1}+\frac{1}{x-1}}x - 3e^{\frac{2}{x-1}+1}\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.102 (sec), leaf count = 42

$$\left\{y(x) = \tan\left(\frac{x^2+2x-3}{2}\mathrm{e}^{\frac{1+x}{x-1}} + 4\,\mathrm{e}Ei\left(1, -2(x-1)^{-1}\right) + \_C1\right)x\right\}$$

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 = 0.0683742 (sec), leaf count = 60

$$\left\{\left\{y(x) \to -\frac{x\left(e^{2c_1+2e^2\text{Ei}(x-1)+2e^{x+1}} - 1\right)}{e^{2c_1+2e^2\text{Ei}(x-1)+2e^{x+1}} + 1}\right\}\right\}$$

✓ **Maple** : cpu = 0.054 (sec), leaf count = 25

$$\left\{y(x) = -\tanh\left(\mathrm{e}^{1+x} - \mathrm{e}^{2} Ei(1, 1-x) + \_C1\right) x\right\}$$

ODE No. 690

$$y'(x) = \frac{-\frac{x^2}{4} + x^3\sqrt{x^2 + 8y(x) - 2x + 1} + \frac{1}{4}}{x+1}$$

✓ **Mathematica** : cpu = 0.319304 (sec), leaf count = 127

$$\left\{\left\{y(x) \to \frac{1}{72}\left(-96c_1x^3 + 144c_1x^2 - 288c_1x + 288c_1\log(4x+4) + 144c_1^2 - 528c_1 + 16x^6 - 48x^5 + 132x^4\right.\right.\right.$$

✓ **Maple** : cpu = 0.37 (sec), leaf count = 40

$$\left\{\_C1 + \frac{4\,x^3}{3} - 2\,x^2 + 4\,x - 4\,\ln\left(1+x\right) - \sqrt{x^2 - 2\,x + 1 + 8\,y\left(x\right)} = 0\right\}$$

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 = 0.0761866 (sec), leaf count = 21

$$\left\{\left\{y(x) \to \tan^{-1}\left(\frac{2c_1 + x^4}{4x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.665 (sec), leaf count = 17

$$\left\{y(x) = \arctan\left(\frac{x^4 + 8\_C1}{4\,x}\right)\right\}$$

ODE No. 692

$$y'(x) = \frac{x^3\sqrt{x^2+y(x)^2}+y(x)}{x}$$

✓ **Mathematica** : cpu = 0.0231054 (sec), leaf count = 20

$$\left\{\left\{y(x)\to x\sinh\left(\frac{1}{3}\left(3c_1+x^3\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 3.357 (sec), leaf count = 30

$$\left\{\ln\left(\sqrt{\left(y\left(x\right)\right)^2+x^2}+y(x)\right)-\frac{x^3}{3}-\ln\left(x\right)-\_C1=0\right\}$$

ODE No. 693

$$y'(x) = e^{bx}\left(e^{-3bx}y(x)^3+e^{-2bx}y(x)^2+1\right)$$

✓ **Mathematica** : cpu = 0.236127 (sec), leaf count = 146

$$\text{Solve}\left[-\frac{1}{3}(9b+29)^{2/3}\text{RootSum}\left[\#1^3(9b+29)^{2/3}-9\#1b-3\#1+(9b+29)^{2/3}\&,\frac{\log\left(\frac{3e^{-2bx}y(x)+e^{-bx}}{\sqrt[3]{(9b+29)e^{-3bx}}}-\right.}{\#1^2\left(-(9b+29)^{2/3}\right)+}\right.\right.$$

✓ **Maple** : cpu = 0.112 (sec), leaf count = 40

$$\left\{y(x)=\frac{1}{\mathrm{e}^{-bx}}RootOf\left(-x-\int^{\_Z}-\left(\_a^3+\_a^2-\_a\,b+1\right)^{-1}d\_a+\_C1\right)\right\}$$

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 = 0.279237 (sec), leaf count = 66

$$\left\{\left\{y(x)\to\frac{-8c_1x^3+4c_1^2x^2+8c_1x^2\log(x+1)+4x^4-8x^3\log(x+1)+4x^2\log^2(x+1)-1}{4x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.34 (sec), leaf count = 30

$$\left\{-2\,\ln\left(1+x\right)-\frac{1}{x}\sqrt{4\,x^2y\left(x\right)+1}+2\,x+\_C1=0\right\}$$

ODE No. 695

$$y'(x) = \frac{x^4 + x^3 + x^2 y(x)^2 + x y(x)^2 + y(x)\log(x-1)}{x \log(x-1)}$$

✓ **Mathematica** : cpu = 0.0556494 (sec), leaf count = 34

$$\{\{y(x) \to x \tan\left(c_1 + 2\text{Ei}(\log(x-1)) + 3\text{Ei}(2\log(x-1)) + \text{Ei}(3\log(x-1))\right)\}\}$$

✓ **Maple** : cpu = 0.058 (sec), leaf count = 39

$$\{y(x) = \tan\left(-Ei(1, -3\ln(x-1)) - 3\,Ei(1, -2\ln(x-1)) - 2\,Ei(1, -\ln(x-1)) + \_C1\right) x\}$$

ODE No. 696

$$y'(x) = \frac{e^{x+1}x^3 + 7e^{x+1} x y(x)^2 + y(x)\log(x-1)}{x \log(x-1)}$$

✗ **Mathematica** : cpu = 3599.95 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.069 (sec), leaf count = 32

$$\left\{y(x) = \frac{x\sqrt{7}}{7}\tan\left(\left(\mathrm{e}\int \frac{x\mathrm{e}^{x}}{\ln(x-1)}\,\mathrm{d}x + \_C1\right)\sqrt{7}\right)\right\}$$

ODE No. 697

$$y'(x) = e^{2x/3}\left(e^{-2x}y(x)^3 + e^{-4x/3}y(x)^2 + 1\right)$$

✓ **Mathematica** : cpu = 0.20948 (sec), leaf count = 114

$$\text{Solve}\left[-\frac{35}{3}\text{RootSum}\left[-35\#1^3 + 9\sqrt[3]{35}\#1 - 35\&, \frac{\log\left(\frac{3e^{-4x/3}y(x)+e^{-2x/3}}{\sqrt[3]{35}\sqrt[3]{e^{-2x}}} - \#1\right)}{3\sqrt[3]{35} - 35\#1^2}\&\right] = c_1 + \frac{1}{9}35^{2/3}e^{4x/3}(e^{-}$$

✓ **Maple** : cpu = 0.11 (sec), leaf count = 40

$$\left\{y(x) = RootOf\left(-x + 3\int^{\_Z}\left(3\_a^3 + 3\_a^2 - 2\_a + 3\right)^{-1} d\_a + \_C1\right)\left(\mathrm{e}^{-\frac{2x}{3}}\right)^{-1}\right\}$$

ODE No. 698

$$y'(x) = e^x \left(e^{-3x} y(x)^3 + e^{-2x} y(x)^2 + 1\right)$$

✓ **Mathematica** : cpu = 0.216505 (sec), leaf count = 108

$$\text{Solve}\left[-\frac{19}{3}\text{RootSum}\left[-19\#1^3 + 6\sqrt[3]{38}\#1 - 19\&, \frac{\log\left(\frac{3e^{-2x}y(x)+e^{-x}}{\sqrt[3]{38}\sqrt[3]{e^{-3x}}} - \#1\right)}{2\sqrt[3]{38} - 19\#1^2}\&\right] = c_1 + \frac{1}{9}38^{2/3}e^{2x}\left(e^{-3x}\right)^{2/}$$

✓ **Maple** : cpu = 0.097 (sec), leaf count = 34

$$\left\{ y(x) = \frac{RootOf\left(-x + \int^{\_Z} \left(\_a^3 + \_a^2 - \_a + 1\right)^{-1} d\_a + \_C1\right)}{e^{-x}} \right\}$$

ODE No. 699

$$y'(x) = \frac{x\left(3x^2\sqrt{x^2+3y(x)} - 2x - 2\right)}{3(x+1)}$$

✓ **Mathematica** : cpu = 0.246708 (sec), leaf count = 101

$$\left\{\left\{y(x) \to \frac{1}{48}\left(-24c_1x^3 + 36c_1x^2 - 72c_1x + 72c_1\log(x+1) + 36c_1^2 + 4x^6 - 12x^5 + 33x^4 - 36x^3 - 24x^3 \text{lo}\right.\right.\right.$$

✓ **Maple** : cpu = 0.333 (sec), leaf count = 36

$$\left\{ \_C1 + \frac{x^3}{2} - \frac{3\,x^2}{4} - \frac{3\,\ln(1+x)}{2} + \frac{3\,x}{2} - \sqrt{x^2 + 3\,y(x)} = 0 \right\}$$

ODE No. 700

$$y'(x) = \frac{1}{xy(x)\left(xy(x)^2 + x + 1\right)}$$

✓ **Mathematica** : cpu = 0.0715526 (sec), leaf count = 76

$$\left\{\left\{y(x) \to -\frac{\sqrt{2xW\left(c_1e^{\frac{1}{2x}-\frac{1}{2}}\right) + x - 1}}{\sqrt{x}}\right\}, \left\{y(x) \to \frac{\sqrt{2xW\left(c_1e^{\frac{1}{2x}-\frac{1}{2}}\right) + x - 1}}{\sqrt{x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.126 (sec), leaf count = 62

$$\left\{y(x) = \frac{1}{x}\sqrt{x\left(2\,lambertW\left(1/2\_C1\,e^{-1/2\,\frac{x-1}{x}}\right)x + x - 1\right)}, y(x) = -\frac{1}{x}\sqrt{x\left(2\,lambertW\left(1/2\_C1\,e^{-1/2\right.\right.}}\right.$$

ODE No. 701

$$y'(x) = \frac{x^4 + x^4\log(x) - 2x^2y(x) - 2x^2y(x)\log(x) + y(x)^2 + y(x)^2\log(x) + 2e^x x - 2x - \log(x) - 1}{e^x - 1}$$

✗ **Mathematica** : cpu = 3599.95 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 6.091 (sec), leaf count = 71

$$\left\{y(x) = 1\left(-x^2\left(e^{\int\frac{\ln(x)+1}{e^x-1}\,dx}\right)^2 + \_C1\,x^2 + \left(e^{\int\frac{\ln(x)+1}{e^x-1}\,dx}\right)^2 + \_C1\right)\left(-\left(e^{\int\frac{\ln(x)+1}{e^x-1}\,dx}\right)^2 + \_C1\right)^{-1}\right\}$$

ODE No. 702

$$y'(x) = \frac{-x^3 + x^3(-\log(x)) - xy(x)^2 + xy(x) - e^x y(x) - xy(x)^2\log(x)}{x\left(x - e^x\right)}$$

✗ **Mathematica** : cpu = 3599.95 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.098 (sec), leaf count = 35

$$\left\{y(x) = \tan\left(\left(\int\frac{x\ln(x)}{e^x - x}\,dx + \int\frac{x}{e^x - x}\,dx + \_C1\right)x\right)\right\}$$

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 = 3602.39 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.293 (sec), leaf count = 44

$$\left\{y(x) = \frac{e^{dilog(x)}}{xe^x(x-1)}\left(\int -\frac{e^{dilog(x)}(x + \ln(x))}{(x-1)^2 e^x}\,dx + \_C1\right)^{-1}\right\}$$

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 = 3599.95 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.067 (sec), leaf count = 38

$$\left\{y(x) = \frac{x}{a}\tan\left(2\sqrt{ab}\left(\_C1 + \int \frac{x^3}{x\ln(x) - 1}\,dx\right)\right)\sqrt{ab}\right\}$$

ODE No. 705

$$y'(x) = \frac{y(x)\left(x^4 + x^3 + \log(y(x)) + x\right)}{x}$$

✓ **Mathematica** : cpu = 0.0553384 (sec), leaf count = 30

$$\left\{\left\{y(x) \to x^x e^{c_1 x + \frac{x^4}{3} + \frac{x^3}{2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.21 (sec), leaf count = 24

$$\left\{y(x) = e^{\frac{x^4}{3}} e^{\frac{x^3}{2}} e^{x\_C1} x^x\right\}$$

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 = 4354.05 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.66 (sec), leaf count = 65

$$\left\{\int_{\_b}^{y(x)} -\frac{1}{2\_a + 2}\left(-\frac{x^2(\_a + 1)\ln(\_a - 1)}{2} + \frac{x^2(\_a + 1)\ln(\_a + 1)}{2} + x^2(\_a + 1)\ln(x) + 4\_a - 4\right)\right.$$

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 = 0 (sec), leaf count = 0 , timed out

`timed out`

✓ **Maple** : cpu = 0.547 (sec), leaf count = 105

$$\left\{\int_{\_b}^{y(x)} \frac{1}{4\_a+4}\left(\frac{x^2(\_a+1)(\ln(\_a+1))^2}{4}+x^2\left(-\frac{\ln(\_a-1)}{2}+\ln(x)\right)(\_a+1)\ln(\_a+1)+\frac{x^2(\_$$

ODE No. 708

$$y'(x) = \frac{(4ax-y(x)^2)^3}{y(x)(4ax-y(x)^2-1)}$$

✓ **Mathematica** : cpu = 1.82677 (sec), leaf count = 89

$$\text{Solve}\left[2a\left(x-\frac{\text{RootSum}\left[-\#1^3+2\#1a-2a\&,\frac{\#1a\log(-\#1+4ax-y(x)^2)-a\log(-\#1+4ax-y(x)^2)}{2a-3\#1^2}\&\right]}{2a}\right)=c_1,y(x)$$

✓ **Maple** : cpu = 27.023 (sec), leaf count = 229

$$\left\{\int_{\_b}^{x} -\frac{(4\_a\,a-(y(x))^2)^3}{-(y(x))^6+12\_a\,a(y(x))^4+(-48\_a^2a^2+2a)(y(x))^2+64\_a^3a^3-8\_a\,a^2+2a}\,d\_a+\int^{y(x}$$

ODE No. 709

$$y'(x) = \frac{x^3\sqrt{4ax-y(x)^2}+2ax+2a}{(x+1)y(x)}$$

✓ **Mathematica** : cpu = 4.11342 (sec), leaf count = 217

$$\left\{\left\{y(x)\to -\frac{1}{6}\sqrt{144ax-24c_1x^3+36c_1x^2-72c_1x+72c_1\log(x+1)-36c_1^2-4x^6+12x^5-33x^4+36x^3}\right.\right.$$

✓ **Maple** : cpu = 0.28 (sec), leaf count = 39

$$\left\{-\sqrt{-(y(x))^2+4ax}-\frac{x^3}{3}+\frac{x^2}{2}-x+\ln(1+x)-\_C1=0\right\}$$

ODE No. 710

$$y'(x) = \frac{2x^3 + 4x^2y(x) + 2xy(x)^2 + 2x + e^{\frac{1}{x}} - \log(x)}{\log(x) - e^{\frac{1}{x}}}$$

✗ **Mathematica** : cpu = 3599.95 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 2.55 (sec), leaf count = 31

$$\left\{y(x) = -x + \tan\left(2\_C1 - 2\int -\frac{x}{\ln(x) - e^{x^{-1}}}\,dx\right)\right\}$$

ODE No. 711

$$y'(x) = -\frac{y(x)(x\log(y(x)) + \log(y(x)) - 1)}{x+1}$$

✓ **Mathematica** : cpu = 0.167683 (sec), leaf count = 28

$$\left\{\left\{y(x) \to e^{c_1 e^{-x} + e^{-x-1}\mathrm{Ei}(x+1)}\right\}\right\}$$

✓ **Maple** : cpu = 0.141 (sec), leaf count = 31

$$\left\{y(x) = 1 e^{\frac{\_C1}{e^x}}\left(e^{\frac{Ei(1,-1-x)}{e^x e}}\right)^{-1}\right\}$$

ODE No. 712

$$y'(x) = \frac{\frac{x^2}{2} + x^3\sqrt{x^2 - 4y(x) + 2x + 1} + x + \frac{1}{2}}{x+1}$$

✓ **Mathematica** : cpu = 0.322972 (sec), leaf count = 115

$$\left\{\left\{y(x) \to \frac{1}{36}(24c_1x^3 - 36c_1x^2 + 72c_1x - 72c_1\log(x+1) - 36c_1^2 + 132c_1 - 4x^6 + 12x^5 - 33x^4 - 8x^3 + 2$$

✓ **Maple** : cpu = 0.375 (sec), leaf count = 38

$$\left\{\_C1 - \frac{2x^3}{3} + x^2 - 2x + 2\ln(1+x) - \sqrt{x^2 + 2x + 1 - 4y(x)} = 0\right\}$$

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 = 0.123156 (sec), leaf count = 649

$$\left\{\left\{y(x) \to \frac{1}{a^2\text{Root}\left[\#1^6\left(16e^{12c_1} + 16x^3\right) - \frac{24\#1^4x^2}{a^4} + \frac{8\#1^3x^{3/2}}{a^6} + \frac{9\#1^2x}{a^8} - \frac{6\#1\sqrt{x}}{a^{10}} + \frac{1}{a^{12}}\&, 1\right]} - \frac{a\sqrt{x} - a -}{a}\right.\right.$$

✓ **Maple** : cpu = 0.403 (sec), leaf count = 86

$$\left\{y(x) = \frac{1}{2\,a}\left(3\,\tanh\left(\mathit{RootOf}\left(729\,x^3(\tanh(\_Z))^6\,a^6 - 2187\,x^3(\tanh(\_Z))^4\,a^6 + 2187\,x^3(\tanh(\_Z))^2\,a^6\right.\right.\right.\right.$$

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 = 3599.95 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.207 (sec), leaf count = 96

$$\left\{y(x) = 1\mathrm{e}^{\int \frac{x\ln(x)+x^2+\ln\left(x^{-1}\right)-\mathrm{e}^x}{\left(-\ln\left(x^{-1}\right)+\mathrm{e}^x\right)x}\,\mathrm{d}x}\left(\int \frac{x(x+\ln(x))}{-\ln\left(x^{-1}\right)+\mathrm{e}^x}\mathrm{e}^{\int \frac{x\ln(x)+x^2+\ln\left(x^{-1}\right)-\mathrm{e}^x}{\left(-\ln\left(x^{-1}\right)+\mathrm{e}^x\right)x}\,\mathrm{d}x}\,\mathrm{d}x + \_C1\right)^{-1}\right\}$$

ODE No. 715

$$y'(x) = \frac{-\frac{x^2}{2} + x^3\sqrt{x^2 + 4y(x) - 4x} + \frac{x}{2} + 1}{x+1}$$

✓ **Mathematica** : cpu = 0.253764 (sec), leaf count = 104

$$\left\{\left\{y(x) \to \frac{1}{36}\left(-24c_1x^3 + 36c_1x^2 - 72c_1x + 72c_1\log(x+1) + 36c_1^2 + 4x^6 - 12x^5 + 33x^4 - 36x^3 - 24x^3\,\text{lo}\right.\right.\right.$$

✓ **Maple** : cpu = 0.327 (sec), leaf count = 39

$$\left\{\_C1 + \frac{2\,x^3}{3} - x^2 + 2\,x - 2\,\ln(1+x) - \sqrt{x^2 - 4\,x + 4\,y(x)} = 0\right\}$$

ODE No. 716

$$y'(x) = \frac{\sqrt{9x^4 - 4y(x)^3} + 3x^4 + 3x^3}{(x+1)y(x)^2}$$

✓ **Mathematica** : cpu = 3.94317 (sec), leaf count = 133

$$\left\{\left\{y(x) \to \left(-\frac{3}{2}\right)^{2/3} \sqrt[3]{8c_1 \log(x+1) - 4c_1^2 + x^4 - 4\log^2(x+1)}\right\}, \left\{y(x) \to \left(\frac{3}{2}\right)^{2/3} \sqrt[3]{8c_1 \log(x+1) -\right.$$

✓ **Maple** : cpu = 0.348 (sec), leaf count = 37

$$\left\{\int_{\_b}^{y(x)} \_a^2 \frac{1}{\sqrt{9\,x^4 - 4\,\_a^3}} \mathrm{d}\_a - \ln(1+x) - \_C1 = 0\right\}$$

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 = 0.306655 (sec), leaf count = 46

$$\left\{\left\{y(x) \to \frac{1}{4}\left(-a^2 - 2ax - 8c_1 \log(x+1) + 4c_1^2 - x^2 + 4\log^2(x+1)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.395 (sec), leaf count = 33

$$\left\{\_C1 + \frac{a}{2} + 2\ln(1+x) - \sqrt{x^2 + 2\,ax + a^2 + 4\,y(x)} = 0\right\}$$

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 = 0.196032 (sec), leaf count = 127

$$\text{Solve}\left[\frac{11}{3}\text{RootSum}\left[11\#1^3 + 15\sqrt[3]{11}\#1 + 11\&, \frac{\log\left(\frac{3e^{2x^2}xy(x)+e^{x^2}x}{\sqrt[3]{11}\sqrt[3]{e^{3x^2}x^3}} - \#1\right)}{11\#1^2 + 5\sqrt[3]{11}}\&\right] = c_1 + \frac{11^{2/3}e^{x^2}x^3}{18\sqrt[3]{e^{3x^2}x^3}}, y(x)\right]$$

✓ **Maple** : cpu = 0.067 (sec), leaf count = 44

$$\left\{y(x) = \frac{-11\, RootOf\left(-5\, x^2 + 20250\, \int^{\_Z} (121\,\_a^3 + 3375\,\_a - 3375)^{-1}\, d\_a + 6\_C1\right) - 15}{45\, e^{x^2}}\right\}$$

ODE No. 719

$$y'(x) = \frac{e^{-x} y(x) \left(x^2 y(x) \log(2x) - e^x - x \log(2x)\right)}{x}$$

✓ **Mathematica** : cpu = 0.0944455 (sec), leaf count = 49

$$\left\{\left\{y(x) \to \frac{2^{e^{-x}} x^{e^{-x}-1}}{c_1 e^{\text{Ei}(-x)} + 2^{e^{-x}} x^{e^{-x}}}\right\}\right\}$$

✓ **Maple** : cpu = 0.143 (sec), leaf count = 34

$$\left\{y(x) = \left(2^{-e^{-x}} x^{-e^{-x}+1}\_C1\, e^{-Ei(1,x)} + x\right)^{-1}\right\}$$

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 = 4.22034 (sec), leaf count = 314

$$\left\{\left\{y(x) \to \sqrt[3]{6c_1x^3 - 9c_1x^2 + 18c_1x - 18c_1 \log(x+1) - 9c_1^2 - x^6 + 3x^5 - 6x^4 + 9x^3 + 6x^3 \log(x+1) - 9}\right.\right.$$

✓ **Maple** : cpu = 0.23 (sec), leaf count = 48

$$\left\{\int_{\_b}^{y(x)} \_a^2 \frac{1}{\sqrt{9\, x^4 - 4\,\_a^3}}\, d\_a - \frac{x^3}{3} + \frac{x^2}{2} - x + \ln(1+x) - \_C1 = 0\right\}$$

ODE No. 721

$$y'(x) = \frac{1}{36}\sqrt{x}\left(18x^{3/2} + x^6 - 12x^3 y(x) + 36y(x)^2\right)$$

✓ **Mathematica** : cpu = 0.0172497 (sec), leaf count = 27

$$\left\{\left\{y(x) \to \frac{1}{c_1 - \frac{2x^{3/2}}{3}} + \frac{x^3}{6}\right\}\right\}$$

✓ **Maple** : cpu = 0.08 (sec), leaf count = 19

$$\left\{y(x) = \frac{x^3}{6} + \left(\_C1 - \frac{2}{3}x^{\frac{3}{2}}\right)^{-1}\right\}$$

ODE No. 722

$$y'(x) = -\frac{y(x)^3}{x(-y(x) + 2y(x)\log(x) - 1)}$$

✓ **Mathematica** : cpu = 38.5275 (sec), leaf count = 490

$$\text{Solve}\left[-\frac{\sqrt[3]{-2}\left((-2)^{2/3} - \frac{(1-2\log(x))^2\left(-\frac{1}{(2\log(x)-1)^3}\right)^{2/3}(y(x)(5-4\log(x))+2)}{2\sqrt[3]{2}(y(x)(2\log(x)-1)-1)}\right)\left(\frac{y(x)(4\log(x)-5)-2}{\sqrt[3]{2}\sqrt[3]{-\frac{1}{(2\log(x)-1)^3}}(2\log(x)-1)(y(x)(2\log(x$$

✓ **Maple** : cpu = 0.366 (sec), leaf count = 70

$$\left\{y(x) = 1e^{RootOf\left(-e^{\_Z}\ln\left(\frac{e^{\_Z}+2}{2x^4}\right)+3\_C1\,e^{\_Z}+\_Z\,e^{\_Z}+2\right)}\left(1 + (2\ln(x) - 1)\,e^{RootOf\left(-e^{\_Z}\ln\left(\frac{e^{\_Z}+2}{2x^4}\right)+3\_C1\,e^{\_Z}+\_$$

ODE No. 723

$$y'(x) = \frac{2a}{32a^3x^2 - 16a^2xy(x)^2 + 2ay(x)^4 + y(x)}$$

✓ **Mathematica** : cpu = 0.0651788 (sec), leaf count = 663

$$\left\{\left\{y(x) \to -\frac{\sqrt[3]{-1024a^6c_1^3 + 9216a^5c_1x - 432a^2 + \sqrt{4\left(-64a^4c_1^2 - 192a^3x\right)^3 + \left(-1024a^6c_1^3 + 9216a^5c_1x \cdots\right.}}}{12\sqrt[3]{2}a} \cdots\right.\right.$$

✓ **Maple** : cpu = 0.079 (sec), leaf count = 856

$$\left\{y(x) = -\frac{1}{12\,a}\left(-8\,\_C1\,a^2\sqrt[3]{\left(64\,\_C1^3a^4 - 576\,\_C1\,a^3x + 3\sqrt{-12288\,\_C1^4a^7x + 24576\,\_C1^2a^6x^2 - \cdots}\right.}\right.\right.$$

ODE No. 724

$$y'(x) = -\frac{y(x)^3}{x(-y(x) + y(x)\log(x) - 1)}$$

✓ **Mathematica** : cpu = 29.2439 (sec), leaf count = 422

$$\text{Solve}\left[-\frac{\sqrt[3]{-2}\left(\frac{1-y(x)(\log(x)-4)}{\sqrt[3]{2}\sqrt[3]{-\frac{1}{(\log(x)-1)^3}}(\log(x)-1)(y(x)(\log(x)-1)-1)} + (-2)^{2/3}\right)\left(\frac{2^{2/3}(y(x)(\log(x)-4)-1)}{\sqrt[3]{-\frac{1}{(\log(x)-1)^3}}(\log(x)-1)(y(x)(\log(x)-1)-1)} + (\cdots\right.}{\cdots}\right.$$

✓ **Maple** : cpu = 0.093 (sec), leaf count = 18

$$\left\{y(x) = \left(-lambertW\left(\_C1\,e^{-2}x\right) + \ln(x) - 2\right)^{-1}\right\}$$

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 = 0.252551 (sec), leaf count = 19

$$\{\{y(x) \to \tan(c_1 + \log(2)\mathrm{li}(x) + x) - x\}\}$$

✓ **Maple** : cpu = 0.968 (sec), leaf count = 25

$$\{y(x) = -x - \tan(\ln(2)\, Ei(1, -\ln(x)) + \_C1 - x)\}$$

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 = 0.0722466 (sec), leaf count = 625

$$\left\{\left\{y(x) \to \frac{1}{a^2 \mathrm{Root}\left[\#1^6\left(16e^{12c_1} + 16x^3\right) - \frac{24\#1^4x^2}{a^4} + \frac{8\#1^3x^{3/2}}{a^6} + \frac{9\#1^2x}{a^8} - \frac{6\#1\sqrt{x}}{a^{10}} + \frac{1}{a^{12}}\&, 1\right]} - \frac{a\sqrt{x} + bx -}{a}\right.\right.$$

✓ **Maple** : cpu = 0.306 (sec), leaf count = 83

$$\left\{y(x) = \frac{1}{2\,a}\left(3\,\tanh\left(RootOf\left(-729\,x^3(\tanh(\_Z))^6\,a^6 + 2187\,x^3(\tanh(\_Z))^4\,a^6 - 2187\,x^3(\tanh(\_Z))^2\right.\right.\right.\right.$$

ODE No. 727

$$y'(x) = \frac{y(x)(y(x) + 2x + 2)}{(x+1)(\log(y(x)) + 2x - 1)}$$

✓ **Mathematica** : cpu = 0.406343 (sec), leaf count = 29

$$\left\{\left\{y(x) \to \frac{W\left(e^{-2x}(c_1 + \log(x+1))\right)}{c_1 + \log(x+1)}\right\}\right\}$$

✓ **Maple** : cpu = 0.809 (sec), leaf count = 25

$$\left\{y(x) = \mathrm{e}^{-lambertW\left((\ln(1+x) - \_C1)\mathrm{e}^{-2\,x}\right) - 2\,x}\right\}$$

ODE No. 728

$$y'(x) = \frac{y(x)\left(x^3 + 3y(x)^2\right)}{x\left(6y(x)^2 + x\right)}$$

✓ **Mathematica** : cpu = 0.340974 (sec), leaf count = 72

$$\left\{\left\{y(x) \to -\frac{\sqrt{x}\sqrt{W\left(\frac{6e^{2c_1+x^2}}{x}\right)}}{\sqrt{6}}\right\}, \left\{y(x) \to \frac{\sqrt{x}\sqrt{W\left(\frac{6e^{2c_1+x^2}}{x}\right)}}{\sqrt{6}}\right\}\right\}$$

✓ **Maple** : cpu = 0.347 (sec), leaf count = 50

$$\left\{\left((y(x))^{-2} + 6\,x^{-1}\right)^{-1} = \frac{x}{54}\left(\mathrm{e}^{\mathit{RootOf}\left(x^2\mathrm{e}^{\_Z} - \mathrm{e}^{\_Z}\ln\left(\frac{\left(\mathrm{e}^{\_Z}+9\right)x}{2}\right) + 3\_C1\,\mathrm{e}^{\_Z} + \_Z\,\mathrm{e}^{\_Z} + 9\right)} + 9\right)\right\}$$

ODE No. 729

$$y'(x) = \frac{(x - y(x))y(x)}{x\left(x - y(x)^3\right)}$$

✓ **Mathematica** : cpu = 0.305178 (sec), leaf count = 327

$$\left\{\left\{y(x) \to \frac{\sqrt[3]{2}(6c_1 - 6\log(x))}{3\sqrt[3]{\sqrt{4\left(6c_1 - 6\log(x)\right)^3 + 2916x^2} + 54x}} - \frac{\sqrt[3]{\sqrt{4\left(6c_1 - 6\log(x)\right)^3 + 2916x^2} + 54x}}{3\sqrt[3]{2}}\right\}, \left\{y(\right.\right.$$

✓ **Maple** : cpu = 0.112 (sec), leaf count = 404

$$\left\{y(x) = -\frac{1}{6}\left(\left(i\left(-27\,x + 3\sqrt{24\_C1^3 - 72\_C1^2\ln(x) + 72\_C1\,(\ln(x))^2 - 24\,(\ln(x))^3 + 81\,x^2}\right)^{\frac{2}{3}} + \right.\right.\right.$$

ODE No. 730

$$y'(x) = \frac{e^x \left(2y(x)^{3/2} - 3e^x\right)^3}{4\sqrt{y(x)}\,(2y(x)^{3/2} - 3e^x + 2)}$$

✗ **Mathematica** : cpu = 49.3138 (sec), leaf count = 0 , could not solve

```
DSolve[Derivative[1][y][x] == (E^x*(-3*E^x + 2*y[x]^(3/2))^3)/(4*Sqrt[y[x]]*(2 - 3*E^x
```

✓ **Maple** : cpu = 1.89 (sec), leaf count = 41

$$\left\{ e^x - \int^{(y(x))^{\frac{3}{2}} - \frac{3e^x}{2}} \frac{2 + 2\_a}{3\_a^3 - 3\_a - 3} d\_a - \_C1 = 0 \right\}$$

ODE No. 731

$$y'(x) = \frac{2y(x) + 1}{x\,(2xy(x)^3 + xy(x)^2 - 2)}$$

✓ **Mathematica** : cpu = 0.303198 (sec), leaf count = 47

$$\text{Solve}\left[\frac{1}{64}(-4y(x)^2 + 4y(x) - 2\log(8y(x) + 4) + 3) - \frac{1}{4x(2y(x) + 1)} = c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.196 (sec), leaf count = 42

$$\left\{ y(x) = \frac{e^{RootOf\left(x\left(e^{\_Z}\right)^3 - 4x\left(e^{\_Z}\right)^2 + 8x\_C1\,e^{\_Z} + 2\_Z\,e^{\_Z}x + 3e^{\_Z}x + 16\right)}}{2} - \frac{1}{2} \right\}$$

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 = 0.464142 (sec), leaf count = 110

$$\left\{\left\{y(x) \to \frac{1}{36}(-9a^2 - 18ax - 24c_1x^3 + 36c_1x^2 - 72c_1x + 72c_1\log(x + 1) + 36c_1^2 + 4x^6 - 12x^5 + 33x^4 -\right.\right.$$

✓ **Maple** : cpu = 0.399 (sec), leaf count = 43

$$\left\{ \_C1 + \frac{2x^3}{3} - x^2 + 2x - 2\ln(1 + x) - \sqrt{x^2 + 2ax + a^2 + 4y(x)} = 0 \right\}$$

ODE No. 733

$$y'(x) = \csc(x)\left(x^4\log(2x) - 2x^2y(x)\log(2x) + y(x)^2\log(2x) - \log(2x) + 2x\sin(x)\right)$$

✗ **Mathematica** : cpu = 3599.96 (sec), leaf count = 0 , timed out

```
$Aborted
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(y(x),x) = (2*x*sin(x)-ln(2*x)+ln(2*x)*x^4-2*ln(2*x)*x^2*y(x)+ln(2*x)*y(x)^
```

ODE No. 734

$$y'(x) = \frac{y(x)\left(x^3 - x\log(y(x)) - \log(y(x))\right)}{x+1}$$

✓ **Mathematica** : cpu = 0.110568 (sec), leaf count = 37

$$\left\{\left\{y(x)\to \exp\left(-c_1e^{-x} - e^{-x-1}\text{Ei}(x+1) + x^2 - 3x + 4\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.16 (sec), leaf count = 39

$$\left\{y(x) = \frac{e^{x^2}e^4}{(e^x)^3}e^{\frac{-C1}{e^x}}e^{\frac{Ei(1,-1-x)}{e^x e}}\right\}$$

ODE No. 735

$$y'(x) = \frac{(2y(x)\log(x) - 1)^3}{x(-y(x) + 2y(x)\log(x) - 1)}$$

✗ **Mathematica** : cpu = 3599.95 (sec), leaf count = 0 , timed out

```
$Aborted
```

✓ **Maple** : cpu = 0.075 (sec), leaf count = 78

$$\left\{y(x) = \frac{71\,RootOf\left(-82944\int^{-Z}(5041\_a^3 - 27648\_a + 27648)^{-1}\,d\_a - 16\ln(x) + 3\_C\right.}{(142\ln(x) - 71)\,RootOf\left(-82944\int^{-Z}(5041\_a^3 - 27648\_a + 27648)^{-1}\,d\_a - 16\ln(x) + 3\_\right.}\right.$$

ODE No. 736

$$y'(x) = \frac{x^4 - 2x^2y(x) + 2x^2 + y(x)^2 + 2x - 1}{x + 1}$$

✓ **Mathematica** : cpu = 0.0981001 (sec), leaf count = 31

$$\left\{\left\{y(x) \to \frac{(x+1)^2}{c_1 - \frac{x^2}{2} - x} + x^2 + 1\right\}\right\}$$

✓ **Maple** : cpu = 0.197 (sec), leaf count = 43

$$\left\{y(x) = \frac{\_C1\,(x^4 + 2\,x^3 - x^2 - 2\,x - 2) + x^2 + 1}{1 + (x^2 + 2\,x)\_C1}\right\}$$

ODE No. 737

$$y'(x) = \frac{x(2x^3 - 2xy(x) + x - 1)}{x^2 - y(x)}$$

✓ **Mathematica** : cpu = 0.0295588 (sec), leaf count = 36

$$\left\{\left\{y(x) \to \frac{1}{2}\left(W\left(-e^{c_1 + \frac{4x^3}{3} - 2x^2 - 1}\right) + 1\right) + x^2\right\}\right\}$$

✓ **Maple** : cpu = 0.093 (sec), leaf count = 29

$$\left\{y(x) = x^2 + \frac{1}{2} lambertW\left(-2\,\frac{e^{4/3\,x^3}\_C1\,e^{-1}}{(e^{x^2})^2}\right) + \frac{1}{2}\right\}$$

ODE No. 738

$$y'(x) = \frac{2a}{32a^3 - 16a^2xy(x)^2 + 2ax^2y(x)^4 - x^2y(x)}$$

✓ **Mathematica** : cpu = 0.470074 (sec), leaf count = 1347

$$\left\{\left\{y(x) \to -\frac{4a + e^{c_1}}{12a} + \frac{\sqrt[3]{4608x^2a^4 - 128x^3a^3 + 1152e^{c_1}x^2a^3 - 96e^{c_1}x^3a^2 - 432x^3a^2 - 24e^{2c_1}x^3a - 2e^{3c}}}{}\right.\right.$$

✓ **Maple** : cpu = 0.815 (sec), leaf count = 1054

$$\left\{y(x)=\frac{1}{24\_C1\,xa}\left(-2\,x\sqrt[3]{-216\_C1^{3}a^{2}x^{3}+576\_C1^{2}a^{3}x^{2}+12\,a\_C1\,x^{2}\sqrt{\frac{(324\_C1^{4}a^{2}+3\_C1)\,x}{}}}\right.\right.$$

ODE No. 739

$$y'(x)=\frac{2y(x)+1}{x\left(2xy(x)^2+xy(x)-2\right)}$$

✓ **Mathematica** : cpu = 0.221075 (sec), leaf count = 39

$$\mathrm{Solve}\left[\frac{1}{8}(-2y(x)+\log(4y(x)+2)-1)-\frac{1}{2x(2y(x)+1)}=c_1,y(x)\right]$$

✓ **Maple** : cpu = 0.193 (sec), leaf count = 35

$$\left\{y(x)=\frac{\mathrm{e}^{RootOf\left(x(\mathrm{e}^{\_Z})^2+2\,x\_C1\,\mathrm{e}^{\_Z}-\_Z\,\mathrm{e}^{\_Z}x-\mathrm{e}^{\_Z}x+4\right)}}{2}-\frac{1}{2}\right\}$$

ODE No. 740

$$y'(x)=\frac{x^4-2x^2y(x)^2+y(x)^4+x}{y(x)}$$

✓ **Mathematica** : cpu = 0.0610398 (sec), leaf count = 74

$$\left\{\left\{y(x)\to-\frac{\sqrt{2c_1x^2+2x^3-1}}{\sqrt{2}\sqrt{c_1+x}}\right\},\left\{y(x)\to\frac{\sqrt{2c_1x^2+2x^3-1}}{\sqrt{2}\sqrt{c_1+x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.107 (sec), leaf count = 72

$$\left\{y(x)=\frac{\sqrt{2}}{2\_C1+2\,x}\sqrt{(\_C1+x)\,(2\_C1\,x^2+2\,x^3-1)},y(x)=-\frac{\sqrt{2}}{2\_C1+2\,x}\sqrt{(\_C1+x)\,(2\_C1\,x^2\right.$$

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 = 2.93149 (sec), leaf count = 175

$$\text{Solve}\left[\frac{1}{2}\left(x^2 - a^{3/2}\text{RootSum}\left[\#1^3b^3 + 3\#1^2ab^2y(x)^2 + \#1a^{3/2}b^2 + 3\#1a^2by(x)^4 + a^{5/2}by(x)^2 + a^{5/2}b + a\right.\right.\right.$$

✓ **Maple** : cpu = 1.05 (sec), leaf count = 246

$$\left\{\int_{\_b}^{x} \frac{\left(\_a^2b + a(y(x))^2\right)^3 \_a}{a^3}\left(b\left((y(x))^2 + 1\right)a^{\frac{5}{2}} + a^{\frac{3}{2}}b^2\_a^2 + \left(\_a^2b + a(y(x))^2\right)^3\right)^{-1} \mathrm{d}\_a + \int^{y(x)} 1\left(\left((-\right.\right.\right.$$

ODE No. 742

$$y'(x) = -\frac{(-\cos(y(x)) + x + 1)\cos(y(x))}{(x+1)(x\sin(y(x)) - 1)}$$

✓ **Mathematica** : cpu = 4.36077 (sec), leaf count = 3913

$$\left\{\left\{y(x) \to -\sec^{-1}\left(\frac{c_1x^3}{x^2-1} + \frac{\log(x+1)x^3}{x^2-1} - \frac{c_1^3x^3}{(x^2-1)\left(c_1^2 + 2\log(x+1)c_1 + \log^2(x+1) + 1\right)} - \frac{}{(x^2 -}\right.\right.\right.$$

✓ **Maple** : cpu = 1.862 (sec), leaf count = 239

$$\left\{y(x) = \arctan\left(\frac{1}{\_C1^2 - 2\_C1\ \ln(1+x) + (\ln(1+x))^2 + 1}\left(\left(-\ln(1+x) + \_C1\right)\sqrt{(\ln(1+x))^2 - 2}\right.\right.\right.$$

ODE No. 743

$$y'(x) = -\frac{i(x^4 + 8x^2y(x)^2 + 16y(x)^4 + 8ix)}{32y(x)}$$

✗ **Mathematica** : cpu = 46.935 (sec), leaf count = 0 , could not solve

```
DSolve[Derivative[1][y][x] == ((-I/32)*((8*I)*x + x^4 + 8*x^2*y[x]^2 + 16*y[x]^4))/y[x
```

✓ **Maple** : cpu = 0.453 (sec), leaf count = 296

$$\left\{y(x) = \sqrt{2}\sqrt{\left(\mathrm{Ai}\left(\frac{(-\sqrt{3}+i)\,x}{2}\right)\_C1 + \mathrm{Bi}\left(\frac{(-\sqrt{3}+i)\,x}{2}\right)\right)\left(\_C1\ \left(i\sqrt{3}+1\right)\mathrm{Ai}^{(1)}\left(\frac{(-\sqrt{3}+i)\,x}{2}\right.\right.}\right.$$

ODE No. 744

$$y'(x) = \frac{x}{x^4 + 2x^2y(x)^2 + y(x)^4 - y(x)}$$

✓ **Mathematica** : cpu = 0.0458892 (sec), leaf count = 510

$$\left\{\left\{y(x) \to \frac{\sqrt[3]{144c_1x^2 + \sqrt{4\left(12x^2 - 4c_1^2\right)^3 + \left(144c_1x^2 + 16c_1^3 - 108\right)^2} + 16c_1^3 - 108}}{6\sqrt[3]{2}} - \frac{}{3\ 2^{2/3}\sqrt[3]{144c_1x^2 \cdots}}\right.\right.$$

✓ **Maple** : cpu = 0.307 (sec), leaf count = 621

$$\left\{y(x) = \frac{1}{12}\left(-2\_C1\ \sqrt[3]{-36\_C1\ x^2 - 54 - \_C1^3 + 6\sqrt{48\,x^6 + 24\,x^4\_C1^2 + \left(3\_C1^4 + 108\_C1\right)x^2}}\right.\right.$$

ODE No. 745

$$y'(x) = \frac{(y(x)\log(x) - 1)^3}{x(-y(x) + y(x)\log(x) - 1)}$$

✗ **Mathematica** : cpu = 3599.95 (sec), leaf count = 0 , timed out

```
$Aborted
```

✓ **Maple** : cpu = 0.075 (sec), leaf count = 78

$$\left\{y(x) = \frac{47\, RootOf\left(-27783 \int^{\_Z} (2209\_a^3 - 9261\_a + 9261)^{-1} d\_a - 7\ln(x) + 3\_C1\right)}{(47\ln(x) - 47)\, RootOf\left(-27783 \int^{\_Z} (2209\_a^3 - 9261\_a + 9261)^{-1} d\_a - 7\ln(x) + 3\_C1\right)}\right.$$

ODE No. 746

$$y'(x) = -\frac{i(x^4 + 2x^2y(x)^2 + y(x)^4 + ix)}{y(x)}$$

✗ **Mathematica** : cpu = 45.7189 (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 = 0.417 (sec), leaf count = 232

$$\left\{y(x) = \frac{\sqrt{2}}{2\,\mathrm{Ai}\left(-\sqrt[3]{-8}\,ix\right)\_C1 + 2\,\mathrm{Bi}\left(-\sqrt[3]{-8}\,ix\right)}\sqrt{\left(\_C1\ \left(i\sqrt{3}+1\right)\mathrm{Ai}^{(1)}\left(-\sqrt[3]{-8}\,ix\right) + \left(i\sqrt{3}+1\right)\mathrm{Bi}^{(}\right.}\right.$$

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 = 3412.19 (sec), leaf count = 85

$$\left\{\left\{y(x) \to \frac{\exp\left(\int_1^x \frac{K[1]\log(2K[1])(-\cot(K[1]))-1}{K[1]}\,dK[1]\right)}{c_1 - \int_1^x K[2]\log(2K[2])\cot(K[2])\exp\left(\int_1^{K[2]} \frac{K[1]\log(2K[1])(-\cot(K[1]))-1}{K[1]}\,dK[1]\right)dK[2]}\right\}\right\}$$

✓ **Maple** : cpu = 0.366 (sec), leaf count = 75

$$\left\{y(x) = 1e^{\int \frac{-x\ln(x) - x\ln(2) - \tan(x)}{x\tan(x)}\,dx}\left(\int -\frac{x(\ln(2) + \ln(x))}{\tan(x)}e^{\int \frac{-x\ln(x) - x\ln(2) - \tan(x)}{x\tan(x)}\,dx}\,dx + \_C1\right)^{-1}\right\}$$

ODE No. 748

$$y'(x) = \frac{y(x)(y(x)+x)}{x\left(y(x)^3+x\right)}$$

✓ **Mathematica** : cpu = 0.292391 (sec), leaf count = 285

$$\left\{\left\{y(x)\to \frac{2\sqrt[3]{2}(c_1+\log(x))}{\sqrt[3]{\sqrt{2916x^2-864\left(c_1+\log(x)\right)^3}+54x}}+\frac{\sqrt[3]{\sqrt{2916x^2-864\left(c_1+\log(x)\right)^3}+54x}}{3\sqrt[3]{2}}\right\},\left\{y(x)\right.\right.$$

✓ **Maple** : cpu = 0.112 (sec), leaf count = 404

$$\left\{y(x)=\frac{1}{3}\left(\left(27\,x+3\,\sqrt{-24\_C1^3-72\_C1^2\ln(x)-72\_C1\,(\ln(x))^2-24\,(\ln(x))^3+81\,x^2}\right)^{\frac{2}{3}}+6\ln\right.\right.$$

ODE No. 749

$$y'(x) = \frac{x(x-y(x))^2(y(x)+x)^2}{y(x)}$$

✓ **Mathematica** : cpu = 0.099116 (sec), leaf count = 126

$$\left\{\left\{y(x)\to -\frac{\sqrt{x^2e^{4c_1+2x^2}-e^{4c_1+2x^2}+x^2+1}}{\sqrt{e^{4c_1+2x^2}+1}}\right\},\left\{y(x)\to \frac{\sqrt{x^2e^{4c_1+2x^2}-e^{4c_1+2x^2}+x^2+1}}{\sqrt{e^{4c_1+2x^2}+1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.146 (sec), leaf count = 192

$$\left\{y(x)=1\sqrt{\left(\left(x^2+1\right)e^{-\frac{x^2\left(x^2+2\right)}{2}}+\_C1\,\left(x^2-1\right)e^{-\frac{x^2\left(x^2-2\right)}{2}}\right)\left(\_C1\,e^{-\frac{x^2\left(x^2-2\right)}{2}}+e^{-\frac{x^2\left(x^2+2\right)}{2}}\right)\left(\_C1\,e^{-\frac{x^2}{}}\right.}\right.$$

ODE No. 750

$$y'(x) = \frac{y(x)\left(x^2 + 3y(x)^2\right)}{x\left(6y(x)^2 + x\right)}$$

✓ **Mathematica** : cpu = 0.325872 (sec), leaf count = 72

$$\left\{\left\{y(x) \to -\frac{\sqrt{x}\sqrt{W\left(\frac{6e^{2c_1+2x}}{x}\right)}}{\sqrt{6}}\right\}, \left\{y(x) \to \frac{\sqrt{x}\sqrt{W\left(\frac{6e^{2c_1+2x}}{x}\right)}}{\sqrt{6}}\right\}\right\}$$

✓ **Maple** : cpu = 0.33 (sec), leaf count = 49

$$\left\{\left((y(x))^{-2} + 6\,x^{-1}\right)^{-1} = \frac{x}{54}\left(\mathrm{e}^{RootOf\left(-\mathrm{e}^{\_Z}\ln\left(\frac{(\mathrm{e}^{\_Z}+9)x}{2}\right)+3\_C1\,\mathrm{e}^{\_Z}+\_Z\,\mathrm{e}^{\_Z}+2\,\mathrm{e}^{\_Z}x+9\right)} + 9\right)\right\}$$

ODE No. 751

$$y'(x) = \frac{y(x)\left(x^4 + x\log(y(x)) + \log(y(x))\right)}{x(x+1)}$$

✓ **Mathematica** : cpu = 0.0721657 (sec), leaf count = 30

$$\left\{\left\{y(x) \to (x+1)^x e^{c_1 x + \frac{x^3}{2} - x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.111 (sec), leaf count = 26

$$\left\{y(x) = \frac{(1+x)^x\,\mathrm{e}^{x\_C1}}{\mathrm{e}^{x^2}}\mathrm{e}^{\frac{x^3}{2}}\right\}$$

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 = 31.6196 (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 = 1.449 (sec), leaf count = 723

$$\left\{y(x) = \arctan\left(\frac{1}{36\,(\ln(1+x))^2 + (-24\,x^3 + 36\,x^2 - 72\_C1 - 72\,x)\ln(1+x) + 4\,x^6 - 12\,x^5 + 33\,x^4 +}\right.\right.$$

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 = 0.100554 (sec), leaf count = 41

$$\left\{\left\{y(x) \to \exp\left(-\frac{12x}{-12c_1 + 3x^4 - 4x^3 + 6x^2 - 12x + 12\log(x+1)}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.161 (sec), leaf count = 38

$$\left\{y(x) = e^{-12\,\frac{x}{3\,x^4 - 4\,x^3 + 6\,x^2 + 12\,\ln(1+x) - 12\_C1 - 12\,x}}\right\}$$

ODE No. 754

$$y'(x) = \frac{x^3 + xy(x)^2 + xy(x) + y(x)^3}{x^2}$$

✓ **Mathematica** : cpu = 0.0288053 (sec), leaf count = 47

$$\text{Solve}\left[\text{RootSum}\left[\#1^3 + \#1^2 + 1\&, \frac{\log\left(\frac{y(x)}{x} - \#1\right)}{3\#1^2 + 2\#1}\&\right] = c_1 + x, y(x)\right]$$

✓ **Maple** : cpu = 0.022 (sec), leaf count = 26

$$\left\{y(x) = \mathit{RootOf}\left(-\int^{\_Z}\left(\_a^3 + \_a^2 + 1\right)^{-1}d\_a + x + \_C1\right)x\right\}$$

ODE No. 755

$$y'(x) = \frac{y(x)^{3/2}}{x^2 - 2xy(x) + y(x)^2 + y(x)^{3/2}}$$

✓ **Mathematica** : cpu = 0.190534 (sec), leaf count = 2633

$$\left\{\left\{y(x) \to \frac{2}{3}\left(x + e^{c_1} + 2e^{2c_1}\right) - \frac{1}{3}\sqrt[3]{x^3 + 3e^{c_1}x^2 - 12e^{2c_1}x^2 + 3e^{2c_1}x + 12e^{3c_1}x + 48e^{4c_1}x + e^{3c_1} - 30e^{4c_1}\right.\right.$$

✓ **Maple** : cpu = 0.109 (sec), leaf count = 44

$$\left\{2\,\frac{\sqrt{y(x)}}{y(x) - x} + (y(x) - x)^{-1} - 2\,\frac{x}{(y(x) - x)\sqrt{y(x)}} - \_C1 = 0\right\}$$

ODE No. 756

$$y'(x) = \frac{x^6 + 2x^3y(x) + x^2y(x)^2 + y(x)^3}{x^4}$$

✓ **Mathematica** : cpu = 0.110958 (sec), leaf count = 95

$$\text{Solve}\left[-\frac{29}{3}\text{RootSum}\left[-29\#1^3 + 3\sqrt[3]{29}\#1 - 29\&, \frac{\log\left(\frac{\frac{3y(x)}{x^4} + \frac{1}{x^2}}{\sqrt[3]{29}\sqrt[3]{\frac{1}{x^6}}} - \#1\right)}{\sqrt[3]{29} - 29\#1^2}\&\right] = c_1 + \frac{1}{9}29^{2/3}\left(\frac{1}{x^6}\right)^{2/3}x^5, y(\right.$$

✓ **Maple** : cpu = 0.036 (sec), leaf count = 37

$$\left\{y(x) = \frac{\left(-3 + 29\,RootOf\left(-81\int^{\_Z}(841\_a^3 - 27\_a + 27)^{-1}d\_a + x + 3\_C1\right)\right)x^2}{9}\right\}$$

ODE No. 757

$$y'(x) = \frac{x^3 + 2x^2 - 4xy(x) - 4x - 8}{2x^2 - 8y(x) + 4x - 8}$$

✓ **Mathematica** : cpu = 0.0273327 (sec), leaf count = 36

$$\left\{\left\{y(x) \to 2\left(W\left(-e^{c_1 - \frac{x}{4} - 1}\right) + 1\right) + \frac{1}{4}(x^2 + 2x - 4)\right\}\right\}$$

✓ **Maple** : cpu = 0.072 (sec), leaf count = 26

$$\left\{y(x) = \frac{x^2}{4} + 2\, lambertW\left(1/2\_C1\, e^{-x/4} e^{-1/2}\right) + \frac{x}{2} + 1\right\}$$

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 = 0.932296 (sec), leaf count = 459

$$\left\{\left\{y(x) \to \frac{6W\left(-\frac{1}{6}\sqrt[6]{e^{-12x}\left(6c_1 + 2x^3 - 3x^2 + 6x - 6\log(x+1)\right)^6}\right)}{6c_1 + 2x^3 - 3x^2 + 6x - 6\log(x+1)}\right\}, \left\{y(x) \to \frac{6W\left(\frac{1}{6}\sqrt[6]{e^{-12x}\left(6c_1 + \right.}\right.}{6c_1 + 2x^3 -}\right.$$

✓ **Maple** : cpu = 0.236 (sec), leaf count = 41

$$\left\{y(x) = e^{-lambertW\left(-\frac{\left(-2x^3 + 3x^2 + 6\ln(1+x) + 6\_C1 - 6x\right)e^{-2x}}{6}\right) - 2x}\right\}$$

ODE No. 759

$$y'(x) = -\frac{ix\left(x^8 + 18x^4 y(x)^2 + 54ix^2 + 81y(x)^4\right)}{243y(x)}$$

✗ **Mathematica** : cpu = 40.7801 (sec), leaf count = 0 , could not solve

```
DSolve[Derivative[1][y][x] == ((-I/243)*x*((54*I)*x^2 + x^8 + 18*x^4*y[x]^2 + 81*y[x]^
```

✓ **Maple** : cpu = 0.592 (sec), leaf count = 305

$$\left\{y(x) = -\frac{\sqrt{3}}{3\,x}\sqrt{\left(-9\_C1\ (1/27\,x^6+i)\,J_{1/3}\left(\left(\left(\frac{2}{27}-\frac{2\,i}{27}\right)\sqrt{6}x^3\right)+\left(-\frac{x^6}{3}-9\,i\right)Y_{\frac{1}{3}}\left(\left(\left(\frac{2}{27}-\frac{2\,i}{27}\right)\sqrt{6}x\right.\right.\right.\right.}\right.$$

ODE No. 760

$$y'(x) = \frac{\left(xy(x)^2+1\right)^3}{x^4y(x)\left(xy(x)^2+x+1\right)}$$

✓ **Mathematica** : cpu = 1.2502 (sec), leaf count = 112

$$\text{Solve}\left[2\left(\frac{1}{10}\log\left(2x^2y(x)^4+2x^2y(x)^2+x^2+4xy(x)^2+2x+2\right)-\frac{1}{5}\log\left(xy(x)^2-x+1\right)-\frac{1}{10}\tan^{-1}\left(2x\right.\right.\right.$$

✓ **Maple** : cpu = 1.79 (sec), leaf count = 137

$$\left\{\frac{(-1+y(x))\,(1+y(x))\,\left(2\,\ln\left(x(y(x))^2-x+1\right)x-\ln\left(2\,x^2(y(x))^4+\left(2\,x^2+4\,x\right)(y(x))^2+x^2+2\,x+2\right.\right.}{10\,x}\right.$$

ODE No. 761

$$y'(x) = \frac{-x^3+4x^2-4xy(x)-4x+8}{2x^2+8y(x)-8x+8}$$

✓ **Mathematica** : cpu = 0.0241966 (sec), leaf count = 33

$$\left\{\left\{y(x)\to W\left(-e^{c_1-x-1}\right)+\frac{1}{4}\left(-x^2+4x-4\right)+1\right\}\right\}$$

✓ **Maple** : cpu = 0.068 (sec), leaf count = 18

$$\left\{y(x) = -\frac{x^2}{4}+\mathit{lambertW}\left(\frac{\_C1}{e^x}\right)+x\right\}$$

ODE No. 762

$$y'(x) = -\frac{y(x)(x\log(y(x)) + \log(y(x)) - x)}{x(x+1)}$$

✓ **Mathematica** : cpu = 0.0551643 (sec), leaf count = 26

$$\left\{\left\{y(x) \to (x+1)^{-1/x} e^{1-\frac{c_1}{x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.123 (sec), leaf count = 22

$$\left\{y(x) = \frac{\mathrm{e}}{\sqrt[x]{1+x}} \mathrm{e}^{\frac{\_C1}{x}}\right\}$$

ODE No. 763

$$y'(x) = \frac{y(x)(x\log(y(x)) + \log(y(x)) + x)}{x(x+1)}$$

✓ **Mathematica** : cpu = 0.057967 (sec), leaf count = 22

$$\left\{\left\{y(x) \to x^x (x+1)^{-x} e^{c_1 x}\right\}\right\}$$

✓ **Maple** : cpu = 0.11 (sec), leaf count = 14

$$\left\{y(x) = \left(\frac{x\_C1}{1+x}\right)^x\right\}$$

ODE No. 764

$$y'(x) = \frac{y(x)\left(x^4 - x\log(y(x)) - \log(y(x))\right)}{x(x+1)}$$

✓ **Mathematica** : cpu = 0.0906099 (sec), leaf count = 50

$$\left\{\left\{y(x) \to (x+1)^{\frac{1}{x}} e^{-\frac{c_1}{x} + \frac{x^3}{4} - \frac{x^2}{3} + \frac{x}{2} - \frac{25}{12x} - 1}\right\}\right\}$$

✓ **Maple** : cpu = 0.131 (sec), leaf count = 36

$$\left\{y(x) = \mathrm{e}^{\frac{x^3}{4}} \mathrm{e}^{-\frac{x^2}{3}} \mathrm{e}^{\frac{x}{2}} \sqrt[x]{1+x}\,\mathrm{e}^{\frac{\_C1}{x}} \mathrm{e}^{-1}\right\}$$

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 = 403.502 (sec), leaf count = 128

$$\left\{\left\{y(x) \to \frac{e^{\text{Li}_2(-x)+\text{Li}_2(x)}x^{\log(1-x)-\frac{\log(x)}{2}+\log(x+1)-\text{lo}}}{c_1 - \int_1^x \log\left(\frac{(K[1]-1)(K[1]+1)}{K[1]}\right)\exp\left(\text{Li}_2(-K[1]) + \text{Li}_2(K[1]) - \frac{1}{2}\log(K[1])\left(-2\log(1-K[1]) +\right.\right.}\right.\right.$$

✓ **Maple** : cpu = 0.243 (sec), leaf count = 106

$$\left\{y(x) = \frac{e^{dilog(1+x)}x^{\ln(1+x)}}{xe^{dilog(x)}}e^{-\frac{(\ln(x))^2}{2}}\left(\int -\frac{e^{dilog(1+x)}x^{\ln(1+x)}}{xe^{dilog(x)}}e^{-\frac{(\ln(x))^2}{2}}\ln\left(\frac{(x-1)(1+x)}{x}\right)\left(x^{\ln\left(\frac{(x-1)(1+x)}{x}\right)}\right)^{-}\right.\right.$$

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 = 3599.95 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.165 (sec), leaf count = 89

$$\left\{y(x) = 1e^{\int \frac{1}{x\ln(x)}\left(-x\ln\left(\frac{(x-1)(1+x)}{x}\right)-\ln(x)\right)dx}\left(\int -\frac{x}{\ln(x)}e^{\int \frac{1}{x\ln(x)}\left(-x\ln\left(\frac{(x-1)(1+x)}{x}\right)-\ln(x)\right)dx}\ln\left(\frac{(x-1)(1+x)}{x}\right)\right.\right.$$

ODE No. 767

$$y'(x) = \frac{-x^3 + 2x^2 - 8xy(x) - 8x + 32}{4x^2 + 32y(x) - 8x + 32}$$

✓ **Mathematica** : cpu = 0.0268262 (sec), leaf count = 38

$$\left\{\left\{y(x) \to 4\left(W\left(-e^{c_1-\frac{x}{16}-1}\right)+1\right) + \frac{1}{8}\left(-x^2+2x-8\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.078 (sec), leaf count = 26

$$\left\{y(x)=-\frac{x^2}{8}+4\,lambertW\left(1/4\_C1\,\mathrm{e}^{-x/16}\mathrm{e}^{-3/4}\right)+\frac{x}{4}+3\right\}$$

ODE No. 768

$$y'(x)=\frac{y(x)(y(x)+1)}{x(xy(x)-y(x)-1)}$$

✓ **Mathematica** : cpu = 1.49087 (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 = 0.128 (sec), leaf count = 26

$$\left\{y(x)=-\left(x\,lambertW\left(\frac{1}{x\mathrm{e}^{x^{-1}}\_C1}\right)+1\right)^{-1}\right\}$$

ODE No. 769

$$y'(x)=-\frac{ix(x^8+8x^4y(x)^2+16ix^2+16y(x)^4)}{32y(x)}$$

✗ **Mathematica** : cpu = 42.6642 (sec), leaf count = 0 , could not solve

```
DSolve[Derivative[1][y][x] == ((-I/32)*x*((16*I)*x^2 + x^8 + 8*x^4*y[x]^2 + 16*y[x]^4)
```

✓ **Maple** : cpu = 0.457 (sec), leaf count = 251

$$\left\{y(x)=-\frac{\sqrt{4}}{2\,x}\sqrt{\left(-2\,\left(1/8\,x^6+i\right)\_C1\,J_{1/3}\left(\left(1/3-i/3\right)x^3\right)+\left(-\frac{x^6}{4}-2\,i\right)Y_{\frac{1}{3}}\left(\left(\frac{1}{3}-\frac{i}{3}\right)x^3\right)+(1+i\right.}$$

ODE No. 770

$$y'(x) = \frac{2y(x)^6}{32x^2y(x)^4 + y(x)^3 + 16xy(x)^2 + 2}$$

✓ **Mathematica** : cpu = 0.127652 (sec), leaf count = 705

$$\left\{\left\{y(x) \to \frac{\sqrt[3]{18432c_1^2x^2 + \sqrt{4\left(192c_1^2x - 12c_1 - 256x^2\right)^3 + \left(18432c_1^2x^2 - 2880c_1x + 8192x^3 + 108\right)^2} - 2}}{3\sqrt[3]{2}\left(1 - 16c_1x\right)}\right.\right.$$

✓ **Maple** : cpu = 0.14 (sec), leaf count = 1105

$$\left\{y(x) = \frac{1}{96\,x + 6\_C1}\left(32\,x\_C1\,\sqrt[3]{96\,\sqrt{3}\left(\_C1/16 + x\right)\sqrt{\left(4096\,x^3 + 27\right)\_C1^4 + 576\,x\_C1^3 + 2048\,\_}}\right.\right.$$

ODE No. 771

$$y'(x) = \frac{-a^2x^3 - 2abx^2 - 4axy(x) - 4ax + 8}{2ax^2 + 4bx + 8y(x) + 8}$$

✓ **Mathematica** : cpu = 0.0345647 (sec), leaf count = 46

$$\left\{\left\{y(x) \to \frac{1}{4}\left(-ax^2 - 2bx - 4\right) - \frac{2\left(W\left(-e^{-\frac{b^2x}{4}+c_1-1}\right)+1\right)}{b}\right\}\right\}$$

✓ **Maple** : cpu = 0.133 (sec), leaf count = 84

$$\left\{y(x) = \frac{1}{4\,b}\left(-ax^2b - 2\,b^2x - 4\,b + 4\,\mathrm{e}^{1/4\,\frac{1}{a}\left(-4\,lambertW\left(-1/2\,\mathrm{e}^{-1/4\,b^2x}\mathrm{e}^{-1/2\,\frac{\_C1\,b^2}{a}}\mathrm{e}^{-b/2}\mathrm{e}^{-1}\right)a+\left(-b^2x-2\,b-4\right)a-2\,\_C1\,b\right.}\right.\right.$$

ODE No. 772

$$y'(x) = \frac{y(x)\log(y(x))(x\log(y(x)) + x + 1)}{x(x+1)}$$

✓ **Mathematica** : cpu = 0.0667967 (sec), leaf count = 21

$$\left\{\left\{y(x) \to e^{\frac{x}{c_1 - x + \log(x+1)}}\right\}\right\}$$

✓ **Maple** : cpu = 0.121 (sec), leaf count = 18

$$\left\{y(x) = \mathrm{e}^{\frac{x}{\ln(1+x) + \_C1 - x}}\right\}$$

ODE No. 773

$$y'(x) = \frac{y(x)^2 + xy(x) + x}{(x-1)(y(x)+x)}$$

✓ **Mathematica** : cpu = 0.102544 (sec), leaf count = 61

$$\text{Solve}\left[\frac{1}{2}\log\left(\frac{y(x)^2}{x^2} + \frac{y(x)}{x} + 1\right) + \frac{\tan^{-1}\left(\frac{\frac{2y(x)}{x}+1}{\sqrt{3}}\right)}{\sqrt{3}} = c_1 + \log(1-x) - \log(x), y(x)\right]$$

✓ **Maple** : cpu = 0.289 (sec), leaf count = 48

$$\left\{y(x) = \frac{\sqrt{3}x}{2}\tan\left(\mathit{RootOf}\left(-\sqrt{3}\ln\left(\frac{3\,x^2\left((\tan(\_Z))^2+1\right)}{4\,(x-1)^2}\right) + 2\sqrt{3}\_C1 - 2\_Z\right)\right) - \frac{x}{2}\right\}$$

ODE No. 774

$$y'(x) = \frac{-2ax^2 - x^3 - 4xy(x) - 4x + 8}{4ax + 2x^2 + 8y(x) + 8}$$

✓ **Mathematica** : cpu = 0.0320352 (sec), leaf count = 45

$$\left\{\left\{y(x) \to \frac{1}{4}\left(-2ax - x^2 - 4\right) - \frac{2\left(W\left(-e^{-\frac{a^2x}{4} + c_1 - 1}\right) + 1\right)}{a}\right\}\right\}$$

✓ **Maple** : cpu = 0.12 (sec), leaf count = 51

$$\left\{y(x)=\frac{1}{4\,a}\left(-2\,a^2x-ax^2-8\,lambertW\left(-1/2\,e^{-1/4\,a^2x}e^{-a/2}e^{-1}e^{1/4\_C1\,a^2}\right)-4\,a-8\right)\right\}$$

ODE No. 775

$$y'(x)=\frac{-y(x)+\sqrt{y(x)}+x}{-y(x)+\sqrt{y(x)}+x+1}$$

✓ **Mathematica** : cpu = 0.105161 (sec), leaf count = 943

$$\{\{y(x)\to \text{Root}\left[x^6-2e^{3c_1}x^3+e^{6c_1}+\#1^6+(-6x-6)\#1^5+\left(15x^2+24x+9\right)\#1^4+\left(-20x^3-36x^2-\right.\right.$$

✓ **Maple** : cpu = 0.1 (sec), leaf count = 32

$$\left\{\sqrt{y(x)-2\sqrt{y(x)}-x}\left(y(x)+\sqrt{y(x)}-x\right)-\_C1=0\right\}$$

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 = 3599.95 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.218 (sec), leaf count = 96

$$\left\{y(x)=1e^{\int\frac{1}{x\ln(x^{-1})}\left(-\ln\left(\frac{x^2+1}{x}\right)x-\ln(x^{-1})\right)\,dx}\left(\int-\frac{x}{\ln(x^{-1})}e^{\int\frac{1}{x\ln(x^{-1})}\left(-\ln\left(\frac{x^2+1}{x}\right)x-\ln(x^{-1})\right)\,dx}\ln\left(\frac{x^2+1}{x}\right)dx+\right.\right.$$

ODE No. 777

$$y'(x) = \frac{y(x)(y(x)+1)}{x\left(xy(x)^4 - y(x) - 1\right)}$$

✓ **Mathematica** : cpu = 0.139282 (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 = 0.22 (sec), leaf count = 51

$$\left\{y(x) = \mathrm{e}^{\mathit{RootOf}\left(x\left(\mathrm{e}^{\_Z}\right)^3 - 5x\left(\mathrm{e}^{\_Z}\right)^2 + 2x\_C1\,\mathrm{e}^{\_Z} + 2\_Z\,\mathrm{e}^{\_Z}x + 7\,\mathrm{e}^{\_Z}x - 2x\_C1 - 2\_Z\,x - 3x + 2\right)} - 1\right\}$$

ODE No. 778

$$y'(x) = \frac{x^9y(x)^3 + x^6y(x)^2 - 3x^2y(x) + 1}{x^3}$$

✓ **Mathematica** : cpu = 0.0982306 (sec), leaf count = 95

$$\text{Solve}\left[-\frac{29}{3}\text{RootSum}\left[-29\#1^3 + 3\sqrt[3]{29}\#1 - 29\&, \frac{\log\left(\frac{3x^6y(x)+x^3}{\sqrt[3]{29}\sqrt[3]{x^9}} - \#1\right)}{\sqrt[3]{29} - 29\#1^2}\&\right] = c_1 + \frac{29^{2/3}\left(x^9\right)^{2/3}}{9x^5}, y(x)\right]$$

✓ **Maple** : cpu = 0.028 (sec), leaf count = 37

$$\left\{y(x) = \frac{-3 + 29\,\mathit{RootOf}\left(-81\int^{\_Z}\left(841\_a^3 - 27\_a + 27\right)^{-1}d\_a + x + 3\_C1\right)}{9\,x^3}\right\}$$

ODE No. 779

$$y'(x) = \frac{x^3y(x) + x^3 + xy(x)^2 + y(x)^3}{(x-1)x^3}$$

✓ **Mathematica** : cpu = 0.0453193 (sec), leaf count = 57

$$\text{Solve}\left[-\frac{1}{4}\log\left(\frac{y(x)^2}{x^2}+1\right) + \frac{1}{2}\log\left(\frac{y(x)}{x}+1\right) + \frac{1}{2}\tan^{-1}\left(\frac{y(x)}{x}\right) = c_1 + \log(1-x) - \log(x), y(x)\right]$$

✓ **Maple** : cpu = 0.117 (sec), leaf count = 50

$$\left\{\frac{1}{2}\ln\left(\frac{y(x)+x}{x}\right)-\frac{1}{4}\ln\left(\frac{(y(x))^2+x^2}{x^2}\right)+\frac{1}{2}\arctan\left(\frac{y(x)}{x}\right)+\ln(x)-\ln(x-1)-\_C1=0\right\}$$

ODE No. 780

$$y'(x)=\frac{x\sqrt{x^2+y(x)^2}+xy(x)+y(x)}{x(x+1)}$$

✓ **Mathematica** : cpu = 0.0258643 (sec), leaf count = 15

$$\{\{y(x)\to x\sinh(c_1+\log(x+1))\}\}$$

✓ **Maple** : cpu = 0.481 (sec), leaf count = 27

$$\left\{\_C1+\frac{1}{x(1+x)}\left(\sqrt{(y(x))^2+x^2}+y(x)\right)=0\right\}$$

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 = 0.544945 (sec), leaf count = 82

$$\left\{\left\{y(x)\to-\frac{\sqrt{x}\sqrt{W\left(6xe^{2c_1+\frac{2x^3}{3}+x^2}\right)}}{\sqrt{6}}\right\},\left\{y(x)\to\frac{\sqrt{x}\sqrt{W\left(6xe^{2c_1+\frac{2x^3}{3}+x^2}\right)}}{\sqrt{6}}\right\}\right\}$$

✓ **Maple** : cpu = 0.402 (sec), leaf count = 61

$$\left\{\left((y(x))^{-2}+6\,x^{-1}\right)^{-1}=\frac{x}{54}\left(\mathrm{e}^{RootOf\left(2\,x^3\mathrm{e}^{\_Z}+3\,x^2\mathrm{e}^{\_Z}-3\,\mathrm{e}^{\_Z}\ln\left(1/2\,\frac{\mathrm{e}^{\_Z}+9}{x}\right)+9\_C1\,\mathrm{e}^{\_Z}+3\_Z\,\mathrm{e}^{\_Z}+27\right)}+9\right)\right\}$$

ODE No. 782

$$y'(x) = \frac{y(x)\coth\left(\frac{1}{x}\right)\left(x^2 y(x)\log\left(\frac{x^2+1}{x}\right) - x\log\left(\frac{x^2+1}{x}\right) - \tanh\left(\frac{1}{x}\right)\right)}{x}$$

✗ **Mathematica** : cpu = 3599.95 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 1.433 (sec), leaf count = 96

$$\left\{y(x) = 1\mathrm{e}^{\int \frac{1}{x\tanh\left(x^{-1}\right)}\left(-\ln\left(\frac{x^2+1}{x}\right)x - \tanh\left(x^{-1}\right)\right)\,\mathrm{d}x}\left(\int -\frac{x}{\tanh\left(x^{-1}\right)}\mathrm{e}^{\int \frac{1}{x\tanh\left(x^{-1}\right)}\left(-\ln\left(\frac{x^2+1}{x}\right)x - \tanh\left(x^{-1}\right)\right)\,\mathrm{d}x}\ln\left(\frac{x^2 \cdots}{x}\right.\right.\right.$$

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 = 3599.95 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.187 (sec), leaf count = 75

$$\left\{y(x) = 1\mathrm{e}^{\int \frac{-x\ln(x) - x\ln(2) - \tanh(x)}{x\tanh(x)}\,\mathrm{d}x}\left(\int -\frac{x(\ln(2) + \ln(x))}{\tanh(x)}\mathrm{e}^{\int \frac{-x\ln(x) - x\ln(2) - \tanh(x)}{x\tanh(x)}\,\mathrm{d}x}\,\mathrm{d}x + \_C1\right)^{-1}\right\}$$

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 = 3599.96 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 29.257 (sec), leaf count = 24

$$\left\{y(x) = -x - \tan\left(\_C1 - \int \frac{\ln(x)}{\sinh(x)}\,\mathrm{d}x\right)\right\}$$

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 = 3599.95 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 87.583 (sec), leaf count = 24

$$\left\{y(x) = -x - \tan\left(\_C1 - \int \frac{\sinh(x)}{\ln(x)}\, dx\right)\right\}$$

ODE No. 786

$$y'(x) = \frac{axy(x)^2\cosh(x) + bx^3\cosh(x) + y(x)\log(x)}{x\log(x)}$$

✗ **Mathematica** : cpu = 3599.95 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.091 (sec), leaf count = 33

$$\left\{y(x) = \frac{x}{a}\tan\left(\sqrt{ab}\left(\_C1 + \int \frac{x\cosh(x)}{\ln(x)}\, dx\right)\right)\sqrt{ab}\right\}$$

ODE No. 787

$$y'(x) = \frac{x(2x^4 - 2x^2 y(x) + x^2 - x - 1)}{(x+1)(x^2 - y(x))}$$

✓ **Mathematica** : cpu = 42.4868 (sec), leaf count = 488

$$\text{Solve}\left[\frac{\left(2 - \frac{x(x^2-x-1)(2x^2-2y(x)+3)}{\sqrt[3]{x^3(x^2-x-1)^3(x^2-y(x))}}\right)\left(\frac{x(x^2-x-1)(2x^2-2y(x)+3)}{\sqrt[3]{x^3(x^2-x-1)^3(x^2-y(x))}} + 4\right)\left(\left(1 - \frac{x(x^2-x-1)(2x^2-2y(x)+3)}{2\sqrt[3]{x^3(x^2-x-1)^3(x^2-y(x))}}\right)\log\left(\frac{2 - \frac{x}{\cdots}}{\cdots}\right.\right.}{18\sqrt[3]{2}\left(-\frac{(2x^2-2y(x)+3)^3}{8(x^2-y(x))^3} + \frac{3x(x^2-\cdots}{2\sqrt[3]{x^3(\cdots}}\right.}\right.$$

✓ **Maple** : cpu = 0.451 (sec), leaf count = 191

$$\left\{y(x) = 1\left(4\,x^2 e^{RootOf\left(8\,x^3 e^{\_Z}-24\,x^2 e^{\_Z}-36\,x^3+6\,\ln\left(\frac{2\,e^{\_Z}-9}{(1+x)^4}\right)e^{\_Z}+18\,\_C1\,e^{\_Z}-6\,\_Z\,e^{\_Z}+24\,e^{\_Z}x+108\,x^2-27\,\ln\left(\frac{2\,e^{\_Z}-9}{(1+x)^4}\right)-\right.}\right.\right.$$

ODE No. 788

$$y'(x) = -\frac{y(x)\left(x^2 y(x)(-\coth(x+1)) + \log(x-1) + x\coth(x+1)\right)}{x\log(x-1)}$$

✗ **Mathematica** : cpu = 3599.96 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.351 (sec), leaf count = 108

$$\left\{y(x) = 1\left(e^{-\int \frac{-\ln(x-1)\sinh(1+x)-x\cosh(1+x)}{\sinh(1+x)x\ln(x-1)}\,dx}\right)^{-1}\left(\_C1 + \int -\frac{x\cosh(1+x)}{\ln(x-1)\sinh(1+x)} e^{\int \frac{-\ln(x-1)\sinh(1+x)-x\cosh(1+x)}{\sinh(1+x)x\ln(x-1)}\right.\right.$$

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 = 3599.96 (sec), leaf count = 0 , timed out

`$Aborted`

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(y(x),x) = -(ln(x-1)-coth(1+x)*x^2-2*coth(1+x)*x*y(x)-coth(1+x)-
coth(1+x)*y(x)^2)/ln(x-1),y(x))
```

ODE No. 790

$$y'(x) = \frac{x^4\coth\left(\frac{x+1}{x-1}\right) - 2x^2 y(x)\coth\left(\frac{x+1}{x-1}\right) + y(x)^2\coth\left(\frac{x+1}{x-1}\right) + 2x\log\left(\frac{1}{x-1}\right) - \coth\left(\frac{x+1}{x-1}\right)}{\log\left(\frac{1}{x-1}\right)}$$

✗ **Mathematica** : cpu = 3599.96 (sec), leaf count = 0 , timed out

`$Aborted`

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(y(x),x) = (2*x*ln(1/(x-1))-coth((1+x)/(x-1))+coth((1+x)/(x-1))*y(x)^2-
2*coth((1+x)/(x-1))*x^2*y(x)+coth((1+x)/(x-1))*x^4)/ln(1/(x-1)),y(x))
```

ODE No. 791

$$y'(x) = \frac{\operatorname{sech}\left(\frac{1}{x-1}\right)\left(x^5+x^4-2x^3y(x)-2x^2y(x)+2x^2\cosh\left(\frac{1}{x-1}\right)+xy(x)^2+y(x)^2-x-2x\cosh\left(\frac{1}{x-1}\right)\right.}{x-1}$$

✗ **Mathematica** : cpu = 3600.05 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 18.286 (sec), leaf count = 306

$$\left\{y(x) = 1\left(\left(-x^2+1\right)\left(\mathrm{e}^{\frac{1}{\left(\mathrm{e}^{(x-1)^{-1}}\right)^2+1}\int\frac{\mathrm{e}^{(x-1)^{-1}}(1+x)}{(x-1)\left(\left(\mathrm{e}^{(x-1)^{-1}}\right)^2+1\right)}\mathrm{d}x}\right)^4\left(\mathrm{e}^{\frac{1}{\left(\mathrm{e}^{(x-1)^{-1}}\right)^2+1}\int\frac{\mathrm{e}^{(x-1)^{-1}}(1+x)}{(x-1)\left(\left(\mathrm{e}^{(x-1)^{-1}}\right)^2+1\right)}\mathrm{d}x\mathrm{e}^{2\,(x-1)}}\right.\right.\right.$$

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 = 4753.33 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.429 (sec), leaf count = 112

$$\left\{y(x) = 1\mathrm{e}^{\int\frac{(1-x)\cosh\left((1+x)^{-1}\right)-x^2-x}{x(x-1)\cosh\left((1+x)^{-1}\right)}\mathrm{d}x}\left(\int-\frac{x(1+x)}{(x-1)\cosh\left((1+x)^{-1}\right)}\mathrm{e}^{\int\frac{(1-x)\cosh\left((1+x)^{-1}\right)-x^2-x}{x(x-1)\cosh\left((1+x)^{-1}\right)}\mathrm{d}x}\mathrm{d}x+\_C1\right)^{-1}\right.$$

ODE No. 793

$$y'(x) = -\frac{y(x)(xy(x)+1)}{x(xy(x)-y(x)+1)}$$

✓ **Mathematica** : cpu = 33.1369 (sec), leaf count = 399

$$\text{Solve}\left[-\frac{\sqrt[3]{-2}\left(\frac{2^{2/3}((x-1)y(x)-2)}{\sqrt[3]{-\frac{1}{(x-1)^3}}(x-1)((x-1)y(x)+1)}+(-2)^{2/3}\right)\left(\frac{-xy(x)+y(x)+2}{\sqrt[3]{2}\sqrt[3]{-\frac{1}{(x-1)^3}}(x-1)((x-1)y(x)+1)}+(-2)^{2/3}\right)\left(\left(\frac{\sqrt[3]{-1}}{\sqrt[3]{-\frac{1}{(x-1)}}}\right.\right.}{}\right.$$

✓ **Maple** : cpu = 0.151 (sec), leaf count = 32

$$\left\{y(x)=-2\,\frac{1}{x}\mathrm{e}^{-\mathit{lambertW}\left(-2\,\frac{(x-1)\left(\mathrm{e}^{\_C1}\right)^{3}\mathrm{e}^{-1}}{x}\right)+3\_C1-1}\right\}$$

ODE No. 794

$$y'(x)=\frac{y(x)}{x\left(x^3y(x)^4+x^2y(x)^3+y(x)-1\right)}$$

✓ **Mathematica** : cpu = 0.849051 (sec), leaf count = 67

$$\text{Solve}\left[\text{RootSum}\left[\#1^3y(x)^3+\#1^2y(x)^2+1\&,\frac{\#1y(x)\log(x-\#1)+\log(x-\#1)}{3\#1y(x)+2}\&\right]+y(x)-\log(x)=c$$

✓ **Maple** : cpu = 0.471 (sec), leaf count = 32

$$\left\{-y(x)+\int^{xy(x)}\frac{1}{\_a\left(\_a^3+\_a^2+1\right)}d\_a-\_C1=0\right\}$$

ODE No. 795

$$y'(x)=\frac{a^3+3a^2x+3ax^2+ay(x)^2+x^3+y(x)^3+xy(x)^2}{(a+x)^3}$$

✓ **Mathematica** : cpu = 0.671757 (sec), leaf count = 111

$$\text{Solve}\left[-\frac{19}{3}\text{RootSum}\left[-19\#1^3+6\sqrt[3]{38}\#1-19\&,\frac{\log\left(\frac{\frac{3y(x)}{(a+x)^3}+\frac{1}{(a+x)^2}}{\sqrt[3]{38}\sqrt[3]{\frac{1}{(a+x)^6}}}-\#1\right)}{2\sqrt[3]{38}-19\#1^2}\&\right]=\frac{1}{9}38^{2/3}\left(\frac{1}{(a+x)^6}\right)^{2/3}$$

✓ **Maple** : cpu = 0.037 (sec), leaf count = 37

$$\left\{y(x)=-\mathit{RootOf}\left(-\int^{\_Z}\left(\_a^3-\_a^2-\_a-1\right)^{-1}d\_a+\ln(x+a)+\_C1\right)(x+a)\right\}$$

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 = 22.4144 (sec), leaf count = 102

$$\text{Solve}\left[\frac{1}{62}\left(-31 \log\left(9e^{\frac{3x^2}{2}}(y(x)+3)y(x) + 3e^{3x^2}(y(x)+3)^2 - y(x)^2\right) + 6\sqrt{93}\tanh^{-1}\left(\frac{\sqrt{\frac{3}{31}}\left(2e^{\frac{3x^2}{2}}(y(x)\right.}{y(x}\right.\right.\right.$$

✓ **Maple** : cpu = 1.394 (sec), leaf count = 143

$$\left\{y(x) = RootOf\left(\left(\left(7\,e^{3\,x^2 + RootOf\left(\left(\left(e^{3/2\,x^2}\right)^2\left(42\,\sqrt{93}\tanh\left(\frac{(\_C1 - 5\_Z)\sqrt{93}}{90}\right)e^{3\,x^2 + \_Z} + 217\left(\tanh\left(\frac{(\_C1 - 5\_Z)\sqrt{93}}{90}\right)\right)^2 e^{3\,x^2 + \_Z} + 1\right.\right.\right.}\right.\right.\right.\right.$$

ODE No. 797

$$y'(x) = \frac{y(x)\left(x^3 y(x)\cosh\left(\frac{x+1}{x-1}\right) + x^2 y(x)\cosh\left(\frac{x+1}{x-1}\right) - x^2\cosh\left(\frac{x+1}{x-1}\right) - x\cosh\left(\frac{x+1}{x-1}\right) - 1\right)}{x}$$

✓ **Mathematica** : cpu = 3.1957 (sec), leaf count = 349

$$\left\{\left\{y(x) \to \frac{\exp\left(\frac{(3e^2-1)\text{Chi}\left(\frac{2}{x-1}\right)}{e} + \frac{(1+3e^2)\text{Shi}\left(\frac{2}{x-1}\right)}{e} - \frac{1}{4}ex^2\sinh\left(\frac{2}{x-1}\right) + \frac{x^2\sinh\left(\frac{2}{x-1}\right)}{4e} - \frac{1}{4}ex^2\cosh\left(\frac{2}{x-1}\right) - \frac{x^2}{}\right.}{x\left(c_1\exp\left(\frac{(x-1)\left((-x+e^2\right.}{}\right.\right.}\right.\right.$$

✓ **Maple** : cpu = 0.429 (sec), leaf count = 168

$$\left\{y(x) = \frac{1}{x}\left(e^{\frac{x^2-1}{4}}e^{\frac{-1-x}{x-1}} + \frac{x^2+4x-5}{4}e^{\frac{1+x}{x-1}} - Ei\left(1, 2(x-1)^{-1}\right)e^{-1} + 3\,e\,Ei\left(1, -2(x-1)^{-1}\right)\right)^{-1}\left(\_C1 + \int -\cosh\left(\frac{1+x}{x-1}\right)e^{-}\right.\right.$$

ODE No. 798

$$y'(x) = \frac{y(x)(y(x)+x+1)}{(x+1)\left(2y(x)^3+y(x)+x\right)}$$

✓ **Mathematica** : cpu = 0.954872 (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 = 0.188 (sec), leaf count = 30

$$\left\{y(x) = e^{\mathit{RootOf}\left(-\left(e^{\_Z}\right)^3 + \ln(1+x)e^{\_Z} + \_C1\, e^{\_Z} - \_Z\, e^{\_Z} + x\right)}\right\}$$

ODE No. 799

$$y'(x) = \frac{y(x)\left(e^{\frac{x+1}{x-1}}x^3y(x) + e^{\frac{x+1}{x-1}}x^2y(x) - e^{\frac{x+1}{x-1}}x^2 - e^{\frac{x+1}{x-1}}x - 1\right)}{x}$$

✓ **Mathematica** : cpu = 0.652826 (sec), leaf count = 126

$$\left\{\left\{y(x) \to \frac{\exp\left(6e\text{Ei}\left(\frac{2}{x-1}\right) + \frac{1}{2}e^{\frac{x}{x-1}+\frac{1}{x-1}}\left(x^2+4x-5\right) - e^{\frac{2}{x-1}}\left(\frac{1}{2}e(x-1)^2 + 3e(x-1)\right)\right)}{x\left(c_1e^{\frac{1}{2}e^{\frac{x}{x-1}+\frac{1}{x-1}}\left(x^2+4x-5\right)} + e^{6e\text{Ei}\left(\frac{2}{x-1}\right)}\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.403 (sec), leaf count = 147

$$\left\{y(x) = \frac{1}{x}e^{\frac{5}{2}e^{\frac{1+x}{x-1}}}e^{-\frac{x^2}{2}e^{\frac{1+x}{x-1}}}\left(e^{eEi\left(1,-2\,(x-1)^{-1}\right)}\right)^{-6}\left(e^{xe^{\frac{1+x}{x-1}}}\right)^{-2}\left(\int -(1+x)e^{\frac{1+x}{x-1}}e^{\frac{5}{2}e^{\frac{1+x}{x-1}}}e^{-\frac{x^2}{2}e^{\frac{1+x}{x-1}}}\left(e^{eEi\left(1,-2\,(x\right.}\right.\right.\right.$$

ODE No. 800

$$y'(x) = \frac{-b^3 + 6b^2x - 12bx^2 - 4by(x)^2 + 8x^3 + 8y(x)^3 + 8xy(x)^2}{(2x-b)^3}$$

✓ **Mathematica** : cpu = 0.333622 (sec), leaf count = 128

$$\text{Solve}\left[-\frac{19}{3}\text{RootSum}\left[-19\#1^3 + 6\sqrt[3]{38}\#1 - 19\&, \frac{\log\left(\frac{\frac{4}{(b-2x)^2} - \frac{24y(x)}{(b-2x)^3}}{4\sqrt[3]{38}\sqrt[3]{\frac{1}{(b-2x)^6}}} - \#1\right)}{2\sqrt[3]{38} - 19\#1^2}\&\right] = \frac{1}{9}38^{2/3}\left(\frac{1}{(b-2x)^6}\right)^{2/}\right.$$

✓ **Maple** : cpu = 0.036 (sec), leaf count = 41

$$\left\{y(x) = \frac{\mathit{RootOf}\left(-\int^{\_Z}(\_a^3 - \_a^2 - \_a - 1)^{-1}\,d\_a + \ln(-2\,x + b) + \_C1\right)(-2\,x + b)}{2}\right\}$$

ODE No. 801

$$y'(x) = \frac{1}{2}e^{\frac{x^2}{4}}\left(2e^{-\frac{3x^2}{4}}y(x)^3 + 2e^{-\frac{x^2}{2}}y(x)^2 + e^{-\frac{x^2}{4}}xy(x) + 2\right)$$

✓ **Mathematica** : cpu = 0.186387 (sec), leaf count = 126

$$\text{Solve}\left[-\frac{29}{3}\text{RootSum}\left[-29\#1^3 + 3\sqrt[3]{29}\#1 - 29\&, \frac{\log\left(\frac{3e^{-\frac{x^2}{2}}y(x) + e^{-\frac{x^2}{4}}}{\sqrt[3]{29}\sqrt[3]{e^{-\frac{3x^2}{4}}}} - \#1\right)}{\sqrt[3]{29} - 29\#1^2}\&\right] = c_1 + \frac{1}{9}29^{2/3}e^{\frac{x^2}{2}}\left(e^{-\frac{3x}{4}}\right.\right.$$

✓ **Maple** : cpu = 0.082 (sec), leaf count = 63

$$\left\{y(x) = \frac{1}{9}\left(-3\,\mathrm{e}^{-1/4\,x^2}\mathrm{e}^{1/4\,x^2} + 29\,\mathit{RootOf}\left(-81\int^{\_Z}(841\,\_a^3 - 27\,\_a + 27)^{-1}\,d\_a + x + 3\,\_C1\right)\right)\left(\mathrm{e}\right.\right.$$

ODE No. 802

$$y'(x) = \frac{\_F1\left(y(x) + \frac{1}{x}\right) + \frac{1}{x}}{x}$$

✓ **Mathematica** : cpu = 0.148504 (sec), leaf count = 98

$$\text{Solve}\left[\int_1^{y(x)} -\frac{\_F1\left(K[2]+\frac{1}{x}\right)\left(\int_1^x -\frac{\_F1'\left(K[2]+\frac{1}{K[1]}\right)}{K[1]^2\left(\_F1\left(K[2]+\frac{1}{K[1]}\right)\right)^2}dK[1]\right)+1}{\_F1\left(K[2]+\frac{1}{x}\right)}dK[2] + \int_1^x \left(\frac{1}{K[1]^2\_F1\left(\frac{1}{K[1]}+y\right.}\right.\right.$$

✓ **Maple** : cpu = 0.129 (sec), leaf count = 27

$$\left\{y(x) = \frac{RootOf\left(-\ln(x) + \int^{\_Z}(\_F1(\_a))^{-1}d\_a + \_C1\right)x - 1}{x}\right\}$$

ODE No. 803

$$y'(x) = \frac{\_F1(y(x)^2 - 2\log(x))}{x\sqrt{y(x)^2}}$$

✓ **Mathematica** : cpu = 0.102322 (sec), leaf count = 634

$$\text{Solve}\left[\int_1^{y(x)}\left(-\int_1^x\left(\frac{2K[2](\_F1(K[2]^2-2\log(K[1])))^2\_F1'(K[2]^2-2\log(K[1]))}{K[1](\_F1(K[2]^2-2\log(K[1]))-1)^2(\_F1(K[2]^2-2\log(K[1]))+1)} + \frac{2K}{K[1](\_}\right.\right.\right.$$

✓ **Maple** : cpu = 0.51 (sec), leaf count = 65

$$\left\{y(x) = \sqrt{2\ln(x) + 2\,RootOf\left(\ln(x) - \int^{\_Z}(\_F1(2\_a)-1)^{-1}d\_a + \_C1\right)}, y(x) = -\sqrt{2\ln(x) + 2}\right.$$

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 = 0.622776 (sec), leaf count = 43

$$\left\{\left\{y(x)\to \tan^{-1}\left(\frac{-12c_1+3x^4-4x^3+6x^2-12x+12\log(x+1)-25}{12x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 1.163 (sec), leaf count = 38

$$\left\{y(x) = \arctan\left(\frac{3\,x^4-4\,x^3+6\,x^2+12\,\ln(1+x)-12\_C1-12\,x}{12\,x}\right)\right\}$$

ODE No. 805

$$y'(x) = \frac{x^4\sqrt{x^2+y(x)^2}+xy(x)+y(x)}{x(x+1)}$$

✓ **Mathematica** : cpu = 0.0684622 (sec), leaf count = 37

$$\left\{\left\{y(x)\to x\sinh\left(\frac{1}{6}(6c_1+2x^3-3x^2+6x-6\log(x+1)+11)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.699 (sec), leaf count = 42

$$\left\{\ln\left(\sqrt{(y(x))^2+x^2}+y(x)\right)-\frac{x^3}{3}+\frac{x^2}{2}-x+\ln(1+x)-\ln(x)-\_C1=0\right\}$$

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 = 0.378279 (sec), leaf count = 22

$$\left\{\left\{y(x)\to \tan^{-1}\left(\frac{-c_1+x-\log(x+1)}{x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.669 (sec), leaf count = 22

$$\left\{y(x) = -\arctan\left(\frac{-x+\ln(1+x)-\_C1}{x}\right)\right\}$$

ODE No. 807

$$y'(x) = -\frac{1}{-e^{y(x)}y(x)\_F1(y(x) - \log(x)) - x}$$

✗ **Mathematica** : cpu = 2.31214 (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 = 0.698 (sec), leaf count = 43

$$\left\{\frac{(\ln(x))^2}{2} - y(x)\ln(x) - \int^{y(x)-\ln(x)} \frac{\_F1(\_a)\_a + e^{-\_a}}{\_F1(\_a)} d\_a + \_C1 = 0\right\}$$

ODE No. 808

$$y'(x) = \frac{(y(x)+1)(2y(x)+1)}{x(2xy(x) - 2y(x) + x - 2)}$$

✓ **Mathematica** : cpu = 2.70014 (sec), leaf count = 149

$$\text{Solve}\left[\frac{2^{2/3}\left(x\log\left(-\frac{6\ 2^{2/3}(y(x)+1)}{2(x-1)y(x)+x-2}\right) - x\log\left(\frac{3\ 2^{2/3}(2xy(x)+x)}{2(x-1)y(x)+x-2}\right) + 2xy(x)\left(\log\left(-\frac{6\ 2^{2/3}(y(x)+1)}{2(x-1)y(x)+x-2}\right) - \log\left(\frac{3\ 2^{2/3}}{2(x-}\right.\right.\right.}{9(2xy(x)+x)}\right.$$

✓ **Maple** : cpu = 0.1 (sec), leaf count = 45

$$\left\{y(x) = 1\left(-x\,lambertW\left(\frac{1}{xe^{x^{-1}}\_C1}\right) - 2\right)\left(2\,x\,lambertW\left(\frac{1}{xe^{x^{-1}}\_C1}\right) + 2\right)^{-1}\right\}$$

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 = 0.283727 (sec), leaf count = 128

$$\text{Solve}\left[-\frac{19}{3}\text{RootSum}\left[-19\#1^3 + 6\sqrt[3]{38}\#1 - 19\&, \frac{\log\left(\frac{\frac{192y(x)}{(4x-5)^3} + \frac{16}{(4x-5)^2}}{16\sqrt[3]{38}\sqrt[3]{\frac{1}{(4x-5)^6}}} - \#1\right)}{2\sqrt[3]{38} - 19\#1^2}\&\right] = c_1 + \frac{1}{9}38^{2/3}\left(\frac{1}{(5-4x}\right.\right.$$

✓ **Maple** : cpu = 0.036 (sec), leaf count = 41

$$\left\{y(x)=-\frac{\mathit{RootOf}\left(-\int^{\_Z}\left(\_a^3-\_a^2-\_a-1\right)^{-1}d\_a+\ln\left(4x-5\right)+\_C1\right)\left(4x-5\right)}{4}\right\}$$

ODE No. 810

$$y'(x)=\frac{x^2\log^2(x)+y(x)^2+y(x)-2xy(x)\log(x)+x}{x}$$

✓ **Mathematica** : cpu = 0.016013 (sec), leaf count = 40

$$\left\{\left\{y(x)\to\frac{1}{\frac{c_1}{x}-1}-\frac{1}{2}x^2\left(\frac{1-2x\log(x)}{x^2}-\frac{1}{x^2}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.05 (sec), leaf count = 16

$$\left\{y(x)=\left(\ln\left(x\right)+\left(-x+\_C1\right)^{-1}\right)x\right\}$$

ODE No. 811

$$y'(x)=\frac{x^4+x^3e^{y(x)}+xy(x)+e^{y(x)}y(x)-x\log\left(e^{y(x)}+x\right)-e^{y(x)}\log\left(e^{y(x)}+x\right)+x}{x^2}$$

✓ **Mathematica** : cpu = 2.83836 (sec), leaf count = 33

$$\left\{\left\{y(x)\to-\log\left(\frac{e^{-c_1x-\frac{x^3}{2}}}{x}-\frac{1}{x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 2.349 (sec), leaf count = 32

$$\left\{y(x)=\frac{x^3}{2}+x\_C1+\ln\left(-x\left(-1+\mathrm{e}^{\frac{x^3}{2}}\mathrm{e}^{x\_C1}\right)^{-1}\right)\right\}$$

ODE No. 812

$$y'(x) = x^3\sqrt{x^3-6y(x)} + \sqrt{x^3-6y(x)} + \frac{x^2}{2} + x^2\sqrt{x^3-6y(x)}$$

✓ **Mathematica** : cpu = 0.39478 (sec), leaf count = 70

$$\left\{\left\{y(x)\to \frac{1}{96}\left(72c_1x^4+96c_1x^3+288c_1x-144c_1^2-9x^8-24x^7-16x^6-72x^5-96x^4+16x^3-144x^2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.292 (sec), leaf count = 30

$$\left\{\_C1 - \frac{3\,x^4}{4} - x^3 - 3\,x - \sqrt{x^3-6\,y\left(x\right)} = 0\right\}$$

ODE No. 813

$$y'(x) = \frac{1}{2}\sqrt{a}\left(2\sqrt{ax^4+8y(x)} - \sqrt{a}x^3 + 2x^3\sqrt{ax^4+8y(x)} + 2x^2\sqrt{ax^4+8y(x)}\right)$$

✓ **Mathematica** : cpu = 0.574373 (sec), leaf count = 66

$$\left\{\left\{y(x)\to \frac{1}{72}a\left(-72c_1x^4-96c_1x^3-288c_1x+144c_1^2+9x^8+24x^7+16x^6+72x^5+87x^4+144x^2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.572 (sec), leaf count = 40

$$\left\{\frac{1}{4}\sqrt{ax^4+8\,y\left(x\right)} + \frac{-3\,x^4-4\,x^3-12\,x}{12}\sqrt{a} - \_C1 = 0\right\}$$

ODE No. 814

$$y'(x) = \frac{y(x)\left(x^7y(x)^2-3x^3y(x)-3\right)}{x\left(x^3y(x)+1\right)}$$

✓ **Mathematica** : cpu = 0.0361035 (sec), leaf count = 72

$$\left\{\left\{y(x)\to \frac{x}{\frac{\sqrt{x(c_1-2x)+x}}{\sqrt{\frac{1}{x^7}}}-x^4}\right\},\left\{y(x)\to -\frac{x}{\frac{\sqrt{x(c_1-2x)+x}}{\sqrt{\frac{1}{x^7}}}+x^4}\right\}\right\}$$

✓ **Maple** : cpu = 0.047 (sec), leaf count = 38

$$\left\{y(x) = \frac{1}{x^3}\left(\sqrt{\_C1 - 2\,x} - 1\right)^{-1}, y(x) = -\frac{1}{x^3}\left(\sqrt{\_C1 - 2\,x} + 1\right)^{-1}\right\}$$

ODE No. 815

$$y'(x) = \frac{e^{3x^2}x(y(x)+3)^3}{81\left(e^{\frac{3x^2}{2}}y(x) + 3e^{\frac{3x^2}{2}} + 3y(x)\right)}$$

✓ **Mathematica** : cpu = 19.1853 (sec), leaf count = 103

$$\text{Solve}\left[\frac{1}{186}\left(31\log\left(-81e^{\frac{3x^2}{2}}(y(x)+3)y(x) + e^{3x^2}(y(x)+3)^2 - 243y(x)^2\right) - 6\sqrt{93}\tanh^{-1}\left(\frac{2e^{\frac{3x^2}{2}}(y(x)+}{9\sqrt{93}}\right.\right.\right.$$

✓ **Maple** : cpu = 1.004 (sec), leaf count = 168

$$\left\{-10\,\ln\left(\frac{10\,e^{3/2\,x^2}(3+y(x))}{27\,e^{3/2\,x^2} + 9\,e^{3/2\,x^2}y\,(x) + 27\,y\,(x)}\right) + 5\,\ln\left(\frac{100\,(3+y(x))^2\left(e^{3/2\,x^2}\right)^2 + \left(-8100\,(y(x))^2 - 24\right.}{189\,\left(e^{3/2\,x^2}\,(3+y\,(x)) +\right.}\right.\right.$$

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 = 0.267129 (sec), leaf count = 74

$$\text{Solve}\left[\frac{1}{2}\left(\text{RootSum}\left[\#1^3 - \#1 + 1\&, \frac{\#1\log\left(-\#1 + x^2 - y(x)^2\right) - \log\left(-\#1 + x^2 - y(x)^2\right)}{3\#1^2 - 1}\&\right] + x^2\right) = \right.$$

✓ **Maple** : cpu = 0.734 (sec), leaf count = 190

$$\left\{\int_{\_b}^{x}\frac{(\_a - y(x))^3\,(y(x)+\_a)^3\,\_a}{\_a^6 - 3\,\_a^4\,(y\,(x))^2 + 3\,\_a^2\,(y\,(x))^4 - (y\,(x))^6 - \_a^2 + (y\,(x))^2 + 1}\,d\_a + \int^{y(x)} - \frac{(}{-\_f^6 + 3\,\_f^4 x}\right.$$

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 = 0.622874 (sec), leaf count = 63

$$\left\{\left\{y(x)\to -\sec^{-1}\left(\frac{-9c_1-x^3+3x^3\log(x)}{9\log(x)}\right)\right\},\left\{y(x)\to \sec^{-1}\left(\frac{-9c_1-x^3+3x^3\log(x)}{9\log(x)}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.728 (sec), leaf count = 27

$$\left\{y(x)=\arccos\left(9\,\frac{\ln(x)}{3\,x^3\ln(x)-x^3+9\_C1}\right)\right\}$$

ODE No. 818

$$y'(x)=\frac{y(x)}{x\left(xy(x)^4+xy(x)^3+xy(x)-1\right)}$$

✓ **Mathematica** : cpu = 0.0986831 (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 = 0.212 (sec), leaf count = 34

$$\left\{y(x)=\mathrm{e}^{RootOf\left(-2\,x\left(\mathrm{e}^{\_Z}\right)^4-3\,x\left(\mathrm{e}^{\_Z}\right)^3+6\,x\_C1\,\mathrm{e}^{\_Z}-6\_Z\,\mathrm{e}^{\_Z}x-6\right)}\right\}$$

ODE No. 819

$$y'(x)=x^2\sqrt{x^2+3y(x)}+\sqrt{x^2+3y(x)}+x^3\sqrt{x^2+3y(x)}-\frac{2x}{3}$$

✓ **Mathematica** : cpu = 0.251648 (sec), leaf count = 65

$$\left\{\left\{y(x)\to\frac{1}{192}\left(-72c_1x^4-96c_1x^3-288c_1x+144c_1^2+9x^8+24x^7+16x^6+72x^5+96x^4+80x^2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.303 (sec), leaf count = 30

$$\left\{\_C1+\frac{3\,x^4}{8}+\frac{x^3}{2}+\frac{3\,x}{2}-\sqrt{x^2+3\,y(x)}=0\right\}$$

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 = 0.362798 (sec), leaf count = 63

$$\left\{\left\{y(x)\to -\sec^{-1}\left(\frac{-4c_1-x^2+2x^2\log(x)}{4\log(x)}\right)\right\},\left\{y(x)\to \sec^{-1}\left(\frac{-4c_1-x^2+2x^2\log(x)}{4\log(x)}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.709 (sec), leaf count = 27

$$\left\{y(x)=\arccos\left(4\,\frac{\ln(x)}{2\,x^2\ln(x)-x^2+4\_C1}\right)\right\}$$

ODE No. 821

$$y'(x)=\frac{y(x)(xy(x)+1)}{x\left(x^3y(x)^4-xy(x)-1\right)}$$

✓ **Mathematica** : cpu = 0.229913 (sec), leaf count = 2093

$$\left\{\left\{y(x)\to \frac{c_1}{4}-\frac{1}{2}\sqrt{\frac{c_1^2}{4}+\frac{\sqrt[3]{1944c_1^2x^6+1458x^5+\sqrt{\left(1944c_1^2x^6+1458x^5\right)^2-4\left(54c_1x^4+144x^3\right)^3}}}{18\sqrt[3]{2}x^3}+\frac{}{x^3}}\right.\right.$$

✓ **Maple** : cpu = 0.165 (sec), leaf count = 27

$$\left\{-\frac{1}{3\,x^3\left(y\left(x\right)\right)^3}-\frac{1}{2\,x^2\left(y\left(x\right)\right)^2}-y(x)+\_C1=0\right\}$$

ODE No. 822

$$y'(x) = \frac{1}{4}x\left(-4e^{-x^2}x^2y(x) - 4e^{-x^2}x^2 + 4e^{-x^2} + e^{-2x^2}x^4 + 4y(x)^2\right)$$

✓ **Mathematica** : cpu = 0.0470079 (sec), leaf count = 32

$$\left\{\left\{y(x) \to \frac{1}{c_1 - \frac{x^2}{2}} + \frac{1}{2}e^{-x^2}x^2\right\}\right\}$$

✓ **Maple** : cpu = 0.135 (sec), leaf count = 25

$$\left\{y(x) = \frac{x^2 \mathrm{e}^{-x^2}}{2} + \left(\_C1 - \frac{x^2}{2}\right)^{-1}\right\}$$

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 = 0.565795 (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 = 0.208 (sec), leaf count = 38

$$\left\{y(x) = \mathrm{e}^{RootOf\left(-2\left(\mathrm{e}^{\_Z}\right)^4 - 3\left(\mathrm{e}^{\_Z}\right)^3 + 6\,\mathrm{e}^{\_Z}\ln(x) + 6\,\_C1\,\mathrm{e}^{\_Z} - 6\,\_Z\,\mathrm{e}^{\_Z} + 6\,x\right)}\right\}$$

ODE No. 824

$$y'(x) = \frac{y(x)\left(x^3 + x^2y(x) + y(x)^2\right)}{(x-1)x^2(y(x)+x)}$$

✓ **Mathematica** : cpu = 0.111738 (sec), leaf count = 68

$$\text{Solve}\left[-\frac{1}{2}\log\left(\frac{y(x)^2}{x^2} + \frac{y(x)}{x} + 1\right) + \log\left(\frac{y(x)}{x}\right) + \frac{\tan^{-1}\left(\frac{\frac{2y(x)}{x}+1}{\sqrt{3}}\right)}{\sqrt{3}} = c_1 + \log(1-x) - \log(x), y(x)\right]$$

✓ **Maple** : cpu = 0.54 (sec), leaf count = 61

$$\left\{-\frac{1}{2}\ln\left(\frac{(y(x))^2+xy(x)+x^2}{x^2}\right)+\frac{\sqrt{3}}{3}\arctan\left(\frac{\sqrt{3}(x+2\,y(x))}{3\,x}\right)+\ln\left(\frac{y(x)}{x}\right)+\ln(x)-\ln(x-1)-\_\right.$$

ODE No. 825

$$y'(x)=\frac{x\left(x^2y(x)^3+(x^2+1)^{3/2}\,y(x)^2+x^2(x^2+1)^{3/2}+(x^2+1)^{3/2}+y(x)^3\right)}{(x^2+1)^3}$$

✓ **Mathematica** : cpu = 0.364551 (sec), leaf count = 148

$$\text{Solve}\left[-\frac{19}{3}\text{RootSum}\left[-19\#1^3+6\sqrt[3]{38}\#1-19\&,\frac{\log\left(\frac{\frac{3xy(x)}{\left(x^2+1\right)^2}+\frac{x}{\left(x^2+1\right)^{3/2}}}{\sqrt[3]{38}\sqrt[3]{\frac{x^3}{\left(x^2+1\right)^{9/2}}}}-\#1\right)}{2\sqrt[3]{38}-19\#1^2}\&\right]=c_1+\frac{19^{2/3}\left(\frac{x^3}{(x^2+1)^{9}}\right.}{}\right.$$

✓ **Maple** : cpu = 0.113 (sec), leaf count = 48

$$\left\{y(x)=\frac{19\,RootOf\left(-1296\int^{\_Z}(361\_a^3-432\_a+432)^{-1}\,d\_a+2\,\ln(x^2+1)+3\_C1\right)-6}{18}\sqrt{x^2+1}\right.$$

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 = 0.790194 (sec), leaf count = 70

$$\left\{\left\{y(x)\to-\frac{\sqrt{x}\sqrt{W\left(\frac{6e^{2c_1}x}{(x+1)^2}\right)}}{\sqrt{6}}\right\},\left\{y(x)\to\frac{\sqrt{x}\sqrt{W\left(\frac{6e^{2c_1}x}{(x+1)^2}\right)}}{\sqrt{6}}\right\}\right\}$$

✓ **Maple** : cpu = 0.501 (sec), leaf count = 51

$$\left\{ \left((y(x))^{-2} + 6\,x^{-1} \right)^{-1} = \frac{x}{54} \left(\mathrm{e}^{RootOf\left(-\mathrm{e}^{\_Z} \ln\left(\frac{(1+x)^2 (\mathrm{e}^{\_Z}+9)}{2\,x} \right) + 3\_C1\,\mathrm{e}^{\_Z} + \_Z\,\mathrm{e}^{\_Z} + 9 \right)} + 9 \right) \right\}$$

ODE No. 827

$$y'(x) = \frac{x^2 y(x) \sqrt{x^2 + y(x)^2} + x^3 \left(-\sqrt{x^2 + y(x)^2} \right) + y(x)}{x}$$

✓ **Mathematica** : cpu = 0.142973 (sec), leaf count = 111

$$\left\{ \left\{ y(x) \to \frac{x \left(-2e^{\sqrt{2}c_1 + \frac{\sqrt{2}x^3}{3}} + e^{2\sqrt{2}c_1 + \frac{2\sqrt{2}x^3}{3}} - 1 \right)}{2e^{\sqrt{2}c_1 + \frac{\sqrt{2}x^3}{3}} + e^{2\sqrt{2}c_1 + \frac{2\sqrt{2}x^3}{3}} - 1} \right\} \right\}$$

✓ **Maple** : cpu = 0.261 (sec), leaf count = 49

$$\left\{ \ln \left(2\,\frac{x \left(\sqrt{2\,(y(x))^2 + 2\,x^2} + y(x) + x \right)}{y(x) - x} \right) + \frac{\sqrt{2}x^3}{3} - \ln(x) - \_C1 = 0 \right\}$$

ODE No. 828

$$y'(x) = \frac{(y(x)+1)(2y(x)+1)}{x\,(2xy(x)^4 + xy(x)^3 - 2y(x) - 2)}$$

✓ **Mathematica** : cpu = 0.523058 (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 = 0.387 (sec), leaf count = 54

$$\left\{ y(x) = \frac{1}{2}\mathrm{e}^{RootOf\left(x(\mathrm{e}^{\_Z})^3 - 8\,x(\mathrm{e}^{\_Z})^2 + 16\,\ln(1/2\,\mathrm{e}^{\_Z} + 1/2)x\mathrm{e}^{\_Z} + 8\,x\_C1\,\mathrm{e}^{\_Z} - 2\_Z\,\mathrm{e}^{\_Z}x + 7\,\mathrm{e}^{\_Z}x + 16 \right)} - \frac{1}{2} \right\}$$

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 = 0.42624 (sec), leaf count = 74

$$\left\{\left\{y(x) \to \frac{-160c_1x^7-200c_1x^6-400c_1x^4+400c_1^2x^2+16x^{12}+40x^{11}+25x^{10}+80x^9+100x^8+100x^6-}{400x^2}\right.\right.$$

✓ **Maple** : cpu = 0.344 (sec), leaf count = 34

$$\left\{\_C1-\frac{1}{x}\sqrt{4\,x^2y\left(x\right)+1}+x^2+\frac{x^4}{2}+\frac{2\,x^5}{5}=0\right\}$$

ODE No. 830

$$y'(x) = \frac{(x-y(x))y(x)}{x\left(-y(x)^4-y(x)^3-y(x)+x\right)}$$

✓ **Mathematica** : cpu = 0.582304 (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 = 0.177 (sec), leaf count = 38

$$\left\{y(x)=\mathrm{e}^{RootOf\left(2\,\left(\mathrm{e}^{\_Z}\right)^4+3\,\left(\mathrm{e}^{\_Z}\right)^3-6\,\mathrm{e}^{\_Z}\ln(x)+6\,\_C1\,\mathrm{e}^{\_Z}+6\,\_Z\,\mathrm{e}^{\_Z}+6\,x\right)}\right\}$$

ODE No. 831

$$y'(x) = \frac{x^3\sqrt{4ax-y(x)^2}+x^2\sqrt{4ax-y(x)^2}+\sqrt{4ax-y(x)^2}+2a}{y(x)}$$

✓ **Mathematica** : cpu = 5.1758 (sec), leaf count = 145

$$\left\{\left\{y(x) \to -\frac{1}{12}\sqrt{576ax-72c_1x^4-96c_1x^3-288c_1x-144c_1^2-9x^8-24x^7-16x^6-72x^5-96x^4-144}\right.\right.$$

✓ **Maple** : cpu = 0.34 (sec), leaf count = 35

$$\left\{-\sqrt{-\left(y\left(x\right)\right)^2+4\,ax}-\frac{x^4}{4}-\frac{x^3}{3}-x-\_C1=0\right\}$$

ODE No. 832

$$y'(x) = \frac{y(x)(y(x)+x+1)}{(x+1)\left(y(x)^4+y(x)^3+y(x)^2+x\right)}$$

✓ **Mathematica** : cpu = 3.79062 (sec), leaf count = 2497

$$\left\{\left\{y(x)\to -\frac{1}{2}\sqrt{\frac{3\sqrt[3]{2}\left(-8x+3c_1\right.}{\sqrt[3]{1944\left(c_1+\log(x+1)\right)^2+972\left(c_1+\log(x+1)\right)+3726x+\sqrt{\left(1944\left(c_1+\log(x+1)\right)\right.}}}}\right.\right.$$

✓ **Maple** : cpu = 0.199 (sec), leaf count = 31

$$\left\{\ln(1+x)+\frac{x}{y(x)}-\frac{(y(x))^3}{3}-\frac{(y(x))^2}{2}-y(x)+\_C1=0\right\}$$

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 = 0.141346 (sec), leaf count = 105

$$\left\{\left\{y(x)\to \frac{x\left(-2e^{\sqrt{2}c_1+\frac{x^4}{2\sqrt{2}}}+e^{2\sqrt{2}c_1+\frac{x^4}{\sqrt{2}}}-1\right)}{2e^{\sqrt{2}c_1+\frac{x^4}{2\sqrt{2}}}+e^{2\sqrt{2}c_1+\frac{x^4}{\sqrt{2}}}-1}\right\}\right\}$$

✓ **Maple** : cpu = 0.207 (sec), leaf count = 49

$$\left\{\ln\left(2\,\frac{x\left(\sqrt{2\,(y(x))^2+2\,x^2}+y(x)+x\right)}{y(x)-x}\right)+\frac{\sqrt{2}x^4}{4}-\ln(x)-\_C1=0\right\}$$

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 = 1.54489 (sec), leaf count = 90

$$\left\{\left\{y(x) \to -\frac{\sqrt{x}\sqrt{W\left(\frac{6(x+1)^2 e^{2c_1+x^2-2x-3}}{x}\right)}}{\sqrt{6}}\right\}, \left\{y(x) \to \frac{\sqrt{x}\sqrt{W\left(\frac{6(x+1)^2 e^{2c_1+x^2-2x-3}}{x}\right)}}{\sqrt{6}}\right\}\right\}$$

✓ **Maple** : cpu = 0.658 (sec), leaf count = 60

$$\left\{\left((y(x))^{-2} + 6\,x^{-1}\right)^{-1} = \frac{x}{54}\left(e^{RootOf\left(x^2 e^{-Z} - e^{-Z}\ln\left(\frac{(e^{-Z}+9)x}{2\,(1+x)^2}\right) + 3\_C1\,e^{-Z} + \_Z\,e^{-Z} - 2\,e^{-Z}x + 9\right)} + 9\right)\right\}$$

ODE No. 835

$$y'(x) = -\frac{1}{x\left(-\sqrt[3]{y(x)^3}\right)\_\mathrm{F1}\left(y(x)^3 - 3\log(x)\right) - x\left(y(x)^3\right)^{2/3}}$$

✗ **Mathematica** : cpu = 3.30038 (sec), leaf count = 0 , could not solve

```
DSolve[Derivative[1][y][x] == -(-(x*(y[x]^3)^(2/3)) - x*(y[x]^3)^(1/3)*_F1[-
3*Log[x] + y[x]^3])^(-1), y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(y(x),x) = -1/(-(y(x)^3)^(2/3)*x-_F1(y(x)^3-3*ln(x))*(y(x)^3)^(1/3)*x),y(x)
```

ODE No. 836

$$y'(x) = \frac{(x - y(x))y(x)(y(x)+1)}{x(xy(x) - y(x) + x)}$$

✓ **Mathematica** : cpu = 20.183 (sec), leaf count = 379

$$\mathrm{Solve}\left[\frac{1}{9}2^{2/3}\left(\frac{\left(1 - \frac{(x-1)^2\left(\frac{x^6}{(x-1)^3}\right)^{2/3}((x+2)y(x)+x)}{x^4((x-1)y(x)+x)}\right)\left(\frac{\left(\frac{x^6}{(x-1)^3}\right)^{2/3}(x-1)^2((x+2)y(x)+x)}{x^4((x-1)y(x)+x)} + 2\right)\left(\left(1 - \frac{(x-1)^2\left(\frac{x^6}{(x-1)^3}\right)^{2/3}\cdots}{x^4((x-1)\cdots}\right.\right.}{\cdots}\right.\right.$$

✓ **Maple** : cpu = 0.334 (sec), leaf count = 73

$$\left\{y(x) = -x\mathrm{e}^{RootOf\left(-\ln\left(\frac{\mathrm{e}^{\_Z}}{2}+\frac{9}{2}\right)\mathrm{e}^{\_Z}+3\_C1\,\mathrm{e}^{\_Z}+\_Z\,\mathrm{e}^{\_Z}-\mathrm{e}^{\_Z}x+9\right)}\left(-9+(x-1)\,\mathrm{e}^{RootOf\left(-\ln\left(\frac{\mathrm{e}^{\_Z}}{2}+\frac{9}{2}\right)\mathrm{e}^{\_Z}+3\_C1\,\mathrm{e}^{\_Z}+\right.}\right.\right.$$

ODE No. 837

$$y'(x) = -\frac{1}{-\sqrt[3]{y(x)^3}\log(x)\_\mathrm{F1}\left(3\mathrm{Ei}(-\log(x)) + y(x)^3\right) - \left(y(x)^3\right)^{2/3}\log(x)}$$

✗ **Mathematica** : cpu = 3.86431 (sec), leaf count = 0 , could not solve

```
DSolve[Derivative[1][y][x] == -(-(Log[x]*(y[x]^3)^(2/3)) - Log[x]*(y[x]^3)^(1/3)*_F1[3
Log[x]] + y[x]^3])^(-1), y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(y(x),x) = -1/(-ln(x)*(y(x)^3)^(2/3)-_F1(y(x)^3+3*Ei(1,-ln(x)))*ln(x)*(y(x)
```

ODE No. 838

$$y'(x) = \frac{\frac{8x^{7/2}}{5} + \frac{4x^6}{25} - \frac{4}{5}x^3y(x) + \frac{6x^3}{5} - 4\sqrt{x}y(x) + y(x)^2 + 4x + \sqrt{x}}{x}$$

✓ **Mathematica** : cpu = 0.0305726 (sec), leaf count = 31

$$\left\{\left\{y(x) \to \frac{1}{c_1 - \log(x)} + \frac{2}{5}\sqrt{x}\left(x^{5/2} + 5\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.117 (sec), leaf count = 25

$$\left\{y(x) = \frac{2\,x}{5}\left(x^2 + 5\,\frac{1}{\sqrt{x}}\right) + \left(\_C1 - \ln(x)\right)^{-1}\right\}$$

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 = 0.10174 (sec), leaf count = 28

$$\left\{\left\{y(x) \to -x\log\left(\frac{e^{2c_1}}{2x} - \frac{x}{2}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.089 (sec), leaf count = 19

$$\left\{y(x) = \ln\left(2\frac{x}{-x^2 + \_C1}\right)x\right\}$$

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 = 0.137755 (sec), leaf count = 30

$$\left\{\left\{y(x) \to -x\log\left(\frac{e^{3c_1}}{3x} - \frac{x^2}{3}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.08 (sec), leaf count = 19

$$\left\{y(x) = \ln\left(3\frac{x}{-x^3 + \_C1}\right)x\right\}$$

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 = 1.6685 (sec), leaf count = 236

$$\left\{\left\{y(x) \to -\frac{\sqrt{2a^{5/2}bx^2 - 2a^{5/2}c + 4a^3b^2x^3 - 4a^3bcx + a^2x + 4\sqrt{a}b^2c_1x^2 - 4\sqrt{a}bcc_1 + 2bc_1x}}{\sqrt{2}\sqrt{2a^{3/2}bc_1 + a^{7/2} + 2a^4bx}}\right\}, \left\{y(x) -\right.\right.$$

✓ **Maple** : cpu = 0.341 (sec), leaf count = 97

$$\left\{y(x) = \frac{1}{x\_C1 + 1}\sqrt{(x\_C1+1)\,a^{\frac{3}{2}}\left((x\_C1+1)\,(bx^2-c)\,\sqrt{a}+\frac{x}{2}\right)}a^{-\frac{3}{2}}, y(x) = -2\,\frac{\sqrt{(x\_C1+1)\,a^{3/}}}{}\right.$$

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 = 1.53159 (sec), leaf count = 186

$$\left\{\left\{y(x) \to -\frac{c_1e^{\frac{1}{4}x^2(2\log(x)-1)}\left(\frac{x}{2}+\frac{1}{2}x(2\log(x)-1)\right)+\frac{1}{4}x^2e^{\frac{1}{4}x^2(2\log(x)-1)}(2\log(x)-1)\left(\frac{x}{2}+\frac{1}{2}x(2\log(x)-\right.}{x\left(c_1e^{\frac{1}{4}x^2(2\log(x)-1)}+\frac{1}{4}x^2e^{\frac{1}{4}x^2(2\log(x)-1)}(2\log(\right.}\right.\right.$$

✓ **Maple** : cpu = 0.051 (sec), leaf count = 43

$$\left\{y(x) = -\frac{\ln(x)\,(2\,x^2\ln(x) - x^2 + 2\_C1 + 4)}{2\,x^2\ln(x) - x^2 + 2\_C1}\right\}$$

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 = 0.166151 (sec), leaf count = 198

$$\left\{\left\{y(x) \to -\frac{c_1e^{\frac{1}{9}x^3(3\log(x)-1)}\left(\frac{x^2}{3}+\frac{1}{3}x^2(3\log(x)-1)\right)+\frac{1}{9}x^3e^{\frac{1}{9}x^3(3\log(x)-1)}(3\log(x)-1)\left(\frac{x^2}{3}+\frac{1}{3}x^2(3\log(\right.}{x^2\left(c_1e^{\frac{1}{9}x^3(3\log(x)-1)}+\frac{1}{9}x^3e^{\frac{1}{9}x^3(3\log(x)-1)}(3\right.}\right.\right.$$

✓ **Maple** : cpu = 0.039 (sec), leaf count = 43

$$\left\{y(x) = -\frac{\ln(x)\,(6\,x^3\ln(x) - 2\,x^3 + 9\_C1 + 18)}{6\,x^3\ln(x) - 2\,x^3 + 9\_C1}\right\}$$

ODE No. 844

$$y'(x) = \frac{y(x)(y(x)+1)(y(x)+x)}{x(xy(x)+y(x)+x)}$$

✓ **Mathematica** : cpu = 24.0525 (sec), leaf count = 386

$$\text{Solve}\left[\frac{2^{2/3}\left(1-\frac{\left(\frac{x^6}{(x+1)^3}\right)^{2/3}(x+1)^2((x-2)y(x)+x)}{x^4((x+1)y(x)+x)}\right)\left(\frac{\left(\frac{x^6}{(x+1)^3}\right)^{2/3}(x+1)^2((x-2)y(x)+x)}{x^4((x+1)y(x)+x)}+2\right)\left(\left(1-\frac{\left(\frac{x^6}{(x+1)^3}\right)^{2/3}(x+1)^2((x}{x^4((x+1)y(x)}\right.\right.}{9}\right.$$

✓ **Maple** : cpu = 0.32 (sec), leaf count = 97

$$\left\{y(x) = -x\mathrm{e}^{RootOf\left(-\ln\left(\frac{\mathrm{e}^{\_Z}}{2}+\frac{9}{2}\right)\mathrm{e}^{\_Z}+3\_C1\,\mathrm{e}^{\_Z}+\_Z\,\mathrm{e}^{\_Z}+\mathrm{e}^{\_Z}x+9\right)}\left(\mathrm{e}^{RootOf\left(-\ln\left(\frac{\mathrm{e}^{\_Z}}{2}+\frac{9}{2}\right)\mathrm{e}^{\_Z}+3\_C1\,\mathrm{e}^{\_Z}+\_Z\,\mathrm{e}^{\_Z}+\mathrm{e}^{\_Z}x+9}\right.\right.$$

ODE No. 845

$$y'(x) = \frac{\sqrt{4y(x)^3-9x^4}+3x^3+x^3\sqrt{4y(x)^3-9x^4}+x^2\sqrt{4y(x)^3-9x^4}}{y(x)^2}$$

✓ **Mathematica** : cpu = 6.19974 (sec), leaf count = 227

$$\left\{\left\{y(x)\to -\frac{1}{2}\sqrt[3]{-\frac{1}{2}}\sqrt[3]{72c_1x^4+96c_1x^3+288c_1x+144c_1^2+9x^8+24x^7+16x^6+72x^5+132x^4+144x^2}\right\}\right.$$

✓ **Maple** : cpu = 0.248 (sec), leaf count = 44

$$\left\{\int_{\_b}^{y(x)}\_a^2\frac{1}{\sqrt{-9\,x^4+4\,\_a^3}}\,\mathrm{d}\_a-\frac{x^4}{4}-\frac{x^3}{3}-x-\_C1=0\right\}$$

ODE No. 846

$$y'(x) = \frac{1}{x^2\left(-\left(\frac{1}{y(x)}+1\right)\right)\_\mathrm{F1}\left(x\left(\frac{1}{y(x)}+1\right)\right)+x^2\_\mathrm{F1}\left(x\left(\frac{1}{y(x)}+1\right)\right)+x\left(\frac{1}{y(x)}+1\right)-x}$$

✓ **Mathematica** : cpu = 1.7295 (sec), leaf count = 362

$$\text{Solve}\left[\int_1^{y(x)}\left(\frac{x\_\mathrm{F1}\left(x\left(\frac{1}{K[2]}+1\right)\right)-1}{xK[2]\_\mathrm{F1}\left(x\left(\frac{1}{K[2]}+1\right)\right)+x\_\mathrm{F1}\left(x\left(\frac{1}{K[2]}+1\right)\right)-K[2]}-\int_1^x\left(\frac{-\frac{K[1]\_\mathrm{F1}'\left(K[1]\left(\frac{1}{K[2]}+1\right)\right)}{K[2]}}{K[1]\left(K[2]\_\mathrm{F1}\left(K[1\right.\right.}\right.\right.\right.$$

✓ **Maple** : cpu = 0.224 (sec), leaf count = 40

$$\left\{y(x) = \mathrm{e}^{RootOf\left(-\_Z-\int^{\frac{\mathrm{e}^{\_Z}x}{\mathrm{e}^{\_Z}-1}}\frac{1}{(\_F1(\_a)\_a-1)\_a}d\_a+\_C1\right)}-1\right\}$$

ODE No. 847

$$y'(x) = x^2\sqrt{x^2-4y(x)+2x+1}+\sqrt{x^2-4y(x)+2x+1}+x^3\sqrt{x^2-4y(x)+2x+1}+\frac{x}{2}+\frac{1}{2}$$

✓ **Mathematica** : cpu = 0.399455 (sec), leaf count = 69

$$\left\{\left\{y(x) \to \frac{1}{144}\left(72c_1x^4+96c_1x^3+288c_1x-144c_1^2-9x^8-24x^7-16x^6-72x^5-96x^4-108x^2+72x+\right.\right.\right.$$

✓ **Maple** : cpu = 0.343 (sec), leaf count = 34

$$\left\{\_C1-\frac{x^4}{2}-\frac{2\,x^3}{3}-2\,x-\sqrt{x^2+2\,x+1-4\,y\left(x\right)}=0\right\}$$

ODE No. 848

$$y'(x) = \_F1(y(x) - \log(\sinh(x))) + \coth(x)$$

✓ **Mathematica** : cpu = 0.13168 (sec), leaf count = 154

$$\text{Solve}\left[\int_1^{y(x)} -\frac{\_F1(K[2]-\log(\sinh(x)))\left(\int_1^x\left(\frac{\_F1'(K[2]-\log(\sinh(K[1])))(\_F1(K[2]-\log(\sinh(K[1])))+\coth(K[1]))}{(\_F1(K[2]-\log(\sinh(K[1]))))^2} - \frac{\_F}{\_F}\right.\right.}{\_F1(K[2]-\log(\sinh(x)))}\right.$$

✓ **Maple** : cpu = 0.623 (sec), leaf count = 27

$$\left\{\int_{\_b}^{y(x)} (\_F1(\_a - \ln(\sinh(x))))^{-1}\, d\_a - x - \_C1 = 0\right\}$$

ODE No. 849

$$y'(x) = x^2\sqrt{x^2+4y(x)-4x} + \sqrt{x^2+4y(x)-4x} + x^3\sqrt{x^2+4y(x)-4x} - \frac{x}{2} + 1$$

✓ **Mathematica** : cpu = 0.352845 (sec), leaf count = 68

$$\left\{\left\{y(x) \to \frac{1}{144}(-72c_1x^4 - 96c_1x^3 - 288c_1x + 144c_1^2 + 9x^8 + 24x^7 + 16x^6 + 72x^5 + 96x^4 + 108x^2 + 144x\right.\right.$$

✓ **Maple** : cpu = 0.326 (sec), leaf count = 33

$$\left\{\_C1 + \frac{x^4}{2} + \frac{2x^3}{3} + 2x - \sqrt{x^2 - 4x + 4y(x)} = 0\right\}$$

ODE No. 850

$$y'(x) = \_F1(y(x) - \log(\sin(x)) + \log(\cos(x)+1)) + \csc(x)$$

✓ **Mathematica** : cpu = 0.253636 (sec), leaf count = 1478

$$\text{Solve}\left[\int_1^{y(x)} -\frac{\sin(x)\left(\left(\int_1^x\left(\frac{(\cot^2(K[1])+\csc(K[1])\cot(K[1])+1)\sin(K[1])(\csc(K[1])+\_F1(K[2]+\log(\cos(K[1])+1)-\log(\sin(K[1]))))}{(-\cot^2(K[1])+\_F1(K[2]+\log(\cos(K[1])+1)-\log(\sin(K[1])))\cot(K\right.\right.\right.}{}\right.$$

✓ **Maple** : cpu = 1.171 (sec), leaf count = 32

$$\left\{\int_{\_b}^{y(x)}(\_F1(\_a-\ln(\sin(x))+\ln(\cos(x)+1)))^{-1}\,\mathrm{d}\_a-x-\_C1=0\right\}$$

ODE No. 851

$$y'(x)=\frac{a^3x^3+3a^2bx^2y(x)+a^2bx^2+3ab^2xy(x)^2+2ab^2xy(x)+b^3y(x)^3+b^3y(x)^2+b^3}{b^3}$$

✓ **Mathematica** : cpu = 0.251233 (sec), leaf count = 145

$$\text{Solve}\left[-\frac{1}{3}(27a+29b)^{2/3}\text{RootSum}\left[\#1^3(27a+29b)^{2/3}-3\#1b^{2/3}+(27a+29b)^{2/3}\&,\frac{\log\left(\frac{\frac{3ax+b}{b}+3y(x)}{\sqrt[3]{\frac{27a+29b}{b}}}-\right.}{b^{2/3}-\#1^2(27a+29}\right.\right.$$

✓ **Maple** : cpu = 0.082 (sec), leaf count = 42

$$\left\{y(x)=\frac{RootOf\left(\int^{\_Z}(\_a^3b+\_a^2b+a+b)^{-1}\,d\_ab-x+\_C1\right)b-ax}{b}\right\}$$

ODE No. 852

$$y'(x)=\frac{\alpha^3y(x)^3+\alpha^3y(x)^2+\alpha^3+3\alpha^2\beta xy(x)^2+2\alpha^2\beta xy(x)+3\alpha\beta^2x^2y(x)+\alpha\beta^2x^2+\beta^3x^3}{\alpha^3}$$

✓ **Mathematica** : cpu = 0.236609 (sec), leaf count = 145

$$\text{Solve}\left[-\frac{1}{3}(29\alpha+27\beta)^{2/3}\text{RootSum}\left[\#1^3(29\alpha+27\beta)^{2/3}-3\#1\alpha^{2/3}+(29\alpha+27\beta)^{2/3}\&,\frac{\log\left(\frac{\frac{\alpha+3\beta x}{\alpha}+3y(x)}{\sqrt[3]{\frac{29\alpha+27\beta}{\alpha}}}\right.}{\alpha^{2/3}-\#1^2(29\alpha}\right.\right.$$

✓ **Maple** : cpu = 0.083 (sec), leaf count = 42

$$\left\{y(x)=\frac{RootOf\left(\int^{\_Z}(\_a^3\alpha+\_a^2\alpha+\alpha+\beta)^{-1}\,d\_a\alpha-x+\_C1\right)\alpha-\beta\,x}{\alpha}\right\}$$

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 = 0.0223262 (sec), leaf count = 76

$$\left\{\left\{y(x) \to \frac{1}{x^3\left(\frac{1}{x^3} - \frac{1}{x^3\sqrt{c_1-2x}}\right)} - \frac{x+2}{x}\right\}, \left\{y(x) \to \frac{1}{x^3\left(\frac{1}{x^3\sqrt{c_1-2x}} + \frac{1}{x^3}\right)} - \frac{x+2}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.059 (sec), leaf count = 63

$$\left\{y(x) = \frac{1}{x}\left(-2\sqrt{\_C1 - 2x} - x - 2\right)\left(\sqrt{\_C1 - 2x} + 1\right)^{-1}, y(x) = \frac{1}{x}\left(-2\sqrt{\_C1 - 2x} + x + 2\right)\left(\sqrt{\_\right.\right.$$

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 = 4.10182 (sec), leaf count = 0 , could not solve

```
DSolve[Derivative[1][y][x] == ((-1 + Log[x] + x^2*Log[x]^2 + Log[y[x]] + 2*x^2*Log[x]*
```

✓ **Maple** : cpu = 0.268 (sec), leaf count = 51

$$\left\{y(x) = 1\left(x^{\frac{x^3}{x^3+3\_C1}}\right)^{-1}\left(x^{\frac{\_C1}{x^3+3\_C1}}\right)^{-3}\left(e^{\frac{x}{x^3+3\_C1}}\right)^{-3}\right\}$$

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 = 1.01632 (sec), leaf count = 0 , could not solve

```
DSolve[Derivative[1][y][x] == ((-1 + Log[x] + x^3*Log[x]^2 + Log[y[x]] + 2*x^3*Log[x]*
```

✓ **Maple** : cpu = 0.343 (sec), leaf count = 51

$$\left\{y(x) = 1\left(x^{\frac{x^4}{x^4+4\_C1}}\right)^{-1}\left(x^{\frac{\_C1}{x^4+4\_C1}}\right)^{-4}\left(e^{\frac{x}{x^4+4\_C1}}\right)^{-4}\right\}$$

ODE No. 856

$$y'(x) = -\frac{x\left(-\_\mathrm{F1}(y(x)^2-2x)-\frac{1}{x}\right)}{\sqrt{y(x)^2}}$$

✓ **Mathematica** : cpu = 1.05298 (sec), leaf count = 100

$$\text{Solve}\left[\int_1^{y(x)}\left(\frac{\sqrt{K[2]^2}}{\_\mathrm{F1}\left(K[2]^2-2x\right)}-\int_1^x\frac{2K[2]\_\mathrm{F1}'(K[2]^2-2K[1])}{\left(\_\mathrm{F1}\left(K[2]^2-2K[1]\right)\right)^2}\,dK[1]\right)dK[2]+\int_1^x\left(-\frac{1}{\_\mathrm{F1}\left(y(x)^2-\right.}\right.\right.$$

✓ **Maple** : cpu = 0.339 (sec), leaf count = 65

$$\left\{y(x)=\sqrt{2\,\mathit{RootOf}\left(x^2-2\int^{\_Z}(\_\mathit{F1}\,(2\_a))^{-1}\,d\_a+4\_\mathit{C1}\right)+2\,x},y(x)=-\sqrt{2\,\mathit{RootOf}\left(x^2-2\right.}\right.$$

ODE No. 857

$$y'(x) = x^2\sqrt{x^2+8y(x)-2x+1}+\sqrt{x^2+8y(x)-2x+1}+x^3\sqrt{x^2+8y(x)-2x+1}-\frac{x}{4}+\frac{1}{4}$$

✓ **Mathematica** : cpu = 0.38341 (sec), leaf count = 69

$$\left\{\left\{y(x)\to\frac{1}{72}\left(-72c_1x^4-96c_1x^3-288c_1x+144c_1^2+9x^8+24x^7+16x^6+72x^5+96x^4+135x^2+18x-\right.\right.\right.$$

✓ **Maple** : cpu = 0.331 (sec), leaf count = 32

$$\left\{\_\mathit{C1}+x^4+\frac{4\,x^3}{3}+4\,x-\sqrt{x^2-2\,x+1+8\,y\left(x\right)}=0\right\}$$

ODE No. 858

$$y'(x) = \frac{a^3y(x)^3+a^3y(x)^2+a^3+3a^2bxy(x)^2+2a^2bxy(x)+3ab^2x^2y(x)+ab^2x^2+b^3x^3}{a^3}$$

✓ **Mathematica** : cpu = 0.24107 (sec), leaf count = 145

$$\text{Solve}\left[-\frac{1}{3}(29a+27b)^{2/3}\text{RootSum}\left[\#1^3(29a+27b)^{2/3}-3\#1a^{2/3}+(29a+27b)^{2/3}\&,\frac{\log\left(\frac{\frac{a+3bx}{a}+3y(x)}{\sqrt[3]{\frac{29a+27b}{a}}}-\right.}{a^{2/3}-\#1^2(29a+2}\right.\right.$$

✓ **Maple** : cpu = 0.08 (sec), leaf count = 42

$$\left\{y(x)=\frac{RootOf\left(\int^{\_Z}(a\_a^3+\_a^2a+a+b)^{-1}\,d\_aa-x+\_C1\right)a-bx}{a}\right\}$$

ODE No. 859

$$y'(x)=\frac{\_\text{F1}(y(x)^2-2x)+x}{x\sqrt{y(x)^2}}$$

✓ **Mathematica** : cpu = 1.47052 (sec), leaf count = 102

$$\text{Solve}\left[\int_1^{y(x)}\left(\frac{\sqrt{K[2]^2}}{\_\text{F1}\left(K[2]^2-2x\right)}-\int_1^x\frac{2K[2]\_\text{F1}'(K[2]^2-2K[1])}{\left(\_\text{F1}\left(K[2]^2-2K[1]\right)\right)^2}\,dK[1]\right)dK[2]+\int_1^x\left(-\frac{1}{\_\text{F1}\left(y(x)^2-\right.}\right.\right.$$

✓ **Maple** : cpu = 0.324 (sec), leaf count = 63

$$\left\{y(x)=\sqrt{2\,RootOf\left(\ln(x)-\int^{\_Z}(\_F1\,(2\_a))^{-1}\,d\_a+2\_C1\right)+2\,x},y(x)=-\sqrt{2\,RootOf\left(\ln(x)-\right.}\right.$$

ODE No. 860

$$y'(x)=\frac{\frac{1}{2}x^4\cos(2y(x))+\frac{x^4}{2}+\frac{1}{2}x^3\cos(2y(x))+\frac{x^3}{2}-\frac{1}{2}\sin(2y(x))+\frac{1}{2}x\cos(2y(x))+\frac{x}{2}}{x}$$

✓ **Mathematica** : cpu = 0.179359 (sec), leaf count = 33

$$\left\{\left\{y(x)\to\tan^{-1}\left(\frac{10c_1+4x^5+5x^4+10x^2}{20x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 2.089 (sec), leaf count = 29

$$\left\{y(x)=\arctan\left(\frac{4\,x^5+5\,x^4+10\,x^2+40\,\_C1}{20\,x}\right)\right\}$$

ODE No. 861

$$y'(x) = -\frac{e^{-1/x}\left(-\_F1\left(e^{\frac{1}{x}}y(x)\right) - \frac{e^{\frac{1}{x}}y(x)}{x}\right)}{x}$$

✓ **Mathematica** : cpu = 2.18958 (sec), leaf count = 155

$$\text{Solve}\left[\int_1^{y(x)} -\frac{\_F1\left(e^{\frac{1}{x}}K[2]\right)\left(\int_1^x\left(\frac{e^{\frac{1}{K[1]}}}{K[1]^2\_F1\left(e^{\frac{1}{K[1]}}K[2]\right)} - \frac{e^{\frac{2}{K[1]}}K[2]\_F1'\left(e^{\frac{1}{K[1]}}K[2]\right)}{K[1]^2\left(\_F1\left(e^{\frac{1}{K[1]}}K[2]\right)\right)^2}\right)dK[1]\right) + e^{\frac{1}{x}}}{\_F1\left(e^{\frac{1}{x}}K[2]\right)}dK[2] +$$

✓ **Maple** : cpu = 0.197 (sec), leaf count = 26

$$\left\{y(x) = \frac{RootOf\left(-\ln(x) + \int^{\_Z}(\_F1(\_a))^{-1}d\_a + \_C1\right)}{e^{x^{-1}}}\right\}$$

ODE No. 862

$$y'(x) = -\log(y(x)-1)\left(\frac{\text{Ei}(-\log(y(x)-1))}{x} - \_F1(x)\right)$$

✗ **Mathematica** : cpu = 1.33812 (sec), leaf count = 0 , could not solve

```
DSolve[Derivative[1][y][x] == -(Log[-1 + y[x]]*(ExpIntegralEi[-Log[-1 + y[x]]]/x - _F1
```

✓ **Maple** : cpu = 0.237 (sec), leaf count = 27

$$\left\{y(x) = e^{RootOf\left(\int -\frac{\_F1(x)}{x}\,dx x + x\_C1 + Ei(1,-\_Z)\right)} + 1\right\}$$

ODE No. 863

$$y'(x)=\frac{x\sqrt{x^2+y(x)^2}+x^4\sqrt{x^2+y(x)^2}+x^3\sqrt{x^2+y(x)^2}+y(x)}{x}$$

✓ **Mathematica** : cpu = 0.0368138 (sec), leaf count = 30

$$\left\{\left\{y(x)\to x\sinh\left(\frac{1}{12}(12c_1+3x^4+4x^3+12x)\right)\right\}\right\}$$

✓ **Maple** : cpu = 5.714 (sec), leaf count = 38

$$\left\{\ln\left(\sqrt{(y(x))^2+x^2}+y(x)\right)-\frac{x^4}{4}-\frac{x^3}{3}-x-\ln(x)-\_C1=0\right\}$$

ODE No. 864

$$y'(x)=\frac{e^{\frac{x^2}{4}}y(x)\left(2e^{-\frac{3x^2}{4}}y(x)^2+e^{-\frac{x^2}{2}}xy(x)+e^{-\frac{x^2}{4}}x\right)}{2e^{-\frac{x^2}{4}}y(x)+2}$$

✓ **Mathematica** : cpu = 0.0474258 (sec), leaf count = 137

$$\left\{\left\{y(x)\to\frac{2e^{\frac{x^2}{2}}}{\sqrt{2}\sqrt{2e^{\frac{x^2}{2}}(c_1-2x)+2e^{\frac{x^2}{2}}}-2e^{\frac{x^2}{4}}}\right\},\left\{y(x)\to-\frac{2e^{\frac{x^2}{2}}}{\sqrt{2}\sqrt{2e^{\frac{x^2}{2}}(c_1-2x)+2e^{\frac{x^2}{2}}}+2e^{\frac{x^2}{4}}}\right\}\right\}$$

✓ **Maple** : cpu = 0.115 (sec), leaf count = 162

$$\left\{y(x)=1\left(e^{\frac{x^2}{2}}\left(\sqrt{\_C1-2x}-1\right)e^{-\frac{x^2}{4}}-e^{\frac{x^2}{4}}\sqrt{\_C1-2x}\right)\left(e^{-\frac{x^2}{4}}\right)^{-1}\left(e^{\frac{x^2}{4}}\sqrt{\_C1-2x}+e^{-\frac{x^2}{4}}e^{\frac{x^2}{2}}\right)^{-1},$$

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 = 320.617 (sec), leaf count = 84

$$\text{Solve}\left[\int_1^x\left(-\frac{f(K[1])}{\log(K[1])}-\frac{\log(y(x)-1)}{K[1]\log^2(K[1])}\right)dK[1]+\int_1^{y(x)}\left(\frac{1}{\log(x)(K[2]-1)}-\int_1^x-\frac{1}{K[1](K[2]-1)\mathrm{lo}\right.\right.$$

✓ **Maple** : cpu = 0.342 (sec), leaf count = 23

$$\left\{y(x) = e^{\int \frac{f(x)}{\ln(x)} dx \ln(x)} x^{-}C1 + 1\right\}$$

ODE No. 866

$$y'(x) = x^2\sqrt{a^2 + 2ax + x^2 + 4y(x)} + \sqrt{a^2 + 2ax + x^2 + 4y(x)} + x^3\sqrt{a^2 + 2ax + x^2 + 4y(x)} - \frac{a}{2} - \frac{x}{2}$$

✓ **Mathematica** : cpu = 0.506387 (sec), leaf count = 74

$$\left\{\left\{y(x) \to \frac{1}{144}(-36a^2 - 72ax - 72c_1x^4 - 96c_1x^3 - 288c_1x + 144c_1^2 + 9x^8 + 24x^7 + 16x^6 + 72x^5 + 96x^4\right.\right.$$

✓ **Maple** : cpu = 0.375 (sec), leaf count = 37

$$\left\{\_C1 + \frac{x^4}{2} + \frac{2x^3}{3} + 2x - \sqrt{x^2 + 2ax + a^2 + 4y(x)} = 0\right\}$$

ODE No. 867

$$y'(x) = \frac{x^6}{27} + \frac{1}{3}x^4y(x) + \frac{x^4}{9} + x^2y(x)^2 + \frac{2}{3}x^2y(x) + y(x)^3 + y(x)^2 - \frac{2x}{3} + 1$$

✓ **Mathematica** : cpu = 0.0957344 (sec), leaf count = 77

$$\text{Solve}\left[-\frac{29}{3}\text{RootSum}\left[-29\#1^3 + 3\sqrt[3]{29}\#1 - 29\&, \frac{\log\left(\frac{x^2+3y(x)+1}{\sqrt[3]{29}} - \#1\right)}{\sqrt[3]{29} - 29\#1^2}\&\right] = c_1 + \frac{1}{9}29^{2/3}x, y(x)\right]$$

✓ **Maple** : cpu = 0.083 (sec), leaf count = 30

$$\left\{y(x) = -\frac{x^2}{3} + RootOf\left(-x + \int^{\_Z} (\_a^3 + \_a^2 + 1)^{-1} d\_a + \_C1\right)\right\}$$

ODE No. 868

$$y'(x) = -x^6 + 3x^4y(x) + x^4 - 3x^2y(x)^2 - 2x^2y(x) + y(x)^3 + y(x)^2 + 2x + 1$$

✓ **Mathematica** : cpu = 0.0665084 (sec), leaf count = 79

$$\text{Solve}\left[-\frac{29}{3}\text{RootSum}\left[-29\#1^3 + 3\sqrt[3]{29}\#1 - 29\&, \frac{\log\left(\frac{-3x^2+3y(x)+1}{\sqrt[3]{29}} - \#1\right)}{\sqrt[3]{29} - 29\#1^2}\&\right] = c_1 + \frac{1}{9}29^{2/3}x, y(x)\right]$$

✓ **Maple** : cpu = 0.076 (sec), leaf count = 28

$$\left\{y(x) = x^2 + \mathit{RootOf}\left(-x + \int^{\_Z} \left(\_a^3 + \_a^2 + 1\right)^{-1} d\_a + \_C1\right)\right\}$$

ODE No. 869

$$y'(x) = \frac{2x^5 + 2x^4 - 2x^3y(x) + x^3 - 2x^2y(x) + 3x^2 - 2y(x) - x + 1}{x^2 - y(x)}$$

✓ **Mathematica** : cpu = 0.0408376 (sec), leaf count = 42

$$\left\{\left\{y(x) \to \frac{1}{2}\left(W\left(-e^{c_1+x^4+\frac{4x^3}{3}-2x^2+4x-1}\right) + 1\right) + x^2\right\}\right\}$$

✓ **Maple** : cpu = 0.117 (sec), leaf count = 37

$$\left\{y(x) = x^2 + \frac{1}{2}\mathit{lambertW}\left(-2\frac{e^{x^4}e^{4/3\,x^3}\_C1\,(e^x)^4\,e^{-1}}{(e^{x^2})^2}\right) + \frac{1}{2}\right\}$$

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 = 1.9739 (sec), leaf count = 35

$$\left\{\left\{y(x) \to -x\log\left(\frac{-c_1 - \frac{x^4}{4} - \frac{x^3}{3} - x}{x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 1.053 (sec), leaf count = 30

$$\left\{y(x)=-\ln\left(-\frac{3\,x^4+4\,x^3+12\_C1+12\,x}{12\,x}\right)x\right\}$$

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 = 0.0273046 (sec), leaf count = 22

$$\left\{\left\{y(x)\to\frac{1}{c_1-x}-\log(2x+1)\right\}\right\}$$

✓ **Maple** : cpu = 0.095 (sec), leaf count = 26

$$\left\{y(x)=\frac{-1+(-x+\_C1)\ln(2\,x+1)}{x-\_C1}\right\}$$

ODE No. 872

$$y'(x)=\frac{14x^{7/2}+\frac{12x^6}{5}-6x^3y(x)-6x^3-5\sqrt{x}y(x)+10x-5\sqrt{x}-5}{x\left(2x^3-5y(x)+10\sqrt{x}-5\right)}$$

✓ **Mathematica** : cpu = 0.0513312 (sec), leaf count = 215

$$\left\{\left\{y(x)\to\frac{1}{5}\left(2x^3+10\sqrt{x}-5\right)-\frac{\sqrt{-25c_1x-x\left(2x^3+10\sqrt{x}-5\right)^2-50x\left(-\frac{4x^{7/2}}{5}-\frac{2x^6}{25}+\frac{2x^3}{5}-2x+2}}{5\sqrt{-\frac{1}{x}}x}$$

✓ **Maple** : cpu = 0.075 (sec), leaf count = 49

$$\left\{y(x)=\frac{2\,x^3}{5}+2\,\sqrt{x}-\sqrt{\_C1+2\,\ln(x)}-1,y(x)=\frac{2\,x^3}{5}+2\,\sqrt{x}+\sqrt{\_C1+2\,\ln(x)}-1\right\}$$

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 = 0.693087 (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 = 0.316 (sec), leaf count = 50

$$\left\{y(x)=\frac{e^{\mathit{RootOf}\left(2\,x\left(e^{\_Z}\right)^4-3\,x\left(e^{\_Z}\right)^3-6\,x\left(e^{\_Z}\right)^2+48\,x\_\mathit{C1}\,e^{\_Z}+54\,\_Z\,e^{\_Z}x+7\,e^{\_Z}x+96\right)}}{2}-\frac{1}{2}\right\}$$

ODE No. 874

$$y'(x) = \frac{1}{512}x\left(a^3x^{12}+24a^2x^8y(x)+8a^2x^8+192ax^4y(x)^2+128ax^4y(x)-256ax^2+512y(x)^3+512y(x)^2\right.$$

✓ **Mathematica** : cpu = 0.100925 (sec), leaf count = 101

$$\text{Solve}\left[-\frac{29}{3}\text{RootSum}\left[-29\#1^3+3\sqrt[3]{29}\#1-29\&,\frac{\log\left(\frac{\frac{1}{8}\left(3ax^5+8x\right)+3xy(x)}{\sqrt[3]{29}\sqrt[3]{x^3}}-\#1\right)}{\sqrt[3]{29}-29\#1^2}\&\right]=c_1+\frac{1}{18}29^{2/3}\left(x^3\right)^{2/}\right.$$

✓ **Maple** : cpu = 0.064 (sec), leaf count = 40

$$\left\{y(x)=-\frac{ax^4}{8}-\frac{1}{3}+\frac{29\,\mathit{RootOf}\left(x^2-162\int^{\_Z}\left(841\,\_a^3-27\,\_a+27\right)^{-1}d\_a+6\,\_\mathit{C1}\right)}{9}\right\}$$

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 = 0.386565 (sec), leaf count = 285

$$\left\{\left\{y(x)\to \frac{x\left(2(x+1)^{\sqrt{2}}\exp\left(\sqrt{2}c_1+\frac{x^4}{2\sqrt{2}}+\frac{x^2}{\sqrt{2}}+\frac{1}{3}\sqrt{2}(x^2+3)\,x+\frac{25}{6\sqrt{2}}\right)+(x+1)^{2\sqrt{2}}\left(-e^{2\sqrt{2}c_1+\frac{x^4}{\sqrt{2}}+\sqrt{2}\cdots}\right.\right.}{-2(x+1)^{\sqrt{2}}\exp\left(\sqrt{2}c_1+\frac{x^4}{2\sqrt{2}}+\frac{x^2}{\sqrt{2}}+\frac{1}{3}\sqrt{2}\,(x^2+3)\,x+\frac{25}{6\sqrt{2}}\right)+(x+1)^{2\sqrt{2}}\left(-e^{2\sqrt{2}c_1+\frac{x^4}{\sqrt{2}}+\sqrt{2}\cdots}\right.}\right.\right.$$

✓ **Maple** : cpu = 0.306 (sec), leaf count = 73

$$\left\{\ln\left(2\,\frac{x\left(\sqrt{2\,(y(x))^2+2\,x^2}+y(x)+x\right)}{y(x)-x}\right)+\ln(1+x)\sqrt{2}+\frac{(3\,x^4-4\,x^3+6\,x^2-12\,x)\sqrt{2}}{12}-\_C1-\cdots\right.$$

ODE No. 876

$$y'(x) = -\frac{y(x)^2\,(x^2y(x)-2xy(x)+y(x)-2x)}{2x(xy(x)-2y(x)-2)}$$

✓ **Mathematica** : cpu = 0.0193312 (sec), leaf count = 135

$$\left\{\left\{y(x)\to -\frac{4x}{\frac{2\sqrt{-4x\left(c_1-2\left(\frac{x^2}{8}-\frac{x}{2}+\frac{\log(x)}{4}\right)\right)-x(x-2)^2}}{\sqrt{-\frac{1}{x}}}-2(x-2)x}\right\},\left\{y(x)\to \frac{4x}{\frac{2\sqrt{-4x\left(c_1-2\left(\frac{x^2}{8}-\frac{x}{2}+\frac{\log(x)}{4}\right)\right)-x(x-2)^2}}{\sqrt{-\frac{1}{x}}}\cdots}\right.\right.$$

✓ **Maple** : cpu = 0.059 (sec), leaf count = 41

$$\left\{y(x)=-4\left(\sqrt{\_C1-8\,\ln(x)}-2\,x+4\right)^{-1},y(x)=4\left(\sqrt{\_C1-8\,\ln(x)}+2\,x-4\right)^{-1}\right\}$$

ODE No. 877

$$y'(x) = \frac{x^6 - 3x^4 y(x) + 2x^3 + 3x^2 y(x)^2 - 2xy(x) - y(x)^3 - 2x}{x^2 - y(x) - 1}$$

✓ **Mathematica** : cpu = 0.0191578 (sec), leaf count = 49

$$\left\{\left\{y(x) \to \frac{1}{1 - \frac{1}{\sqrt{c_1 - 2x}}} + x^2 - 1\right\}, \left\{y(x) \to \frac{1}{\frac{1}{\sqrt{c_1 - 2x}} + 1} + x^2 - 1\right\}\right\}$$

✓ **Maple** : cpu = 0.062 (sec), leaf count = 73

$$\left\{y(x) = \frac{1}{2\,x - 2\_C1}\left(-2\_C1\,x^2 + 2\,x^3 + \sqrt{2\_C1 - 2\,x + 1} - 1\right), y(x) = \frac{1}{-2\,x + 2\_C1}\left(2\_C1\,x^2 -\right.$$

ODE No. 878

$$y'(x) = \frac{-64a^3x^3 + 48a^2x^2y(x)^2 + 16a^2x^2 - 12axy(x)^4 - 8axy(x)^2 + y(x)^6 + y(x)^4 + 1}{y(x)}$$

✓ **Mathematica** : cpu = 0.315198 (sec), leaf count = 130

$$\text{Solve}\left[2a\left(x - \frac{1}{2}\text{RootSum}\left[64\#1^3a^3 - 48\#1^2a^2y(x)^2 - 16\#1^2a^2 + 12\#1ay(x)^4 + 8\#1ay(x)^2 + 2a - y(x)\right.\right.\right.$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(y(x),x) = (1+y(x)^4-8*a*x*y(x)^2+16*a^2*x^2+y(x)^6-12*y(x)^4*a*x+48*y(x)^2
64*a^3*x^3)/y(x),y(x))
```

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 = 0.184624 (sec), leaf count = 135

$$\left\{\left\{y(x) \to \frac{x\left(-2(x+1)^{\sqrt{2}}e^{\sqrt{2}c_1 + \sqrt{2}x} + e^{2\sqrt{2}c_1 + 2\sqrt{2}x} - (x+1)^{2\sqrt{2}}\right)}{2(x+1)^{\sqrt{2}}e^{\sqrt{2}c_1 + \sqrt{2}x} + e^{2\sqrt{2}c_1 + 2\sqrt{2}x} - (x+1)^{2\sqrt{2}}}\right\}\right\}$$

✓ **Maple** : cpu = 0.264 (sec), leaf count = 55

$$\left\{\ln\left(2\,\frac{x\left(\sqrt{2\,(y(x))^2+2\,x^2}+y(x)+x\right)}{y(x)-x}\right)+\sqrt{2}x-\ln(1+x)\sqrt{2}-\ln(x)-\_C1=0\right\}$$

ODE No. 880

$$y'(x)=-\frac{2a}{128a^4x^3-96a^3x^2y(x)^2-32a^3x^2+24a^2xy(x)^4+16a^2xy(x)^2-2ay(x)^6-2ay(x)^4-2a-y(x)$$

✓ **Mathematica** : cpu = 0.164771 (sec), leaf count = 131

$$\text{Solve}\left[\frac{\text{RootSum}\left[-64\#1^3a^3+48\#1^2a^2y(x)^2+16\#1^2a^2-12\#1ay(x)^4-8\#1ay(x)^2+y(x)^6+y(x)^4+1\right.}{8a^2}\right.$$

✓ **Maple** : cpu = 0.082 (sec), leaf count = 41

$$\left\{\frac{y(x)}{2\,a}+\frac{\int^{(y(x))^2-4\,ax}(\_a^3+\_a^2+1)^{-1}\,d\_a}{8\,a^2}-\_C1=0\right\}$$

ODE No. 881

$$y'(x)=\frac{x^6+9x^4y(x)-6x^3+27x^2y(x)^2-18xy(x)+27y(x)^3-18x}{9x^2+27y(x)+27}$$

✓ **Mathematica** : cpu = 0.0198016 (sec), leaf count = 75

$$\left\{\left\{y(x)\to\frac{1}{27\left(\frac{1}{27}-\frac{1}{\sqrt{c_1-1458x}}\right)}+\frac{1}{3}(-x^2-3)\right\},\left\{y(x)\to\frac{1}{27\left(\frac{1}{\sqrt{c_1-1458x}}+\frac{1}{27}\right)}+\frac{1}{3}(-x^2-3)\right\}\right\}$$

✓ **Maple** : cpu = 0.063 (sec), leaf count = 77

$$\left\{y(x)=\frac{1}{-6\,x+6\_C1}\left(-2\_C1\,x^2+2\,x^3-3\sqrt{2\_C1-2\,x+1}+3\right),y(x)=\frac{1}{-6\,x+6\_C1}\left(-2\_C1\right.$$

ODE No. 882

$$y'(x) = -\frac{1}{216}\sqrt{x}\left(-108x^{3/2} + x^9 - 18x^6 y(x) - 6x^6 + 108x^3 y(x)^2 + 72x^3 y(x) - 216y(x)^3 - 216y(x)^2 - 2\right.$$

✓ **Mathematica** : cpu = 0.105943 (sec), leaf count = 119

$$\text{Solve}\left[-\frac{29}{3}\text{RootSum}\left[-29\#1^3 + 3\sqrt[3]{29}\#1 - 29\&, \frac{\log\left(\frac{\frac{1}{2}(2\sqrt{x}-x^{7/2})+3\sqrt{x}y(x)}{\sqrt[3]{29}\sqrt[3]{x^{3/2}}} - \#1\right)}{\sqrt[3]{29} - 29\#1^2}\&\right] = c_1 + \frac{2}{27}29^{2/3}\sqrt{x}\right.$$

✓ **Maple** : cpu = 0.074 (sec), leaf count = 41

$$\left\{ y(x) = \frac{x^3}{6} - \frac{1}{3} + \frac{29}{9} \mathit{RootOf}\left(2\,x^{3/2} - 243\int^{\_Z} \left(841\,\_a^3 - 27\,\_a + 27\right)^{-1} d\_a + 9\,\_C1\right)\right\}$$

ODE No. 883

$$y'(x) = \frac{x(a^3 y(x)^6 + a^3 y(x)^4 + a^3 + 3a^2 b x^2 y(x)^4 + 2a^2 b x^2 y(x)^2 + 3ab^2 x^4 y(x)^2 + ab^2 x^4 + b^3 x^6)}{a^{7/2} y(x)}$$

✓ **Mathematica** : cpu = 1.62909 (sec), leaf count = 164

$$\text{Solve}\left[\frac{x^2}{2} - \frac{1}{2}a^{5/2}\text{RootSum}\left[\#1^3 b^3 + 3\#1^2 ab^2 y(x)^2 + \#1^2 ab^2 + 3\#1 a^2 b y(x)^4 + 2\#1 a^2 b y(x)^2 + a^{5/2} b + a^3\right.\right.$$

✓ **Maple** : cpu = 0.767 (sec), leaf count = 352

$$\left\{\int_{\_b}^{x} (b^3\_a^6 + 3\,ab^2\_a^4 (y(x))^2 + 3\,a^2 b\_a^2 (y(x))^4 + (y(x))^6 a^3 + a\_a^4 b^2 + 2\,(y(x))^2 a^2 b\_a^2 + (y(x))^4 a^3\right.$$

ODE No. 884

$$y'(x) = -\frac{x(x^6 - 3x^4 y(x)^2 - x^4 + 3x^2 y(x)^4 + 2x^2 y(x)^2 - y(x)^6 - y(x)^4 - 1)}{y(x)}$$

✓ **Mathematica** : cpu = 0.604342 (sec), leaf count = 71

$$\text{Solve}\left[\frac{1}{4}\left(2\log\left(-x^2 + y(x)^2 + 1\right) - 2x^2 - \frac{1}{y(x)(y(x)+x)} + \frac{1}{xy(x) - y(x)^2} - 2\log(x - y(x)) - 2\log(y(x\right.\right.$$

✓ **Maple** : cpu = 0.497 (sec), leaf count = 107

$$\left\{y(x) = \mathrm{e}^{\mathit{RootOf}\left(-3\,x^{2}\left(\mathrm{e}^{\_Z}\right)^{2}+6\,x^{3}\mathrm{e}^{\_Z}+3\left(\mathrm{e}^{\_Z}\right)^{2}\ln\left(\frac{\left(\mathrm{e}^{\_Z}\right)^{2}-2\,\mathrm{e}^{\_Z}x+1}{\mathrm{e}^{\_Z}-2\,x}\right)-2\,\_C1\left(\mathrm{e}^{\_Z}\right)^{2}-3\,\_Z\left(\mathrm{e}^{\_Z}\right)^{2}-6\,\mathrm{e}^{\_Z}\ln\left(\frac{\left(\mathrm{e}^{\_Z}\right)^{2}-2\,\mathrm{e}^{\_Z}x+1}{\mathrm{e}^{\_Z}-2\,x}\right)\right.}\right.$$

ODE No. 885

$$y'(x) = -\frac{i(x^6 + 12x^4y(x)^2 + 4x^4 + 48x^2y(x)^4 + 32x^2y(x)^2 + 64y(x)^6 + 64y(x)^4 + 32ix + 64)}{128y(x)}$$

✗ **Mathematica** : cpu = 40.9791 (sec), leaf count = 0 , could not solve

```
DSolve[Derivative[1][y][x] == ((-I/128)*(64 + (32*I)*x + 4*x^4 + x^6 + 32*x^2*y[x]^2 +
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(y(x),x) = -1/128*I*(32*I*x+64+64*y(x)^4+32*x^2*y(x)^2+4*x^4+64*y(x)^6+48*x
```

ODE No. 886

$$y'(x) = \frac{x^6y(x)^3 - 3x^5y(x)^2 + x^4y(x)^2 + 3x^4y(x) - 4x^3y(x) - x^3 + 2x^2 + 1}{x^4}$$

✓ **Mathematica** : cpu = 0.080746 (sec), leaf count = 82

$$\text{Solve}\left[-\frac{29}{3}\text{RootSum}\left[-29\#1^3 + 3\sqrt[3]{29}\#1 - 29\&, \frac{\log\left(\frac{3x^2y(x)-3x+1}{\sqrt[3]{29}} - \#1\right)}{\sqrt[3]{29} - 29\#1^2}\&\right] = c_1 - \frac{29^{2/3}}{9x}, y(x)\right]$$

✓ **Maple** : cpu = 0.046 (sec), leaf count = 42

$$\left\{y(x) = \frac{9\,x - 3 + 29\,\mathit{RootOf}\left(-81\,\int^{\_Z}\left(841\,\_a^{3} - 27\,\_a + 27\right)^{-1}d\_a x + 3\,x\_C1 - 1\right)}{9\,x^{2}}\right\}$$

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 = 0.0280495 (sec), leaf count = 106

$$\left\{\left\{y(x) \to \frac{1}{a^3x^3\left(\frac{1}{a^3x^3} - \frac{1}{x^3\sqrt{c_1 - 2a^6x}}\right)} - \frac{ax+1}{ax}\right\}, \left\{y(x) \to \frac{1}{a^3x^3\left(\frac{1}{x^3\sqrt{c_1 - 2a^6x}} + \frac{1}{a^3x^3}\right)} - \frac{ax+1}{ax}\right\}\right\}$$

✓ **Maple** : cpu = 0.06 (sec), leaf count = 72

$$\left\{y(x) = \frac{1}{ax}\left(-ax - \sqrt{\_C1 - 2\,x} - 1\right)\left(\sqrt{\_C1 - 2\,x} + 1\right)^{-1}, y(x) = \frac{1}{ax}\left(ax - \sqrt{\_C1 - 2\,x} + 1\right)\left(\sqrt{\_\right.$$

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 = 0.0215573 (sec), leaf count = 78

$$\left\{\left\{y(x) \to \frac{1}{x^4\left(\frac{1}{x^2} - \frac{1}{x^2\sqrt{c_1 + \frac{2}{x}}}\right)} + \frac{x-1}{x^2}\right\}, \left\{y(x) \to \frac{1}{x^4\left(\frac{1}{x^2\sqrt{c_1 + \frac{2}{x}}} + \frac{1}{x^2}\right)} + \frac{x-1}{x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.072 (sec), leaf count = 79

$$\left\{y(x) = \frac{1}{x^2}\left(\sqrt{\frac{x\_C1 + 2}{x}}x - x + 1\right)\left(\sqrt{\frac{x\_C1 + 2}{x}} - 1\right)^{-1}, y(x) = \frac{1}{x^2}\left(\sqrt{\frac{x\_C1 + 2}{x}}x + x - 1\right)\left(\sqrt{\right.$$

ODE No. 889

$$y'(x) = -\frac{e^x\left(-8y(x)^{9/2}+36e^x y(x)^3-8y(x)^3+24e^x y(x)^{3/2}-54e^{2x}y(x)^{3/2}-18e^{2x}+27e^{3x}-8\right)}{8\sqrt{y(x)}}$$

✗ **Mathematica** : cpu = 3605.62 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 1.263 (sec), leaf count = 49

$$\left\{e^x-\frac{2}{3}\ln\left((y(x))^{\frac{3}{2}}-\frac{3\,e^x}{2}+1\right)+\frac{2}{3}\ln\left((y(x))^{\frac{3}{2}}-\frac{3\,e^x}{2}\right)-4\left(-6\,(y(x))^{3/2}+9\,e^x\right)^{-1}-\_C1=0\right\}$$

ODE No. 890

$$y'(x) = \frac{x}{x^6+3x^4y(x)^2+x^4+3x^2y(x)^4+2x^2y(x)^2+y(x)^6+y(x)^4-y(x)+1}$$

✓ **Mathematica** : cpu = 0.150009 (sec), leaf count = 103

$$\text{Solve}\left[y(x)-\frac{1}{2}\text{RootSum}\left[\#1^3+3\#1^2y(x)^2+\#1^2+3\#1y(x)^4+2\#1y(x)^2+y(x)^6+y(x)^4+1\&,\frac{}{3\#1^2}\right.\right.$$

✓ **Maple** : cpu = 0.88 (sec), leaf count = 34

$$\left\{-y(x)+\frac{\int^{(y(x))^2+x^2}\left(\_a^3+\_a^2+1\right)^{-1}d\_a}{2}-\_C1=0\right\}$$

ODE No. 891

$$y'(x) = \frac{y(x)^2\left(x^4y(x)+2x^2y(x)+2x^2-2y(x)\right)}{x^3\left(x^2y(x)+x^2-y(x)\right)}$$

✓ **Mathematica** : cpu = 0.0258077 (sec), leaf count = 135

$$\left\{\left\{y(x)\to\frac{x^5}{\frac{\sqrt{x^5\left(c_1-2\left(\frac{1}{2x^4}-\frac{1}{x^2}+\log(x)\right)\right)+(x^2-1)^2x}}{\sqrt{\frac{1}{x^5}}}-x^3\left(x^2-1\right)}\right\},\left\{y(x)\to-\frac{x^5}{\frac{\sqrt{x^5\left(c_1-2\left(\frac{1}{2x^4}-\frac{1}{x^2}+\log(x)\right)\right)+(x^2-1)^2}}{\sqrt{\frac{1}{x^5}}}}\right.\right.$$

✓ **Maple** : cpu = 0.071 (sec), leaf count = 56

$$\left\{y(x) = x^2\left(\sqrt{\_C1 - 2\ln(x)}x^2 - x^2 + 1\right)^{-1}, y(x) = -x^2\left(\sqrt{\_C1 - 2\ln(x)}x^2 + x^2 - 1\right)^{-1}\right\}$$

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 = 3599.96 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.608 (sec), leaf count = 40

$$\left\{y(x) = e^{RootOf\left(-\_Z + \int^{\left(e^{-\_Z}\right)^2 - 2\,e^{-\_Z}x}\left(e^{2\,(\_a+1)^{-1}} + \_a\right)^{-1} d\_a + \_C1\right)} - x\right\}$$

ODE No. 893

$$y'(x) = \frac{x^3 y(x)^3 + x^3 y(x)^2 + x^3 + 6x^2 y(x)^2 + 4x^2 y(x) + 12xy(x) + 6x + 8}{x^3}$$

✓ **Mathematica** : cpu = 0.0904112 (sec), leaf count = 80

$$\text{Solve}\left[-\frac{29}{3}\text{RootSum}\left[-29\#1^3 + 3\sqrt[3]{29}\#1 - 29\&, \frac{\log\left(\frac{3y(x)+\frac{x+6}{x}}{\sqrt[3]{29}} - \#1\right)}{\sqrt[3]{29} - 29\#1^2}\&\right] = c_1 + \frac{1}{9}29^{2/3}x, y(x)\right]$$

✓ **Maple** : cpu = 0.044 (sec), leaf count = 41

$$\left\{y(x) = \frac{29\,RootOf\left(-81\int^{\_Z}(841\_a^3 - 27\_a + 27)^{-1} d\_a + x + 3\_C1\right)x - 3\,x - 18}{9\,x}\right\}$$

ODE No. 894

$$y'(x) = -\frac{i(x^6 + 3x^4 y(x)^2 + x^4 + 3x^2 y(x)^4 + 2x^2 y(x)^2 + y(x)^6 + y(x)^4 + ix + 1)}{y(x)}$$

✗ **Mathematica** : cpu = 40.6808 (sec), leaf count = 0 , could not solve

```
DSolve[Derivative[1][y][x] == ((-I)*(1 + I*x + x^4 + x^6 + 2*x^2*y[x]^2 + 3*x^4*y[x]^2
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(y(x),x) = -I*(I*x+1+x^4+2*x^2*y(x)^2+y(x)^4+x^6+3*x^4*y(x)^2+3*x^2*y(x)^4+
```

ODE No. 895

$$y'(x) = \frac{x(a^3 x^{12} + 24a^2 x^8 y(x) - 32a^2 x^6 + 192ax^4 y(x)^2 - 256ax^2 y(x) - 256ax^2 + 512y(x)^3)}{64ax^4 + 512y(x) + 512}$$

✓ **Mathematica** : cpu = 0.0242033 (sec), leaf count = 81

$$\left\{\left\{y(x) \to \frac{1}{8}(-ax^4 - 8) + \frac{1}{512\left(\frac{1}{512} - \frac{1}{\sqrt{c_1 - 262144x^2}}\right)}\right\}, \left\{y(x) \to \frac{1}{8}(-ax^4 - 8) + \frac{1}{512\left(\frac{1}{\sqrt{c_1 - 262144x^2}} + \frac{}{5}\right.}\right.$$

✓ **Maple** : cpu = 0.067 (sec), leaf count = 79

$$\left\{y(x) = 1\left(-8 + \left(-\sqrt{-x^2 + \_C1} - 1\right) ax^4\right)\left(8 + 8\sqrt{-x^2 + \_C1}\right)^{-1}, y(x) = 1\left(8 + \left(-\sqrt{-x^2 + \_C1}\right.\right.\right.$$

ODE No. 896

$$y'(x) = \frac{-x^6 + 3x^4 y(x)^2 + x^4 - 3x^2 y(x)^4 - 2x^2 y(x)^2 + y(x)^6 + y(x)^4 + x + 1}{y(x)}$$

✓ **Mathematica** : cpu = 0.253534 (sec), leaf count = 106

$$\text{Solve}\left[\frac{1}{2}\text{RootSum}\left[-\#1^3 + 3\#1^2 y(x)^2 + \#1^2 - 3\#1 y(x)^4 - 2\#1 y(x)^2 + y(x)^6 + y(x)^4 + 1\&, \frac{}{3\#1^2 - 6\#}\right.\right.$$

✓ **Maple** : cpu = 0.64 (sec), leaf count = 63

$$\left\{\int_{\_b}^{y(x)} \frac{\_a}{-\_a^6 + 3\,\_a^4 x^2 - 3\,x^4\,\_a^2 + x^6 - \_a^4 + 2\,\_a^2 x^2 - x^4 - 1}\,\mathrm{d}\_a + x - \_C1 = 0\right\}$$

ODE No. 897

$$y'(x) = \frac{\sqrt{x}\left(-108x^{3/2}y(x) + 18x^{9/2} - 108x^{3/2} + x^9 - 18x^6y(x) + 108x^3y(x)^2 - 216y(x)^3\right)}{36x^3 - 216y(x) - 216}$$

✓ **Mathematica** : cpu = 0.0260857 (sec), leaf count = 79

$$\left\{\left\{y(x) \to \frac{1}{6}\left(x^3-6\right) - \frac{1}{216\left(-\frac{1}{\sqrt{c_1-62208x^{3/2}}} - \frac{1}{216}\right)}\right\}, \left\{y(x) \to \frac{1}{6}\left(x^3-6\right) - \frac{1}{216\left(\frac{1}{\sqrt{c_1-62208x^{3/2}}} - \frac{1}{216}\right)}\right.\right.$$

✓ **Maple** : cpu = 0.1 (sec), leaf count = 87

$$\left\{y(x) = 1\left(\sqrt{9\_C1 - 12\,x^{3/2}}x^3 - 3\,x^3 + 18\right)\left(6\,\sqrt{9\_C1 - 12\,x^{3/2}} - 18\right)^{-1}, y(x) = 1\left(\sqrt{9\_C1 - 12\,x^{3}}\right.\right.$$

ODE No. 898

$$y'(x) = \frac{4x^6y(x)^3 + 2x^5y(x) + 2x^5 + 3x^4y(x)^2 + \frac{x^3}{2} + \frac{3}{4}x^2y(x) + \frac{1}{16}}{x^6\left(4x^2y(x) + 4x^2 + 1\right)}$$

✓ **Mathematica** : cpu = 0.0227102 (sec), leaf count = 106

$$\left\{\left\{y(x) \to \frac{1}{64x^8\left(\frac{1}{64x^8} - \frac{1}{x^8\sqrt{c_1+\frac{8192}{x}}}\right)} - \frac{4x^2+1}{4x^2}\right\}, \left\{y(x) \to \frac{1}{64x^8\left(\frac{1}{x^8\sqrt{c_1+\frac{8192}{x}}} + \frac{1}{64x^8}\right)} - \frac{4x^2+1}{4x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.066 (sec), leaf count = 87

$$\left\{y(x) = \frac{1}{4\,x^2}\left(-4\,x^2 - \sqrt{\frac{x\_C1+2}{x}} - 1\right)\left(\sqrt{\frac{x\_C1+2}{x}} + 1\right)^{-1}, y(x) = \frac{1}{4\,x^2}\left(4\,x^2 - \sqrt{\frac{x\_C1+2}{x}} +\right.\right.$$

ODE No. 899

$$y'(x) = \frac{x^6y(x)^3 + x^6y(x)^2 + x^6 + \frac{x^5}{2} + \frac{3}{4}x^4y(x)^2 + \frac{1}{2}x^4y(x) + \frac{3}{16}x^2y(x) + \frac{x^2}{16} + \frac{1}{64}}{x^8}$$

✓ **Mathematica** : cpu = 0.090847 (sec), leaf count = 106

$$\text{Solve}\left[-\frac{29}{3}\text{RootSum}\left[-29\#1^3 + 3\sqrt[3]{29}\#1 - 29\&, \frac{\log\left(\frac{\frac{3y(x)}{x^2}+\frac{4x^2+3}{4x^4}}{\sqrt[3]{29}\sqrt[3]{\frac{1}{x^6}}} - \#1\right)}{\sqrt[3]{29} - 29\#1^2}\&\right] = c_1 - \frac{1}{9}29^{2/3}\left(\frac{1}{x^6}\right)^{2/3}x^3,$$

✓ **Maple** : cpu = 0.052 (sec), leaf count = 47

$$\left\{y(x) = \frac{116\, RootOf\left(-81\int^{-Z}(841\_a^3 - 27\_a + 27)^{-1}\,d\_a x + 3\,x\_C1 - 1\right)x^2 - 12\,x^2 - 9}{36\,x^2}\right\}$$

ODE No. 900

$$y'(x) = \frac{2a(4ax - y(x)^2 - 1)}{128a^4x^3 - 96a^3x^2y(x)^2 + 24a^2xy(x)^4 - 2ay(x)^6 + 4axy(x) - y(x)^3 - y(x)}$$

✓ **Mathematica** : cpu = 0.0954106 (sec), leaf count = 381

$$\{\{y(x) \to \text{Root}[8\#1^5a - 16\#1^4a^2c_1 - 64\#1^3a^2x + \#1^2(128a^3c_1x - 2) + 128\#1a^3x^2 - 256a^4c_1x^2 + 8ax$$

✓ **Maple** : cpu = 0.087 (sec), leaf count = 48

$$\left\{\frac{y(x)}{2\,a} - \frac{1}{16\,a^2\left((y(x))^2 - 4\,ax\right)^2} + \left(32\,a^3x - 8\,a^2(y(x))^2\right)^{-1} - \_C1 = 0\right\}$$

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 = 0.153409 (sec), leaf count = 33

$$\text{Solve}\left[ax\log(y(x)) - \frac{x^2}{2} - y(x)\log(x) - y(x)\log(y(x)) = c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.757 (sec), leaf count = 30

$$\left\{y(x) = e^{RootOf\left(-2\_Z\,ax+2\,e^{\_Z}\ln(x)+2\,e^{\_Z}\_Z+2\_C1\,a+x^2\right)}\right\}$$

ODE No. 902

$$y'(x) = \frac{x^6 - 3x^4y(x)^2 + x^3 + 3x^2y(x)^4 - xy(x)^2 - y(x)^6 - x}{y(x)\left(x^2 - y(x)^2 - 1\right)}$$

✓ **Mathematica** : cpu = 0.102458 (sec), leaf count = 295

$$\left\{\left\{y(x) \to -\frac{1}{2}\sqrt{\frac{4x^3}{x-c_1} - \frac{4c_1x^2}{x-c_1} - \frac{\sqrt{4c_1-4x+1}}{x-c_1} - \frac{1}{x-c_1}}\right\}, \left\{y(x) \to \frac{1}{2}\sqrt{\frac{4x^3}{x-c_1} - \frac{4c_1x^2}{x-c_1} - \frac{\sqrt{4c_1}}{x}\right.\right.$$

✓ **Maple** : cpu = 0.334 (sec), leaf count = 183

$$\left\{y(x) = \frac{1}{2\_C1 + 6\,x}\sqrt{(\_C1 + 3\,x)\left(4\_C1\,x^2 + 12\,x^3 - \sqrt{-12\_C1 - 36\,x + 9} - 3\right)}, y(x) = \frac{1}{2\_C1 +}\right.$$

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 = 0.0568045 (sec), leaf count = 19

$$\left\{\left\{y(x) \to 2x\cot^{-1}\left(e^{-c_1-x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.12 (sec), leaf count = 48

$$\left\{y(x)=\arctan\left(2\,\frac{\mathrm{e}^{x}\_C1}{(\mathrm{e}^{x})^{2}\_C1^{2}+1},\frac{-(\mathrm{e}^{x})^{2}\_C1^{2}+1}{(\mathrm{e}^{x})^{2}\_C1^{2}+1}\right)x\right\}$$

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 = 0.0539496 (sec), leaf count = 23

$$\left\{\left\{y(x)\to 2x\cot^{-1}\left(e^{-c_1-\frac{x^2}{2}}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.066 (sec), leaf count = 64

$$\left\{y(x)=\arctan\left(2\,\frac{\mathrm{e}^{1/2\,x^{2}}\_C1}{(\mathrm{e}^{1/2\,x^{2}})^{2}\_C1^{2}+1},1\left(-\left(\mathrm{e}^{\frac{x^2}{2}}\right)^{2}\_C1^{2}+1\right)\left(\left(\mathrm{e}^{\frac{x^2}{2}}\right)^{2}\_C1^{2}+1\right)^{-1}\right)x\right\}$$

ODE No. 905

$$y'(x)=\frac{a^3x^3y(x)^3+a^3x^3y(x)^2+a^3x^3+3a^2x^2y(x)^2+2a^2x^2y(x)+a^2x+3axy(x)+ax+1}{a^3x^3}$$

✓ **Mathematica** : cpu = 0.0799493 (sec), leaf count = 85

$$\text{Solve}\left[-\frac{29}{3}\text{RootSum}\left[-29\#1^3+3\sqrt[3]{29}\#1-29\&,\frac{\log\left(\frac{\frac{ax+3}{ax}+3y(x)}{\sqrt[3]{29}}-\#1\right)}{\sqrt[3]{29}-29\#1^2}\&\right]=c_1+\frac{1}{9}29^{2/3}x,y(x)\right]$$

✓ **Maple** : cpu = 0.062 (sec), leaf count = 46

$$\left\{y(x)=\frac{29\,\mathit{RootOf}\left(-81\int^{\_Z}(841\_a^{3}-27\_a+27)^{-1}d\_a+x+3\_C1\right)ax-3\,ax-9}{9\,ax}\right\}$$

ODE No. 906

$$y'(x) = \frac{x(x^2 + y(x)^2 + 1)}{x^6 + 3x^4y(x)^2 + 3x^2y(x)^4 - x^2y(x) + y(x)^6 - y(x)^3 - y(x)}$$

✓ **Mathematica** : cpu = 0.0549755 (sec), leaf count = 326

$$\{\{y(x) \to \text{Root}\left[4\#1^5 - 4\#1^4c_1 + 8\#1^3x^2 + \#1^2\left(2 - 8c_1x^2\right) + 4\#1x^4 - 4c_1x^4 + 2x^2 + 1\&, 1\right]\}, \{y(x) -$$

✓ **Maple** : cpu = 0.355 (sec), leaf count = 37

$$\left\{ -\frac{1}{4\left(\left(y\left(x\right)\right)^2 + x^2\right)^2} - \left(2\,x^2 + 2\left(y\left(x\right)\right)^2\right)^{-1} - y\left(x\right) + \_C1 = 0 \right\}$$

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 = 0.0560737 (sec), leaf count = 22

$$\left\{\left\{y(x) \to \frac{1}{c_1 - \log(x)} - x(\cos(x) - 1)\right\}\right\}$$

✓ **Maple** : cpu = 0.18 (sec), leaf count = 20

$$\left\{y(x) = -(\cos\left(x\right) - 1)\,x + \left(\_C1 - \ln\left(x\right)\right)^{-1}\right\}$$

ODE No. 908

$$y'(x) = \frac{4(a-1)(a+1)x}{a^6x^4 - 3a^4x^4 - 2a^4x^2y(x)^2 + 3a^2x^4 + 4a^2x^2y(x)^2 + a^2y(x)^4 - x^4 - 2x^2y(x)^2 - y(x)^4 + 4y(x)}$$

✓ **Mathematica** : cpu = 1.49978 (sec), leaf count = 1269

$$\left\{\left\{y(x) \to \frac{c_1}{3\left(a^2 - 1\right)} + \frac{\sqrt[3]{-18x^2c_1a^6 + 54x^2c_1a^4 + 54a^4 - 54x^2c_1a^2 - 108a^2 + 2c_1^3 + 18x^2c_1 + \sqrt{4\left(-3a\right.}}}{}\right.\right.$$

✓ **Maple** : cpu = 0.465 (sec), leaf count = 1742

$$\left\{ y(x) = \frac{9^{\frac{2}{3}}}{27\,a^2 - 27} \left(\left(-\_C1\,a^2 + \_C1 \right) \sqrt[3]{9} \sqrt[3]{(a+1)^2 (a-1)^2 \left(\frac{1}{3} \sqrt{-3\,(a-1)^5 (a+1)^5 x^6 + 6\_C1^2 (\right.}} \right.\right.$$

ODE No. 909

$$y'(x) = \frac{x^3 y(x)^6 + x^3 y(x)^4 + x^3 + 3x^2 y(x)^4 + 2x^2 y(x)^2 + 3xy(x)^2 + x + 1}{x^5 y(x)}$$

✗ **Mathematica** : cpu = 40.7416 (sec), leaf count = 0 , could not solve

```
DSolve[Derivative[1][y][x] == (1 + x + x^3 + 3*x*y[x]^2 + 2*x^2*y[x]^2 + 3*x^2*y[x]^4
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(y(x),x) = (x^3+y(x)^4*x^3+2*x^2*y(x)^2+x+x^3*y(x)^6+3*x^2*y(x)^4+3*x*y(x)
```

ODE No. 910

$$y'(x) = \frac{x^6 + 3x^5 y(x) + 3x^4 y(x)^2 + x^4 + x^3 y(x)^3 + 2x^3 y(x) + x^2 y(x)^2 - y(x) - 2x + 1}{x}$$

✓ **Mathematica** : cpu = 0.082554 (sec), leaf count = 98

$$\text{Solve}\left[-\frac{29}{3} \text{RootSum}\left[-29\#1^3 + 3\sqrt[3]{29}\#1 - 29\&, \frac{\log\left(\frac{3x^3 + 3x^2 y(x) + x}{\sqrt[3]{29}\sqrt[3]{x^3}} - \#1 \right)}{\sqrt[3]{29} - 29\#1^2}\& \right] = c_1 + \frac{29^{2/3}\left(x^3\right)^{2/3}}{9x}, y(x)\right.$$

✓ **Maple** : cpu = 0.036 (sec), leaf count = 42

$$\left\{ y(x) = \frac{-9\,x^2 + 29\,RootOf\left(-81\,\int^{\_Z} \left(841\_a^3 - 27\_a + 27 \right)^{-1} d\_a + x + 3\_C1 \right) - 3}{9\,x} \right\}$$

ODE No. 911

$$y'(x) = -y(x)\left(-\_\mathrm{F1}(x) - \frac{\log(y(x))}{x} + \cot(x)\log(y(x))\right)$$

✓ **Mathematica** : cpu = 3.66868 (sec), leaf count = 56

$$\mathrm{Solve}\left[\int_1^x \left(\frac{2\log(y(x))\sin(K[1])}{K[1]^2} - \frac{2(\log(y(x))\cos(K[1]) - \sin(K[1])\_\mathrm{F1}(K[1]))}{K[1]}\right) dK[1] - 2\sin(1)\log($$

✓ **Maple** : cpu = 0.556 (sec), leaf count = 30

$$\left\{y(x) = \mathrm{e}^{\frac{\_C1\,x}{\sin(x)}}\mathrm{e}^{\frac{x}{\sin(x)}\int\frac{\_F1(x)\sin(x)}{x}\,\mathrm{d}x}\right\}$$

ODE No. 912

$$y'(x) = \frac{2ax}{-128a^4 + 96a^3xy(x)^2 + 32a^3x - 24a^2x^2y(x)^4 - 16a^2x^2y(x)^2 + 2ax^3y(x)^6 + 2ax^3y(x)^4 + 2ax^3 -}$$

✓ **Mathematica** : cpu = 1.56235 (sec), leaf count = 201

$$\mathrm{Solve}\left[-\mathrm{RootSum}\left[-\#1^3y(x)^6 - \#1^3y(x)^4 - \#1^3 + 12\#1^2ay(x)^4 + 8\#1^2ay(x)^2 - 48\#1a^2y(x)^2 - 16\#1\right.\right.$$

✓ **Maple** : cpu = 1346.46 (sec), leaf count = 43

$$\left\{-\frac{y(x)}{2\,a} + \frac{1}{8\,a^2}\int^{(y(x))^2-4\,\frac{a}{x}}\left(\_a^3 + \_a^2 + 1\right)^{-1}d\_a - \_C1 = 0\right\}$$

ODE No. 913

$$y'(x) = \frac{y(x)^3 + y(x) + y(x)^3\left(-\log^3(x)\right) + y(x)^3\log^2(x) + 3y(x)^2\log^2(x) - 2y(x)^2\log(x) - 3y(x)\log(x)}{xy(x)}$$

✗ **Mathematica** : cpu = 3600.01 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.076 (sec), leaf count = 43

$$\left\{y(x) = 9\left(9\,\ln(x) + 56\,RootOf\left(-81\int^{\_Z}\left(3136\,\_a^3 - 27\,\_a + 27\right)^{-1}d\_a - \ln(x) + 3\,\_C1\right) - 3\right)^{-1}\right.$$

ODE No. 914

$$y'(x) = \frac{2a(-4a + xy(x)^2 + x)}{-128a^4 + 96a^3xy(x)^2 - 24a^2x^2y(x)^4 + 2ax^3y(x)^6 + 4ax^2y(x) - x^3y(x)^3 - x^3y(x)}$$

✓ **Mathematica** : cpu = 1.64263 (sec), leaf count = 401

$$\{\{y(x) \to \text{Root}\left[8\#1^5ax^2 - 8\#1^4ac_1x^2 - 64\#1^3a^2x + \#1^2\left(64a^2c_1x + 2x^2\right) + 128\#1a^3 - 128a^3c_1 - 8ax$$

✓ **Maple** : cpu = 3.258 (sec), leaf count = 71

$$\left\{ \frac{x(y(x))^4 + (-4\,a + x)\,(y(x))^2 - 2\,a}{2\,a\,(y\,(x))^4\left(-x\,(y\,(x))^2 + 4\,a\right)^2} + \frac{8\,a(y(x))^5 + 2\,(y(x))^2 + 1}{16\,a^2\,(y\,(x))^4} + \_C1 = 0 \right\}$$

ODE No. 915

$$y'(x) = \frac{y(x)^3 + y(x) - 8y(x)^3\log^3(x) + 4y(x)^3\log^2(x) + 12y(x)^2\log^2(x) - 4y(x)^2\log(x) - 6y(x)\log(x)}{xy(x)}$$

✗ **Mathematica** : cpu = 3600. (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.073 (sec), leaf count = 43

$$\left\{ y(x) = 9\left(18\,\ln(x) + 83\,RootOf\left(-81\int^{\_Z}\left(6889\,\_a^3 - 27\,\_a + 27\right)^{-1}d\_a - \ln(x) + 3\,\_C1\right) - 3\right)^{-}\right.$$

ODE No. 916

$$y'(x) = \frac{y(x)\left(x^4\log^2(y(x)) + 2x^4\log(x)\log(y(x)) + x^4\log^2(x) + x\log(y(x)) + \log(y(x)) - x + x\log(x) +\right.}{x(x+1)}$$

✗ **Mathematica** : cpu = 2.26916 (sec), leaf count = 0 , could not solve

`DSolve[Derivative[1][y][x] == ((-1 - x + Log[x] + x*Log[x] + x^4*Log[x]^2 + Log[y[x]]`

✓ **Maple** : cpu = 0.384 (sec), leaf count = 73

$$\left\{ y(x) = e^{\frac{-12\,\ln(1+x)\ln(x) + \left(-3\,x^4 + 4\,x^3 - 6\,x^2 + 12\,\_C1 + 12\,x\right)\ln(x) - 12\,x}{3\,x^4 - 4\,x^3 + 6\,x^2 + 12\,\ln(1+x) - 12\,\_C1 - 12\,x}} \right\}$$

ODE No. 917

$$y'(x) = \frac{y(x)\left(x\log^2(y(x)) + 2x\log(x)\log(y(x)) + x\log(y(x)) + \log(y(x)) - x + x\log^2(x) + x\log(x) + \mathrm{lo}\right.}{x(x+1)}$$

✗ **Mathematica** : cpu = 1.36628 (sec), leaf count = 0 , could not solve

```
DSolve[Derivative[1][y][x] == ((-1 - x + Log[x] + x*Log[x] + x*Log[x]^2 + Log[y[x]] +
```

✓ **Maple** : cpu = 0.276 (sec), leaf count = 38

$$\left\{y(x) = e^{\frac{\ln(1+x)\ln(x)+(-x+\_C1)\ln(x)-x}{-\ln(1+x)-\_C1+x}}\right\}$$

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 = 3600.05 (sec), leaf count = 0 , timed out

```
$Aborted
```

✓ **Maple** : cpu = 1.452 (sec), leaf count = 41

$$\left\{x - \mathit{RootOf}\left(\int^{\_Z}\left(64\_a^3 + 16\_a^2 + 1\right)^{-1} d\_ay(x) + \_C1\, y(x) + 1\right) + \frac{1}{4\,(y\,(x))^2} = 0\right\}$$

ODE No. 919

$$y'(x) = \frac{\left(-y(x) + \sqrt{y(x)} + x\right) y(x)^{3/2}}{x^3 - 3x^2y(x) + 3xy(x)^2 + xy(x)^{3/2} - y(x)^3 - y(x)^{5/2} + y(x)^2}$$

✗ **Mathematica** : cpu = 3602.88 (sec), leaf count = 0 , timed out

```
$Aborted
```

✓ **Maple** : cpu = 0.224 (sec), leaf count = 82

$$\left\{-\frac{1}{(x-y\,(x))^3}\left(\left(\_C1\,x^3 - 6\,x - 1\right)(y\,(x))^{\frac{5}{2}} + \left(-3\_C1\,x^2 + 3\right)(y\,(x))^{\frac{7}{2}} - (y\,(x))^{\frac{11}{2}}\_C1 + 3\,(y\,(x))^{3/2}\,x^2\right.\right.$$

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 = 0.236834 (sec), leaf count = 301

$$\left\{\left\{y(x) \to \text{Root}\left[\#1^5\left(128c_1x^2 - 8x - 1\right) + 128\#1^4x^2 + \#1^3(64c_1x - 2) + 64\#1^2x + 8\#1c_1 + 8\&, 1\right]\right\}, \{$$

✗ **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*
```

ODE No. 921

$$y'(x) = -y(x)\left(-\_\text{F1}(x) - \frac{\log(y(x))}{x} + \frac{\log(y(x))}{x\log(x)}\right)$$

✓ **Mathematica** : cpu = 2.79748 (sec), leaf count = 52

$$\text{Solve}\left[\text{ConditionalExpression}\left[\int_1^x \left(\frac{\log(y(x)) - \log(y(x))\log(K[1])}{K[1]^2} - \frac{\log(K[1])\_\text{F1}(K[1])}{K[1]}\right) dK[1] = c_1\right.\right.$$

✓ **Maple** : cpu = 0.171 (sec), leaf count = 30

$$\left\{y(x) = e^{\frac{\_C1\, x}{\ln(x)}} e^{\frac{x}{\ln(x)} \int \frac{\_F1(x)\ln(x)}{x}\, dx}\right\}$$

ODE No. 922

$$y'(x) = \frac{y(x)^2}{x^3 - 3x^2y(x) + x^2\sqrt{y(x)} + 3xy(x)^2 - 2xy(x)^{3/2} - y(x)^3 + y(x)^{5/2} + y(x)^2 + y(x)^{3/2}}$$

✗ **Mathematica** : cpu = 3599.94 (sec), leaf count = 0 , timed out

```
$Aborted
```

✓ **Maple** : cpu = 0.179 (sec), leaf count = 47

$$\left\{\frac{\ln\left(y(x)\right)}{2} - \int^{x\frac{1}{\sqrt{y(x)}} - \sqrt{y(x)}} \left(2\_a^3 + 2\_a^2 - \_a + 2\right)^{-1} d\_a - \_C1 = 0\right\}$$

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 = 3603.4 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.387 (sec), leaf count = 36

$$\left\{ y(x) = \mathrm{e}^{\mathit{RootOf}\left(-\_Z + \int^{\left(\mathrm{e}^{\_Z}\right)^2 - 2\,\mathrm{e}^{\_Z} x} \left(\mathrm{e}^{2\_a} + \_a\right)^{-1} d\_a + \_C1\right)} - x \right\}$$

ODE No. 924

$$y'(x) = -\frac{y(x)\left(-\_\mathrm{F1}(x) - \frac{\log^2(y(x))}{2x}\right)}{\log(y(x))}$$

✓ **Mathematica** : cpu = 0.892876 (sec), leaf count = 55

$$\text{Solve}\left[\text{ConditionalExpression}\left[\int_1^x \left(-\frac{\_\mathrm{F1}(K[1])}{K[1]} - \frac{\log^2(y(x))}{2K[1]^2}\right) dK[1] + \frac{1}{2}\log^2(y(x)) = c_1, \Re(x) > 0 \vee\right.\right.$$

✓ **Maple** : cpu = 0.201 (sec), leaf count = 46

$$\left\{ y(x) = \mathrm{e}^{\sqrt{2 \int \frac{\_F1(x)}{x}\, \mathrm{d}x x + 2\_C1\, x}}, y(x) = \mathrm{e}^{-\sqrt{2}\sqrt{x\left(\int \frac{\_F1(x)}{x}\, \mathrm{d}x + \_C1\right)}} \right\}$$

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 = 3602.49 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.301 (sec), leaf count = 38

$$\left\{ y(x) = \mathrm{e}^{\mathit{RootOf}\left(-\_Z + \int^{\left(\mathrm{e}^{\_Z}\right)^2 - 2\,\mathrm{e}^{\_Z} x} \left(\mathrm{e}^{2\_a^2} + \_a\right)^{-1} d\_a + \_C1\right)} - x \right\}$$

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 = 0.0231136 (sec), leaf count = 128

$$\left\{\left\{y(x) \to \frac{1}{16x(x-2)\left(-\frac{e^{2\left(\frac{1}{2}\log(2-x)-\frac{\log(x)}{2}\right)}}{\sqrt{c_1+2048\log(x)}} - \frac{1}{64}\right)} + \frac{2}{x-2}\right\}, \left\{y(x) \to \frac{1}{16x(x-2)\left(\frac{e^{2\left(\frac{1}{2}\log(2-x)-\frac{\log(x)}{2}\right)}}{\sqrt{c_1+2048\log(x)}}\right.}\right.$$

✓ **Maple** : cpu = 0.083 (sec), leaf count = 67

$$\left\{y(x) = 1\left(2\sqrt{\_C1 + 8\ln(x)} - 8\right)\left(x\sqrt{\_C1 + 8\ln(x)} - 4x + 8\right)^{-1}, y(x) = 1\left(2\sqrt{\_C1 + 8\ln(x)} + 8\right.$$

ODE No. 927

$$y'(x) = -\frac{1}{8}x\left(12e^{-x^2}x^2y(x)^2 + 8e^{-x^2}x^2y(x) + 8e^{-x^2}x^2 - 8e^{-x^2} + e^{-3x^2}x^6 - 6e^{-2x^2}x^4y(x) - 2e^{-2x^2}x^4 - 8y\right.$$

✓ **Mathematica** : cpu = 0.163244 (sec), leaf count = 112

$$\text{Solve}\left[-\frac{29}{3}\text{RootSum}\left[-29\#1^3 + 3\sqrt[3]{29}\#1 - 29\&, \frac{\log\left(\frac{\frac{1}{2}e^{-x^2}x\left(2e^{x^2}-3x^2\right)+3xy(x)}{\sqrt[3]{29}\sqrt[3]{x^3}} - \#1\right)}{\sqrt[3]{29} - 29\#1^2}\&\right] = c_1 + \frac{1}{18}29^{2/3}\right.$$

✓ **Maple** : cpu = 0.141 (sec), leaf count = 68

$$\left\{y(x) = \frac{58\, RootOf\left(x^2 - 162\int^{-Z}(841\_a^3 - 27\_a + 27)^{-1}d\_a + 6\_C1\right) + \left(9x^2 - 6e^{x^2}\right)e^{-x^2}}{18e^{-x^2}e^{x^2}}\right\}$$

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 = 1.30815 (sec), leaf count = 23

$$\left\{\left\{y(x) \to -x \log\left(-\frac{\log(x+1) - c_1}{x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.448 (sec), leaf count = 20

$$\left\{y(x) = -\ln\left(\frac{-\ln(1+x) + \_C1}{x}\right) x\right\}$$

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 = 3599.96 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.054 (sec), leaf count = 42

$$\left\{y(x) = 18\left(58\, RootOf\left(-324\int^{\_Z}(841\_a^3 - 27\_a + 27)^{-1} d\_a - \ln(x) + 12\_C1\right) + 9x - 6\right)^{-1}\right\}$$

ODE No. 930

$$y'(x) = \frac{e^{\frac{y(x)}{x}}\left(x^4 + x^2 e^{-\frac{y(x)}{x}} + x e^{-\frac{y(x)}{x}} + x e^{-\frac{y(x)}{x}} y(x) + e^{-\frac{y(x)}{x}} y(x)\right)}{x(x+1)}$$

✓ **Mathematica** : cpu = 1.56652 (sec), leaf count = 39

$$\left\{\left\{y(x) \to -x \log\left(\frac{-c_1 - \frac{x^3}{3} + \frac{x^2}{2} - x + \log(x+1)}{x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.684 (sec), leaf count = 36

$$\left\{y(x) = -\ln\left(\frac{-2x^3 + 3x^2 + 6\ln(1+x) - 6\_C1 - 6x}{6x}\right) x\right\}$$

ODE No. 931

$$y'(x) = \frac{x^6 + 3x^5y(x) + 3x^4y(x)^2 + x^3y(x)^3 - 2x^3 - 3x^2y(x) - xy(x)^2 - y(x) - 2x}{x(x^2 + xy(x) + 1)}$$

✓ **Mathematica** : cpu = 0.0218701 (sec), leaf count = 80

$$\left\{\left\{y(x) \to \frac{1}{x^2\left(\frac{1}{x} - \frac{1}{x\sqrt{c_1 - 2x}}\right)} - \frac{x^2+1}{x}\right\}, \left\{y(x) \to \frac{1}{x^2\left(\frac{1}{x\sqrt{c_1-2x}} + \frac{1}{x}\right)} - \frac{x^2+1}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.057 (sec), leaf count = 73

$$\left\{y(x) = \frac{1}{x}\left(-\sqrt{\_C1 - 2\,x}x^2 - x^2 - 1\right)\left(\sqrt{\_C1 - 2\,x} + 1\right)^{-1}, y(x) = \frac{1}{x}\left(-\sqrt{\_C1 - 2\,x}x^2 + x^2 + 1\right)\left(\right.$$

ODE No. 932

$$y'(x) = \frac{e^{-\frac{3x^2}{2}}x\left(3e^{3x^2}y(x)^3 + e^{\frac{9x^2}{2}}y(x)^3 + 18e^{3x^2}y(x)^2 + 9e^{\frac{9x^2}{2}}y(x)^2 + 27e^{3x^2}y(x) + 27e^{\frac{9x^2}{2}}y(x) + 27e^{\frac{9x^2}{2}} +\right.}{243y(x)}$$

✗ **Mathematica** : cpu = 3599.96 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.174 (sec), leaf count = 54

$$\left\{y(x) = -369\frac{e^{3/2\,x^2}}{123 + 123\,e^{3/2\,x^2} - 136\,RootOf\left(-41\,x^2 - 50243409\int^{\_Z}(9248\_a^3 - 1860867\_a + 18608\right.}\right.$$

ODE No. 933

$$y'(x) = \frac{x^3 + x^3(-\log^3(x)) + x^3\log^2(x) + 3x^2y(x)\log^2(x) - 2x^2y(x)\log(x) + x^2 + xy(x)^2 + xy(x) + y(x}{x^2}$$

✓ **Mathematica** : cpu = 0.105655 (sec), leaf count = 99

$$\text{Solve}\left[-\frac{29}{3}\text{RootSum}\left[-29\#1^3 + 3\sqrt[3]{29}\#1 - 29\&, \frac{\log\left(\frac{\frac{3y(x)}{x^2} + \frac{1-3\log(x)}{x}}{\sqrt[3]{29}\sqrt[3]{\frac{1}{x^3}}} - \#1\right)}{\sqrt[3]{29} - 29\#1^2}\&\right] = c_1 + \frac{29^{2/3}}{9\sqrt[3]{\frac{1}{x^3}}}, y(x)\right]$$

✓ **Maple** : cpu = 0.052 (sec), leaf count = 39

$$\left\{y(x)=\frac{x\left(9\ln(x)-3+29\,RootOf\left(-81\int^{\_Z}(841\_a^3-27\_a+27)^{-1}d\_a+x+3\_C1\right)\right)}{9}\right\}$$

ODE No. 934

$$y'(x)=-\frac{x^6}{64}-\frac{3x^5}{32}+\frac{3}{16}x^4y(x)-\frac{x^4}{8}+\frac{3}{4}x^3y(x)+\frac{x^3}{8}-\frac{3}{4}x^2y(x)^2+\frac{1}{4}x^2y(x)+\frac{x^2}{4}-\frac{3}{2}xy(x)^2-xy(x)+y(x)^3+y(x$$

✓ **Mathematica** : cpu = 0.148286 (sec), leaf count = 102

$$\text{Solve}\left[-\frac{31}{3}\text{RootSum}\left[-31\#1^3+3\,2^{2/3}\sqrt[3]{31}\#1-31\&,\frac{\log\left(\sqrt[3]{\frac{2}{31}}\left(\frac{1}{4}(-3x^2-6x+4)+3y(x)\right)-\#1\right)}{2^{2/3}\sqrt[3]{31}-31\#1^2}\&\right]\right.$$

✓ **Maple** : cpu = 0.096 (sec), leaf count = 39

$$\left\{y(x)=\frac{x^2}{4}+\frac{x}{2}+RootOf\left(-x+2\int^{\_Z}(2\_a^3+2\_a^2+1)^{-1}d\_a+\_C1\right)\right\}$$

ODE No. 935

$$y'(x)=\frac{x^6}{64}-\frac{3x^5}{16}+\frac{3}{16}x^4y(x)+\frac{13x^4}{16}-\frac{3}{2}x^3y(x)-\frac{3x^3}{2}+\frac{3}{4}x^2y(x)^2+\frac{7}{2}x^2y(x)+x^2-3xy(x)^2-2xy(x)+y(x)^3+y($$

✓ **Mathematica** : cpu = 43.8413 (sec), leaf count = 248

$$\text{Solve}\left[\frac{\sqrt[3]{2}\left(\frac{\frac{1}{4}(3x^2-12x+4)+3y(x)}{\sqrt[3]{2}}+2^{2/3}\right)\left(2^{2/3}-2^{2/3}\left(\frac{1}{4}(3x^2-12x+4)+3y(x)\right)\right)\left(\left(\frac{1}{4}(-3x^2+12x-4)-3y\right.\right.}{9\left(-\left(\frac{1}{4}(3x^2-12x+\right.\right.}\right.$$

✓ **Maple** : cpu = 0.246 (sec), leaf count = 55

$$\left\{y(x)=\frac{e^{RootOf\left(\ln(e^{\_Z}-4)e^{\_Z}+\_C1\,e^{\_Z}-e^{\_Z}\_Z+e^{\_Z}x-4\ln(e^{\_Z}-4)-4\_C1+4\_Z-4x+4\right)}}{4}-1-\frac{x^2}{4}+x\right\}$$

ODE No. 936

$$y'(x) = \frac{x^6}{512} - \frac{3x^5}{256} + \frac{3}{64}x^4y(x) + \frac{5x^4}{128} - \frac{3}{16}x^3y(x) - \frac{5x^3}{64} + \frac{3}{8}x^2y(x)^2 + \frac{7}{16}x^2y(x) + \frac{x^2}{16} - \frac{3}{4}xy(x)^2 - \frac{1}{2}xy(x) + y(x)^3$$

✓ **Mathematica** : cpu = 0.141018 (sec), leaf count = 99

$$\text{Solve}\left[-\frac{89}{3}\text{RootSum}\left[-89\#1^3 + 6\sqrt[3]{178}\#1 - 89\&, \frac{\log\left(\frac{2^{2/3}\left(\frac{1}{8}(3x^2-6x+8)+3y(x)\right)}{\sqrt[3]{89}} - \#1\right)}{2\sqrt[3]{178} - 89\#1^2}\&\right] = c_1 + \frac{89^{2/3}x}{18\sqrt[3]{2}},$$

✓ **Maple** : cpu = 0.093 (sec), leaf count = 39

$$\left\{y(x) = -\frac{x^2}{8} + \frac{x}{4} + RootOf\left(-x + 4\int^{\_Z}\left(4\_a^3 + 4\_a^2 + 3\right)^{-1}d\_a + \_C1\right)\right\}$$

ODE No. 937

$$y'(x) = \frac{2xy(x)^3 + y(x)^3 - 2y(x) + 6xy(x)\log^2(2x+1) + 3y(x)\log^2(2x+1) + 6xy(x)^2\log(2x+1) + 3y(}{(2x+1)(y(x) + \log(2x+1) +}$$

✓ **Mathematica** : cpu = 0.0252994 (sec), leaf count = 124

$$\left\{\left\{y(x) \to \frac{1}{(2x+1)\left(\frac{2x+1}{4x^2+4x+1} - \frac{1}{(2x+1)\sqrt{c_1-2x}}\right)} - \log(2x+1) - 1\right\}, \left\{y(x) \to \frac{1}{(2x+1)\left(\frac{1}{(2x+1)\sqrt{c_1-2x}} + \right.}\right.$$

✓ **Maple** : cpu = 0.072 (sec), leaf count = 79

$$\left\{y(x) = 1\left(-\sqrt{\_C1 - 2x}\ln(2x+1) - \ln(2x+1) - 1\right)\left(\sqrt{\_C1 - 2x} + 1\right)^{-1}, y(x) = 1\left(-\sqrt{\_C1 - 2\right.\right.$$

ODE No. 938

$$y'(x) = \frac{x^6 - 3x^5 + 3x^4y(x) + 4x^4 - 6x^3y(x) - 3x^3 + 3x^2y(x)^2 + 5x^2y(x) - x^2 - 3xy(x)^2 - 2xy(x) + y(}{x}$$

✓ **Mathematica** : cpu = 0.0802662 (sec), leaf count = 108

$$\text{Solve}\left[-\frac{29}{3}\text{RootSum}\left[-29\#1^3+3\sqrt[3]{29}\#1-29\&,\frac{\log\left(\frac{\frac{3x^2-3x+1}{x}+\frac{3y(x)}{x}}{\sqrt[3]{29}\sqrt[3]{\frac{1}{x^3}}}-\#1\right)}{\sqrt[3]{29}-29\#1^2}\&\right]=c_1+\frac{1}{9}29^{2/3}\left(\frac{1}{x^3}\right)^{2/3}$$

✓ **Maple** : cpu = 0.047 (sec), leaf count = 39

$$\left\{y(x)=-x^2+x-\frac{1}{3}+\frac{29\,RootOf\left(-81\int^{-Z}(841\_a^3-27\_a+27)^{-1}d\_a+\ln(x)+3\_C1\right)}{9}\right\}$$

ODE No. 939

$$y'(x)=\frac{x^6+6x^5-12x^4y(x)+12x^4-48x^3y(x)+16x^3+48x^2y(x)^2-48x^2y(x)+16x^2+96xy(x)^2-32}{16x^2-64y(x)+32x-64}$$

✓ **Mathematica** : cpu = 0.453891 (sec), leaf count = 136

$$\text{Solve}\left[\frac{2}{5}\text{RootSum}\left[\#1^4+4\#1^3-8\#1^2y(x)-16\#1y(x)-8\#1+16y(x)^2+16y(x)+8\&,\frac{\#1^2(-\log(x-}{}\right.\right.$$

✓ **Maple** : cpu = 0.162 (sec), leaf count = 70

$$\left\{x+\frac{2}{5}\ln\left(2\left(y(x)-1/4\,x^2-x/2\right)^2+2\,y(x)-\frac{x^2}{2}-x+1\right)-\frac{2}{5}\arctan\left(-2\,y(x)+\frac{x^2}{2}+x-1\right)-\frac{4}{5}\ln\right.$$

ODE No. 940

$$y'(x)=\frac{x^3\log^3(x)-3x^2y(x)\log^2(x)-x^2+x^2\log(x)-y(x)^3-y(x)^2-2xy(x)+3xy(x)^2\log(x)+xy(x)}{x(-y(x)-x+x\log(x))}$$

✓ **Mathematica** : cpu = 0.0197426 (sec), leaf count = 80

$$\left\{\left\{y(x)\to-\frac{1}{x\left(-\frac{1}{x^2\sqrt{c_1-2x}}-\frac{1}{x^2}\right)}-x+x\log(x)\right\},\left\{y(x)\to-\frac{1}{x\left(\frac{1}{x^2\sqrt{c_1-2x}}-\frac{1}{x^2}\right)}-x+x\log(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.063 (sec), leaf count = 63

$$\left\{y(x)=x\left(\sqrt{\_C1-2\,x}\ln(x)-\ln(x)+1\right)\left(\sqrt{\_C1-2\,x}-1\right)^{-1},y(x)=x\left(\sqrt{\_C1-2\,x}\ln(x)+\ln(\right.\right.$$

ODE No. 941

$$y'(x) = \frac{x^6 - 12x^5 + 12x^4y(x) + 48x^4 - 96x^3y(x) - 72x^3 + 48x^2y(x)^2 + 192x^2y(x) + 32x^2 - 192xy(x)^2 -}{16x^2 + 64y(x) - 64x + 64}$$

✓ **Mathematica** : cpu = 0.364106 (sec), leaf count = 53

$$\text{Solve}\left[x - 8\text{RootSum}\left[11776\#1^3 - 40\#1 - 1\&, \#1\log\left(17664\#1^2 - 1472\#1 + 11x^2 + 44y(x) - 44x - 40\right.\right.\right.$$

✓ **Maple** : cpu = 0.073 (sec), leaf count = 35

$$\left\{y(x) = -\frac{x^2}{4} + x + \mathit{RootOf}\left(-x + \int^{\_Z} \frac{\_a+1}{\_a^3 - \_a - 1} d\_a + \_C1\right)\right\}$$

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 = 3599.93 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.761 (sec), leaf count = 43

$$\left\{y(x) = e^{\mathit{RootOf}\left(-\_Z + \int \left(e^{\_Z}\right)^2 - 2e^{\_Z}x\left(e^{2\frac{\_a^3}{\_a+1}} + \_a\right)^{-1} d\_a + \_C1\right)} - x\right\}$$

ODE No. 943

$$y'(x) = \frac{x^6 - 6x^5 + 24x^4y(x) + 12x^4 - 96x^3y(x) - 24x^3 + 192x^2y(x)^2 + 96x^2y(x) + 32x^2 - 384xy(x)^2 -}{64x^2 + 512y(x) - 128x + 512}$$

✓ **Mathematica** : cpu = 0.422096 (sec), leaf count = 53

$$\text{Solve}\left[x - 16\text{RootSum}\left[6656\#1^3 - 23\#1 - 1\&, \#1\log\left(79872\#1^2 - 18304\#1 + 181x^2 + 1448y(x) - 362x\right.\right.\right.$$

✓ **Maple** : cpu = 0.072 (sec), leaf count = 40

$$\left\{y(x) = -\frac{x^2}{8} + \frac{x}{4} + \mathit{RootOf}\left(-x + \int^{\_Z} 4\frac{\_a+1}{4\_a^3 - \_a - 1} d\_a + \_C1\right)\right\}$$

ODE No. 944

$$y'(x) = \frac{a^3x^6 + 6a^2bx^5 + 12a^2x^4y(x) - 8a^2x^3 + 12ab^2x^4 + 48abx^3y(x) - 16abx^2 + 48ax^2y(x)^2 - 32axy(x)}{16ax^2 + 32bx + 64y(x) + 64}$$

✓ **Mathematica** : cpu = 1.79994 (sec), leaf count = 233

$$\text{Solve}\Big[x - 4\text{RootSum}\Big[\#1^6a^3 + 6\#1^5a^2b + 12\#1^4a^2y(x) + 12\#1^4ab^2 + 48\#1^3aby(x) + 8\#1^3b^3 + 8\#1^2ab$$

✓ **Maple** : cpu = 0.102 (sec), leaf count = 47

$$\left\{y(x) = -\frac{ax^2}{4} - \frac{bx}{2} + RootOf\left(bx + 2\int^{\_Z} -\frac{b(\_a+1)}{2\_a^3 + \_a\,b + b}d\_a + 2\_C1\right)\right\}$$

ODE No. 945

$$y'(x) = \frac{8a^3x^3 + 12a^2x^4 + 48a^2x^2y(x) + 6ax^5 + 48ax^3y(x) - 16ax^2 + 96axy(x)^2 + x^6 + 12x^4y(x) - 8x^3 +}{32ax + 16x^2 + 64y(x) + 64}$$

✓ **Mathematica** : cpu = 1.40924 (sec), leaf count = 213

$$\text{Solve}\Big[x - 4\text{RootSum}\Big[\#1^6 + 6\#1^5a + 12\#1^4a^2 + 12\#1^4y(x) + 8\#1^3a^3 + 48\#1^3ay(x) + 48\#1^2a^2y(x) +$$

✓ **Maple** : cpu = 0.087 (sec), leaf count = 41

$$\left\{y(x) = -\frac{x^2}{4} - \frac{ax}{2} + RootOf\left(-x + \int^{\_Z} 2\frac{\_a+1}{2\_a^3 + \_a\,a + a}d\_a + \_C1\right)\right\}$$

ODE No. 946

$$y'(x) = \frac{x\left(12e^{-x^2}x^2y(x)^2 + 8e^{-x^2}x^2y(x) - 8e^{-x^2}y(x) + 4e^{-2x^2}x^2 + 8e^{-x^2}x^2 - 8e^{-x^2} + e^{-3x^2}x^6 - 6e^{-2x^2}x^4\right.}{4e^{-x^2}x^2 - 8y(x) - 8}$$

✓ **Mathematica** : cpu = 0.0822357 (sec), leaf count = 150

$$\left\{\left\{y(x) \to \frac{e^{-3x^2}}{8\left(\frac{1}{8}e^{-3x^2} - \frac{e^{-3x^2}}{\sqrt{c_1 - 64x^2}}\right)} - \frac{1}{2}e^{-x^2}\left(2e^{x^2} - x^2\right)\right\}, \left\{y(x) \to \frac{e^{-3x^2}}{8\left(\frac{e^{-3x^2}}{\sqrt{c_1 - 64x^2}} + \frac{1}{8}e^{-3x^2}\right)} - \frac{1}{2}e^{-x^2}\left(2e\right.\right.\right.$$

✓ **Maple** : cpu = 0.187 (sec), leaf count = 85

$$\left\{y(x)=1\left(-2+x^2\left(\sqrt{-x^2+\_C1}+1\right)\mathrm{e}^{-x^2}\right)\left(2\sqrt{-x^2+\_C1}+2\right)^{-1}, y(x)=1\left(2+x^2\left(\sqrt{-x^2+\_C\right.\right.\right.$$

ODE No. 947

$$y'(x)=\frac{x^3\sin(x)+x^2y(x)^2+2x^2y(x)\cos(x)+\frac{x^2}{2}+x^2\cos(x)+\frac{1}{2}x^2\cos(2x)+2xy(x)-2xy(x)\sin(x)+}{x^3}$$

✓ **Mathematica** : cpu = 0.107425 (sec), leaf count = 30

$$\left\{\left\{y(x)\to\frac{1}{c_1-\log(x)}-\frac{-\sin(x)+x\cos(x)+1}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.295 (sec), leaf count = 44

$$\left\{y(x)=\frac{(\cos(x)\,x-\sin(x)+1)\ln(x)-\cos(x)\_C1\,x+\sin(x)\_C1+x-\_C1}{x\,(\_C1-\ln(x))}\right\}$$

ODE No. 948

$$y'(x)=-\frac{216y(x)}{36x^2+4y(x)^8+12y(x)^7+33y(x)^6+60y(x)^5-24xy(x)^4-216y(x)^4-36xy(x)^3-252y(x)^3-}$$

✓ **Mathematica** : cpu = 0.343284 (sec), leaf count = 39

$$\text{Solve}\left[\frac{36}{y(x)\,(2y(x)^3+3y(x)^2+6y(x)+6)-6x}+\log(y(x))=c_1,y(x)\right]$$

✓ **Maple** : cpu = 0.257 (sec), leaf count = 68

$$\left\{y(x)=\mathrm{e}^{RootOf\left(-12\_C1\,(\mathrm{e}^{\_Z})^4-2\,(\mathrm{e}^{\_Z})^4\_Z-18\_C1\,(\mathrm{e}^{\_Z})^3-3\,(\mathrm{e}^{\_Z})^3\_Z-36\_C1\,(\mathrm{e}^{\_Z})^2-6\,(\mathrm{e}^{\_Z})^2\_Z-36\_C1\,\mathrm{e}^{\_Z}-6\,\mathrm{e}^{\_Z}\_Z+3\right.}\right.$$

ODE No. 949

$$y'(x)=\frac{x^6-3x^5+3x^4y(x)+x^4-6x^3y(x)+2x^3+3x^2y(x)^2+x^2y(x)-3x^2-3xy(x)^2+xy(x)+y(x)^3}{x\left(x^2+y(x)-x+1\right)}$$

✓ **Mathematica** : cpu = 0.020251 (sec), leaf count = 76

$$\left\{\left\{y(x)\to\frac{1}{x\left(\frac{1}{x}-\frac{1}{x\sqrt{c_1-2\log(x)}}\right)}-x^2+x-1\right\},\left\{y(x)\to\frac{1}{x\left(\frac{1}{x\sqrt{c_1-2\log(x)}}+\frac{1}{x}\right)}-x^2+x-1\right\}\right\}$$

✓ **Maple** : cpu = 0.064 (sec), leaf count = 81

$$\left\{y(x)=1\left(\left(-x^2+x\right)\sqrt{\_C1-2\ln(x)}-x^2+x-1\right)\left(1+\sqrt{\_C1-2\ln(x)}\right)^{-1},y(x)=1\left(\left(-x^2+x\right)\right.\right.$$

ODE No. 950

$$y'(x)=\frac{a^3x^6}{64}+\frac{3}{32}a^2bx^5+\frac{3}{16}a^2x^4y(x)+\frac{a^2x^4}{16}+\frac{3}{16}ab^2x^4+\frac{3}{4}abx^3y(x)+\frac{1}{4}abx^3+\frac{3}{4}ax^2y(x)^2+\frac{1}{2}ax^2y(x)-\frac{ax}{2}+$$

✓ **Mathematica** : cpu = 0.229234 (sec), leaf count = 141

$$\text{Solve}\left[-\frac{1}{3}(27b+58)^{2/3}\text{RootSum}\left[\#1^3(27b+58)^{2/3}-3\ 2^{2/3}\#1+(27b+58)^{2/3}\&,\frac{\log\left(\frac{\sqrt[3]{2}\left(\frac{1}{4}\left(3ax^2+6bx+4\right)+3\right.}{\sqrt[3]{27b+58}}\right.}{2^{2/3}-\#1^2(27b+}\right.\right.$$

✓ **Maple** : cpu = 0.113 (sec), leaf count = 42

$$\left\{y(x)=-\frac{ax^2}{4}-\frac{bx}{2}+RootOf\left(-x+2\int^{\_Z}\left(2\_a^3+2\_a^2+b+2\right)^{-1}d\_a+\_C1\right)\right\}$$

ODE No. 951

$$y'(x) = \frac{a^3x^3}{8}+\frac{3a^2x^4}{16}+\frac{3}{4}a^2x^2y(x)+\frac{a^2x^2}{4}+\frac{3ax^5}{32}+\frac{3}{4}ax^3y(x)+\frac{ax^3}{4}+\frac{3}{2}axy(x)^2+axy(x)+\frac{x^6}{64}+\frac{3}{16}x^4y(x)+\frac{x^4}{16}$$

✓ **Mathematica** : cpu = 0.207703 (sec), leaf count = 140

$$\text{Solve}\left[-\frac{1}{3}(27a+58)^{2/3}\text{RootSum}\left[\#1^3(27a+58)^{2/3}-3\ 2^{2/3}\#1+(27a+58)^{2/3}\&,\frac{\log\left(\frac{\sqrt[3]{2}\left(\frac{1}{4}(6ax+3x^2+4)+3\right.}{\sqrt[3]{27a+58}}\right.}{2^{2/3}-\#1^2(27a+}\right.\right.$$

✓ **Maple** : cpu = 0.099 (sec), leaf count = 41

$$\left\{y(x)=-\frac{x^2}{4}-\frac{ax}{2}+RootOf\left(-x+2\int^{\_Z}\left(2\_a^3+2\_a^2+a+2\right)^{-1}d\_a+\_C1\right)\right\}$$

ODE No. 952

$$y'(x) = \frac{-x^2\sqrt{x^2+y(x)^2}+xy(x)\sqrt{x^2+y(x)^2}+x^5\left(-\sqrt{x^2+y(x)^2}\right)+x^4y(x)\sqrt{x^2+y(x)^2}-x^4\sqrt{x^2+y}}{x}$$

✓ **Mathematica** : cpu = 0.151773 (sec), leaf count = 189

$$\left\{\left\{y(x)\to\frac{x\left(-2e^{\sqrt{2}c_1+\frac{\sqrt{2}x^5}{5}+\frac{x^4}{2\sqrt{2}}+\frac{x^2}{\sqrt{2}}}+e^{2\sqrt{2}c_1+\frac{2\sqrt{2}x^5}{5}+\frac{x^4}{\sqrt{2}}+\sqrt{2}x^2}-1\right)}{2e^{\sqrt{2}c_1+\frac{\sqrt{2}x^5}{5}+\frac{x^4}{2\sqrt{2}}+\frac{x^2}{\sqrt{2}}}+e^{2\sqrt{2}c_1+\frac{2\sqrt{2}x^5}{5}+\frac{x^4}{\sqrt{2}}+\sqrt{2}x^2}-1}\right\}\right\}$$

✓ **Maple** : cpu = 0.408 (sec), leaf count = 62

$$\left\{\ln\left(2\,\frac{x\left(\sqrt{2\,(y(x))^2+2\,x^2}+y(x)+x\right)}{y(x)-x}\right)+\frac{(4\,x^5+5\,x^4+10\,x^2)\sqrt{2}}{20}-\_C1-\ln(x)=0\right\}$$

ODE No. 953

$$y'(x) = \frac{y(x)\left(x^4\log^2(y(x)) + 2x^4\log(x)\log(y(x)) + x^4\log^2(x) + x^3\log^2(y(x)) + 2x^3\log(x)\log(y(x)) + x^3\right.}{x}$$

✗ **Mathematica** : cpu = 1.46174 (sec), leaf count = 0 , could not solve

```
DSolve[Derivative[1][y][x] == ((-1 + Log[x] + x*Log[x]^2 + x^3*Log[x]^2 + x^4*Log[x]^2
```

✓ **Maple** : cpu = 0.463 (sec), leaf count = 145

$$\left\{y(x) = 1\left(x^{\frac{x^5}{4x^5+5x^4+10x^2+20\_C1}}\right)^{-4}\left(x^{\frac{x^4}{4x^5+5x^4+10x^2+20\_C1}}\right)^{-5}\left(x^{\frac{x^2}{4x^5+5x^4+10x^2+20\_C1}}\right)^{-10}\left(x^{\frac{\_C1}{4x^5+5x^4+10x^2+20\_C1}}\right.\right.$$

ODE No. 954

$$y'(x) = \frac{\frac{24}{5}x^{7/2}y(x) - \frac{24x^{13/2}}{25} + \frac{8x^{7/2}}{5} - 8x^{3/2} - \frac{8x^9}{125} + \frac{12}{25}x^6y(x) + \frac{4x^6}{25} - \frac{24x^4}{5} - \frac{6}{5}x^3y(x)^2 - \frac{4}{5}x^3y(x) + \frac{6x^3}{5} +}{x}$$

✓ **Mathematica** : cpu = 0.119485 (sec), leaf count = 115

$$\text{Solve}\left[-\frac{29}{3}\text{RootSum}\left[-29\#1^3 + 3\sqrt[3]{29}\#1 - 29\&, \frac{\log\left(\frac{\frac{-6x^3-30\sqrt{x}+5}{5x}+\frac{3y(x)}{x}}{\sqrt[3]{29}\sqrt[3]{\frac{1}{x^3}}} - \#1\right)}{\sqrt[3]{29} - 29\#1^2}\&\right] = c_1 + \frac{1}{9}29^{2/3}\left(\frac{1}{x^3}\right)$$

✓ **Maple** : cpu = 0.111 (sec), leaf count = 53

$$\left\{y(x) = \frac{1}{45}\left(18\,x^{7/2} + 145\,RootOf\left(-81\int^{\_Z}\left(841\,\_a^3 - 27\,\_a + 27\right)^{-1}d\_a + \ln(x) + 3\,\_C1\right)\sqrt{x} - 1\right.\right.$$

ODE No. 955

$$y'(x) = \frac{-24x^{7/2}y(x) + \frac{24x^{13/2}}{5} + 14x^{7/2} + 40x^{3/2} + \frac{8x^9}{25} - \frac{12}{5}x^6y(x) + \frac{12x^6}{5} + 24x^4 + 6x^3y(x)^2 - 6x^3y(x) -}{x\left(2x^3 - 5y(x) + 10\sqrt{x} - 5\right)}$$

✓ **Mathematica** : cpu = 0.0384522 (sec), leaf count = 112

$$\left\{\left\{y(x) \to \frac{1}{5}\left(2x^3 + 10\sqrt{x} - 5\right) - \frac{1}{125x\left(-\frac{1}{x\sqrt{c_1 - 31250\log(x)}} - \frac{1}{125x}\right)}\right\}, \left\{y(x) \to \frac{1}{5}\left(2x^3 + 10\sqrt{x} - 5\right) - \right.\right.$$

✓ **Maple** : cpu = 0.122 (sec), leaf count = 101

$$\left\{y(x) = 1\left(\left(2\,x^3+10\sqrt{x}\right)\sqrt{\_C1-2\,\ln(x)}-2\,x^3-10\sqrt{x}+5\right)\left(5\sqrt{\_C1-2\,\ln(x)}-5\right)^{-1}, y(x) = 1$$

ODE No. 956

$$y'(x) = \frac{y(x)\left(y(x)e^{\frac{2\log^2(x)}{\log(x)+1}}x^{\frac{2}{\log(x)+1}+2}+y(x)e^{\frac{2\log^2(x)}{\log(x)+1}}\log^2(x)x^{\frac{2}{\log(x)+1}+2}+2y(x)e^{\frac{2\log^2(x)}{\log(x)+1}}\log(x)x^{\frac{2}{\log(x)+1}+2}-e^{\frac{2}{1}}\right.}{x(\log(x)+1)}$$

✓ **Mathematica** : cpu = 0.209982 (sec), leaf count = 28

$$\left\{\left\{y(x)\to\frac{1}{\left(c_1e^{\frac{x^4}{4}}+1\right)(\log(x)+1)}\right\}\right\}$$

✓ **Maple** : cpu = 0.176 (sec), leaf count = 79

$$\left\{y(x) = \frac{1}{\ln(x)+1}\mathrm{e}^{-\frac{x^4}{4}}\left(x^{-2\,\frac{\ln(x)}{\ln(x)+1}}(\ln(x)+1)\,\mathrm{e}^{\frac{(-4\,\ln(x)-4)\ln(\ln(x)+1)-x^4\ln(x)-x^4+8\,(\ln(x))^2}{4\,\ln(x)+4}}+\_C1\right)^{-1}\right\}$$

ODE No. 957

$$y'(x) = \frac{y(x)\left(y(x)e^{\frac{2\log^2(x)}{\log(x)+1}}x^{\frac{2}{\log(x)+1}+3}+y(x)e^{\frac{2\log^2(x)}{\log(x)+1}}\log^2(x)x^{\frac{2}{\log(x)+1}+3}+2y(x)e^{\frac{2\log^2(x)}{\log(x)+1}}\log(x)x^{\frac{2}{\log(x)+1}+3}-e^{\frac{2}{1}}\right.}{x(\log(x)+1)}$$

✓ **Mathematica** : cpu = 0.201378 (sec), leaf count = 28

$$\left\{\left\{y(x)\to\frac{1}{\left(c_1e^{\frac{x^5}{5}}+1\right)(\log(x)+1)}\right\}\right\}$$

✓ **Maple** : cpu = 0.124 (sec), leaf count = 79

$$\left\{y(x) = \frac{1}{\ln(x)+1}\mathrm{e}^{-\frac{x^5}{5}}\left(x^{-2\,\frac{\ln(x)}{\ln(x)+1}}(\ln(x)+1)\,\mathrm{e}^{\frac{(-5\,\ln(x)-5)\ln(\ln(x)+1)-x^5\ln(x)-x^5+10\,(\ln(x))^2}{5\,\ln(x)+5}}+\_C1\right)^{-1}\right\}$$

ODE No. 958

$$y'(x) = \frac{2xy(x)^3 + y(x)^3 + 2xy(x)^2 + y(x)^2 + 6xy(x)\log^2(2x+1) + 3y(x)\log^2(2x+1) + 6xy(x)^2\log(2x$$

✓ **Mathematica** : cpu = 0.0743472 (sec), leaf count = 82

$$\text{Solve}\left[-\frac{29}{3}\text{RootSum}\left[-29\#1^3 + 3\sqrt[3]{29}\#1 - 29\&, \frac{\log\left(\frac{3y(x)+3\log(2x+1)+1}{\sqrt[3]{29}} - \#1\right)}{\sqrt[3]{29} - 29\#1^2}\&\right] = c_1 + \frac{1}{9}29^{2/3}x, y(x)$$

✓ **Maple** : cpu = 0.06 (sec), leaf count = 40

$$\left\{y(x) = -\ln(2x+1) - \frac{1}{3} + \frac{29\,RootOf\left(-81\int^{\_Z}(841\_a^3 - 27\_a + 27)^{-1}d\_a + x + 3\_C1\right)}{9}\right\}$$

ODE No. 959

$$y'(x) = \frac{\csc\left(\frac{y(x)}{2x}\right)\sec\left(\frac{y(x)}{2x}\right)\sec\left(\frac{y(x)}{x}\right)\left(x^3\sin\left(\frac{y(x)}{2x}\right)\sin\left(\frac{y(x)}{x}\right)\cos\left(\frac{y(x)}{2x}\right) - \frac{1}{2}y(x)\sin\left(\frac{y(x)}{x}\right) + \frac{1}{2}y(x)\sin}{x}$$

✓ **Mathematica** : cpu = 0.0599147 (sec), leaf count = 20

$$\left\{\left\{y(x) \to x\sin^{-1}\left(e^{c_1+\frac{x^2}{2}}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.088 (sec), leaf count = 15

$$\left\{y(x) = \arcsin\left(e^{\frac{x^2}{2}}\_C1\right)x\right\}$$

ODE No. 960

$$y'(x) = \frac{\csc\left(\frac{y(x)}{2x}\right)\sec\left(\frac{y(x)}{2x}\right)\sec\left(\frac{y(x)}{x}\right)\left(x^2\sin\left(\frac{y(x)}{2x}\right)\sin\left(\frac{y(x)}{x}\right)\cos\left(\frac{y(x)}{2x}\right) - \frac{1}{2}y(x)\sin\left(\frac{y(x)}{x}\right) + \frac{1}{2}y(x)\sin}{x}$$

✓ **Mathematica** : cpu = 0.0391101 (sec), leaf count = 14

$$\{\{y(x) \to x\sin^{-1}(e^{c_1+x})\}\}$$

✓ **Maple** : cpu = 0.076 (sec), leaf count = 11

$$\{y(x) = \arcsin(e^x\_C1)\,x\}$$

ODE No. 961

$$y'(x) = \frac{\exp\left(-2x^6 + 6x^4y(x)^2 + 2x^4 - 6x^2y(x)^4 - 4x^2y(x)^2 + 2y(x)^6 + 2y(x)^4 + 2\right) + x^2 + 2xy(x) + y(x}{-\exp\left(-2x^6 + 6x^4y(x)^2 + 2x^4 - 6x^2y(x)^4 - 4x^2y(x)^2 + 2y(x)^6 + 2y(x)^4 + 2\right) + x^2 + 2xy(x) + y}$$

✗ **Mathematica** : cpu = 3599.94 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.46 (sec), leaf count = 45

$$\left\{ y(x) = \mathrm{e}^{\mathit{RootOf}\left(-\_Z + \int^{\left(\mathrm{e}^{\_Z}\right)^2 - 2\,\mathrm{e}^{\_Z}x} \left(\mathrm{e}^{2\_a^3+2\_a^2+2} + \_a\right)^{-1} d\_a + \_C1\right)} - x \right\}$$

ODE No. 962

$$y'(x) = \frac{4(a-1)(a+1)x(a^2x^2}{a^8x^6 - 4a^6x^6 - 3a^6x^4y(x)^2 + 6a^4x^6 + 9a^4x^4y(x)^2 + 3a^4x^2y(x)^4 - 4a^2x^6 - 9a^2x^4y(x)^2 - 6a^2x^2y(x}$$

✓ **Mathematica** : cpu = 5.22304 (sec), leaf count = 1191

$$\left\{\left\{y(x) \to \mathrm{Root}\left[2x^4a^8 - 8x^4a^6 + e^{c_1}x^4a^4 + 11x^4a^4 - 2e^{c_1}x^4a^2 - 6x^4a^2 + 4x^2a^2 + \left(2a^2-2\right)\#1^5 + e^{c_1}x^4\right.\right.\right.$$

✓ **Maple** : cpu = 1.829 (sec), leaf count = 79

$$\left\{ -\frac{y(x)}{(a-1)(a+1)} + 2\,\frac{1}{\left(a^2-1\right)^2 \left(a^2x^2 - x^2 - (y(x))^2\right)^2} - 2\,\frac{1}{\left(a^2-1\right)^2 \left(a^2x^2 - x^2 - (y(x))^2\right)} + \_C1 = 0\right.$$

ODE No. 963

$$y'(x) = \frac{-\frac{5x^3}{2} + \frac{15}{4}x^3\cos(x) - \frac{3}{2}x^3\cos(2x) + \frac{1}{4}x^3\cos(3x) + \frac{9}{2}x^2y(x) - 6x^2y(x)\cos(x) + \frac{3}{2}x^2y(x)\cos(2x) +}{}$$

✓ **Mathematica** : cpu = 0.150919 (sec), leaf count = 108

$$\mathrm{Solve}\left[-\frac{29}{3}\mathrm{RootSum}\left[-29\#1^3 + 3\sqrt[3]{29}\#1 - 29\&, \frac{\log\left(\frac{\frac{3y(x)}{x} + \frac{-3x+3x\cos(x)+1}{x}}{\sqrt[3]{29}\sqrt[3]{\frac{1}{x^3}}} - \#1\right)}{\sqrt[3]{29} - 29\#1^2}\&\right] = c_1 + \frac{1}{9}29^{2/3}\left(\frac{1}{x^3}\right.\right.$$

✓ **Maple** : cpu = 0.259 (sec), leaf count = 39

$$\left\{y(x) = -\cos(x)\,x + x - \frac{1}{3} + \frac{29\,RootOf\left(-81\int^{\_Z}(841\_a^3 - 27\_a + 27)^{-1}d\_a + \ln(x) + 3\_C1\right)}{9}\right\}$$

ODE No. 964

$$y'(x) = -\frac{}{a^8x^6 - 4a^6x^6 - 3a^6x^4y(x)^2 - 2a^6x^4 + 6a^4x^6 + 9a^4x^4y(x)^2 + 6a^4x^4 + 3a^4x^2y(x)^4 + 4a^4x^2y(x)^2}$$

✓ **Mathematica** : cpu = 4.64526 (sec), leaf count = 264

$$\text{Solve}\left[\frac{y(x)}{(a-1)(a+1)} - \frac{8\text{RootSum}\left[-\#1^3a^6 + 3\#1^3a^4 - 3\#1^3a^2 + \#1^3 + 3\#1^2a^4y(x)^2 + 2\#1^2a^4 - 6\#1\right.}{}\right.$$

✓ **Maple** : cpu = 3.18 (sec), leaf count = 80

$$\left\{\frac{y(x)}{(a-1)(a+1)} + 4\frac{1}{a^4 - 2a^2 + 1}\sum_{\_R=RootOf(\_Z^3+2\_Z^2+8)}\frac{\ln\left(-a^2x^2 + x^2 + (y(x))^2 - \_R\right)}{3\_R^2 + 4\_R} - \_C1 = 0\right\}$$

ODE No. 965

$$y'(x) = \frac{\csc\left(\frac{y(x)}{2x}\right)\sec\left(\frac{y(x)}{2x}\right)\sec\left(\frac{y(x)}{x}\right)\left(x^4\sin\left(\frac{y(x)}{2x}\right)\sin\left(\frac{y(x)}{x}\right)\cos\left(\frac{y(x)}{2x}\right) + x^3\sin\left(\frac{y(x)}{2x}\right)\sin\left(\frac{y(x)}{x}\right)\cos\left(\right.\right.}{}$$

✓ **Mathematica** : cpu = 0.0616081 (sec), leaf count = 29

$$\left\{\left\{y(x) \to x\sin^{-1}\left(xe^{c_1 + \frac{x^3}{3} + \frac{x^2}{2}}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.099 (sec), leaf count = 26

$$\left\{y(x) = \arcsin\left(\_C1\,x\left(e^{-\frac{x^3}{3}}\right)^{-1}\left(e^{-\frac{x^2}{2}}\right)^{-1}\right)x\right\}$$

ODE No. 966

$$y'(x) = -\frac{}{216x^3 - 216x^2y(x)^4 - 324x^2y(x)^3 - 648x^2y(x)^2 - 648x^2y(x) + 216x^2 - 8y(x)^{12} - 36y(x)^{11} - 1}$$

✓ **Mathematica** : cpu = 0.459814 (sec), leaf count = 292

$$\text{Solve}\Big[72\text{RootSum}\Big[-216\#1^3 + 216\#1^2y(x)^4 + 324\#1^2y(x)^3 + 648\#1^2y(x)^2 + 648\#1^2y(x) - 216\#1^2 -$$

✓ **Maple** : cpu = 0.791 (sec), leaf count = 50

$$\left\{y(x) = \mathrm{e}^{RootOf\left(-\_Z - 6\int^{x - 1/3\left(\mathrm{e}^{\_Z}\right)^4 - 1/2\left(\mathrm{e}^{\_Z}\right)^3 - \left(\mathrm{e}^{\_Z}\right)^2 - \mathrm{e}^{\_Z}}\left(\_a^3 + \_a^2 + 1\right)^{-1}d\_a + \_C1\right)}\right\}$$

ODE No. 967

$$y'(x) = -\frac{x(64x^9 - 288x^8y(x) - 96x^8 + 432x^7y(x)^2 + 288x^7y(x) - 144x^7 - 216x^6y(x)^3 - 216x^6y(x)^2 - 2}{}$$

✓ **Mathematica** : cpu = 0.1729 (sec), leaf count = 151

$$\text{Solve}\left[-\frac{29}{3}\text{RootSum}\left[-29\#1^3 + 3\sqrt[3]{29}\#1 - 29\&, \frac{\log\left(\frac{\frac{3xy(x)}{x^2+1} + \frac{-4x^4+2x^3+5x}{2\left(x^2+1\right)^2}}{\sqrt[3]{29}\sqrt[3]{\frac{x^3}{\left(x^2+1\right)^3}}} - \#1\right)}{\sqrt[3]{29} - 29\#1^2}\&\right] = c_1 + \frac{29^{2/3}\left(\frac{x^3}{(x^2+1)}\right.}{}\right.$$

✓ **Maple** : cpu = 0.101 (sec), leaf count = 91

$$\left\{y(x) = \frac{58\,RootOf\left(-162\int^{\_Z}\left(841\,\_a^3 - 27\,\_a + 27\right)^{-1}d\_a + \ln\left(x^2+1\right) + 6\,\_C1\right)x^2 + 12\,x^3 - 6\,x^2}{18\,x^2 + 18}\right.$$

ODE No. 968

$$y'(x) = \frac{\csc\left(\frac{y(x)}{2x}\right)\sec\left(\frac{y(x)}{2x}\right)\sec\left(\frac{y(x)}{x}\right)\left(x^4\sin\left(\frac{y(x)}{2x}\right)\sin\left(\frac{y(x)}{x}\right)\cos\left(\frac{y(x)}{2x}\right) - \frac{1}{2}xy(x)\sin\left(\frac{y(x)}{x}\right) - \frac{1}{2}y(x)\sin\right.}{}$$

✓ **Mathematica** : cpu = 0.0845815 (sec), leaf count = 30

$$\left\{\left\{y(x)\to x\sin^{-1}\left((x+1)e^{c_1+\frac{x^2}{2}-x-\frac{3}{2}}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.116 (sec), leaf count = 22

$$\left\{y(x) = \arcsin\left(\frac{\_C1\ (1+x)}{e^x}e^{\frac{x^2}{2}}\right)x\right\}$$

ODE No. 969

$$y'(x) = \frac{\csc\left(\frac{y(x)}{2x}\right)\sec\left(\frac{y(x)}{2x}\right)\sec\left(\frac{y(x)}{x}\right)\left(-\frac{1}{2}xy(x)\sin\left(\frac{y(x)}{x}\right) - \frac{1}{2}y(x)\sin\left(\frac{y(x)}{x}\right) + x\sin\left(\frac{y(x)}{2x}\right)\sin\left(\frac{y(x)}{x}\right)\mathrm{co}\right.}{}$$

✓ **Mathematica** : cpu = 0.0572432 (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 = 0.125 (sec), leaf count = 15

$$\left\{y(x) = \arcsin\left(\frac{\_C1\ x}{1+x}\right)x\right\}$$

ODE No. 970

$$y'(x) = -\frac{}{216x^3 - 216x^2y(x)^4 - 324x^2y(x)^3 - 648x^2y(x)^2 - 648x^2y(x) - 8y(x)^{12} - 36y(x)^{11} - 126y(x)^{10}}$$

✓ **Mathematica** : cpu = 0.49733 (sec), leaf count = 66

$$\text{Solve}\left[\frac{36(2y(x)^4+3y(x)^3+6y(x)^2+6y(x)-6x-3)}{(y(x)\,(2y(x)^3+3y(x)^2+6y(x)+6)-6x)^2}+\log(y(x)) = c_1, y(x)\right]$$

✓ **Maple** : cpu = 0.892 (sec), leaf count = 181

$$\left\{\frac{1}{6\_C1 - 6\ln(y(x))}\left(-6\sqrt{3\ln(y(x)) - 3\_C1 + 9} + \left(2\,(y(x))^4 + 3\,(y(x))^3 + 6\,(y(x))^2 - 6\,x + 6\,y(x)\right.\right.\right.$$

ODE No. 971

$$y'(x) = \frac{(xy(x) + 1)^3}{x^5}$$

✓ **Mathematica** : cpu = 0.172239 (sec), leaf count = 157

$$\text{Solve}\left[\frac{1}{3}\log\left(\frac{\frac{3}{x^3}+\frac{3y(x)}{x^2}}{3\sqrt[3]{-\frac{1}{x^6}}}+1\right)-\frac{1}{6}\log\left(\frac{\left(\frac{3}{x^3}+\frac{3y(x)}{x^2}\right)^2}{9\left(-\frac{1}{x^6}\right)^{2/3}}-\frac{\frac{3}{x^3}+\frac{3y(x)}{x^2}}{3\sqrt[3]{-\frac{1}{x^6}}}+1\right)+\frac{\tan^{-1}\left(\frac{\frac{2\left(\frac{3}{x^3}+\frac{3y(x)}{x^2}\right)}{3\sqrt[3]{-\frac{1}{x^6}}}-1}{\sqrt{3}}\right)}{\sqrt{3}}=c\right.$$

✓ **Maple** : cpu = 0.415 (sec), leaf count = 86

$$\left\{y(x)=\frac{\sqrt{3}}{6\,x}\left(3\,\tan\left(\mathit{RootOf}\left(-18\,x^3\left(-x^{-6}\right)^{2/3}-6\_Z\sqrt{3}-\ln\left(\frac{\left(\sqrt{3}+\tan\left(\_Z\right)\right)^6}{\left(\left(\tan\left(\_Z\right)\right)^2+1\right)^3}\right)+18\_C1\right)\right)\right.x\right.$$

ODE No. 972

$$y'(x) = \frac{x(-2x^4 + 2x^2y(x) - x^2 + 1)}{y(x) - x^2}$$

✓ **Mathematica** : cpu = 0.0256571 (sec), leaf count = 32

$$\left\{\left\{y(x)\to\frac{1}{2}\left(W\left(-e^{c_1+x^4-2x^2-1}\right)+1\right)+x^2\right\}\right\}$$

✓ **Maple** : cpu = 0.122 (sec), leaf count = 27

$$\left\{y(x)=x^2+\frac{1}{2}\mathit{lambertW}\left(-2\,\frac{e^{x^4}\_C1\,e^{-1}}{\left(e^{x^2}\right)^2}\right)+\frac{1}{2}\right\}$$

ODE No. 973

$$y'(x) = e^{-2bx}y(x)\left(e^{bx}y(x) + e^{2bx} + y(x)^2\right)$$

✓ **Mathematica** : cpu = 0.230204 (sec), leaf count = 146

$$\text{Solve}\left[-\frac{1}{3}(9b-7)^{2/3}\text{RootSum}\left[\#1^3(9b-7)^{2/3} - 9\#1b + 6\#1 + (9b-7)^{2/3}\&, \frac{\log\left(\frac{3e^{-2bx}y(x)+e^{-bx}}{\sqrt[3]{(9b-7)e^{-3bx}}} - \#1\right.}{\#1^2\left(-(9b-7)^{2/3}\right) + 3b -}\right.\right.$$

✓ **Maple** : cpu = 0.509 (sec), leaf count = 134

$$\left\{y(x) = -\frac{e^{bx}}{2} - \frac{1}{2}\tan\left(RootOf\left(2\_Z\,e^{bx} - \sqrt{-\left(e^{bx}\right)^2(4\,b-3)}\ln\left(\left(4\left(\tan\left(\_Z\right)\right)^2 b - 3\left(\tan\left(\_Z\right)\right)^2 + \right.\right.\right.\right.\right.$$

ODE No. 974

$$y'(x) = -x^6 + 3x^4y(x) - 3x^2y(x)^2 + y(x)^3 + 2x$$

✓ **Mathematica** : cpu = 0.0101114 (sec), leaf count = 39

$$\left\{\left\{y(x) \to x^2 - \frac{1}{\sqrt{c_1 - 2x}}\right\}, \left\{y(x) \to \frac{1}{\sqrt{c_1 - 2x}} + x^2\right\}\right\}$$

✓ **Maple** : cpu = 0.055 (sec), leaf count = 57

$$\left\{y(x) = 1\left(x^2\sqrt{2\_C1 - 2\,x} - 1\right)\frac{1}{\sqrt{2\_C1 - 2\,x}}, y(x) = 1\left(x^2\sqrt{2\_C1 - 2\,x} + 1\right)\frac{1}{\sqrt{2\_C1 - 2\,x}}\right\}$$

ODE No. 975

$$y'(x) = \frac{x^6}{27} + \frac{1}{3}x^4y(x) + x^2y(x)^2 + y(x)^3 - \frac{2x}{3}$$

✓ **Mathematica** : cpu = 0.010656 (sec), leaf count = 47

$$\left\{\left\{y(x) \to -\frac{1}{\sqrt{c_1 - 2x}} - \frac{x^2}{3}\right\}, \left\{y(x) \to \frac{1}{\sqrt{c_1 - 2x}} - \frac{x^2}{3}\right\}\right\}$$

✓ **Maple** : cpu = 0.054 (sec), leaf count = 59

$$\left\{y(x) = -\frac{1}{3}\left(x^2\sqrt{-54\_C1 - 2\,x} - 3\right)\frac{1}{\sqrt{-54\_C1 - 2\,x}}, y(x) = -\frac{1}{3}\left(x^2\sqrt{-54\_C1 - 2\,x} + 3\right)\frac{}{\sqrt{-54\_}}\right.$$

ODE No. 976

$$y'(x) = \frac{y(x)\left(x^7 y(x)^2 + x^4 y(x) + x - 3\right)}{x}$$

✓ **Mathematica** : cpu = 0.126372 (sec), leaf count = 101

$$\text{Solve}\left[-\frac{7}{3}\text{RootSum}\left[-7\#1^3 + 6\sqrt[3]{-7}\#1 - 7\&, \frac{\log\left(\frac{3x^6 y(x)+x^3}{\sqrt[3]{7}\sqrt[3]{-x^9}} - \#1\right)}{2\sqrt[3]{-7} - 7\#1^2}\&\right] = c_1 + \frac{7^{2/3}\left(-x^9\right)^{2/3}}{9x^5}, y(x)\right]$$

✓ **Maple** : cpu = 0.336 (sec), leaf count = 59

$$\left\{y(x) = \frac{1}{2\,x^3}\left(\sqrt{3}\tan\left(RootOf\left(-\sqrt{3}\ln\left(\frac{9\left(\tan\left(\_Z\right)\right)^2 + 9}{7\,\left(3\,\tan\left(\_Z\right) - \sqrt{3}\right)^2}\right) + 3\sqrt{3}\_C1 - 2\sqrt{3}x - 2\_Z\right)\right) -\right.\right.$$

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 = 0.270569 (sec), leaf count = 139

$$\text{Solve}\left[-\frac{25}{3}\text{RootSum}\left[-25\#1^3 + 24\sqrt[3]{-1}5^{2/3}\#1 - 25\&, \frac{\log\left(\frac{3e^{2x^2} x y(x)+e^{x^2} x}{5^{2/3}\sqrt[3]{-e^{3x^2} x^3}} - \#1\right)}{8\sqrt[3]{-1}5^{2/3} - 25\#1^2}\&\right] = c_1 - \frac{5\sqrt[3]{5}e^{x^2} x^3}{18\sqrt[3]{-e^{3x^2}}}\right.$$

✓ **Maple** : cpu = 0.265 (sec), leaf count = 122

$$\left\{y(x) = \frac{1}{2\,\mathrm{e}^{x^2}}\left(\sqrt{11}\tan\left(RootOf\left(-4\sqrt{11}x^2 + 4\sqrt{11}\ln\left(11\right) + 8\sqrt{11}\ln\left(-\frac{36\sqrt{11}}{11} + 36\,\tan\left(\_Z\right)\right) -\right.\right.\right.\right.$$

ODE No. 978

$$y'(x) = \frac{y(x)\left(x^2 + xy(x) + y(x)^2 + x\right)}{x^2}$$

✓ **Mathematica** : cpu = 0.0853706 (sec), leaf count = 60

$$\text{Solve}\left[-\frac{1}{2}\log\left(\frac{y(x)^2}{x^2} + \frac{y(x)}{x} + 1\right) + \log\left(\frac{y(x)}{x}\right) - \frac{\tan^{-1}\left(\frac{\frac{2y(x)}{x}+1}{\sqrt{3}}\right)}{\sqrt{3}} = c_1 + x, y(x)\right]$$

✓ **Maple** : cpu = 0.248 (sec), leaf count = 71

$$\left\{y(x) = \frac{\sqrt{3}x}{2}\tan\left(RootOf\left(-\sqrt{3}\ln\left(\frac{4}{3 + 3\,(\tan(\_Z))^2}\right) - 2\sqrt{3}\ln\left(-1/6\sqrt{3} + 1/2\tan(\_Z)\right) - \sqrt{3}\ln\right.\right.\right.$$

ODE No. 979

$$y'(x) = \frac{-x^3 + 3x^2y(x) - 3xy(x)^2 + y(x)^3 + x}{x}$$

✓ **Mathematica** : cpu = 0.0109437 (sec), leaf count = 37

$$\left\{\left\{y(x) \to x - \frac{1}{\sqrt{c_1 - 2\log(x)}}\right\}, \left\{y(x) \to \frac{1}{\sqrt{c_1 - 2\log(x)}} + x\right\}\right\}$$

✓ **Maple** : cpu = 0.066 (sec), leaf count = 57

$$\left\{y(x) = 1\left(x\sqrt{2\_C1 - 2\ln(x)} - 1\right)\frac{1}{\sqrt{2\_C1 - 2\ln(x)}}, y(x) = 1\left(x\sqrt{2\_C1 - 2\ln(x)} + 1\right)\frac{}{\sqrt{2\_C1}}\right.$$

ODE No. 980

$$y'(x) = \frac{x^3 y(x)^3 + 6x^2 y(x)^2 + 12xy(x) + 2x + 8}{x^3}$$

✓ **Mathematica** : cpu = 0.0117613 (sec), leaf count = 43

$$\left\{\left\{y(x) \to -\frac{1}{\sqrt{c_1 - 2x}} - \frac{2}{x}\right\}, \left\{y(x) \to \frac{1}{\sqrt{c_1 - 2x}} - \frac{2}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.023 (sec), leaf count = 35

$$\left\{y(x) = -\frac{1}{\sqrt{\_C1 - 2\,x}} - 2\,x^{-1}, y(x) = \frac{1}{\sqrt{\_C1 - 2\,x}} - 2\,x^{-1}\right\}$$

ODE No. 981

$$y'(x) = \frac{a^3 x^3 y(x)^3 + 3a^2 x^2 y(x)^2 + a^2 x + 3axy(x) + 1}{a^3 x^3}$$

✓ **Mathematica** : cpu = 0.0163012 (sec), leaf count = 49

$$\left\{\left\{y(x) \to -\frac{1}{ax} - \frac{1}{\sqrt{c_1 - 2x}}\right\}, \left\{y(x) \to \frac{1}{\sqrt{c_1 - 2x}} - \frac{1}{ax}\right\}\right\}$$

✓ **Maple** : cpu = 0.034 (sec), leaf count = 41

$$\left\{y(x) = -\frac{1}{\sqrt{\_C1 - 2\,x}} - \frac{1}{ax}, y(x) = \frac{1}{\sqrt{\_C1 - 2\,x}} - \frac{1}{ax}\right\}$$

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 = 0.143628 (sec), leaf count = 132

$$\text{Solve}\left[-\frac{7}{3}\text{RootSum}\left[-7\#1^3 + 6\sqrt[3]{-7}\#1 - 7\&, \frac{\log\left(\frac{3e^{-\frac{x^2}{2}} y(x) + e^{-\frac{x^2}{4}}}{\sqrt[3]{7}\sqrt[3]{-e^{-\frac{3x^2}{4}}}} - \#1\right)}{2\sqrt[3]{-7} - 7\#1^2}\&\right] = c_1 + \frac{1}{9} 7^{2/3} e^{\frac{x^2}{2}} \left(-e^{-\frac{3x^2}{4}}\right)$$

✓ **Maple** : cpu = 0.555 (sec), leaf count = 145

$$\left\{\frac{1}{3}\ln\left(36+\frac{324}{7}\left(y(x)\,\mathrm{e}^{-\frac{x^2}{2}}+\frac{1}{3}\mathrm{e}^{-\frac{x^2}{4}}\right)^2\left(\mathrm{e}^{\frac{x^2}{4}}\right)^2+\frac{1}{7}\left(108\,y(x)\,\mathrm{e}^{-1/2\,x^2}+36\,\mathrm{e}^{-1/4\,x^2}\right)\mathrm{e}^{\frac{x^2}{4}}\right)+\frac{2\sqrt{3}}{9}\arctan\right.$$

ODE No. 983

$$y'(x)=\frac{-x^3+3x^2y(x)+x^2-3xy(x)^2+y(x)^3}{(x-1)(x+1)}$$

✓ **Mathematica** : cpu = 0.462023 (sec), leaf count = 238

$$\text{Solve}\left[\frac{1}{3}\log\left(\frac{\frac{3y(x)}{x^2-1}-\frac{3x}{x^2-1}}{3\sqrt[3]{\frac{1}{(x-1)^3(x+1)^3}}}+1\right)-\frac{1}{6}\log\left(\frac{\left(\frac{3y(x)}{x^2-1}-\frac{3x}{x^2-1}\right)^2}{9\left(\frac{1}{(x-1)^3(x+1)^3}\right)^{2/3}}-\frac{\frac{3y(x)}{x^2-1}-\frac{3x}{x^2-1}}{3\sqrt[3]{\frac{1}{(x-1)^3(x+1)^3}}}+1\right)+\frac{\tan^{-1}\left(\cdots\right)}{\sqrt{\cdots}}\right.$$

✓ **Maple** : cpu = 0.587 (sec), leaf count = 188

$$\left\{y(x)=\frac{\sqrt{3}}{2}\left(\frac{x^2-1}{3}\left(3\tan\left(RootOf\left(9\left(\frac{1}{(x-1)^3(1+x)^3}\right)^{2/3}\ln\left(\frac{x-1}{1+x}\right)x^4-18\left(\frac{1}{(x-1)^3(1+x)^3}\right.\right.\right.\right.\right.\right.$$

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 = 8.75235 (sec), leaf count = 428

$$\text{Solve}\left[\frac{\sqrt[3]{2}\left(\frac{3e^{-2x}x(x-1)y(x)+e^{-x}(x-1)}{\sqrt[3]{2}\sqrt[3]{e^{-3x}(x-1)^3}}+2^{2/3}\right)\left(2^{2/3}-\frac{2^{2/3}\left(3e^{-2x}x(x-1)y(x)+e^{-x}(x-1)\right)}{\sqrt[3]{e^{-3x}(x-1)^3}}\right)\left(\left(1-\frac{3e^{-2x}x(x-1)y(x)+e^{-x}(x\cdots}{\sqrt[3]{e^{-3x}(x-1)^3}}\cdots\right.\right.}{9\left(-\frac{e^{3x}\left(3e^{-2x}x(x-1)y(x\cdots\right.}{(x-1)^3}\cdots\right.}\right.$$

✓ **Maple** : cpu = 0.352 (sec), leaf count = 40

$$\left\{y(x)=\frac{1}{9\,x}\mathrm{e}^{RootOf\left(-\mathrm{e}^{\_Z}\ln\left(\frac{x\left(\mathrm{e}^{\_Z}+9\right)}{2}\right)+3\_C1\,\mathrm{e}^{\_Z}+\mathrm{e}^{\_Z}\_Z+\mathrm{e}^{\_Z}x+9\right)+x}\right\}$$

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 = 0.267784 (sec), leaf count = 103

$$\text{Solve}\left[-\frac{17}{3}\text{RootSum}\left[-17\#1^3 + 3\sqrt[3]{-34}\#1 - 17\&, \frac{\log\left(\frac{\frac{x+3}{x^3}+\frac{3y(x)}{x^2}}{\sqrt[3]{34}\sqrt[3]{-\frac{1}{x^6}}} - \#1\right)}{\sqrt[3]{-34} - 17\#1^2}\&\right] = c_1 - \frac{1}{9}34^{2/3}\left(-\frac{1}{x^6}\right)^{2/3} x$$

✓ **Maple** : cpu = 0.052 (sec), leaf count = 43

$$\left\{y(x) = \frac{17\,RootOf\left(162\int^{-Z}\left(289\_a^3 + 54\_a - 54\right)^{-1} d\_a x + 3\_C1\,x + 2\right)x - 3\,x - 9}{9\,x}\right\}$$

ODE No. 986

$$y'(x) = \frac{-x^3\log^3(x) + 3x^2y(x)\log^2(x) + x^2 + y(x)^3 + xy(x) - 3xy(x)^2\log(x)}{x^2}$$

✓ **Mathematica** : cpu = 0.0141205 (sec), leaf count = 44

$$\left\{\left\{y(x) \to x\log(x) - \frac{x}{\sqrt{c_1 - 2x}}\right\}, \left\{y(x) \to \frac{x}{\sqrt{c_1 - 2x}} + x\log(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.033 (sec), leaf count = 36

$$\left\{y(x) = -x\frac{1}{\sqrt{\_C1 - 2\,x}} + x\ln(x), y(x) = x\frac{1}{\sqrt{\_C1 - 2\,x}} + x\ln(x)\right\}$$

ODE No. 987

$$y'(x) = \frac{y(x)}{x} - F(x)\left(y(x)^2 - ax^2\right)$$

✓ **Mathematica** : cpu = 0.0921632 (sec), leaf count = 40

$$\left\{\left\{y(x) \to \sqrt{a}x \tanh\left(\sqrt{a}\int_1^x K[1]F(K[1])\,dK[1] + \sqrt{a}c_1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.078 (sec), leaf count = 22

$$\left\{y(x) = \tanh\left(\sqrt{a}\left(\_C1 + \int F(x)\,x\,\mathrm{d}x\right)\right)x\sqrt{a}\right\}$$

ODE No. 988

$$y'(x) = \frac{y(x)}{x} - F(x)\left(-x^2 - 2xy(x) + y(x)^2\right)$$

✓ **Mathematica** : cpu = 0.442561 (sec), leaf count = 104

$$\left\{\left\{y(x) \to -\frac{x\left(-\exp\left(2\sqrt{2}\left(\int_1^x K[1](-F(K[1]))\,dK[1] + c_1\right)\right) + \sqrt{2}\exp\left(2\sqrt{2}\left(\int_1^x K[1](-F(K[1]))\,dK[1]\right.\right.\right.}{\exp\left(2\sqrt{2}\left(\int_1^x K[1](-F(K[1]))\,dK[1] + c_1\right)\right) + 1}\right.\right.$$

✓ **Maple** : cpu = 0.062 (sec), leaf count = 29

$$\left\{y(x) = \frac{x\left(\sqrt{2} + 2\tanh\left(\left(\_C1 + \int F(x)\,x\,\mathrm{d}x\right)\sqrt{2}\right)\right)\sqrt{2}}{2}\right\}$$

ODE No. 989

$$y'(x) = \frac{y(x)}{x} - F(x)\left(-ay(x)^2 - bx^2\right)$$

✓ **Mathematica** : cpu = 0.0983494 (sec), leaf count = 55

$$\left\{\left\{y(x) \to \frac{\sqrt{b}x \tan\left(\sqrt{a}\sqrt{b}\int_1^x K[1]F(K[1])\,dK[1] + \sqrt{a}\sqrt{b}c_1\right)}{\sqrt{a}}\right\}\right\}$$

✓ **Maple** : cpu = 0.065 (sec), leaf count = 29

$$\left\{ y(x) = \frac{x}{a} \tan\left(\sqrt{ab}\left(\_C1 + \int F(x)\, x\, \mathrm{d}x\right)\right)\sqrt{ab} \right\}$$

ODE No. 990

$$y'(x) = 2x - F(x)\left(-x^4 + 2x^2 y(x) - y(x)^2 + 1\right)$$

✓ **Mathematica** : cpu = 0.43654 (sec), leaf count = 49

$$\left\{\left\{ y(x) \to \frac{e^{\int_1^x 2F(K[5])\, dK[5]}}{c_1 - \frac{1}{2} e^{\text{Integrate}[2F(K[5]),\{K[5],1,x\},\text{Assumptions}\to\text{True}]}} + x^2 + 1 \right\}\right\}$$

✓ **Maple** : cpu = 0.599 (sec), leaf count = 44

$$\left\{ y(x) = \frac{-x^2\left(\mathrm{e}^{\int F(x)\, \mathrm{d}x}\right)^2 + \_C1\, x^2 + \left(\mathrm{e}^{\int F(x)\, \mathrm{d}x}\right)^2 + \_C1}{-\left(\mathrm{e}^{\int F(x)\, \mathrm{d}x}\right)^2 + \_C1} \right\}$$

ODE No. 991

$$y'(x) = \frac{y(x)}{x} - F(x)\left(x^2 + 2xy(x) - y(x)^2\right)$$

✓ **Mathematica** : cpu = 0.275136 (sec), leaf count = 101

$$\left\{\left\{ y(x) \to -\frac{x\left(-\exp\left(2\sqrt{2}\left(\int_1^x K[1]F(K[1])\, dK[1] + c_1\right)\right) + \sqrt{2}\exp\left(2\sqrt{2}\left(\int_1^x K[1]F(K[1])\, dK[1] + c_1\right)\right)\right.}{\exp\left(2\sqrt{2}\left(\int_1^x K[1]F(K[1])\, dK[1] + c_1\right)\right) + 1}\right.\right.$$

✓ **Maple** : cpu = 0.056 (sec), leaf count = 29

$$\left\{ y(x) = \frac{x\left(\sqrt{2} - 2\tanh\left(\left(\_C1 + \int F(x)\, x\, \mathrm{d}x\right)\sqrt{2}\right)\right)\sqrt{2}}{2} \right\}$$

ODE No. 992

$$y'(x) = \frac{y(x)}{x} - F(x)\left(-x^3 - 7xy(x)^2\right)$$

✓ **Mathematica** : cpu = 0.0995375 (sec), leaf count = 42

$$\left\{\left\{y(x) \to \frac{x\tan\left(\sqrt{7}\int_1^x K[1]^2 F(K[1])\,dK[1] + \sqrt{7}c_1\right)}{\sqrt{7}}\right\}\right\}$$

✓ **Maple** : cpu = 0.057 (sec), leaf count = 25

$$\left\{y(x) = \frac{\tan\left(\left(\int x^2 F(x)\,\mathrm{d}x + \_C1\right)\sqrt{7}\right)x\sqrt{7}}{7}\right\}$$

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 = 515.344 (sec), leaf count = 71

$$\left\{\left\{y(x) \to \frac{\int_1^x \frac{F(K[5])}{\sqrt{\frac{1}{\log^2(K[5])}}}\,dK[5] + c_1 - 1}{\sqrt{\frac{1}{\log^2(x)}}\left(\int_1^x \frac{F(K[5])}{\sqrt{\frac{1}{\log^2(K[5])}}}\,dK[5]\right) + c_1\sqrt{\frac{1}{\log^2(x)}}}\right\}\right\}$$

✓ **Maple** : cpu = 0.042 (sec), leaf count = 35

$$\left\{y(x) = -\frac{\ln(x)\left(\int -2\ln(x)F(x)\,\mathrm{d}x - \_C1 - 2\right)}{\int -2\ln(x)F(x)\,\mathrm{d}x - \_C1}\right\}$$

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 = 0.114989 (sec), leaf count = 198

$$\left\{\left\{y(x) \to -\frac{c_1 e^{\frac{1}{16}x^4(4\log(x)-1)}\left(\frac{x^3}{4} + \frac{1}{4}x^3(4\log(x)-1)\right) + \frac{1}{16}x^4 e^{\frac{1}{16}x^4(4\log(x)-1)}(4\log(x)-1)\left(\frac{x^3}{4} + \frac{1}{4}x^3(4\mathrm{lo}\right.}{x^3\left(c_1 e^{\frac{1}{16}x^4(4\log(x)-1)} + \frac{1}{16}x^4 e^{\frac{1}{16}x^4(4\log(x)-1}\right.}\right.\right.$$

✓ **Maple** : cpu = 0.039 (sec), leaf count = 43

$$\left\{y(x) = -\frac{\ln(x)\left(4\,x^4\ln(x) - x^4 + 8\_C1 + 16\right)}{4\,x^4\ln(x) - x^4 + 8\_C1}\right\}$$

ODE No. 995

$$y'(x) = (y(x) - e^x)^2 + e^x$$

✓ **Mathematica** : cpu = 0.0176486 (sec), leaf count = 17

$$\left\{\left\{y(x) \to \frac{1}{c_1 - x} + e^x\right\}\right\}$$

✓ **Maple** : cpu = 0.145 (sec), leaf count = 14

$$\left\{y(x) = \mathrm{e}^x + (\_C1 - x)^{-1}\right\}$$

ODE No. 996

$$y'(x) = \frac{(y(x) - \mathrm{Si}(x))^2 + \sin(x)}{x}$$

✗ **Mathematica** : cpu = 62.8865 (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 = 0.099 (sec), leaf count = 15

$$\left\{y(x) = Si(x) + (\_C1 - \ln(x))^{-1}\right\}$$

ODE No. 997

$$y'(x) = (y(x) + \cos(x))^2 + \sin(x)$$

✓ **Mathematica** : cpu = 0.0297369 (sec), leaf count = 18

$$\left\{\left\{y(x) \to \frac{1}{c_1 - x} - \cos(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.076 (sec), leaf count = 16

$$\left\{y(x) = -\cos(x) + (\_C1 - x)^{-1}\right\}$$

ODE No. 998

$$y'(x) = \frac{(-\mathrm{Ci}(x) + y(x) - \log(x))^2 + \cos(x)}{x}$$

✓ **Mathematica** : cpu = 0.463834 (sec), leaf count = 27

$$\left\{\left\{y(x) \to \frac{x^2}{c_1 - \frac{x^2}{2}} + \mathrm{Ci}(x) + \log(x) + 1\right\}\right\}$$

✓ **Maple** : cpu = 0.484 (sec), leaf count = 27

$$\left\{y(x) = \ln(x) + Ci(x) + \frac{-\_C1\, x^2 + 1}{\_C1\, x^2 + 1}\right\}$$

ODE No. 999

$$y'(x) = \frac{(y(x) - x + \log(x+1))^2 + x}{x+1}$$

✓ **Mathematica** : cpu = 0.0231897 (sec), leaf count = 24

$$\left\{\left\{y(x) \to \frac{1}{c_1 - \log(x+1)} + x - \log(x+1)\right\}\right\}$$

✓ **Maple** : cpu = 0.071 (sec), leaf count = 36

$$\left\{y(x) = \frac{-(\ln(1+x))^2 + (x - \_C1)\ln(1+x) + \_C1\, x - 1}{\ln(1+x) + \_C1}\right\}$$

ODE No. 1000

$$y'(x) = \frac{x^3 + 2x^2 y(x) - xy(x) - y(x)^2 + xy(x)\log(x)}{x^2(x + \log(x))}$$

✗ **Mathematica** : cpu = 3599.93 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.195 (sec), leaf count = 19

$$\left\{y(x) = \frac{x(\_C1\,x - 1)}{\_C1\,\ln(x) + 1}\right\}$$

ODE No. 1001

$$y''(x) = 0$$

✓ **Mathematica** : cpu = 0.00409193 (sec), leaf count = 12

$$\{\{y(x) \to c_2 x + c_1\}\}$$

✓ **Maple** : cpu = 0.006 (sec), leaf count = 9

$$\{y(x) = \_C1\,x + \_C2\}$$

Hand solution

$$y'' = 0$$

Integration twice gives

$$y(x) = c_1 x + c_2$$

ODE No. 1002

$$y''(x) + y(x) = 0$$

✓ **Mathematica** : cpu = 0.00507908 (sec), leaf count = 16

$$\{\{y(x) \to c_2 \sin(x) + c_1 \cos(x)\}\}$$

✓ **Maple** : cpu = 0.03 (sec), leaf count = 13

$$\{y(x) = \_C1 \sin(x) + \_C2 \cos(x)\}$$

Hand solution

$$y'' + y = 0$$

Let $y = e^{\lambda x}$, substitution in above gives

$$\begin{aligned} \lambda^2 e^{\lambda x} + e^{\lambda x} &= 0 \\ \lambda^2 + 1 &= 0 \end{aligned}$$

Hence $\lambda = \pm i$, therefore the solution is

$$\begin{aligned} y &= Ae^{ix} + Be^{-ix} \\ &= A(\cos x + i \sin x) + B(\cos x - i \sin x) \\ &= \cos x(A + B) + \sin x(Ai - iB) \\ &= \cos x(A + B) + \sin x(i(A - B)) \end{aligned}$$

Let $A + B = c_1, i(A - B) = c_2$ hence

$$y = c_1 \cos x + c_2 \sin x$$

ODE No. 1003

$$-\sin(nx)+y''(x)+y(x)=0$$

✓ **Mathematica** : cpu = 0.13611 (sec), leaf count = 45

$$\left\{\left\{y(x)\to c_2\sin(x)+c_1\cos(x)+\frac{\cos^2(x)(-\sin(nx))-\sin^2(x)\sin(nx)}{n^2-1}\right\}\right\}$$

✓ **Maple** : cpu = 0.318 (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

$$\begin{aligned}\lambda^2e^{\lambda x}+e^{\lambda x}&=0\\ \lambda^2+1&=0\end{aligned}$$

Hence $\lambda=\pm i$, therefore the solution is

$$\begin{aligned}y_h&=Ae^{ix}+Be^{-ix}\\ &=A(\cos x+i\sin x)+B(\cos x-i\sin x)\\ &=\cos x(A+B)+\sin x(Ai-iB)\\ &=\cos x(A+B)+\sin x(i(A-B))\end{aligned}$$

Let $A+B=c_1, i(A-B)=c_2$ hence

$$y_h=c_1\cos x+c_2\sin x$$

Now we solve for the particular solution using variation of parameters. Let

$$\begin{aligned}y_p&=u_1(x)\cos x+u_2(x)\sin x\\ y_p'&=u_1'\cos x-u_1\sin x+u_2'\sin x+u_2\cos x\\ &=u_2\cos x-u_1\sin x+u_1'\cos x+u_2'\sin x\end{aligned}$$

Let first condition be

$$u_1' \cos x + u_2' \sin x = 0 \tag{2}$$

Hence

$$\begin{aligned}
y_p' &= u_2 \cos x - u_1 \sin x \\
y_p'' &= u_2' \cos x - u_2 \sin x - u_1' \sin x - u_1 \cos x
\end{aligned}$$

Substituting in (1) gives

$$\begin{aligned}
y_p'' + y_p &= \sin nx \\
u_2' \cos x - u_2 \sin x - u_1' \sin x - u_1 \cos x + u_1 \cos x + u_2 \sin x &= \sin nx \\
u_2' \cos x - u_1' \sin x &= \sin nx \qquad (3)
\end{aligned}$$

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
```

ODE No. 1004

$$-a\cos(bx) + y''(x) + y(x) = 0$$

✓ **Mathematica** : cpu = 0.118886 (sec), leaf count = 47

$$\left\{\left\{y(x) \to \frac{-a\cos^2(x)\cos(bx) - a\sin^2(x)\cos(bx)}{b^2-1} + c_2\sin(x) + c_1\cos(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.058 (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
```

ODE No. 1005

$$-\sin(ax)\sin(bx) + y''(x) + y(x) = 0$$

✓ **Mathematica** : cpu = 0.572167 (sec), leaf count = 1163

$$\left\{\left\{y(x) \to c_1\cos(x) + c_2\sin(x) + \frac{-\cos(x)\cos((a-b-1)x)a^3 + \cos(x)\cos((a-b+1)x)a^3 + \cos(x)\cos}{}\right.\right.$$

✓ **Maple** : cpu = 0.122 (sec), leaf count = 82

$$\left\{y(x) = \sin(x)\_C2 + \cos(x)\_C1 + \frac{-(a+b+1)(a+b-1)\cos(x(a-b)) + \cos((a+b)x)(a-b+1)}{2a^4 + (-4b^2-4)a^2 + 2b^4 - 4b^2 + 2}\right.$$

Hand solution

$$y'' + y = \sin ax \sin bx \tag{1}$$

We start by solving the homogeneous equation

$$y'' + y = 0$$

Let $y = e^{\lambda x}$, substitution in above gives

$$\begin{aligned}\lambda^2 e^{\lambda x} + e^{\lambda x} &= 0\\ \lambda^2 + 1 &= 0\end{aligned}$$

Hence $\lambda = \pm i$, therefore the solution is

$$\begin{aligned}y_h &= Ae^{ix} + Be^{-ix}\\ &= A(\cos x + i\sin x) + B(\cos x - i\sin x)\\ &= \cos x(A+B) + \sin x(Ai - iB)\\ &= \cos x(A+B) + \sin x(i(A-B))\end{aligned}$$

Let $A + B = c_1, i(A-B) = c_2$ hence

$$\begin{aligned}y_h &= c_1\cos x + c_2\sin x\\ &= y_h = c_1y_1 + c_2y_2\end{aligned}$$

Now we solve for the particular solution using variation of parameters.

$$
y_p = u_1 y_1 + u_2 y_2
$$

Wonskian is

$$
W = \begin{vmatrix} y_1 & y_2 \\ y_1' & y_2' \end{vmatrix} = \begin{vmatrix} \cos x & \sin x \\ -\sin x & \cos x \end{vmatrix} = \cos^2 x + \sin^2 x = 1
$$

Hence, using $f = \sin ax \sin bx$, which is the RHS of the ODE, and noting that a_0 is the coefficient of y'' which is one here, then

$$
\begin{aligned}
u_1 &= \int \frac{-y_2}{W} \frac{f}{a_0} dx = -\int \sin x \sin(ax) \sin(bx)\, dx \\
&= -\frac{1}{4}\left(\frac{\cos((a-b-1)x)}{a-b-1} - \frac{\cos((a-b+1)x)}{a-b+1} - \frac{\cos((a+b-1)x)}{a+b-1} + \frac{\cos((a+b+1)x)}{a+b+1}\right)
\end{aligned}
$$

And

$$
\begin{aligned}
u_2 &= \int \frac{y_1}{W} \frac{f}{a_0} dx = -\int \cos x \sin(ax) \sin(bx)\, dx \\
&= \frac{1}{4}\left(\frac{\sin((a-b-1)x)}{a-b-1} + \frac{\sin((a-b+1)x)}{a-b+1} - \frac{\sin((a+b-1)x)}{a+b-1} - \frac{\sin((a+b+1)x)}{a+b+1}\right)
\end{aligned}
$$

Since $y_p = u_1(x)\cos x + u_2(x)\sin x$ then

$$
\begin{aligned}
y_p &= -\frac{1}{4}\left(\frac{\cos((a-b-1)x)}{a-b-1} - \frac{\cos((a-b+1)x)}{a-b+1} - \frac{\cos((a+b-1)x)}{a+b-1} + \frac{\cos((a+b+1)x)}{a+b+1}\right)\cos x \\
&\quad + \frac{1}{4}\left(\frac{\sin((a-b-1)x)}{a-b-1} + \frac{\sin((a-b+1)x)}{a-b+1} - \frac{\sin((a+b-1)x)}{a+b-1} - \frac{\sin((a+b+1)x)}{a+b+1}\right)\sin x
\end{aligned}
$$

$$
\begin{aligned}
&= \frac{1}{4}\left(-\frac{\cos^2((a-b-1)x)}{a-b-1} + \frac{\sin^2((a-b-1)x)}{a-b-1}\right) + \frac{1}{4}\left(\frac{\cos^2((a-b+1)x)}{a-b+1} + \frac{\sin^2((a-b+1)x)}{a-b+1}\right) \\
&\quad + \frac{1}{4}\left(\frac{\cos^2((a+b-1)x)}{a+b-1} - \frac{\sin^2((a+b-1)x)}{a+b-1}\right) + \frac{1}{4}\left(-\frac{\cos^2((a+b+1)x)}{a+b+1} - \frac{\sin^2((a+b+1)x)}{a+b+1}\right)
\end{aligned}
$$

$$
\begin{aligned}
&= \frac{1}{4}\left(-\frac{\cos^2((a-b-1)x)}{a-b-1} + \frac{\sin^2((a-b-1)x)}{a-b-1}\right) + \frac{1}{4}\left(\frac{1}{a-b+1}\right) \\
&\quad + \frac{1}{4}\left(\frac{\cos^2((a+b-1)x)}{a+b-1} - \frac{\sin^2((a+b-1)x)}{a+b-1}\right) - \frac{1}{4}\left(\frac{1}{a+b+1}\right)
\end{aligned}
$$

Let $a-b-1=\alpha, a+b-1=\beta$ then

$$
\begin{aligned}
y_p &= \frac{1}{4}\left(\frac{\sin^2(\alpha x)-\cos^2(\alpha x)}{\alpha}\right)+\frac{1}{4}\left(\frac{\cos^2(\beta x)-\sin^2(\beta x)}{\beta}\right)+\frac{1}{4}\left(\frac{1}{\alpha+2}\right)-\frac{1}{4}\left(\frac{1}{\beta+2}\right)\\
&= \frac{1}{4}\left(\frac{\sin^2(\alpha x)-\cos^2(\alpha x)}{\alpha}+\frac{\cos^2(\beta x)-\sin^2(\beta x)}{\beta}+\frac{1}{\alpha+2}-\frac{1}{\beta+2}\right)
\end{aligned}
$$

Therefore, the full solution is

$$
\begin{aligned}
y &= y_h + y_p\\
&= c_1\cos x + c_2\sin x + \frac{1}{4}\left(\frac{\sin^2(\alpha x)-\cos^2(\alpha x)}{\alpha}+\frac{\cos^2(\beta x)-\sin^2(\beta x)}{\beta}+\frac{1}{\alpha+2}-\frac{1}{\beta+2}\right)
\end{aligned}
$$

I made mistake. Need to go over it again. I do not see it now. Maple does not verify.

```
restart;
ode:=diff(diff(y(x),x),x)+y(x)-sin(a*x)*sin(b*x)=0;
alpha:=a-b-1;
beta:=a+b-1;
yp:=1/4*(1/alpha* (sin(alpha*x)^2-cos(alpha*x)^2)+1/beta* (cos(beta*x)^2-sin(beta*x)^2))+(1/
y0:=yp+_C1*sin(x)+_C2*cos(x);
not zero
```

ODE No. 1006

$$y''(x)-y(x)=0$$

✓ **Mathematica** : cpu = 0.00491812 (sec), leaf count = 20

$$\{\{y(x)\to c_1 e^x + c_2 e^{-x}\}\}$$

✓ **Maple** : cpu = 0.013 (sec), leaf count = 15

$$\{y(x) = \_C1\,e^{-x} + \_C2\,e^{x}\}$$

Hand solution

$$y''-y=0 \tag{1}$$

Let $y = e^{\lambda x}$, substitution in above gives

$$
\begin{aligned}
\lambda^2 e^{\lambda x} - e^{\lambda x} &= 0 \\
\lambda^2 - 1 &= 0
\end{aligned}
$$

Hence $\lambda = \pm 1$, therefore the solution is

$$y_h = Ae^x + Be^{-x}$$

ODE No. 1007

$$-4e^{x^2}x^2 + y''(x) - 2y(x) = 0$$

✓ **Mathematica** : cpu = 0.0833086 (sec), leaf count = 135

$$\left\{\left\{y(x) \to c_1 e^{\sqrt{2}x} + c_2 e^{-\sqrt{2}x} + \frac{e^{-\sqrt{2}x}\left(-2e^{x\left(x+\sqrt{2}\right)}x + 2e^{\left(x-\sqrt{2}\right)x+2\sqrt{2}x}x + \sqrt{2}e^{x\left(x+\sqrt{2}\right)} + \sqrt{2}e^{\left(x-\sqrt{2}\right)x+2\sqrt{}}\right.}{2\sqrt{2}}\right.\right.$$

✓ **Maple** : cpu = 0.079 (sec), leaf count = 26

$$\left\{y(x) = \mathrm{e}^{\sqrt{2}x}\_C2 + \mathrm{e}^{-\sqrt{2}x}\_C1 + \mathrm{e}^{x^2}\right\}$$

Hand solution

$$y'' - 2y = 4x^2 e^{x^2} \tag{1}$$

We start by solving the homogeneous equation

$$y'' - 2y = 0$$

Let $y = e^{\lambda x}$, substitution in above gives

$$
\begin{aligned}
\lambda^2 e^{\lambda x} - 2e^{\lambda x} &= 0 \\
\lambda^2 - 2 &= 0
\end{aligned}
$$

Hence $\lambda = \pm\sqrt{2}$, therefore the solution is

$$
\begin{aligned}
y_h &= Ae^{\sqrt{2}x} + Be^{-\sqrt{2}x} \\
&= Ay_1 + By_2
\end{aligned}
$$

Now we solve for the particular solution using variation of parameters.

$$
y_p = u_1 y_1 + u_2 y_2
$$

wronskian is

$$
W = \begin{vmatrix} y_1 & y_2 \\ y_1' & y_2' \end{vmatrix} = \begin{vmatrix} e^{\sqrt{2}x} & e^{-\sqrt{2}x} \\ \sqrt{2}e^{\sqrt{2}x} & -\sqrt{2}e^{-\sqrt{2}x} \end{vmatrix} = -\sqrt{2} - \sqrt{2} = -2\sqrt{2}
$$

Hence, using $f = 4x^2 e^{x^2}$, which is the RHS of the ODE, and noting that a_0 is the coefficient of y'' which is one here, then

$$
\begin{aligned}
u_1 &= \int \frac{-y_2}{W}\frac{f}{a_0} dx = -\int \frac{e^{-\sqrt{2}x}}{-2\sqrt{2}} 4x^2 e^{x^2} dx \\
&= \frac{2}{\sqrt{2}} \int x^2 e^{x^2 -\sqrt{2}x} dx \\
&= \frac{2}{\sqrt{2}} \left(\frac{1}{4} e^{x\left(x-\sqrt{2}\right)} \left(\sqrt{2} + 2x\right) \right)
\end{aligned}
$$

And

$$
\begin{aligned}
u_2 &= \int \frac{y_1}{W}\frac{f}{a_0} dx = \int \frac{e^{\sqrt{2}x}}{-2\sqrt{2}} 4x^2 e^{x^2} dx \\
&= \frac{-2}{\sqrt{2}} \int x^2 e^{x^2 +\sqrt{2}x} dx \\
&= \frac{-2}{\sqrt{2}} \left(-\frac{1}{4} e^{x\left(x+\sqrt{2}\right)} \left(\sqrt{2} - 2x\right) \right)
\end{aligned}
$$

Since $y_p = u_1 e^{\sqrt{2}x} + u_2 e^{-\sqrt{2}x}$ then

$$
\begin{aligned}
y_p &= \frac{2}{\sqrt{2}} \left(\frac{1}{4} e^{x\left(x-\sqrt{2}\right)} \left(\sqrt{2} + 2x\right) \right) e^{\sqrt{2}x} - \frac{2}{\sqrt{2}} \left(-\frac{1}{4} e^{x\left(x+\sqrt{2}\right)} \left(\sqrt{2} - 2x\right) \right) e^{-\sqrt{2}x} \\
&= \frac{2}{\sqrt{2}} \frac{1}{4} e^{x^2} \left(\sqrt{2} + 2x\right) + \frac{2}{\sqrt{2}} \frac{1}{4} e^{x^2} \left(\sqrt{2} - 2x\right) \\
&= \frac{1}{2} e^{x^2} + \frac{1}{2} e^{x^2} \\
&= e^{x^2}
\end{aligned}
$$

Therefore, the full solution is

$$
\begin{aligned}
y &= y_h + y_p \\
&= Ae^{\sqrt{2}x} + Be^{-\sqrt{2}x} + e^{x^2}
\end{aligned}
$$

```
restart;
ode:=diff(y(x),x$2)-2*y(x)=4*x^2*exp(x^2);
y0:=_C1*exp(sqrt(2)*x)+_C2*exp(-sqrt(2)*x)+exp(x^2);
odetest(y(x)=y0,ode);
0
```

ODE No. 1008

$$a^2y(x) - \cot(ax) + y''(x) = 0$$

✓ **Mathematica** : cpu = 0.044074 (sec), leaf count = 48

$$\left\{\left\{y(x) \to -\frac{\sin(ax)\left(\log\left(\cos\left(\frac{ax}{2}\right)\right) - \log\left(\sin\left(\frac{ax}{2}\right)\right)\right)}{a^2} + c_2 \sin(ax) + c_1 \cos(ax)\right\}\right\}$$

✓ **Maple** : cpu = 0.114 (sec), leaf count = 41

$$\left\{y(x) = \sin(ax)\_C2 + \cos(ax)\_C1 + \frac{\sin(ax)}{a^2}\ln\left(\frac{1-\cos(ax)}{\sin(ax)}\right)\right\}$$

ODE No. 1009

$$ly(x) + y''(x) = 0$$

✓ **Mathematica** : cpu = 0.00512995 (sec), leaf count = 28

$$\left\{\left\{y(x) \to c_2 \sin\left(\sqrt{l}x\right) + c_1 \cos\left(\sqrt{l}x\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.023 (sec), leaf count = 21

$$\left\{y(x) = \_C1\ \sin\left(\sqrt{l}x\right) + \_C2\ \cos\left(\sqrt{l}x\right)\right\}$$

ODE No. 1010

$$y(x)(ax+b)+y''(x)=0$$

✓ **Mathematica** : cpu = 0.00694745 (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 = 0.168 (sec), leaf count = 31

$$\left\{y(x)=\_C1\ \text{Ai}\left(-(ax+b)a^{-\frac{2}{3}}\right)+\_C2\ \text{Bi}\left(-(ax+b)a^{-\frac{2}{3}}\right)\right\}$$

Hand solution

$$y''+(ax+b)\,y=0 \tag{1}$$

For $a\neq 0$. Let $y=\eta(\xi)\,,\xi=ax+b$, hence

$$\begin{aligned}\frac{dy}{dx}&=\frac{d\eta}{d\xi}\frac{d\xi}{dx}\\&=\frac{d\eta}{d\xi}a\end{aligned}$$

And

$$\begin{aligned}\frac{d^2y}{dx^2}&=\frac{d}{dx}\left(\frac{d\eta}{d\xi}a\right)\\&=a\frac{d}{dx}\left(\frac{d\eta}{d\xi}\right)\\&=a\left(\frac{d^2\eta}{d\xi^2}\frac{d\xi}{dx}\right)\\&=a^2\frac{d^2\eta}{d\xi^2}\end{aligned}$$

Therefore (1) becomes

$$\begin{aligned}a^2\frac{d^2\eta}{d\xi^2}+\xi\eta(\xi)&=0\\a^2\eta''+\xi\eta&=0\end{aligned} \tag{2}$$

This is Airy ODE but with plus sign instead of the normal Airy $\eta'' - \xi\eta = 0$. Let

$$
\begin{aligned}
\eta &= \sum_{n=0}^{\infty} c_n \xi^n \\
\eta' &= \sum_{n=0}^{\infty} n c_n \xi^{n-1} = \sum_{n=1}^{\infty} n c_n \xi^{n-1} = \sum_{n=0}^{\infty} (n+1)\, c_{n+1} \xi^n \\
\eta'' &= \sum_{n=0}^{\infty} n(n+1)\, c_{n+1} \xi^{n-1} = \sum_{n=1}^{\infty} n(n+1)\, c_{n+1} \xi^{n-1} = \sum_{n=0}^{\infty} (n+1)\,(n+2)\, c_{n+2} \xi^n
\end{aligned}
$$

Hence (2) becomes

$$
\begin{aligned}
a^2 \sum_{n=0}^{\infty} (n+1)\,(n+2)\, c_{n+2} \xi^n + \xi \sum_{n=0}^{\infty} c_n \xi^n &= 0 \\
\sum_{n=0}^{\infty} a^2 (n+1)\,(n+2)\, c_{n+2} \xi^n + \sum_{n=0}^{\infty} c_n \xi^{n+1} &= 0 \\
\sum_{n=0}^{\infty} a^2 (n+1)\,(n+2)\, c_{n+2} \xi^n + \sum_{n=1}^{\infty} c_{n-1} \xi^n &= 0 \\
2a^2 c_2 + \sum_{n=1}^{\infty} \left(a^2 (n+1)\,(n+2)\, c_{n+2} + c_{n-1} \right) \xi^n &= 0
\end{aligned}
$$

Hence

$$
\begin{aligned}
2a^2 c_2 &= 0 \qquad (3) \\
a^2 (n+1)\,(n+2)\, c_{n+2} + c_{n-1} &= 0 \qquad n \geq 1 \qquad (4)
\end{aligned}
$$

From (3) and since $a \neq 0$

$$
c_2 = 0
$$

From (4)

$$
c_{n+2} = \frac{-c_{n-1}}{a^2\,(n+1)\,(n+2)}
$$

Hence for $n=3$, we see from the above recurrence equation and because $c_2=0$ that

$$c_5=\frac{-c_2}{a^2\,(4)\,(6)}=0$$

Similarly, for $n=6$

$$c_8=\frac{-c_5}{a^2\,(7)\,(8)}=0$$

Similarly, for $n=9$

$$c_{11}=\frac{-c_8}{a^2\,(10)\,(11)}=0$$

And so on. Hence we found so far that for $n=3,6,9,12,\cdots$ all terms generated which are $c_5,c_8,c_{11},\cdots$ are zero.

Now, for $n=1$, the recurrence equation gives

$$c_3=\frac{-c_0}{a^2}\frac{1}{2\cdot 3}$$

For $n=2$

$$c_4=\frac{-c_1}{a^2}\frac{1}{3\cdot 4}$$

For $n=4$

$$c_6=\frac{-c_3}{a^2\,(5)\,(6)}=c_0\left(\frac{1}{a^2}\frac{1}{5\cdot 6}\right)\left(\frac{1}{a^2}\frac{1}{2\cdot 3}\right)$$

For $n=5$

$$c_7=\frac{-c_4}{a^2\,(6)\,(7)}=c_1\left(\frac{1}{a^2}\frac{1}{6\cdot 7}\right)\left(\frac{1}{a^2}\frac{1}{3\cdot 4}\right)$$

For $n=7$

$$c_9=\frac{-c_6}{a^2\,(8)\,(9)}=-c_0\left(\frac{1}{a^2}\frac{1}{8\cdot 9}\right)\left(\frac{1}{a^2}\frac{1}{5\cdot 6}\right)\left(\frac{1}{a^2}\frac{1}{2\cdot 3}\right)$$

For $n=8$

$$
c_{10} = \frac{-c_7}{a^2 (9)(10)} = -c_1 \left(\frac{1}{a^2} \frac{1}{9 \cdot 10} \right) \left(\frac{1}{a^2} \frac{1}{6 \cdot 7} \right) \left(\frac{1}{a^2} \frac{1}{3 \cdot 4} \right)
$$

Therefore, in summary, this is what we have so far. For $n = 3, 6, 9, 12, \cdots$ all terms are zero. For $n = 1, 4, 7, \cdots$ all terms are expressed using c_0 and for $n = 2, 5, 8, \cdots$ all terms are expressed using c_1. So there are two arbitrary constants c_0, c_1.

In other words, $c_2, c_5, c_8, c_{11}, \cdots = 0$ and $c_3, c_6, c_9, c_{12}, \cdots = f(c_0)$ and $c_4, c_7, c_{10}, c_{13}, \cdots = f(c_1)$.

$$
\begin{aligned}
\eta &= \sum_{n=0}^{\infty} c_n \xi^n \\
&= c_0 + c_1 \xi^1 + c_2 \xi^2 + c_3 \xi^3 + \cdots \\
&= c_0 + \left(c_1 \xi^1\right) + 0 - \left(c_0 \frac{\xi^3}{a^2} \frac{1}{2 \cdot 3} \right) - \left(c_1 \frac{\xi^4}{a^2} \frac{1}{3 \cdot 4} \right) + 0 + c_0 \frac{\xi^6}{a^4} \frac{1}{2 \cdot 3 \cdot 5 \cdot 6} + c_1 \frac{\xi^7}{a^4} \frac{1}{3 \cdot 4 \cdot 6 \cdot 7} + 0 \\
&= c_0 \left(1 - \frac{\xi^3}{a^2} \frac{1}{2 \cdot 3} + \frac{\xi^6}{a^4} \frac{1}{2 \cdot 3 \cdot 5 \cdot 6} - \cdots \right) + c_1 \left(\xi - \frac{\xi^4}{a^2} \frac{1}{3 \cdot 4} + \frac{\xi^7}{a^4} \frac{1}{3 \cdot 4 \cdot 6 \cdot 7} - \cdots \right) \\
&= c_0 \left(1 - \frac{1}{a^2} \frac{\xi^3}{3!} + \frac{1 \cdot 4}{a^4} \frac{\xi^6}{6!} - \frac{1 \cdot 4 \cdot 7}{a^6} \frac{\xi^9}{9!} + \cdots \right) + c_1 \left(\xi - \frac{\xi^4}{a^2} \frac{2}{4!} + \frac{\xi^7}{a^4} \frac{2 \cdot 5}{7!} - \frac{\xi^{10}}{a^6} \frac{2 \cdot 5 \cdot 8}{10!} + \cdots \right)
\end{aligned}
$$

Hence

$$
\eta = c_0 \left(\sum_{n=0}^{\infty} 3^n \left(\frac{1}{3} \right)_n \frac{(-1)^n}{a^{2n}} \frac{\xi^{3n}}{(3n)!} \right) + c_1 \left(\sum_{n=0}^{\infty} 3^n \left(\frac{2}{3} \right)_n \frac{(-1)^n}{a^{2n}} \frac{\xi^{3n+1}}{(3n+1)!} \right) \tag{5}
$$

Where

$$
\begin{aligned}
3^n \left(\frac{1}{3} \right)_n &= (1) \cdot (4) \cdot (7) \ldots (3n - 2) \\
3^n \left(\frac{2}{3} \right)_n &= (2) \cdot (5) \cdot (8) \ldots (3n - 1)
\end{aligned}
$$

And

$$
\left(\frac{1}{3} \right)_0 = \left(\frac{2}{3} \right)_0 = 1
$$

Equation (5) can be simplified more by moving $\frac{(-1)^n}{a^{2n}}$ into ξ as follows

$$\eta = c_0\left(\sum_{n=0}^{\infty} 3^n \left(\frac{1}{3}\right)_n \frac{1}{(3n)!}\left(\frac{-\xi}{a^{\frac{2}{3}}}\right)^{3n}\right) + ac_1\left(\sum_{n=0}^{\infty} 3^n \left(\frac{2}{3}\right)_n \frac{1}{(3n+1)!}\left(\frac{-\xi}{a^{\frac{2}{3}}}\right)^{3n+1}\right)$$

Let $\left(\frac{-\xi}{a^{\frac{2}{3}}}\right) = z$ then the above is

$$\eta = c_0\left(\sum_{n=0}^{\infty} 3^n \left(\frac{1}{3}\right)_n \frac{z^{3n}}{(3n)!}\right) + ac_1\left(\sum_{n=0}^{\infty} 3^n \left(\frac{2}{3}\right)_n \frac{z^{3n+1}}{(3n+1)!}\right)$$

Let

$$f(\xi) = \sum_{n=0}^{\infty} 3^n \left(\frac{1}{3}\right)_n \frac{\xi^{3n}}{(3n)!}$$
$$g(\xi) = \sum_{n=0}^{\infty} 3^n \left(\frac{2}{3}\right)_n \frac{\xi^{3n+1}}{(3n+1)!}$$

Now looking at definition of AiryAI (z) we see

$$\text{AiryAI}\,(z) = r_1 f(z) - r_2 g(z)$$
$$\text{AiryBI}\,(z) = \sqrt{3}(r_1 f(z) + r_2 g(z))$$

These are Airy functions AiryAI and AiryBI with appropriate choice of c_0, c_1. See definition of these special functions. Converting back to x using $\xi = ax + b$ should result in solution given by CAS. Need to write these final details to make sure. Will finish later.

ODE No. 1011

$$y''(x) - (x^2+1)\,y(x) = 0$$

✓ **Mathematica** : cpu = 0.00766293 (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 = 0.056 (sec), leaf count = 17

$$\left\{y(x) = e^{\frac{x^2}{2}}\left(\mathit{Erf}(x)\_C2 + \_C1\right)\right\}$$

Hand solution

$$y'' - \left(x^2 + 1\right) y = 0 \tag{1}$$

Second order with varying coefficient. Using power series, let $y = \sum_{n=0}^{\infty} c_n x^n$, hence

$$\begin{aligned}
y' &= \sum_{n=0}^{\infty} n c_n x^{n-1} = \sum_{n=1}^{\infty} n c_n x^{n-1} = \sum_{n=0}^{\infty} (n+1) c_{n+1} x^n \\
y'' &= \sum_{n=0}^{\infty} n(n+1) c_{n+1} x^{n-1} = \sum_{n=1}^{\infty} n(n+1) c_{n+1} x^{n-1} = \sum_{n=0}^{\infty} (n+1)(n+2) c_{n+2} x^n
\end{aligned}$$

Substituting back in the original ODE gives

$$\begin{aligned}
\sum_{n=0}^{\infty} (n+1)(n+2) c_{n+2} x^n - \left(x^2+1\right) \sum_{n=0}^{\infty} c_n x^n &= 0 \\
\sum_{n=0}^{\infty} (n+1)(n+2) c_{n+2} x^n - x^2 \sum_{n=0}^{\infty} c_n x^n - \sum_{n=0}^{\infty} c_n x^n &= 0 \\
\sum_{n=0}^{\infty} (n+1)(n+2) c_{n+2} x^n - \sum_{n=0}^{\infty} c_n x^{n+2} - \sum_{n=0}^{\infty} c_n x^n &= 0 \\
\sum_{n=0}^{\infty} (n+1)(n+2) c_{n+2} x^n - \sum_{n=2}^{\infty} c_{n-2} x^n - \sum_{n=0}^{\infty} c_n x^n &= 0
\end{aligned}$$

For $n = 0$

$$\begin{aligned}
(n+1)(n+2) c_{n+2} - c_n &= 0 \\
2c_2 - c_0 &= 0 \\
c_2 &= \frac{c_0}{2}
\end{aligned}$$

For $n = 1$

$$\begin{aligned}
(n+1)(n+2) c_{n+2} - c_n &= 0 \\
(2)(3) c_3 - c_1 &= 0 \\
c_3 &= \frac{c_1}{6}
\end{aligned}$$

For $n \geq 2$

$$\begin{aligned}
(n+1)(n+2) c_{n+2} - c_{n-2} - c_n &= 0 \\
c_{n+2} &= \frac{c_{n-2} + c_n}{(n+1)(n+2)}
\end{aligned}$$

Hence for $n=2$

$$c_4 = \frac{c_0+c_2}{(3)(4)} = \frac{c_0+\frac{c_0}{2}}{(3)(4)} = \frac{2c_0+c_0}{(2)(3)(4)} = c_0\frac{3}{(2)(3)(4)}$$

For $n=3$

$$c_5 = \frac{c_1+c_3}{(4)(5)} = \frac{c_1+\frac{c_1}{6}}{(4)(5)} = \frac{6c_1+c_1}{(4)(5)(6)} = c_1\frac{7}{(4)(5)(6)}$$

For $n=4$

$$c_6 = \frac{c_2+c_4}{(5)(6)} = \frac{\frac{c_0}{2}+c_0\frac{3}{(2)(3)(4)}}{(5)(6)} = \frac{c_0(3)(4)+3c_0}{(2)(3)(4)(5)(6)} = c_0\frac{15}{(2)(3)(4)(5)(6)}$$

For $n=5$

$$\begin{aligned} c_7 &= \frac{c_3+c_5}{(6)(7)} \\ &= \frac{\frac{c_1}{6}+c_1\frac{7}{(4)(5)(6)}}{(6)(7)} = \frac{3}{560}c_1 \end{aligned}$$

And so on. Hence the series is

$$\begin{aligned} y &= \sum_{n=0}^{\infty} c_n x^n \\ &= c_0 + c_1 x + c_2 x^2 + c_3 x^3 + \cdots \\ &= c_0 + c_1 x + \frac{c_0}{2}x^2 + \frac{c_1}{6}x^3 + c_0\frac{3}{(2)(3)(4)}x^4 + c_1\frac{7}{(4)(5)(6)}x^5 + c_0\frac{15}{(2)(3)(4)(5)(6)}x^6 + c_1\frac{3}{560}x^7 + \cdots \\ &= c_0 + c_1 x + \frac{c_0}{2}x^2 + \frac{c_1}{6}x^3 + c_0\frac{1}{8}x^4 + c_1\frac{7}{120}x^5 + c_0\frac{1}{48}x^6 + c_1\frac{3}{560}x^7 + \cdots \\ &= c_0\left(1 + \frac{x^2}{2} + \frac{1}{8}x^4 + \frac{1}{48}x^6 + \cdots\right) + c_1\left(x + \frac{1}{6}x^3 + \frac{7}{120}x^5 + \frac{3}{560}x^7 + \cdots\right) \end{aligned}$$

Now the power series for $e^{\frac{x^2}{2}} = 1 + \frac{x^2}{2} + \frac{x^4}{8} + \frac{x^6}{48} + \cdots$, so we can convert the first term above (the expression for c_0 to be $e^{\frac{x^2}{2}}$. Hence

$$c_0\left(1 + \frac{x^2}{2} + \frac{1}{8}x^4 + \frac{1}{48}x^6 + \cdots\right) = c_0 e^{\frac{x^2}{2}}$$

So now we have to work on the second term (the expression for c_1)

$$c_1\left(x + \frac{1}{6}x^3 + \frac{7}{120}x^5 + \frac{3}{560}x^7 + \cdots\right) =?$$

Recall that series for error function is

$$\operatorname{erf}(x) = \frac{2}{\sqrt{\pi}}\left(x - \frac{x^3}{3} + \frac{x^5}{10} - \frac{x^7}{48} + \cdots\right)$$

Multiplying $e^{\frac{x^2}{2}}$ by $\operatorname{erf}(x)$ gives

$$\begin{aligned}
e^{\frac{x^2}{2}} \operatorname{erf}(x) &= \frac{2}{\sqrt{\pi}}\left(1 + \frac{x^2}{2} + \frac{x^4}{(2)(4)} + \frac{x^6}{(2)(4)(6)} + \cdots\right)\left(x - \frac{x^3}{3} + \frac{x^5}{10} - \frac{x^7}{48} + \cdots\right) \\
&= \frac{2}{\sqrt{\pi}}\left(x - \frac{x^3}{3} + \frac{x^5}{10} - \frac{x^7}{48} + \cdots + \frac{x^3}{2} - \frac{x^5}{6} + \frac{x^7}{20} - \frac{x^{15}}{96} + \cdots\right) \\
&= \frac{2}{\sqrt{\pi}}\left(x + \frac{x^3}{6} + \frac{7x^5}{120} + \frac{3}{560}x^7 + \cdots\right)
\end{aligned}$$

Comparing the above to the term next to c_1 above, we see they are the same with a multiplier $\frac{2}{\sqrt{\pi}}$, which can be absorbed into the constant c_1, Hence

$$\begin{aligned}
y &= c_0\left(1 + \frac{x^2}{2} + \frac{1}{8}x^4 + \frac{1}{48}x^6 + \cdots\right) + c_1\left(x + \frac{1}{6}x^3 + \frac{7}{120}x^5 + \frac{3}{560}x^7 + \cdots\right) \\
&= c_0 e^{\frac{x^2}{2}} + c_1\left(e^{\frac{x^2}{2}} \operatorname{erf}(x)\right)
\end{aligned}$$

Hence final solution is

$$y = c_0 e^{\frac{x^2}{2}} + c_2\left(e^{\frac{x^2}{2}} \operatorname{erf}(x)\right)$$

Verification

```
restart;
ode:=diff(diff(y(x),x),x)-(x^2+1)*y(x)=0;
y0:=_C1*exp(x^2/2)+_C2*exp(x^2/2)*erf(x);
odetest(y(x)=y0,ode);
0
```

ODE No. 1012

$$y''(x) - \left(a + x^2\right) y(x) = 0$$

✓ **Mathematica** : cpu = 0.00877007 (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 = 0.503 (sec), leaf count = 29

$$\left\{y(x) = 1\left(\_C2\, W_{-\frac{a}{4}, \frac{1}{4}}\left(x^2\right) + \_C1\, M_{-\frac{a}{4}, \frac{1}{4}}\left(x^2\right)\right)\frac{1}{\sqrt{x}}\right\}$$

ODE No. 1013

$$y''(x) - (a^2x^2 + a)\,y(x) = 0$$

✓ **Mathematica** : cpu = 0.0198914 (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 = 0.481 (sec), leaf count = 22

$$\left\{y(x) = e^{\frac{ax^2}{2}}\left(\mathit{Erf}\left(\sqrt{a}x\right)\_C2 + \_C1\right)\right\}$$

ODE No. 1014

$$y''(x) - cx^a y(x) = 0$$

✓ **Mathematica** : cpu = 0.0469343 (sec), leaf count = 170

$$\left\{\left\{y(x) \to (a+2)^{-\frac{1}{a+2}} c_1 c^{\frac{1}{2(a+2)}} x^{\frac{\frac{a}{2}+1}{a+2}} \Gamma\left(1 - \frac{1}{a+2}\right) I_{-\frac{1}{a+2}}\left(\frac{2\sqrt{c}x^{\frac{a+2}{2}}}{a+2}\right) + (-1)^{\frac{1}{a+2}} (a+2)^{-\frac{1}{a+2}} c_2 c^{\frac{1}{2(a+2)}} x^{1-}\right.\right.$$

✓ **Maple** : cpu = 0.215 (sec), leaf count = 63

$$\left\{y(x) = \sqrt{x}\left(Y_{(a+2)^{-1}}\left(2\,\frac{\sqrt{-c}x^{a/2+1}}{a+2}\right)\_C2 + J_{(a+2)^{-1}}\left(2\,\frac{\sqrt{-c}x^{a/2+1}}{a+2}\right)\_C1\right)\right\}$$

ODE No. 1015

$$y''(x) - y(x)\left(a^2x^{2n} - 1\right) = 0$$

✗ **Mathematica** : cpu = 0.322122 (sec), leaf count = 0 , could not solve

```
DSolve[-((-1 + a^2*x^(2*n))*y[x]) + Derivative[2][y][x] == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x) = \mathit{DESol}\left(\left\{\frac{d^2}{dx^2}\_Y(x) + \left(-a^2x^{2\,n} + 1\right)\_Y(x)\right\}, \{\_Y(x)\}\right)\right\}$$

ODE No. 1016

$$y(x)\left(ax^{2c}+bx^{c-1}\right)+y''(x)=0$$

✓ **Mathematica** : cpu = 0.126869 (sec), leaf count = 312

$$\left\{\left\{y(x)\to 2^{\frac{c}{2(c+1)}}c_1\left(x^{c+1}\right)^{\frac{c}{2(c+1)}}x^{-c/2}e^{-\frac{\sqrt{a}x^{c+1}}{\sqrt{-c^2-2c-1}}}U\left(\frac{\frac{\sqrt{a}cb}{\sqrt{-(c+1)^2}}+\frac{\sqrt{a}b}{\sqrt{-(c+1)^2}}+ac}{2(ca+a)},\frac{c}{c+1},\frac{2\sqrt{a}x^{c+1}}{\sqrt{-c^2-2c-1}}\right)+\right.\right.$$

✓ **Maple** : cpu = 0.694 (sec), leaf count = 91

$$\left\{y(x)=x^{-\frac{c}{2}}\left(W_{\frac{-ib}{2\,c+2}\frac{1}{\sqrt{a}},\,(2\,c+2)^{-1}}\left(\frac{2\,ix^{c+1}}{c+1}\sqrt{a}\right)\_C2+M_{\frac{-ib}{2\,c+2}\frac{1}{\sqrt{a}},\,(2\,c+2)^{-1}}\left(\frac{2\,ix^{c+1}}{c+1}\sqrt{a}\right)\_C1\right)\right\}$$

ODE No. 1017

$$\left(e^{2x}-v^2\right)y(x)+y''(x)=0$$

✓ **Mathematica** : cpu = 0.0283699 (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 = 0.127 (sec), leaf count = 17

$$\{y(x)=\_C1\ J_v(\mathrm{e}^x)+\_C2\ Y_v(\mathrm{e}^x)\}$$

ODE No. 1018

$$ae^{bx}y(x)+y''(x)=0$$

✓ **Mathematica** : cpu = 0.0217165 (sec), leaf count = 55

$$\left\{\left\{y(x)\to c_1J_0\left(\frac{2\sqrt{a}\sqrt{e^{bx}}}{b}\right)+2c_2Y_0\left(\frac{2\sqrt{a}\sqrt{e^{bx}}}{b}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.086 (sec), leaf count = 39

$$\left\{y(x)=\_C1\ J_0\left(2\,\frac{\sqrt{a}\mathrm{e}^{1/2\,bx}}{b}\right)+\_C2\ Y_0\left(2\,\frac{\sqrt{a}\mathrm{e}^{1/2\,bx}}{b}\right)\right\}$$

ODE No. 1019

$$y''(x) - y(x)\left(4a^2b^2x^2e^{2bx^2} - 1\right) = 0$$

✗ **Mathematica** : cpu = 0.769507 (sec), leaf count = 0 , could not solve

```
DSolve[-((-1 + 4*a^2*b^2*E^(2*b*x^2)*x^2)*y[x]) + Derivative[2][y][x] == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x) = DESol\left(\left\{\frac{d^2}{dx^2}\_Y(x) + \left(-4\,a^2b^2x^2e^{2\,bx^2}+1\right)\_Y(x)\right\}, \{\_Y(x)\}\right)\right\}$$

ODE No. 1020

$$y(x)\left(ae^{2x} + be^x + c\right) + y''(x) = 0$$

✓ **Mathematica** : cpu = 0.694071 (sec), leaf count = 180

$$\left\{\left\{y(x) \to c_1 e^{i\left(\sqrt{c}\log(e^x)-\sqrt{a}e^x\right)} U\left(\frac{i\left(b - i\sqrt{a} + 2\sqrt{a}\sqrt{c}\right)}{2\sqrt{a}}, 2i\sqrt{c}+1, 2i\sqrt{a}e^x\right) + c_2 e^{i\left(\sqrt{c}\log(e^x)-\sqrt{a}e^x\right)} L^{2i\sqrt{c}}_{-\frac{i(b-i\sqrt{}}{}}\right.\right.$$

✓ **Maple** : cpu = 0.318 (sec), leaf count = 58

$$\left\{y(x) = e^{-\frac{x}{2}}\left(M_{-\frac{i}{2}b\frac{1}{\sqrt{a}}, i\sqrt{c}}\left(2\,i\sqrt{a}e^x\right)\_C1 + W_{-\frac{i}{2}b\frac{1}{\sqrt{a}}, i\sqrt{c}}\left(2\,i\sqrt{a}e^x\right)\_C2\right)\right\}$$

ODE No. 1021

$$y(x)\left(a\cos^2(x) + b\right) + y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0357327 (sec), leaf count = 44

$$\left\{\left\{y(x) \to c_1 \text{MathieuC}\left[\frac{1}{2}(a+2b), -\frac{a}{4}, x\right] + c_2 \text{MathieuS}\left[\frac{1}{2}(a+2b), -\frac{a}{4}, x\right]\right\}\right\}$$

✓ **Maple** : cpu = 0.612 (sec), leaf count = 39

$$\left\{y(x) = \_C1\ MathieuC\left(-\frac{a}{2} - b, \frac{a}{4}, ix\right) + \_C2\ MathieuS\left(-\frac{a}{2} - b, \frac{a}{4}, ix\right)\right\}$$

ODE No. 1022

$$y(x)(a\cos(2x)+b)+y''(x)=0$$

✓ **Mathematica** : cpu = 0.0281399 (sec), leaf count = 28

$$\left\{\left\{y(x)\to c_1\text{MathieuC}\left[b,-\frac{a}{2},x\right]+c_2\text{MathieuS}\left[b,-\frac{a}{2},x\right]\right\}\right\}$$

✓ **Maple** : cpu = 0.28 (sec), leaf count = 21

$$\left\{y(x)=\_C1\ \mathit{MathieuC}\left(b,-\frac{a}{2},x\right)+\_C2\ \mathit{MathieuS}\left(b,-\frac{a}{2},x\right)\right\}$$

ODE No. 1023

$$y(x)\left(a\cos^2(x)+b\right)+y''(x)=0$$

✓ **Mathematica** : cpu = 0.0155639 (sec), leaf count = 44

$$\left\{\left\{y(x)\to c_1\text{MathieuC}\left[\frac{1}{2}(a+2b),-\frac{a}{4},x\right]+c_2\text{MathieuS}\left[\frac{1}{2}(a+2b),-\frac{a}{4},x\right]\right\}\right\}$$

✓ **Maple** : cpu = 0.276 (sec), leaf count = 29

$$\left\{y(x)=\_C1\ \mathit{MathieuC}\left(\frac{a}{2}+b,-\frac{a}{4},x\right)+\_C2\ \mathit{MathieuS}\left(\frac{a}{2}+b,-\frac{a}{4},x\right)\right\}$$

ODE No. 1024

$$y''(x)-y(x)\left(2\tan^2(x)+1\right)=0$$

✓ **Mathematica** : cpu = 0.165155 (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 = 0.204 (sec), leaf count = 30

$$\left\{y(x)=\frac{i\cos(x)\sin(x)\_C2+\ln(\cos(x)+i\sin(x))\_C2+\_C1}{\cos(x)}\right\}$$

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 = 0.94065 (sec), leaf count = 615

$$\left\{\left\{y(x) \to \frac{c_2(-1)^{\frac{1}{2}(-2m-1)+1}\cos^2(x)^{\frac{1}{4}(-2m-1)+1}\left(\cos^2(x)-1\right)^{\frac{1}{2}\left(\frac{4am+4\sqrt{-a}n^2+4an-4\sqrt{-a}n+4(-a)^{3/2}+8\sqrt{-a}a+\sqrt{-a}+4mn}{8a+8n^2-8n+2}\right.}}{}\right.\right.$$

✓ **Maple** : cpu = 0.294 (sec), leaf count = 102

$$\left\{y(x) = (\sin(x))^n\left((\cos(x))^{-m+1}{}_2\mathrm{F}_1\left(\frac{n}{2}-\frac{m}{2}+\frac{i}{2}\sqrt{a}+\frac{1}{2},\frac{n}{2}-\frac{m}{2}-\frac{i}{2}\sqrt{a}+\frac{1}{2};\frac{3}{2}-m;(\cos(x))^2\right)\_C2\right.\right.$$

ODE No. 1026

$$y''(x) - y(x)(B + n(n+1)\wp(x;\mathrm{g2},\mathrm{g3})) = 0$$

✗ **Mathematica** : cpu = 0.171838 (sec), leaf count = 0 , could not solve

```
DSolve[-((B + n*(1 + n)*WeierstrassP[x, {g2, g3}])*y[x]) + Derivative[2][y][x] == 0, y
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x) = \mathit{DESol}\left(\left\{\frac{\mathrm{d}^2}{\mathrm{d}x^2}\_Y(x) + (-n(n+1)\,\mathit{WeierstrassP}(x,g2,g3) - B)\_Y(x)\right\},\{\_Y(x)\}\right)\right\}$$

ODE No. 1027

$$y(x)\left(a\,\mathrm{sn}(x|k)^2 + b\right) + y''(x) = 0$$

✗ **Mathematica** : cpu = 1.3509 (sec), leaf count = 0 , could not solve

```
DSolve[(b + a*JacobiSN[x, k]^2)*y[x] + Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 0.682 (sec), leaf count = 69

$$\left\{y(x) = \_C1\ \mathit{HeunG}\left(k^{-2},\frac{b}{4k^2},-\frac{n}{2},\frac{n}{2}+\frac{1}{2},\frac{1}{2},\frac{1}{2},(\mathit{JacobiSN}(x,k))^2\right) + \_C2\ \mathit{HeunG}\left(k^{-2},\frac{k^2+b+1}{4k^2},\right.\right.$$

ODE No. 1028

$$y''(x) - y(x)\left(ap(x) + b + \frac{p^4(x)}{30} + \frac{7p''(x)}{3}\right) = 0$$

✗ **Mathematica** : cpu = 0.247848 (sec), leaf count = 0 , could not solve

```
DSolve[-(y[x]*(b + a*p[x] + (p^4)[x]/30 + (7*Derivative[2][p][x])/3)) + Derivative[2][
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x) = DESol\left(\left\{\frac{d^2}{dx^2}\_Y(x) + \left(-\frac{\frac{d^4}{dx^4}p(x)}{30} - \frac{7\frac{d^2}{dx^2}p(x)}{3} - ap(x) - b\right)\_Y(x)\right\}, \{\_Y(x)\}\right)\right\}$$

ODE No. 1029

$$y''(x) - y(x)\left(f'(x) + f(x)^2\right) = 0$$

✗ **Mathematica** : cpu = 0.115703 (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 = 0.238 (sec), leaf count = 22

$$\left\{y(x) = \left(\int e^{\int -2f(x)\,dx}\,dx + \_C1\right)e^{\int f(x)\,dx}\_C2\right\}$$

ODE No. 1030

$$y(x)(l + P(x)) + y''(x) = 0$$

✗ **Mathematica** : cpu = 0.125131 (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

$$\left\{y(x) = DESol\left(\left\{(P(x) + l)\_Y(x) + \frac{d^2}{dx^2}\_Y(x)\right\}, \{\_Y(x)\}\right)\right\}$$

ODE No. 1031

$$y''(x) - f(x)y(x) = 0$$

✗ **Mathematica** : cpu = 0.0988783 (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

$$\left\{y(x) = DESol\left(\left\{-f(x)\_Y(x) + \frac{d^2}{dx^2}\_Y(x)\right\}, \{\_Y(x)\}\right)\right\}$$

ODE No. 1032

$$y(x)\left(\frac{\left(\frac{1}{4} - v^2\right)g'(x)^2}{g(x)} + g'(x)^2 + \frac{g^3(x)}{2g'(x)} - \frac{3g''(x)^2}{4g'(x)^2}\right) + y''(x) = 0$$

✗ **Mathematica** : cpu = 0.509698 (sec), leaf count = 0 , could not solve

```
DSolve[y[x]*((g^3)[x]/(2*Derivative[1][g][x]) + Derivative[1][g][x]^2 + ((1/4 - v^2)*D
```

✓ **Maple** : cpu = 0.192 (sec), leaf count = 48

$$\left\{y(x) = 1\left(\_C2\, W_{\frac{i}{2}v^2 - \frac{i}{8}, \frac{1}{2}}(2\,ig(x)) + \_C1\, M_{\frac{i}{2}v^2 - \frac{i}{8}, \frac{1}{2}}(2\,ig(x))\right)\frac{1}{\sqrt{\frac{d}{dx}g\,(x)}}\right\}$$

ODE No. 1033

$$ae^{-2x}y(x) + y''(x) + y'(x) = 0$$

✓ **Mathematica** : cpu = 0.0179062 (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 = 0.036 (sec), leaf count = 27

$$\left\{y(x) = \_C1\, \sin\left(e^{-x}\sqrt{a}\right) + \_C2\, \cos\left(e^{-x}\sqrt{a}\right)\right\}$$

Hand solution

$$y'' + y' + ae^{-2x}y = 0$$

Let $y(x) = \eta(\xi)$ where $\xi = e^{-x}$, hence

$$\begin{aligned}\frac{dy}{dx} &= \frac{d\eta}{d\xi}\frac{d\xi}{dx}\\ &= \frac{d\eta}{d\xi}\left(-e^{-x}\right)\end{aligned}$$

And

$$\begin{aligned}\frac{d^2y}{dx^2} &= \frac{d}{dx}\left(\frac{d\eta}{d\xi}\left(-e^{-x}\right)\right)\\ &= \frac{d^2\eta}{d\xi^2}\frac{d\xi}{dx}\left(-e^{-x}\right) + \frac{d\eta}{d\xi}\left(e^{-x}\right)\\ &= \frac{d^2\eta}{d\xi^2}\left(-e^{-x}\right)\left(-e^{-x}\right) + \frac{d\eta}{d\xi}\left(e^{-x}\right)\\ &= \frac{d^2\eta}{d\xi^2}\left(e^{-2x}\right) + \frac{d\eta}{d\xi}\left(e^{-x}\right)\end{aligned}$$

Hence the original ODE becomes

$$\begin{aligned}\frac{d^2\eta}{d\xi^2}\left(e^{-2x}\right) + \frac{d\eta}{d\xi}\left(e^{-x}\right) + \frac{d\eta}{d\xi}\left(-e^{-x}\right) + ae^{-2x}\eta(\xi) &= 0\\ \eta'' + a\eta &= 0\end{aligned}$$

This is standard second order with constant coefficients. The solution is

$$\eta = c_1 \cos\left(\sqrt{a}\xi\right) + c_2 \sin\left(\sqrt{a}\xi\right)$$

Substituting back

$$y(x) = c_1 \cos\left(\sqrt{a}e^{-x}\right) + c_2 \sin\left(\sqrt{a}e^{-x}\right)$$

Verification

```
restart;
ode:=diff(diff(y(x),x),x)+diff(y(x),x)+a*exp(-2*x)*y(x)=0;
ys:=_C1*cos(sqrt(a)*exp(-x))+_C2*sin(sqrt(a)*exp(-x));
odetest(y(x)=ys,ode);
0
```

ODE No. 1034

$$y''(x) - y'(x) + e^{2x}y(x) = 0$$

✓ **Mathematica** : cpu = 0.012128 (sec), leaf count = 20

$$\{\{y(x) \to c_2 \sin(e^x) + c_1 \cos(e^x)\}\}$$

✓ **Maple** : cpu = 0.013 (sec), leaf count = 15

$$\{y(x) = \_C1 \sin(e^x) + \_C2 \cos(e^x)\}$$

Hand solution

$$y'' - y' + e^{2x}y = 0$$

Let $y(x) = \eta(\xi)$ where $\xi = e^x$, hence

$$\begin{aligned}\frac{dy}{dx} &= \frac{d\eta}{d\xi}\frac{d\xi}{dx} \\ &= \frac{d\eta}{d\xi}e^x\end{aligned}$$

And

$$\begin{aligned}\frac{d^2y}{dx^2} &= \frac{d}{dx}\left(\frac{d\eta}{d\xi}e^x\right) \\ &= \frac{d^2\eta}{d\xi^2}\frac{d\xi}{dx}(e^x) + \frac{d\eta}{d\xi}(e^x) \\ &= \frac{d^2\eta}{d\xi^2}(e^x)(e^x) + \frac{d\eta}{d\xi}(e^x) \\ &= \frac{d^2\eta}{d\xi^2}(e^{2x}) + \frac{d\eta}{d\xi}(e^x)\end{aligned}$$

Hence the original ODE becomes

$$
\begin{aligned}
\frac{d^2\eta}{d\xi^2}\left(e^{2x}\right)+\frac{d\eta}{d\xi}\left(e^{x}\right)-\frac{d\eta}{d\xi}\left(e^{x}\right)+e^{2x}\eta=0\\
\eta''+\eta=0
\end{aligned}
$$

This is standard second order with constant coefficients. The solution is

$$
\eta=c_1\cos\left(\xi\right)+c_2\sin\left(\xi\right)
$$

Substituting back

$$
y(x)=c_1\cos\left(e^{x}\right)+c_2\sin\left(e^{x}\right)
$$

Verification

```
restart;
ode:=diff(diff(y(x),x),x)-diff(y(x),x)+exp(2*x)*y(x)=0;
ys:=_C1*cos(exp(x))+_C2*sin(exp(x));
odetest(y(x)=ys,ode);
0
```

ODE No. 1035

$$
ay'(x)+by(x)+y''(x)=0
$$

✓ **Mathematica** : cpu = 0.005776 (sec), leaf count = 58

$$
\left\{\left\{y(x)\to c_1e^{\frac{1}{2}x\left(-\sqrt{a^2-4b}-a\right)}+c_2e^{\frac{1}{2}x\left(\sqrt{a^2-4b}-a\right)}\right\}\right\}
$$

✓ **Maple** : cpu = 0.02 (sec), leaf count = 41

$$
\left\{y(x)=\_C1\,e^{-\frac{x}{2}\left(a-\sqrt{a^2-4\,b}\right)}+\_C2\,e^{-\frac{x}{2}\left(a+\sqrt{a^2-4\,b}\right)}\right\}
$$

ODE No. 1036

$$ay'(x) + by(x) - f(x) + y''(x) = 0$$

✓ **Mathematica** : cpu = 0.519657 (sec), leaf count = 207

$$\left\{\left\{y(x) \to e^{\frac{1}{2}x\left(\sqrt{a^2-4b}-a\right)} \int_1^x \frac{f(K[2]) \exp\left(\frac{1}{2}\left(-\sqrt{a^2-4b}-a\right) K[2] + aK[2]\right)}{\sqrt{a^2-4b}} dK[2] + e^{\frac{1}{2}x\left(-\sqrt{a^2-4b}-a\right)} \int_1^x\right.\right.$$

✓ **Maple** : cpu = 0.294 (sec), leaf count = 124

$$\left\{y(x) = \mathrm{e}^{-\frac{x}{2}\left(a-\sqrt{a^2-4b}\right)}\_C2 + \mathrm{e}^{-\frac{x}{2}\left(a+\sqrt{a^2-4b}\right)}\_C1 + 1\left(\int f(x)\, \mathrm{e}^{-\frac{x}{2}\left(-a+\sqrt{a^2-4b}\right)}\, \mathrm{d}x \mathrm{e}^{x\sqrt{a^2-4b}} - \int f(x)\, \mathrm{e}^{\frac{x}{2}\left(\right.}\right.\right.$$

ODE No. 1037

$$ay'(x) + y(x)\left(-\left(b^2x^2 + c\right)\right) + y''(x) = 0$$

✓ **Mathematica** : cpu = 0.03043 (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 = 0.172 (sec), leaf count = 64

$$\left\{y(x) = \mathrm{e}^{-\frac{x(bx+a)}{2}} x\left(U\left(\frac{a^2+12\,b+4\,c}{16\,b}, \frac{3}{2}, bx^2\right)\_C2 + M\left(\frac{a^2+12\,b+4\,c}{16\,b}, \frac{3}{2}, bx^2\right)\_C1\right)\right\}$$

ODE No. 1038

$$2ay'(x) + f(x)y(x) + y''(x) = 0$$

✗ **Mathematica** : cpu = 0.281092 (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

$$\left\{y(x) = DESol\left(\left\{f(x)\_Y(x) + 2\,a\frac{\mathrm{d}}{\mathrm{d}x}\_Y(x) + \frac{\mathrm{d}^2}{\mathrm{d}x^2}\_Y(x)\right\}, \{\_Y(x)\}\right)\right\}$$

ODE No. 1039

$$y''(x) + xy'(x) + y(x) = 0$$

✓ **Mathematica** : cpu = 0.0157572 (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 = 0.023 (sec), leaf count = 25

$$\left\{y(x) = \left(\mathit{Erf}\left(\frac{i}{2}\sqrt{2}x\right)\_C1 + \_C2\right)\left(e^{\frac{x^2}{2}}\right)^{-1}\right\}$$

ODE No. 1040

$$y''(x) + xy'(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 0.050529 (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 = 0.083 (sec), leaf count = 33

$$\left\{y(x) = \sqrt{\pi}\sqrt{2}e^{-\frac{x^2}{2}}\_C2 + x\left(\pi\_C2\ \mathit{Erf}\left(\frac{\sqrt{2}x}{2}\right) + \_C1\right)\right\}$$

ODE No. 1041

$$(n+1)y(x) + y''(x) + xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.0100881 (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 = 0.108 (sec), leaf count = 41

$$\left\{y(x) = e^{-\frac{x^2}{2}} x \left(M\left(-\frac{n}{2} + \frac{1}{2}, \frac{3}{2}, \frac{x^2}{2}\right)\_C1 + U\left(-\frac{n}{2} + \frac{1}{2}, \frac{3}{2}, \frac{x^2}{2}\right)\_C2\right)\right\}$$

ODE No. 1042

$$-ny(x)+y''(x)+xy'(x)=0$$

✓ **Mathematica** : cpu = 0.00852464 (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 = 0.119 (sec), leaf count = 41

$$\left\{y(x)=\mathrm{e}^{-\frac{x^2}{2}}x\left(U\left(\frac{n}{2}+1,\frac{3}{2},\frac{x^2}{2}\right)\_C2+M\left(\frac{n}{2}+1,\frac{3}{2},\frac{x^2}{2}\right)\_C1\right)\right\}$$

ODE No. 1043

$$y''(x)-xy'(x)+2y(x)=0$$

✓ **Mathematica** : cpu = 0.0570176 (sec), leaf count = 69

$$\left\{\left\{y(x)\to\frac{1}{4}c_2\left(\sqrt{2\pi}x^2\operatorname{erfi}\left(\frac{x}{\sqrt{2}}\right)-\sqrt{2\pi}\operatorname{erfi}\left(\frac{x}{\sqrt{2}}\right)-2e^{\frac{x^2}{2}}x\right)+c_1\left(x^2-1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.823 (sec), leaf count = 42

$$\left\{y(x)=2\,\mathrm{e}^{1/2\,x^2}\_C1\,x-(x-1)\,(1+x)\left(\sqrt{\pi}\sqrt{2}\mathit{erfi}\left(\frac{\sqrt{2}x}{2}\right)\_C1-\_C2\right)\right\}$$

Hand solution

$$y''-xy'+2y=0 \tag{1}$$

Second order with varying coefficient. Using power series, let $y=\sum_{n=0}^{\infty}c_n x^n$, hence

$$y'=\sum_{n=0}^{\infty}nc_n x^{n-1}=\sum_{n=1}^{\infty}nc_n x^{n-1}=\sum_{n=0}^{\infty}(n+1)\,c_{n+1}x^n$$
$$y''=\sum_{n=0}^{\infty}n(n+1)\,c_{n+1}x^{n-1}=\sum_{n=1}^{\infty}n(n+1)\,c_{n+1}x^{n-1}=\sum_{n=0}^{\infty}(n+1)\,(n+2)\,c_{n+2}x^n$$

Substituting back in the original ODE gives

$$\begin{aligned}
\sum_{n=0}^{\infty}(n+1)(n+2)c_{n+2}x^n - x\sum_{n=0}^{\infty}(n+1)c_{n+1}x^n + 2\sum_{n=0}^{\infty}c_nx^n &= 0\\
\sum_{n=0}^{\infty}(n+1)(n+2)c_{n+2}x^n - \sum_{n=0}^{\infty}(n+1)c_{n+1}x^{n+1} + \sum_{n=0}^{\infty}2c_nx^n &= 0\\
\sum_{n=0}^{\infty}(n+1)(n+2)c_{n+2}x^n - \sum_{n=1}^{\infty}nc_nx^n + \sum_{n=0}^{\infty}2c_nx^n &= 0
\end{aligned}$$

For $n=0$

$$\begin{aligned}
(n+1)(n+2)c_{n+2} + 2c_n &= 0\\
(1)(2)c_2 + 2c_0 &= 0\\
c_2 &= -c_0
\end{aligned}$$

For $n \geq 1$

$$\begin{aligned}
(n+1)(n+2)c_{n+2} - nc_n + 2c_n &= 0\\
c_{n+2} &= \frac{c_n(n-2)}{(n+1)(n+2)}
\end{aligned}$$

Hence for $n=1$

$$c_3 = \frac{-c_1}{(2)(3)}$$

For $n=2$

$$c_4 = \frac{c_2(2-2)}{(3)(4)} = 0$$

For $n=3$

$$c_5 = \frac{c_3}{(4)(5)} = \frac{-c_1}{(2)(3)(4)(5)}$$

For $n=4$ and since $c_4=0$ then

$$c_6 = \frac{c_4(n-2)}{(n+1)(n+2)} = 0$$

For $n=5$

$$c_7 = \frac{3c_5}{(6)(7)} = -\frac{3c_1}{(2)(3)(4)(5)(6)(7)}$$

For $n=6$ and since $c_6=0$ then

$$c_8 = \frac{c_6(n-2)}{(n+1)(n+2)} = 0$$

For $n = 7$

$$c_9 = \frac{5c_7}{(8)(9)} = -\frac{(3)(5)c_1}{(2)(3)(4)(5)(6)(7)(8)(9)}$$

And so on. Hence

$$\begin{aligned}
y &= \sum_{n=0}^{\infty} c_n x^n \\
&= c_0 + c_1 x + c_2 x^2 + c_3 x^3 + \cdots \\
&= c_0 + c_1 x - c_0 x^2 - \frac{c_1}{(2)(3)} x^3 - \frac{c_1}{(2)(3)(4)(5)} x^5 - \frac{3c_1}{(2)(3)(4)(5)(6)(7)} x^7 - \frac{(3)(5)c_1}{(2)(3)(4)(5)(6)(7)(8)(9} \\
&= c_0(1 - x^2) + c_1 \left(x - \frac{1}{(2)(3)} x^3 - \frac{1}{(2)(3)(4)(5)} x^5 - \frac{3}{(2)(3)(4)(5)(6)(7)} x^7 - \frac{(3)(5)}{(2)(3)(4)(5)(6)(7)(8} \right. \\
&= c_0(1 - x^2) + c_1 \left(x - \frac{1}{3!} x^3 - \frac{1}{5!} x^5 - \frac{3}{7!} x^7 - \frac{15}{9!} x^9 - \cdots \right)
\end{aligned}$$

Hence

$$y(x) = c_0(1 - x^2) + c_1 \left(x - \frac{1}{6} x^3 - \frac{1}{120} x^5 - \frac{1}{1680} x^7 - \frac{1}{24\,192} x^9 - \cdots \right)$$

Verification

```
restart;
Order:=10:
sol:=dsolve(ode,y(x),series):
subs({y(0)=c0,D(y)(0)=c1},rhs(sol)):
sol:=convert(%,polynom):

sol:=collect(sol,{c0,c1});
sol := (-x^2+1)*c0+(x-(1/6)*x^3-(1/120)*x^5-(1/1680)*x^7-(1/24192)*x^9)*c1
```

ODE No. 1044

$$-ay(x) + y''(x) - xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.00880111 (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 = 0.132 (sec), leaf count = 35

$$\left\{ y(x) = x \left(U\left(\frac{1}{2} + \frac{a}{2}, \frac{3}{2}, \frac{x^2}{2} \right) \_C2 + M\left(\frac{1}{2} + \frac{a}{2}, \frac{3}{2}, \frac{x^2}{2} \right) \_C1 \right) \right\}$$

ODE No. 1045

$$y''(x) - xy'(x) + (x-1)y(x) = 0$$

✓ **Mathematica** : cpu = 0.0353798 (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 = 0.013 (sec), leaf count = 21

$$\left\{y(x) = e^x \left(\mathit{Erf}\left(\frac{i}{2}\sqrt{2}(x-2)\right) \_C1 + \_C2 \right)\right\}$$

ODE No. 1046

$$ay(x) + y''(x) - 2xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.00722776 (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 = 0.12 (sec), leaf count = 31

$$\left\{y(x) = x \left(U\left(\frac{1}{2} - \frac{a}{4}, \frac{3}{2}, x^2\right) \_C2 + M\left(\frac{1}{2} - \frac{a}{4}, \frac{3}{2}, x^2\right) \_C1 \right)\right\}$$

ODE No. 1047

$$\left(4x^2 + 2\right) y(x) + y''(x) + 4xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.0141669 (sec), leaf count = 27

$$\left\{\left\{y(x) \to c_1 e^{-x^2} + c_2 e^{-x^2} x\right\}\right\}$$

✓ **Maple** : cpu = 0.063 (sec), leaf count = 16

$$\left\{y(x) = e^{-x^2} (\_C2 \, x + \_C1)\right\}$$

Hand solution

$$y'' + 4xy' + \left(4x^2 + 2\right) y = 0 \tag{1}$$

Second order with varying coefficient. Using power series, let $y = \sum_{n=0}^{\infty} c_n x^n$, hence

$$\begin{aligned}
y' &= \sum_{n=0}^{\infty} n c_n x^{n-1} = \sum_{n=1}^{\infty} n c_n x^{n-1} = \sum_{n=0}^{\infty} (n+1)\, c_{n+1} x^n \\
y'' &= \sum_{n=0}^{\infty} n(n+1)\, c_{n+1} x^{n-1} = \sum_{n=1}^{\infty} n(n+1)\, c_{n+1} x^{n-1} = \sum_{n=0}^{\infty} (n+1)\,(n+2)\, c_{n+2} x^n
\end{aligned}$$

Substituting back in the original ODE gives

$$\begin{aligned}
\sum_{n=0}^{\infty} (n+1)\,(n+2)\, c_{n+2} x^n + 4x \sum_{n=0}^{\infty} (n+1)\, c_{n+1} x^n + \left(4x^2 + 2\right) \sum_{n=0}^{\infty} c_n x^n &= 0 \\
\sum_{n=0}^{\infty} (n+1)\,(n+2)\, c_{n+2} x^n + \sum_{n=0}^{\infty} 4(n+1)\, c_{n+1} x^{n+1} + \sum_{n=0}^{\infty} 4 c_n x^{n+2} + \sum_{n=0}^{\infty} 2 c_n x^n &= 0 \\
\sum_{n=0}^{\infty} (n+1)\,(n+2)\, c_{n+2} x^n + \sum_{n=1}^{\infty} 4n c_n x^n + \sum_{n=2}^{\infty} 4 c_{n-2} x^n + \sum_{n=0}^{\infty} 2 c_n x^n &= 0
\end{aligned}$$

For $n = 0$

$$\begin{aligned}
(n+1)\,(n+2)\, c_{n+2} + 2 c_n &= 0 \\
(1)\,(2)\, c_2 + 2 c_0 &= 0 \\
c_2 &= -c_0
\end{aligned}$$

For $n = 1$

$$\begin{aligned}
(n+1)\,(n+2)\, c_{n+2} + 4n c_n + 2 c_n &= 0 \\
(2)\,(3)\, c_3 + 4 c_1 + 2 c_1 &= 0 \\
c_3 &= -c_1
\end{aligned}$$

For $n \geq 2$

$$\begin{aligned}
(n+1)\,(n+2)\, c_{n+2} + 4n c_n + 4 c_{n-2} + 2 c_n &= 0 \\
c_{n+2} &= \frac{(-4n - 2)\, c_n - 4 c_{n-2}}{(n+1)\,(n+2)}
\end{aligned}$$

Hence for $n = 2$

$$c_4 = \frac{(-8 - 2)\, c_2 - 4 c_0}{(3)\,(4)} = \frac{(-8 - 2)\,(-c_0) - 4 c_0}{(3)\,(4)} = c_0 \frac{6}{(3)\,(4)}$$

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
```

ODE No. 1048

$$\left(2n+3x^2-1\right)y(x)+y''(x)-4xy'(x)=0$$

✓ **Mathematica** : cpu = 0.0112138 (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 = 0.146 (sec), leaf count = 37

$$\left\{y(x)=\mathrm{e}^{\frac{x^2}{2}}x\left(U\left(-\frac{n}{2}+\frac{1}{2},\frac{3}{2},x^2\right)\_C2+M\left(-\frac{n}{2}+\frac{1}{2},\frac{3}{2},x^2\right)\_C1\right)\right\}$$

ODE No. 1049

$$\left(4x^2-1\right)y(x)+y''(x)-4xy'(x)-e^x=0$$

✓ **Mathematica** : cpu = 0.0702524 (sec), leaf count = 109

$$\left\{\left\{y(x)\to c_1e^{x(x-i)}-\frac{1}{2}ic_2e^{(x-i)x+2ix}+\frac{1}{4}\sqrt{\pi}e^{x(x-i)-\frac{i}{2}}\left(e^{2ix}\mathrm{erfi}\left(\left(\frac{1}{2}+\frac{i}{2}\right)-ix\right)-ie^{i}\mathrm{erf}\left(-x+\left(\frac{1}{2}+\frac{i}{2}\right.\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.322 (sec), leaf count = 66

$$\left\{y(x)=\frac{\left(\mathrm{e}^{\frac{i}{2}}\sqrt{\pi}(i\cos(x)+\sin(x))\,Erf\left(x-\frac{1}{2}-\frac{i}{2}\right)-(i\cos(x)-\sin(x))\,\mathrm{e}^{-\frac{i}{2}}\sqrt{\pi}Erf\left(x-\frac{1}{2}+\frac{i}{2}\right)+4\sin\right.}{4}\right.$$

ODE No. 1050

$$\left(4x^2-2\right)y(x)+y''(x)-4xy'(x)=0$$

✓ **Mathematica** : cpu = 0.012454 (sec), leaf count = 23

$$\left\{\left\{y(x)\to c_1e^{x^2}+c_2e^{x^2}x\right\}\right\}$$

✓ **Maple** : cpu = 0.055 (sec), leaf count = 14

$$\left\{y(x)=\mathrm{e}^{x^2}(\_C2\,x+\_C1)\right\}$$

ODE No. 1051

$$\left(4x^2-3\right)y(x)-e^{x^2}+y''(x)-4xy'(x)=0$$

✓ **Mathematica** : cpu = 0.0373374 (sec), leaf count = 44

$$\left\{\left\{y(x)\to c_1e^{(x-1)x}+\frac{1}{2}c_2e^{(x-1)x+2x}-e^{(x-1)x+x}\right\}\right\}$$

✓ **Maple** : cpu = 0.078 (sec), leaf count = 27

$$\left\{y(x)=\mathrm{e}^{x(1+x)}\_C2+\mathrm{e}^{x(x-1)}\_C1-\mathrm{e}^{x^2}\right\}$$

ODE No. 1052

$$axy'(x)+by(x)+y''(x)=0$$

✓ **Mathematica** : cpu = 0.0214657 (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 = 0.148 (sec), leaf count = 58

$$\left\{y(x)=\mathrm{e}^{-\frac{ax^2}{2}}x\left(U\left(\frac{2\,a-b}{2\,a},\frac{3}{2},\frac{ax^2}{2}\right)\_C2+M\left(\frac{2\,a-b}{2\,a},\frac{3}{2},\frac{ax^2}{2}\right)\_C1\right)\right\}$$

ODE No. 1053

$$a^2x^2y(x)+2axy'(x)+y''(x)=0$$

✓ **Mathematica** : cpu = 0.031293 (sec), leaf count = 57

$$\left\{\left\{y(x)\to c_1e^{-\frac{ax^2}{2}-\sqrt{a}x}+\frac{c_2e^{\sqrt{a}x-\frac{ax^2}{2}}}{2\sqrt{a}}\right\}\right\}$$

✓ **Maple** : cpu = 0.069 (sec), leaf count = 35

$$\left\{y(x)=\_C1\,\mathrm{e}^{-\frac{x}{2}\left(ax-2\sqrt{a}\right)}+\_C2\,\mathrm{e}^{-\frac{x}{2}\left(ax+2\sqrt{a}\right)}\right\}$$

ODE No. 1054

$$(ax+b)y'(x)+y(x)(cx+d)+y''(x)=0$$

✓ **Mathematica** : cpu = 0.0495998 (sec), leaf count = 172

$$\left\{\left\{y(x)\to c_1 e^{\frac{cx}{a}-\frac{ax^2}{2}-bx}H_{\frac{-a^3+da^2-bca+c^2}{a^3}}\left(\frac{ab-2c}{\sqrt{2}a^{3/2}}+\frac{\sqrt{a}x}{\sqrt{2}}\right)+c_2 e^{\frac{cx}{a}-\frac{ax^2}{2}-bx}\,{}_1F_1\left(-\frac{-a^3+da^2-bca+c^2}{2a^3};\frac{1}{2}\right.\right.\right.$$

✓ **Maple** : cpu = 0.073 (sec), leaf count = 98

$$\left\{y(x)=\mathrm{e}^{-\frac{cx}{a}}\left(U\left(\frac{da^2-abc+c^2}{2\,a^3},\frac{1}{2},-\frac{\left(a^2x+ab-2\,c\right)^2}{2\,a^3}\right)\_C2+M\left(\frac{da^2-abc+c^2}{2\,a^3},\frac{1}{2},-\frac{(a^2x+ab-}{2\,a^3}\right.\right.\right.$$

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 = 0.224492 (sec), leaf count = 421

$$\left\{\left\{y(x)\to c_1\exp\left(\frac{-bx\sqrt{a^2-4\mathrm{a1}}-\frac{1}{2}ax^2\sqrt{a^2-4\mathrm{a1}}-\frac{1}{2}a^2x^2-abx+2\mathrm{a1}x^2+2\mathrm{b1}x}{2\sqrt{a^2-4\mathrm{a1}}}\right)H_{\frac{-a^3+2\mathrm{c1}a^2-\sqrt{a^2-4\mathrm{a1}}}{}}\right.\right.$$

✓ **Maple** : cpu = 0.279 (sec), leaf count = 262

$$\left\{y(x)=\left(\_C2\,\left(a^2x+ab-4\,a1\,x-2\,b1\right)\,{}_1\mathrm{F}_1(\frac{1}{4}\left(3\,\left(a^2-4\,a1\right)^{3/2}+a^3-2\,a^2c1+\left(2\,b1\,b-4\,a1\right)a+(\right.\right.\right.$$

ODE No. 1056

$$x^2(-y'(x))+y''(x)+xy(x)=0$$

✓ **Mathematica** : cpu = 0.0519001 (sec), leaf count = 66

$$\left\{\left\{y(x)\to c_1x-\frac{c_2\left(3e^{\frac{x^3}{3}}\left(-x^3\right)^{2/3}+3^{2/3}x^3\Gamma\left(\frac{2}{3},-\frac{x^3}{3}\right)\right)}{3\left(-x^3\right)^{2/3}}\right\}\right\}$$

✓ **Maple** : cpu = 0.239 (sec), leaf count = 47

$$\left\{y(x)=\frac{1}{x^2}\left(\mathrm{e}^{\frac{x^3}{3}}\left(-x^3\right)^{\frac{2}{3}}\sqrt[3]{3}\_C2+x^3\left(-\_C2\,\Gamma\left(\frac{2}{3}\right)+\_C2\,\Gamma\left(\frac{2}{3},-\frac{x^3}{3}\right)+\_C1\right)\right)\right\}$$

ODE No. 1057

$$x^2(-y'(x)) + y''(x) - (x+1)^2 y(x) = 0$$

✓ **Mathematica** : cpu = 0.954408 (sec), leaf count = 55

$$\left\{\left\{y(x) \to c_2 e^{\frac{x^3}{3}+x} \int_1^x e^{-\frac{1}{3}K[1]^3-2K[1]}\, dK[1] + c_1 e^{\frac{x^3}{3}+x}\right\}\right\}$$

✓ **Maple** : cpu = 0.924 (sec), leaf count = 50

$$\left\{y(x) = \_C1\ HeunT\left(0, -3, 2\sqrt[3]{3}, \frac{3^{\frac{2}{3}}x}{3}\right) \mathrm{e}^{-x} + \_C2\ HeunT\left(0, 3, 2\sqrt[3]{3}, -\frac{3^{\frac{2}{3}}x}{3}\right) \mathrm{e}^{\frac{x\left(x^2+3\right)}{3}}\right\}$$

ODE No. 1058

$$\left(x^4-2\right) xy(x) - (x+1)x^2 y'(x) + y''(x) = 0$$

✓ **Mathematica** : cpu = 1.01624 (sec), leaf count = 55

$$\left\{\left\{y(x) \to c_2 e^{\frac{x^3}{3}} \int_1^x e^{\frac{K[1]^4}{4}-\frac{K[1]^3}{3}}\, dK[1] + c_1 e^{\frac{x^3}{3}}\right\}\right\}$$

✓ **Maple** : cpu = 0.185 (sec), leaf count = 29

$$\left\{y(x) = \mathrm{e}^{\frac{x^3}{3}}\left(\int \mathrm{e}^{\frac{x^4}{4}-\frac{x^3}{3}}\, \mathrm{d}x\_C2 + \_C1\right)\right\}$$

ODE No. 1059

$$x^4 y'(x) - x^3 y(x) + y''(x) = 0$$

✓ **Mathematica** : cpu = 0.069901 (sec), leaf count = 72

$$\left\{\left\{y(x) \to c_1 x - \frac{c_2 e^{-\frac{x^5}{5}}\left(5(x^5)^{4/5} - 5^{4/5} e^{\frac{x^5}{5}} x^5 \Gamma\left(\frac{4}{5}, \frac{x^5}{5}\right)\right)}{5\left(x^5\right)^{4/5}}\right\}\right\}$$

✓ **Maple** : cpu = 0.131 (sec), leaf count = 56

$$\left\{y(x) = \frac{1}{x^7}\left(9\_C2\,\mathrm{e}^{-1/10\,x^5}\left(x^5+4\right) M_{7/5,\,\frac{9}{10}}\left(1/5\,x^5\right) + x^8\left(x^2\_C2\,\mathrm{e}^{-\frac{x^5}{10}} M_{\frac{2}{5},\,\frac{9}{10}}\left(\frac{x^5}{5}\right) + \_C1\right)\right)\right\}$$

ODE No. 1060

$$ax^{q-1}y'(x)+bx^{q-2}y(x)+y''(x)=0$$

✓ **Mathematica** : cpu = 0.0372213 (sec), leaf count = 83

$$\left\{\left\{y(x)\to c_2q^{-1/q}a^{\frac{1}{q}}\left(x^q\right)^{\frac{1}{q}}\ {}_1F_1\left(\frac{b}{aq}+\frac{1}{q};1+\frac{1}{q};-\frac{ax^q}{q}\right)+c_1\,{}_1F_1\left(\frac{b}{aq};1-\frac{1}{q};-\frac{ax^q}{q}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.244 (sec), leaf count = 81

$$\left\{y(x)=\mathrm{e}^{-\frac{ax^q}{q}}x\left(U\left(\frac{aq-b}{aq},\frac{q+1}{q},\frac{ax^q}{q}\right)\_C2+M\left(\frac{aq-b}{aq},\frac{q+1}{q},\frac{ax^q}{q}\right)\_C1\right)\right\}$$

ODE No. 1061

$$-e^{-\frac{x^{3/2}}{3}}x+y''(x)+\sqrt{x}y'(x)+\left(\frac{x}{4}+\frac{1}{4\sqrt{x}}-9\right)y(x)=0$$

✓ **Mathematica** : cpu = 0.0969658 (sec), leaf count = 70

$$\left\{\left\{y(x)\to c_1e^{-\frac{1}{3}(\sqrt{x}+9)x}+\frac{1}{6}c_2e^{6x-\frac{1}{3}(\sqrt{x}+9)x}-\frac{1}{9}e^{3x-\frac{1}{3}(\sqrt{x}+9)x}x\right\}\right\}$$

✓ **Maple** : cpu = 0.229 (sec), leaf count = 28

$$\left\{y(x)=-\frac{-9\cosh(3x)\_C1-9\sinh(3x)\_C2+x}{9}\mathrm{e}^{-\frac{1}{3}x^{\frac{3}{2}}}\right\}$$

ODE No. 1062

$$\frac{\left(x+\sqrt{x}-8\right)y(x)}{4x^2}+y''(x)-\frac{y'(x)}{\sqrt{x}}=0$$

✓ **Mathematica** : cpu = 0.0282231 (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 = 0.034 (sec), leaf count = 19

$$\left\{y(x)=\frac{\_C2\,x^3+\_C1}{x}\mathrm{e}^{\sqrt{x}}\right\}$$

ODE No. 1063

$$y''(x) - (2e^x + 1)\,y'(x) + e^{2x}y(x) - e^{3x} = 0$$

✓ **Mathematica** : cpu = 0.0487726 (sec), leaf count = 28

$$\left\{\left\{y(x) \to c_1 e^{e^x} + c_2 e^{x+e^x} + e^x + 2\right\}\right\}$$

✓ **Maple** : cpu = 0.399 (sec), leaf count = 61

$$\left\{y(x) = \left(\_C1\ \cosh\left(\frac{x}{2}\right) + \_C2\ \sinh\left(\frac{x}{2}\right)\right) e^{e^x + \frac{x}{2}} + \left(\left(e^{2x} + e^x + 1\right)\cosh\left(\frac{x}{2}\right) - 3\ \sinh\left(x/2\right)\left(e^x + 1/3\right.\right.\right.$$

ODE No. 1064

$$ay'(x) + by(x) + y''(x) + \tan(x) = 0$$

✓ **Mathematica** : cpu = 0.648948 (sec), leaf count = 1400

$$\left\{\left\{y(x) \to e^{\frac{1}{2}\left(-a-\sqrt{a^2-4b}\right)x}c_1 + e^{\frac{1}{2}\left(\sqrt{a^2-4b}-a\right)x}c_2 + \frac{8\left(2\,{}_2F_1\left(1, \frac{1}{4}i\left(\sqrt{a^2-4b}-a\right); \frac{1}{4}i\left(\sqrt{a^2-4b}-a\right)+1; -\right.\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.576 (sec), leaf count = 125

$$\left\{y(x) = e^{-\frac{x}{2}\left(a-\sqrt{a^2-4\,b}\right)}\_C2 + e^{-\frac{x}{2}\left(a+\sqrt{a^2-4\,b}\right)}\_C1 - 1\left(\int \tan\left(x\right) e^{-\frac{x}{2}\left(-a+\sqrt{a^2-4\,b}\right)}\,dx e^{x\sqrt{a^2-4\,b}} - \int \tan\left(x\right.\right.\right.$$

ODE No. 1065

$$\left(n^2 - a^2\right)y(x) + 2n\cot(x)y'(x) + y''(x) = 0$$

✓ **Mathematica** : cpu = 0.160593 (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 = 0.353 (sec), leaf count = 60

$$\left\{y(x) = \left(\sin\left(x\right)\right)^{-n+\frac{1}{2}}\left(LegendreQ\left(-\frac{1}{2} + \sqrt{-a^2 + 2\,n^2}, n - \frac{1}{2}, \cos\left(x\right)\right)\_C2 + LegendreP\left(-\frac{1}{2} + \sqrt{-a\right.\right.\right.$$

ODE No. 1066

$$y''(x) + \tan(x)y'(x) + y(x)\cos^2(x) = 0$$

✓ **Mathematica** : cpu = 0.0347814 (sec), leaf count = 18

$$\{\{y(x) \to c_2 \sin(\sin(x)) + c_1 \cos(\sin(x))\}\}$$

✓ **Maple** : cpu = 0.108 (sec), leaf count = 15

$$\{y(x) = \_C1\ \sin(\sin(x)) + \_C2\ \cos(\sin(x))\}$$

ODE No. 1067

$$y''(x) + \tan(x)y'(x) - y(x)\cos^2(x) = 0$$

✓ **Mathematica** : cpu = 0.0330717 (sec), leaf count = 21

$$\{\{y(x) \to c_1 \cosh(\sin(x)) + ic_2 \sinh(\sin(x))\}\}$$

✓ **Maple** : cpu = 0.062 (sec), leaf count = 17

$$\left\{y(x) = \_C1\ \mathrm{e}^{\sin(x)} + \_C2\ \mathrm{e}^{-\sin(x)}\right\}$$

ODE No. 1068

$$v(v+1)y(x) + y''(x) + \cot(x)y'(x) = 0$$

✓ **Mathematica** : cpu = 0.150224 (sec), leaf count = 20

$$\{\{y(x) \to c_1 P_v(\cos(x)) + c_2 Q_v(\cos(x))\}\}$$

✓ **Maple** : cpu = 0.462 (sec), leaf count = 45

$$\left\{y(x) = \_C1\ {}_2\mathrm{F}_1(-\frac{v}{2}, \frac{1}{2} + \frac{v}{2}; \frac{1}{2}; (\cos(x))^2) + \_C2\ \cos(x)\, {}_2\mathrm{F}_1(1 + \frac{v}{2}, \frac{1}{2} - \frac{v}{2}; \frac{3}{2}; (\cos(x))^2)\right\}$$

ODE No. 1069

$$y''(x) - \cot(x)y'(x) + y(x)\sin^2(x) = 0$$

✓ **Mathematica** : cpu = 0.0365749 (sec), leaf count = 19

$$\{\{y(x) \to c_1 \cos(\cos(x)) - c_2 \sin(\cos(x))\}\}$$

✓ **Maple** : cpu = 0.128 (sec), leaf count = 15

$$\{y(x) = \_C1 \ \sin(\cos(x)) + \_C2 \ \cos(\cos(x))\}$$

ODE No. 1070

$$a\tan(x)y'(x) + by(x) + y''(x) = 0$$

✓ **Mathematica** : cpu = 0.321752 (sec), leaf count = 143

$$\left\{\left\{y(x) \to c_1\, {}_2F_1\left(-\frac{a}{4} - \frac{1}{4}\sqrt{a^2+4b}, \frac{1}{4}\sqrt{a^2+4b} - \frac{a}{4}; \frac{1}{2} - \frac{a}{2}; \cos^2(x)\right) + i^{a+1} c_2 \cos^{a+1}(x)\, {}_2F_1\left(\frac{a}{4} - \frac{1}{4}\sqrt{a^2\right.\right.\right.$$

✓ **Maple** : cpu = 0.24 (sec), leaf count = 60

$$\left\{y(x) = (\cos(x))^{\frac{1}{2}+\frac{a}{2}} \left(\mathit{LegendreP}\left(\frac{1}{2}\sqrt{a^2+4\,b} - \frac{1}{2}, \frac{1}{2} + \frac{a}{2}, \sin(x)\right) \_C1 + \mathit{LegendreQ}\left(\frac{1}{2}\sqrt{a^2+4\,b} - \frac{1}{2}\right.\right.\right.$$

ODE No. 1071

$$\left(b^2 - a^2\right) y(x) + 2a\cot(ax)y'(x) + y''(x) = 0$$

✓ **Mathematica** : cpu = 0.107492 (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 = 0.132 (sec), leaf count = 24

$$\left\{y(x) = \frac{\_C1 \ \sin(bx) + \_C2 \ \cos(bx)}{\sin(ax)}\right\}$$

ODE No. 1072

$$y(x)\left(-4anp(x)^2+a+bp(x)\right)+ap''(x)y'(x)+y''(x)=0$$

✗ **Mathematica** : cpu = 0.265594 (sec), leaf count = 0 , could not solve

```
DSolve[(a + b*p[x] - 4*a*n*p[x]^2)*y[x] + a*Derivative[1][y][x]*Derivative[2][p][x] +
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x)=DESol\left(\left\{\frac{\mathrm{d}^2}{\mathrm{d}x^2}\_Y(x)+a\left(\frac{\mathrm{d}^2}{\mathrm{d}x^2}p(x)\right)\frac{\mathrm{d}}{\mathrm{d}x}\_Y(x)+\left(a+bp(x)-4\,na(p(x))^2\right)\_Y(x)\right\},\{\_Y(x)\right.\right.$$

ODE No. 1073

$$\frac{y'(x)\left(-\wp(x;a,b)\wp'(x;a,b)+\wp(x;a,b)^3-6\wp(x;a,b)^2+\frac{a}{2}\right)}{\wp'(x;a,b)-\wp(x;a,b)^2}+\frac{y(x)\left(\wp(x;a,b)^2(-\wp'(x;a,b))-(6\wp(x;a,b)^2\right.}{\wp(x;a,b)^2+\wp'(x;}$$

✗ **Mathematica** : cpu = 1.30403 (sec), leaf count = 0 , could not solve

```
DSolve[((-(WeierstrassP[x, {a, b}]*(-a/2 + 6*WeierstrassP[x, {a, b}]^2)) - Weierstrass
WeierstrassP[x, {a, b}]^2 + WeierstrassPPrime[x, {a, b}]) + Derivative[2][y][x] == 0,
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x)=DESol\left(\left\{\frac{\mathrm{d}^2}{\mathrm{d}x^2}\_Y(x)+\frac{\frac{\mathrm{d}}{\mathrm{d}x}\_Y(x)}{WeierstrassPPrime\,(x,a,b)+(WeierstrassP\,(x,a,b))^2}\left(11\,Weierstrass\right.\right.\right.\right.$$

ODE No. 1074

$$\frac{k^2\mathrm{cn}(x|k)\mathrm{sn}(x|k)y'(x)}{\mathrm{dn}(x|k)}+n^2y(x)\mathrm{dn}(x|k)^2+y''(x)=0$$

✗ **Mathematica** : cpu = 49.8571 (sec), leaf count = 0 , could not solve

```
DSolve[n^2*JacobiDN[x, k]^2*y[x] + (k^2*JacobiCN[x, k]*JacobiSN[x, k]*Derivative[1][y]
```

✓ **Maple** : cpu = 0.107 (sec), leaf count = 21

$$\{y(x)=\_C1\,\sin(nJacobiAM(x,k))+\_C2\,\cos(nJacobiAM(x,k))\}$$

ODE No. 1075

$$f(x)y'(x) + g(x)y(x) + y''(x) = 0$$

✗ **Mathematica** : cpu = 0.181506 (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

$$\left\{y(x) = DESol\left(\left\{g(x)\_Y(x) + f(x)\frac{d}{dx}\_Y(x) + \frac{d^2}{dx^2}\_Y(x)\right\}, \{\_Y(x)\}\right)\right\}$$

ODE No. 1076

$$y(x)\left(a + f'(x)\right) + f(x)y'(x) - g(x) + y''(x) = 0$$

✗ **Mathematica** : cpu = 0.199431 (sec), leaf count = 0 , could not solve

```
DSolve[-g[x] + y[x]*(a + Derivative[1][f][x]) + f[x]*Derivative[1][y][x] + Derivative[
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x) = DESol\left(\left\{\frac{d^2}{dx^2}\_Y(x) + f(x)\frac{d}{dx}\_Y(x) + \left(\frac{d}{dx}f(x) + a\right)\_Y(x) - g(x)\right\}, \{\_Y(x)\}\right)\right\}$$

ODE No. 1077

$$y'(x)(af(x) + b) + y(x)(cf(x) + d) + y''(x) = 0$$

✗ **Mathematica** : cpu = 0.295843 (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
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x) = DESol\left(\left\{\frac{d^2}{dx^2}\_Y(x) + (af(x) + b)\frac{d}{dx}\_Y(x) + (cf(x) + d)\_Y(x)\right\}, \{\_Y(x)\}\right)\right\}$$

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 = 0.0688608 (sec), leaf count = 74

$$\left\{\left\{y(x)\to c_1e^{-\frac{1}{2}\int_1^x f(K[1])\,dK[1]-i\sqrt{a}x}-\frac{ic_2e^{-\frac{1}{2}\int_1^x f(K[1])\,dK[1]+i\sqrt{a}x}}{2\sqrt{a}}\right\}\right\}$$

✓ **Maple** : cpu = 0.059 (sec), leaf count = 33

$$\left\{y(x)=\mathrm{e}^{-\frac{\int f(x)\,\mathrm{d}x}{2}}\left(\sinh\left(\sqrt{-a}x\right)\_C1+\cosh\left(\sqrt{-a}x\right)\_C2\right)\right\}$$

ODE No. 1079

$$by(x)f(x)^{2a}-\frac{af'(x)y'(x)}{f(x)}+y''(x)=0$$

✓ **Mathematica** : cpu = 0.258272 (sec), leaf count = 307

$$\left\{\left\{y(x)\to-\frac{\sqrt{c_1}\exp\left(-c_2-\int_1^x-i\sqrt{b}f(K[1])^a\,dK[1]\right)\left(-1+\exp\left(2c_2+2\int_1^x-i\sqrt{b}f(K[1])^a\,dK[1]\right)\right)}{\sqrt{2}}\right.\right.$$

✓ **Maple** : cpu = 0.03 (sec), leaf count = 37

$$\left\{y(x)=\_C1\,\mathrm{e}^{\int i(f(x))^a\sqrt{b}\,\mathrm{d}x}+\_C2\,\mathrm{e}^{-\int i(f(x))^a\sqrt{b}\,\mathrm{d}x}\right\}$$

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 = 0.287391 (sec), leaf count = 0 , could not solve

```
DSolve[y[x]*(a^2 - b^2*f[x]^2 + (a*Derivative[1][f][x])/f[x]) - (2*a + Derivative[1][f
```

✓ **Maple** : cpu = 0.389 (sec), leaf count = 74

$$\left\{y(x)=\mathrm{e}^{\int-1\left(\frac{f(x)\left(\mathrm{e}^{\_C1\,b}\right)^2b}{\left(\mathrm{e}^{\int f(x)\,\mathrm{d}xb}\right)^2}+bf(x)-\frac{\left(\mathrm{e}^{\_C1\,b}\right)^2a}{\left(\mathrm{e}^{\int f(x)\,\mathrm{d}xb}\right)^2}+a\right)\left(\frac{\left(\mathrm{e}^{\_C1\,b}\right)^2}{\left(\mathrm{e}^{\int f(x)\,\mathrm{d}xb}\right)^2}-1\right)^{-1}\mathrm{d}x}\_C2\right\}$$

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 = 0.758018 (sec), leaf count = 0 , could not solve

```
DSolve[-((a^2*y[x]*Derivative[1][f][x]^2)/(b^2 + f[x]^2)) + (f[x]*(f^3)[x]*Derivative[
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x)=DESol\left(\left\{\frac{d^2}{dx^2}\_Y(x)+\frac{f(x)\left(\frac{d^3}{dx^3}f(x)\right)\frac{d}{dx}\_Y(x)}{(f(x))^2+b^2}-\frac{\left(\frac{d}{dx}f(x)\right)^2a^2\_Y(x)}{(f(x))^2+b^2}\right\},\{\_Y(x)\}\right)\right\}$$

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 = 0.50401 (sec), leaf count = 0 , could not solve

```
DSolve[y[x]*(Derivative[1][g][x]^2 + ((m^2 - v^2)*Derivative[1][g][x]^2)/g[x]) - Deriv
1 + 2*m)*Derivative[1][g][x])/g[x] + Derivative[2][g][x]/Derivative[1][g][x]) + Deriva
```

✓ **Maple** : cpu = 0.24 (sec), leaf count = 74

$$\left\{y(x)=(g(x))^{2m}e^{-ig(x)}\left(U\left(\frac{i}{2}m^2-\frac{i}{2}v^2+m+\frac{1}{2},\,1+2m,\,2ig(x)\right)\_C2+M\left(\frac{i}{2}m^2-\frac{i}{2}v^2+m+\frac{1}{2},\,1\right.\right.\right.$$

ODE No. 1083

$$-\frac{f'(x)y'(x)}{f(x)}+y(x)\left(-\frac{f''(x)}{2f(x)}+\frac{3f'(x)^2}{4f(x)^2}+\frac{\left(\frac{1}{4}-v^2\right)g'(x)^2}{g(x)^2}+g'(x)^2+\frac{g^3(x)}{2g'(x)}-\frac{3g''(x)^2}{4g'(x)^2}\right)+y''(x)=0$$

✗ **Mathematica** : cpu = 0.84092 (sec), leaf count = 0 , could not solve

```
DSolve[-((Derivative[1][f][x]*Derivative[1][y][x])/f[x]) + y[x]*((3*Derivative[1][f][x
```

✓ **Maple** : cpu = 0.159 (sec), leaf count = 31

$$\left\{y(x)=\sqrt{\frac{f(x)g(x)}{\frac{d}{dx}g(x)}}(Y_v(g(x))\_C2+J_v(g(x))\_C1)\right\}$$

ODE No. 1084

$$-y'(x)\left(\frac{2f'(x)}{f(x)}-\frac{g'(x)}{g(x)}+\frac{g''(x)}{g'(x)}\right)+y(x)\left(-\frac{f''(x)}{f(x)}+\frac{f'(x)\left(\frac{2f'(x)}{f(x)}-\frac{g'(x)}{g(x)}+\frac{g''(x)}{g'(x)}\right)}{f(x)}-\frac{v^2g'(x)^2}{g(x)^2}+g'(x)^2\right)$$

✗ **Mathematica** : cpu = 0.840795 (sec), leaf count = 0 , could not solve

```
DSolve[-(Derivative[1][y][x]*((2*Derivative[1][f][x])/f[x] - Derivative[1][g][x]/g[x]
```

✓ **Maple** : cpu = 0.122 (sec), leaf count = 20

$$\{y(x)=f(x)\left(Y_v(g(x))\_C2+J_v(g(x))\_C1\right)\}$$

ODE No. 1085

$$-y'(x)\left(\frac{(2v-1)g'(x)}{g(x)}+\frac{g''(x)}{g'(x)}+\frac{2h'(x)}{h(x)}\right)+y(x)\left(g'(x)^2+\frac{h'(x)\left(\frac{(2v-1)g'(x)}{g(x)}+\frac{g''(x)}{g'(x)}+\frac{2h'(x)}{h(x)}\right)}{h(x)}-\frac{h''(x)}{h(x)}\right)$$

✗ **Mathematica** : cpu = 0.897719 (sec), leaf count = 0 , could not solve

```
DSolve[-(Derivative[1][y][x]*(((-1 + 2*v)*Derivative[1][g][x])/g[x] + (2*Derivative[1]
1 + 2*v)*Derivative[1][g][x])/g[x] + (2*Derivative[1][h][x])/h[x] + Derivative[2][g][x
```

✓ **Maple** : cpu = 0.101 (sec), leaf count = 24

$$\{y(x)=h(x)\,(g(x))^v\left(Y_v(g(x))\_C2+J_v(g(x))\_C1\right)\}$$

ODE No. 1086

$$4y''(x)+9xy(x)=0$$

✓ **Mathematica** : cpu = 0.00524867 (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 = 0.056 (sec), leaf count = 29

$$\left\{y(x)=\_C1\ \text{Ai}\left(-\frac{3^{\frac{2}{3}}\sqrt[3]{2}x}{2}\right)+\_C2\ \text{Bi}\left(-\frac{3^{\frac{2}{3}}\sqrt[3]{2}x}{2}\right)\right\}$$

ODE No. 1087

$$4y''(x) - (a + x^2)\, y(x) = 0$$

✓ **Mathematica** : cpu = 0.00871919 (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 = 0.147 (sec), leaf count = 33

$$\left\{y(x) = 1\left(\_C2\, W_{-\frac{a}{8},\, \frac{1}{4}}\left(\frac{x^2}{2}\right) + \_C1\, M_{-\frac{a}{8},\, \frac{1}{4}}\left(\frac{x^2}{2}\right)\right)\frac{1}{\sqrt{x}}\right\}$$

ODE No. 1088

$$4y''(x) + 4\tan(x) y'(x) + y(x)\left(-\left(5\tan^2(x) + 2\right)\right) = 0$$

✓ **Mathematica** : cpu = 0.109282 (sec), leaf count = 180

$$\left\{\left\{y(x) \to -\frac{(-1)^{7/8} 2^{5/8} c_1}{\sqrt[8]{-8\cos^2(2x) - 16\cos(2x) - 8}} + \frac{3(-1)^{5/8} c_2 \left(4\sqrt[4]{-1}2^{3/4}\sinh^{-1}\left(\frac{1}{2}\sqrt[4]{-\frac{1}{2}}\sqrt[4]{-8\cos^2(2x) - 1\right.\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.17 (sec), leaf count = 31

$$\left\{y(x) = \left(i\cos(x)\sin(x)\_C2 - \ln(\sin(x) + i\cos(x))\_C2 + \_C1\right)\frac{1}{\sqrt{\cos(x)}}\right\}$$

ODE No. 1089

$$-y'(x)(ab + c + x) + ay''(x) + y(x)(b(c + x) + d) = 0$$

✓ **Mathematica** : cpu = 0.0467507 (sec), leaf count = 99

$$\left\{\left\{y(x) \to c_1 e^{bx} H_d\left(\frac{x}{\sqrt{2}\sqrt{a}} - \frac{ab - c}{\sqrt{2}\sqrt{a}}\right) + c_2 e^{bx}\, {}_1F_1\left(-\frac{d}{2}; \frac{1}{2}; \left(\frac{x}{\sqrt{2}\sqrt{a}} - \frac{ab - c}{\sqrt{2}\sqrt{a}}\right)^2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.07 (sec), leaf count = 58

$$\left\{y(x) = e^{bx}\left(U\left(-\frac{d}{2}, \frac{1}{2}, \frac{(ab - c - x)^2}{2\,a}\right)\_C2 + M\left(-\frac{d}{2}, \frac{1}{2}, \frac{(ab - c - x)^2}{2\,a}\right)\_C1\right)\right\}$$

ODE No. 1090

$$a\left(a^2-2be^{-ax}\right)y'(x)+a^2y''(x)+b^2e^{-2ax}y(x)=0$$

✓ **Mathematica** : cpu = 0.0351843 (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 = 0.098 (sec), leaf count = 40

$$\left\{y(x)=\mathrm{e}^{-\frac{a^3x+2\,be^{-ax}}{2\,a^2}}\left(\cosh\left(\frac{ax}{2}\right)\_C2+\sinh\left(\frac{ax}{2}\right)\_C1\right)\right\}$$

ODE No. 1091

$$x(y''(x)+y(x))-\cos(x)=0$$

✓ **Mathematica** : cpu = 0.0311333 (sec), leaf count = 41

$$\left\{\left\{y(x)\to c_2\sin(x)+c_1\cos(x)+\frac{1}{2}(\mathrm{Ci}(2x)\sin(x)-\mathrm{Si}(2x)\cos(x)+\log(x)\sin(x))\right\}\right\}$$

✓ **Maple** : cpu = 0.056 (sec), leaf count = 35

$$\left\{y(x)=\frac{\sin(x)\,Ci(2\,x)}{2}-\frac{Si(2\,x)\cos(x)}{2}+\frac{(2\_C2+\ln(x))\sin(x)}{2}+\cos(x)\_C1\right\}$$

ODE No. 1092

$$(a+x)y(x)+xy''(x)=0$$

✓ **Mathematica** : cpu = 0.0963399 (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 = 0.116 (sec), leaf count = 29

$$\left\{y(x)=\_C1\;M_{-\frac{i}{2}a,\,\frac{1}{2}}(2\,ix)+\_C2\;W_{-\frac{i}{2}a,\,\frac{1}{2}}(2\,ix)\right\}$$

ODE No. 1093

$$xy''(x) + y'(x) = 0$$

✓ **Mathematica** : cpu = 0.00569504 (sec), leaf count = 13

$$\{\{y(x) \to c_1 \log(x) + c_2\}\}$$

✓ **Maple** : cpu = 0.021 (sec), leaf count = 10

$$\{y(x) = \_C2 \ln(x) + \_C1\}$$

ODE No. 1094

$$ay(x) + xy''(x) + y'(x) = 0$$

✓ **Mathematica** : cpu = 0.0240723 (sec), leaf count = 41

$$\left\{\left\{y(x) \to c_1 J_0\left(2\sqrt{a}\sqrt{x}\right) + 2c_2 Y_0\left(2\sqrt{a}\sqrt{x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.014 (sec), leaf count = 29

$$\left\{y(x) = \_C1\ J_0\left(2\sqrt{a}\sqrt{x}\right) + \_C2\ Y_0\left(2\sqrt{a}\sqrt{x}\right)\right\}$$

ODE No. 1095

$$lxy(x) + xy''(x) + y'(x) = 0$$

✓ **Mathematica** : cpu = 0.00955339 (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 = 0.061 (sec), leaf count = 23

$$\left\{y(x) = \_C1\ J_0\left(\sqrt{l}x\right) + \_C2\ Y_0\left(\sqrt{l}x\right)\right\}$$

ODE No. 1096

$$(a+x)y(x)+xy''(x)+y'(x)=0$$

✓ **Mathematica** : cpu = 0.0143192 (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 = 0.109 (sec), leaf count = 39

$$\left\{y(x)=\mathrm{e}^{-ix}\left(U\left(\frac{1}{2}+\frac{i}{2}a,\ 1,\ 2\,ix\right)\_C2+M\left(\frac{1}{2}+\frac{i}{2}a,\ 1,\ 2\,ix\right)\_C1\right)\right\}$$

ODE No. 1097

$$ay(x)+xy''(x)-y'(x)=0$$

✓ **Mathematica** : cpu = 0.0295372 (sec), leaf count = 46

$$\left\{\left\{y(x)\to 2ac_1xJ_2\left(2\sqrt{a}\sqrt{x}\right)-2ac_2xY_2\left(2\sqrt{a}\sqrt{x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.013 (sec), leaf count = 31

$$\left\{y(x)=x\left(Y_2\left(2\,\sqrt{a}\sqrt{x}\right)\_C2+J_2\left(2\,\sqrt{a}\sqrt{x}\right)\_C1\right)\right\}$$

ODE No. 1098

$$-ax^3y(x)+xy''(x)-y'(x)=0$$

✓ **Mathematica** : cpu = 0.0108922 (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 = 0.012 (sec), leaf count = 27

$$\left\{y(x)=\_C1\ \sinh\left(\frac{x^2}{2}\sqrt{a}\right)+\_C2\ \cosh\left(\frac{x^2}{2}\sqrt{a}\right)\right\}$$

ODE No. 1099

$$x^3\left(e^{x^3}-v^2\right)y(x)+xy''(x)-y'(x)=0$$

✗ **Mathematica** : cpu = 1.04105 (sec), leaf count = 0 , could not solve

```
DSolve[(E^x^3 - v^2)*x^3*y[x] - Derivative[1][y][x] + x*Derivative[2][y][x] == 0, y[x]
```

✓ **Maple** : cpu = 0.072 (sec), leaf count = 25

$$\left\{y(x)=\_C1\,J_v\left(\mathrm{e}^{\frac{x^2}{2}}\right)+\_C2\,Y_v\left(\mathrm{e}^{\frac{x^2}{2}}\right)\right\}$$

ODE No. 1100

$$xy''(x)+2y'(x)-xy(x)-e^x=0$$

✓ **Mathematica** : cpu = 0.0316245 (sec), leaf count = 44

$$\left\{\left\{y(x)\to\frac{c_1e^{-x}}{x}+\frac{c_2e^x}{2x}+\frac{e^x(2x-1)}{4x}\right\}\right\}$$

✓ **Maple** : cpu = 0.066 (sec), leaf count = 23

$$\left\{y(x)=\frac{\sinh(x)\_C2}{x}+\frac{\cosh(x)\_C1}{x}+\frac{\mathrm{e}^x}{2}\right\}$$

Hand solution

$$xy''+2y'-xy=e^x \tag{1}$$

First method, much shorter, using transformation. Let $y_h=\frac{u(x)}{x}$, hence (now we are solving only the homogeneous part).

$$\begin{aligned}y'&=\frac{u'}{x}-\frac{u}{x^2}\\ y''&=\frac{u''}{x}-\frac{u'}{x^2}-\frac{u'}{x^2}+2\frac{u}{x^3}\end{aligned}$$

And (1) becomes

$$
\begin{aligned}
x\left(\frac{u''}{x}-\frac{u'}{x^2}-\frac{u'}{x^2}+2\frac{u}{x^3}\right)+2\left(\frac{u'}{x}-\frac{u}{x^2}\right)-x\left(\frac{u}{x}\right)&=0\\
u''-2\frac{u'}{x}+2\frac{u}{x^2}+\frac{2u'}{x}-\frac{2u}{x^2}-u&=0\\
u''-u&=0
\end{aligned}
$$

Hence the roots of the characteristic equation are ± 1 and the solution is

$$
u = Ae^{x} + Be^{-x}
$$

Hence

$$
y_h = \frac{1}{x}\left(Ae^{x} + Be^{-x}\right)
$$

The particular solution is found below, and given in the second method. The transformation method is much simpler.

The second method, which is much longer, using series method. This is used if a transformation is not known or can not be found. There is singularity at $x = 0$. We need to check if the singularity is regular or not. Writing in standard form $y'' + p(x)\,y' + q(x)\,y = 0$ gives (we are looking at the homogeneous part now only)

$$
y'' + \frac{2}{x}y' - y = 0
$$

Hence $\lim_{x\to 0} xp(x) = \lim_{x\to 0} x\frac{2}{x} = 2$ which is analytic at $x = 0$. And $\lim_{x\to 0} x^2 q(x) = \lim_{x\to 0} -x^2 = 0$ which is analytic. Hence the singularity is regular (removable). Using Frobenius series, assume that

$$
y = \sum_{n=-\infty}^{\infty} c_n x^{n+r}
$$

Where $c_n = 0$ for $n < 0$. Hence

$$
\begin{aligned}
y' &= \sum (n+r)\, c_n x^{n+r-1}\\
y'' &= \sum (n+r)\,(n+r-1)\, c_n x^{n+r-2}
\end{aligned}
$$

Substituting back in the original ODE gives

$$
\sum (n+r)\,(n+r-1)\, c_n x^{n+r-1} + \sum 2(n+r)\, c_n x^{n+r-1} - \sum c_n x^{n+r+1} = 0
$$

Adjusting so that all have same power x^{n+r} gives

$$\sum (n+r+1)(n+r)\, c_{n+1} x^{n+r} + \sum 2(n+r+1)\, c_{n+1} x^{n+r} - \sum c_{n-1} x^{n+r} = 0$$

Hence

$$\begin{aligned} (n+r+1)(n+r)\, c_{n+1} + 2(n+r+1)\, c_{n+1} - c_{n-1} &= 0 \\ (n+r+1)(2+(n+r))\, c_{n+1} - c_{n-1} &= 0 \end{aligned} \tag{2}$$

We want equation with c_0 in it. Hence let $n = -1$

$$(-1+r+1)(2+(-1+r))\, c_0 - c_{-2} = 0$$

But $c_n = 0$ for all $n < 0$ hence

$$(-1+r+1)(2+(-1+r))\, c_0 = 0$$

But $c_0 \neq 0$, as this is the basis for this method. Therefore, we obtain the indicial equation for r

$$\begin{aligned} (-1+r+1)(2+(-1+r)) &= 0 \\ r(r+1) &= 0 \end{aligned}$$

Hence $r = 0$ or $r = -1$ are the roots. Now for each r we find a solution. Using $r = 0$, we go back the recurrence equation (2)

$$\begin{aligned} (n+1)(2+n)\, c_{n+1} - c_{n-1} &= 0 \\ c_{n+1} &= \frac{c_{n-1}}{(n+1)(2+n)} \end{aligned}$$

For $n = 0$

$$c_1 = \frac{c_{-1}}{(n+1)(2+n)} = 0$$

For $n = 1$

$$c_2 = \frac{c_0}{(2)(3)}$$

For $n = 2$

$$c_3 = \frac{c_1}{(n+1)(2+n)} = 0$$

For $n = 3$

$$c_4 = \frac{c_2}{(4)(5)} = \frac{c_0}{(2)(3)(4)(5)}$$

And so on. Hence, for $r=0$ we have

$$\begin{aligned} y_{r=0} &= \sum_{n=0}^{\infty} c_n x^n = c_0 + c_1 x^1 + c_2 x^2 + c_3 x^3 + \cdots \\ &= c_0 + \frac{c_0}{6} x^2 + \frac{c_0}{120} x^4 + \cdots \\ &= A\left(1 + \frac{1}{6} x^2 + \frac{1}{120} x^4 + \cdots\right) \end{aligned} \tag{3}$$

Where A is used as arbitrary constant instead of a_0. Now we find the solution for $r=-1$. we go back the recurrence equation (2)

$$\begin{aligned} (n-1+1)(2+(n-1))\, c_{n+1} - c_{n-1} &= 0 \\ n(1+n)\, c_{n+1} - c_{n-1} &= 0 \\ c_{n+1} &= \frac{c_{n-1}}{n(1+n)} \end{aligned}$$

For $n=0$

$$c_1 = \frac{c_{-1}}{n(1+n)} = 0$$

For $n=1$

$$c_2 = \frac{c_0}{2}$$

For $n=2$

$$c_3 = \frac{c_1}{n(1+n)} = 0$$

For $n=3$

$$c_4 = \frac{c_2}{(3)(4)} = \frac{c_0}{(2)(3)(4)}$$

For $n=4$

$$c_5 = \frac{c_3}{n(1+n)} = 0$$

For $n=5$

$$c_6 = \frac{c_4}{(5)(6)} = \frac{c_0}{(2)(3)(4)(5)(6)}$$

And so on. Hence solution is

$$\begin{aligned} y_{r=-1} &= \frac{1}{x} \sum_{n=0}^{\infty} c_n x^n = \frac{1}{x}\left(c_0 + \frac{c_0}{2} x^2 + \frac{c_0}{(2)(3)(4)} x^4 + \frac{c_0}{(2)(3)(4)(5)(6)} x^6 + \cdots\right) \\ &= \frac{B}{x}\left(1 + \frac{1}{2} x^2 + \frac{1}{24} x^4 + \frac{1}{720} x^6 + \cdots\right) \end{aligned}$$

Where B is used as arbitrary constant instead of a_0. Therefore, the homogeneous solution found is

$$\begin{aligned}
y_h &= y_{r=0} + y_{r=-1}\\
&= A\left(1 + \frac{1}{6}x^2 + \frac{1}{120}x^4 + \cdots\right) + \frac{B}{x}\left(1 + \frac{1}{2}x^2 + \frac{1}{24}x^4 + \frac{1}{720}x^6 + \cdots\right)
\end{aligned}$$

But

$$e^x = 1 + x + \frac{1}{2}x^2 + \frac{1}{6}x^3 + \frac{1}{24}x^4 + \frac{1}{120}x^5 + \cdots \tag{3}$$

And

$$e^{-x} = 1 - x + \frac{1}{2}x^2 - \frac{1}{6}x^3 + \frac{1}{24}x^4 - \frac{1}{120}x^5 + \cdots \tag{4}$$

Hence adding (3)+(4) gives

$$\begin{aligned}
e^x + e^{-x} &= 2 + 2\frac{1}{2}x^2 + 2\frac{1}{24}x^4 + \cdots\\
&= 2\left(1 + \frac{1}{2}x^2 + \frac{1}{24}x^4 + \frac{1}{720}x^6 \cdots\right)
\end{aligned}$$

But $y_{r=-1} = \frac{B}{x}\left(1 + \frac{1}{2}x^2 + \frac{1}{24}x^4 + \frac{1}{720}x^6 + \cdots\right)$, therefore comparing the result we found above, we see that we can write $y_{r=-1}$ as

$$y_{r=-1} = \frac{B}{x}\left(\frac{e^x + e^{-x}}{2}\right)$$

Similarly, we obtain $y_{r=0}$ expression

$$\begin{aligned}
\frac{1}{x}e^x &= \frac{1}{x}\left(1 + x + \frac{1}{2}x^2 + \frac{1}{6}x^3 + \frac{1}{24}x^4 + \frac{1}{120}x^5 + \cdots\right)\\
&= \frac{1}{x} + 1 + \frac{1}{2}x + \frac{1}{6}x^2 + \frac{1}{24}x^3 + \frac{1}{120}x^4 + \cdots
\end{aligned} \tag{3A}$$

And

$$\begin{aligned}
\frac{1}{x}e^{-x} &= \frac{1}{x}\left(1 - x + \frac{1}{2}x^2 - \frac{1}{6}x^3 + \frac{1}{24}x^4 - \frac{1}{120}x^5 + \cdots\right)\\
&= \frac{1}{x} - 1 + \frac{1}{2}x - \frac{1}{6}x^2 + \frac{1}{24}x^3 - \frac{1}{120}x^4 + \cdots
\end{aligned} \tag{4A}$$

Now (3A)-(4A) gives

$$\begin{aligned}
\frac{1}{x}e^x - \frac{1}{x}e^{-x} &= \left(\frac{1}{x} + 1 + \frac{1}{2}x + \frac{1}{6}x^2 + \frac{1}{24}x^3 + \frac{1}{120}x^4 + \cdots\right) - \left(\frac{1}{x} - 1 + \frac{1}{2}x - \frac{1}{6}x^2 + \frac{1}{24}x^3 - \frac{1}{120}x^4 + \cdot\right.\\
&= 2 + 2\frac{1}{6}x^2 + 2\frac{1}{120}x^4 + \cdots\\
&= 2\left(1 + \frac{1}{6}x^2 + \frac{1}{120}x^4 + \cdots\right)
\end{aligned}$$

Hence

$$\left(1+\frac{1}{6}x^2+\frac{1}{120}x^4+\cdots\right)=\frac{1}{2x}\left(e^x-e^{-x}\right)$$

But $y_{r=0}=A\left(1+\frac{1}{6}x^2+\frac{1}{120}x^4+\cdots\right)$, therefore comparing the result we found above, wee see that we can write $y_{r=0}$ as

$$\begin{aligned}
y_{r=0} &= A\left(\frac{1}{2x}\left(e^x-e^{-x}\right)\right)\\
&= \frac{A}{2x}\left(e^x-e^{-x}\right)
\end{aligned}$$

Therefore

$$\begin{aligned}
y_h &= y_{r=0}+y_{r=-1}\\
&= \frac{A}{2x}\left(e^x-e^{-x}\right)+\frac{B}{2x}\left(e^x+e^{-x}\right)\\
&= \frac{1}{x}\left(\frac{A}{2}e^x-\frac{A}{2}e^{-x}+\frac{B}{2}e^x+\frac{B}{2}e^{-x}\right)\\
&= \frac{1}{x}\left(e^x\left(\frac{A}{2}+\frac{B}{2}\right)+e^{-x}\left(-\frac{A}{2}+\frac{B}{2}\right)\right)
\end{aligned}$$

Let $\frac{A+B}{2}=A_0$, $\frac{B-A}{2}=B_0$ hence the above becomes

$$y_h=\frac{1}{x}\left(A_0e^x+B_0e^{-x}\right)$$

We see this is the same solution using the transformation method given above. We now need to find particular solution. Let $y_1=\frac{e^x}{x}, y_2=\frac{e^{-x}}{x}$, hence $y_1'=\frac{e^x}{x}-\frac{e^x}{x^2}$ and $y_2'=\frac{-e^{-x}}{x^2}-\frac{e^{-x}}{x}$, hence the Wronskian is

$$\begin{aligned}
W &= \begin{vmatrix} y_1 & y_2\\ y_1' & y_2'\end{vmatrix}\\
&= \begin{vmatrix} \frac{e^x}{x} & \frac{e^{-x}}{x}\\ \frac{e^x}{x}-\frac{e^x}{x^2} & \frac{-e^{-x}}{x^2}-\frac{e^{-x}}{x}\end{vmatrix}\\
&= \frac{e^x}{x}\left(\frac{-e^{-x}}{x^2}-\frac{e^{-x}}{x}\right)-\frac{e^{-x}}{x}\left(\frac{e^x}{x}-\frac{e^x}{x^2}\right)\\
&= \left(\frac{-1}{x^3}-\frac{1}{x^2}\right)-\left(\frac{1}{x^2}-\frac{1}{x^3}\right)\\
&= -\frac{2}{x^2}
\end{aligned}$$

Therefore, let $y_p = u_1 y_1 + u_2 y_2$ and hence

$$u_1 = -\int \frac{y_2}{aW} e^x dx$$

Where $a = x$ since the original ODE is $xy'' + 2y' - xy = e^x$, and a is the coefficient of y'' always. Hence the above becomes

$$u_1 = -\int \frac{\frac{e^{-x}}{x}}{x\left(-\frac{2}{x^2}\right)} e^x dx = \int \frac{e^{-x}}{2} e^x dx = \int \frac{1}{2} dx = \frac{x}{2}$$

And

$$u_2 = \int \frac{\frac{e^x}{x}}{x\left(-\frac{2}{x^2}\right)} e^x dx = -\int \frac{\frac{e^x}{x}}{\frac{2}{x}} e^x dx = -\frac{1}{2}\int e^{2x} dx = -\frac{1}{2}\frac{e^{2x}}{2} = \frac{-1}{4} e^{2x}$$

Hence

$$\begin{aligned} y_p &= u_1 y_1 + u_2 y_2 \\ &= \frac{x}{2}\frac{e^x}{x} - \frac{1}{4} e^{2x} \frac{e^{-x}}{x} \\ &= \frac{1}{2} e^x - \frac{1}{4x} e^x \end{aligned}$$

Therefore

$$y_p = e^x \left(\frac{1}{2} - \frac{1}{4x}\right)$$

Hence the general solution is

$$\begin{aligned} y &= y_h + y_p \\ &= \frac{1}{x}\left(A_0 e^x + B_0 e^{-x}\right) + e^x \left(\frac{1}{2} - \frac{1}{4x}\right) \end{aligned}$$

Verification

```
restart;
ode:=x*diff(diff(y(x),x),x)+2*diff(y(x),x)-x*y(x)=exp(x);
y0:=1/x*( _C1* exp(x)+ _C2*exp(-x))+ (1/2-1/(4*x))*exp(x);
odetest(y(x)=y0,ode);
0
```

ODE No. 1101

$$axy(x) + xy''(x) + 2y'(x) = 0$$

✓ **Mathematica** : cpu = 0.0227754 (sec), leaf count = 52

$$\left\{\left\{y(x) \to \frac{c_1 e^{-i\sqrt{a}x}}{x} - \frac{i c_2 e^{i\sqrt{a}x}}{2\sqrt{a}x}\right\}\right\}$$

✓ **Maple** : cpu = 0.075 (sec), leaf count = 29

$$\left\{y(x) = \frac{1}{x}\left(\_C2 \cosh\left(\sqrt{-a}x\right) + \_C1 \sinh\left(\sqrt{-a}x\right)\right)\right\}$$

Hand solution

$$xy'' + 2y' + axy = 0 \tag{1}$$

First method much shorter, using transformation suggested by Kamke. Let $y = \frac{u(x)}{x}$, hence

$$\begin{aligned} y' &= \frac{u'}{x} - \frac{u}{x^2} \\ y'' &= \frac{u''}{x} - \frac{u'}{x^2} - \frac{u'}{x^2} + 2\frac{u}{x^3} \end{aligned}$$

And (1) becomes

$$\begin{aligned} x\left(\frac{u''}{x} - \frac{u'}{x^2} - \frac{u'}{x^2} + 2\frac{u}{x^3}\right) + 2\left(\frac{u'}{x} - \frac{u}{x^2}\right) + ax\left(\frac{u}{x}\right) &= 0 \\ u'' - 2\frac{u'}{x} + 2\frac{u}{x^2} + \frac{2u'}{x} - \frac{2u}{x^2} + au &= 0 \\ u'' + au &= 0 \end{aligned}$$

Hence the roots of the characteristic equation are $\pm\sqrt{-a}$ and the solution is

$$u = A\cos\left(\sqrt{a}x\right) + B\sin\left(\sqrt{a}x\right)$$

Hence

$$y = \frac{1}{x}\left(A\cos\left(\sqrt{a}x\right) + B\sin\left(\sqrt{a}x\right)\right)$$

Second method Using series method.

There is singularity at $x = 0$. We need to check if it regular or not. Writing in standard form $y'' + p(x)\,y' + q(x)\,y = 0$ gives (we are looking at the homogeneous part now only)

$$y'' + \frac{2}{x}y' + ay = 0$$

Hence $\lim_{x\to 0} xp(x) = \lim_{x\to 0} x\frac{2}{x} = 2$ which is analytic at $x = 0$. And $\lim_{x\to 0} x^2 q(x) = \lim_{x\to 0} -ax^2 = 0$ which is analytic. Hence the singularity is regular (removable). Using Frobenius series, assume that

$$y = \sum_{n=-\infty}^{\infty} c_n x^{n+r}$$

Where $c_n = 0$ for $n < 0$. Hence

$$\begin{aligned} y' &= \sum (n+r)\,c_n x^{n+r-1} \\ y'' &= \sum (n+r)\,(n+r-1)\,c_n x^{n+r-2} \end{aligned}$$

Substituting back in the original ODE gives

$$\sum (n+r)\,(n+r-1)\,c_n x^{n+r-1} + \sum 2(n+r)\,c_n x^{n+r-1} + \sum ac_n x^{n+r+1} = 0$$

Adjusting so that all have same power x^{n+r} gives

$$\sum (n+r+1)\,(n+r)\,c_{n+1} x^{n+r} + \sum 2(n+r+1)\,c_{n+1} x^{n+r} + \sum ac_{n-1} x^{n+r} = 0$$

Hence

$$\begin{aligned} (n+r+1)\,(n+r)\,c_{n+1} + 2(n+r+1)\,c_{n+1} + ac_{n-1} &= 0 \\ (n+r+1)\,(2+(n+r))\,c_{n+1} + ac_{n-1} &= 0 \end{aligned} \tag{2}$$

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 $n = 3$

$$
c_4 = \frac{-ac_2}{(4)(5)} = \frac{-a(-ac_0)}{(2)(3)(4)(5)} = \frac{a^2 c_0}{(2)(3)(4)(5)}
$$

And so on. Hence, for $r = 0$ we have

$$
\begin{aligned}
y_{r=0} &= \sum_{n=0}^{\infty} c_n x^n = c_0 + c_1 x^1 + c_2 x^2 + c_3 x^3 + \cdots \\
&= c_0 - a\frac{c_0}{6}x^2 + a^2\frac{c_0}{120}x^4 + \cdots \\
&= A\left(1 - a\frac{1}{6}x^2 + a^2\frac{1}{120}x^4 + \cdots\right) \qquad (3)
\end{aligned}
$$

Where A is used as arbitrary constant instead of a_0. Now we find the solution for $r = -1$. we go back the recurrence equation (2)

$$
\begin{aligned}
(n-1+1)(2+(n-1))\,c_{n+1} + ac_{n-1} &= 0 \\
n(1+n)\,c_{n+1} + ac_{n-1} &= 0 \\
c_{n+1} &= \frac{-ac_{n-1}}{n(1+n)}
\end{aligned}
$$

For $n=0$

$$c_1 = \frac{-ac_{-1}}{n\left(1+n\right)} = 0$$

For $n=1$

$$c_2 = \frac{-ac_0}{2}$$

For $n=2$

$$c_3 = \frac{-ac_1}{n\left(1+n\right)} = 0$$

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 $n=4$

$$c_5 = \frac{-ac_3}{n\left(1+n\right)} = 0$$

For $n=5$

$$c_6 = \frac{-ac_4}{(5)\,(6)} = \frac{-a(a^2c_0)}{(2)\,(3)\,(4)\,(5)\,(6)} = \frac{-a^3c_0}{(2)\,(3)\,(4)\,(5)\,(6)}$$

And so on. Hence solution is

$$\begin{aligned}
y_{r=-1} &= \frac{1}{x}\sum_{n=0}^{\infty} c_n x^n = \frac{1}{x}\left(c_0 - \frac{ac_0}{2}x^2 + \frac{a^2c_0}{(2)\,(3)\,(4)}x^4 - \frac{a^3c_0}{(2)\,(3)\,(4)\,(5)\,(6)}x^6 + \cdots\right)\\
&= \frac{B}{x}\left(1 - \frac{a}{2}x^2 + \frac{a^2}{24}x^4 - \frac{a^3}{720}x^6 + \cdots\right)
\end{aligned}$$

Where B is used as arbitrary constant instead of a_0. Therefore, the homogeneous solution found is

$$\begin{aligned}
y_h &= y_{r=0} + y_{r=-1}\\
&= A\left(1 - a\frac{1}{6}x^2 + a^2\frac{1}{120}x^4 + \cdots\right) + \frac{B}{x}\left(1 - \frac{a}{2}x^2 + \frac{a^2}{24}x^4 - \frac{a^3}{720}x^6 + \cdots\right)\\
&= A\left(1 - \frac{1}{6}\left(\sqrt{a}x\right)^2 + \frac{1}{120}\left(\sqrt{a}x\right)^4 + \cdots\right) + \frac{B}{x}\left(1 - \frac{1}{2}\left(\sqrt{a}x\right)^2 + \frac{1}{24}\left(\sqrt{a}x\right)^4 - \frac{1}{720}\left(\sqrt{a}x\right)^6 + \cdots\right)
\end{aligned}$$

But

$$\sin x = x - \frac{1}{6}x^3 + \frac{1}{120}x^5 - \cdots \tag{3}$$

And

$$\cos x = 1 - \frac{1}{2}x^2 + \frac{1}{24}x^4 - \frac{1}{720}x^6 + \cdots \tag{4}$$

Therefore

$$\begin{aligned}
\sin\left(\sqrt{a}x\right) &= \sqrt{a}x - \frac{1}{6}\left(\sqrt{a}x\right)^3 + \frac{1}{120}\left(\sqrt{a}x\right)^5 - \cdots\\
\cos\left(\sqrt{a}x\right) &= 1 - \frac{1}{2}\left(\sqrt{a}x\right)^2 + \frac{1}{24}\left(\sqrt{a}x\right)^4 - \frac{1}{720}\left(\sqrt{a}x\right)^6 + \cdots
\end{aligned}$$

Therefore, using the above, we can write y_h as

$$\begin{aligned}
y_h &= \frac{A}{\sqrt{ax}}\sqrt{ax}\left(1-\frac{1}{6}\left(\sqrt{ax}\right)^2+\frac{1}{120}\left(\sqrt{ax}\right)^4+\cdots\right)+\frac{B}{x}\cos\left(\sqrt{ax}\right)\\
&= \frac{A}{\sqrt{ax}}\left(\sqrt{ax}-\frac{1}{6}\left(\sqrt{ax}\right)^3+\frac{1}{120}\left(\sqrt{ax}\right)^5+\cdots\right)+\frac{B}{x}\cos\left(\sqrt{ax}\right)\\
&= \frac{A}{\sqrt{ax}}\sin\left(\sqrt{ax}\right)+\frac{B}{x}\cos\left(\sqrt{ax}\right)
\end{aligned}$$

Let $A_0=\frac{A}{\sqrt{a}}$, hence the above becomes the same solution found using the transformation method

$$y(x)=\frac{1}{x}\left(A_0\sin\left(\sqrt{a}x\right)+B\cos\left(\sqrt{a}x\right)\right)$$

Clearly, the transformation method is much faster and better. But the trick is to see the correct transformation needed and this is not always easy.

<u>Third method</u> Using Laplace transform. Using property $\mathcal{L}xf(x)=-\frac{d}{ds}F(s)$ then the Laplace transform of the ODE becomes

$$\begin{aligned}
\mathcal{L}(xy''+2y'+axy)&=0\\
-\frac{d}{ds}(\mathcal{L}y'')+2\left(-\frac{d}{ds}(\mathcal{L}y')\right)+a\left(-\frac{d}{ds}Y\right)&=0\\
-\frac{d}{ds}\left(s^2Y-sA-B\right)+2\left(-\frac{d}{ds}(sY-A)\right)+a(-Y')&=0
\end{aligned}$$

Where $A=y(0)\,,B=y'(0)$. Simplifying gives

$$\begin{aligned}
-\left(2sY+s^2Y'-A\right)-2(Y+sY')-aY'&=0\\
Y'\left(-s^2-2s-a\right)+Y(-2s-2)+A&=0\\
Y'+Y\frac{2s+2}{s^2+2s+a}&=\frac{A}{s^2+2s+a}
\end{aligned}$$

This is first order ODE, which is solved easily using an integrating factor. Solving for $Y(s)$ gives

$$Y(s)=\frac{As+c_1}{s^2+a+2s}$$

Where c_1 is constant of integration. The inverse Laplace of the above is

$$y(x)=e^{-x}\left(A\cos\left(x\sqrt{1-a}\right)+\frac{(-A+c_1)}{\sqrt{1-a}}\sinh\left(x\sqrt{1-a}\right)\right)$$

I need to find why the above does not verify. May be I made a mistake somewhere. Verification of the result of the first two methods is below.

```
restart;
ode:=x*diff(diff(y(x),x),x)+2*diff(y(x),x)+a*x*y(x)=0;
y0:=1/x*( _C1* cos(sqrt(a)*x)+ _C2*sin(sqrt(a)*x));
odetest(y(x)=y0,ode);
0
```

ODE No. 1102

$$ax^2y(x) + xy''(x) + 2y'(x) = 0$$

✓ **Mathematica** : cpu = 0.00737175 (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 = 0.073 (sec), leaf count = 33

$$\left\{y(x) = 1\left(\_C2\, Y_{\frac{1}{3}}\left(\frac{2}{3}\sqrt{a}x^{\frac{3}{2}}\right) + \_C1\, J_{\frac{1}{3}}\left(\frac{2}{3}\sqrt{a}x^{\frac{3}{2}}\right)\right)\frac{1}{\sqrt{x}}\right\}$$

Hand solution

$$xy'' + 2y' + ax^2y = 0 \tag{1}$$

Since there is a term $2y$, we can use $y = \frac{u(x)}{x}$, hence

$$\begin{aligned} y' &= \frac{u'}{x} - \frac{u}{x^2} \\ y'' &= \frac{u''}{x} - \frac{u'}{x^2} - \frac{u'}{x^2} + 2\frac{u}{x^3} \end{aligned}$$

And (1) becomes

$$\begin{aligned} x\left(\frac{u''}{x} - \frac{u'}{x^2} - \frac{u'}{x^2} + 2\frac{u}{x^3}\right) + 2\left(\frac{u'}{x} - \frac{u}{x^2}\right) + ax^2\left(\frac{u}{x}\right) &= 0 \\ u'' - 2\frac{u'}{x} + 2\frac{u}{x^2} + \frac{2u'}{x} - \frac{2u}{x^2} + axu &= 0 \\ u'' + axu &= 0 \end{aligned} \tag{2}$$

This is Emdon-Fowler. (form is $u'' + x^n u = 0$) with $n = 1$. Assume that

$$u = \sum_{n=0}^{\infty} c_n x^n$$

Hence

$$\begin{aligned} u' &= \sum_{n=0} n c_n x^{n-1} = \sum_{n=1} n c_n x^{n-1} = \sum_{n=0} (n+1)\, c_{n+1} x^n \\ u'' &= \sum_{n=0} n(n+1)\, c_{n+1} x^{n-1} = \sum_{n=1} n(n+1)\, c_{n+1} x^{n-1} = \sum_{n=0} (n+1)\,(n+2)\, c_{n+2} x^n \end{aligned}$$

Substituting back in (2) gives

$$\begin{aligned} \sum_{n=0} (n+1)\,(n+2)\, c_{n+2} x^n + \sum_{n=0} a c_n x^{n+1} &= 0 \\ \sum_{n=0} (n+1)\,(n+2)\, c_{n+2} x^n + \sum_{n=1} a c_{n-1} x^n &= 0 \end{aligned}$$

For $n = 0$

$$(1)\,(2)\, c_2 = 0$$

Hence $c_2 = 0$. For $n \geq 1$

$$\begin{aligned} (n+1)\,(n+2)\, c_{n+2} + a c_{n-1} &= 0 \\ c_{n+2} &= \frac{-a c_{n-1}}{(n+1)\,(n+2)} \end{aligned} \tag{3}$$

For $n = 1$, from (3)

$$c_3 = \frac{-a c_0}{(2)\,(3)}$$

For $n = 2$, from (3)

$$c_4 = \frac{-a c_1}{(3)\,(4)}$$

For $n = 3$, from (3)

$$c_5 = \frac{-a c_2}{(4)\,(5)} = 0$$

For $n = 4$, from (3)

$$c_6 = \frac{-a c_3}{(5)\,(6)} = \frac{-a}{(5)\,(6)} \left(\frac{-a c_0}{(2)\,(3)} \right) = \frac{a^2 c_0}{(2)\,(3)\,(5)\,(6)}$$

For $n = 5$, from (3)

$$c_7 = \frac{-a c_4}{(6)\,(7)} = \frac{-a}{(6)\,(7)} \left(\frac{-a c_1}{(3)\,(4)} \right) = \frac{a^2 c_1}{(3)\,(4)\,(6)\,(7)}$$

For $n = 6$, from (3)

$$c_8 = \frac{-ac_5}{(7)(8)} = 0$$

For $n = 7$, from (3)

$$c_9 = \frac{-ac_6}{(8)(9)} = \frac{-a}{(8)(9)}\left(\frac{a^2 c_0}{(2)(3)(5)(6)}\right) = \frac{-a^3 c_0}{(2)(3)(5)(6)(8)(9)}$$

For $n = 8$, from (3)

$$c_{10} = \frac{-ac_7}{(9)(10)} = \frac{-a}{(9)(10)}\left(\frac{a^2 c_1}{(3)(4)(6)(7)}\right) = \frac{-a^3 c_1}{(3)(4)(6)(7)(9)(10)}$$

And so on. Hence,

$$\begin{aligned}
u &= \sum_{n=0}^{\infty} c_n x^n = c_0 + c_1 x^1 + c_2 x^2 + c_3 x^3 + \cdots \\
&= c_0 + c_1 x + 0 + c_3 x^3 + c_4 x^4 + 0 + c_6 x^6 + c_7 x^7 + 0 + c_9 x^9 + \cdots \\
&= c_0 + c_1 x - \frac{ac_0}{(2)(3)} x^3 - \frac{ac_1}{(3)(4)} x^4 + \frac{a^2 c_0}{(2)(3)(5)(6)} x^6 + \frac{a^2 c_1}{(3)(4)(6)(7)} x^7 - \frac{a^3 c_0}{(2)(3)(5)(6)(8)(9)} x^9 - \frac{}{(3} \\
&= c_0\left(1 - \frac{a}{6} x^3 + \frac{a^2}{180} x^6 - \frac{a^3}{12\,960} x^9 + \cdots\right) + x c_1\left(1 - \frac{a}{12} x^3 + \frac{a^2}{504} x^6 - \frac{a^3}{45\,360} x^9 + \cdots\right) \\
&= c_0\left(1 - \frac{1}{6}\left(a^{\frac{1}{3}} x\right)^3 + \frac{1}{180}\left(a^{\frac{1}{3}} x\right)^6 - \frac{1}{12\,960}\left(a^{\frac{1}{3}} x\right)^9 + \cdots\right) + x c_1\left(1 - \frac{1}{12}\left(a^{\frac{1}{3}} x\right)^3 + \frac{1}{504}\left(a^{\frac{1}{3}} x\right)^6 - \frac{1}{45\,3}\right.
\end{aligned}$$

Comparing the above to the series expansion of Airy functions, we see that

$$u = c_0 \operatorname{AiryAI}\left(-a^{\frac{1}{3}} x\right) + c_1 \operatorname{AiryBI}\left(-a^{\frac{1}{3}} x\right)$$

And since $y = \frac{u(x)}{x}$ then

$$y = \frac{1}{x}\left(c_0 \operatorname{AiryAI}\left(-a^{\frac{1}{3}} x\right) + c_1 \operatorname{AiryBI}\left(-a^{\frac{1}{3}} x\right)\right)$$

Verification

```
restart;
#for series solution of u''+axu=0, use this:
Order:=10;
sol:=dsolve(ode,u(x),series);
sol:=convert(sol,polynom);
sol:=subs({u(0)=c0,D(u)(0)=c1},rhs(sol));
```

```
collect(sol,{c0,c1});
(1-(1/6)*a*x^3+(1/180)*a^2*x^6-(1/12960)*a^3*x^9)*c0+(x-(1/12)*a*x^4+(1/504)*a^2*x^7)*c1
#to verify final solution use this:
ode:=x*diff(y(x),x$2)+2*diff(y(x),x)+a*x^2*y(x)=0;
y0:=(1/x)*(_C0*AiryAi(-a^(1/3)*x)+_C1*AiryBi(-a^(1/3)*x));
odetest(y(x)=y0,ode);
0
```

ODE No. 1103

$$ay(x) + xy''(x) - 2y'(x) = 0$$

✓ **Mathematica** : cpu = 0.0281069 (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 = 0.013 (sec), leaf count = 33

$$\left\{y(x)=x^{\frac{3}{2}}\left(Y_3\left(2\sqrt{a}\sqrt{x}\right)\_C2+J_3\left(2\sqrt{a}\sqrt{x}\right)\_C1\right)\right\}$$

ODE No. 1104

$$ay(x) + vy'(x) + xy''(x) = 0$$

✓ **Mathematica** : cpu = 0.0375912 (sec), leaf count = 104

$$\left\{\left\{y(x)\to c_2a^{\frac{v-1}{2}-v+1}x^{\frac{v-1}{2}-v+1}\Gamma(2-v)J_{1-v}\left(2\sqrt{a}\sqrt{x}\right)+c_1a^{\frac{1-v}{2}}x^{\frac{1-v}{2}}\Gamma(v)J_{v-1}\left(2\sqrt{a}\sqrt{x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.021 (sec), leaf count = 41

$$\left\{y(x)=x^{\frac{1}{2}-\frac{v}{2}}\left(Y_{v-1}\left(2\sqrt{a}\sqrt{x}\right)\_C2+J_{v-1}\left(2\sqrt{a}\sqrt{x}\right)\_C1\right)\right\}$$

ODE No. 1105

$$ay'(x) + bxy(x) + xy''(x) = 0$$

✓ **Mathematica** : cpu = 0.0218106 (sec), leaf count = 64

$$\left\{\left\{y(x) \to c_1 x^{\frac{1-a}{2}} J_{\frac{a-1}{2}}\left(\sqrt{b}x\right) + c_2 x^{\frac{1-a}{2}} Y_{\frac{a-1}{2}}\left(\sqrt{b}x\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.072 (sec), leaf count = 39

$$\left\{y(x) = x^{-\frac{a}{2}+\frac{1}{2}}\left(Y_{\frac{a}{2}-\frac{1}{2}}\left(\sqrt{b}x\right)\_C2 + J_{\frac{a}{2}-\frac{1}{2}}\left(\sqrt{b}x\right)\_C1\right)\right\}$$

ODE No. 1106

$$ay'(x) + bx^{\mathrm{a1}}y(x) + xy''(x) = 0$$

✓ **Mathematica** : cpu = 0.0532146 (sec), leaf count = 441

$$\left\{\left\{y(x) \to c_1 \left(\frac{1}{\mathrm{a1}}+1\right)^{\frac{a}{\left(\frac{1}{\mathrm{a1}}+1\right)\mathrm{a1}}-\frac{1}{\left(\frac{1}{\mathrm{a1}}+1\right)\mathrm{a1}}} \mathrm{a1}^{\frac{a}{\left(\frac{1}{\mathrm{a1}}+1\right)\mathrm{a1}}-\frac{1}{\left(\frac{1}{\mathrm{a1}}+1\right)\mathrm{a1}}} b^{\frac{1}{2}\left(\frac{1}{\left(\frac{1}{\mathrm{a1}}+1\right)\mathrm{a1}}-\frac{a}{\left(\frac{1}{\mathrm{a1}}+1\right)\mathrm{a1}}\right)} \left(x^{\mathrm{a1}}\right)^{\frac{1}{2}\left(\frac{1}{\mathrm{a1}}+1\right)\left(\frac{1}{\left(\frac{1}{\mathrm{a1}}+1\right)\mathrm{a1}}-\right.}\right.\right.$$

✓ **Maple** : cpu = 0.119 (sec), leaf count = 71

$$\left\{y(x) = x^{-\frac{a}{2}+\frac{1}{2}}\left(Y_{\frac{a-1}{a1+1}}\left(2\frac{\sqrt{b}x^{a1/2+1/2}}{a1+1}\right)\_C2 + J_{\frac{a-1}{a1+1}}\left(2\frac{\sqrt{b}x^{a1/2+1/2}}{a1+1}\right)\_C1\right)\right\}$$

ODE No. 1107

$$ay(x) + (b+x)y'(x) + xy''(x) = 0$$

✓ **Mathematica** : cpu = 0.0308293 (sec), leaf count = 40

$$\left\{\left\{y(x) \to c_1 e^{-x} U(b-a, b, x) + c_2 e^{-x} L_{a-b}^{b-1}(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.142 (sec), leaf count = 30

$$\left\{y(x) = \mathrm{e}^{-x}\left(U(-a+b,\, b,\, x)\_C2 + M(-a+b,\, b,\, x)\_C1\right)\right\}$$

ODE No. 1108

$$(a+b+x)y'(x)+ay(x)+xy''(x)=0$$

✓ **Mathematica** : cpu = 0.0363996 (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 = 0.129 (sec), leaf count = 26

$$\left\{y(x)=\mathrm{e}^{-x}(M(b,\,a+b,\,x)\_C1+U(b,\,a+b,\,x)\_C2)\right\}$$

ODE No. 1109

$$xy''(x)-xy'(x)-y(x)-e^x x(x+1)=0$$

✓ **Mathematica** : cpu = 0.0557073 (sec), leaf count = 45

$$\left\{\left\{y(x)\to c_2(-e^x x\mathrm{Ei}(-x)-1)+c_1e^x x+e^x\left(x^2+x-x\log(-x)-1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.07 (sec), leaf count = 33

$$\left\{y(x)=\mathrm{e}^{x}\left(\_C1\,xEi(1,x)-\mathrm{e}^{-x}\_C1-x\ln(x)+\_C2\,x+x^2-1\right)\right\}$$

ODE No. 1110

$$-ay(x)+xy''(x)-xy'(x)=0$$

✓ **Mathematica** : cpu = 0.042637 (sec), leaf count = 36

$$\left\{\left\{y(x)\to c_2G_{1,2}^{2,0}\left(-x\middle|\begin{array}{c}1-a\\0,1\end{array}\right)+c_1x\,{}_1F_1(a+1;2;x)\right\}\right\}$$

✓ **Maple** : cpu = 0.091 (sec), leaf count = 23

$$\{y(x)=x(U(a+1,\,2,\,x)\_C2+M(a+1,\,2,\,x)\_C1)\}$$

ODE No. 1111

$$xy''(x) - (x+1)y'(x) + y(x) = 0$$

✓ **Mathematica** : cpu = 0.0190293 (sec), leaf count = 20

$$\{\{y(x) \to c_1 e^x + c_2(-x-1)\}\}$$

✓ **Maple** : cpu = 0.044 (sec), leaf count = 13

$$\{y(x) = \_C2\, \mathrm{e}^x + \_C1\, x + \_C1\}$$

Hand solution

$$xy'' - (x+1)\, y' + y = 0 \tag{1}$$

Taking Laplace transform of each term and using property of $\mathcal{L}(xf(x)) = -\frac{d}{ds}F(s)$ where $F(s) = \mathcal{L}f(x)$, then

$$\mathcal{L}(xy'') = -\frac{d}{ds}(\mathcal{L}y'')$$

Let $\mathcal{L}y(x) = Y(s) \equiv Y$. Now $\mathcal{L}y'' = s^2Y - sy(0) - y'(0)$. Assuming $y(0) = A, y'(0) = B$ then

$$\begin{aligned}\mathcal{L}(xy'') &= -\frac{d}{ds}\left(s^2Y - As - B\right)\\ &= -\left(2sY + s^2Y' - A\right)\end{aligned}$$

And

$$\begin{aligned}\mathcal{L}((x+1)\, y') &= \mathcal{L}(xy' + y')\\ &= -\frac{d}{ds}(\mathcal{L}y') + \mathcal{L}y'\\ &= -\frac{d}{ds}(sY - y(0)) + (sY - y(0))\\ &= -\frac{d}{ds}(sY - A) + (sY - y(0))\\ &= -(Y + sY') + (sY - A)\\ &= -Y - sY' + sY - A\end{aligned}$$

Hence Laplace transform of the ODE becomes

$$
\begin{aligned}
-\left(2sY + s^2Y' - A\right) - \left(-Y - sY' + sY - A\right) + Y &= 0 \\
-2sY - s^2Y' + A + Y + sY' - sY + A + Y &= 0 \\
Y'\left(s - s^2\right) + Y(-2s + 1 - s + 1) &= -2A \\
Y'\left(s^2 - s\right) + Y(3s - 2) &= 2A \\
Y' + \frac{(3s-2)}{s\,(s-1)}Y &= \frac{2A}{s\,(s-1)}
\end{aligned}
$$

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

$$
\begin{aligned}
y(x) &= -c_1 + (A + c_1)\,e^x - c_1 x \\
&= -c_1(1 + x) + (A + c_1)\,e^x
\end{aligned}
$$

Let $-c_1 = A_0, A + c_1 + B_0$, hence

$$
y(x) = A_0(1 + x) + B_0 e^x
$$

Verification

```
rrestart;
ode:=x*diff(diff(y(x),x),x)-(1+x)*diff(y(x),x)+y(x)=0;
y0:=_C0*(1+x)+_C1*exp(x);
odetest(y(x)=y0,ode);
0
```

ODE No. 1112

$$xy''(x) - (x + 1)y'(x) - 2(x - 1)y(x) = 0$$

✓ **Mathematica** : cpu = 0.0275821 (sec), leaf count = 30

$$\left\{\left\{y(x) \to c_1 e^{2x} - \frac{1}{9} c_2 e^{-x}(3x + 1)\right\}\right\}$$

✓ **Maple** : cpu = 0.087 (sec), leaf count = 22

$$\{y(x) = \_C1\, e^{2x} + \_C2\, e^{-x}(3x + 1)\}$$

ODE No. 1113

$$-ay(x) + (b - x)y'(x) + xy''(x) = 0$$

✓ **Mathematica** : cpu = 0.0220423 (sec), leaf count = 24

$$\{\{y(x) \to c_1 U(a, b, x) + c_2 L_{-a}^{b-1}(x)\}\}$$

✓ **Maple** : cpu = 0.132 (sec), leaf count = 17

$$\{y(x) = \_C1\, M(a, b, x) + \_C2\, U(a, b, x)\}$$

ODE No. 1114

$$xy''(x) - 2(x - 1)y'(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 0.0714696 (sec), leaf count = 39

$$\left\{\left\{y(x) \to c_2 G_{1,2}^{2,0}\left(-2x \middle| \begin{array}{c} \frac{1}{2} \\ -1, 0 \end{array}\right) + c_1 e^x (I_0(x) - I_1(x))\right\}\right\}$$

✓ **Maple** : cpu = 0.134 (sec), leaf count = 34

$$\{y(x) = (-\_C2\, K_1(-x) + \_C2\, K_0(-x) + \_C1\, (I_0(x) - I_1(x)))\, e^x\}$$

ODE No. 1115

$$xy''(x)-(3x-2)y'(x)-(2x-3)y(x)=0$$

✓ **Mathematica** : cpu = 0.0690784 (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 = 1.258 (sec), leaf count = 47

$$\left\{y(x)=\mathrm{e}^{-\frac{x\left(-3+\sqrt{17}\right)}{2}}\left(U\left(1-\frac{6\sqrt{17}}{17},\,2,\,\sqrt{17}x\right)\_C2+M\left(1-\frac{6\sqrt{17}}{17},\,2,\,\sqrt{17}x\right)\_C1\right)\right\}$$

ODE No. 1116

$$y'(x)(ax+b+n)+any(x)+xy''(x)=0$$

✓ **Mathematica** : cpu = 0.0632822 (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 = 0.156 (sec), leaf count = 31

$$\left\{y(x)=\mathrm{e}^{-ax}(M(b,\,b+n,\,ax)\_C1+U(b,\,b+n,\,ax)\_C2)\right\}$$

ODE No. 1117

$$-(x+1)(a+b)y'(x)+abxy(x)+xy''(x)=0$$

✓ **Mathematica** : cpu = 0.0987001 (sec), leaf count = 107

$$\left\{\left\{y(x)\to c_1U\left(-\frac{-a^2-ba-a+b}{a-b},a+b+2,(a-b)x\right)e^{(a+b+1)\log(x)+bx}+c_2L_{\frac{-a^2-ba-a+b}{a-b}}^{a+b+1}((a-b)x)e^{(a+b-$$

✓ **Maple** : cpu = 0.196 (sec), leaf count = 82

$$\left\{y(x)=x^{a+b+1}\mathrm{e}^{bx}\left(U\left(\frac{a^2+ab+a-b}{a-b},\,a+b+2,\,x(a-b)\right)\_C2+M\left(\frac{a^2+ab+a-b}{a-b},\,a+b+2,\,x(a$$

ODE No. 1118

$$y'(x)(x(a+b)+m+n)+y(x)(abx+an+bm)+xy''(x)=0$$

✓ **Mathematica** : cpu = 0.0965405 (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 = 0.16 (sec), leaf count = 39

$$\left\{y(x)=\mathrm{e}^{-ax}(U(m,\,m+n,\,x(a-b))\_C2+M(m,\,m+n,\,x(a-b))\_C1)\right\}$$

ODE No. 1119

$$y(x)\left(a^2x+2ab\right)-2(ax+b)y'(x)+xy''(x)=0$$

✓ **Mathematica** : cpu = 0.175824 (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 = 0.089 (sec), leaf count = 20

$$\left\{y(x)=\mathrm{e}^{ax}\left(x^{2\,b+1}\_C2+\_C1\right)\right\}$$

ODE No. 1120

$$(ax+b)y'(x)+y(x)(cx+d)+xy''(x)=0$$

✓ **Mathematica** : cpu = 0.0644652 (sec), leaf count = 168

$$\left\{\left\{y(x)\to c_1e^{-\frac{1}{2}x\sqrt{a^2-4c}-\frac{ax}{2}}U\left(-\frac{-ab-\sqrt{a^2-4c}b+2d}{2\sqrt{a^2-4c}},b,\sqrt{a^2-4c}x\right)+c_2e^{-\frac{1}{2}x\sqrt{a^2-4c}-\frac{ax}{2}}L^{b-1}_{\frac{-ab-\sqrt{a^2-4c}b+2d}{2\sqrt{a^2-4c}}}\right.\right.$$

✓ **Maple** : cpu = 0.294 (sec), leaf count = 109

$$\left\{y(x)=\mathrm{e}^{-\frac{x}{2}\left(a+\sqrt{a^2-4\,c}\right)}\left(U\left(\frac{1}{2}\left(b\sqrt{a^2-4\,c}+ab-2\,d\right)\frac{1}{\sqrt{a^2-4\,c}},\,b,\,\sqrt{a^2-4\,c}x\right)\_C2+M\left(\frac{1}{2}\left(b\sqrt{a^2-\right.\right.\right.\right.$$

ODE No. 1121

$$-\left(x^2-x\right)y'(x)+xy''(x)+(x-1)y(x)=0$$

✓ **Mathematica** : cpu = 11.2733 (sec), leaf count = 40

$$\left\{\left\{y(x)\to c_2x\int_1^x\frac{e^{\frac{K[1]^2}{2}-K[1]}}{K[1]^2}dK[1]+c_1x\right\}\right\}$$

✓ **Maple** : cpu = 0.033 (sec), leaf count = 23

$$\left\{y(x)=\left(\int\frac{1}{x^2}\mathrm{e}^{\frac{x(x-2)}{2}}\,\mathrm{d}x\_C1+\_C2\right)x\right\}$$

ODE No. 1122

$$-\left(x^2-x-2\right)y'(x)+xy''(x)-x(x+3)y(x)=0$$

✓ **Mathematica** : cpu = 10.7986 (sec), leaf count = 56

$$\left\{\left\{y(x)\to c_2e^{\frac{x^2}{2}}\int_1^x\frac{e^{-\frac{1}{2}K[1]^2-K[1]}}{K[1]^2}dK[1]+c_1e^{\frac{x^2}{2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.276 (sec), leaf count = 28

$$\left\{y(x)=\mathrm{e}^{\frac{x^2}{2}}\left(\int\frac{1}{x^2}\mathrm{e}^{-\frac{x(x+2)}{2}}\,\mathrm{d}x\_C2+\_C1\right)\right\}$$

ODE No. 1123

$$-\left(2ax^2+1\right)y'(x)+bx^3y(x)+xy''(x)=0$$

✓ **Mathematica** : cpu = 0.013526 (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 = 0.076 (sec), leaf count = 45

$$\left\{y(x)=\_C1\,\mathrm{e}^{\frac{x^2}{2}\left(\sqrt{a^2-b}+a\right)}+\_C2\,\mathrm{e}^{-\frac{x^2}{2}\left(\sqrt{a^2-b}-a\right)}\right\}$$

ODE No. 1124

$$-2\left(x^2-a\right)y'(x)+2nxy(x)+xy''(x)=0$$

✓ **Mathematica** : cpu = 0.0804662 (sec), leaf count = 65

$$\left\{\left\{y(x)\to c_1\,{}_1F_1\left(-\frac{n}{2};a+\frac{1}{2};x^2\right)+i^{1-2a}c_2x^{1-2a}\,{}_1F_1\left(-a-\frac{n}{2}+\frac{1}{2};\frac{3}{2}-a;x^2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.128 (sec), leaf count = 29

$$\left\{y(x)=\_C1\,M\left(-\frac{n}{2},\,\frac{1}{2}+a,\,x^2\right)+\_C2\,U\left(-\frac{n}{2},\,\frac{1}{2}+a,\,x^2\right)\right\}$$

ODE No. 1125

$$-4x^5-4x^3y(x)+\left(4x^2-1\right)y'(x)+xy''(x)=0$$

✓ **Mathematica** : cpu = 0.220787 (sec), leaf count = 48

$$\left\{\left\{y(x)\to c_1e^{-\left(1-\sqrt{2}\right)x^2}+c_2e^{-\left(1+\sqrt{2}\right)x^2}-x^2-2\right\}\right\}$$

✓ **Maple** : cpu = 0.075 (sec), leaf count = 36

$$\left\{y(x)=\mathrm{e}^{x^2\left(\sqrt{2}-1\right)}\_C2+\mathrm{e}^{-x^2\left(1+\sqrt{2}\right)}\_C1-x^2-2\right\}$$

ODE No. 1126

$$\left(a^2x^3+a\right)y(x)+\left(2ax^3-1\right)y'(x)+xy''(x)=0$$

✗ **Mathematica** : cpu = 0.934876 (sec), leaf count = 0 , DifferentialRoot result

$$\left\{\left\{y(x)\to \text{DifferentialRoot}\left(\{y,x\},\left\{\left(a^2x^3+a\right)y(x)+\left(2x^3a-1\right)y'(x)+xy''(x)=0,y(1)=c_1,y'(1)=\right.\right.\right.$$

✓ **Maple** : cpu = 0.069 (sec), leaf count = 19

$$\left\{y(x)=\mathrm{e}^{-\frac{ax^3}{3}}\left(\_C2\,x^2+\_C1\right)\right\}$$

ODE No. 1127

$$y(x)\left(a^2 x\log^2(x)+a\log(x)+a\right)+(2ax\log(x)+1)y'(x)+xy''(x)=0$$

✓ **Mathematica** : cpu = 0.0518141 (sec), leaf count = 36

$$\left\{\left\{y(x)\to c_1 e^{ax}x^{-ax}+c_2 e^{ax}x^{-ax}\log(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.026 (sec), leaf count = 21

$$\left\{y(x)=x^{-ax}\mathrm{e}^{ax}\left(\ln(x)\_C2+\_C1\right)\right\}$$

ODE No. 1128

$$(xf(x)+2)y'(x)+f(x)y(x)+xy''(x)=0$$

✗ **Mathematica** : cpu = 0.247436 (sec), leaf count = 0 , could not solve

```
DSolve[f[x]*y[x] + (2 + x*f[x])*Derivative[1][y][x] + x*Derivative[2][y][x] == 0, y[x]
```

✓ **Maple** : cpu = 0.317 (sec), leaf count = 32

$$\left\{y(x)=\frac{1}{x}\left(\_C2\int \mathrm{e}^{\int \frac{-xf(x)-2}{x}\,\mathrm{d}x}x^2\,\mathrm{d}x+\_C1\right)\right\}$$

ODE No. 1129

$$(x-3)y''(x)-(4x-9)y'(x)+(3x-6)y(x)=0$$

✓ **Mathematica** : cpu = 0.0399875 (sec), leaf count = 42

$$\left\{\left\{y(x)\to\frac{1}{8}c_2 e^{3x-9}\left(4x^3-42x^2+150x-183\right)+c_1 e^{x-3}\right\}\right\}$$

✓ **Maple** : cpu = 0.048 (sec), leaf count = 30

$$\left\{y(x)=\mathrm{e}^{x}\_C1+\_C2\,\mathrm{e}^{3x}\left(4x^3-42x^2+150x-183\right)\right\}$$

ODE No. 1130

$$ay(x) + 2xy''(x) + y'(x) = 0$$

✓ **Mathematica** : cpu = 0.0123907 (sec), leaf count = 46

$$\left\{\left\{y(x) \to c_2 \sin\left(\sqrt{2}\sqrt{a}\sqrt{x}\right) + c_1 \cos\left(\sqrt{2}\sqrt{a}\sqrt{x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.023 (sec), leaf count = 31

$$\left\{y(x) = \_C1 \sin\left(\sqrt{x}\sqrt{2}\sqrt{a}\right) + \_C2 \cos\left(\sqrt{x}\sqrt{2}\sqrt{a}\right)\right\}$$

ODE No. 1131

$$ay(x) + 2xy''(x) - (x-1)y'(x) = 0$$

✓ **Mathematica** : cpu = 0.0113197 (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 = 0.115 (sec), leaf count = 33

$$\left\{y(x) = \sqrt{x}\left(U\left(-a+\frac{1}{2}, \frac{3}{2}, \frac{x}{2}\right)\_C2 + M\left(-a+\frac{1}{2}, \frac{3}{2}, \frac{x}{2}\right)\_C1\right)\right\}$$

ODE No. 1132

$$ay(x) + 2xy''(x) - (2x-1)y'(x) = 0$$

✓ **Mathematica** : cpu = 0.0114406 (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 = 0.137 (sec), leaf count = 29

$$\left\{y(x) = \sqrt{x}\left(U\left(-\frac{a}{2}+\frac{1}{2}, \frac{3}{2}, x\right)\_C2 + M\left(-\frac{a}{2}+\frac{1}{2}, \frac{3}{2}, x\right)\_C1\right)\right\}$$

ODE No. 1133

$$(2x-1)y''(x)-(3x-4)y'(x)+(x-3)y(x)=0$$

✓ **Mathematica** : cpu = 0.095681 (sec), leaf count = 92

$$\left\{\left\{y(x)\to 2^{5/8}c_1e^{x-\frac{1}{2}}+\frac{c_2e^{\frac{x}{2}-\frac{1}{2}}\left(\sqrt{2}e^{x/2}\sqrt[4]{2x-1}\Gamma\left(\frac{3}{4},\frac{1}{4}(2x-1)\right)-2\sqrt[4]{e}\right)}{2^{5/8}\sqrt[4]{2x-1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.237 (sec), leaf count = 37

$$\left\{y(x)=1\mathrm{e}^{\frac{x}{2}}\left(U\left(1,\frac{3}{4},\frac{x}{2}-\frac{1}{4}\right)\_C2+M\left(1,\frac{3}{4},\frac{x}{2}-\frac{1}{4}\right)\_C1\right)\frac{1}{\sqrt[4]{2x-1}}\right\}$$

ODE No. 1134

$$4xy''(x)-(a+x)y(x)=0$$

✓ **Mathematica** : cpu = 0.0957092 (sec), leaf count = 78

$$\left\{\left\{y(x)\to \frac{1}{4}c_2e^{-x/2}x\,{}_1F_1\left(\frac{1}{128}(-32(-a-4i)-128i)+1;2;x\right)+\frac{1}{4}c_1e^{-x/2}xU\left(\frac{1}{128}(-32(-a-4i)-12\right.\right.\right.$$

✓ **Maple** : cpu = 0.09 (sec), leaf count = 21

$$\left\{y(x)=\_C1\,M_{-\frac{a}{4},\frac{1}{2}}(x)+\_C2\,W_{-\frac{a}{4},\frac{1}{2}}(x)\right\}$$

ODE No. 1135

$$4xy''(x)+2y'(x)-y(x)=0$$

✓ **Mathematica** : cpu = 0.00992776 (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 = 0.014 (sec), leaf count = 17

$$\left\{y(x)=\_C1\ \sinh\left(\sqrt{x}\right)+\_C2\ \cosh\left(\sqrt{x}\right)\right\}$$

ODE No. 1136

$$4xy''(x) + 4y'(x) - (x+2)y(x) = 0$$

✓ **Mathematica** : cpu = 0.0214017 (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 = 0.066 (sec), leaf count = 16

$$\left\{y(x) = \mathrm{e}^{\frac{x}{2}}\left(Ei(1,x)\_C2 + \_C1\right)\right\}$$

ODE No. 1137

$$ly(x) + 4xy''(x) - (x+2)y(x) + 4y(x) = 0$$

✓ **Mathematica** : cpu = 0.0975225 (sec), leaf count = 74

$$\left\{\left\{y(x) \to \frac{1}{4}c_2 e^{-x/2}x\,{}_1F_1\left(\frac{1}{128}(-32(l+(2-4i)) - 128i) + 1; 2; x\right) + \frac{1}{4}c_1 e^{-x/2}xU\left(\frac{1}{128}(-32(l+(2-4i$$

✓ **Maple** : cpu = 0.097 (sec), leaf count = 25

$$\left\{y(x) = \_C1\, M_{\frac{l}{4}+\frac{1}{2},\frac{1}{2}}(x) + \_C2\, W_{\frac{l}{4}+\frac{1}{2},\frac{1}{2}}(x)\right\}$$

ODE No. 1138

$$y(x)(-(-2m-4n+x)) + 4my'(x) + 4xy''(x) = 0$$

✓ **Mathematica** : cpu = 0.0326926 (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 = 0.134 (sec), leaf count = 26

$$\left\{y(x) = \mathrm{e}^{-\frac{x}{2}}\left(U(-n,\, m,\, x)\_C2 + M(-n,\, m,\, x)\_C1\right)\right\}$$

ODE No. 1139

$$-(a+x)y(x)+16xy''(x)+8y'(x)=0$$

✓ **Mathematica** : cpu = 0.014349 (sec), leaf count = 74

$$\left\{\left\{y(x)\to c_1 e^{\frac{1}{4}(2\log(x)-x)}U\left(\frac{a+6}{8},\frac{3}{2},\frac{x}{2}\right)+c_2 e^{\frac{1}{4}(2\log(x)-x)}L_{\frac{1}{8}(-a-6)}^{\frac{1}{2}}\left(\frac{x}{2}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.143 (sec), leaf count = 37

$$\left\{y(x)=\sqrt{x}\mathrm{e}^{-\frac{x}{4}}\left(M\left(\frac{a}{8}+\frac{3}{4},\frac{3}{2},\frac{x}{2}\right)\_C1+U\left(\frac{a}{8}+\frac{3}{4},\frac{3}{2},\frac{x}{2}\right)\_C2\right)\right\}$$

ODE No. 1140

$$axy''(x)+by'(x)+cy(x)=0$$

✓ **Mathematica** : cpu = 0.0502509 (sec), leaf count = 190

$$\left\{\left\{y(x)\to c_1 a^{\frac{1}{2}\left(\frac{b}{a}-1\right)}c^{\frac{1}{2}\left(1-\frac{b}{a}\right)}x^{\frac{1}{2}\left(1-\frac{b}{a}\right)}\Gamma\left(\frac{b}{a}\right)J_{\frac{b}{a}-1}\left(\frac{2\sqrt{c}\sqrt{x}}{\sqrt{a}}\right)+c_2 a^{\frac{1}{2}\left(1-\frac{b}{a}\right)-\frac{a-b}{a}}c^{\frac{a-b}{a}+\frac{1}{2}\left(\frac{b}{a}-1\right)}x^{\frac{a-b}{a}+\frac{1}{2}\left(\frac{b}{a}-1\right)}\Gamma\left(\right.\right.\right.$$

✓ **Maple** : cpu = 0.033 (sec), leaf count = 66

$$\left\{y(x)=x^{\frac{a-b}{2a}}\left(Y_{\frac{-a+b}{a}}\left(2\sqrt{\frac{c}{a}}\sqrt{x}\right)\_C2+J_{\frac{-a+b}{a}}\left(2\sqrt{\frac{c}{a}}\sqrt{x}\right)\_C1\right)\right\}$$

ODE No. 1141

$$(3a+bx)y'(x)+axy''(x)+3by(x)=0$$

✓ **Mathematica** : cpu = 0.110105 (sec), leaf count = 79

$$\left\{\left\{y(x)\to c_1 e^{-\frac{bx}{a}}-\frac{c_2 e^{-\frac{bx}{a}}\left(a^2 e^{\frac{bx}{a}}-b^2x^2\mathrm{Ei}\left(\frac{bx}{a}\right)+abxe^{\frac{bx}{a}}\right)}{2a^2x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.111 (sec), leaf count = 55

$$\left\{y(x)=\frac{1}{x^2}\left(\mathrm{e}^{-\frac{bx}{a}}Ei\left(1,-\frac{bx}{a}\right)\_C2\,b^2x^2+\_C1\,\mathrm{e}^{-\frac{bx}{a}}x^2+a\_C2\,(bx+a)\right)\right\}$$

ODE No. 1142

$$cy(x)\sqrt[5]{ax+b}+5(ax+b)y''(x)+8ay'(x)=0$$

✓ **Mathematica** : cpu = 0.0551176 (sec), leaf count = 108

$$\left\{\left\{y(x)\to\frac{3ac_2\sin\left(\frac{\sqrt{5}\sqrt{c}(ax+b)^{3/5}}{3a}\right)}{\sqrt{5}\sqrt{c}(ax+b)^{3/5}}+\frac{6ac_1\cos\left(\frac{\sqrt{5}\sqrt{c}(ax+b)^{3/5}}{3a}\right)}{\sqrt{5}\sqrt{c}(ax+b)^{3/5}}\right\}\right\}$$

✓ **Maple** : cpu = 0.153 (sec), leaf count = 53

$$\left\{y(x)=1\left(\_C2\ \cosh\left(\frac{1}{3\,a}(ax+b)^{\frac{3}{5}}\sqrt{-5\,c}\right)+\_C1\ \sinh\left(\frac{1}{3\,a}(ax+b)^{\frac{3}{5}}\sqrt{-5\,c}\right)\right)(ax+b)^{-\frac{3}{5}}\right\}$$

ODE No. 1143

$$(a+bx)y'(x)+2axy''(x)+cy(x)=0$$

✓ **Mathematica** : cpu = 0.0429995 (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 = 0.172 (sec), leaf count = 57

$$\left\{y(x)=\sqrt{x}\mathrm{e}^{-\frac{bx}{2\,a}}\left(M\left(\frac{b-c}{b},\frac{3}{2},\frac{bx}{2\,a}\right)\_C1+U\left(\frac{b-c}{b},\frac{3}{2},\frac{bx}{2\,a}\right)\_C2\right)\right\}$$

ODE No. 1144

$$(3a+bx)y'(x)+2axy''(x)+cy(x)=0$$

✓ **Mathematica** : cpu = 0.0374795 (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 = 0.122 (sec), leaf count = 60

$$\left\{y(x)=\mathrm{e}^{-\frac{bx}{2\,a}}\left(U\left(\frac{3\,b-2\,c}{2\,b},\frac{3}{2},\frac{bx}{2\,a}\right)\_C2+M\left(\frac{3\,b-2\,c}{2\,b},\frac{3}{2},\frac{bx}{2\,a}\right)\_C1\right)\right\}$$

ODE No. 1145

$$y(x)(\text{a0}x+\text{b0})+(\text{a1}x+\text{b1})y'(x)+(\text{a2}x+\text{b2})y''(x)=0$$

✓ **Mathematica** : cpu = 0.3722 (sec), leaf count = 386

$$\left\{\left\{y(x)\to c_1U\left(-\frac{\text{b2a1}^2-\text{a2b1a1}-\sqrt{\text{a1}^2-4\text{a0a2}}\text{b2a1}+2\text{a2}^2\text{b0}+\text{a2}\sqrt{\text{a1}^2-4\text{a0a2}}\text{b1}-2\text{a0a2b2}-2\text{a}}{2\text{a2}^2\sqrt{\text{a1}^2-4\text{a0a2}}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.313 (sec), leaf count = 248

$$\left\{y(x)=\mathrm{e}^{-\frac{x}{2\,a2}\left(\sqrt{-4\,a0\,a2+a1^2}+a1\right)}(a2\,x+b2)^{\frac{a1\,b2+a2^2-a2\,b1}{a2^2}}\left(U\left(\frac{1}{2\,a2^2}\left(\left(a1\,b2+2\,a2^2-a2\,b1\right)\sqrt{-4\,a0\,a}\right.\right.\right.\right.$$

ODE No. 1146

$$x^2y''(x)-6y(x)=0$$

✓ **Mathematica** : cpu = 0.0254939 (sec), leaf count = 18

$$\left\{\left\{y(x)\to c_1x^3+\frac{c_2}{x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.016 (sec), leaf count = 15

$$\left\{y(x)=\frac{\_C1\,x^5+\_C2}{x^2}\right\}$$

ODE No. 1147

$$x^2y''(x)-12y(x)=0$$

✓ **Mathematica** : cpu = 0.0187794 (sec), leaf count = 18

$$\left\{\left\{y(x)\to c_1x^4+\frac{c_2}{x^3}\right\}\right\}$$

✓ **Maple** : cpu = 0.015 (sec), leaf count = 15

$$\left\{y(x)=\frac{\_C1\,x^7+\_C2}{x^3}\right\}$$

ODE No. 1148

$$ay(x) + x^2 y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0113338 (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 = 0.019 (sec), leaf count = 35

$$\left\{y(x) = \_C1\, x^{\frac{1}{2}+\frac{1}{2}\sqrt{1-4\,a}} + \_C2\, x^{\frac{1}{2}-\frac{1}{2}\sqrt{1-4\,a}}\right\}$$

ODE No. 1149

$$y(x)(ax+b) + x^2 y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0662417 (sec), leaf count = 212

$$\left\{\left\{y(x) \to c_2 a^{\frac{1}{2}\left(\sqrt{1-4b}+1\right)-\frac{1}{2}\sqrt{1-4b}} x^{\frac{1}{2}\left(\sqrt{1-4b}+1\right)-\frac{1}{2}\sqrt{1-4b}} \Gamma\left(\sqrt{1-4b}+1\right) J_{\sqrt{1-4b}}\left(2\sqrt{a}\sqrt{x}\right) + c_1 a^{\frac{1}{2}\left(1-\sqrt{1-4b}\right)+\frac{1}{2}\surd}\right.\right.$$

✓ **Maple** : cpu = 0.02 (sec), leaf count = 45

$$\left\{y(x) = \sqrt{x}\left(Y_{\sqrt{1-4\,b}}\left(2\,\sqrt{a}\sqrt{x}\right)\_C2 + J_{\sqrt{1-4\,b}}\left(2\,\sqrt{a}\sqrt{x}\right)\_C1\right)\right\}$$

ODE No. 1150

$$x^2 y''(x) + \left(x^2 - 2\right) y(x) = 0$$

✓ **Mathematica** : cpu = 0.0100807 (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 = 0.115 (sec), leaf count = 27

$$\left\{y(x) = \frac{\left(\_C1\, x + \_C2\right)\cos\left(x\right) + \sin\left(x\right)\left(\_C2\, x - \_C1\right)}{x}\right\}$$

ODE No. 1151

$$x^2y''(x) - \left(ax^2+2\right)y(x) = 0$$

✓ **Mathematica** : cpu = 0.0198808 (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 = 0.109 (sec), leaf count = 43

$$\left\{y(x)=\frac{1}{x}\left(\_C2\,\left(ax+\sqrt{a}\right)e^{-\sqrt{a}x}-\_C1\,e^{\sqrt{a}x}\left(ax-\sqrt{a}\right)\right)\right\}$$

ODE No. 1152

$$\left(a^2x^2-6\right)y(x)+x^2y''(x)=0$$

✓ **Mathematica** : cpu = 0.020164 (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 = 0.293 (sec), leaf count = 53

$$\left\{y(x)=\frac{\left(\_C1\,a^2x^2+3\,\_C2\,ax-3\,\_C1\right)\cos(ax)+\sin(ax)\left(\_C2\,a^2x^2-3\,\_C1\,ax-3\,\_C2\right)}{x^2}\right\}$$

ODE No. 1153

$$y(x)\left(ax^2-(v-1)v\right)+x^2y''(x)=0$$

✓ **Mathematica** : cpu = 0.034648 (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 = 0.045 (sec), leaf count = 31

$$\left\{y(x)=\sqrt{x}\left(Y_{v-\frac{1}{2}}\left(\sqrt{a}x\right)\_C2+J_{v-\frac{1}{2}}\left(\sqrt{a}x\right)\_C1\right)\right\}$$

ODE No. 1154

$$y(x)\left(ax^2+bx+c\right)+x^2y''(x)=0$$

✓ **Mathematica** : cpu = 0.0204677 (sec), leaf count = 88

$$\left\{\left\{y(x)\to c_1 M_{-\frac{ib}{2\sqrt{a}},-\frac{1}{2}i\sqrt{4c-1}}\left(2i\sqrt{a}x\right)+c_2 W_{-\frac{ib}{2\sqrt{a}},-\frac{1}{2}i\sqrt{4c-1}}\left(2i\sqrt{a}x\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.16 (sec), leaf count = 57

$$\left\{y(x)=\_C1\ M_{-\frac{i}{2}b\frac{1}{\sqrt{a}},\,\frac{1}{2}\sqrt{1-4\,c}}\left(2\,i\sqrt{a}x\right)+\_C2\ W_{-\frac{i}{2}b\frac{1}{\sqrt{a}},\,\frac{1}{2}\sqrt{1-4\,c}}\left(2\,i\sqrt{a}x\right)\right\}$$

ODE No. 1155

$$y(x)\left(ax^k-(b-1)b\right)+x^2y''(x)=0$$

✓ **Mathematica** : cpu = 0.0526687 (sec), leaf count = 225

$$\left\{\left\{y(x)\to c_1 k^{-\frac{2(1-b)}{k}-\frac{2b}{k}+\frac{1}{k}} a^{\frac{1-b}{k}+\frac{1}{2}\left(\frac{2b}{k}-\frac{1}{k}\right)}\left(x^k\right)^{\frac{1-b}{k}+\frac{1}{2}\left(\frac{2b}{k}-\frac{1}{k}\right)}\Gamma\left(-\frac{2b}{k}+\frac{1}{k}+1\right)J_{\frac{1-2b}{k}}\left(\frac{2\sqrt{a}\sqrt{x^k}}{k}\right)+c_2 k^{-1/k}$$

✓ **Maple** : cpu = 0.099 (sec), leaf count = 67

$$\left\{y(x)=\sqrt{x}\left(Y_{\frac{1}{k}\sqrt{(2\,b-1)^2}}\left(2\,\frac{\sqrt{a}x^{k/2}}{k}\right)\_C2+J_{\frac{1}{k}\sqrt{(2\,b-1)^2}}\left(2\,\frac{\sqrt{a}x^{k/2}}{k}\right)\_C1\right)\right\}$$

ODE No. 1156

$$x^2y''(x)+\frac{y(x)}{\log(x)}-e^x x(x\log(x)+2)=0$$

✗ **Mathematica** : cpu = 0.208489 (sec), leaf count = 0 , could not solve

```
DSolve[-(E^x*x*(2 + x*Log[x])) + y[x]/Log[x] + x^2*Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 0.207 (sec), leaf count = 71

$$\left\{y(x)=\ln(x)\,\_C2-\left(Ei(1,-\ln(x))\ln(x)+x\right)\_C1-\ln(x)\left(-\int\frac{\left(Ei(1,-\ln(x))\ln(x)+x\right)e^x(2+x}{x}\right.\right.$$

ODE No. 1157

$$ay'(x) + x^2y''(x) - xy(x) = 0$$

✗ **Mathematica** : cpu = 0.484242 (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

$$\left\{y(x) = DESol\left(\left\{\frac{\mathrm{d}^2}{\mathrm{d}x^2}\_Y(x) + \frac{a\frac{\mathrm{d}}{\mathrm{d}x}\_Y(x)}{x^2} - \frac{\_Y(x)}{x}\right\}, \{\_Y(x)\}\right)\right\}$$

ODE No. 1158

$$-y(x)\left(ab + b^2x^2\right) + ay'(x) + x^2y''(x) = 0$$

✓ **Mathematica** : cpu = 17.4651 (sec), leaf count = 42

$$\left\{\left\{y(x) \to c_2e^{bx}\int_1^x e^{\frac{a}{K[1]}-2bK[1]}\,dK[1] + c_1e^{bx}\right\}\right\}$$

✓ **Maple** : cpu = 0.409 (sec), leaf count = 178

$$\left\{y(x) = \sqrt{x}\left(\mathrm{e}^{bx}HeunD\left(-4\sqrt{2}\sqrt{ab}, -1 - 4\sqrt{2}\sqrt{ab}, 8\sqrt{2}\sqrt{ab}, -4\sqrt{2}\sqrt{ab} + 1, 1\left(\sqrt{2}\sqrt{ab}x - a\right)\left(\sqrt{2}\sqrt{a}\right.\right.\right.\right.$$

ODE No. 1159

$$-ax^2 + x^2y''(x) + xy'(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 0.0148171 (sec), leaf count = 44

$$\left\{\left\{y(x) \to \frac{ax^2}{3} + \frac{c_1(x^2+1)}{2x} + \frac{ic_2(x^2-1)}{2x}\right\}\right\}$$

✓ **Maple** : cpu = 0.022 (sec), leaf count = 19

$$\left\{y(x) = x\_C2 + \frac{ax^2}{3} + \frac{\_C1}{x}\right\}$$

ODE No. 1160

$$ay(x) + x^2 y''(x) + xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.0096593 (sec), leaf count = 30

$$\left\{\left\{y(x) \to c_2 \sin\left(\sqrt{a}\log(x)\right) + c_1 \cos\left(\sqrt{a}\log(x)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.022 (sec), leaf count = 23

$$\left\{y(x) = \_C1\ \sin\left(\sqrt{a}\ln(x)\right) + \_C2\ \cos\left(\sqrt{a}\ln(x)\right)\right\}$$

ODE No. 1161

$$-(a+x)y(x) + x^2 y''(x) + xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.0487982 (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 = 0.015 (sec), leaf count = 31

$$\left\{y(x) = \_C1\ I_{2\sqrt{a}}\left(2\sqrt{x}\right) + \_C2\ K_{2\sqrt{a}}\left(2\sqrt{x}\right)\right\}$$

ODE No. 1162

$$\left(x^2 - v^2\right) y(x) + x^2 y''(x) + xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.0601733 (sec), leaf count = 18

$$\{\{y(x) \to c_1 J_v(x) + c_2 Y_v(x)\}\}$$

✓ **Maple** : cpu = 0.016 (sec), leaf count = 15

$$\{y(x) = \_C1\ J_v(x) + \_C2\ Y_v(x)\}$$

ODE No. 1163

$$-f(x) + \left(x^2 - v^2\right) y(x) + x^2 y''(x) + x y'(x) = 0$$

✓ **Mathematica** : cpu = 0.334185 (sec), leaf count = 70

$$\left\{\left\{y(x) \to J_v(x) \int_1^x -\frac{\pi f(K[1]) Y_v(K[1])}{2K[1]} \, dK[1] + Y_v(x) \int_1^x \frac{\pi f(K[2]) J_v(K[2])}{2K[2]} \, dK[2] + c_1 J_v(x) + c_2 Y_v(x$$

✓ **Maple** : cpu = 0.112 (sec), leaf count = 49

$$\left\{y(x) = -\frac{J_v(x)\pi}{2} \int \frac{Y_v(x) f(x)}{x} \, dx + \frac{Y_v(x)\pi}{2} \int \frac{J_v(x) f(x)}{x} \, dx + Y_v(x)\_C1 + J_v(x)\_C2\right\}$$

ODE No. 1164

$$y(x)\left(l x^2 - v^2\right) + x^2 y''(x) + x y'(x) = 0$$

✓ **Mathematica** : cpu = 0.0219223 (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 = 0.037 (sec), leaf count = 23

$$\left\{y(x) = \_C1 \, J_v\left(\sqrt{l} x\right) + \_C2 \, Y_v\left(\sqrt{l} x\right)\right\}$$

ODE No. 1165

$$(a + x) y'(x) + x^2 y''(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 0.0775915 (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 = 0.021 (sec), leaf count = 19

$$\left\{y(x) = (x + a)\_C1 + \_C2 \, x e^{\frac{a}{x}}\right\}$$

ODE No. 1166

$$-3x^3 + x^2y''(x) - xy'(x) + y(x) = 0$$

✓ **Mathematica** : cpu = 0.0139211 (sec), leaf count = 23

$$\left\{\left\{y(x) \to c_1 x + c_2 x \log(x) + \frac{3x^3}{4}\right\}\right\}$$

✓ **Maple** : cpu = 0.02 (sec), leaf count = 21

$$\left\{y(x) = \frac{x(4\_C1\ \ln(x) + 3\,x^2 + 4\_C2)}{4}\right\}$$

ODE No. 1167

$$y(x)\left(ax^m + b\right) + x^2y''(x) - xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.08 (sec), leaf count = 326

$$\left\{\left\{y(x) \to c_1 m^{-\frac{2(m-i\sqrt{b-1}m)}{m^2} - \frac{2i\sqrt{b-1}}{m}} a^{\frac{m-i\sqrt{b-1}m}{m^2} + \frac{i\sqrt{b-1}}{m}} (x^m)^{\frac{m-i\sqrt{b-1}m}{m^2} + \frac{i\sqrt{b-1}}{m}} \Gamma\left(1 - \frac{2i\sqrt{b-1}}{m}\right) J_{-\frac{2i\sqrt{b-1}}{m}}\left(\frac{2\sqrt{a}\sqrt{}}{m}\right.\right.\right.$$

✓ **Maple** : cpu = 0.042 (sec), leaf count = 63

$$\left\{y(x) = x\left(Y_{2\,\frac{\sqrt{1-b}}{m}}\left(2\,\frac{\sqrt{a}x^{m/2}}{m}\right)\_C2 + J_{2\,\frac{\sqrt{1-b}}{m}}\left(2\,\frac{\sqrt{a}x^{m/2}}{m}\right)\_C1\right)\right\}$$

ODE No. 1168

$$x^2y''(x) + 2xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.00532098 (sec), leaf count = 15

$$\left\{\left\{y(x) \to c_2 - \frac{c_1}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.015 (sec), leaf count = 11

$$\left\{y(x) = \_C1 + \frac{\_C2}{x}\right\}$$

ODE No. 1169

$$y(x)\left(ax-b^2\right)+x^2y''(x)+2xy'(x)=0$$

✓ **Mathematica** : cpu = 0.0703794 (sec), leaf count = 236

$$\left\{\left\{y(x)\to c_1a^{\frac{1}{2}\left(-\sqrt{4b^2+1}-1\right)+\frac{1}{2}\sqrt{4b^2+1}}x^{\frac{1}{2}\left(-\sqrt{4b^2+1}-1\right)+\frac{1}{2}\sqrt{4b^2+1}}\Gamma\left(1-\sqrt{4b^2+1}\right)J_{-\sqrt{4b^2+1}}\left(2\sqrt{a}\sqrt{x}\right)+c_2a^{\frac{1}{2}\left(\sqrt{\right.}}\right.\right.$$

✓ **Maple** : cpu = 0.036 (sec), leaf count = 49

$$\left\{y(x)=1\left(\_C2\,Y_{\sqrt{4\,b^2+1}}\left(2\,\sqrt{a}\sqrt{x}\right)+\_C1\,J_{\sqrt{4\,b^2+1}}\left(2\,\sqrt{a}\sqrt{x}\right)\right)\frac{1}{\sqrt{x}}\right\}$$

ODE No. 1170

$$y(x)\left(ax^2+b\right)+x^2y''(x)+2xy'(x)=0$$

✓ **Mathematica** : cpu = 0.0230486 (sec), leaf count = 58

$$\left\{\left\{y(x)\to c_1j_{\frac{1}{2}\left(\sqrt{1-4b}-1\right)}\left(\sqrt{a}x\right)+c_2y_{\frac{1}{2}\left(\sqrt{1-4b}-1\right)}\left(\sqrt{a}x\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.055 (sec), leaf count = 43

$$\left\{y(x)=1\left(\_C2\,Y_{\frac{1}{2}\sqrt{1-4\,b}}\left(\sqrt{a}x\right)+\_C1\,J_{\frac{1}{2}\sqrt{1-4\,b}}\left(\sqrt{a}x\right)\right)\frac{1}{\sqrt{x}}\right\}$$

ODE No. 1171

$$y(x)\left(ax+lx^2-n(n+1)\right)+x^2y''(x)+2xy'(x)=0$$

✓ **Mathematica** : cpu = 0.0548046 (sec), leaf count = 142

$$\left\{\left\{y(x)\to c_1e^{n\log(x)-i\sqrt{l}x}U\left(\frac{i\left(a-2i\sqrt{l}n-2i\sqrt{l}\right)}{2\sqrt{l}},2n+2,2i\sqrt{l}x\right)+c_2e^{n\log(x)-i\sqrt{l}x}L_{-\frac{i\left(a-2i\sqrt{l}n-2i\sqrt{l}\right)}{2\sqrt{l}}}^{2n+1}\left(2i\right.\right.\right.$$

✓ **Maple** : cpu = 0.18 (sec), leaf count = 49

$$\left\{y(x)=\frac{1}{x}\left(\_C2\,W_{-\frac{i}{2}a\frac{1}{\sqrt{l}},n+\frac{1}{2}}\left(2\,i\sqrt{l}x\right)+\_C1\,M_{-\frac{i}{2}a\frac{1}{\sqrt{l}},n+\frac{1}{2}}\left(2\,i\sqrt{l}x\right)\right)\right\}$$

ODE No. 1172

$$ay(x) + x^2 y''(x) + 2(x-1)y'(x) = 0$$

✓ **Mathematica** : cpu = 0.0697391 (sec), leaf count = 158

$$\left\{\left\{y(x) \to 2^{\frac{1}{2}\left(1-\sqrt{1-4a}\right)} c_1 \left(\frac{1}{x}\right)^{\frac{1}{2}\left(1-\sqrt{1-4a}\right)} {}_1F_1\left(\frac{1}{2} - \frac{1}{2}\sqrt{1-4a}; 1-\sqrt{1-4a}; -\frac{2}{x}\right) + 2^{\frac{1}{2}\left(\sqrt{1-4a}+1\right)} c_2 \left(\frac{1}{x}\right)^{\frac{1}{2}}\right.\right.$$

✓ **Maple** : cpu = 0.044 (sec), leaf count = 47

$$\left\{y(x) = e^{-x^{-1}} \sqrt{x^{-1}} \left(K_{\frac{1}{2}\sqrt{1-4\,a}}\left(x^{-1}\right)\_C2 + I_{\frac{1}{2}\sqrt{1-4\,a}}\left(x^{-1}\right)\_C1\right)\right\}$$

ODE No. 1173

$$2(a+x)y'(x) - (b-1)by(x) + x^2 y''(x) = 0$$

✓ **Mathematica** : cpu = 0.106051 (sec), leaf count = 74

$$\left\{\left\{y(x) \to (-2)^{1-b} c_1 a^{1-b} \left(\frac{1}{x}\right)^{1-b} {}_1F_1\left(1-b; 2-2b; \frac{2a}{x}\right) + (-2)^b c_2 a^b \left(\frac{1}{x}\right)^b {}_1F_1\left(b; 2b; \frac{2a}{x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.115 (sec), leaf count = 37

$$\left\{y(x) = 1e^{\frac{a}{x}} \left(K_{b-\frac{1}{2}}\left(\frac{a}{x}\right)\_C2 + I_{b-\frac{1}{2}}\left(\frac{a}{x}\right)\_C1\right) \frac{1}{\sqrt{x}}\right\}$$

ODE No. 1174

$$x^5(-\log(x)) + x^2 y''(x) - 2xy'(x) + 2y(x) = 0$$

✓ **Mathematica** : cpu = 0.0193525 (sec), leaf count = 33

$$\left\{\left\{y(x) \to c_2 x^2 + c_1 x + \frac{1}{144}\left(12x^5 \log(x) - 7x^5\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.105 (sec), leaf count = 25

$$\left\{y(x) = \frac{x^5 \ln(x)}{12} - \frac{7\,x^5}{144} + \_C1\,x^2 + x\_C2\right\}$$

ODE No. 1175

$$-\left(ax^2+12a+4\right)\cos(x)+x^2y''(x)-2xy'(x)-4y(x)-x\sin(x)=0$$

✓ **Mathematica** : cpu = 0.17257 (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 = 0.065 (sec), leaf count = 29

$$\left\{y(x)=\frac{(-2\,a-1)\sin(x)+x^5\_C2-ax\cos(x)+\_C1}{x}\right\}$$

ODE No. 1176

$$x^2y''(x)+\left(x^2+2\right)y(x)-2xy'(x)=0$$

✓ **Mathematica** : cpu = 0.018102 (sec), leaf count = 33

$$\left\{\left\{y(x)\to c_1e^{-ix}x-\frac{1}{2}ic_2e^{ix}x\right\}\right\}$$

✓ **Maple** : cpu = 0.069 (sec), leaf count = 15

$$\{y(x)=x(\cos(x)\_C2+\sin(x)\_C1)\}$$

ODE No. 1177

$$x^2y''(x)+\left(x^2+2\right)y'(x)+x^2(-\sec(x))-2xy'(x)=0$$

✗ **Mathematica** : cpu = 3599.94 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.099 (sec), leaf count = 34

$$\left\{y(x)=x\left(-\cos(x)\int\frac{\sin(x)}{\cos(x)\,x}\,dx+\cos(x)\_C1+\sin(x)(\_C2+\ln(x))\right)\right\}$$

ODE No. 1178

$$x^3(-\sec(x)) + x^2y''(x) + \left(x^2+2\right)y(x) - 2xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.0667236 (sec), leaf count = 74

$$\left\{\left\{y(x) \to c_1e^{-ix}x - \frac{1}{2}ic_2e^{ix}x + \frac{1}{2}e^{-ix}x\left(e^{2ix}\log\left(1+e^{-2ix}\right) + \log\left(1+e^{2ix}\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.037 (sec), leaf count = 23

$$\{y(x) = (\cos(x)\ln(\cos(x)) + \cos(x)\_C1 + \sin(x)(x+\_C2))x\}$$

ODE No. 1179

$$\left(a^2x^2+2\right)y(x) + x^2y''(x) - 2xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.0225629 (sec), leaf count = 38

$$\left\{\left\{y(x) \to c_1xe^{-iax} - \frac{ic_2xe^{iax}}{2a}\right\}\right\}$$

✓ **Maple** : cpu = 0.048 (sec), leaf count = 19

$$\{y(x) = x(\cos(ax)\_C2 + \sin(ax)\_C1)\}$$

ODE No. 1180

$$-f(x) + \left(-v^2+x^2+1\right)y(x) + x^2y''(x) + 3xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.214505 (sec), leaf count = 73

$$\left\{\left\{y(x) \to \frac{J_v(x)\int_1^x -\frac{1}{2}\pi f(K[1])Y_v(K[1])\,dK[1] + Y_v(x)\int_1^x \frac{1}{2}\pi f(K[2])J_v(K[2])\,dK[2]}{x} + \frac{c_1J_v(x)}{x} + \frac{c_2Y_v(}{x}\right.\right.$$

✓ **Maple** : cpu = 0.069 (sec), leaf count = 49

$$\left\{y(x) = \frac{Y_v(x)\pi\int J_v(x)f(x)\,dx - J_v(x)\pi\int Y_v(x)f(x)\,dx + 2Y_v(x)\_C1 + 2J_v(x)\_C2}{2x}\right\}$$

ODE No. 1181

$$x^2 y''(x) + (3x-1)y'(x) + y(x) = 0$$

✓ **Mathematica** : cpu = 0.0449853 (sec), leaf count = 37

$$\left\{\left\{y(x) \to \frac{c_1 e^{-1/x}}{x} - \frac{c_2 e^{-1/x}\text{Ei}\left(\frac{1}{x}\right)}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.026 (sec), leaf count = 25

$$\left\{y(x) = \frac{1}{x e^{x^{-1}}}\left(\_C1\ Ei\left(1, -x^{-1}\right) + \_C2\right)\right\}$$

ODE No. 1182

$$x^2 y''(x) - 3xy'(x) + 4y(x) - 5x = 0$$

✓ **Mathematica** : cpu = 0.016977 (sec), leaf count = 24

$$\{\{y(x) \to c_1 x^2 + 2c_2 x^2 \log(x) + 5x\}\}$$

✓ **Maple** : cpu = 0.02 (sec), leaf count = 20

$$\{y(x) = x^2\_C2 + x^2 \ln(x)\_C1 + 5x\}$$

ODE No. 1183

$$x^2 y''(x) + x^2(-\log(x)) - 3xy'(x) - 5y(x) = 0$$

✓ **Mathematica** : cpu = 0.0308034 (sec), leaf count = 27

$$\left\{\left\{y(x) \to c_1 x^5 + \frac{c_2}{x} - \frac{1}{9}x^2 \log(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.018 (sec), leaf count = 22

$$\left\{y(x) = x^5\_C2 + \frac{\_C1}{x} - \frac{x^2 \ln(x)}{9}\right\}$$

ODE No. 1184

$$-x^4+x^2y''(x)+x^2-4xy'(x)+6y(x)=0$$

✓ **Mathematica** : cpu = 0.0201662 (sec), leaf count = 38

$$\left\{\left\{y(x)\to c_2x^3+c_1x^2+\frac{1}{2}\left(x^4+2x^2+2x^2\log(x)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.04 (sec), leaf count = 25

$$\left\{y(x)=\frac{x^2(2\_C1\,x+x^2+2\ln(x)+2\_C2+2)}{2}\right\}$$

ODE No. 1185

$$-\left(2x^3-4\right)y(x)+x^2y''(x)+5xy'(x)=0$$

✓ **Mathematica** : cpu = 0.0375425 (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 = 0.037 (sec), leaf count = 33

$$\left\{y(x)=\frac{1}{x^2}\left(\_C2\,K_0\left(\frac{2\sqrt{2}}{3}x^{\frac{3}{2}}\right)+\_C1\,I_0\left(\frac{2\sqrt{2}}{3}x^{\frac{3}{2}}\right)\right)\right\}$$

ODE No. 1186

$$x^3(-\sin(x))+x^2y''(x)-5xy'(x)+8y(x)=0$$

✓ **Mathematica** : cpu = 0.0337866 (sec), leaf count = 42

$$\left\{\left\{y(x)\to c_2x^4+c_1x^2+\frac{1}{2}\left(x^4\mathrm{Ci}(x)-x^3\sin(x)+x^2\cos(x)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.04 (sec), leaf count = 36

$$\left\{y(x)=\frac{x^4\,Ci(x)}{2}-\frac{\sin(x)\,x^3}{2}+\frac{x^2(2\_C1\,x^2+2\_C2+\cos(x))}{2}\right\}$$

ODE No. 1187

$$axy'(x) + by(x) + x^2y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0119616 (sec), leaf count = 99

$$\left\{\left\{y(x)\to c_1x^{\frac{1}{2}\sqrt{b}\left(-\frac{\sqrt{a^2-2a-4b+1}}{\sqrt{b}}-\frac{a-1}{\sqrt{b}}\right)}+c_2x^{\frac{1}{2}\sqrt{b}\left(\frac{\sqrt{a^2-2a-4b+1}}{\sqrt{b}}-\frac{a-1}{\sqrt{b}}\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.025 (sec), leaf count = 53

$$\left\{y(x) = \_C1\, x^{-\frac{a}{2}+\frac{1}{2}+\frac{1}{2}\sqrt{a^2-2\,a-4\,b+1}} + \_C2\, x^{-\frac{a}{2}+\frac{1}{2}-\frac{1}{2}\sqrt{a^2-2\,a-4\,b+1}}\right\}$$

ODE No. 1188

$$(ax+b)y'(x) + cy(x) + x^2y''(x) = 0$$

✓ **Mathematica** : cpu = 0.136179 (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 = 0.213 (sec), leaf count = 114

$$\left\{y(x) = x^{-\frac{1}{2}\sqrt{a^2-2\,a-4\,c+1}-\frac{a}{2}+\frac{1}{2}}\left(M\left(-\frac{1}{2}+\frac{1}{2}\sqrt{a^2-2\,a-4\,c+1}+\frac{a}{2},\, 1+\sqrt{a^2-2\,a-4\,c+1},\, \frac{b}{x}\right)\_C1 +\right.\right.$$

ODE No. 1189

$$axy'(x) + y(x)\left(bx^m + c\right) + x^2y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0698662 (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 = 0.06 (sec), leaf count = 79

$$\left\{y(x) = x^{-\frac{a}{2}+\frac{1}{2}}\left(Y_{\frac{1}{m}\sqrt{a^2-2\,a-4\,c+1}}\left(2\,\frac{\sqrt{b}x^{m/2}}{m}\right)\_C2 + J_{\frac{1}{m}\sqrt{a^2-2\,a-4\,c+1}}\left(2\,\frac{\sqrt{b}x^{m/2}}{m}\right)\_C1\right)\right\}$$

ODE No. 1190

$$y(x)(ax+b)+x^2y''(x)+x^2y'(x)=0$$

✓ **Mathematica** : cpu = 0.033505 (sec), leaf count = 122

$$\left\{\left\{y(x)\to c_1e^{\frac{1}{2}((\sqrt{1-4b}+1)\log(x)-2x)}U\left(\frac{1}{2}\left(-2a+\sqrt{1-4b}+1\right),\sqrt{1-4b}+1,x\right)+c_2e^{\frac{1}{2}((\sqrt{1-4b}+1)\log(x)-2x)}\right.\right.$$

✓ **Maple** : cpu = 0.145 (sec), leaf count = 38

$$\left\{y(x)=\mathrm{e}^{-\frac{x}{2}}\left(W_{a,\,\frac{1}{2}\sqrt{1-4b}}(x)\_C2+M_{a,\,\frac{1}{2}\sqrt{1-4b}}(x)\_C1\right)\right\}$$

ODE No. 1191

$$x^2y''(x)+x^2y'(x)-2y(x)=0$$

✓ **Mathematica** : cpu = 0.00950123 (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 = 0.023 (sec), leaf count = 23

$$\left\{y(x)=\frac{\_C2\,(x+2)\,\mathrm{e}^{-x}+\_C1\,(x-2)}{x}\right\}$$

ODE No. 1192

$$x^2y''(x)+\left(x^2-1\right)y'(x)-y(x)=0$$

✓ **Mathematica** : cpu = 12.1019 (sec), leaf count = 39

$$\left\{\left\{y(x)\to c_2e^{-x}\int_1^x e^{K[1]-\frac{1}{K[1]}}\,dK[1]+c_1e^{-x}\right\}\right\}$$

✓ **Maple** : cpu = 0.282 (sec), leaf count = 51

$$\left\{y(x)=\sqrt{x}\left(\mathrm{e}^{-x}\mathit{HeunD}\left(4,3,-8,5,\frac{x-1}{1+x}\right)\_C1+\mathrm{e}^{-x^{-1}}\mathit{HeunD}\left(-4,3,-8,5,\frac{x-1}{1+x}\right)\_C2\right)\right\}$$

ODE No. 1193

$$x^2y''(x) + (x+1)xy'(x) + (x-9)y(x) = 0$$

✓ **Mathematica** : cpu = 0.0484523 (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 = 0.05 (sec), leaf count = 38

$$\left\{y(x) = \frac{\_C2\,(x^3+9\,x^2+36\,x+60)\,e^{-x} + \_C1\,(x^2-8\,x+20)}{x^3}\right\}$$

ODE No. 1194

$$x^2y''(x) + (x+1)xy'(x) + (3x-1)y(x) = 0$$

✓ **Mathematica** : cpu = 0.0589116 (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 = 0.08 (sec), leaf count = 48

$$\left\{y(x) = \frac{x^2\_C2\,e^{-x}(x-3)\,Ei(1,-x) + \_C1\,x^2(x-3)\,e^{-x} + \_C2\,(x^2-2\,x-1)}{x}\right\}$$

ODE No. 1195

$$x^2y''(x) + (x+3)xy'(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 0.0306514 (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 = 0.142 (sec), leaf count = 93

$$\left\{y(x) = -1e^{-\frac{x}{2}}\left(-\_C1\left(\sqrt{2}+x+1\right)I_{-\frac{1}{2}+\sqrt{2}}\left(\frac{x}{2}\right) - \_C1\left(-\sqrt{2}+x+1\right)I_{\frac{1}{2}+\sqrt{2}}\left(\frac{x}{2}\right) + \_C2\left(\left(-x-\sqrt{\right.\right.\right.\right.$$

ODE No. 1196

$$x^2y''(x) - (x-1)xy'(x) + (x-1)y(x) = 0$$

✓ **Mathematica** : cpu = 0.0298076 (sec), leaf count = 37

$$\left\{\left\{y(x) \to \frac{c_2(x^2\text{Ei}(x) - e^x x - e^x)}{2x} + c_1 x\right\}\right\}$$

✓ **Maple** : cpu = 0.049 (sec), leaf count = 31

$$\left\{y(x) = \frac{Ei(1,-x)\_C2\, x^2 + \_C2\,(1+x)\,e^x + \_C1\, x^2}{x}\right\}$$

ODE No. 1197

$$-(a+x)y(x) + x^2y''(x) - \left(x^2-2x\right)y'(x) = 0$$

✓ **Mathematica** : cpu = 0.0184089 (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 = 0.075 (sec), leaf count = 43

$$\left\{y(x) = 1e^{\frac{x}{2}}\left(K_{\frac{1}{2}\sqrt{4\,a+1}}\left(\frac{x}{2}\right)\_C2 + I_{\frac{1}{2}\sqrt{4\,a+1}}\left(\frac{x}{2}\right)\_C1\right)\frac{1}{\sqrt{x}}\right\}$$

ODE No. 1198

$$x^2y''(x) - \left(x^2-2x\right)y'(x) - (3x+2)y(x) = 0$$

✓ **Mathematica** : cpu = 0.0293801 (sec), leaf count = 41

$$\left\{\left\{y(x) \to c_1 e^x x - \frac{c_2(e^x x^3\text{Ei}(-x) + x^2 - x + 2)}{6x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.056 (sec), leaf count = 37

$$\left\{y(x) = \frac{-e^x Ei(1,x)\_C2\, x^3 + \_C1\, x^3 e^x + \_C2\,(x^2-x+2)}{x^2}\right\}$$

ODE No. 1199

$$x^2y''(x) - (x+4)xy'(x) + 4y(x) = 0$$

✓ **Mathematica** : cpu = 0.014108 (sec), leaf count = 41

$$\left\{\left\{y(x)\to c_2e^x x^4 - \frac{1}{6}c_1 x\left(e^x x^3 \text{Ei}(-x) + x^2 - x + 2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.032 (sec), leaf count = 35

$$\left\{y(x) = x\left(\mathrm{e}^x Ei(1,x)\_C2\, x^3 + \_C1\, x^3\mathrm{e}^x - \_C2\,\left(x^2 - x + 2\right)\right)\right\}$$

ODE No. 1200

$$-(v-1)vy(x) + x^2y''(x) + 2x^2y'(x) = 0$$

✓ **Mathematica** : cpu = 0.0233481 (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 = 0.023 (sec), leaf count = 27

$$\left\{y(x) = \mathrm{e}^{-x}\sqrt{x}\left(K_{v-\frac{1}{2}}(x)\_C2 + I_{v-\frac{1}{2}}(x)\_C1\right)\right\}$$

ODE No. 1201

$$x^2y''(x) + (2x+1)xy'(x) - 4y(x) = 0$$

✓ **Mathematica** : cpu = 0.0560247 (sec), leaf count = 44

$$\left\{\left\{y(x)\to \frac{c_1e^{-2x}(2x+3)}{2x^2} + \frac{c_2(2x^2-4x+3)}{4x^2}\right\}\right\}$$

✓ **Maple** : cpu = 1.101 (sec), leaf count = 34

$$\left\{y(x) = \frac{\_C1\,(2\,x^2 - 4\,x + 3)}{x^2} + \frac{\_C2\,\mathrm{e}^{-2\,x}(2\,x+3)}{x^2}\right\}$$

ODE No. 1202

$$x^2y''(x) - 2(x+1)xy'(x) + 2(x+1)y(x) = 0$$

✓ **Mathematica** : cpu = 0.0149486 (sec), leaf count = 22

$$\left\{\left\{y(x) \to c_1x + \frac{1}{2}c_2e^{2x}x\right\}\right\}$$

✓ **Maple** : cpu = 0.42 (sec), leaf count = 14

$$\{y(x) = x(\mathrm{e}^{2x}\_C2 + \_C1)\}$$

ODE No. 1203

$$ax^2y'(x) + x^2y''(x) - 2y(x) = 0$$

✓ **Mathematica** : cpu = 0.0208641 (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 = 0.055 (sec), leaf count = 28

$$\left\{y(x) = \frac{\_C2\,(ax+2)\,\mathrm{e}^{-ax} + \_C1\,(ax-2)}{x}\right\}$$

ODE No. 1204

$$x^2(a+2b)y'(x) + y(x)\left(bx^2(a+b) - 2\right) + x^2y''(x) = 0$$

✓ **Mathematica** : cpu = 0.020571 (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 = 0.063 (sec), leaf count = 35

$$\left\{y(x) = \frac{\_C2\,(ax+2)\,\mathrm{e}^{-(a+b)x} + \_C1\,\mathrm{e}^{-bx}(ax-2)}{x}\right\}$$

ODE No. 1205

$$ax^2y'(x) + f(x)y(x) + x^2y''(x) = 0$$

✗ **Mathematica** : cpu = 0.197538 (sec), leaf count = 0 , could not solve

```
DSolve[f[x]*y[x] + a*x^2*Derivative[1][y][x] + x^2*Derivative[2][y][x] == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x) = DESol\left(\left\{\frac{f(x)\_Y(x)}{x^2} + a\frac{d}{dx}\_Y(x) + \frac{d^2}{dx^2}\_Y(x)\right\}, \{\_Y(x)\}\right)\right\}$$

ODE No. 1206

$$y(x)\left(abx + cx^2 + d\right) + x(2ax + b)y'(x) + x^2y''(x) = 0$$

✓ **Mathematica** : cpu = 0.1055 (sec), leaf count = 120

$$\left\{\left\{y(x) \to c_1 e^{\frac{1}{2}(-2ax-(b-1)\log(x))} J_{\frac{1}{2}\sqrt{b^2-2b-4d+1}}\left(-i\sqrt{a^2-cx}\right) + c_2 e^{\frac{1}{2}(-2ax-(b-1)\log(x))} Y_{\frac{1}{2}\sqrt{b^2-2b-4d+1}}\left(-i\sqrt{a^2\right.\right.\right.$$

✓ **Maple** : cpu = 0.408 (sec), leaf count = 76

$$\left\{y(x) = e^{-ax}x^{-\frac{b}{2}+\frac{1}{2}}\left(Y_{\frac{1}{2}\sqrt{b^2-2b-4d+1}}\left(\sqrt{-a^2+cx}\right)\_C2 + J_{\frac{1}{2}\sqrt{b^2-2b-4d+1}}\left(\sqrt{-a^2+cx}\right)\_C1\right)\right\}$$

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 = 0.118954 (sec), leaf count = 294

$$\left\{\left\{y(x) \to c_1 U\left(-\frac{-ab + 2\mathrm{b1} - \sqrt{a^2 - 4\mathrm{a1}} - \sqrt{a^2 - 4\mathrm{a1}}\sqrt{b^2 - 2b - 4\mathrm{c1} + 1}}{2\sqrt{a^2 - 4\mathrm{a1}}}, \sqrt{b^2 - 2b - 4\mathrm{c1} + 1} + 1, \sqrt{a\right.\right.\right.$$

✓ **Maple** : cpu = 0.92 (sec), leaf count = 110

$$\left\{y(x) = e^{-\frac{ax}{2}}x^{-\frac{b}{2}}\left(W_{-\frac{ab-2\,b1}{2}\frac{1}{\sqrt{a^2-4\,a1}}, \frac{1}{2}\sqrt{b^2-2\,b-4\,c1+1}}\left(\sqrt{a^2-4\,a1}\,x\right)\_C2 + M_{-\frac{ab-2\,b1}{2}\frac{1}{\sqrt{a^2-4\,a1}}, \frac{1}{2}\sqrt{b^2-2\,b-4\,c1+1}}\right.\right.$$

ODE No. 1208

$$x^3y'(x) + x^2y''(x) + (x^2 - 2)\, y(x) = 0$$

✓ **Mathematica** : cpu = 0.053037 (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 = 0.208 (sec), leaf count = 35

$$\left\{y(x) = \frac{1}{x}\left(\sqrt{\pi}\sqrt{2} Erf\left(\frac{\sqrt{2}x}{2}\right) \_C2 - 2\, e^{-1/2\, x^2} \_C2\, x + \_C1\right)\right\}$$

ODE No. 1209

$$x^2y''(x) + (x^2 + 2)\, xy'(x) + (x^2 - 2)\, y(x) = 0$$

✓ **Mathematica** : cpu = 0.0218458 (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 = 0.092 (sec), leaf count = 40

$$\left\{y(x) = \frac{1}{x^2}\left(\left(\pi\, Erf\left(\frac{i}{2}\sqrt{2}x\right) \_C2 + \_C1\right) e^{-\frac{x^2}{2}} - i\sqrt{\pi}\sqrt{2} \_C2\, x\right)\right\}$$

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 = 0.269602 (sec), leaf count = 252

$$\left\{\left\{y(x) \to c_1(-1)^{\frac{1}{4}\left(-\sqrt{4a^2-4a(-1)^n+1}-2a+1\right)} x^{\frac{1}{2}\left(-\sqrt{4a^2-4a(-1)^n+1}-2a+1\right)} {}_1F_1\left(-\frac{a}{2} - \frac{n}{2} - \frac{1}{4}\sqrt{4a^2 - 4(-1)^n a +\right.\right.\right.$$

✓ **Maple** : cpu = 0.911 (sec), leaf count = 81

$$\left\{y(x) = e^{\frac{x^2}{2}} x^{-a-\frac{1}{2}} \left(W_{\frac{n}{2}+\frac{a}{2}+\frac{1}{4},\, \frac{1}{4}\sqrt{1-4\,(-1)^n a+4\,a^2}}\left(x^2\right) \_C2 + M_{\frac{n}{2}+\frac{a}{2}+\frac{1}{4},\, \frac{1}{4}\sqrt{1-4\,(-1)^n a+4\,a^2}}\left(x^2\right) \_C1\right)\right\}$$

ODE No. 1211

$$4x^3y'(x) + x^2y''(x) + \left(4x^4 + 2x^2 + 1\right) y(x) = 0$$

✓ **Mathematica** : cpu = 0.0562823 (sec), leaf count = 68

$$\left\{\left\{y(x) \to c_1 e^{-x^2} x^{\frac{1}{2}-\frac{i\sqrt{3}}{2}} - \frac{i c_2 e^{-x^2} x^{\frac{1}{2}+\frac{i\sqrt{3}}{2}}}{\sqrt{3}}\right\}\right\}$$

✓ **Maple** : cpu = 0.236 (sec), leaf count = 36

$$\left\{y(x) = \mathrm{e}^{-x^2}\left(x^{\frac{1}{2}-\frac{i}{2}\sqrt{3}}\_C2 + x^{\frac{1}{2}+\frac{i}{2}\sqrt{3}}\_C1\right)\right\}$$

ODE No. 1212

$$x\left(ax^2 + b\right) y'(x) + f(x)y(x) + x^2y''(x) = 0$$

✗ **Mathematica** : cpu = 0.350493 (sec), leaf count = 0 , could not solve

```
DSolve[f[x]*y[x] + x*(b + a*x^2)*Derivative[1][y][x] + x^2*Derivative[2][y][x] == 0, y
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x) = DESol\left(\left\{\frac{f(x)\_Y(x)}{x^2} + \frac{\left(ax^2 + b\right)\frac{\mathrm{d}}{\mathrm{d}x}\_Y(x)}{x} + \frac{\mathrm{d}^2}{\mathrm{d}x^2}\_Y(x)\right\}, \{\_Y(x)\}\right)\right\}$$

ODE No. 1213

$$\left(x^3 + 1\right) xy'(x) + x^2y''(x) - y(x) = 0$$

✓ **Mathematica** : cpu = 0.0865715 (sec), leaf count = 54

$$\left\{\left\{y(x) \to \frac{\sqrt[3]{3} c_1 \, {}_1F_1\left(-\frac{1}{3}; \frac{1}{3}; -\frac{x^3}{3}\right)}{x} + \frac{c_2 x \, {}_1F_1\left(\frac{1}{3}; \frac{5}{3}; -\frac{x^3}{3}\right)}{\sqrt[3]{3}}\right\}\right\}$$

✓ **Maple** : cpu = 0.12 (sec), leaf count = 53

$$\left\{y(x) = \left(\_C1\, I_{-\frac{1}{6}}\left(\frac{x^3}{6}\right) + \_C1\, I_{\frac{5}{6}}\left(\frac{x^3}{6}\right) - \_C2\left(K_{\frac{1}{6}}\left(\frac{x^3}{6}\right) - K_{\frac{5}{6}}\left(\frac{x^3}{6}\right)\right)\right)\mathrm{e}^{-\frac{x^3}{6}} x^{\frac{3}{2}}\right\}$$

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 = 0.328771 (sec), leaf count = 260

$$\left\{\left\{y(x)\to \frac{c_1e^{-\frac{x^2}{2}}2^{\frac{1}{4}\left(\sqrt{4a^2-4a(-1)^n+1}+2\right)}\left(x^2\right)^{\frac{1}{4}\left(\sqrt{4a^2-4a(-1)^n+1}+2\right)}U\left(\frac{1}{4}\left(-2a-2n+\sqrt{4a^2-4(-1)^na+1}+\right.\right.}{\sqrt{x}}\right.\right.$$

✓ **Maple** : cpu = 0.651 (sec), leaf count = 71

$$\left\{y(x)=1\left(\_C1\,M_{\frac{n}{2}+\frac{a}{2}+\frac{1}{4},\,\frac{1}{4}\sqrt{1-4\,(-1)^na+4\,a^2}}\left(x^2\right)+\_C2\,W_{\frac{n}{2}+\frac{a}{2}+\frac{1}{4},\,\frac{1}{4}\sqrt{1-4\,(-1)^na+4\,a^2}}\left(x^2\right)\right)\frac{1}{\sqrt{x}}\right\}$$

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 = 0.154692 (sec), leaf count = 664

$$\left\{\left\{y(x)\to c_1x^{\frac{1-n}{2}}2^{\frac{\sqrt{b^2n^2-2bn^2-4c1n^2+n^2}+n^2}{2n^2}}\left(x^n\right)^{\frac{\sqrt{b^2n^2-2bn^2-4c1n^2+n^2}+n^2}{2n^2}}\exp\left(\frac{1}{2}\left(-\frac{ax^n}{n}-b\log(x)\right)-\frac{\sqrt{a^2-4a}}{2n}\right.\right.\right.$$

✓ **Maple** : cpu = 0.234 (sec), leaf count = 148

$$\left\{y(x)=x^{-\frac{b}{2}-\frac{n}{2}+\frac{1}{2}}e^{-\frac{ax^n}{2\,n}}\left(W_{-\frac{(b+n-1)a-2\,b1}{2\,n}\frac{1}{\sqrt{a^2-4\,a1}},\,\frac{1}{2\,n}\sqrt{b^2-2\,b-4\,c1+1}}\left(\frac{x^n}{n}\sqrt{a^2-4\,a1}\right)\_C2+M_{-\frac{(b+n-1)a-2\,b1}{2\,n}\frac{1}{\sqrt{a}}}\right.\right.$$

ODE No. 1216

$$xy'(x)\left(ax^{\text{a1}}+b\right)+y(x)\left(Ax^{2\text{a1}}+Bx^{\text{a1}}+Cx^{\text{b1}}+\text{DD}\right)+x^2y''(x)=0$$

✗ **Mathematica** : cpu = 1.36414 (sec), leaf count = 0 , could not solve

```
DSolve[(DD + B*x^a1 + A*x^(2*a1) + C*x^b1)*y[x] + x*(b + a*x^a1)*Derivative[1][y][x] +
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x)=DESol\left(\left\{\frac{d^2}{dx^2}\_Y(x)+\frac{\left(ax^{a1}+b\right)\frac{d}{dx}\_Y(x)}{x}+\frac{\left(Ax^{2\,a1}+Bx^{a1}+Cx^{b1}+DD\right)\_Y(x)}{x^2}\right\},\{\_Y$$

ODE No. 1217

$$-y(x)(a+x\tan(x))+x^2y''(x)-\left(2x^2\tan(x)-x\right)y'(x)=0$$

✓ **Mathematica** : cpu = 0.14674 (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 = 0.209 (sec), leaf count = 24

$$\left\{y(x)=\frac{1}{\cos(x)}\left(\_C2\,Y_{\sqrt{a}}(x)+\_C1\,J_{\sqrt{a}}(x)\right)\right\}$$

ODE No. 1218

$$y(x)(a+x\cot(x))+x^2y''(x)+\left(2x^2\cot(x)+x\right)y'(x)=0$$

✓ **Mathematica** : cpu = 0.160317 (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 = 0.089 (sec), leaf count = 30

$$\left\{y(x)=\frac{1}{\sin(x)}\left(\_C2\,Y_{i\sqrt{a}}(x)+\_C1\,J_{i\sqrt{a}}(x)\right)\right\}$$

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 = 381.471 (sec), leaf count = 216

$$\left\{\left\{y(x)\to c_1U\left(-\frac{-ib-\sqrt{a}-\sqrt{a}\sqrt{1-4c}}{2\sqrt{a}},\sqrt{1-4c}+1,2i\sqrt{a}x\right)\exp\left(\int_1^x\frac{-2i\sqrt{a}K[1]-2f(K[1])+\sqrt{}}{2K[1]}\right.\right.\right.$$

✓ **Maple** : cpu = 0.223 (sec), leaf count = 69

$$\left\{y(x)=\mathrm{e}^{-\int\frac{f(x)}{x}\,\mathrm{d}x}\left(W_{-\frac{i}{2}b\frac{1}{\sqrt{a}},\frac{1}{2}\sqrt{1-4c}}(2i\sqrt{a}x)\_C2+M_{-\frac{i}{2}b\frac{1}{\sqrt{a}},\frac{1}{2}\sqrt{1-4c}}(2i\sqrt{a}x)\_C1\right)\right\}$$

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 = 189.369 (sec), leaf count = 96

$$\left\{\left\{y(x)\to c_1J_{\frac{1}{2}(2v-1)}(\sqrt{a}x)\exp\left(\int_1^x\frac{1-2K[1]f(K[1])}{2K[1]}dK[1]\right)+c_2Y_{\frac{1}{2}(2v-1)}(\sqrt{a}x)\exp\left(\int_1^x\frac{1-2K[1]f}{2K[1}\right.\right.\right.$$

✓ **Maple** : cpu = 0.068 (sec), leaf count = 40

$$\left\{y(x)=\sqrt{x}\mathrm{e}^{-\frac{\int 2f(x)\,\mathrm{d}x}{2}}\left(J_{v-\frac{1}{2}}(\sqrt{a}x)\_C1+Y_{v-\frac{1}{2}}(\sqrt{a}x)\_C2\right)\right\}$$

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 = 0.0588271 (sec), leaf count = 40

$$\left\{\left\{y(x)\to c_1J_v(x)e^{\int_1^x f(K[1])\,dK[1]}+c_2Y_v(x)e^{\int_1^x f(K[1])\,dK[1]}\right\}\right\}$$

✓ **Maple** : cpu = 0.057 (sec), leaf count = 35

$$\left\{y(x)=\mathrm{e}^{-\frac{1}{2}\int\frac{-2xf(x)+1}{x}\,\mathrm{d}x}\sqrt{x}(J_v(x)\_C1+Y_v(x)\_C2)\right\}$$

ODE No. 1222

$$\left(x^2+1\right)y''(x)+xy'(x)+2y(x)=0$$

✓ **Mathematica** : cpu = 0.0207188 (sec), leaf count = 30

$$\left\{\left\{y(x)\to c_2\sin\left(\sqrt{2}\sinh^{-1}(x)\right)+c_1\cos\left(\sqrt{2}\sinh^{-1}(x)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.057 (sec), leaf count = 23

$$\left\{y(x)=\_C1\ \sin\left(\sqrt{2}Arcsinh(x)\right)+\_C2\ \cos\left(\sqrt{2}Arcsinh(x)\right)\right\}$$

ODE No. 1223

$$\left(x^2+1\right)y''(x)+xy'(x)-9y(x)=0$$

✓ **Mathematica** : cpu = 0.0180419 (sec), leaf count = 25

$$\left\{\left\{y(x)\to c_1\cosh\left(3\sinh^{-1}(x)\right)+ic_2\sinh\left(3\sinh^{-1}(x)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.033 (sec), leaf count = 39

$$\left\{y(x)=\_C1\ \sin\left(3\ \arctan\left(\frac{x}{\sqrt{-x^2-1}}\right)\right)+\_C2\ \cos\left(3\ \arctan\left(\frac{x}{\sqrt{-x^2-1}}\right)\right)\right\}$$

ODE No. 1224

$$ay(x)+\left(x^2+1\right)y''(x)+xy'(x)=0$$

✓ **Mathematica** : cpu = 0.0176637 (sec), leaf count = 30

$$\left\{\left\{y(x)\to c_2\sin\left(\sqrt{a}\sinh^{-1}(x)\right)+c_1\cos\left(\sqrt{a}\sinh^{-1}(x)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.021 (sec), leaf count = 23

$$\left\{y(x)=\_C1\ \sin\left(\sqrt{a}Arcsinh(x)\right)+\_C2\ \cos\left(\sqrt{a}Arcsinh(x)\right)\right\}$$

ODE No. 1225

$$\left(x^2+1\right)y''(x)-xy'(x)+y(x)=0$$

✓ **Mathematica** : cpu = 0.0303327 (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 = 0.053 (sec), leaf count = 23

$$\left\{y(x)=-\sqrt{x^2+1}\_C2+x(\_C2\ Arcsinh(x)+\_C1)\right\}$$

ODE No. 1226

$$-(v-1)vy(x)+\left(x^2+1\right)y''(x)+2xy'(x)=0$$

✓ **Mathematica** : cpu = 0.018589 (sec), leaf count = 30

$$\{\{y(x)\to c_1P_{v-1}(ix)+c_2Q_{v-1}(ix)\}\}$$

✓ **Maple** : cpu = 0.169 (sec), leaf count = 25

$$\{y(x)=\_C1\ LegendreP(v-1,ix)+\_C2\ LegendreQ(v-1,ix)\}$$

ODE No. 1227

$$\left(x^2+1\right)y''(x)-2xy'(x)+2y(x)=0$$

✓ **Mathematica** : cpu = 0.0544709 (sec), leaf count = 21

$$\left\{\left\{y(x)\to c_2x-c_1(x-i)^2\right\}\right\}$$

✓ **Maple** : cpu = 0.015 (sec), leaf count = 16

$$\left\{y(x)=\_C2\ x^2+\_C1\ x-\_C2\right\}$$

ODE No. 1228

$$ay(x) + (x^2 + 1)\, y''(x) + 3xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.0153012 (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 = 0.154 (sec), leaf count = 53

$$\left\{y(x) = 1\left(\_C2\, \left(x + \sqrt{x^2+1}\right)^{-\sqrt{1-a}} + \_C1\, \left(x + \sqrt{x^2+1}\right)^{\sqrt{1-a}}\right) \frac{1}{\sqrt{x^2+1}}\right\}$$

ODE No. 1229

$$(x^2 + 1)\, y''(x) + 4xy'(x) + 2y(x) + 2x - 2\cos(x) = 0$$

✓ **Mathematica** : cpu = 0.041525 (sec), leaf count = 48

$$\left\{\left\{y(x) \to \frac{c_1}{x^2+1} + \frac{c_2 x}{x^2+1} + \frac{-x^3 - 6\cos(x)}{3\,(x^2+1)}\right\}\right\}$$

✓ **Maple** : cpu = 0.072 (sec), leaf count = 31

$$\left\{y(x) = \frac{-x^3 + 3\_C1\, x - 6\, \cos(x) + 3\_C2}{3\, x^2 + 3}\right\}$$

ODE No. 1230

$$axy'(x) + (a-2)y(x) + (x^2 + 1)\, y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0247263 (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 = 0.48 (sec), leaf count = 36

$$\left\{y(x) = \_C1\, (x^2+1)^{-\frac{a}{2}+1} + \_C2\, {}_2\mathrm{F}_1(1, \frac{a}{2} - \frac{1}{2}; \frac{3}{2}; -x^2)x\right\}$$

ODE No. 1231

$$(x^2-1)\,y''(x)-v(v+1)y(x)=0$$

✓ **Mathematica** : cpu = 0.075669 (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 = 0.076 (sec), leaf count = 52

$$\left\{y(x)=-(x-1)\,(1+x)\left({}_2\mathrm{F}_1(1-\frac{v}{2},\frac{3}{2}+\frac{v}{2};\,\frac{3}{2};\,x^2)\_C2\,x+\_C1\,{}_2\mathrm{F}_1(1+\frac{v}{2},\frac{1}{2}-\frac{v}{2};\,\frac{1}{2};\,x^2)\right)\right\}$$

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 = 1311.2 (sec), leaf count = 6626

$$\left\{\left\{y(x)\to c_1\,{}_2F_1\left(-\frac{n}{2}-\frac{1}{2},\frac{n}{2};\frac{1}{2};x^2\right)+\left(\int_1^x\left(\frac{}{4\left({}_2F_1\left(\frac{1}{2}(-n-1),\frac{n}{2};\frac{1}{2};K[1]^2\right)\,{}_2F_1\left(1-\frac{n}{2},\frac{n+3}{2};\frac{5}{2};K[1]^2\right.\right.}\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.763 (sec), leaf count = 409

$$\left\{y(x)=3\left(-{}_2\mathrm{F}_1(n/2+1,-n/2+1/2;\,1/2;\,x^2)(n+1)\int 1/3\,\frac{}{(x-1)^3\left(({}_2\mathrm{F}_1(n/2+1,-n/2+1/2;\,1/2;\right.}\right.\right.$$

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 = 1311.72 (sec), leaf count = 6626

$$\left\{\left\{y(x)\to c_1\,{}_2F_1\left(-\frac{n}{2}-\frac{1}{2},\frac{n}{2};\frac{1}{2};x^2\right)+\left(\int_1^x\left(\frac{}{4\left({}_2F_1\left(\frac{1}{2}(-n-1),\frac{n}{2};\frac{1}{2};K[1]^2\right)\,{}_2F_1\left(1-\frac{n}{2},\frac{n+3}{2};\frac{5}{2};K[1]^2\right.\right.}\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.213 (sec), leaf count = 409

$$\left\{y(x)=3\,(x-1)\,(1+x)\left(-{}_2\mathrm{F}_1(n/2+1,-n/2+1/2;\,1/2;\,x^2)(n+1)\int 1/3\,\frac{}{\left(({}_2\mathrm{F}_1(n/2+1,-n/2+1/2\right.}\right.\right.$$

ODE No. 1234

$$\left(x^2-1\right)y''(x)+xy'(x)+2=0$$

✓ **Mathematica** : cpu = 0.0937484 (sec), leaf count = 97

$$\left\{\left\{y(x)\to c_1\log\left(\sqrt{x^2-1}+x\right)+c_2-\frac{1}{4}\log^2\left(1-\frac{x}{\sqrt{x^2-1}}\right)-\frac{1}{4}\log^2\left(\frac{x}{\sqrt{x^2-1}}+1\right)+\frac{1}{2}\log\left(\frac{x}{\sqrt{x^2-}}\right.\right.\right.$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , exception

```
time expired
```

ODE No. 1235

$$ay(x)+\left(x^2-1\right)y''(x)+xy'(x)=0$$

✓ **Mathematica** : cpu = 0.0646498 (sec), leaf count = 97

$$\left\{\left\{y(x)\to c_1\cos\left(\frac{1}{2}\sqrt{a}\left(\log\left(1-\frac{x}{\sqrt{x^2-1}}\right)-\log\left(\frac{x}{\sqrt{x^2-1}}+1\right)\right)\right)-c_2\sin\left(\frac{1}{2}\sqrt{a}\left(\log\left(1-\frac{x}{\sqrt{x^2-}}\right.\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.025 (sec), leaf count = 45

$$\left\{y(x)=1\left(\_C1\left(\left(x+\sqrt{x^2-1}\right)^{i\sqrt{a}}\right)^2+\_C2\right)\left(\left(x+\sqrt{x^2-1}\right)^{i\sqrt{a}}\right)^{-1}\right\}$$

ODE No. 1236

$$f(x)y(x)+\left(x^2-1\right)y''(x)+xy'(x)=0$$

✗ **Mathematica** : cpu = 0.368416 (sec), leaf count = 0 , could not solve

```
DSolve[f[x]*y[x] + x*Derivative[1][y][x] + (-1 + x^2)*Derivative[2][y][x] == 0, y[x],
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x)=DESol\left(\left\{\frac{f(x)\_Y(x)}{x^2-1}+\frac{x\frac{\mathrm{d}}{\mathrm{d}x}\_Y(x)}{x^2-1}+\frac{\mathrm{d}^2}{\mathrm{d}x^2}\_Y(x)\right\},\{\_Y(x)\}\right)\right\}$$

ODE No. 1237

$$(x^2-1)\,y''(x)+2xy'(x)=0$$

✓ **Mathematica** : cpu = 0.010656 (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 = 0.032 (sec), leaf count = 20

$$\left\{y(x)=\_C1-\frac{(\ln(1+x)-\ln(x-1))\_C2}{2}\right\}$$

ODE No. 1238

$$-a+(x^2-1)\,y''(x)+2xy'(x)=0$$

✓ **Mathematica** : cpu = 0.0182566 (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 = 0.022 (sec), leaf count = 26

$$\left\{y(x)=\frac{(a-\_C1)\ln(1+x)}{2}+\frac{(a+\_C1)\ln(x-1)}{2}+\_C2\right\}$$

ODE No. 1239

$$-ly(x)+(x^2-1)\,y''(x)+2xy'(x)=0$$

✓ **Mathematica** : cpu = 0.0137432 (sec), leaf count = 46

$$\left\{\left\{y(x)\to c_1P_{\frac{1}{2}(\sqrt{4l+1}-1)}(x)+c_2Q_{\frac{1}{2}(\sqrt{4l+1}-1)}(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.091 (sec), leaf count = 35

$$\left\{y(x)=\_C1\;LegendreP\left(\frac{1}{2}\sqrt{1+4\,l}-\frac{1}{2},x\right)+\_C2\;LegendreQ\left(\frac{1}{2}\sqrt{1+4\,l}-\frac{1}{2},x\right)\right\}$$

ODE No. 1240

$$-v(v+1)y(x)+\left(x^2-1\right)y''(x)+2xy'(x)=0$$

✓ **Mathematica** : cpu = 0.0184332 (sec), leaf count = 18

$$\{\{y(x)\to c_1 P_v(x)+c_2 Q_v(x)\}\}$$

✓ **Maple** : cpu = 0.051 (sec), leaf count = 15

$$\{y(x)=\_C1\ \mathit{LegendreP}(v,x)+\_C2\ \mathit{LegendreQ}(v,x)\}$$

ODE No. 1241

$$-(v-1)(v+2)y(x)+\left(x^2-1\right)y''(x)-2xy'(x)=0$$

✓ **Mathematica** : cpu = 0.0159761 (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 = 0.056 (sec), leaf count = 24

$$\{y(x)=(x-1)(1+x)(\_C2\ \mathit{LegendreQ}(v,2,x)+\_C1\ \mathit{LegendreP}(v,2,x))\}$$

ODE No. 1242

$$\left(x^2-1\right)y''(x)-\left(x^2-x\right)y(x)-(3x+1)y'(x)=0$$

✓ **Mathematica** : cpu = 0.0818802 (sec), leaf count = 68

$$\left\{\left\{y(x)\to c_1 e^{-x}(x+1)^2-c_2 e^{-x-2}\left(x^2(-\mathrm{Ei}(2(x+1)))-2x\mathrm{Ei}(2(x+1))-\mathrm{Ei}(2(x+1))+2e^{2x+2}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.082 (sec), leaf count = 41

$$\left\{y(x)=\_C2\ \mathrm{e}^{-x-2}(1+x)^2\ \mathit{Ei}(1,-2x-2)+\_C1\ \mathrm{e}^{-x}(1+x)^2+2\,\mathrm{e}^{x}\_C2\right\}$$

ODE No. 1243

$$\left(x^2-1\right)y''(x)+\left(x^2+1\right)y(x)+4xy'(x)=0$$

✓ **Mathematica** : cpu = 0.0308901 (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 = 0.051 (sec), leaf count = 21

$$\left\{y(x)=\frac{\_C2\ \cos(x)+\_C1\ \sin(x)}{x^2-1}\right\}$$

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 = 0.0290425 (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 = 0.165 (sec), leaf count = 27

$$\left\{y(x)=\left(x^2-1\right)^{-\frac{n}{2}}\left(\mathit{LegendreQ}(v,n,x)\_C2+\mathit{LegendreP}(v,n,x)\_C1\right)\right\}$$

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 = 0.0220292 (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 = 0.062 (sec), leaf count = 27

$$\left\{y(x)=\left(x^2-1\right)^{\frac{n}{2}}\left(\mathit{LegendreQ}(v,n,x)\_C2+\mathit{LegendreP}(v,n,x)\_C1\right)\right\}$$

ODE No. 1246

$$-2(v-1)xy'(x)-2vy(x)+\left(x^2-1\right)y''(x)=0$$

✓ **Mathematica** : cpu = 0.0203525 (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 = 0.183 (sec), leaf count = 28

$$\left\{y(x)=\left(x^2-1\right)^v\left({}_2\mathrm{F}_1(\frac{1}{2},v+1;\,\frac{3}{2};\,x^2)\_C2\,x+\_C1\right)\right\}$$

ODE No. 1247

$$2axy'(x)+(a-1)ay(x)+\left(x^2-1\right)y''(x)=0$$

✓ **Mathematica** : cpu = 0.229094 (sec), leaf count = 97

$$\left\{\left\{y(x)\to c_1\sqrt{1-x^2}\left(x^2-1\right)^{-a/2}e^{-\sqrt{(a-1)^2}\tanh^{-1}(x)}+\frac{c_2\sqrt{1-x^2}\left(x^2-1\right)^{-a/2}e^{\sqrt{(a-1)^2}\tanh^{-1}(x)}}{2\sqrt{(a-1)^2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.03 (sec), leaf count = 27

$$\left\{y(x)=\_C1\,(1+x)^{1-a}+\_C2\,(x-1)^{1-a}\right\}$$

ODE No. 1248

$$axy'(x)+y(x)\left(bx^2+cx+d\right)+\left(x^2-1\right)y''(x)=0$$

✗ **Mathematica** : cpu = 2.19426 (sec), leaf count = 0 , DifferentialRoot result

$$\{\{y(x)\to \text{DifferentialRoot}(\{y,x\},\{\left(bx^2+cx+d\right)y(x)+xay'(x)+\left(x^2-1\right)y''(x)=0,y(0)=c_1,y'(0)$$

✓ **Maple** : cpu = 0.542 (sec), leaf count = 134

$$\left\{y(x)=\left(x^2-1\right)^{-\frac{a}{4}}\mathrm{e}^{\sqrt{-b}x}\left(HeunC\left(4\sqrt{-b},-\frac{a}{2}+1,\frac{a}{2}-1,2\,c,d-c-\frac{a^2}{8}+b+\frac{1}{2},\frac{1}{2}+\frac{x}{2}\right)\left(\frac{1}{2}+\frac{x}{2}\right)^{-\frac{a}{4}}\right.\right.$$

ODE No. 1249

$$(ax+b)y'(x)+cy(x)+\left(x^2-1\right)y''(x)=0$$

✓ **Mathematica** : cpu = 0.179369 (sec), leaf count = 193

$$\left\{\left\{y(x)\to c_2 2^{\frac{1}{2}(a+b-2)}(x-1)^{\frac{1}{2}(-a-b+2)}\,{}_2F_1\left(-\frac{b}{2}-\frac{1}{2}\sqrt{a^2-2a-4c+1}+\frac{1}{2},-\frac{b}{2}+\frac{1}{2}\sqrt{a^2-2a-4c+1}+\right.\right.\right.$$

✓ **Maple** : cpu = 0.091 (sec), leaf count = 134

$$\left\{y(x)=\_C1\ {}_2\mathrm{F}_1(-\frac{1}{2}+\frac{a}{2}-\frac{1}{2}\sqrt{a^2-2\,a-4\,c+1},-\frac{1}{2}+\frac{a}{2}+\frac{1}{2}\sqrt{a^2-2\,a-4\,c+1};\frac{a}{2}-\frac{b}{2};\frac{1}{2}+\frac{x}{2})+\_\right.$$

ODE No. 1250

$$\left(x^2-a^2\right)y''(x)+8xy'(x)+12y(x)=0$$

✓ **Mathematica** : cpu = 0.0534572 (sec), leaf count = 41

$$\left\{\left\{y(x)\to\frac{c_2(a^2+3x^2)}{3(a-x)^3(a+x)^3}+\frac{c_1}{(a+x)^3}\right\}\right\}$$

✓ **Maple** : cpu = 0.032 (sec), leaf count = 41

$$\left\{y(x)=\frac{3\_C2\,a^2x+\_C2\,x^3+\_C1\,a^2+3\_C1\,x^2}{(a-x)^3(x+a)^3}\right\}$$

ODE No. 1251

$$x(x+1)y''(x)-(x-1)y'(x)+y(x)=0$$

✓ **Mathematica** : cpu = 0.03774 (sec), leaf count = 25

$$\{\{y(x)\to c_1(x-1)+c_2(x\log(x)-\log(x)-4)\}\}$$

✓ **Maple** : cpu = 0.043 (sec), leaf count = 20

$$\{y(x)=\_C2\,(x-1)\ln(x)-4\_C2+\_C1\,(x-1)\}$$

ODE No. 1252

$$(ax+b)y'(x)+cy(x)+x(x+1)y''(x)=0$$

✓ **Mathematica** : cpu = 0.167604 (sec), leaf count = 151

$$\left\{\left\{y(x)\to c_2 x^{1-b}\,{}_2F_1\left(\frac{a}{2}-b-\frac{1}{2}\sqrt{a^2-2a-4c+1}+\frac{1}{2},\frac{a}{2}-b+\frac{1}{2}\sqrt{a^2-2a-4c+1}+\frac{1}{2};2-b;-x\right)+\right.\right.$$

✓ **Maple** : cpu = 0.06 (sec), leaf count = 124

$$\left\{y(x)=\_C1\,{}_2\mathrm{F}_1(-\frac{1}{2}+\frac{a}{2}-\frac{1}{2}\sqrt{a^2-2\,a-4\,c+1},-\frac{1}{2}+\frac{a}{2}+\frac{1}{2}\sqrt{a^2-2\,a-4\,c+1};\,a-b;\,1+x)+\_C\right.$$

ODE No. 1253

$$x(x+1)y''(x)+(3x+2)y'(x)+y(x)=0$$

✓ **Mathematica** : cpu = 0.027465 (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 = 0.01 (sec), leaf count = 16

$$\left\{y(x)=\frac{\ln(1+x)\_C1+\_C2}{x}\right\}$$

ODE No. 1254

$$\left(x^2+x-2\right)y''(x)+\left(x^2-x\right)y'(x)-\left(6x^2+7x\right)y(x)=0$$

✓ **Mathematica** : cpu = 0.0965197 (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 = 0.096 (sec), leaf count = 42

$$\left\{y(x)=-195\,\_C2\,\mathrm{e}^{2\,x-5}(x-1)\,Ei(1,5\,x-5)+\_C2\,(x+44)\,\mathrm{e}^{-3\,x}+\_C1\,\mathrm{e}^{2\,x}(x-1)\right\}$$

ODE No. 1255

$$ay'(x) + (x-1)xy''(x) - 2y(x) = 0$$

✓ **Mathematica** : cpu = 0.21847 (sec), leaf count = 118

$$\left\{\left\{y(x) \to \frac{c_1(a^2 + 2ax - a + 2x^2 - 2x)}{a^2 + 3a + 4} + \frac{c_2 x^{a+1}(a^2 + 2ax - a + 2x^2 - 2x)(1-x)^{1-a}}{(a-1)a(a+1)(a^2 + 3a + 4)(a^2 + a(2x-1) + 2(x-1)x)}\right\}\right\}$$

✓ **Maple** : cpu = 0.052 (sec), leaf count = 42

$$\left\{y(x) = \_C1\ (a^2 + a(2x-1) + 2x^2 - 2x) + \frac{\_C2\ x^a x(x-1)}{(x-1)^a}\right\}$$

ODE No. 1256

$$-v(v+1)y(x) + (x-1)xy''(x) + (2x-1)y'(x) = 0$$

✓ **Mathematica** : cpu = 0.0237699 (sec), leaf count = 26

$$\{\{y(x) \to c_1 P_v(2x-1) + c_2 Q_v(2x-1)\}\}$$

✓ **Maple** : cpu = 0.125 (sec), leaf count = 51

$$\{y(x) = \_C1\ {}_2\mathrm{F}_1(-v, -v;\ -2v;\ x^{-1})x^v + \_C2\ {}_2\mathrm{F}_1(v+1, v+1;\ 2v+2;\ x^{-1})x^{-v-1}\}$$

ODE No. 1257

$$((a+1)x + b)y'(x) + (x-1)xy''(x) = 0$$

✓ **Mathematica** : cpu = 0.0499111 (sec), leaf count = 33

$$\left\{\left\{y(x) \to \frac{c_1 x^{b+1}\,{}_2F_1(b+1, a+b+1; b+2; x)}{b+1} + c_2\right\}\right\}$$

✓ **Maple** : cpu = 0.315 (sec), leaf count = 27

$$\{y(x) = \_C1 + {}_2\mathrm{F}_1(b+1, a+b+1;\ b+2;\ x)x^{b+1}\_C2\}$$

ODE No. 1258

$$(ax+b)y'(x)+cy(x)+(x-1)xy''(x)=0$$

✓ **Mathematica** : cpu = 0.167545 (sec), leaf count = 146

$$\left\{\left\{y(x)\to(-1)^{b+1}c_2x^{b+1}\,{}_2F_1\left(\frac{a}{2}+b-\frac{1}{2}\sqrt{a^2-2a-4c+1}+\frac{1}{2},\frac{a}{2}+b+\frac{1}{2}\sqrt{a^2-2a-4c+1}+\frac{1}{2};b+2\right.\right.\right.$$

✓ **Maple** : cpu = 0.06 (sec), leaf count = 110

$$\left\{y(x)=\_C1\,{}_2\mathrm{F}_1(-\frac{1}{2}+\frac{a}{2}-\frac{1}{2}\sqrt{a^2-2\,a-4\,c+1},-\frac{1}{2}+\frac{a}{2}+\frac{1}{2}\sqrt{a^2-2\,a-4\,c+1};\,-b;\,x)+\_C2\,x^{b+1}\right.$$

ODE No. 1259

$$((a+1)x+b)y'(x)-ly(x)+(x-1)xy''(x)=0$$

✓ **Mathematica** : cpu = 0.145016 (sec), leaf count = 120

$$\left\{\left\{y(x)\to(-1)^{b+1}c_2x^{b+1}\,{}_2F_1\left(\frac{a}{2}+b-\frac{1}{2}\sqrt{a^2+4l}+1,\frac{a}{2}+b+\frac{1}{2}\sqrt{a^2+4l}+1;b+2;x\right)+c_1\,{}_2F_1\left(\frac{a}{2}-\right.\right.\right.$$

✓ **Maple** : cpu = 0.065 (sec), leaf count = 92

$$\left\{y(x)=\_C1\,{}_2\mathrm{F}_1(\frac{a}{2}-\frac{1}{2}\sqrt{a^2+4\,l},\frac{a}{2}+\frac{1}{2}\sqrt{a^2+4\,l};\,-b;\,x)+\_C2\,x^{b+1}{}_2\mathrm{F}_1(\frac{a}{2}-\frac{1}{2}\sqrt{a^2+4\,l}+b+1,\frac{a}{2}+\right.$$

ODE No. 1260

$$y'(x)(x(\mathrm{a1}+\mathrm{b1}+1)-\mathrm{d1})+\mathrm{a1b1d1}+(x-1)xy''(x)=0$$

✓ **Mathematica** : cpu = 0.184739 (sec), leaf count = 65

$$\left\{\left\{y(x)\to\mathrm{a1b1}x\Gamma(\mathrm{d1}+1)\,{}_3\tilde{F}_2(1,\mathrm{a1}+\mathrm{b1}+1,1;\mathrm{d1}+1,2;x)-\frac{c_1x^{1-\mathrm{d1}}\,{}_2F_1(1-\mathrm{d1},\mathrm{a1}+\mathrm{b1}-\mathrm{d1}+1;2-}{\mathrm{d1}-1}\right.\right.$$

✓ **Maple** : cpu = 0.577 (sec), leaf count = 76

$$\left\{y(x)=\int\left(-a1\;b1\;(signum(x-1))^{a1+b1-d1}\;(-signum(x-1))^{-a1-b1+d1}\;{}_2\mathrm{F}_1(d1,-a1-b1+d1;\,1+\right.\right.$$

ODE No. 1261

$$y(x)(2lx(-n+p-1)+2lp+m)+2\left(x(-2l+n+1)-lx^2+n+1\right)y'(x)+x(x+2)y''(x)=0$$

✗ **Mathematica** : cpu = 2.48822 (sec), leaf count = 0 , DifferentialRoot result

$$\left\{\left\{y(x)\to \text{DifferentialRoot}\left(\{y,x\},\left\{(-2xl-2xnl+2xpl+2pl+m)y(x)+2\left(-lx^2-2lx+nx+x+n\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.246 (sec), leaf count = 105

$$\left\{y(x)=(x+2)^{-\frac{n}{2}-\frac{1}{2}}\left(-\frac{x}{2}-1\right)^{\frac{n}{2}+\frac{1}{2}}\left(x^{-n}\mathit{HeunC}\left(4\,l,-n,n,-4\,pl,\frac{(4\,n+4\,p+4)\,l}{2}-\frac{n^2}{2}+m-n,-\frac{x}{2}\right)\right.\right.$$

ODE No. 1262

$$\left(x^2+x-1\right)y'(x)+(x+1)^2y''(x)-(x+2)y(x)=0$$

✓ **Mathematica** : cpu = 50.4889 (sec), leaf count = 87

$$\left\{\left\{y(x)\to c_2e^{-x}\int_1^x (K[1]+1)^{\frac{K[1]}{K[1]+1}+\frac{1}{K[1]+1}}\exp\left(-\frac{K[1]^2}{K[1]+1}-\frac{K[1]}{K[1]+1}+2K[1]-\frac{1}{K[1]+1}\right)dK[1]+c\right.\right.$$

✓ **Maple** : cpu = 0.272 (sec), leaf count = 53

$$\left\{y(x)=(1+x)\left(\_C1\,\mathrm{e}^{-x}\mathit{HeunD}\left(4,4,-8,12,\frac{x}{x+2}\right)+\_C2\,\mathit{HeunD}\left(-4,4,-8,12,\frac{x}{x+2}\right)\mathrm{e}^{\frac{x-1}{2\,x+2}}\right)\right\}$$

ODE No. 1263

$$-(20x+30)\left(x^2+3x\right)^{7/3}+x(x+3)y''(x)+(3x-1)y'(x)+y(x)=0$$

✗ **Mathematica** : cpu = 3599.93 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.099 (sec), leaf count = 52

$$\left\{y(x)=1\left(\_C2+\int\frac{1}{x^2+3\,x}\left(\_C1+3\left(x^2+3\,x\right)^{7/3}x(x+3)\right)(x+3)^{\frac{7}{3}}x^{-\frac{4}{3}}\,\mathrm{d}x\right)x^{\frac{4}{3}}(x+3)^{-\frac{7}{3}}\right\}$$

ODE No. 1264

$$\left(x^2+3x+4\right)y''(x)+\left(x^2+x+1\right)y'(x)-(2x+3)y(x)=0$$

✓ **Mathematica** : cpu = 0.077229 (sec), leaf count = 23

$$\left\{\left\{y(x)\to c_2\left(x^2+x+3\right)+c_1e^{-x}\right\}\right\}$$

✓ **Maple** : cpu = 0.049 (sec), leaf count = 19

$$\left\{y(x)=\_C1\;\mathrm{e}^{-x}+\_C2\;\left(x^2+x+3\right)\right\}$$

ODE No. 1265

$$(x-2)(x-1)y''(x)-(2x-3)y'(x)+y(x)=0$$

✓ **Mathematica** : cpu = 0.0477343 (sec), leaf count = 64

$$\left\{\left\{y(x)\to c_1\left(x^2-3x+2\right)P_{\frac{1}{2}\left(-1+\sqrt{5}\right)}^2(2x-3)+c_2\left(x^2-3x+2\right)Q_{\frac{1}{2}\left(-1+\sqrt{5}\right)}^2(2x-3)\right\}\right\}$$

✓ **Maple** : cpu = 0.437 (sec), leaf count = 93

$$\left\{y(x)=(x-2)^2\left(\_C2\;{}_2\mathrm{F}_1(\frac{1}{2}+\frac{\sqrt{5}}{2},\frac{5}{2}+\frac{\sqrt{5}}{2};\sqrt{5}+1;\;(x-1)^{-1})(x-1)^{-\frac{1}{2}-\frac{\sqrt{5}}{2}}+\_C1\;{}_2\mathrm{F}_1(\frac{5}{2}-\frac{\sqrt{5}}{2},\frac{1}{2}\right.\right.$$

ODE No. 1266

$$(x-2)^2y''(x)-(x-2)y'(x)-3y(x)=0$$

✓ **Mathematica** : cpu = 0.0297404 (sec), leaf count = 22

$$\left\{\left\{y(x)\to c_1(x-2)^3+\frac{c_2}{x-2}\right\}\right\}$$

✓ **Maple** : cpu = 0.035 (sec), leaf count = 19

$$\left\{y(x)=\frac{\_C1+\_C2\;(x-2)^4}{x-2}\right\}$$

ODE No. 1267

$$-\left(l+2x^2-5x\right)y'(x)+2x^2y''(x)-(4x-1)y(x)=0$$

✓ **Mathematica** : cpu = 0.448252 (sec), leaf count = 166

$$\left\{\left\{y(x)\to\frac{c_1e^{x-\frac{l}{2x}}}{\sqrt{x}}-\frac{\sqrt{\frac{\pi}{2}}c_2e^{-\frac{l}{2x}-\sqrt{2}\sqrt{-l}+x}\left(\operatorname{erf}\left(\frac{\sqrt{-l}}{\sqrt{2}\sqrt{x}}-\sqrt{x}\right)+e^{2\sqrt{2}\sqrt{-l}}\operatorname{erf}\left(\frac{\sqrt{-l}}{\sqrt{2}\sqrt{x}}+\sqrt{x}\right)-e^{2\sqrt{2}\sqrt{-l}}+1\right)}{\sqrt{-l}\sqrt{x}}\right.\right.$$

✓ **Maple** : cpu = 0.083 (sec), leaf count = 41

$$\left\{y(x)=e^{x}\left(\_C1\int\frac{1}{2\,e^{x}}e^{\frac{l}{2\,x}}x^{-\frac{3}{2}}\,dx+\_C2\right)\frac{1}{\sqrt{x}}\left(e^{\frac{l}{2\,x}}\right)^{-1}\right\}$$

ODE No. 1268

$$y(x)(ax+b)+2(x-1)xy''(x)+(2x-1)y'(x)=0$$

✗ **Mathematica** : cpu = 1.60679 (sec), leaf count = 0 , DifferentialRoot result

$$\{\{y(x)\to\text{DifferentialRoot}(\{y,x\},\{(xa+b)y(x)+(2x-1)y'(x)+2(x-1)xy''(x)=0,y(2)=c_1,y'(2)=$$

✓ **Maple** : cpu = 0.146 (sec), leaf count = 39

$$\left\{y(x)=\_C1\;MathieuC\left(-a-2\,b,\frac{a}{2},\arccos\left(\sqrt{x}\right)\right)+\_C2\;MathieuS\left(-a-2\,b,\frac{a}{2},\arccos\left(\sqrt{x}\right)\right)\right\}$$

ODE No. 1269

$$((2v+5)x-2v-3)y'(x)+(v+1)y(x)+2(x-1)xy''(x)=0$$

✓ **Mathematica** : cpu = 0.0944293 (sec), leaf count = 60

$$\left\{\left\{y(x)\to c_1\,{}_2F_1\left(\frac{1}{2},v+1;v+\frac{3}{2};x\right)+c_2i^{-2v-1}x^{\frac{1}{2}(-2v-1)}\,{}_2F_1\left(\frac{1}{2},-v;\frac{1}{2}-v;x\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.099 (sec), leaf count = 40

$$\left\{y(x)=\_C1\,{}_2F_1(\frac{1}{2},v+1;\,\frac{3}{2}+v;\,x)+\_C2\,x^{-\frac{1}{2}-v}{}_2F_1(\frac{1}{2},-v;\,\frac{1}{2}-v;\,x)\right\}$$

ODE No. 1270

$$\left(2x^2+6x+4\right)y''(x)+\left(10x^2+21x+8\right)y'(x)+\left(12x^2+17x+8\right)y(x)=0$$

✗ **Mathematica** : cpu = 3609.66 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.208 (sec), leaf count = 46

$$\left\{y(x)=\mathrm{e}^{-2x}(x+2)^4\left(\_C2\ HeunC\left(-1,\frac{5}{2},4,-\frac{7}{4},\frac{7}{2},-1-x\right)(1+x)^{\frac{5}{2}}+\_C1\ HeunC\left(-1,-\frac{5}{2},4,-\frac{7}{4},\right.\right.$$

ODE No. 1271

$$4x^2y''(x)+y(x)=0$$

✓ **Mathematica** : cpu = 0.0125398 (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 = 0.012 (sec), leaf count = 14

$$\left\{y(x)=\sqrt{x}(\ln(x)\_C2+\_C1)\right\}$$

ODE No. 1272

$$\left(4a^2x^2+1\right)y(x)+4x^2y''(x)=0$$

✓ **Mathematica** : cpu = 0.0122918 (sec), leaf count = 32

$$\left\{\left\{y(x)\to c_1\sqrt{x}J_0(ax)+c_2\sqrt{x}Y_0(ax)\right\}\right\}$$

✓ **Maple** : cpu = 0.058 (sec), leaf count = 23

$$\left\{y(x)=\sqrt{x}(Y_0(ax)\_C2+J_0(ax)\_C1)\right\}$$

ODE No. 1273

$$4x^2y''(x) - y(x)\left(-4kx + 4m^2 + x^2 - 1\right) = 0$$

✓ **Mathematica** : cpu = 0.0170365 (sec), leaf count = 20

$$\{\{y(x) \to c_1 M_{k,m}(x) + c_2 W_{k,m}(x)\}\}$$

✓ **Maple** : cpu = 0.088 (sec), leaf count = 17

$$\{y(x) = \_C1\ M_{k,\,m}(x) + \_C2\ W_{k,\,m}(x)\}$$

ODE No. 1274

$$\left(x - v^2\right)y(x) + 4x^2y''(x) + 4xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.0426351 (sec), leaf count = 38

$$\left\{\left\{y(x) \to c_1\Gamma(1-v)J_{-v}\left(\sqrt{x}\right) + c_2\Gamma(v+1)J_v\left(\sqrt{x}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.014 (sec), leaf count = 19

$$\left\{y(x) = \_C1\ J_v\left(\sqrt{x}\right) + \_C2\ Y_v\left(\sqrt{x}\right)\right\}$$

ODE No. 1275

$$y(x)\left(2x(2l - m + 1) - m^2 - x^2 + 1\right) + 4x^2y''(x) + 4xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.0361852 (sec), leaf count = 120

$$\left\{\left\{y(x) \to c_1 e^{\frac{1}{2}\left(\sqrt{m^2-1}\log(x) - x\right)} U\left(\frac{1}{2}\left(-2l + m + \sqrt{m^2-1}\right), \sqrt{m^2-1} + 1, x\right) + c_2 e^{\frac{1}{2}\left(\sqrt{m^2-1}\log(x) - x\right)} L^{\sqrt{m}}_{\frac{1}{2}(2}\right.\right.$$

✓ **Maple** : cpu = 0.173 (sec), leaf count = 53

$$\left\{y(x) = 1\left(\_C2\ W_{l-\frac{m}{2}+\frac{1}{2},\,\frac{1}{2}\sqrt{m+1}\sqrt{m-1}}(x) + \_C1\ M_{l-\frac{m}{2}+\frac{1}{2},\,\frac{1}{2}\sqrt{m+1}\sqrt{m-1}}(x)\right)\frac{1}{\sqrt{x}}\right\}$$

ODE No. 1276

$$-4e^x\sqrt{x^3}+4x^2y''(x)-\left(4x^2+1\right)y(x)+4xy'(x)=0$$

✓ **Mathematica** : cpu = 0.0623517 (sec), leaf count = 55

$$\left\{\left\{y(x)\to \frac{c_1e^{-x}}{\sqrt{x}}+\frac{c_2e^x}{2\sqrt{x}}+\frac{e^x\sqrt{x^3}(2x-1)}{4x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.095 (sec), leaf count = 31

$$\left\{y(x)=\sinh(x)\_C2\frac{1}{\sqrt{x}}+\cosh(x)\_C1\frac{1}{\sqrt{x}}+\frac{e^x}{2x}\sqrt{x^3}\right\}$$

ODE No. 1277

$$-\left(ax^2+1\right)y(x)+4x^2y''(x)+4xy'(x)=0$$

✓ **Mathematica** : cpu = 0.0288553 (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 = 0.066 (sec), leaf count = 27

$$\left\{y(x)=1\left(\_C2\cosh\left(\frac{x}{2}\sqrt{a}\right)+\_C1\sinh\left(\frac{x}{2}\sqrt{a}\right)\right)\frac{1}{\sqrt{x}}\right\}$$

ODE No. 1278

$$f(x)y(x)+4x^2y''(x)+4xy'(x)=0$$

✗ **Mathematica** : cpu = 0.252789 (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

$$\left\{y(x)=DESol\left(\left\{\frac{f(x)\_Y(x)}{4x^2}+\frac{\frac{d}{dx}\_Y(x)}{x}+\frac{d^2}{dx^2}\_Y(x)\right\},\{\_Y(x)\}\right)\right\}$$

ODE No. 1279

$$4x^2y''(x)+5xy'(x)-y(x)-\log(x)=0$$

✓ **Mathematica** : cpu = 0.216168 (sec), leaf count = 74

$$\left\{\left\{y(x)\to c_1x^{\frac{1}{2}\left(\frac{\sqrt{17}}{4}-\frac{1}{4}\right)}+c_2x^{\frac{1}{2}\left(-\frac{1}{4}-\frac{\sqrt{17}}{4}\right)}-\frac{256(\log(x)+1)}{\left(\sqrt{17}-1\right)^2\left(1+\sqrt{17}\right)^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.434 (sec), leaf count = 32

$$\left\{y(x)=x^{-\frac{1}{8}+\frac{\sqrt{17}}{8}}\_C2+x^{-\frac{1}{8}-\frac{\sqrt{17}}{8}}\_C1-\ln(x)-1\right\}$$

ODE No. 1280

$$4x^2y''(x)-\left(4x^2+12x+3\right)y(x)+8xy'(x)=0$$

✓ **Mathematica** : cpu = 0.0401981 (sec), leaf count = 52

$$\left\{\left\{y(x)\to\frac{c_2e^{-x}\left(4e^{2x}x^2\text{Ei}(-2x)+2x-1\right)}{2x^{3/2}}+c_1e^x\sqrt{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.064 (sec), leaf count = 40

$$\left\{y(x)=\left(-4\,Ei(1,2\,x)\,\mathrm{e}^{x}\_C2\,x^2+\_C2\,(2\,x-1)\,\mathrm{e}^{-x}+\_C1\,x^2\mathrm{e}^{x}\right)x^{-\frac{3}{2}}\right\}$$

ODE No. 1281

$$4x^2y''(x)+\left(4x^2-4x-1\right)y(x)-4(2x-1)xy'(x)=0$$

✓ **Mathematica** : cpu = 0.0196434 (sec), leaf count = 28

$$\left\{\left\{y(x)\to\frac{c_1e^x}{\sqrt{x}}+c_2e^x\sqrt{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.066 (sec), leaf count = 15

$$\left\{y(x)=\mathrm{e}^{x}(\_C2\,x+\_C1)\frac{1}{\sqrt{x}}\right\}$$

ODE No. 1282

$$4x^3y'(x)+4x^2y''(x)+\left(x^2-4\right)\left(x^2+6\right)y(x)=0$$

✓ **Mathematica** : cpu = 0.023504 (sec), leaf count = 39

$$\left\{\left\{y(x)\to\frac{c_1e^{-\frac{x^2}{4}}}{x^2}+\frac{1}{5}c_2e^{-\frac{x^2}{4}}x^3\right\}\right\}$$

✓ **Maple** : cpu = 0.05 (sec), leaf count = 21

$$\left\{y(x)=\frac{\_C2\,x^5+\_C1}{x^2}\mathrm{e}^{-\frac{x^2}{4}}\right\}$$

ODE No. 1283

$$4x^2y''(x)+4x^2\log(x)y'(x)+y(x)\left(x^2\log^2(x)+2x-8\right)-4\sqrt{e^xx^{-x}}x^2=0$$

✓ **Mathematica** : cpu = 0.108075 (sec), leaf count = 90

$$\left\{\left\{y(x)\to c_1e^{x/2}x^{-\frac{x}{2}-1}+\frac{1}{3}c_2e^{x/2}x^{2-\frac{x}{2}}+\frac{1}{9}\left(3x^2\sqrt{e^xx^{-x}}\log(x)-x^2\sqrt{e^xx^{-x}}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.171 (sec), leaf count = 48

$$\left\{y(x)=\frac{x^2}{3}\left(\ln(x)-\frac{1}{3}\right)\sqrt{x^{-x}\mathrm{e}^x}+\mathrm{e}^{\frac{x}{2}}\left(\_C1\,x^{-\frac{x}{2}+2}+\_C2\,x^{-\frac{x}{2}-1}\right)\right\}$$

ODE No. 1284

$$(2x+1)^2y''(x)-2(2x+1)y'(x)-12y(x)-3x-1=0$$

✓ **Mathematica** : cpu = 0.0437374 (sec), leaf count = 47

$$\left\{\left\{y(x)\to c_1(2x+1)^3+\frac{c_2}{2x+1}+\frac{-72x^2-56x-7}{192(2x+1)}\right\}\right\}$$

✓ **Maple** : cpu = 0.024 (sec), leaf count = 41

$$\left\{y(x)=\frac{\_C1}{2\,x+1}+(2\,x+1)^3\_C2+\frac{-72\,x^2-56\,x-7}{384\,x+192}\right\}$$

ODE No. 1285

$$((4a+2)x-a)y'(x)+(a-1)ay(x)+x(4x-1)y''(x)=0$$

✓ **Mathematica** : cpu = 0.331756 (sec), leaf count = 134

$$\left\{\left\{y(x)\to \frac{2c_1\sqrt[4]{4x-1}x^{\frac{1}{2}-\frac{a}{2}}e^{\sqrt{-(a-1)^2}\tan^{-1}\left(\sqrt{4x-1}\right)}}{\sqrt[4]{1-4x}}-\frac{c_2\sqrt[4]{4x-1}x^{\frac{1}{2}-\frac{a}{2}}e^{-\sqrt{-(a-1)^2}\tan^{-1}\left(\sqrt{4x-1}\right)}}{2\sqrt{-(a-1)^2}\sqrt[4]{1-4x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.141 (sec), leaf count = 52

$$\left\{y(x)=\_C1\,{}_2\mathrm{F}_1(\frac{a}{2},\frac{a}{2}-\frac{1}{2};\,a;\,4\,x)+\_C2\,x^{1-a}{}_2\mathrm{F}_1(-\frac{a}{2}+1,-\frac{a}{2}+\frac{1}{2};\,-a+2;\,4\,x)\right\}$$

ODE No. 1286

$$(3x-1)^2y''(x)+3(3x-1)y'(x)-9y(x)-\log^2(3x-1)=0$$

✓ **Mathematica** : cpu = 0.103862 (sec), leaf count = 101

$$\left\{\left\{y(x)\to \frac{c_1((1-3x)^2+1)}{2(1-3x)}+\frac{ic_2((1-3x)^2-1)}{2(1-3x)}+\frac{-6x-3x\log^2(3x-1)+\log^2(3x-1)+\log(3x-1}{9(3x-1)}\right.\right.$$

✓ **Maple** : cpu = 0.022 (sec), leaf count = 32

$$\left\{y(x)=\frac{\_C1}{3\,x-1}+(3\,x-1)\,\_C2-\frac{(\ln(3\,x-1))^2}{9}-\frac{2}{9}\right\}$$

ODE No. 1287

$$9(x-1)xy''(x)+3(2x-1)y'(x)-20y(x)=0$$

✓ **Mathematica** : cpu = 0.0189484 (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 = 0.03 (sec), leaf count = 27

$$\left\{y(x)=\_C1\,(6\,x-5)\,x^{\frac{2}{3}}+\_C2\,(6\,x-1)\,(x-1)^{\frac{2}{3}}\right\}$$

ODE No. 1288

$$16x^2y''(x) + (4x+3)y(x) = 0$$

✓ **Mathematica** : cpu = 0.0367995 (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 = 0.035 (sec), leaf count = 21

$$\left\{y(x) = \sqrt[4]{x}\left(\cos\left(\sqrt{x}\right)\_C2 + \sin\left(\sqrt{x}\right)\_C1\right)\right\}$$

ODE No. 1289

$$16x^2y''(x) + 32xy'(x) - (4x+5)y(x) = 0$$

✓ **Mathematica** : cpu = 0.0821253 (sec), leaf count = 53

$$\left\{\left\{y(x)\to \frac{c_2e^{-\sqrt{x}}\left(\sqrt{x}+1\right)}{x^{5/4}} - \frac{c_1e^{\sqrt{x}}\left(\sqrt{x}-1\right)}{x^{5/4}}\right\}\right\}$$

✓ **Maple** : cpu = 0.112 (sec), leaf count = 33

$$\left\{y(x) = 1\left(\_C2\ \left(\sqrt{x}+1\right)\mathrm{e}^{-\sqrt{x}} + \_C1\ \mathrm{e}^{\sqrt{x}}\left(\sqrt{x}-1\right)\right)x^{-\frac{5}{4}}\right\}$$

ODE No. 1290

$$\left(27x^2+4\right)y''(x) + 27xy'(x) - 3y(x) = 0$$

✓ **Mathematica** : cpu = 0.163952 (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 = 0.029 (sec), leaf count = 47

$$\left\{y(x) = \_C1\ \sin\left(\frac{1}{3}\arctan\left(3\frac{\sqrt{3}x}{\sqrt{-27\,x^2-4}}\right)\right) + \_C2\ \cos\left(\frac{1}{3}\arctan\left(3\frac{\sqrt{3}x}{\sqrt{-27\,x^2-4}}\right)\right)\right\}$$

ODE No. 1291

$$48(x-1)xy''(x)+(152x-40)y'(x)+53y(x)=0$$

✓ **Mathematica** : cpu = 0.08084 (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 = 0.077 (sec), leaf count = 62

$$\left\{y(x)=\_C1\,{}_2\mathrm{F}_1(\frac{13}{12}+\frac{\sqrt{5}\sqrt{2}}{12},\frac{13}{12}-\frac{\sqrt{5}\sqrt{2}}{12};\frac{5}{6};x)+\_C2\,\sqrt[6]{x}{}_2\mathrm{F}_1(\frac{5}{4}-\frac{\sqrt{5}\sqrt{2}}{12},\frac{5}{4}+\frac{\sqrt{5}\sqrt{2}}{12};\frac{7}{6};x)\right\}$$

ODE No. 1292

$$50(x-1)xy''(x)+25(2x-1)y'(x)-2y(x)=0$$

✓ **Mathematica** : cpu = 0.0391015 (sec), leaf count = 53

$$\left\{\left\{y(x)\to c_1\cosh\left(\frac{2}{5}\log\left(\sqrt{x-1}+\sqrt{x}\right)\right)+ic_2\sinh\left(\frac{2}{5}\log\left(\sqrt{x-1}+\sqrt{x}\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.076 (sec), leaf count = 31

$$\left\{y(x)=1\left(\_C1\,\left(\sqrt{x}+\sqrt{x-1}\right)^{\frac{4}{5}}+\_C2\right)\left(\sqrt{x}+\sqrt{x-1}\right)^{-\frac{2}{5}}\right\}$$

ODE No. 1293

$$144(x-1)xy''(x)+(120x-48)y'(x)+y(x)=0$$

✓ **Mathematica** : cpu = 0.337094 (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 = 0.072 (sec), leaf count = 33

$$\left\{y(x)=\sqrt[3]{x}\left(\mathit{LegendreQ}\left(-\frac{1}{2},\frac{2}{3},\sqrt{1-x}\right)\_C2+\mathit{LegendreP}\left(-\frac{1}{2},\frac{2}{3},\sqrt{1-x}\right)\_C1\right)\right\}$$

ODE No. 1294

$$144(x-1)xy''(x)+(168x-96)y'(x)+y(x)=0$$

✓ **Mathematica** : cpu = 0.169885 (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 = 0.069 (sec), leaf count = 33

$$\left\{y(x)=\sqrt[6]{x}\left(\mathit{LegendreQ}\left(-\frac{1}{2},\frac{1}{3},\sqrt{1-x}\right)\_C2+\mathit{LegendreP}\left(-\frac{1}{2},\frac{1}{3},\sqrt{1-x}\right)\_C1\right)\right\}$$

ODE No. 1295

$$ax^2y''(x)+bxy'(x)+y(x)\left(cx^2+dx+f\right)=0$$

✓ **Mathematica** : cpu = 0.293725 (sec), leaf count = 310

$$\left\{\left\{y(x)\to c_1U\left(-\frac{-\sqrt{c}a-id\sqrt{a}-\sqrt{c}\sqrt{a^2-2ba-4fa+b^2}}{2a\sqrt{c}},\frac{\sqrt{a^2-2ba-4fa+b^2}}{a}+1,\frac{2i\sqrt{c}x}{\sqrt{a}}\right)\exp\left(\right.\right.\right.$$

✓ **Maple** : cpu = 0.321 (sec), leaf count = 106

$$\left\{y(x)=x^{-\frac{b}{2a}}\left(M_{-\frac{i}{2}d\frac{1}{\sqrt{a}}\frac{1}{\sqrt{c}},\frac{1}{2a}\sqrt{a^2+(-2b-4f)a+b^2}}\left(2\,ix\sqrt{c}\frac{1}{\sqrt{a}}\right)\_C1+W_{-\frac{i}{2}d\frac{1}{\sqrt{a}}\frac{1}{\sqrt{c}},\frac{1}{2a}\sqrt{a^2+(-2b-4f)a+b^2}}\left(2\,ix\sqrt{\right.\right.\right.$$

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 = 0.566357 (sec), leaf count = 356

$$\left\{\left\{y(x)\to c_1U\left(-\frac{2\mathrm{b0}\mathrm{a2}-\sqrt{\mathrm{a1}^2-4\mathrm{a0}\mathrm{a2}}\mathrm{a2}-\mathrm{a1}\mathrm{b1}-\sqrt{\mathrm{a1}^2-4\mathrm{a0}\mathrm{a2}}\sqrt{\mathrm{a2}^2-2\mathrm{b1}\mathrm{a2}-4\mathrm{c0}\mathrm{a2}+\mathrm{b1}^2}}{2\mathrm{a2}\sqrt{\mathrm{a1}^2-4\mathrm{a0}\mathrm{a2}}},\sqrt{\mathrm{a}\right.\right.\right.$$

✓ **Maple** : cpu = 0.371 (sec), leaf count = 150

$$\left\{y(x)=x^{-\frac{b1}{2\,a2}}\mathrm{e}^{-\frac{a1\,x}{2\,a2}}\left(M_{-\frac{a1\,b1-2\,a2\,b0}{2\,a2}\frac{1}{\sqrt{-4\,a0\,a2+a1^2}},\frac{1}{2\,a2}\sqrt{a2^2+(-2\,b1-4\,c0)a2+b1^2}}\left(\frac{x}{a2}\sqrt{-4\,a0\,a2+a1^2}\right)\_C1+W\right.\right.$$

ODE No. 1297

$$\left(ax^2+1\right)y''(x)+axy'(x)+by(x)=0$$

✓ **Mathematica** : cpu = 0.0352745 (sec), leaf count = 52

$$\left\{\left\{y(x)\to c_2\sin\left(\frac{\sqrt{b}\sinh^{-1}\left(\sqrt{a}x\right)}{\sqrt{a}}\right)+c_1\cos\left(\frac{\sqrt{b}\sinh^{-1}\left(\sqrt{a}x\right)}{\sqrt{a}}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.027 (sec), leaf count = 63

$$\left\{y(x)=1\left(\_C1\left(\left(\sqrt{a}x+\sqrt{ax^2+1}\right)^{i\sqrt{b}\frac{1}{\sqrt{a}}}\right)^2+\_C2\right)\left(\left(\sqrt{a}x+\sqrt{ax^2+1}\right)^{i\sqrt{b}\frac{1}{\sqrt{a}}}\right)^{-1}\right\}$$

ODE No. 1298

$$\left(ax^2+1\right)y''(x)+bxy'(x)+cy(x)=0$$

✓ **Mathematica** : cpu = 0.0804297 (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 = 0.164 (sec), leaf count = 124

$$\left\{y(x)=\left(ax^2+1\right)^{\frac{2a-b}{4a}}\left(LegendreP\left(\frac{1}{2a}\left(\sqrt{a^2+(-2b-4c)a+b^2}-a\right),\frac{2a-b}{2a},\sqrt{-a}x\right)\_C1+Legen\right.$$

ODE No. 1299

$$\left(a^2x^2-1\right)y''(x)+2a^2xy'(x)=0$$

✓ **Mathematica** : cpu = 0.0149569 (sec), leaf count = 19

$$\left\{\left\{y(x)\to c_2-\frac{c_1\tanh^{-1}(ax)}{a}\right\}\right\}$$

✓ **Maple** : cpu = 0.021 (sec), leaf count = 27

$$\left\{y(x)=\_C1-\frac{\left(\ln(ax+1)-\ln(ax-1)\right)\_C2}{2a}\right\}$$

ODE No. 1300

$$\left(a^2x^2-1\right)y''(x)+2a^2xy'(x)-2a^2y(x)=0$$

✓ **Mathematica** : cpu = 0.0359961 (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 = 0.05 (sec), leaf count = 31

$$\left\{y(x)=-\frac{\_C2\,a\ln(ax+1)\,x}{2}+\frac{\_C2\,a\ln(ax-1)\,x}{2}+\_C1\,x+\_C2\right\}$$

ODE No. 1301

$$\left(ax^2+bx\right)y''(x)-2ay(x)+2by'(x)=0$$

✓ **Mathematica** : cpu = 0.0334909 (sec), leaf count = 31

$$\left\{\left\{y(x)\to\frac{c_2(ax+b)^3}{3ax}+\frac{c_1}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.033 (sec), leaf count = 19

$$\left\{y(x)=\frac{\_C1+\_C2\,(ax+b)^3}{x}\right\}$$

ODE No. 1302

$$\mathrm{A0}y(x)(ax+b)+\mathrm{A1}(ax+b)y'(x)+\mathrm{A2}(ax+b)^2y''(x)=0$$

✓ **Mathematica** : cpu = 0.0838542 (sec), leaf count = 243

$$\left\{\left\{y(x)\to c_1\left(\frac{2b}{a}+2x\right)^{\frac{\mathrm{A1}}{2a\mathrm{A2}}}(2a\mathrm{A2}x+2\mathrm{A2}b)^{-\frac{\mathrm{A1}}{2a\mathrm{A2}}}\left(-\frac{\mathrm{A0}\left(\frac{b}{a}+x\right)}{a\mathrm{A2}}\right)^{\frac{1}{2}-\frac{\mathrm{A1}}{2a\mathrm{A2}}}I_{\frac{\mathrm{A1}}{a\mathrm{A2}}-1}\left(2\sqrt{-\frac{\mathrm{A0}\left(\frac{b}{a}+x\right)}{a\mathrm{A2}}}\right)+\right.\right.$$

✓ **Maple** : cpu = 0.08 (sec), leaf count = 98

$$\left\{y(x)=(ax+b)^{-\frac{-aA2+A1}{2\,aA2}}\left(Y_{\frac{aA2-A1}{aA2}}\left(2\sqrt{A0}\sqrt{\frac{ax+b}{a^2A2}}\right)\_C2+J_{\frac{aA2-A1}{aA2}}\left(2\sqrt{A0}\sqrt{\frac{ax+b}{a^2A2}}\right)\_C1\right)\right\}$$

ODE No. 1303

$$y''(x)\left(ax^2+bx+c\right)+(dx+f)y'(x)+gy(x)=0$$

✗ **Mathematica** : cpu = 14.6398 (sec), leaf count = 0 , DifferentialRoot result

$$\left\{\left\{y(x)\to \text{DifferentialRoot}\left(\{y,x\},\left\{gy(x)+(xd+f)y'(x)+\left(ax^2+bx+c\right)y''(x)=0,y(0)=c_1,y'(0)=\right.\right.\right.$$

✓ **Maple** : cpu = 0.236 (sec), leaf count = 501

$$\left\{y(x)=\_C1\ {}_2\mathrm{F}_1(-\frac{1}{2\,a}\left(a-d+\sqrt{a^2+(-2\,d-4\,g)\,a+d^2}\right),\frac{1}{2\,a}\left(-a+d+\sqrt{a^2+(-2\,d-4\,g)\,a+d^2}\right)\right.$$

ODE No. 1304

$$x^3y''(x)+xy'(x)-(2x+3)y(x)=0$$

✓ **Mathematica** : cpu = 0.052318 (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 = 0.06 (sec), leaf count = 38

$$\left\{y(x)=\frac{1}{x}\left(Ei\left(1,x^{-1}\right){\mathrm{e}^{x^{-1}}}\_C2+\_C1\,{\mathrm{e}^{x^{-1}}}-2\,\left(x^2-x/2+1/2\right)x\_C2\right)\right\}$$

ODE No. 1305

$$x^3y''(x)+2xy'(x)-y(x)=0$$

✓ **Mathematica** : cpu = 0.083562 (sec), leaf count = 47

$$\left\{\left\{y(x)\to c_2G_{1,2}^{2,0}\left(-\frac{2}{x}|\begin{array}{c}\frac{1}{2}\\-1,0\end{array}\right)+c_1e^{\frac{1}{x}}\left(I_0\left(\frac{1}{x}\right)-I_1\left(\frac{1}{x}\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.082 (sec), leaf count = 44

$$\left\{y(x)=\left(-\_C2\,K_1\left(-x^{-1}\right)+\_C2\,K_0\left(-x^{-1}\right)+\_C1\,\left(I_0\left(x^{-1}\right)-I_1\left(x^{-1}\right)\right)\right){\mathrm{e}^{x^{-1}}}\right\}$$

ODE No. 1306

$$y(x)\left(ax^2+a+bx\right)+x^3y''(x)+x^2y'(x)=0$$

✗ **Mathematica** : cpu = 1.09073 (sec), leaf count = 0 , DifferentialRoot result

$$\left\{\left\{y(x)\to \text{DifferentialRoot}\left(\{y,x\},\left\{y''(x)x^3+y'(x)x^2+\left(ax^2+bx+a\right)y(x)=0,y(1)=c_1,y'(1)=c_2\right\}\right)\right.\right.$$

✓ **Maple** : cpu = 0.357 (sec), leaf count = 69

$$\left\{y(x)=\mathit{HeunD}\left(0,8\,a+4\,b,0,8\,a-4\,b,\frac{1+x}{x-1}\right)\left(\int\frac{1}{x}\left(\mathit{HeunD}\left(0,8\,a+4\,b,0,8\,a-4\,b,\frac{1+x}{x-1}\right)\right)^{-2}\mathrm{d}x\_\right.\right.$$

ODE No. 1307

$$x^3y''(x)+(x+1)xy'(x)-2y(x)=0$$

✓ **Mathematica** : cpu = 0.110738 (sec), leaf count = 54

$$\left\{\left\{y(x)\to\frac{c_1e^{\frac{1}{x}}(x+1)}{x}-\frac{c_2\left(e^{\frac{1}{x}}x\text{Ei}\left(-\frac{1}{x}\right)+e^{\frac{1}{x}}\text{Ei}\left(-\frac{1}{x}\right)+x\right)}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.062 (sec), leaf count = 36

$$\left\{y(x)=\frac{\_C2\,\mathrm{e}^{x^{-1}}(1+x)\,Ei(1,x^{-1})+\_C1\,(1+x)\,\mathrm{e}^{x^{-1}}-\_C2\,x}{x}\right\}$$

ODE No. 1308

$$x^3y''(x)-x^2y'(x)+xy(x)-\log^3(x)=0$$

✓ **Mathematica** : cpu = 0.0228643 (sec), leaf count = 41

$$\left\{\left\{y(x)\to c_1x+c_2x\log(x)+\frac{2\log^3(x)+6\log^2(x)+9\log(x)+6}{8x}\right\}\right\}$$

✓ **Maple** : cpu = 0.023 (sec), leaf count = 40

$$\left\{y(x)=\frac{2\,(\ln(x))^3+6\,(\ln(x))^2+(8\_C1\,x^2+9)\ln(x)+8\_C2\,x^2+6}{8\,x}\right\}$$

ODE No. 1309

$$x^3y''(x) - (x^2-1)\,y'(x) + xy(x) = 0$$

✓ **Mathematica** : cpu = 0.0994623 (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 = 0.108 (sec), leaf count = 85

$$\left\{y(x) = \frac{\_C1}{x} e^{\frac{1}{4x^2}}\left(2x^2 I_0(1/4x^{-2}) + I_1\left(\frac{1}{4x^2}\right) - I_0\left(\frac{1}{4x^2}\right)\right) + \frac{\_C2}{x} e^{\frac{1}{4x^2}}\left(2K_0(-1/4x^{-2})x^2 - K_0\left(-\right.\right.\right.$$

ODE No. 1310

$$x^3y''(x) + 3x^2y'(x) + xy(x) - 1 = 0$$

✓ **Mathematica** : cpu = 0.0124598 (sec), leaf count = 31

$$\left\{\left\{y(x) \to \frac{c_1}{x} + \frac{c_2\log(x)}{x} + \frac{\log^2(x)}{2x}\right\}\right\}$$

✓ **Maple** : cpu = 0.016 (sec), leaf count = 20

$$\left\{y(x) = \frac{1}{x}\left(\_C1\ \ln(x) + \frac{(\ln(x))^2}{2} + \_C2\right)\right\}$$

ODE No. 1311

$$-v(v+1)xy(x) + x\left(x^2+1\right)y''(x) + \left(2x^2+1\right)y'(x) = 0$$

✓ **Mathematica** : cpu = 0.136778 (sec), leaf count = 63

$$\left\{\left\{y(x) \to c_2 G_{2,2}^{2,0}\left(-x^2\middle| \begin{array}{c} \frac{1-v}{2}, \frac{v+2}{2} \\ 0, 0 \end{array}\right) + c_1\, {}_2F_1\left(\frac{v}{2}+\frac{1}{2}, -\frac{v}{2}; 1; -x^2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.152 (sec), leaf count = 52

$$\left\{y(x) = \_C1\ {}_2\mathrm{F}_1(-\frac{v}{2}, \frac{1}{2}+\frac{v}{2}; \frac{1}{2}; x^2+1) + \_C2\ \sqrt{x^2+1}\,{}_2\mathrm{F}_1(1+\frac{v}{2}, \frac{1}{2}-\frac{v}{2}; \frac{3}{2}; x^2+1)\right\}$$

ODE No. 1312

$$x\left(x^2+1\right)y''(x)+2\left(x^2-1\right)y'(x)-2xy(x)=0$$

✓ **Mathematica** : cpu = 0.0243471 (sec), leaf count = 32

$$\left\{\left\{y(x)\to \frac{c_1}{x^2+1}+\frac{c_2x^3}{3\left(x^2+1\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.023 (sec), leaf count = 19

$$\left\{y(x)=\frac{\_C2\,x^3+\_C1}{x^2+1}\right\}$$

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 = 0.219543 (sec), leaf count = 87

$$\left\{\left\{y(x)\to c_1\,{}_2F_1\left(\frac{n}{2}-\frac{v}{2},\frac{n}{2}+\frac{v}{2}+\frac{1}{2};n+1;-x^2\right)+c_2x^{-2n}\,{}_2F_1\left(-\frac{n}{2}-\frac{v}{2},-\frac{n}{2}+\frac{v}{2}+\frac{1}{2};1-n;-x^2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.095 (sec), leaf count = 35

$$\left\{y(x)=x^{-n}\left(\mathit{LegendreP}\left(v,n,\sqrt{x^2+1}\right)\_C1+\mathit{LegendreQ}\left(v,n,\sqrt{x^2+1}\right)\_C2\right)\right\}$$

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 = 0.191852 (sec), leaf count = 87

$$\left\{\left\{y(x)\to c_1\,{}_2F_1\left(-\frac{n}{2}-\frac{v}{2},-\frac{n}{2}+\frac{v}{2}+\frac{1}{2};1-n;-x^2\right)+c_2x^{2n}\,{}_2F_1\left(\frac{n}{2}-\frac{v}{2},\frac{n}{2}+\frac{v}{2}+\frac{1}{2};n+1;-x^2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.085 (sec), leaf count = 33

$$\left\{y(x)=x^{n}\left(\mathit{LegendreP}\left(v,n,\sqrt{x^2+1}\right)\_C1+\mathit{LegendreQ}\left(v,n,\sqrt{x^2+1}\right)\_C2\right)\right\}$$

ODE No. 1315

$$ax^3y(x) + (x^2-1)\,xy''(x) + y'(x) = 0$$

✓ **Mathematica** : cpu = 0.0282205 (sec), leaf count = 44

$$\left\{\left\{y(x)\to c_2\sin\left(\sqrt{a}\sqrt{x^2-1}\right)+c_1\cos\left(\sqrt{a}\sqrt{x^2-1}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.025 (sec), leaf count = 45

$$\left\{y(x)=\_C1\ \sin\left((x-1)\,(1+x)\,\sqrt{a}\frac{1}{\sqrt{x^2-1}}\right)+\_C2\ \cos\left((x-1)\,(1+x)\,\sqrt{a}\frac{1}{\sqrt{x^2-1}}\right)\right\}$$

ODE No. 1316

$$x(x^2-1)\,y''(x) + (x^2-1)\,y'(x) - xy(x) = 0$$

✓ **Mathematica** : cpu = 0.0941704 (sec), leaf count = 38

$$\left\{\left\{y(x)\to c_2G_{2,2}^{2,0}\left(x^2\middle|\begin{array}{c}\frac{1}{2},\frac{3}{2}\\0,0\end{array}\right)+\frac{2c_1E(x^2)}{\pi}\right\}\right\}$$

✓ **Maple** : cpu = 0.047 (sec), leaf count = 18

$$\{y(x)=\_C1\ \mathit{EllipticE}(x)+\_C2\ (\mathit{EllipticCE}(x)-\mathit{EllipticCK}(x))\}$$

ODE No. 1317

$$x(x^2-1)\,y''(x) + (3x^2-1)\,y'(x) + xy(x) = 0$$

✓ **Mathematica** : cpu = 0.129666 (sec), leaf count = 38

$$\left\{\left\{y(x)\to c_2G_{2,2}^{2,0}\left(x^2\middle|\begin{array}{c}\frac{1}{2},\frac{1}{2}\\0,0\end{array}\right)+\frac{2c_1K(x^2)}{\pi}\right\}\right\}$$

✓ **Maple** : cpu = 0.048 (sec), leaf count = 13

$$\{y(x)=\_C1\ \mathit{EllipticK}(x)+\_C2\ \mathit{EllipticCK}(x)\}$$

ODE No. 1318

$$\left(ax^2+b\right)y'(x)+cxy(x)+x\left(x^2-1\right)y''(x)=0$$

✓ **Mathematica** : cpu = 0.302032 (sec), leaf count = 172

$$\left\{\left\{y(x)\to c_1\,{}_2F_1\left(\frac{a}{4}-\frac{1}{4}\sqrt{a^2-2a-4c+1}-\frac{1}{4},\frac{a}{4}+\frac{1}{4}\sqrt{a^2-2a-4c+1}-\frac{1}{4};\frac{1}{2}-\frac{b}{2};x^2\right)+i^{b+1}c_2x^{b+1}\right.\right.$$

✓ **Maple** : cpu = 0.139 (sec), leaf count = 122

$$\left\{y(x)=\_C1\,{}_2\mathrm{F}_1(-\frac{1}{4}+\frac{a}{4}+\frac{1}{4}\sqrt{a^2-2\,a-4\,c+1},-\frac{1}{4}+\frac{a}{4}-\frac{1}{4}\sqrt{a^2-2\,a-4\,c+1};-\frac{b}{2}+\frac{1}{2};x^2)+\_C\right.$$

ODE No. 1319

$$x\left(x^2+2\right)y''(x)-y'(x)-6xy(x)=0$$

✓ **Mathematica** : cpu = 0.11398 (sec), leaf count = 72

$$\left\{\left\{y(x)\to\frac{1}{3}c_2\left(-\sqrt[4]{2}\left(x^2+2\right)^{3/4}x^2\,{}_2F_1\left(\frac{1}{4},\frac{3}{4};\frac{5}{4};-\frac{x^2}{2}\right)-x^2-1\right)+c_1\left(x^2+2\right)^{3/4}x^{3/2}\right\}\right\}$$

✓ **Maple** : cpu = 0.163 (sec), leaf count = 31

$$\left\{y(x)=\left(x^2+2\right)^{\frac{3}{4}}\left(x^{\frac{3}{2}}\_C1+{}_2\mathrm{F}_1(-\frac{3}{4},\frac{7}{4};\frac{1}{4};-\frac{x^2}{2})\_C2\right)\right\}$$

ODE No. 1320

$$x\left(x^2-2\right)y''(x)+\left(x^2+4x+2\right)y(x)-\left(x^3+3x^2-2x-2\right)y'(x)=0$$

✓ **Mathematica** : cpu = 0.0838091 (sec), leaf count = 21

$$\left\{\left\{y(x)\to c_1e^xx^2+c_2(x-1)\right\}\right\}$$

✓ **Maple** : cpu = 0.052 (sec), leaf count = 17

$$\left\{y(x)=\_C1\,(x-1)+\_C2\,\mathrm{e}^xx^2\right\}$$

ODE No. 1321

$$(x+1)x^2y''(x) - (2x+1)xy'(x) + (2x+1)y(x) = 0$$

✓ **Mathematica** : cpu = 0.0272916 (sec), leaf count = 18

$$\{\{y(x) \to c_1x + c_2x(x + \log(x))\}\}$$

✓ **Maple** : cpu = 0.032 (sec), leaf count = 15

$$\{y(x) = x(\_C2\ \ln(x) + \_C2\ x + \_C1)\}$$

ODE No. 1322

$$(x+1)x^2y''(x) + 2(3x+2)xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.0345389 (sec), leaf count = 44

$$\left\{\left\{y(x) \to c_1\left(-\frac{1}{3x^3} + \frac{1}{x^2} - \frac{3}{x} - \frac{1}{x+1} - 4\log(x) + 4\log(x+1)\right) + c_2\right\}\right\}$$

✓ **Maple** : cpu = 0.031 (sec), leaf count = 44

$$\left\{y(x) = \_C1 + \left(-4\ \ln(x) + 4\ \ln(1+x) - \frac{12\,x^3 + 6\,x^2 - 2\,x + 1}{3\,x^3\,(1+x)}\right)\_C2\right\}$$

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 = 0.732683 (sec), leaf count = 0 , DifferentialRoot result

$$\{\{y(x) \to \text{DifferentialRoot}(\{y, x\}, \{(-2x-2)y(x) + (2x-4)y'(x) + (x-1)xy''(x) = 0, y(2) = c_1, y'(2)$$

✓ **Maple** : cpu = 0.024 (sec), leaf count = 17

$$\left\{y(x) = \frac{\_C1 + \_C2\,(x-1)^3}{x^2}\right\}$$

ODE No. 1324

$$y''(x) = \frac{(5x-4)y'(x)}{(x-1)x} - \frac{(9x-6)y(x)}{(x-1)x^2}$$

✓ **Mathematica** : cpu = 0.0304425 (sec), leaf count = 25

$$\{\{y(x) \to c_1 x^3 - c_2 x^2 (x \log(x) + 1)\}\}$$

✓ **Maple** : cpu = 0.033 (sec), leaf count = 18

$$\{y(x) = x^2 (\ln(x)\_C2\, x + \_C1\, x + \_C2)\}$$

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 = 0.265198 (sec), leaf count = 52

$$\{\{y(x) \to (-1)^\alpha c_1 x^\alpha\, {}_2F_1(a+\alpha, \alpha+b; \alpha-\beta+1; x) + (-1)^\beta c_2 x^\beta\, {}_2F_1(a+\beta, b+\beta; -\alpha+\beta+1; x)\}\}$$

✓ **Maple** : cpu = 0.152 (sec), leaf count = 86

$$\Big\{y(x) = (x-1)^{1-a-\alpha-b-\beta} \left(x^\alpha {}_2\mathrm{F}_1(1-b-\beta, 1-a-\beta;\ 1+\alpha-\beta;\ x)\_C1 + {}_2\mathrm{F}_1(1-\alpha-b, 1-a-\alpha;\ 1\right.$$

ODE No. 1326

$$y''(x) = -\frac{y'(x)}{x+1} - \frac{y(x)}{x(x+1)^2}$$

✓ **Mathematica** : cpu = 0.0249954 (sec), leaf count = 29

$$\left\{\left\{y(x) \to \frac{c_1 x}{x+1} + \frac{c_2(x\log(x) - 1)}{x+1}\right\}\right\}$$

✓ **Maple** : cpu = 0.032 (sec), leaf count = 22

$$\left\{y(x) = \frac{\ln(x)\_C2\, x + \_C1\, x - \_C2}{1+x}\right\}$$

ODE No. 1327

$$y''(x) = \frac{2y'(x)}{(x-2)x} - \frac{y(x)}{(x-2)x^2}$$

✓ **Mathematica** : cpu = 0.179857 (sec), leaf count = 104

$$\left\{\left\{y(x) \to \left(-\frac{1}{2}\right)^{-\frac{1}{\sqrt{2}}} c_1 x^{-\frac{1}{\sqrt{2}}} {}_2F_1\left(-\frac{1}{\sqrt{2}}, -1-\frac{1}{\sqrt{2}}; 1-\sqrt{2}; \frac{x}{2}\right) + \left(-\frac{1}{2}\right)^{\frac{1}{\sqrt{2}}} c_2 x^{\frac{1}{\sqrt{2}}} {}_2F_1\left(\frac{1}{\sqrt{2}}, -1+\frac{1}{\sqrt{2}}; 1\right.\right.\right.$$

✓ **Maple** : cpu = 0.336 (sec), leaf count = 81

$$\left\{y(x) = (x-2)^2 \left(\_C2\ {}_2\mathrm{F}_1(2+\frac{\sqrt{2}}{2}, 1+\frac{\sqrt{2}}{2}; 1+\sqrt{2}; \frac{x}{2}) x^{\frac{\sqrt{2}}{2}} + \_C1\ {}_2\mathrm{F}_1(2-\frac{\sqrt{2}}{2}, 1-\frac{\sqrt{2}}{2}; 1-\sqrt{2}; \frac{x}{2})\right.\right.$$

ODE No. 1328

$$y''(x) = \frac{2y(x)}{(x-1)^2 x}$$

✓ **Mathematica** : cpu = 0.022807 (sec), leaf count = 36

$$\left\{\left\{y(x) \to \frac{c_2(-x^2 + 2x\log(x) + 1)}{x-1} - \frac{c_1 x}{x-1}\right\}\right\}$$

✓ **Maple** : cpu = 0.033 (sec), leaf count = 27

$$\left\{y(x) = \frac{2\ln(x)\_C2\, x - \_C2\, x^2 + \_C1\, x + \_C2}{x-1}\right\}$$

ODE No. 1329

$$y''(x) = -\frac{y'(x)\left(-x(a(\delta + \mathrm{gamma1}) + \alpha + \beta - \delta + 1) + a\mathrm{gamma1} + x^2(\alpha+\beta+1)\right)}{(x-1)x(x-a)} - \frac{y(x)(\alpha\beta x - q)}{(x-1)x(x-a)}$$

✗ **Mathematica** : cpu = 6.14978 (sec), leaf count = 0 , DifferentialRoot result

$$\{\{y(x) \to \mathrm{DifferentialRoot}(\{y, x\}, \{(x\alpha\beta - q)y(x) + (\alpha x^2 + \beta x^2 + x^2 - \alpha x - \beta x - a\delta x + \delta x - agamma$$

✓ **Maple** : cpu = 0.352 (sec), leaf count = 64

$$\{y(x) = \_C1\ HeunG(a, q, \alpha, \beta, \gamma 1, \delta, x) + \_C2\, x^{1-\gamma 1} HeunG(a, q - (-1+\gamma 1)(\delta(a-1) + \alpha + \beta - \gamma 1 +$$

ODE No. 1330

$$y''(x) = -\frac{y'(x)\left(Ax^2 + Bx + C\right)}{(x-a)(x-b)(x-c)} - \frac{(\mathrm{DD}x + e)y(x)}{(x-a)(x-b)(x-c)}$$

✗ **Mathematica** : cpu = 176.457 (sec), leaf count = 0 , DifferentialRoot result

$$\{\{y(x) \to \text{DifferentialRoot}(\{y, x\}, \{(x\mathrm{DD} + e)y(x) + \left(Ax^2 + Bx + C\right)y'(x) - (a-x)(b-x)(c-x)y''($$

✓ **Maple** : cpu = 1.131 (sec), leaf count = 1147

$$\left\{y(x) = \_C1\ HeunG\left(\frac{a-c}{a-b}, \frac{DD\,a + E}{a-b}, \frac{A}{2} - \frac{1}{2} + \frac{1}{2}\sqrt{A^2 - 2\,A - 4\,DD + 1}, 1\left((A(b-c)\,a - Abc - Bc -\right.\right.\right.$$

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 = 0.04389 (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 = 0.029 (sec), leaf count = 19

$$\left\{y(x) = \_C1\ \sqrt{x} + \_C2\ \sqrt{x\,(x-2)}\right\}$$

ODE No. 1332

$$y''(x) = \frac{y'(x)}{x+1} - \frac{(3x+1)y(x)}{4x^2(x+1)}$$

✓ **Mathematica** : cpu = 0.0254975 (sec), leaf count = 26

$$\{\{y(x) \to c_1\sqrt{x} + c_2\sqrt{x}(x + \log(x))\}\}$$

✓ **Maple** : cpu = 0.023 (sec), leaf count = 17

$$\{y(x) = \sqrt{x}(\_C2\ \ln(x) + \_C2\,x + \_C1)\}$$

ODE No. 1333

$$y''(x) = \frac{v(v+1)y(x)}{4x^2} - \frac{(3x-1)y'(x)}{2(x-1)x}$$

✓ **Mathematica** : cpu = 0.113957 (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 = 0.084 (sec), leaf count = 45

$$\left\{y(x) = \_C1\, x^{-\frac{v}{2}} {}_2\mathrm{F}_1(\frac{1}{2}, -v;\ \frac{1}{2} - v;\ x) + \_C2\, x^{\frac{v}{2}+\frac{1}{2}} {}_2\mathrm{F}_1(\frac{1}{2}, v+1;\ \frac{3}{2} + v;\ x)\right\}$$

ODE No. 1334

$$y''(x) = -\frac{y(x)\left(x(a^2-b^2)+c^2\right)}{4(x-1)x^2} - \frac{((a+1)x-1)y'(x)}{(x-1)x}$$

✓ **Mathematica** : cpu = 0.209962 (sec), leaf count = 114

$$\left\{\left\{y(x) \to i^{-c} c_1 x^{-c/2} {}_2F_1\left(\frac{a}{2} - \frac{b}{2} - \frac{c}{2}, \frac{a}{2} + \frac{b}{2} - \frac{c}{2}; 1-c; x\right) + i^c c_2 x^{c/2} {}_2F_1\left(\frac{a}{2} - \frac{b}{2} + \frac{c}{2}, \frac{a}{2} + \frac{b}{2} + \frac{c}{2}; c+1\right.\right.\right.$$

✓ **Maple** : cpu = 0.1 (sec), leaf count = 89

$$\left\{y(x) = (x-1)^{1-a}\left(x^{-\frac{c}{2}} {}_2\mathrm{F}_1(-\frac{a}{2} - \frac{b}{2} - \frac{c}{2} + 1, -\frac{a}{2} + \frac{b}{2} - \frac{c}{2} + 1;\ 1-c;\ x)\_C2 + x^{\frac{c}{2}} {}_2\mathrm{F}_1(-\frac{a}{2} - \frac{b}{2} + \frac{c}{2} + \right.\right.$$

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 = 0.339199 (sec), leaf count = 893

$$\left\{\left\{y(x) \to e^{\frac{1}{4}(-2\log(1-x)-\log(x))} \sqrt[4]{x} c_1 {}_2F_1\left(\frac{1}{4}\left(\sqrt{-8a-4b-4\sqrt{4a^2+4ba-a-b+1}+1}\right), \frac{(-8a-4b-}{}\right.\right.\right.$$

✓ **Maple** : cpu = 0.07 (sec), leaf count = 57

$$\left\{y(x) = \_C1\ LegendreP\left(\frac{1}{2}\sqrt{1-4\,a}-\frac{1}{2}, \sqrt{-a-b}, \sqrt{x}\right) + \_C2\ LegendreQ\left(\frac{1}{2}\sqrt{1-4\,a}-\frac{1}{2}, \sqrt{-a-b},\right.\right.$$

ODE No. 1336

$$y''(x) = -\frac{(1-3x)y(x)}{(x-1)(2x-1)^2}$$

✓ **Mathematica** : cpu = 0.0536975 (sec), leaf count = 70

$$\{\{y(x) \to c_2\sqrt{1-2x}(2x\log(2(x-1)+1) - 2\log(2(x-1)+1) - 2x\log(x-1) + 2\log(x-1) - 1) - c_1$$

✓ **Maple** : cpu = 0.053 (sec), leaf count = 44

$$\{y(x) = \sqrt{2\,x-1}(2\,\_C2\,(x-1)\ln(2\,x-1) - 2\,\_C2\,(x-1)\ln(x-1) + \_C1\,x - \_C1 - \_C2)\}$$

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 = 0.0847389 (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 = 0.046 (sec), leaf count = 27

$$\left\{y(x) = 1\left(\sqrt{x+b}\_C1 + \_C2\right)\frac{1}{\sqrt{\frac{x+a}{a-b}}}\right\}$$

ODE No. 1338

$$y''(x) = \frac{y(x)}{3(x-2)x^2} + \frac{(6x-1)y'(x)}{3(x-2)x}$$

✓ **Mathematica** : cpu = 0.0688816 (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 = 0.039 (sec), leaf count = 27

$$\left\{y(x) = \_C2\,\sqrt[6]{x}(x-2)^{\frac{17}{6}} + 18\left(x^2-\frac{17\,x}{3}+\frac{187}{18}\right)x\_C1\right\}$$

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 = 0.270144 (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 = 0.155 (sec), leaf count = 76

$$\left\{y(x) = (ax+1)^{-b+c-d}\left(x^{-c}{}_2\mathrm{F}_1(-d,1-b-d;\,1-d-c;\,-ax)\_C2 + x^d{}_2\mathrm{F}_1(c,1-b+c;\,1+d+c;\,-a\right.$$

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 = 0.0377281 (sec), leaf count = 32

$$\left\{\left\{y(x)\to \frac{c_2x^3}{ax+b}+\frac{c_1x^2}{ax+b}\right\}\right\}$$

✓ **Maple** : cpu = 0.033 (sec), leaf count = 20

$$\left\{y(x) = \frac{x^2(\_C2\,x+\_C1)}{ax+b}\right\}$$

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 = 3599.95 (sec), leaf count = 0 , timed out

```
$Aborted
```

✓ **Maple** : cpu = 0.208 (sec), leaf count = 201

$$\left\{ y(x) = \frac{1}{a^2 (v+6)(v+2)(v+12)} \left(x^{-\frac{1}{2}+\frac{1}{2}\sqrt{1-4v}} a^2 \_C2 (v+6)(v+2)(v+12)\, {}_2\mathrm{F}_1(-\frac{1}{2} - \frac{1}{2}\sqrt{1-4v}, \frac{3}{2}\right.$$

ODE No. 1342

$$y''(x) = -\frac{ay(x)}{x^4}$$

✓ **Mathematica** : cpu = 0.0718411 (sec), leaf count = 52

$$\left\{\left\{y(x) \to c_1 x e^{\frac{i\sqrt{a}}{x}} - \frac{ic_2 x e^{-\frac{i\sqrt{a}}{x}}}{2\sqrt{a}}\right\}\right\}$$

✓ **Maple** : cpu = 0.059 (sec), leaf count = 31

$$\left\{ y(x) = x\left(\cosh\left(\frac{1}{x}\sqrt{-a}\right)\_C2 + \sinh\left(\frac{1}{x}\sqrt{-a}\right)\_C1\right)\right\}$$

ODE No. 1343

$$y''(x) = -\frac{y(x)\left((1-a)ax^2 - b(b+x)\right)}{x^4}$$

✗ **Mathematica** : cpu = 0.763823 (sec), leaf count = 0 , DifferentialRoot result

$$\left\{\left\{y(x) \to \text{DifferentialRoot}\left(\{y, x\}, \left\{y''(x)x^4 + \left(-a^2x^2 + ax^2 - bx - b^2\right)y(x) = 0, y(1) = c_1, y'(1) = c_2\right\}\right)\right.\right.$$

✓ **Maple** : cpu = 0.119 (sec), leaf count = 58

$$\left\{ y(x) = I_{a+1}\left(\frac{b}{x}\right)\_C1\, b - K_{a+1}\left(\frac{b}{x}\right)\_C2\, b + 2\left(\_C1\, I_a\left(\frac{b}{x}\right) + \_C2\, K_a\left(\frac{b}{x}\right)\right)(ax + b/2)\right\}$$

ODE No. 1344

$$y''(x) = -\frac{\left(e^{2/x} - v^2\right) y(x)}{x^4}$$

✓ **Mathematica** : cpu = 0.572261 (sec), leaf count = 173

$$\left\{\left\{y(x) \to \frac{c_1 2^{v+\frac{v+1}{2}} \left(e^{2/x}\right)^{\frac{v+1}{2}-\frac{1}{2}} \left(-e^{2/x}\right)^{\frac{1}{2}(-v-1)+\frac{1}{2}} I_v\left(\sqrt{-e^{2/x}}\right)}{\log\left(e^{2/x}\right)} + \frac{c_2(-1)^{-v} 2^{v+\frac{v+1}{2}} \left(e^{2/x}\right)^{\frac{v+1}{2}-\frac{1}{2}} \left(-e^{2/x}\right)^{\frac{1}{2}(}}{\log\left(e^{2/x}\right)}\right.\right.$$

✓ **Maple** : cpu = 0.081 (sec), leaf count = 23

$$\left\{y(x) = x\left(Y_v\left(e^{x^{-1}}\right)\_C2 + J_v\left(e^{x^{-1}}\right)\_C1\right)\right\}$$

ODE No. 1345

$$y''(x) = \frac{2y(x)}{x^4} - \frac{y'(x)}{x^3}$$

✓ **Mathematica** : cpu = 0.0439067 (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 = 0.056 (sec), leaf count = 25

$$\left\{y(x) = x e^{\frac{1}{2x^2}}\left(Erf\left(\frac{\sqrt{2}}{2x}\right)\_C2 + \_C1\right)\right\}$$

ODE No. 1346

$$y''(x) = \frac{(a+b)y'(x)}{x^2} - \frac{y(x)(x(a+b)+ab)}{x^4}$$

✓ **Mathematica** : cpu = 0.0840219 (sec), leaf count = 37

$$\left\{\left\{y(x) \to \frac{c_2 x e^{-\frac{a}{x}}}{a-b} + c_1 x e^{-\frac{b}{x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.06 (sec), leaf count = 25

$$\left\{y(x) = x\left(e^{-\frac{b}{x}}\_C2 + e^{-\frac{a}{x}}\_C1\right)\right\}$$

ODE No. 1347

$$y''(x) = -\frac{y(x)}{x^4} - \frac{y'(x)}{x}$$

✓ **Mathematica** : cpu = 0.123416 (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 = 0.039 (sec), leaf count = 19

$$\{y(x) = \_C1\ J_0(x^{-1}) + \_C2\ Y_0(x^{-1})\}$$

ODE No. 1348

$$y''(x) = -\frac{y(x)\left(a(x^4+1)+bx^2\right)}{x^4} - \frac{y'(x)}{x}$$

✗ **Mathematica** : cpu = 1.35805 (sec), leaf count = 0 , DifferentialRoot result

$$\{\{y(x) \to \text{DifferentialRoot}(\{y,x\},\{y''(x)x^4 + y'(x)x^3 + (ax^4+bx^2+a)\,y(x) = 0, y(1) = c_1, y'(1) = c_2\}$$

✓ **Maple** : cpu = 0.217 (sec), leaf count = 73

$$\left\{y(x) = HeunD\left(0, 2\,a+b, 0, 2\,a-b, \frac{x^2+1}{x^2-1}\right)\left(\int \frac{1}{x}\left(HeunD\left(0, 2\,a+b, 0, 2\,a-b, \frac{x^2+1}{x^2-1}\right)\right)^{-2} dx\_C2\right.\right.$$

ODE No. 1349

$$y''(x) = -\frac{y(x)}{x^4} - \frac{(x^2+1)\,y'(x)}{x^3}$$

✓ **Mathematica** : cpu = 0.111331 (sec), leaf count = 76

$$\left\{\left\{y(x) \to c_2 G_{1,2}^{2,0}\left(-\frac{1}{2x^2}\middle| \begin{matrix}\frac{3}{2}\\ 0,0\end{matrix}\right) + c_1 e^{\frac{1}{4x^2}}\left(\left(1-\frac{1}{2x^2}\right)I_0\left(\frac{1}{4x^2}\right) + \frac{I_1\left(\frac{1}{4x^2}\right)}{2x^2}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.083 (sec), leaf count = 85

$$\left\{y(x) = \frac{\_C1}{x^2}e^{\frac{1}{4\,x^2}}\left(2\,x^2 I_0(1/4\,x^{-2}) + I_1\left(\frac{1}{4\,x^2}\right) - I_0\left(\frac{1}{4\,x^2}\right)\right) + \frac{\_C2}{x^2}e^{\frac{1}{4\,x^2}}\left(2\,K_0(-1/4\,x^{-2})x^2 - K_0\left(-\right.\right.\right.$$

ODE No. 1350

$$y''(x) = -\frac{a^2 y(x)}{x^4} - \frac{2y'(x)}{x}$$

✓ **Mathematica** : cpu = 0.00981033 (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 = 0.014 (sec), leaf count = 21

$$\left\{y(x) = \_C1 \sin\left(\frac{a}{x}\right) + \_C2 \cos\left(\frac{a}{x}\right)\right\}$$

ODE No. 1351

$$y''(x) = \frac{y(x)}{x^4} - \frac{(2x^2+1)\,y'(x)}{x^3}$$

✓ **Mathematica** : cpu = 0.0400477 (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 = 0.045 (sec), leaf count = 24

$$\left\{y(x) = \mathrm{e}^{\frac{1}{2\,x^2}}\left(\mathit{Erf}\left(\frac{\sqrt{2}}{2\,x}\right)\_C2 + \_C1\right)\right\}$$

ODE No. 1352

$$y''(x) = -\frac{2(a+x)y'(x)}{x^2} - \frac{by(x)}{x^4}$$

✓ **Mathematica** : cpu = 0.0139115 (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 = 0.068 (sec), leaf count = 43

$$\left\{y(x) = \_C1\,\mathrm{e}^{\frac{1}{x}\left(a-\sqrt{a^2-b}\right)} + \_C2\,\mathrm{e}^{\frac{1}{x}\left(a+\sqrt{a^2-b}\right)}\right\}$$

ODE No. 1353

$$y''(x) = \frac{(2x^2-1)\,y'(x)}{x^3} - \frac{y(x)}{x^4}$$

✓ **Mathematica** : cpu = 0.125646 (sec), leaf count = 119

$$\left\{\left\{y(x)\to c_1\left(x^3+2x-\frac{1}{x}\right)-\frac{c_2\left(\sqrt{2\pi}x^4\text{erfi}\left(\frac{1}{\sqrt{2}x}\right)+2\sqrt{2\pi}x^2\text{erfi}\left(\frac{1}{\sqrt{2}x}\right)-\sqrt{2\pi}\text{erfi}\left(\frac{1}{\sqrt{2}x}\right)+2e^{\frac{1}{2x^2}}x-2e\right.}{16x}\right.\right.$$

✓ **Maple** : cpu = 0.286 (sec), leaf count = 66

$$\left\{y(x)=\frac{1}{x}\left(\_C1\,\sqrt{2}\sqrt{\pi}\left(x^4+2\,x^2-1\right)\mathit{erfi}\left(\frac{\sqrt{2}}{2\,x}\right)+\left(-2\,\_C1\,x^3+2\,\_C1\,x\right)\mathrm{e}^{\frac{1}{2\,x^2}}+\_C2\,\left(x^4+2\,x^2-\right.\right.\right.$$

ODE No. 1354

$$y''(x) = \frac{(2x^2-1)\,y'(x)}{x^3} - \frac{2y(x)}{x^4}$$

✓ **Mathematica** : cpu = 0.0890846 (sec), leaf count = 108

$$\left\{\left\{y(x)\to\frac{c_2\left(-5\sqrt{2\pi}x^2\text{erfi}\left(\frac{1}{\sqrt{2}x}\right)+\sqrt{2\pi}\text{erfi}\left(\frac{1}{\sqrt{2}x}\right)-2e^{\frac{1}{2x^2}}x+4e^{\frac{1}{2x^2}}x^5+8e^{\frac{1}{2x^2}}x^3\right)}{12x^2}+c_1\left(1-\frac{1}{5x^2}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.313 (sec), leaf count = 33

$$\left\{y(x)=\frac{1}{x^2}\left(\_C2\;{}_1\mathrm{F}_1(-\frac{5}{2};\,-\frac{1}{2};\,\frac{1}{2\,x^2})x^5+5\,\_C1\,x^2-\_C1\right)\right\}$$

ODE No. 1355

$$y''(x) = \frac{xy(x)}{x^3+1} - \frac{(x^3-1)\,y'(x)}{x\,(x^3+1)}$$

✓ **Mathematica** : cpu = 0.146896 (sec), leaf count = 59

$$\left\{\left\{y(x) \to \frac{1}{2}c_2\left(2x^2 - x^2\sqrt[3]{x^3+1}\,{}_2F_1\left(\frac{1}{3},\frac{2}{3};\frac{5}{3};-x^3\right)\right) + c_1\sqrt[3]{x^3+1}\right\}\right\}$$

✓ **Maple** : cpu = 0.137 (sec), leaf count = 30

$$\left\{y(x) = \sqrt[3]{x^3+1}\left({}_2\mathrm{F}_1(\frac{2}{3},\frac{4}{3};\frac{5}{3};-x^3)\_C1\,x^2 + \_C2\right)\right\}$$

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 = 0.307423 (sec), leaf count = 90

$$\left\{\left\{y(x) \to c_1x^{-n}\,{}_2F_1\left(-\frac{n}{2}-\frac{v}{2},-\frac{n}{2}+\frac{v}{2}+\frac{1}{2};1-n;-x^2\right) + c_2x^n\,{}_2F_1\left(\frac{n}{2}-\frac{v}{2},\frac{n}{2}+\frac{v}{2}+\frac{1}{2};n+1;-x^2\right)\right\}$$

✓ **Maple** : cpu = 0.095 (sec), leaf count = 29

$$\left\{y(x) = \_C1\ LegendreP\left(v,n,\sqrt{x^2+1}\right) + \_C2\ LegendreQ\left(v,n,\sqrt{x^2+1}\right)\right\}$$

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 = 0.717014 (sec), leaf count = 288

$$\left\{\left\{y(x) \to c_1x^{\frac{1}{2}\left(-\sqrt{a^2-4a-4c+4}-a+2\right)}\,{}_2F_1\left(-\frac{1}{4}\sqrt{a^2-2a-4b+1} - \frac{1}{4}\sqrt{a^2-4a-4c+4} + \frac{1}{4}, \frac{1}{4}\sqrt{a^2-2a-\right.\right.\right.$$

✓ **Maple** : cpu = 0.134 (sec), leaf count = 97

$$\left\{y(x) = x^{-\frac{a}{2}+1}\left(LegendreQ\left(-\frac{1}{2}+\frac{1}{2}\sqrt{a^2-2\,a-4\,b+1},\frac{1}{2}\sqrt{a^2-4\,a-4\,c+4},\sqrt{x^2+1}\right)\_C2 + Legend\right.\right.$$

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 = 0.0659515 (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 = 0.078 (sec), leaf count = 20

$$\left\{y(x) = x\left(\ln\left(x+\sqrt{x^2-1}\right)\_C2 + \_C1\right)\right\}$$

ODE No. 1359

$$y''(x) = -\frac{v(v+1)y(x)}{x^2\,(x^2-1)} - \frac{2xy'(x)}{x^2-1}$$

✓ **Mathematica** : cpu = 0.109203 (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 = 0.099 (sec), leaf count = 57

$$\left\{y(x) = \_C1\,{}_2\mathrm{F}_1(-\frac{v}{2},\frac{1}{2}-\frac{v}{2};\,\frac{1}{2}-v;\,x^2)x^{-v} + \_C2\,{}_2\mathrm{F}_1(1+\frac{v}{2},\frac{1}{2}+\frac{v}{2};\,\frac{3}{2}+v;\,x^2)x^{v+1}\right\}$$

ODE No. 1360

$$y''(x) = \frac{v(v+1)y(x)}{x^2} - \frac{2xy'(x)}{x^2-1}$$

✓ **Mathematica** : cpu = 0.105471 (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 = 0.083 (sec), leaf count = 47

$$\left\{y(x)=\_C1\ {}_2\mathrm{F}_1\left(\frac{1}{2},-v;\ \frac{1}{2}-v;\ x^2\right)x^{-v}+\_C2\ {}_2\mathrm{F}_1\left(\frac{1}{2},v+1;\ \frac{3}{2}+v;\ x^2\right)x^{v+1}\right\}$$

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 = 0.516951 (sec), leaf count = 38

$$\left\{\left\{y(x)\to c_1x^{-a}+c_2\left(-2ax^2+2a-x^2+3\right)x^{a+1}\right\}\right\}$$

✓ **Maple** : cpu = 0.037 (sec), leaf count = 33

$$\left\{y(x)=\_C1\ x^{-a}+\_C2\ x^{a+1}\left(2\,ax^2+x^2-2\,a-3\right)\right\}$$

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 = 14.6278 (sec), leaf count = 0 , DifferentialRoot result

$$\left\{\left\{y(x)\to \text{DifferentialRoot}\left(\{y,x\},\left\{-2y'(x)x^3+\left(a^2x^4-n^2x^4+ax^4-nx^4-a^2x^2+2n^2x^2+ax^2+2nx\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.237 (sec), leaf count = 109

$$\left\{y(x)=\_C1\ HeunC\left(0,-n-\frac{1}{2},-2,-\frac{a^2}{4}+\frac{n^2}{4}-\frac{a}{4}+\frac{n}{4},-\frac{n^2}{4}-\frac{n}{4}+\frac{3}{4}+\frac{a^2}{4}-\frac{a}{4},x^2\right)x^{-n}+\_C2\ Heu\right.$$

ODE No. 1363

$$y''(x) = -\frac{(ax^2+a-2)\,y'(x)}{x\,(x^2-1)} - \frac{by(x)}{x^2}$$

✓ **Mathematica** : cpu = 0.805687 (sec), leaf count = 236

$$\left\{\left\{y(x)\to c_1(-1)^{\frac{1}{4}\left(-\sqrt{a^2-2a-4b+1}+a-1\right)}x^{\frac{1}{2}\left(-\sqrt{a^2-2a-4b+1}+a-1\right)}\,{}_2F_1\left(\frac{a}{2}-\frac{1}{2},\frac{a}{2}-\frac{1}{2}\sqrt{a^2-2a-4b+1}-\frac{1}{2};1\right.\right.\right.$$

✓ **Maple** : cpu = 0.15 (sec), leaf count = 161

$$\left\{y(x) = \left(x^2-1\right)^{-a+2}\left(x^{\frac{a}{2}-\frac{1}{2}-\frac{1}{2}\sqrt{a^2-2\,a-4\,b+1}}{}_2\mathrm{F}_1(-\frac{a}{2}+\frac{3}{2},-\frac{a}{2}+\frac{3}{2}-\frac{1}{2}\sqrt{a^2-2\,a-4\,b+1};1-\frac{1}{2}\sqrt{a^2-2\right.\right.$$

ODE No. 1364

$$y''(x) = \frac{y'(x)\,(2(a-1)x^2-2a+2bc(x^2-1)\,x^c)}{x\,(x^2-1)} - \frac{y(x)\,(bc(2a-c-1)x^{c+2}-bc(2a-c+1)x^c+x^2((a-}{x^2\,(x^2-}$$

✓ **Mathematica** : cpu = 0.170632 (sec), leaf count = 42

$$\left\{\left\{y(x)\to c_1P_v(x)e^{a\log(x)+bx^c}+c_2Q_v(x)e^{a\log(x)+bx^c}\right\}\right\}$$

✓ **Maple** : cpu = 0.115 (sec), leaf count = 25

$$\left\{y(x) = x^a\mathrm{e}^{bx^c}(\mathit{LegendreQ}(v,x)\_\mathit{C2}+\mathit{LegendreP}(v,x)\_\mathit{C1})\right\}$$

ODE No. 1365

$$y''(x) = -\frac{ay(x)}{\left(x^2+1\right)^2}$$

✓ **Mathematica** : cpu = 0.0991388 (sec), leaf count = 72

$$\left\{\left\{y(x)\to c_1\sqrt{x^2+1}e^{i\sqrt{a+1}\tan^{-1}(x)}+\frac{ic_2\sqrt{x^2+1}e^{-i\sqrt{a+1}\tan^{-1}(x)}}{2\sqrt{a+1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.07 (sec), leaf count = 59

$$\left\{y(x) = \sqrt{x^2+1}\left(\left(\frac{x+i}{-x+i}\right)^{-\frac{1}{2}\sqrt{a+1}}\_\mathit{C2}+\left(\frac{x+i}{-x+i}\right)^{\frac{1}{2}\sqrt{a+1}}\_\mathit{C1}\right)\right\}$$

ODE No. 1366

$$y''(x) = -\frac{2xy'(x)}{x^2+1} - \frac{y(x)}{(x^2+1)^2}$$

✓ **Mathematica** : cpu = 0.0229264 (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 = 0.013 (sec), leaf count = 17

$$\left\{y(x) = (\_C1\,x+\_C2)\frac{1}{\sqrt{x^2+1}}\right\}$$

ODE No. 1367

$$y''(x) = -\frac{y(x)\left(a^2(x^2+1)^2+m^2-n(n+1)\left(x^2+1\right)\right)}{(x^2+1)^2} - \frac{2xy'(x)}{x^2+1}$$

✗ **Mathematica** : cpu = 2.1833 (sec), leaf count = 0 , DifferentialRoot result

$$\left\{\left\{y(x)\to \text{DifferentialRoot}\left(\{y,x\},\left\{y''(x)\left(x^2+1\right)^2+2xy'(x)\left(x^2+1\right)+\left(a^2x^4+2a^2x^2-n^2x^2-nx^2+\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.244 (sec), leaf count = 88

$$\left\{y(x) = (x^2+1)^{\frac{m}{2}}\left(\mathit{HeunC}\left(0,\frac{1}{2},m,-\frac{a^2}{4},\frac{1}{4}+\frac{a^2}{4}+\frac{m^2}{4}-\frac{n^2}{4}-\frac{n}{4},-x^2\right)\_C2\,x+\mathit{HeunC}\left(0,-\frac{1}{2},m,\right.\right.\right.$$

ODE No. 1368

$$y''(x) = -\frac{axy'(x)}{x^2+1} - \frac{by(x)}{(x^2+1)^2}$$

✓ **Mathematica** : cpu = 0.0272903 (sec), leaf count = 106

$$\left\{\left\{y(x)\to c_1\left(x^2+1\right)^{\frac{2-a}{4}}P_{\frac{a-2}{2}}^{\frac{1}{2}\sqrt{a^2-4a+4b+4}}(ix)+c_2\left(x^2+1\right)^{\frac{2-a}{4}}Q_{\frac{a-2}{2}}^{\frac{1}{2}\sqrt{a^2-4a+4b+4}}(ix)\right\}\right\}$$

✓ **Maple** : cpu = 0.087 (sec), leaf count = 71

$$\left\{y(x) = (x^2+1)^{-\frac{a}{4}+\frac{1}{2}}\left(\mathit{LegendreQ}\left(\frac{a}{2}-1,\frac{1}{2}\sqrt{a^2-4\,a+4\,b+4},ix\right)\_C2+\mathit{LegendreP}\left(\frac{a}{2}-1,\frac{1}{2}\sqrt{a^2-\right.\right.\right.$$

ODE No. 1369

$$y''(x) = -\frac{ay(x)}{(x^2-1)^2}$$

✓ **Mathematica** : cpu = 0.108256 (sec), leaf count = 75

$$\left\{\left\{y(x) \to c_1\sqrt{1-x^2}e^{-\sqrt{1-a}\tanh^{-1}(x)} + \frac{c_2\sqrt{1-x^2}e^{\sqrt{1-a}\tanh^{-1}(x)}}{2\sqrt{1-a}}\right\}\right\}$$

✓ **Maple** : cpu = 0.076 (sec), leaf count = 55

$$\left\{y(x) = \sqrt{x^2-1}\left(\left(\frac{x-1}{1+x}\right)^{-\frac{1}{2}\sqrt{1-a}} \_C2 + \left(\frac{x-1}{1+x}\right)^{\frac{1}{2}\sqrt{1-a}} \_C1\right)\right\}$$

ODE No. 1370

$$y''(x) = \frac{a^2y(x)}{(x^2-1)^2} - \frac{2xy'(x)}{x^2-1}$$

✓ **Mathematica** : cpu = 0.0299993 (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 = 0.016 (sec), leaf count = 19

$$\{y(x) = \_C1\ \sinh(aArtanh(x)) + \_C2\ \cosh(aArtanh(x))\}$$

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 = 0.021603 (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 = 0.065 (sec), leaf count = 37

$$\left\{y(x) = \_C1\ LegendreP\left(\frac{1}{2}\sqrt{1+4\lambda}-\frac{1}{2}, a, x\right) + \_C2\ LegendreQ\left(\frac{1}{2}\sqrt{1+4\lambda}-\frac{1}{2}, a, x\right)\right\}$$

ODE No. 1372

$$y''(x) = -\frac{y(x)\left((x^2-1)\left(ax^2+bx+c\right)-k^2\right)}{\left(x^2-1\right)^2} - \frac{2xy'(x)}{x^2-1}$$

✗ **Mathematica** : cpu = 4.15288 (sec), leaf count = 0 , DifferentialRoot result

$$\{\{y(x) \to \text{DifferentialRoot}(\{y, x\}, \{(ax^4 + bx^3 - ax^2 + cx^2 - bx - k^2 - c)\, y(x) + (2x^3 - 2x)\, y'(x) + (x$$

✓ **Maple** : cpu = 0.293 (sec), leaf count = 110

$$\left\{y(x) = \mathrm{e}^{\sqrt{-a}x}\left(\mathit{HeunC}\left(4\sqrt{-a}, -k, k, 2\,b, \frac{k^2}{2} + a - b + c, \frac{1}{2} + \frac{x}{2}\right)\sqrt{2\,x-2}(1+x)^{-\frac{k}{2}}\,(x-1)^{\frac{k}{2}-\frac{1}{2}}\,\_C2 -\right.\right.$$

ODE No. 1373

$$y''(x) = -\frac{y(x)\left(-a^2(x^2-1)^2 - m^2 - n(n+1)\,(x^2-1)\right)}{\left(x^2-1\right)^2} - \frac{2xy'(x)}{x^2-1}$$

✗ **Mathematica** : cpu = 2.2023 (sec), leaf count = 0 , DifferentialRoot result

$$\{\{y(x) \to \text{DifferentialRoot}(\{y, x\}, \{(-a^2x^4 + 2a^2x^2 - n^2x^2 - nx^2 - a^2 - m^2 + n^2 + n)\, y(x) + (2x^3 - 2$$

✓ **Maple** : cpu = 0.224 (sec), leaf count = 84

$$\left\{y(x) = (x^2-1)^{\frac{m}{2}}\left(\mathit{HeunC}\left(0, \frac{1}{2}, m, -\frac{a^2}{4}, \frac{1}{4} + \frac{a^2}{4} + \frac{m^2}{4} - \frac{n^2}{4} - \frac{n}{4}, x^2\right)\_C2\,x + \mathit{HeunC}\left(0, -\frac{1}{2}, m, -\right.\right.\right.$$

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 = 0.0364104 (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 = 0.066 (sec), leaf count = 23

$$\left\{y(x) = \left(x^2-1\right)^a\left(\mathit{LegendreQ}(v,x)\,\_C2 + \mathit{LegendreP}(v,x)\,\_C1\right)\right\}$$

ODE No. 1375

$$y''(x) = -\frac{y(x)\left(4ax^2(a-n)-\left(x^2-1\right)\left(2a+(v-n)(n+v+1)\right)\right)}{\left(x^2-1\right)^2} - \frac{2x(-2a+n+1)y'(x)}{x^2-1}$$

✓ **Mathematica** : cpu = 0.0494763 (sec), leaf count = 54

$$\left\{\left\{y(x)\to c_1\left(x^2-1\right)^{\frac{1}{2}(2a-n)}P_v^n(x)+c_2\left(x^2-1\right)^{\frac{1}{2}(2a-n)}Q_v^n(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.08 (sec), leaf count = 29

$$\left\{y(x)=\left(x^2-1\right)^{a-\frac{n}{2}}\left(\mathit{LegendreQ}(v,n,x)\_\mathit{C2}+\mathit{LegendreP}(v,n,x)\_\mathit{C1}\right)\right\}$$

ODE No. 1376

$$y''(x) = -\frac{by(x)}{x^2\left(a+x^2\right)} - \frac{\left(a+2x^2\right)y'(x)}{x\left(a+x^2\right)}$$

✓ **Mathematica** : cpu = 0.101726 (sec), leaf count = 82

$$\left\{\left\{y(x)\to c_2\sin\left(\frac{\sqrt{b}\left(\log(x)-\log\left(\sqrt{a}\sqrt{a+x^2}+a\right)\right)}{\sqrt{a}}\right)+c_1\cos\left(\frac{\sqrt{b}\left(\log(x)-\log\left(\sqrt{a}\sqrt{a+x^2}+a\right)\right)}{\sqrt{a}}\right.\right.$$

✓ **Maple** : cpu = 0.048 (sec), leaf count = 73

$$\left\{y(x)=1\left(\_\mathit{C2}\left(\left(\frac{1}{x}\left(2\,a+2\,\sqrt{a}\sqrt{x^2+a}\right)\right)^{i\sqrt{b}\frac{1}{\sqrt{a}}}\right)^2+\_\mathit{C1}\right)\left(\left(\frac{1}{x}\left(2\,a+2\,\sqrt{a}\sqrt{x^2+a}\right)\right)^{i\sqrt{b}\frac{1}{\sqrt{a}}}\right)^{-1}\right.$$

ODE No. 1377

$$y''(x) = -\frac{b^2y(x)}{\left(a^2+x^2\right)^2}$$

✓ **Mathematica** : cpu = 0.258554 (sec), leaf count = 109

$$\left\{\left\{y(x)\to c_1\sqrt{a^2+x^2}e^{i\sqrt{\frac{b^2}{a^2}+1}\tan^{-1}\left(\frac{x}{a}\right)}+\frac{ic_2\sqrt{a^2+x^2}e^{-i\sqrt{\frac{a^2+b^2}{a^2}}\tan^{-1}\left(\frac{x}{a}\right)}}{2a\sqrt{\frac{a^2+b^2}{a^2}}}\right\}\right\}$$

✓ **Maple** : cpu = 0.154 (sec), leaf count = 83

$$\left\{y(x)=\sqrt{a^2+x^2}\left(\left(\frac{ix-a}{ix+a}\right)^{-\frac{1}{2a}\sqrt{a^2+b^2}}\_C2+\left(\frac{ix-a}{ix+a}\right)^{\frac{1}{2a}\sqrt{a^2+b^2}}\_C1\right)\right\}$$

ODE No. 1378

$$y''(x)=-\frac{2(x^2-1)\,y'(x)}{(x-1)^2x}-\frac{(-2x^2+2x+2)\,y(x)}{(x-1)^2x^2}$$

✓ **Mathematica** : cpu = 0.0552532 (sec), leaf count = 65

$$\left\{\left\{y(x)\to\frac{c_1x^2}{1-x}+\frac{c_2x(2x^2\log(1-x)-2x^2\log(x)+2x-2x\log(1-x)+2x\log(x)-1)}{(x-1)^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.053 (sec), leaf count = 48

$$\left\{y(x)=\frac{x}{(x-1)^2}\left(-\_C2\,x(x-1)\ln(x-1)+\_C2\,x(x-1)\ln(x)+\_C1\,x^2+(-\_C1-\_C2)\,x+\right.$$

ODE No. 1379

$$y''(x)=\frac{12y(x)}{(x+1)^2\,(x^2+2x+3)}$$

✓ **Mathematica** : cpu = 0.0872812 (sec), leaf count = 99

$$\left\{\left\{y(x)\to\frac{c_2\left(2x^3+4x^2-3\sqrt{2}x^2\tan^{-1}\left(\frac{x+1}{\sqrt{2}}\right)+8x-6\sqrt{2}x\tan^{-1}\left(\frac{x+1}{\sqrt{2}}\right)-9\sqrt{2}\tan^{-1}\left(\frac{x+1}{\sqrt{2}}\right)+2\right)}{2(x+1)^2}+c\right.\right.$$

✓ **Maple** : cpu = 0.074 (sec), leaf count = 59

$$\left\{y(x)=\frac{1}{(1+x)^2}\left(-3\_C2\,(x^2+2\,x+3)\arctan\left(1/2\,(1+x)\sqrt{2}\right)+\_C2\,(x^3+2\,x^2+4\,x+1)\sqrt{2}+\_\right.\right.$$

ODE No. 1380

$$y''(x) = -\frac{by(x)}{x^2(x-a)^2}$$

✓ **Mathematica** : cpu = 0.315934 (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 = 0.111 (sec), leaf count = 67

$$\left\{y(x)=\sqrt{x\,(a-x)}\left(\left(\frac{x}{a-x}\right)^{\frac{1}{2\,a}\sqrt{a^2-4\,b}}\_C2+\left(\frac{a-x}{x}\right)^{\frac{1}{2\,a}\sqrt{a^2-4\,b}}\_C1\right)\right\}$$

ODE No. 1381

$$y''(x) = c-\frac{by(x)}{x^2(x-a)^2}$$

✓ **Mathematica** : cpu = 0.789986 (sec), leaf count = 589

$$\left\{\left\{y(x)\to -\frac{2cx^2(a-x)\left(1-\frac{x}{a}\right)^{-\frac{1}{2}\sqrt{\frac{a^2-4b}{a^2}}}\left(\sqrt{\frac{a^2-4b}{a^2}}\left(1-\frac{x}{a}\right)^{\sqrt{\frac{a^2-4b}{a^2}}}\,{}_2F_1\left(\frac{1}{2}\sqrt{1-\frac{4b}{a^2}}-\frac{1}{2},\frac{1}{2}\sqrt{1-\frac{4b}{a^2}}+\frac{3}{2};\frac{1}{2}\right.\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.224 (sec), leaf count = 177

$$\left\{y(x)=-1\left(\left(\left(\int\sqrt{x\,(a-x)}\left(\frac{a-x}{x}\right)^{-\frac{1}{2\,a}\sqrt{a^2-4\,b}}\,{\rm d}x c-\_C2\,\sqrt{a^2-4\,b}\right)\left(\frac{a-x}{x}\right)^{\frac{1}{2\,a}\sqrt{a^2-4\,b}}-\left(\int\sqrt{x\,(a\right.\right.\right.\right.$$

ODE No. 1382

$$y''(x) = \frac{cy(x)}{(x-a)^2(x-b)^2}$$

✓ **Mathematica** : cpu = 0.742055 (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 = 0.173 (sec), leaf count = 104

$$\left\{y(x)=\sqrt{(a-x)(b-x)}\left(\left(\frac{a-x}{b-x}\right)^{\frac{1}{2a-2b}\sqrt{a^2-2ab+b^2+4c}}\_C1+\left(\frac{a-x}{b-x}\right)^{-\frac{1}{2a-2b}\sqrt{a^2-2ab+b^2+4c}}\_C2\right)\right\}$$

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 = 0.141349 (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 = 0.058 (sec), leaf count = 39

$$\left\{y(x)=\_C1\left(\frac{a-x}{b-x}\right)^{\beta}+\_C2\left(\frac{a-x}{b-x}\right)^{\alpha}\right\}$$

ODE No. 1384

$$y''(x) = -\frac{y(x)\left(-(a^2-1)x^2+2(a+3)bx-b^2\right)}{4x^2}$$

✓ **Mathematica** : cpu = 0.0335028 (sec), leaf count = 110

$$\left\{\left\{y(x)\to c_1M_{\frac{(a+3)b}{2\sqrt{a^2-1}},\frac{\sqrt{b(b^2+1)}}{2\sqrt{b}}}\left(\sqrt{a^2-1}x\right)+c_2W_{\frac{(a+3)b}{2\sqrt{a^2-1}},\frac{\sqrt{b(b^2+1)}}{2\sqrt{b}}}\left(\sqrt{a^2-1}x\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.272 (sec), leaf count = 73

$$\left\{y(x) = \_C1\, M_{\frac{b(a+3)}{2}\frac{1}{\sqrt{a^2-1}},\, \frac{1}{2}\sqrt{b^2+1}}\left(\sqrt{a^2-1}x\right) + \_C2\, W_{\frac{b(a+3)}{2}\frac{1}{\sqrt{a^2-1}},\, \frac{1}{2}\sqrt{b^2+1}}\left(\sqrt{a^2-1}x\right)\right\}$$

ODE No. 1385

$$y''(x) = -\frac{(ax^2+a-3)\, y(x)}{4\,(x^2+1)^2}$$

✓ **Mathematica** : cpu = 0.0192572 (sec), leaf count = 78

$$\left\{\left\{y(x) \to c_1\sqrt{x^2+1}P_{\frac{1}{2}\left(\sqrt{1-a}-1\right)}^{\frac{1}{2}}(ix) + c_2\sqrt{x^2+1}Q_{\frac{1}{2}\left(\sqrt{1-a}-1\right)}^{\frac{1}{2}}(ix)\right\}\right\}$$

✓ **Maple** : cpu = 0.077 (sec), leaf count = 55

$$\left\{y(x) = \sqrt[4]{x^2+1}\left(\left(x+\sqrt{x^2+1}\right)^{-\frac{1}{2}\sqrt{1-a}}\_C2 + \left(x+\sqrt{x^2+1}\right)^{\frac{1}{2}\sqrt{1-a}}\_C1\right)\right\}$$

ODE No. 1386

$$y''(x) = \frac{18y(x)}{(2x+1)^2\,(x^2+x+1)}$$

✓ **Mathematica** : cpu = 0.101103 (sec), leaf count = 108

$$\left\{\left\{y(x) \to \frac{c_1(x^2+x+1)}{(2x+1)^2} + \frac{c_2\left(16x^3+24x^2-12\sqrt{3}x^2\tan^{-1}\left(\frac{2x+1}{\sqrt{3}}\right)+30x-12\sqrt{3}x\tan^{-1}\left(\frac{2x+1}{\sqrt{3}}\right)-12\right.}{(2x+1)^2}\right.\right.$$

✓ **Maple** : cpu = 0.075 (sec), leaf count = 58

$$\left\{y(x) = \frac{1}{(2\,x+1)^2}\left(36\_C2\,(x^2+x+1)\arctan\left(1/3\,(2\,x+1)\sqrt{3}\right) - 16\left(x^3+x^2+\frac{11\,x}{8}+3/16\right)\_C2\right.\right.$$

ODE No. 1387

$$y''(x) = \frac{3y(x)}{4\left(x^2+x+1\right)^2}$$

✓ **Mathematica** : cpu = 0.0381067 (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 = 0.034 (sec), leaf count = 28

$$\left\{y(x)=\sqrt{x^2+x+1}\left(\arctan\left(\frac{(2\,x+1)\,\sqrt{3}}{3}\right)\_C2+\_C1\right)\right\}$$

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 = 0.313682 (sec), leaf count = 235

$$\left\{\left\{y(x)\to c_2(-1)^{\frac{1}{2}(-2v-3)+1}x^{\frac{1}{4}(-2v-3)+1}e^{\frac{1}{4}(-2\log(1-x)-\log(x))}(x-1)^{\frac{1}{2}\left(\frac{1}{2}(a+v+1)+\frac{1}{2}(a+v+2)+\frac{1}{2}(-2v-3)+1\right)}\,{}_2F_1\left(\frac{1}{2}(\right.\right.\right.$$

✓ **Maple** : cpu = 0.089 (sec), leaf count = 76

$$\left\{y(x)=(x-1)^{-\frac{a}{2}}\left(x^{-\frac{v}{2}}{}_2\mathrm{F}_1\left(-\frac{v}{2}-\frac{a}{2},\frac{1}{2}-\frac{v}{2}-\frac{a}{2};\,\frac{1}{2}-v;\,x\right)\_C1+x^{\frac{v}{2}+\frac{1}{2}}{}_2\mathrm{F}_1\left(1+\frac{v}{2}-\frac{a}{2},\frac{v}{2}+\frac{1}{2}-\frac{a}{2};\,\frac{3}{2}+\right.\right.\right.$$

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 = 0.392253 (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 = 0.083 (sec), leaf count = 68

$$\left\{y(x) = (x-1)^{-n}\left(x^{-\frac{v}{2}}{}_2\mathrm{F}_1(-v-n,\frac{1}{2}-n;\ \frac{1}{2}-v;\ x)\_C1 + x^{\frac{v}{2}+\frac{1}{2}}{}_2\mathrm{F}_1(\frac{1}{2}-n, v-n+1;\ \frac{3}{2}+v;\ x)\_C2\right.\right.$$

ODE No. 1390

$$y''(x) = -\frac{3y(x)}{16(x-1)^2x^2}$$

✓ **Mathematica** : cpu = 0.0414975 (sec), leaf count = 51

$$\left\{\left\{y(x)\to \frac{2c_2(1-x)^{3/4}x^{5/4}}{\sqrt{-(x-1)x}} + c_1(1-x)^{3/4}\sqrt[4]{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.042 (sec), leaf count = 25

$$\left\{y(x) = \_C1\, x^{\frac{3}{4}}\sqrt[4]{x-1} + \_C2\, \sqrt[4]{x}(x-1)^{\frac{3}{4}}\right\}$$

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 = 0.0623216 (sec), leaf count = 27

$$\left\{\left\{y(x)\to c_1x^5 - \frac{1}{4}c_2x\left(2ax^2+1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.031 (sec), leaf count = 20

$$\{y(x) = \_C1\, x^5 + 2\,\_C2\, ax^3 + \_C2\, x\}$$

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 = 92.4563 (sec), leaf count = 1763961

Too large to display

✓ **Maple** : cpu = 0.244 (sec), leaf count = 561

$$\left\{ y(x) = (x^2-1)^{-\frac{b}{4a}} \left(-\frac{1}{2}+\frac{x}{2}\right)^{\frac{1}{4a}\left(2a+\sqrt{4a^2+(-4b-4c-4d-4e)a+b^2}\right)} \left({}_2F_1(\frac{1}{4a}\left(\sqrt{4a^2+(-4b-4c-4d-\right.\right.\right.$$

ODE No. 1393

$$y''(x) = -\frac{y(x)(bx^2+cx+d)}{a(x-1)^2x^2}$$

✓ **Mathematica** : cpu = 22.4424 (sec), leaf count = 413606

Too large to display

✓ **Maple** : cpu = 0.173 (sec), leaf count = 272

$$\left\{ y(x) = (x-1)^{\frac{1}{2}(\sqrt{a}-\sqrt{a-4b-4c-4d})\frac{1}{\sqrt{a}}} \left({}_2F_1(-\frac{1}{2}\left(\sqrt{a-4b-4c-4d}-\sqrt{a}+\sqrt{a-4d}+\sqrt{a-4b}\right)\frac{1}{\sqrt{a}}, \right.\right.$$

ODE No. 1394

$$y''(x) = -\frac{cy(x)}{x^2(ax+b)^2} - \frac{2y'(x)}{x}$$

✓ **Mathematica** : cpu = 0.0514464 (sec), leaf count = 115

$$\left\{\left\{ y(x) \to c_1 \exp\left(\frac{\sqrt{c}\left(-\frac{\sqrt{b^2-4c}}{\sqrt{c}}-\frac{b}{\sqrt{c}}\right)(\log(x)-\log(ax+b))}{2b}\right) + c_2 \exp\left(\frac{\sqrt{c}\left(\frac{\sqrt{b^2-4c}}{\sqrt{c}}-\frac{b}{\sqrt{c}}\right)(\log(x)-\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.131 (sec), leaf count = 79

$$\left\{ y(x) = \sqrt{\frac{ax+b}{x}}\left(\left(\frac{x}{ax+b}\right)^{-\frac{a}{2b}\sqrt{\frac{b^2-4c}{a^2}}}\_C2 + \left(\frac{x}{ax+b}\right)^{\frac{a}{2b}\sqrt{\frac{b^2-4c}{a^2}}}\_C1\right)\right\}$$

ODE No. 1395

$$y''(x) = -\frac{y(x)}{(ax+b)^4}$$

✓ **Mathematica** : cpu = 0.150835 (sec), leaf count = 54

$$\left\{\left\{y(x)\to c_1 e^{\frac{i}{a(ax+b)}}(ax+b)+c_2 e^{-\frac{i}{a(ax+b)}}(ax+b)\right\}\right\}$$

✓ **Maple** : cpu = 0.069 (sec), leaf count = 39

$$\left\{y(x) = (ax+b)\left(\_C2\,\cos\left(\frac{1}{a\,(ax+b)}\right)+\_C1\,\sin\left(\frac{1}{a\,(ax+b)}\right)\right)\right\}$$

ODE No. 1396

$$y''(x) = -\frac{Ay(x)}{(ax^2+bx+c)^2}$$

✓ **Mathematica** : cpu = 1.52801 (sec), leaf count = 211

$$\left\{\left\{y(x)\to \frac{c_2\sqrt{ax^2+bx+c}\exp\left(-\frac{\sqrt{4ac-b^2}\sqrt{1-\frac{4A}{b^2-4ac}}\tan^{-1}\left(\frac{2ax+b}{\sqrt{4ac-b^2}}\right)}{\sqrt{b^2-4ac}}\right)}{\sqrt{b^2-4ac}\sqrt{1-\frac{4A}{b^2-4ac}}}+c_1\sqrt{x(ax+b)+c}\exp\left(\frac{\sqrt{4ac-}}{}\right.\right.\right.$$

✓ **Maple** : cpu = 0.213 (sec), leaf count = 178

$$\left\{y(x) = \sqrt{ax^2+bx+c}\left(\left(1\left(i\sqrt{4\,ca-b^2}-2\,ax-b\right)\left(2\,ax+b+i\sqrt{4\,ca-b^2}\right)^{-1}\right)^{-\frac{a}{2}\sqrt{\frac{-4\,ca+b^2-4\,A}{a^2}}\frac{1}{\sqrt{-4\,ca+b}}}\right.\right.$$

ODE No. 1397

$$y''(x) = \frac{y(x)}{x^5} - \frac{y'(x)}{x^4}$$

✓ **Mathematica** : cpu = 0.0452896 (sec), leaf count = 38

$$\left\{\left\{y(x)\to \frac{c_2\Gamma\left(\frac{1}{3},-\frac{1}{3x^3}\right)}{3^{2/3}\sqrt[3]{-\frac{1}{x^3}}}+c_1x\right\}\right\}$$

✓ **Maple** : cpu = 0.126 (sec), leaf count = 27

$$\left\{y(x) = x\left(-\sqrt{3}\Gamma\left(\frac{2}{3}\right)\Gamma\left(\frac{1}{3},-\frac{1}{3\,x^3}\right)\_C2 + 2\,\pi\,\_C2 + \_C1\right)\right\}$$

ODE No. 1398

$$y''(x) = -\frac{\left(-(2v+1)^2+x^2-1\right)y(x)}{\left(x^2-1\right)^2} - \frac{\left(3x^2-1\right)y'(x)}{x\left(x^2-1\right)}$$

✗ **Mathematica** : cpu = 1.39204 (sec), leaf count = 0 , DifferentialRoot result

$$\{\{y(x)\to \text{DifferentialRoot}(\{y,x\},\{x\left(x^2-4v^2-4v-2\right)y(x)+\left(3x^4-4x^2+1\right)y'(x)+\left(x^5-2x^3+x\right)$$

✓ **Maple** : cpu = 0.217 (sec), leaf count = 69

$$\left\{y(x) = \_C1\,\left(x^2-1\right)^{-v-\frac{1}{2}}\,{}_2\mathrm{F}_1(-v,-v;\,-2\,v;\,-x^2+1) + \_C2\,\left(x^2-1\right)^{v+\frac{1}{2}}\,{}_2\mathrm{F}_1(v+1,v+1;\,2\,v+2;\,-$$

ODE No. 1399

$$y''(x) = \frac{(3x+1)y'(x)}{(x-1)(x+1)} - \frac{36(x+1)^2y(x)}{(x-1)^2(3x+5)^2}$$

✓ **Mathematica** : cpu = 0.0530402 (sec), leaf count = 72

$$\left\{\left\{y(x)\to c_1e^{\frac{1}{2}(3\log(1-x)+\log(3x+5))}+\frac{1}{2}c_2e^{\frac{1}{2}(3\log(1-x)+\log(3x+5))}(3\log(1-x)+\log(3x+5))\right\}\right\}$$

✓ **Maple** : cpu = 0.072 (sec), leaf count = 34

$$\left\{y(x) = \sqrt{3\,x+5}(x-1)^{\frac{3}{2}}\left(\_C2\,\ln\left(3\,x+5\right)+3\,\_C2\,\ln\left(x-1\right)+\_C1\right)\right\}$$

ODE No. 1400

$$y''(x) = \frac{y'(x)}{x} - \frac{ay(x)}{x^6}$$

✓ **Mathematica** : cpu = 0.0800518 (sec), leaf count = 60

$$\left\{\left\{y(x) \to c_1 x^2 e^{\frac{i\sqrt{a}}{2x^2}} - \frac{i c_2 x^2 e^{-\frac{i\sqrt{a}}{2x^2}}}{2\sqrt{a}}\right\}\right\}$$

✓ **Maple** : cpu = 0.058 (sec), leaf count = 35

$$\left\{y(x) = x^2 \left(\cosh\left(\frac{1}{2\,x^2}\sqrt{-a}\right) \_C2 + \sinh\left(\frac{1}{2\,x^2}\sqrt{-a}\right) \_C1\right)\right\}$$

ODE No. 1401

$$y''(x) = -\frac{(a+3x^2)\,y'(x)}{x^3} - \frac{by(x)}{x^6}$$

✓ **Mathematica** : cpu = 0.0134956 (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 = 0.061 (sec), leaf count = 45

$$\left\{y(x) = \_C1\, e^{-\frac{1}{4\,x^2}\left(-a+\sqrt{a^2-4\,b}\right)} + \_C2\, e^{\frac{1}{4\,x^2}\left(a+\sqrt{a^2-4\,b}\right)}\right\}$$

ODE No. 1402

$$y''(x) = -\frac{y(x)\left(4a(a+1)x^4 - 2a(x^2-1)\,x^2 + (x^2-1)^2\,(x^2-v^2)\right)}{x^2\,(x^2-1)^2} - \frac{((1-4a)x^2-1)\,y'(x)}{x\,(x^2-1)}$$

✗ **Mathematica** : cpu = 5.34429 (sec), leaf count = 0 , DifferentialRoot result

$$\{\{y(x) \to \text{DifferentialRoot}(\{y,x\},\{(x^6 + 4a^2x^4 - v^2x^4 + 2ax^4 - 2x^4 + 2v^2x^2 + 2ax^2 + x^2 - v^2)\,y(x) +$$

✓ **Maple** : cpu = 0.28 (sec), leaf count = 58

$$\left\{y(x) = (x^2-1)^a (x^2-1)\left(\_C1\, x^v \mathit{HeunC}\left(0, v, 1, \frac{1}{4}, \frac{1}{4}+\frac{a}{2}, x^2\right) + \_C2\, x^{-v} \mathit{HeunC}\left(0, -v, 1, \frac{1}{4}, \frac{1}{4}+\frac{a}{2}\right.\right.\right.$$

ODE No. 1403

$$y''(x) = -y'(x)\left(\frac{-\mathrm{a1}-\mathrm{b1}+1}{x-\mathrm{c1}} + \frac{-\mathrm{a2}-\mathrm{b2}+1}{x-\mathrm{c2}} + \frac{-\mathrm{a3}-\mathrm{b3}+1}{x-\mathrm{c3}}\right) - \frac{y(x)\left(\frac{\mathrm{a1b1(c1-c2)(c1-c3)}}{x-\mathrm{c1}} + \frac{\mathrm{a2b2(c2-c1)(c}}{x-\mathrm{c2}}\right.}{(x-\mathrm{c1})(x-\mathrm{c2})(}$$

✗ **Mathematica** : cpu = 92.4912 (sec), leaf count = 0 , DifferentialRoot result

$$\{\{y(x) \to \mathrm{DifferentialRoot}(\{y, x\}, \{(\mathrm{c1}-x)^2(\mathrm{c2}-x)^2 y''(x)(\mathrm{c3}-x)^2 + (\mathrm{c1}-x)(\mathrm{c2}-x)\left(\mathrm{a1}x^2 + \mathrm{a2}x^2 +\right.$$

✓ **Maple** : cpu = 0.84 (sec), leaf count = 298

$$\left\{y(x) = (x-c2)^{a2}(x-c3)^{b3}\left(\mathit{HeunG}\left(\frac{c1-c3}{c1-c2}, \frac{((-a3-2\,b1-b2+2)\,c1 + (a3+b1-1)\,c2 + c3\right.\right.\right.$$

ODE No. 1404

$$y''(x) = -\frac{(1-2x^2)\,y(x)}{4x^6} - \frac{(2x^2+1)\,y'(x)}{x^3}$$

✓ **Mathematica** : cpu = 0.0233875 (sec), leaf count = 33

$$\left\{\left\{y(x) \to \frac{c_1 e^{\frac{1}{4x^2}}}{x} + c_2 e^{\frac{1}{4x^2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.053 (sec), leaf count = 19

$$\left\{y(x) = \frac{\_C1\, x + \_C2}{x} \mathrm{e}^{\frac{1}{4\,x^2}}\right\}$$

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 = 0.0759993 (sec), leaf count = 77

$$\left\{\left\{y(x)\to c_1 e^{-\frac{1}{4x^2}} x^{\frac{3}{2}-\frac{\sqrt{9-a}}{2}} + \frac{c_2 e^{-\frac{1}{4x^2}} x^{\frac{\sqrt{9-a}}{2}+\frac{3}{2}}}{\sqrt{9-a}}\right\}\right\}$$

✓ **Maple** : cpu = 0.087 (sec), leaf count = 42

$$\left\{y(x) = \mathrm{e}^{-\frac{1}{4x^2}}\left(x^{\frac{3}{2}-\frac{1}{2}\sqrt{-a+9}}\_C2 + x^{\frac{3}{2}+\frac{1}{2}\sqrt{-a+9}}\_C1\right)\right\}$$

ODE No. 1406

$$y''(x) = -\frac{27xy(x)}{16\,(x^3-1)^2}$$

✓ **Mathematica** : cpu = 300.211 (sec), leaf count = 81

$$\left\{\left\{y(x)\to \frac{c_1\sqrt[3]{x^3}\sqrt[4]{x^3-1}\,{}_2F_1\left(-\frac{1}{12},\frac{1}{4};\frac{2}{3};x^3\right)}{x} + \frac{\sqrt[3]{-1}c_2\left(x^3\right)^{2/3}\sqrt[4]{x^3-1}\,{}_2F_1\left(\frac{1}{4},\frac{7}{12};\frac{4}{3};x^3\right)}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.231 (sec), leaf count = 44

$$\left\{y(x) = \sqrt{x}\sqrt[4]{x^3-1}\left(LegendreP\left(-\frac{1}{6},\frac{1}{3},\sqrt{-x^3+1}\right)\_C1 + LegendreQ\left(-\frac{1}{6},\frac{1}{3},\sqrt{-x^3+1}\right)\_C2\right)\right\}$$

ODE No. 1407

$$y''(x) = -y'(x)\left(\frac{\mathrm{b1}(-\mathrm{al1}-\mathrm{bl1}+1)}{\mathrm{b1}x-\mathrm{a1}} + \frac{\mathrm{b2}(-\mathrm{al2}-\mathrm{bl2}+1)}{\mathrm{b2}x-\mathrm{a2}} + \frac{\mathrm{b3}(-\mathrm{al3}-\mathrm{bl3}+1)}{\mathrm{b3}x-\mathrm{a3}}\right) - \frac{y(x)\left(\frac{\mathrm{al1bl1(a1b2-a2b}}{\mathrm{b1}x-}\right.}{}$$

✗ **Mathematica** : cpu = 480.373 (sec), leaf count = 0 , DifferentialRoot result

$$\{\{y(x)\to \mathrm{DifferentialRoot}(\{y,x\},\{(\mathrm{a1}-x\mathrm{b1})^2(\mathrm{a2}-x\mathrm{b2})^2 y''(x)(\mathrm{a3}-x\mathrm{b3})^2 + (\mathrm{a1}-x\mathrm{b1})(\mathrm{a2}-x\mathrm{b2})\,(\mathrm{a}$$

✓ **Maple** : cpu = 2.355 (sec), leaf count = 2597

$$\left\{y(x) = (b3\,x - a3)^{\frac{1}{2}\left(\frac{(al3+bl3)\sqrt{(2\,al1+2\,al2+2\,al3+2\,bl1+2\,bl2+2\,bl3-4)\sqrt{al3^2+6\,al3\,bl3+bl3^2}+2\,bl3^2+(2\,al1+2\,al2+8\,al3+2\,bl}}{}\right.}\right.$$

ODE No. 1408

$$y''(x) = -\frac{y(x)\left(Ax^2+B\right)}{x\left(x^2-\mathrm{a1}\right)\left(x^2-\mathrm{a2}\right)\left(x^2-\mathrm{a3}\right)} - \frac{y'(x)\left(x^2\left(\left(x^2-\mathrm{a1}\right)\left(x^2-\mathrm{a2}\right)+\left(x^2-\mathrm{a1}\right)\left(x^2-\mathrm{a3}\right)+\left(x^2-\mathrm{a2}\right.\right.\right.}{x\left(x^2-\mathrm{a1}\right)\left(x^2-\mathrm{a2}\right)\left(x^2\right.}$$

✗ **Mathematica** : cpu = 71.815 (sec), leaf count = 0 , DifferentialRoot result

$$\left\{\left\{y(x)\to \mathrm{DifferentialRoot}\left(\{y,x\},\left\{\left(Ax^2+B\right)y(x)+\left(2x^6-\mathrm{a1}x^4-\mathrm{a2}x^4-\mathrm{a3}x^4+\mathrm{a1a2a3}\right)y'(x)-x(a\right.\right.\right.\right.$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x) = DESol\left(\left\{\frac{d^2}{dx^2}\_Y(x) + \frac{\left(x^2\left(\left(x^2-a1\right)\left(x^2-a2\right)+\left(x^2-a2\right)\left(x^2-a3\right)+\left(x^2-a3\right)\left(x^2-a1\right)\right)\right.}{\left(x^2-a1\right)\left(x^2-a2\right)x\left(x^2-a3\right.}\right.\right.\right.$$

ODE No. 1409

$$y''(x) = -b^2x^{-2a}y(x) - \frac{ay'(x)}{x}$$

✓ **Mathematica** : cpu = 0.024902 (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 = 0.026 (sec), leaf count = 39

$$\left\{y(x) = \_C1\ \sin\left(\frac{x^{1-a}b}{a-1}\right) + \_C2\ \cos\left(\frac{x^{1-a}b}{a-1}\right)\right\}$$

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 = 0.136819 (sec), leaf count = 481

$$\left\{\left\{y(x) \to c_1 i^{\frac{-\sqrt{q^2+2q+4s+1}+q+1}{b}} a^{\frac{-\sqrt{q^2+2q+4s+1}+q+1}{2b}} \left(x^b\right)^{\frac{-\sqrt{q^2+2q+4s+1}+q+1}{2b}} {}_2F_1\left(\frac{p}{2b}+\frac{q}{2b}-\frac{\sqrt{p^2-2p-4r+1}}{2b}-\right.\right.\right.$$

✓ **Maple** : cpu = 0.313 (sec), leaf count = 253

$$\left\{y(x) = \_C1\ {}_2\mathrm{F}_1\left(\frac{1}{2\,b}\left(p+q+\sqrt{q^2+2\,q+4\,s+1}+\sqrt{p^2-2\,p-4\,r+1}\right), \frac{1}{2\,b}\left(p+q+\sqrt{q^2+2\,q+4\,s\right.\right.\right.$$

ODE No. 1411

$$y''(x) = \frac{y(x)}{e^x+1}$$

✓ **Mathematica** : cpu = 0.353277 (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 = 0.027 (sec), leaf count = 27

$$\left\{y(x) = \frac{\_C1\ (\mathrm{e}^x+1)\ln(\mathrm{e}^x+1) + \_C2\ \mathrm{e}^x + \_C1 + \_C2}{\mathrm{e}^x}\right\}$$

ODE No. 1412

$$y''(x) = \frac{y'(x)}{x\log(x)} + y(x)\log^2(x)$$

✓ **Mathematica** : cpu = 0.0160567 (sec), leaf count = 29

$$\{\{y(x) \to c_1 \cosh(x(\log(x)-1)) + ic_2 \sinh(x(\log(x)-1))\}\}$$

✓ **Maple** : cpu = 0.014 (sec), leaf count = 23

$$\{y(x) = \_C1\ \sinh(x(\ln(x)-1)) + \_C2\ \cosh(x(\ln(x)-1))\}$$

ODE No. 1413

$$y''(x) = \frac{y'(x)}{x(\log(x)-1)} - \frac{y(x)}{x^2(\log(x)-1)}$$

✗ **Mathematica** : cpu = 0.372068 (sec), leaf count = 0 , could not solve

```
DSolve[Derivative[2][y][x] == -(y[x]/(x^2*(-1 + Log[x]))) + Derivative[1][y][x]/(x*(-
1 + Log[x])), y[x], x]
```

✓ **Maple** : cpu = 0.091 (sec), leaf count = 12

$$\{y(x) = \_C1\, x + \_C2\, \ln(x)\}$$

ODE No. 1414

$$y''(x) = y(x)\left(-\operatorname{csch}^2(x)\right)\left(-a^2\sinh^2(x) - (n-1)n\right)$$

✓ **Mathematica** : cpu = 1.20618 (sec), leaf count = 231

$$\left\{\left\{y(x) \to \frac{c_2(-1)^{\frac{1}{2}(-2n-1)+1}\tanh^2(x)^{\frac{1}{4}(-2n-1)+1}\left(\tanh^2(x)-1\right)^{\frac{1}{2}\left(\frac{a+n}{2}+\frac{1}{2}(a+n+1)+\frac{1}{2}(-2n-1)+1\right)-\frac{1}{2}}\ {}_2F_1\left(\frac{1}{2}(-2n\right.}{\sqrt{\tanh(x)}}\right.\right.$$

✓ **Maple** : cpu = 0.335 (sec), leaf count = 97

$$\left\{y(x) = \_C1\,(\sinh(x))^n\ {}_2\mathrm{F}_1(-\frac{a}{2}+\frac{n}{2}, \frac{a}{2}+\frac{n}{2}; \frac{1}{2}; \frac{\cosh(2x)}{2}+\frac{1}{2}) + \_C2\,(\sinh(x))^n\,(2\cosh(2x)+2)^{\frac{3}{4}}\ {}_2\right.$$

ODE No. 1415

$$y''(x) = -\left(n^2-a^2\right)y(x) - 2n\coth(x)y'(x)$$

✓ **Mathematica** : cpu = 0.87628 (sec), leaf count = 273

$$\left\{\left\{y(x) \to \frac{c_2(-1)^{\frac{1}{2}(-2n-1)+1}\tanh^2(x)^{\frac{1}{4}(-2n-1)+1}\left(\tanh^2(x)-1\right)^{\frac{1}{2}\left(\frac{a+n}{2}+\frac{1}{2}(a+n+1)+\frac{1}{2}(-2n-1)+1\right)}\ {}_2F_1\left(\frac{1}{2}(-2n-\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.188 (sec), leaf count = 36

$$\left\{y(x) = (\sinh(x))^{\frac{1}{2}-n}\left(LegendreQ\left(-\frac{1}{2}+a, n-\frac{1}{2}, \cosh(x)\right)\_C2 + LegendreP\left(-\frac{1}{2}+a, n-\frac{1}{2}, \cosh(\right.\right.\right.$$

ODE No. 1416

$$y''(x) = -(v-n)(n+v+1)y(x) - (2n+1)\cot(x)y'(x)$$

✓ **Mathematica** : cpu = 0.197853 (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 = 0.234 (sec), leaf count = 26

$$\left\{y(x)=(\sin(x))^{-n}\left(\mathit{LegendreQ}(v,n,\cos(x))\_C2+\mathit{LegendreP}(v,n,\cos(x))\_C1\right)\right\}$$

ODE No. 1417

$$y''(x) = -\csc(x)y'(x)\left(\sin^2(x)-\cos(x)\right) - y(x)\sin^2(x)$$

✓ **Mathematica** : cpu = 0.148532 (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 = 0.198 (sec), leaf count = 31

$$\left\{y(x)=\mathrm{e}^{\frac{\cos(x)}{2}}\left(\cos\left(\frac{\sqrt{3}\cos(x)}{2}\right)\_C2+\sin\left(\frac{\sqrt{3}\cos(x)}{2}\right)\_C1\right)\right\}$$

ODE No. 1418

$$y''(x) = \frac{y(x)\sin(x)}{x\cos(x)-\sin(x)} - \frac{x\sin(x)y'(x)}{x\cos(x)-\sin(x)}$$

✗ **Mathematica** : cpu = 1.26402 (sec), leaf count = 0 , could not solve

```
DSolve[Derivative[2][y][x] == (Sin[x]*y[x])/(x*Cos[x] - Sin[x]) - (x*Sin[x]*Derivative
```

✓ **Maple** : cpu = 3.699 (sec), leaf count = 59

$$\left\{y(x)=\sin(x)\left(\int \mathrm{e}^{\int \frac{-2(\cos(x))^3x+3(\cos(x))^2\sin(x)-\sin(x)}{\cos(x)(\cos(x)x-\sin(x))\sin(x)}\,\mathrm{d}x}\cos(x)\,\mathrm{d}x\_C2+\_C1\right)\right\}$$

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 = 1.133 (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 = 0.251 (sec), leaf count = 12

$$\{y(x) = x(\sin(x)\_C2 + \_C1)\}$$

ODE No. 1420

$$\cos^2(x)y''(x) - y(x)\left(a\cos^2(x) + (n-1)n\right) = 0$$

✓ **Mathematica** : cpu = 0.449778 (sec), leaf count = 134

$$\left\{\left\{y(x) \to c_1 i^{1-n}\cos^{1-n}(x)\,{}_2F_1\left(-\frac{n}{2} - \frac{i\sqrt{a}}{2} + \frac{1}{2}, -\frac{n}{2} + \frac{i\sqrt{a}}{2} + \frac{1}{2}; \frac{3}{2} - n; \cos^2(x)\right) + c_2 i^n\cos^n(x)\,{}_2F_1\left(\frac{n}{2}\right.\right.\right.$$

✓ **Maple** : cpu = 0.382 (sec), leaf count = 123

$$\left\{y(x) = \_C1\ \sin(2x)(\cos(x))^{-n}{}_2\mathrm{F}_1(1 + \frac{i}{2}\sqrt{a} - \frac{n}{2}, 1 - \frac{i}{2}\sqrt{a} - \frac{n}{2}; \frac{3}{2} - n; \frac{\cos(2x)}{2} + \frac{1}{2}) + \_C2\ (\cos(x\right.$$

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 = 0.237783 (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 = 0.089 (sec), leaf count = 27

$$\left\{y(x) = \_C1\ (\cos(ax))^n + \_C2\ (\cos(ax))^{n-1}\sin(ax)\right\}$$

ODE No. 1422

$$y''(x) = 2y(x)\csc^2(x)$$

✓ **Mathematica** : cpu = 0.0887688 (sec), leaf count = 64

$$\left\{\left\{y(x)\to \frac{c_1\cos(x)}{\sqrt{\cos^2(x)-1}}+\frac{c_2\left(\cos(x)\log\left(\sqrt{\cos^2(x)-1}+\cos(x)\right)-\sqrt{\cos^2(x)-1}\right)}{\sqrt{\cos^2(x)-1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.29 (sec), leaf count = 50

$$\left\{y(x)=\frac{-i\ln(\cos(2x)+i\sin(2x))\sin(2x)\_C2+\_C1\ \sin(2x)+2\_C2\,(\cos(2x)-1)}{\cos(2x)-1}\right\}$$

ODE No. 1423

$$y''(x) = -ay(x)\csc^2(x)$$

✓ **Mathematica** : cpu = 0.0729047 (sec), leaf count = 70

$$\left\{\left\{y(x)\to c_1\sqrt[4]{\cos^2(x)-1}P_{-\frac{1}{2}}^{\frac{1}{2}\sqrt{1-4a}}(\cos(x))+c_2\sqrt[4]{\cos^2(x)-1}Q_{-\frac{1}{2}}^{\frac{1}{2}\sqrt{1-4a}}(\cos(x))\right\}\right\}$$

✓ **Maple** : cpu = 0.313 (sec), leaf count = 132

$$\left\{y(x)=1\sqrt[4]{2\cos(2x)+2}\left(\frac{\cos(2x)}{2}-\frac{1}{2}\right)^{\frac{1}{4}\sqrt{1-4a}}\sqrt{-2\cos(2x)+2}\left(\sqrt{2\cos(2x)+2}\,{}_2F_1(\frac{1}{4}\sqrt{1-4a}+\right.$$

ODE No. 1424

$$\sin^2(x)y''(x)-y(x)\left(a\sin^2(x)+(n-1)n\right)=0$$

✓ **Mathematica** : cpu = 0.172546 (sec), leaf count = 90

$$\left\{\left\{y(x)\to c_1\sqrt[4]{\cos^2(x)-1}P_{\frac{1}{2}i(2\sqrt{a}+i)}^{\frac{1}{2}(2n-1)}(\cos(x))+c_2\sqrt[4]{\cos^2(x)-1}Q_{\frac{1}{2}i(2\sqrt{a}+i)}^{\frac{1}{2}(2n-1)}(\cos(x))\right\}\right\}$$

✓ **Maple** : cpu = 0.319 (sec), leaf count = 120

$$\left\{y(x)=1\left(\frac{\cos(2x)}{2}-\frac{1}{2}\right)^{\frac{n}{2}}\left((2\cos(2x)+2)^{\frac{3}{4}}\,{}_2F_1(\frac{1}{2}+\frac{i}{2}\sqrt{a}+\frac{n}{2},\frac{1}{2}-\frac{i}{2}\sqrt{a}+\frac{n}{2};\frac{3}{2};\frac{\cos(2x)}{2}+\frac{1}{2})\sqrt[4]{-}\right.$$

ODE No. 1425

$$y''(x) = y(x)\csc^2(x)\left(-\left(-a^2\cos^2(x) - (3-2a)\cos(x) + 3a - 3\right)\right)$$

✓ **Mathematica** : cpu = 1.91747 (sec), leaf count = 385

$$\left\{\left\{y(x) \to \frac{(2a+1)c_2(-2a(\cos(x)-1)+\cos(x)-1)(-2a\cos}{(1-2a)^2 a(\cos(x)+1)\left((3-2a)^2\left(-F_1\left(2a+1; a-\frac{1}{2}, a+\frac{1}{2}; 2a+2; \frac{3-2a}{-2a\cos(x)+\cos(x)+2}, \frac{}{-2a\cos}\right.\right.\right.}\right.\right.$$

✓ **Maple** : cpu = 0.505 (sec), leaf count = 93

$$\left\{y(x) = 1\sqrt[4]{2\cos(x)+2}\left(\_C2\ {}_2\mathrm{F}_1(-a-\frac{1}{2}, -\frac{1}{2}+a;\ -a+\frac{3}{2};\ \frac{\cos(x)}{2}+\frac{1}{2})(\cos(x)+1)^{-\frac{1}{4}-\frac{a}{2}}\sqrt{2\cos(x)}\right.\right.$$

ODE No. 1426

$$\sin^2(x)y''(x) - y(x)\left(a^2\cos^2(x) + \frac{b^2}{(2a-3)^2} + 3a + b\cos(x) + 2\right) = 0$$

✓ **Mathematica** : cpu = 6.35996 (sec), leaf count = 4128

$$\left\{\left\{y(x) \to \frac{c_1(\cos(x)+1)^{\frac{1}{2}\left(-\frac{8a^2}{-16a^2+48a-36}+\frac{24a}{-16a^2+48a-36}+a-\frac{-32a^2+96a+\sqrt{\left(32a^2-96a+72\right)^2-4\left(-16a^2+48a-36\right)\left(16a^4+16ba^2-88a\right.}}{2\left(-16a^2+48a-36\right)}\right.}}{}\right.\right.$$

✓ **Maple** : cpu = 0.625 (sec), leaf count = 549

$$\left\{y(x) = 1\left(\frac{\cos(x)}{2}-\frac{1}{2}\right)^{\frac{1}{8a-12}\left(4a-6+\sqrt{4b^2+16(a-3/2)^2 b+16a^4-72a^2+81}\right)}\left({}_2\mathrm{F}_1(\frac{1}{8a-12}\left(8a^2-\sqrt{4b^2-16(a\right.\right.\right.$$

ODE No. 1427

$$y''(x) = y(x)\left(-\csc^2(x)\right)\left(-\left(a^2b^2-(a+1)^2\right)\sin^2(x) - a(a+1)b\sin(2x) - (a-1)a\right)$$

✗ **Mathematica** : cpu = 200.569 (sec), leaf count = 0 , could not solve

```
DSolve[Derivative[2][y][x] == -(Csc[x]^2*(-((-1 + a)*a) - (-(1 + a)^2 + a^2*b^2)*Sin[x
```

✓ **Maple** : cpu = 1.631 (sec), leaf count = 179

$$\left\{y(x) = 1e^{\int \frac{1}{\sin(2x)(\sin(2x)b+\cos(2x)+1)}\left(2\left((a+1)\cos(2x)+a+1/2\right)b\sin(2x)-(\cos(2x)+1)\left(\left(ab^2-a-2\right)\cos(2x)-ab^2-a+1\right)\right)dx}\left(\int -2\,e\right.\right.$$

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 = 0.393316 (sec), leaf count = 104

$$\left\{\left\{y(x)\to c_1\sqrt[4]{\cos^2(x)-1}P_{\frac{1}{2}\left(2\sqrt{b-a}-1\right)}^{\frac{1}{2}\sqrt{-4a-4c+1}}(\cos(x)) + c_2\sqrt[4]{\cos^2(x)-1}Q_{\frac{1}{2}\left(2\sqrt{b-a}-1\right)}^{\frac{1}{2}\sqrt{-4a-4c+1}}(\cos(x))\right\}\right\}$$

✓ **Maple** : cpu = 0.349 (sec), leaf count = 183

$$\left\{y(x) = 1\sqrt[4]{2\cos(2x)+2}\left(\frac{\cos(2x)}{2}-\frac{1}{2}\right)^{\frac{1}{4}\sqrt{-4a+1-4c}}\sqrt{-2\cos(2x)+2}\left(\sqrt{2\cos(2x)+2}\,{}_2F_1\left(\frac{1}{4}\sqrt{-4a\right.\right.\right.$$

ODE No. 1429

$$y''(x) = y(x)\csc^2(x) - \cot(x)y'(x)$$

✓ **Mathematica** : cpu = 0.0584034 (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 = 0.043 (sec), leaf count = 25

$$\left\{y(x) = \frac{\sin(x)\_C1}{\cos(x)-1} + \frac{(\cos(x)-1)\_C2}{\sin(x)}\right\}$$

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 = 0.463606 (sec), leaf count = 22

$$\{\{y(x) \to c_1 P_v^n(\cos(x)) + c_2 Q_v^n(\cos(x))\}\}$$

✓ **Maple** : cpu = 0.402 (sec), leaf count = 101

$$\left\{y(x) = 1\left(\frac{\cos(2x)}{2} - \frac{1}{2}\right)^{\frac{n}{2}} \left(\sin(2x)\,{}_2\mathrm{F}_1(1 + \frac{v}{2} + \frac{n}{2}, \frac{1}{2} - \frac{v}{2} + \frac{n}{2}; \frac{3}{2}; \frac{\cos(2x)}{2} + \frac{1}{2})\_C1 + \sqrt{-2\cos(2\right.\right.$$

ODE No. 1431

$$y''(x) = \cot(2x)y'(x) - 2y(x)$$

✓ **Mathematica** : cpu = 0.20034 (sec), leaf count = 80

$$\left\{\left\{y(x) \to c_1\left(\cos^2(x) - \frac{1}{2}\right) - \frac{2}{3}c_2\cos^{\frac{3}{2}}(x)\left(2\cos^2(x)\,{}_2F_1\left(\frac{1}{4}, \frac{3}{4}; \frac{7}{4}; \cos^2(x)\right) - {}_2F_1\left(\frac{1}{4}, \frac{3}{4}; \frac{7}{4}; \cos^2(x)\right) + \right.\right.\right.$$

✓ **Maple** : cpu = 0.333 (sec), leaf count = 30

$$\left\{y(x) = (\sin(2x))^{\frac{3}{4}}\left(\mathit{LegendreQ}\left(\frac{1}{4}, \frac{3}{4}, \cos(2x)\right)\_C2 + \mathit{LegendreP}\left(\frac{1}{4}, \frac{3}{4}, \cos(2x)\right)\_C1\right)\right\}$$

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 = 0.0983212 (sec), leaf count = 37

$$\left\{\left\{y(x) \to \frac{c_1 e^{-2x}}{\sqrt{\sin(x)}} + \frac{c_2 e^{2x}}{4\sqrt{\sin(x)}}\right\}\right\}$$

✓ **Maple** : cpu = 0.05 (sec), leaf count = 22

$$\left\{y(x) = (\_C1\ \sinh(2x) + \_C2\ \cosh(2x))\frac{1}{\sqrt{\sin(x)}}\right\}$$

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 = 0.253804 (sec), leaf count = 46

$$\left\{\left\{y(x) \to \frac{1}{5}c_2x^3\sqrt{\cos(x)} + \frac{c_1\sqrt{\cos(x)}}{x^2} - \frac{1}{4}x^2\sqrt{\cos(x)}\right\}\right\}$$

✓ **Maple** : cpu = 0.111 (sec), leaf count = 28

$$\left\{y(x) = \frac{4\,x^5\_C1 - x^4 + 4\_C2}{4\,x^2}\sqrt{\cos(x)}\right\}$$

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 = 107.235 (sec), leaf count = 1596424

Too large to display

✓ **Maple** : cpu = 0.687 (sec), leaf count = 517

$$\left\{y(x) = (\sin(x))^{-\frac{a+b}{2a}}\left(\frac{\cos(x)}{2} - \frac{1}{2}\right)^{\frac{1}{4a}\left(2a+\sqrt{a^2+(-2b-4c-4d-4e)a+b^2}\right)}\left({}_2F_1(\frac{1}{4a}\left(\sqrt{a^2 + (-2b - 4c - 4d -\right.\right.\right.$$

ODE No. 1435

$$y''(x) = -4y(x)\sin(3x)\csc^3(x)$$

✓ **Mathematica** : cpu = 0.142943 (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 = 0.16 (sec), leaf count = 38

$$\left\{y(x) = \sqrt{\sin(x)}\left(\mathit{LegendreQ}\left(-\frac{1}{2} + 4\,i, \frac{i}{2}\sqrt{47}, \cos(x)\right)\_C2 + \mathit{LegendreP}\left(-\frac{1}{2} + 4\,i, \frac{i}{2}\sqrt{47}, \cos(x)\right)\_\right.\right.$$

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 = 0.530178 (sec), leaf count = 42

$$\left\{\left\{y(x)\to c_1\sqrt[4]{\cos^2(x)-1}P_v^n(\cos(x))+c_2\sqrt[4]{\cos^2(x)-1}Q_v^n(\cos(x))\right\}\right\}$$

✓ **Maple** : cpu = 0.296 (sec), leaf count = 113

$$\Bigg\{y(x) = 1\sqrt[4]{2\,\cos(2\,x)+2}\left(\frac{\cos(2\,x)}{2}-\frac{1}{2}\right)^{\frac{n}{2}}\sqrt{-2\,\cos(2\,x)+2}\Bigg(\sqrt{2\,\cos(2\,x)+2}{}_2\mathrm{F}_1(1+\frac{v}{2}+\frac{n}{2},\frac{1}{2}-\frac{v}{2}$$

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 = 0.293085 (sec), leaf count = 44

$$\left\{\left\{y(x)\to c_1\cos^{\frac{\sqrt{13}}{2}-\frac{3}{2}}(x)+c_2\cos^{-\frac{3}{2}-\frac{\sqrt{13}}{2}}(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.184 (sec), leaf count = 29

$$\left\{y(x) = \_C1\,(\cos(x))^{-\frac{3}{2}+\frac{\sqrt{13}}{2}}+\_C2\,(\cos(x))^{-\frac{3}{2}-\frac{\sqrt{13}}{2}}\right\}$$

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 = 0.956676 (sec), leaf count = 615

$$\left\{\left\{y(x)\to\frac{c_2(-1)^{\frac{1}{2}(-2m-1)+1}\cos^2(x)^{\frac{1}{4}(-2m-1)+1}\left(\cos^2(x)-1\right)^{\frac{1}{2}\left(\frac{4am+4\sqrt{-a}n^2+4an-4\sqrt{-a}n+4(-a)^{3/2}+8\sqrt{-a}a+\sqrt{-a}+4mn}{8a+8n^2-8n+2}\right.}}{}\right.\right.$$

✓ **Maple** : cpu = 0.231 (sec), leaf count = 102

$$\Bigg\{y(x) = (\sin(x))^n\Bigg((\cos(x))^{-m+1}{}_2\mathrm{F}_1(\frac{n}{2}-\frac{m}{2}+\frac{i}{2}\sqrt{a}+\frac{1}{2},\frac{n}{2}-\frac{m}{2}-\frac{i}{2}\sqrt{a}+\frac{1}{2};\frac{3}{2}-m;(\cos(x))^2)\_C2$$

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 = 0.801619 (sec), leaf count = 0 , could not solve

```
DSolve[Derivative[2][y][x] == (Derivative[1][phi][x]*Derivative[1][y][x])/(-
phi[a] + phi[x]) - (y[x]*(-(n*(1 + n)*(-phi[a] + phi[x])^2) + Derivative[2][phi][a]))/
phi[a] + phi[x]), y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x) = DESol\left(\left\{\frac{d^2}{dx^2}\_Y(x) - \frac{\left(\frac{d}{dx}\phi(x)\right)\frac{d}{dx}\_Y(x)}{\phi(x) - \phi(a)} + \frac{\left(-n(n+1)(\phi(x) - \phi(a))^2 + \frac{d^2}{da^2}\phi(a)\right)\_Y(x)}{\phi(x) - \phi(a)}\right\}\right.\right.$$

ODE No. 1440

$$y''(x) = -\frac{y'(x)\left(-\phi''(x) - \phi(x)\phi'(x) + \phi(x^3)\right)}{\phi'(x) + \phi(x)^2} - \frac{y(x)\left(-\phi(x)\phi''(x) + \phi(x)^2(-\phi'(x)) + \phi'(x)^2\right)}{\phi'(x) + \phi(x)^2}$$

✗ **Mathematica** : cpu = 0.879861 (sec), leaf count = 0 , could not solve

```
DSolve[Derivative[2][y][x] == -((Derivative[1][y][x]*(phi[x^3] - phi[x]*Derivative[1]
(phi[x]^2*Derivative[1][phi][x]) + Derivative[1][phi][x]^2 - phi[x]*Derivative[2][phi]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x) = DESol\left(\left\{\frac{\left(\left(\frac{d}{dx}\phi(x)\right)^2 - (\phi(x))^2\frac{d}{dx}\phi(x) - \phi(x)\frac{d^2}{dx^2}\phi(x)\right)\_Y(x)}{\frac{d}{dx}\phi(x) + (\phi(x))^2} + \frac{\left(\phi(x^3) - \phi(x)\frac{d}{dx}\phi(x) - \frac{d^2}{dx^2}\right.}{\frac{d}{dx}\phi(x) + (\phi(x\right.}\right.\right.$$

ODE No. 1441

$$y''(x) = -\frac{y'(x)(-\mathrm{cn}(x|k)\mathrm{dn}(x|k) - 2\mathrm{sn}(x|k))}{\mathrm{sn}(x|k)^2 - \mathrm{sn}(a|k)^2} - \frac{y(x)\left(6k^2\mathrm{sn}(a|k)^4 - 4(k^2+1)\,\mathrm{sn}(a|k)^2 + 2\right)}{\mathrm{sn}(x|k)^2 - \mathrm{sn}(a|k)^2} - \frac{1}{\mathrm{sn}(x|k)^2 - \mathrm{s}}$$

✗ **Mathematica** : cpu = 3.64768 (sec), leaf count = 0 , could not solve

```
DSolve[Derivative[2][y][x] == -(-JacobiSN[a, k]^2 + JacobiSN[x, k]^2)^(-
1) - ((2 - 4*(1 + k^2)*JacobiSN[a, k]^2 + 6*k^2*JacobiSN[a, k]^4)*y[x])/(-
JacobiSN[a, k]^2 + JacobiSN[x, k]^2) - ((-(JacobiCN[x, k]*JacobiDN[x, k]) - 2*JacobiSN
JacobiSN[a, k]^2 + JacobiSN[x, k]^2), y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x) = DESol\left(\left\{\frac{d^2}{dx^2}\_Y(x) - 2\,\frac{JacobiSN(x,k)\, JacobiCN(x,k)\, JacobiDN(x,k)\, \frac{d}{dx}\_Y(x)}{(JacobiSN\,(x,k))^2 - JacobiSN\,(a,k)} - \frac{(-2+4\,\right.\right.\right.$$

ODE No. 1442

$$y''(x) = \frac{y(x)}{f(x)} - \frac{xy'(x)}{f(x)}$$

✗ **Mathematica** : cpu = 0.218801 (sec), leaf count = 0 , could not solve

```
DSolve[Derivative[2][y][x] == y[x]/f[x] - (x*Derivative[1][y][x])/f[x], y[x], x]
```

✓ **Maple** : cpu = 0.066 (sec), leaf count = 30

$$\left\{y(x) = x\left(\int e^{\int \frac{1}{x}\left(-2-\frac{x^2}{f(x)}\right)dx}\,dx\_C1 + \_C2\right)\right\}$$

ODE No. 1443

$$y''(x) = -\frac{f'(x)y'(x)}{2f(x)} - \frac{g(x)y(x)}{f(x)}$$

✗ **Mathematica** : cpu = 0.282203 (sec), leaf count = 0 , could not solve

```
DSolve[Derivative[2][y][x] == -((g[x]*y[x])/f[x]) - (Derivative[1][f][x]*Derivative[1]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x) = DESol\left(\left\{\frac{g(x)\_Y(x)}{f\,(x)} + \frac{\left(\frac{d}{dx}f(x)\right)\frac{d}{dx}\_Y(x)}{2\,f\,(x)} + \frac{d^2}{dx^2}\_Y(x)\right\}, \{\_Y(x)\}\right)\right\}$$

ODE No. 1444

$$y''(x) = -by(x)f(x)^{2a} - \frac{af'(x)y'(x)}{f(x)}$$

✗ **Mathematica** : cpu = 1.47711 (sec), leaf count = 0 , could not solve

```
DSolve[Derivative[2][y][x] == -(b*f[x]^(2*a)*y[x]) - (a*Derivative[1][f][x]*Derivative
```

✓ **Maple** : cpu = 0.03 (sec), leaf count = 37

$$\left\{y(x) = \_C1\, e^{\int i(f(x))^a\sqrt{b}\,dx} + \_C2\, e^{-\int i(f(x))^a\sqrt{b}\,dx}\right\}$$

ODE No. 1445

$$y''(x) = -\frac{y'(x)\left(2f(x)g(x)g'(x)^2 - \left(g(x)^2-1\right)\left(2f'(x)g'(x)+f(x)g''(x)\right)\right)}{f(x)\left(g(x)^2-1\right)g'(x)} - \frac{y(x)\left(\left(g(x)^2-1\right)\left(f'(x)\left(2f'(\right.\right.\right.}{}$$

✗ **Mathematica** : cpu = 1.41205 (sec), leaf count = 0 , could not solve

```
DSolve[Derivative[2][y][x] == -((Derivative[1][y][x]*(2*f[x]*g[x]*Derivative[1][g][x]^
1 + g[x]^2)*(2*Derivative[1][f][x]*Derivative[1][g][x] + f[x]*Derivative[2][g][x])))/(
1 + g[x]^2)*Derivative[1][g][x])) - (y[x]*(-(f[x]*Derivative[1][g][x]^2*(2*g[x]*Deriva
1 + g[x]^2)*(-(f[x]*Derivative[1][g][x]*Derivative[2][f][x]) + Derivative[1][f][x]*(2*
1 + g[x]^2)*Derivative[1][g][x]), y[x], x]
```

✓ **Maple** : cpu = 0.212 (sec), leaf count = 20

$$\{y(x) = f(x)\left(LegendreQ(v, g(x))\_C2 + LegendreP(v, g(x))\_C1\right)\}$$

ODE No. 1446

$$y''(x) = -\frac{(x-1)y(x)}{x^4} - \frac{y'(x)}{x}$$

✓ **Mathematica** : cpu = 0.0412598 (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 = 0.053 (sec), leaf count = 22

$$\left\{y(x) = \mathrm{e}^{-x^{-1}}\left(Ei\left(1, -2\,x^{-1}\right)\_C2 + \_C1\right)\right\}$$

ODE No. 1447

$$y''(x) = -\frac{(-x-1)y(x)}{x^4} - \frac{y'(x)}{x}$$

✓ **Mathematica** : cpu = 0.0342394 (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 = 0.062 (sec), leaf count = 20

$$\left\{y(x) = \mathrm{e}^{x^{-1}}\left(Ei\left(1, 2\,x^{-1}\right)\_C2 + \_C1\right)\right\}$$

ODE No. 1448

$$y''(x) = -\frac{b^2 y(x)}{(x^2-a^2)^2}$$

✓ **Mathematica** : cpu = 0.346073 (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 = 0.122 (sec), leaf count = 77

$$\left\{y(x)=\sqrt{(a-x)(x+a)}\left(\left(\frac{a-x}{x+a}\right)^{-\frac{1}{2a}\sqrt{a^2-b^2}}\_C2+\left(\frac{a-x}{x+a}\right)^{\frac{1}{2a}\sqrt{a^2-b^2}}\_C1\right)\right\}$$

ODE No. 1449

$$y^{(3)}(x)-\lambda y(x)=0$$

✓ **Mathematica** : cpu = 0.0345273 (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 = 0.039 (sec), leaf count = 47

$$\left\{y(x)=\_C1\,\mathrm{e}^{-\frac{(i\sqrt{3}+1)x}{2}\sqrt[3]{\lambda}}+\_C2\,\mathrm{e}^{\frac{(i\sqrt{3}-1)x}{2}\sqrt[3]{\lambda}}+\_C3\,\mathrm{e}^{\sqrt[3]{\lambda}x}\right\}$$

ODE No. 1450

$$ax^3y(x)-bx+y^{(3)}(x)=0$$

✗ **Mathematica** : cpu = 3599.94 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.359 (sec), leaf count = 1616

$$\left\{y(x)=\int -11211200\,bx^3\left(\left(-5/8\,x^6{}_0\mathrm{F}_2(\,;\,\frac{13}{6},7/3;\,-\frac{x^6a}{216})a+35\,{}_0\mathrm{F}_2(\,;\,7/6,4/3;\,-\frac{x^6a}{216})\right)\,{}_0\mathrm{F}_2(\,;\,5/6,7/\right.$$

ODE No. 1451

$$y^{(3)}(x) - ax^b y(x) = 0$$

✓ **Mathematica** : cpu = 0.0211854 (sec), leaf count = 168

$$\left\{\left\{y(x) \to (-1)^{\frac{1}{b+3}}(b+3)^{-\frac{3}{b+3}}c_2 x a^{\frac{1}{b+3}}\,{}_0F_2\left(;1-\frac{1}{b+3},1+\frac{1}{b+3};\frac{ax^{b+3}}{(b+3)^3}\right) + (-1)^{\frac{2}{b+3}}(b+3)^{-\frac{6}{b+3}}c_3 x^2 a^{b\cdot}\right.\right.$$

✓ **Maple** : cpu = 0.148 (sec), leaf count = 114

$$\left\{y(x) = \_C1\,{}_0\mathrm{F}_2(\ ;\ \frac{b+1}{b+3},\frac{b+2}{b+3};\ \frac{x^{b+3}a}{(b+3)^3}) + \_C2\ x\,{}_0\mathrm{F}_2(\ ;\ \frac{b+4}{b+3},\frac{b+2}{b+3};\ \frac{x^{b+3}a}{(b+3)^3}) + \_C3\ x^2\,{}_0\mathrm{F}_2(\ ;\ \frac{b+4}{b+3}\right.$$

ODE No. 1452

$$y^{(3)}(x) + 3y'(x) - 4y(x) = 0$$

✓ **Mathematica** : cpu = 0.00800787 (sec), leaf count = 54

$$\left\{\left\{y(x) \to c_3 e^x + c_1 e^{-x/2}\sin\left(\frac{\sqrt{15}x}{2}\right) + c_2 e^{-x/2}\cos\left(\frac{\sqrt{15}x}{2}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.013 (sec), leaf count = 35

$$\left\{y(x) = \_C1\ \mathrm{e}^{x} + \_C2\ \mathrm{e}^{-\frac{x}{2}}\sin\left(\frac{\sqrt{15}x}{2}\right) + \_C3\ \mathrm{e}^{-\frac{x}{2}}\cos\left(\frac{\sqrt{15}x}{2}\right)\right\}$$

ODE No. 1453

$$a^2(-y'(x)) - e^{2ax}\sin^2(x) + y^{(3)}(x) = 0$$

✓ **Mathematica** : cpu = 0.779964 (sec), leaf count = 128

$$\left\{\left\{y(x) \to \frac{e^{-ax}(-9(a^2-4)\,a^4 e^{3ax}\cos(2x) - 3(11a^2-4)\,a^3 e^{3ax}\sin(2x) + (9a^6+49a^4+56a^2+16)\,(12a^2}{12a^3\,(9a^6+49a^4+56a^2+16)}\right.\right.$$

✓ **Maple** : cpu = 0.148 (sec), leaf count = 122

$$\left\{y(x) = \frac{1}{108\,a^9+588\,a^7+672\,a^5+192\,a^3}\left(\left(\left(-9\,a^6+36\,a^4\right)\cos(2\,x) + \left(-33\,a^5+12\,a^3\right)\sin(2\,x) + 9\,a^6\right.\right.\right.$$

ODE No. 1454

$$2axy'(x) + ay(x) + y^{(3)}(x) = 0$$

✓ **Mathematica** : cpu = 0.0109623 (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 = 0.064 (sec), leaf count = 55

$$\left\{y(x) = \_C1 \left(\text{Ai}\left(-\frac{2^{\frac{2}{3}}x}{2}\sqrt[3]{a}\right)\right)^2 + \_C2 \left(\text{Bi}\left(-\frac{2^{\frac{2}{3}}x}{2}\sqrt[3]{a}\right)\right)^2 + \_C3 \text{ Ai}\left(-\frac{2^{\frac{2}{3}}x}{2}\sqrt[3]{a}\right)\text{Bi}\left(-\frac{2^{\frac{2}{3}}x}{2}\sqrt[3]{a}\right)\right\}$$

ODE No. 1455

$$x(a+b-1)y'(x) - aby(x) + x^2(-y''(x)) + y^{(3)}(x) = 0$$

✓ **Mathematica** : cpu = 0.0278695 (sec), leaf count = 127

$$\left\{\left\{y(x) \to \sqrt[3]{-\frac{1}{3}}c_2 x\, {}_2F_2\left(\frac{1}{3}-\frac{a}{3},\frac{1}{3}-\frac{b}{3};\frac{2}{3},\frac{4}{3};\frac{x^3}{3}\right) + c_1\, {}_2F_2\left(-\frac{a}{3},-\frac{b}{3};\frac{1}{3},\frac{2}{3};\frac{x^3}{3}\right) + \left(-\frac{1}{3}\right)^{2/3} c_3 x^2\, {}_2F_2\left(\frac{2}{3}\right.\right.\right.$$

✓ **Maple** : cpu = 0.143 (sec), leaf count = 71

$$\left\{y(x) = \_C1\, {}_2\text{F}_2(-\frac{a}{3},-\frac{b}{3};\frac{1}{3},\frac{2}{3};\frac{x^3}{3}) + \_C2\, x^2 {}_2\text{F}_2(-\frac{a}{3}+\frac{2}{3},-\frac{b}{3}+\frac{2}{3};\frac{4}{3},\frac{5}{3};\frac{x^3}{3}) + \_C3\, {}_2\text{F}_2(\frac{1}{3}-\frac{b}{3},\frac{1}{3}-\right.$$

ODE No. 1456

$$x^{2c-2}y'(x) + (c-1)x^{2c-3}y(x) + y^{(3)}(x) = 0$$

✓ **Mathematica** : cpu = 0.0362437 (sec), leaf count = 183

$$\left\{\left\{y(x) \to c_1\, {}_1F_2\left(\frac{1}{2}-\frac{1}{2c};1-\frac{1}{c},1-\frac{1}{2c};-\frac{x^{2c}}{4c^2}\right) + 4^{-1/c}c_3 c^{-2/c}\left(x^{2c}\right)^{\frac{1}{c}}\, {}_1F_2\left(\frac{1}{2}+\frac{1}{2c};1+\frac{1}{2c},1+\frac{1}{c};-\frac{x^{2c}}{4c^2}\right.\right.\right.$$

✓ **Maple** : cpu = 0.069 (sec), leaf count = 73

$$\left\{y(x) = x\left(\left(Y_{\frac{1}{2c}}\left(\frac{x^c}{2c}\right)\right)^2 \_C2 + Y_{\frac{1}{2c}}\left(\frac{x^c}{2c}\right)J_{\frac{1}{2c}}\left(\frac{x^c}{2c}\right)\_C3 + \left(J_{\frac{1}{2c}}\left(\frac{x^c}{2c}\right)\right)^2 \_C1\right)\right\}$$

ODE No. 1457

$$-3y'(x)(a+2\wp(x;\mathrm{g2},\mathrm{g3}))+by(x)+y^{(3)}(x)=0$$

✗ **Mathematica** : cpu = 0.03551 (sec), leaf count = 0 , could not solve

```
DSolve[b*y[x] - 3*(a + 2*WeierstrassP[x, {g2, g3}])*Derivative[1][y][x] + Derivative[3
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x)=DESol\left(\left\{\frac{\mathrm{d}^3}{\mathrm{d}x^3}\_Y(x)+(-6\,WeierstrassP(x,g2,g3)-3\,a)\,\frac{\mathrm{d}}{\mathrm{d}x}\_Y(x)+b\_Y(x)\right\},\{\_Y(x)\}\right)\right.$$

ODE No. 1458

$$\frac{1}{2}y(x)\left(\left(1-n^2\right)\wp'(x;\mathrm{g2},\mathrm{g3})-a\right)+\left(1-n^2\right)y'(x)\wp(x;\mathrm{g2},\mathrm{g3})+y^{(3)}(x)=0$$

✗ **Mathematica** : cpu = 0.0192533 (sec), leaf count = 0 , could not solve

```
DSolve[((-a + (1 - n^2)*WeierstrassPPrime[x, {g2, g3}])*y[x])/2 + (1 - n^2)*Weierstras
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x)=DESol\left(\left\{\frac{\mathrm{d}^3}{\mathrm{d}x^3}\_Y(x)+\left(-WeierstrassP(x,g2,g3)\,n^2+WeierstrassP(x,g2,g3)\right)\frac{\mathrm{d}}{\mathrm{d}x}\_Y(x)+\right.\right.\right.$$

ODE No. 1459

$$-y'(x)(a+4n(n+1)\wp(x;\mathrm{g2},\mathrm{g3}))-2n(n+1)y(x)\wp'(x;\mathrm{g2},\mathrm{g3})+y^{(3)}(x)=0$$

✗ **Mathematica** : cpu = 0.0191304 (sec), leaf count = 0 , could not solve

```
DSolve[-2*n*(1 + n)*WeierstrassPPrime[x, {g2, g3}]*y[x] - (a + 4*n*(1 + n)*Weierstrass
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x)=\left(DESol\left(\left\{\frac{\mathrm{d}^2}{\mathrm{d}x^2}\_Y(x)+\left(-WeierstrassP(x,g2,g3)\,n^2-n\,WeierstrassP(x,g2,g3)-\frac{a}{4}\right)\_Y(\right.\right.\right.\right.$$

ODE No. 1460

$$y'(x)(a+A\wp(x;\mathrm{g2},\mathrm{g3}))+By(x)\wp'(x;\mathrm{g2},\mathrm{g3})+y^{(3)}(x)=0$$

✗ **Mathematica** : cpu = 0.0137468 (sec), leaf count = 0 , could not solve

```
DSolve[B*WeierstrassPPrime[x, {g2, g3}]*y[x] + (a + A*WeierstrassP[x, {g2, g3}])*Deriv
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x)=DESol\left(\left\{\frac{\mathrm{d}^3}{\mathrm{d}x^3}\_Y(x)+(A\,WeierstrassP(x,g2,g3)+a)\frac{\mathrm{d}}{\mathrm{d}x}\_Y(x)+B\,WeierstrassPPrime(x,g2\right.\right.\right.$$

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 = 0.0300143 (sec), leaf count = 0 , could not solve

```
DSolve[(b - 3*k^2*JacobiCN[z, x]*JacobiDN[z, x]*JacobiSN[z, x] + c*JacobiSN[z, x]^2)*y
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x)=DESol\left(\left\{\frac{\mathrm{d}^3}{\mathrm{d}x^3}\_Y(x)+\left(-3\,k^2(JacobiSN(z,x))^2-a\right)\frac{\mathrm{d}}{\mathrm{d}x}\_Y(x)+\left(b+c(JacobiSN(z,x))^2-3\right.\right.\right.\right.$$

ODE No. 1462

$$-y'(x)\left(a+6k^2\sin^2(x)\right)+by(x)+y^{(3)}(x)=0$$

✗ **Mathematica** : cpu = 0.0233497 (sec), leaf count = 0 , could not solve

```
DSolve[b*y[x] - (a + 6*k^2*Sin[x]^2)*Derivative[1][y][x] + Derivative[3][y][x] == 0, y
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x)=DESol\left(\left\{\frac{\mathrm{d}^3}{\mathrm{d}x^3}\_Y(x)+\left(-6\,k^2(\sin(x))^2-a\right)\frac{\mathrm{d}}{\mathrm{d}x}\_Y(x)+b\_Y(x)\right\},\{\_Y(x)\}\right)\right\}$$

ODE No. 1463

$$y(x)f'(x) + 2f(x)y'(x) + y^{(3)}(x) = 0$$

✗ **Mathematica** : cpu = 0.0648399 (sec), leaf count = 0 , could not solve

```
DSolve[y[x]*Derivative[1][f][x] + 2*f[x]*Derivative[1][y][x] + Derivative[3][y][x] ==
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x) = \left(DESol\left(\left\{\frac{d^2}{dx^2}\_Y(x) + \frac{f(x)\_Y(x)}{2}\right\}, \{\_Y(x)\}\right)\right)^2\right\}$$

ODE No. 1464

$$y^{(3)}(x) - 2y''(x) - 3y'(x) + 10y(x) = 0$$

✓ **Mathematica** : cpu = 0.00620957 (sec), leaf count = 34

$$\{\{y(x) \to c_3 e^{-2x} + c_1 e^{2x}\sin(x) + c_2 e^{2x}\cos(x)\}\}$$

✓ **Maple** : cpu = 0.013 (sec), leaf count = 27

$$\{y(x) = \_C1\, e^{-2x} + \_C2\, e^{2x}\sin(x) + \_C3\, e^{2x}\cos(x)\}$$

ODE No. 1465

$$-a^2y'(x) + 2a^2y(x) + y^{(3)}(x) - 2y''(x) - \sinh(x) = 0$$

✓ **Mathematica** : cpu = 0.105105 (sec), leaf count = 95

$$\left\{\left\{y(x) \to \frac{e^{-x}(3a^2e^{2x} - a^2 - 3e^{2x} - 12e^x\sinh(x) - 6e^x\cosh(x) + 1)}{6(a-2)(a+2)(a^2-1)} + c_1e^{-ax} + c_3e^{ax} + c_2e^{2x}\right\}\right\}$$

✓ **Maple** : cpu = 0.08 (sec), leaf count = 214

$$\left\{y(x) = \frac{1}{12\,a^5 - 60\,a^3 + 48\,a}\left(-3\,(a+1)\left((a-2)\,e^{-ax} + e^{ax}(a+2)\right)\cosh\left((a-1)\,x\right) + 3\,(a-1)\left((a-2)\right.\right.$$

ODE No. 1466

$$a^3(-y(x)) + 3a^2y'(x) - 3ay''(x) - e^{ax} + y^{(3)}(x) = 0$$

✓ **Mathematica** : cpu = 0.0171837 (sec), leaf count = 46

$$\left\{\left\{y(x) \to c_3x^2e^{ax} + c_2xe^{ax} + c_1e^{ax} + \frac{1}{6}x^3e^{ax}\right\}\right\}$$

✓ **Maple** : cpu = 0.026 (sec), leaf count = 27

$$\left\{y(x) = \frac{e^{ax}(6\_C3\,x^2 + x^3 + 6\_C2\,x + 6\_C1)}{6}\right\}$$

ODE No. 1467

$$\mathrm{a0}y(x) + \mathrm{a1}y'(x) + \mathrm{a2}y''(x) + y^{(3)}(x) = 0$$

✓ **Mathematica** : cpu = 0.00641948 (sec), leaf count = 84

$$\left\{\left\{y(x) \to c_1e^{x\mathrm{Root}[\#1^3+\#1^2\mathrm{a2}+\#1\mathrm{a1}+\mathrm{a0}\&,1]} + c_2e^{x\mathrm{Root}[\#1^3+\#1^2\mathrm{a2}+\#1\mathrm{a1}+\mathrm{a0}\&,2]} + c_3e^{x\mathrm{Root}[\#1^3+\#1^2\mathrm{a2}+\#1\mathrm{a1}+\mathrm{a0}\&,3]}\right.\right.$$

✓ **Maple** : cpu = 0.036 (sec), leaf count = 590

$$\left\{y(x) = \_C1\,e^{-x\left(\left(\frac{i}{12}\sqrt{3}+\frac{1}{12}\right)\left(36\,a1\,a2-108\,a0-8\,a2^3+12\,\sqrt{12\,a0\,a2^3-3\,a1^2a2^2-54\,a1\,a2\,a0+12\,a1^3+81\,a0^2}\right)^{\frac{2}{3}}+\frac{a2}{3}\sqrt[3]{36\,a1\,a2-\right.}\right.$$

ODE No. 1468

$$2\left(2a + 4x^2 - 1\right)y'(x) - 8axy(x) + y^{(3)}(x) - 6xy''(x) = 0$$

✓ **Mathematica** : cpu = 0.0876085 (sec), leaf count = 57

$$\left\{\left\{y(x) \to c_2H_{\frac{a}{2}}(x)\,{}_1F_1\left(-\frac{a}{4};\frac{1}{2};x^2\right) + c_1H_{\frac{a}{2}}(x)^2 + c_3\,{}_1F_1\left(-\frac{a}{4};\frac{1}{2};x^2\right)^2\right\}\right\}$$

✓ **Maple** : cpu = 0.148 (sec), leaf count = 59

$$\left\{y(x) = x^2\left(\left(M\left(\frac{1}{2}-\frac{a}{4},\frac{3}{2},x^2\right)\right)^2\_C1 + M\left(\frac{1}{2}-\frac{a}{4},\frac{3}{2},x^2\right)U\left(\frac{1}{2}-\frac{a}{4},\frac{3}{2},x^2\right)\_C3 + \left(U\left(\frac{1}{2}-\frac{a}{4},\frac{3}{2}\right.\right.\right.\right.$$

ODE No. 1469

$$a^3x^3y(x) + 3a^2x^2y'(x) + 3axy''(x) + y^{(3)}(x) = 0$$

✓ **Mathematica** : cpu = 0.0181356 (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 = 0.039 (sec), leaf count = 37

$$\left\{y(x) = \mathrm{e}^{-\frac{ax^2}{2}}\left(\_C1 + \_C2\,\mathrm{e}^{\sqrt{3}\sqrt{a}x} + \_C3\,\mathrm{e}^{-\sqrt{3}\sqrt{a}x}\right)\right\}$$

ODE No. 1470

$$y^{(3)}(x) - \sin(x)y''(x) - 2\cos(x)y'(x) + y(x)\sin(x) - \log(x) = 0$$

✗ **Mathematica** : cpu = 3599.93 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.108 (sec), leaf count = 36

$$\left\{y(x) = \left(\_C3 + \int\left(2\_C1\,x + \_C2 - \frac{3\,x^2}{4} + \frac{x^2\ln(x)}{2}\right)\mathrm{e}^{\cos(x)}\,\mathrm{d}x\right)\mathrm{e}^{-\cos(x)}\right\}$$

ODE No. 1471

$$f(x)y''(x) + f(x)y(x) + y^{(3)}(x) + y'(x) = 0$$

✗ **Mathematica** : cpu = 0.0753228 (sec), leaf count = 0 , could not solve

`DSolve[f[x]*y[x] + Derivative[1][y][x] + f[x]*Derivative[2][y][x] + Derivative[3][y][x`

✓ **Maple** : cpu = 0.165 (sec), leaf count = 36

$$\left\{y(x) = \mathrm{e}^{ix}\left(\int\mathrm{e}^{-2\,ix}\left(\int\_C3\,\mathrm{e}^{\int i-f(x)\,\mathrm{d}x}\,\mathrm{d}x + \_C2\right)\mathrm{d}x + \_C1\right)\right\}$$

ODE No. 1472

$$f(x)\left(x^2y''(x)-2xy'(x)+2y(x)\right)+y^{(3)}(x)=0$$

✗ **Mathematica** : cpu = 0.0766091 (sec), leaf count = 0 , could not solve

```
DSolve[f[x]*(2*y[x] - 2*x*Derivative[1][y][x] + x^2*Derivative[2][y][x]) + Derivative[
```

✓ **Maple** : cpu = 0.18 (sec), leaf count = 33

$$\left\{y(x)=\left(\int \_C1+\_C2\int e^{-\int x^2f(x)+3x^{-1}\,dx}\,dx\,dx+\_C3\right)x\right\}$$

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 = 0.0122435 (sec), leaf count = 0 , could not solve

```
DSolve[y[x]*(f[x]*g[x] + Derivative[1][g][x]) + g[x]*Derivative[1][y][x] + f[x]*Deriva
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x)=DESol\left(\left\{\frac{d^3}{dx^3}\_Y(x)+f(x)\frac{d^2}{dx^2}\_Y(x)+g(x)\frac{d}{dx}\_Y(x)+\left(f(x)g(x)+\frac{d}{dx}g(x)\right)\_Y(x)\right\},\{\right.$$

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 = 0.0142706 (sec), leaf count = 0 , could not solve

```
DSolve[y[x]*(4*f[x]*g[x] + 2*Derivative[1][g][x]) + (2*f[x]^2 + 4*g[x] + Derivative[1]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x)=\left(DESol\left(\left\{\frac{d^2}{dx^2}\_Y(x)+f(x)\frac{d}{dx}\_Y(x)+g(x)\_Y(x)\right\},\{\_Y(x)\}\right)\right)^2\right\}$$

ODE No. 1475

$$4y^{(3)}(x) - 8y''(x) - 11y'(x) - 3y(x) + 18e^x = 0$$

✓ **Mathematica** : cpu = 0.0287798 (sec), leaf count = 38

$$\left\{\left\{y(x) \to c_1 e^{-x/2} + c_2 e^{-x/2} x + c_3 e^{3x} + e^x\right\}\right\}$$

✓ **Maple** : cpu = 0.032 (sec), leaf count = 23

$$\left\{y(x) = (\_C3\, x + \_C2)\, e^{-\frac{x}{2}} + \_C1\, e^{3\, x} + e^x\right\}$$

ODE No. 1476

$$-36n^2 y'(x)\wp(x; \mathrm{g2}, \mathrm{g3}) - 2(n+3)(4n-3)ny(x)\phi'(x) + 27y^{(3)}(x) = 0$$

✗ **Mathematica** : cpu = 0.122044 (sec), leaf count = 0 , could not solve

```
DSolve[-2*n*(3 + n)*(-3 + 4*n)*y[x]*Derivative[1][phi][x] - 36*n^2*WeierstrassP[x, {g2
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x) = DESol\left(\left\{27\,\frac{d^3}{dx^3}\_Y(x) - 36\; WeierstrassP(x, g2, g3)\, n^2 \frac{d}{dx}\_Y(x) + \left(-8\; WeierstrassPPrime(x\right.\right.\right.$$

ODE No. 1477

$$xy^{(3)}(x) + 3y''(x) + xy(x) = 0$$

✓ **Mathematica** : cpu = 0.17617 (sec), leaf count = 48

$$\left\{\left\{y(x) \to \frac{c_1 e^{-x}}{x} + \frac{c_2 e^{\sqrt[3]{-1}x}}{x} + \frac{c_3 e^{-(-1)^{2/3}x}}{x}\right\}\right\}$$

✓ **Maple** : cpu = 0.026 (sec), leaf count = 41

$$\left\{y(x) = \frac{1}{x}\left(\_C1\, e^{-x} + \_C2\, e^{\frac{x}{2}} \sin\left(\frac{\sqrt{3}x}{2}\right) + \_C3\, e^{\frac{x}{2}} \cos\left(\frac{\sqrt{3}x}{2}\right)\right)\right\}$$

ODE No. 1478

$$-ax^2y(x) + xy^{(3)}(x) + 3y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0326587 (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 = 0.127 (sec), leaf count = 48

$$\left\{y(x) = \_C1\,{}_0\mathrm{F}_2(\ ;\frac{3}{4},\frac{5}{4};\frac{ax^4}{64}) + \frac{\_C2}{x}{}_0\mathrm{F}_2(\ ;\frac{1}{2},\frac{3}{4};\frac{ax^4}{64}) + \_C3\,x{}_0\mathrm{F}_2(\ ;\frac{5}{4},\frac{3}{2};\frac{ax^4}{64})\right\}$$

ODE No. 1479

$$(a+b)y''(x) - ay(x) + xy^{(3)}(x) - xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.147465 (sec), leaf count = 153

$$\left\{\left\{y(x) \to \frac{1}{2}ic_2x\,{}_1F_2\left(\frac{a}{2}+\frac{1}{2};\frac{3}{2},\frac{a}{2}+\frac{b}{2}+\frac{1}{2};\frac{x^2}{4}\right) + c_1\,{}_1F_2\left(\frac{a}{2};\frac{1}{2},\frac{a}{2}+\frac{b}{2};\frac{x^2}{4}\right) + c_3\left(\frac{i}{2}\right)^{-a-b+2}x^{-a-b+2}\,{}_1F$$

✓ **Maple** : cpu = 0.244 (sec), leaf count = 92

$$\left\{y(x) = \_C1\,{}_1\mathrm{F}_2(\frac{a}{2};\frac{1}{2},\frac{a}{2}+\frac{b}{2};\frac{x^2}{4}) + \_C2\,x{}_1\mathrm{F}_2(\frac{1}{2}+\frac{a}{2};\frac{3}{2},\frac{a}{2}+\frac{b}{2}+\frac{1}{2};\frac{x^2}{4}) + \_C3\,x^{-a-b+2}{}_1\mathrm{F}_2(1-\frac{b}{2};-$$

ODE No. 1480

$$-(2v+x)y''(x) - (-2v+x-1)y'(x) + xy^{(3)}(x) + (x-1)y(x) = 0$$

✓ **Mathematica** : cpu = 0.222331 (sec), leaf count = 93

$$\left\{\left\{y(x) \to \frac{c_3e^xx^{2v+2}\Gamma\left(v+\frac{3}{2}\right)\,{}_1\tilde{F}_1\left(v+\frac{3}{2};2v+3;-2x\right)}{\Gamma\left(\frac{1}{2}-v\right)} + c_22^{-2v-2}e^xG_{2,3}^{2,1}\left(2x\middle|\begin{array}{c}1,v+\frac{3}{2}\\1,2(v+1),0\end{array}\right) + c_1e^x\right\}\right\}$$

✓ **Maple** : cpu = 0.277 (sec), leaf count = 35

$$\left\{y(x) = \_C1\,\mathrm{e}^x + \_C2\,x^{v+1}I_{-v-1}(x) + \_C3\,x^{v+1}K_{v+1}(x)\right\}$$

ODE No. 1481

$$-f(x)+\left(x^2-3\right)y''(x)+xy^{(3)}(x)+4xy'(x)+2y(x)=0$$

✓ **Mathematica** : cpu = 1.10667 (sec), leaf count = 424

$$\left\{\left\{y(x)\to-\frac{1}{240}e^{-\frac{x^2}{2}}\left(-240x^5\left(\int_1^x\left(\frac{1}{15}\sqrt{\frac{\pi}{2}}K[1]\mathrm{erfi}\left(\frac{K[1]}{\sqrt{2}}\right)f(K[1])-\frac{1}{240}\left(15\mathrm{Ei}\left(\frac{K[1]^2}{2}\right)+16e^{\frac{K[1]^2}{2}}\right.\right.\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.079 (sec), leaf count = 44

$$\left\{y(x)=\left(\_C3+\int\frac{2\_C1\,x+\_C2-\iint-f(x)\,\mathrm{d}x\,\mathrm{d}x}{x^6}\mathrm{e}^{\frac{x^2}{2}}\,\mathrm{d}x\right)\mathrm{e}^{-\frac{x^2}{2}}x^5\right\}$$

ODE No. 1482

$$axy(x)-b+2xy^{(3)}(x)+3y''(x)=0$$

✓ **Mathematica** : cpu = 2980.36 (sec), leaf count = 3626

$$\left\{\left\{y(x)\to c_1\,{}_0F_2\left(;\frac{2}{3},\frac{5}{6};-\frac{ax^3}{54}\right)+\frac{\sqrt[6]{a}\sqrt{x}c_2\,{}_0F_2\left(;\frac{5}{6},\frac{7}{6};-\frac{ax^3}{54}\right)}{\sqrt[6]{2}\sqrt{3}}+\frac{\sqrt[3]{a}xc_3\,{}_0F_2\left(;\frac{7}{6},\frac{4}{3};-\frac{ax^3}{54}\right)}{3\sqrt[3]{2}}+\frac{1}{6}\left(6\,{}_0F_2\left(;\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.412 (sec), leaf count = 1616

$$\left\{y(x)=-\int 2802800\,bx\left(\left(-5/8\,{}_0\mathrm{F}_2(\;;\frac{13}{6},7/3;\,-\frac{ax^3}{54})ax^3+\frac{35}{4}{}_0\mathrm{F}_2(\;;7/6,4/3;\,-\frac{ax^3}{54})\right){}_0\mathrm{F}_2(\;;5/6,7/6\right.\right.$$

ODE No. 1483

$$-4(\nu+x-1)y''(x)+(6\nu+2x-5)y'(x)+(1-2\nu)y(x)+2xy^{(3)}(x)=0$$

✓ **Mathematica** : cpu = 0.148361 (sec), leaf count = 112

$$\left\{\left\{y(x)\to\frac{c_3e^xx\Gamma\left(\frac{5}{2}-3\nu\right)\left(\frac{2\,{}_1\tilde{F}_1\left(\frac{3}{2}-3\nu;1-2\nu;-x\right)}{3(2\nu-1)x}+\frac{2}{3x\Gamma(2-2\nu)}\right)}{\Gamma\left(\frac{3}{2}-\nu\right)}+c_2e^xG_{2,3}^{2,1}\left(x\left|\begin{array}{c}1,3\nu-\frac{1}{2}\\1,2\nu,0\end{array}\right.\right)+c_1e^x\right\}\right\}$$

✓ **Maple** : cpu = 0.28 (sec), leaf count = 37

$$\left\{y(x)=\_C1\,\mathrm{e}^x+\_C2\,\mathrm{e}^{\frac{x}{2}}x^\nu I_\nu\left(\frac{x}{2}\right)+\_C3\,\mathrm{e}^{\frac{x}{2}}x^\nu K_\nu\left(\frac{x}{2}\right)\right\}$$

ODE No. 1484

$$6y'(x)(ak+bx)+3(2ax+k)y''(x)+y(x)(3bk+2cx)+2xy^{(3)}(x)=0$$

✗ **Mathematica** : cpu = 63.2941 (sec), leaf count = 0 , DifferentialRoot result

$$\{\{y(x)\to \text{DifferentialRoot}(\{y,x\},\{(2xc+3bk)y(x)+(6xb+6ak)y'(x)+(6xa+3k)y''(x)+2xy^{(3)}(x)=$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x)=DESol\left(\left\{(3\,bk+2\,cx)\,\_Y(x)+(6\,ak+6\,bx)\,\frac{\mathrm{d}}{\mathrm{d}x}\_Y(x)+(6\,ax+3\,k)\,\frac{\mathrm{d}^2}{\mathrm{d}x^2}\_Y(x)+2\,x\frac{\mathrm{d}^3}{\mathrm{d}x^3}\_Y\right.\right.\right.$$

ODE No. 1485

$$(x-2)xy^{(3)}(x)-(x-2)xy''(x)-2y'(x)+2y(x)=0$$

✓ **Mathematica** : cpu = 0.146938 (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 = 0.381 (sec), leaf count = 51

$$\left\{y(x)=\_C3\ Ei(1,x-2)\,\mathrm{e}^{x-2}+\frac{\_C3\ x^2\ln(x-2)}{4}+\_C2\ \mathrm{e}^{x}-\frac{\_C3\ x^2\ln(x)}{4}+\frac{(2+2\,x)\_C3}{4}+\_C1\right.$$

ODE No. 1486

$$(2x-1)y^{(3)}(x)-8xy'(x)+8y(x)=0$$

✓ **Mathematica** : cpu = 0.18235 (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 = 0.261 (sec), leaf count = 51

$$\left\{y(x)=\_C1\ x+\_C2\ \mathrm{e}^{2\,x}-\frac{\_C3\ (2\,x\mathrm{e}^{-1}Ei(1,2\,x-1)-Ei(1,4\,x-2)\,\mathrm{e}^{2\,x-2}-\mathrm{e}^{-2\,x})}{4}\right\}$$

ODE No. 1487

$$(2x-1)y^{(3)}(x)+(x+4)y''(x)+2y'(x)=0$$

✗ **Mathematica** : cpu = 3599.93 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.114 (sec), leaf count = 38

$$\left\{y(x)=1\left(\_C3+\int(2\_C1\,x+\_C2)\mathrm{e}^{\frac{x}{2}}(2\,x-1)^{-\frac{3}{4}}\,\mathrm{d}x\right)\mathrm{e}^{-\frac{x}{2}}\frac{1}{\sqrt[4]{2\,x-1}}\right\}$$

ODE No. 1488

$$ax^2y(x)+x^2y^{(3)}(x)-6y'(x)=0$$

✓ **Mathematica** : cpu = 0.592911 (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 = 0.633 (sec), leaf count = 135

$$\left\{y(x)=\frac{1}{x}\left(-\left(\left(-i-\sqrt{3}\right)\left(-a^4\right)^{\frac{2}{3}}+ia^3x\right)\_C2\,\mathrm{e}^{\frac{\frac{i}{2}\left(-\sqrt{3}+i\right)x}{a}\sqrt[3]{-a^4}}-\_C3\left(\left(-i+\sqrt{3}\right)\left(-a^4\right)^{\frac{2}{3}}+ia^3x\right)\mathrm{e}^{\frac{i}{2}\cdots}\right.$$

ODE No. 1489

$$x^2y^{(3)}(x)+(x+1)y''(x)-y(x)=0$$

✗ **Mathematica** : cpu = 0.883284 (sec), leaf count = 0 , DifferentialRoot result

$$\{\{y(x)\to\text{DifferentialRoot}(\{y,x\},\{y^{(3)}(x)x^2-y(x)+(x+1)y''(x)=0,y(1)=c_1,y'(1)=c_2,y''(1)=c_3\cdots$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x)=DESol\left(\left\{-\_Y(x)+(1+x)\frac{\mathrm{d}^2}{\mathrm{d}x^2}\_Y(x)+x^2\frac{\mathrm{d}^3}{\mathrm{d}x^3}\_Y(x)\right\},\{\_Y(x)\}\right)\right\}$$

ODE No. 1490

$$x^2y^{(3)}(x) + \left(x^2+1\right)y'(x) - xy''(x) = 0$$

✓ **Mathematica** : cpu = 0.0193061 (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 = 0.079 (sec), leaf count = 18

$$\{y(x) = \_C1 + \_C2\, xJ_1(x) + \_C3\, xY_1(x)\}$$

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 = 0.0464704 (sec), leaf count = 102

$$\left\{\left\{y(x)\to c_2\left(x^{2a}\right)^{-\nu}\,{}_1F_2\left(-\nu-\frac{1}{2};1-2\nu,1-\nu;-x^{2a}\right)+c_3\left(x^{2a}\right)^{\nu}\,{}_1F_2\left(\nu-\frac{1}{2};\nu+1,2\nu+1;-x^{2a}\right)+c\right.\right.$$

✓ **Maple** : cpu = 0.093 (sec), leaf count = 88

$$\left\{y(x) = \_C1\,{}_1\mathrm{F}_2(-\frac{1}{2};\,\nu+1,-\nu+1;\,-x^{2a}) + \_C2\,x^{-2a\nu}{}_1\mathrm{F}_2(-\frac{1}{2}-\nu;\,1-2\nu,-\nu+1;\,-x^{2a}) + \_C3\,x\right.$$

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 = 0.416704 (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 = 0.148 (sec), leaf count = 39

$$\left\{y(x) = \_C1\,(M(-n,\,m,\,x))^2 + \_C2\,(U(-n,\,m,\,x))^2 + \_C3\,M(-n,\,m,\,x)U(-n,\,m,\,x)\right\}$$

ODE No. 1493

$$-f(x) + x^2 y^{(3)}(x) + \left(x^2 + 2\right) y'(x) + 4xy''(x) + 3xy(x) = 0$$

✓ **Mathematica** : cpu = 7.88382 (sec), leaf count = 2582

$$\left\{\left\{y(x) \to J_0(x)c_1 + 2Y_0(x)c_2 + \frac{2c_3\,{}_1F_2\left(1; \frac{1}{2}, \frac{1}{2}; -\frac{x^2}{4}\right)}{x} + \frac{xJ_0(x) \int_1^x \left(\frac{-16J_1(K[1])Y_0(K[1])^2 f(K[1])\,{}_1F_2(3; \frac{5}{2}, \frac{5}{2}; -\frac{1}{4}K\right.}{}\right.\right.\right.$$

✓ **Maple** : cpu = 0.371 (sec), leaf count = 1033

$$\left\{y(x) = \frac{1}{x}\left(-\int -18 \frac{}{((-18\,x^2 J_0\,(x) - 72\,x J_1\,(x) + 54\,J_0\,(x))\,{}_1\mathrm{F}_2(1;\ 1/2, 1/2;\ -1/4\,x^2) + 8\,(9/4\,J_0\,(x)\,(\right.\right.$$

ODE No. 1494

$$x^2 y^{(3)}(x) + 5xy''(x) + 4y'(x) - \log(x) = 0$$

✓ **Mathematica** : cpu = 0.0289056 (sec), leaf count = 43

$$\left\{\left\{y(x) \to -\frac{c_1}{x} - \frac{2c_2}{x} - \frac{2c_2 \log(x)}{x} + c_3 - \frac{x}{2} + \frac{1}{4}x \log(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.022 (sec), leaf count = 32

$$\left\{y(x) = \frac{(x^2 + 4\_C2)\ln(x) - 2\,x^2 + 4\_C1\,x + 4\_C3}{4\,x}\right\}$$

ODE No. 1495

$$x^2 y^{(3)}(x) + 6xy''(x) + 6y'(x) = 0$$

✓ **Mathematica** : cpu = 0.0198776 (sec), leaf count = 24

$$\left\{\left\{y(x) \to -\frac{c_2}{2x^2} - \frac{c_1}{x} + c_3\right\}\right\}$$

✓ **Maple** : cpu = 0.016 (sec), leaf count = 16

$$\left\{y(x) = \_C1 + \frac{\_C2}{x} + \frac{\_C3}{x^2}\right\}$$

ODE No. 1496

$$ax^2y(x) + x^2y^{(3)}(x) + 6xy''(x) + 6y'(x) = 0$$

✓ **Mathematica** : cpu = 0.285576 (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 = 0.032 (sec), leaf count = 57

$$\left\{y(x) = \frac{1}{x^2}\left(\_C1\, e^{\frac{(i\sqrt{3}-1)x}{2}\sqrt[3]{-a}} + \_C2\, e^{-\frac{(i\sqrt{3}+1)x}{2}\sqrt[3]{-a}} + \_C3\, e^{\sqrt[3]{-a}x}\right)\right\}$$

ODE No. 1497

$$-3x(p+q)y''(x) + 3p(3q+1)y'(x) + x^2y^{(3)}(x) + x^2(-y(x)) = 0$$

✓ **Mathematica** : cpu = 0.515562 (sec), leaf count = 135

$$\left\{\left\{y(x) \to c_1\, {}_0F_2\left(;\frac{2}{3}-p,\frac{1}{3}-q;\frac{x^3}{27}\right) + c_2(-1)^{\frac{1}{3}(3p+1)}3^{-3p-1}x^{3p+1}\, {}_0F_2\left(;p+\frac{4}{3},p-q+\frac{2}{3};\frac{x^3}{27}\right) + c_3(-1)^{\frac{1}{3}}$$

✓ **Maple** : cpu = 0.26 (sec), leaf count = 77

$$\left\{y(x) = \_C1\, {}_0\mathrm{F}_2(\,;-q+\frac{1}{3},-p+\frac{2}{3};\frac{x^3}{27}) + \_C2\, x^{1+3p}\, {}_0\mathrm{F}_2(\,;p+\frac{4}{3},\frac{2}{3}-q+p;\frac{x^3}{27}) + \_C3\, x^{2+3q}\, {}_0\mathrm{F}_2(\,;$$

ODE No. 1498

$$\left(ax^2+6n\right)y'(x) - 2axy(x) - 2(n+1)xy''(x) + x^2y^{(3)}(x) = 0$$

✓ **Mathematica** : cpu = 12.9682 (sec), leaf count = 701

$$\left\{\left\{y(x) \to \frac{\pi c_3 2^{-n-\frac{3}{2}}x\left(\sqrt{a}x\right)^{-n-\frac{1}{2}}\left(a^{3/2}2^{2n}x^3\csc\left(\frac{1}{2}\pi(2n+1)\right)\Gamma\left(\frac{3}{2}-n\right)\Gamma\left(n+\frac{3}{2}\right)\Gamma\left(\frac{1}{2}(2n+3)\right)J_{\frac{1}{2}(2n+1)}}{}\right.\right.$$

✓ **Maple** : cpu = 0.262 (sec), leaf count = 53

$$\left\{y(x) = \_C1\, x^{n+\frac{1}{2}}J_{-n-\frac{1}{2}}\left(\sqrt{a}x\right) + \_C2\, x^{n+\frac{1}{2}}Y_{-n-\frac{1}{2}}\left(\sqrt{a}x\right) + \_C3\left(ax^2+4n-2\right)\right\}$$

ODE No. 1499

$$-\left(\nu^2+x^2-\frac{1}{4}\right)y'(x)+\left(\nu^2+x^2-2x-\frac{1}{4}\right)y(x)+x^2y^{(3)}(x)-\left(x^2-2x\right)y''(x)=0$$

✓ **Mathematica** : cpu = 0.236059 (sec), leaf count = 97

$$\left\{\left\{y(x)\to\frac{c_3e^xx^{\nu+\frac{1}{2}}\Gamma\left(\nu+\frac{1}{2}\right)\,{}_1\tilde{F}_1\left(\nu+\frac{1}{2};2\nu+1;-2x\right)}{\Gamma\left(\frac{3}{2}-\nu\right)}+c_22^{-\nu-\frac{1}{2}}e^xG_{2,3}^{2,1}\left(2x\middle|\begin{array}{c}1,0\\\frac{1}{2}-\nu,\nu+\frac{1}{2},0\end{array}\right)+c_1e^x\right\}\right.$$

✓ **Maple** : cpu = 0.266 (sec), leaf count = 25

$$\left\{y(x)=\_C1\,\mathrm{e}^x+\_C2\,\sqrt{x}I_\nu(x)+\_C3\,\sqrt{x}K_\nu(x)\right\}$$

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 = 49.6894 (sec), leaf count = 0 , DifferentialRoot result

$$\{\{y(x)\to\mathrm{DifferentialRoot}(\{y,x\},\{y^{(3)}(x)x^2-(x+v)y''(x)x-(x+1)\nu y(x)+(2x\nu+\nu)y'(x)=0,y(1$$

✓ **Maple** : cpu = 0.243 (sec), leaf count = 55

$$\left\{y(x)=\_C1\,\mathrm{e}^x+\_C2\,x^{\frac{\nu}{2}+\frac{1}{2}}J_{-\nu-1}\left(2\sqrt{\nu}\sqrt{x}\right)+\_C3\,x^{\frac{\nu}{2}+\frac{1}{2}}Y_{-\nu-1}\left(2\sqrt{\nu}\sqrt{x}\right)\right\}$$

ODE No. 1501

$$\left(-\nu^2+x^2-2x+\frac{1}{4}\right)y'(x)+\left(\nu^2-\frac{1}{4}\right)y(x)+x^2y^{(3)}(x)-2\left(x^2-x\right)y''(x)=0$$

✓ **Mathematica** : cpu = 0.189587 (sec), leaf count = 86

$$\left\{\left\{y(x)\to\frac{c_3e^xx^{\nu+\frac{1}{2}}\Gamma\left(\nu+\frac{1}{2}\right)\,{}_1\tilde{F}_1\left(\nu+\frac{1}{2};2\nu+1;-x\right)}{\Gamma\left(\frac{3}{2}-\nu\right)}+c_2e^xG_{2,3}^{2,1}\left(x\middle|\begin{array}{c}1,0\\\frac{1}{2}-\nu,\nu+\frac{1}{2},0\end{array}\right)+c_1e^x\right\}\right\}$$

✓ **Maple** : cpu = 0.242 (sec), leaf count = 37

$$\left\{y(x)=\_C1\,\mathrm{e}^x+\_C2\,\mathrm{e}^{\frac{x}{2}}\sqrt{x}I_\nu\left(\frac{x}{2}\right)+\_C3\,\mathrm{e}^{\frac{x}{2}}\sqrt{x}K_\nu\left(\frac{x}{2}\right)\right\}$$

ODE No. 1502

$$-\left(x^4-6x\right)y''(x)-\left(2x^3-6\right)y'(x)+x^2y^{(3)}(x)+2x^2y(x)=0$$

✓ **Mathematica** : cpu = 0.0769861 (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 = 0.502 (sec), leaf count = 103

$$\left\{y(x)=\frac{1}{x^2}\left(\_C2\ \int e^{\frac{x^3}{6}}\sqrt{x}\left(I_{-\frac{5}{6}}\left(-\frac{x^3}{6}\right)x^3+I_{\frac{1}{6}}\left(-\frac{x^3}{6}\right)x^3-2\,I_{1/6}(-1/6\,x^3)\right)\,dx+\_C3\ \int e^{\frac{x^3}{6}}\sqrt{x}\left(K\right.\right.$$

ODE No. 1503

$$\left(x^2+1\right)y^{(3)}(x)+\frac{1}{x^2}+8xy''(x)+10y'(x)-2\log(x)-3=0$$

✓ **Mathematica** : cpu = 0.113854 (sec), leaf count = 62

$$\left\{\left\{y(x)\to c_3-\frac{100(3c_2-1)x^3+900c_2x+225c_1+36x^5-60(3x^4+10x^2+15)x\log(x)}{900\left(x^2+1\right)^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.029 (sec), leaf count = 67

$$\left\{y(x)=\frac{(45\,x^5+150\,x^3+225\,x)\ln(x)-9\,x^5+225\,\_C1\,x^4+(225\,\_C2-50)x^3+450\,\_C1\,x^2+(675\,\_}{225\,\left(x^2+1\right)^2}\right.$$

ODE No. 1504

$$\left(x^2+2\right)y^{(3)}(x)+\left(x^2+2\right)y'(x)-2xy''(x)-2xy(x)=0$$

✓ **Mathematica** : cpu = 1.24827 (sec), leaf count = 85

$$\left\{\left\{y(x)\to \frac{c_1x^2}{2}-\frac{ic_2e^{ix}\sqrt{\frac{4}{x^2}+1}x}{2\sqrt{x^2+4}}-\frac{c_3e^{-ix}\sqrt{\frac{4}{x^2}+1}x}{4\sqrt{x^2+4}}\right\}\right\}$$

✓ **Maple** : cpu = 0.21 (sec), leaf count = 18

$$\left\{y(x)=\_C1\,x^2+\_C2\,\cos(x)+\_C3\,\sin(x)\right\}$$

ODE No. 1505

$$(2ax+b)y'(x)+ay(x)+2(x-1)xy^{(3)}(x)+3(2x-1)y''(x)=0$$

✗ **Mathematica** : cpu = 62.2056 (sec), leaf count = 0 , DifferentialRoot result

$$\{\{y(x)\to \text{DifferentialRoot}(\{y,x\},\{ay(x)+(2xa+b)y'(x)+(6x-3)y''(x)+2(x-1)xy^{(3)}(x)=0,y(2)$$

✓ **Maple** : cpu = 0.151 (sec), leaf count = 79

$$\left\{y(x)=\_C1\left(\mathit{MathieuC}\left(-\frac{a}{2}-\frac{b}{2}+1,\frac{a}{4},\arccos\left(\sqrt{x}\right)\right)\right)^{2}+\_C2\left(\mathit{MathieuS}\left(-\frac{a}{2}-\frac{b}{2}+1,\frac{a}{4},\arccos\right.\right.\right.$$

ODE No. 1506

$$4x^2y^{(3)}(x)+\left(x^2+14x-1\right)y''(x)+4(x+1)y'(x)+2y(x)=0$$

✓ **Mathematica** : cpu = 501.89 (sec), leaf count = 318

$$\left\{\left\{y(x)\to -\frac{c_2e^{-\frac{x}{4}-\frac{1}{4x}}\left(-71\sqrt{e\pi}x^{5/2}\text{erfi}\left(\frac{1-x}{2\sqrt{x}}\right)-193\sqrt{\frac{\pi}{e}}x^{5/2}\text{erfi}\left(\frac{x+1}{2\sqrt{x}}\right)+193i\sqrt{e\pi}x^{5/2}-193i\sqrt{\frac{\pi}{e}}x^{5/2}+\right.}{x^2}\right.\right.$$

✓ **Maple** : cpu = 0.072 (sec), leaf count = 43

$$\left\{y(x)=\left(\_C3+\int\frac{2\_C1\,x+\_C2}{4}\mathrm{e}^{\frac{x}{4}}\mathrm{e}^{\frac{1}{4x}}x^{-\frac{5}{2}}\,\mathrm{d}x\right)\mathrm{e}^{-\frac{x}{4}}\sqrt{x}\mathrm{e}^{-\frac{1}{4x}}\right\}$$

ODE No. 1507

$$xy^{(3)}(x)(ax+b)+(\alpha x+\beta)y''(x)-f(x)+xy'(x)+y(x)=0$$

✗ **Mathematica** : cpu = 2.45386 (sec), leaf count = 0 , could not solve

```
DSolve[-f[x] + y[x] + x*Derivative[1][y][x] + (beta + alpha*x)*Derivative[2][y][x] + x
```

✓ **Maple** : cpu = 0.639 (sec), leaf count = 1210

$$\left\{y(x)=\left(\left(\left(\int-\left(\_C1+\int f(x)\,\mathrm{d}x\right)(ax+b)^{\frac{(-3b-\beta)a+\alpha b}{ab}}\mathit{HeunC}\left(0,\frac{-2b+\beta}{b},\frac{(2b+\beta)a-\alpha b}{ab},-\frac{b}{a^2},\right.\right.\right.\right.\right.$$

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 = 0.953768 (sec), leaf count = 143

$$\left\{\left\{y(x)\to c_2 3^{\nu-1}a^{\frac{1-\nu}{3}}x^{1-\nu}\,{}_0F_2\left(;1-\frac{2\nu}{3},1-\frac{\nu}{3};-\frac{ax^3}{27}\right)+c_3 3^{-\nu-1}a^{\frac{\nu+1}{3}}x^{\nu+1}\,{}_0F_2\left(;\frac{\nu}{3}+1,\frac{2\nu}{3}+1;-\frac{ax^3}{27}\right)\right.\right.$$

✓ **Maple** : cpu = 0.154 (sec), leaf count = 81

$$\left\{y(x)=\_C1\,x\,{}_0\mathrm{F}_2(\,;\,\frac{\nu}{3}+1,-\frac{\nu}{3}+1;\,-\frac{ax^3}{27})+\_C2\,x^{-\nu+1}{}_0\mathrm{F}_2(\,;\,1-\frac{2\,\nu}{3},-\frac{\nu}{3}+1;\,-\frac{ax^3}{27})+\_C3\,x^{\nu+1}{}_0\mathrm{F}\right.$$

ODE No. 1509

$$\left(\left(1-4\nu^2\right)x+4x^3\right)y'(x)+\left(4\nu^2-1\right)y(x)+x^3y^{(3)}(x)=0$$

✓ **Mathematica** : cpu = 0.0099828 (sec), leaf count = 34

$$\left\{\left\{y(x)\to c_1xJ_\nu(x)^2+c_3xY_\nu(x)^2+c_2xJ_\nu(x)Y_\nu(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.063 (sec), leaf count = 29

$$\left\{y(x)=x\left((Y_\nu(x))^2\_C2+Y_\nu(x)J_\nu(x)\_C3+(J_\nu(x))^2\_C1\right)\right\}$$

ODE No. 1510

$$y(x)\left(a(\nu-1)x^{2\nu}+bx^{3\nu}+\nu^2-1\right)+x\left(ax^{2\nu}-\nu^2+1\right)y'(x)+x^3y^{(3)}(x)=0$$

✗ **Mathematica** : cpu = 0.0870668 (sec), leaf count = 0 , could not solve

```
DSolve[(-1 + nu^2 + a*(-1 + nu)*x^(2*nu) + b*x^(3*nu))*y[x] + x*(1 - nu^2 + a*x^(2*nu)
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x)=DESol\left(\left\{x^3\frac{d^3}{dx^3}\_Y(x)+\left(x^{2\,\nu}ax-\nu^2x+x\right)\frac{d}{dx}\_Y(x)+\left(x^{2\,\nu}a\nu-ax^{2\,\nu}+bx^{3\,\nu}+\nu^2-1\right)\_Y\right.\right.\right.$$

ODE No. 1511

$$x^3 y^{(3)}(x) + (x+8)x^3 - 6(x-1)x^3 \log(x) + 3x^2 y''(x) - 2xy'(x) + 2y(x) = 0$$

✓ **Mathematica** : cpu = 0.0371506 (sec), leaf count = 51

$$\left\{\left\{y(x) \to \frac{c_1}{x^2} + c_2 x + c_3 x \log(x) + \frac{1}{450}\left(-50x^4 + 50x^4 \log(x) - 18x^3 - 135x^3 \log(x)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.037 (sec), leaf count = 49

$$\left\{y(x) = \frac{(50\,x^6 - 135\,x^5 + 450\,\_C3\,x^3)\ln(x) - 50\,x^6 - 18\,x^5 + 450\,\_C1\,x^3 + 450\,\_C2}{450\,x^2}\right\}$$

ODE No. 1512

$$\left(1-a^2\right)xy'(x) + x^3 y^{(3)}(x) + 3x^2 y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0389588 (sec), leaf count = 29

$$\left\{\left\{y(x) \to -\frac{c_1 x^{-a}}{a} + \frac{c_2 x^a}{a} + c_3\right\}\right\}$$

✓ **Maple** : cpu = 0.018 (sec), leaf count = 18

$$\left\{y(x) = \_C1 + \_C2\,x^a + \_C3\,x^{-a}\right\}$$

ODE No. 1513

$$x^3 y^{(3)}(x) - 4x^2 y''(x) + \left(x^2+8\right)xy'(x) - 2\left(x^2+4\right)y(x) = 0$$

✓ **Mathematica** : cpu = 0.0841623 (sec), leaf count = 25

$$\left\{\left\{y(x) \to c_1 x^2 - c_2 x \sin(x) + c_3 x \cos(x)\right\}\right\}$$

✓ **Maple** : cpu = 0.224 (sec), leaf count = 18

$$\left\{y(x) = x(\cos(x)\,\_C3 + \sin(x)\,\_C2 + \_C1\,x)\right\}$$

ODE No. 1514

$$\left(ax^3-12\right)y(x)+x^3y^{(3)}(x)+6x^2y''(x)=0$$

✓ **Mathematica** : cpu = 0.761538 (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 = 0.52 (sec), leaf count = 135

$$\left\{y(x)=\frac{1}{x^3}\left(-\left(\left(-i-\sqrt{3}\right)\left(-a^4\right)^{\frac{2}{3}}+ia^3x\right)\_C2\,\mathrm{e}^{\frac{\frac{i}{2}\left(-\sqrt{3}+i\right)x}{a}\sqrt[3]{-a^4}}-\_C3\left(\left(-i+\sqrt{3}\right)\left(-a^4\right)^{\frac{2}{3}}+ia^3x\right)\mathrm{e}$$

ODE No. 1515

$$y(x)\left(a\left(4c^2\nu^2-a^2\right)+4b^2c^2(c-a)x^{2c}\right)+y'(x)\left(3(a-1)ax+4b^2c^2x^{2c+1}-4c^2\nu^2+1\right)+3(1-a)x^2y''(x)+x^3$$

✗ **Mathematica** : cpu = 0.216347 (sec), leaf count = 0 , could not solve

```
DSolve[(a*(-a^2 + 4*c^2*nu^2) + 4*b^2*c^2*(-a + c)*x^(2*c))*y[x] + (1 - 4*c^2*nu^2 + 3
1 + a)*a*x + 4*b^2*c^2*x^(1 + 2*c))*Derivative[1][y][x] + 3*(1 - a)*x^2*Derivative[2][
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x)=DESol\left(\left\{x^3\frac{\mathrm{d}^3}{\mathrm{d}x^3}\_Y(x)+\left(-3\,ax^2+3\,x^2\right)\frac{\mathrm{d}^2}{\mathrm{d}x^2}\_Y(x)+\left(4\,b^2c^2x^{2\,c+1}-4\,\nu^2c^2+3\,a^2x-3\,ax+1$$

ODE No. 1516

$$x^3y^{(3)}(x)+(x+3)x^2y''(x)+5(x-6)xy'(x)+(4x+30)y(x)=0$$

✗ **Mathematica** : cpu = 434.96 (sec), leaf count = 0 , DifferentialRoot result

$$\{\{y(x)\to\text{DifferentialRoot}(\{y,x\},\{y^{(3)}(x)x^3+(x+3)y''(x)x^2+5(x-6)y'(x)x+(4x+30)y(x)=0,y($$

✓ **Maple** : cpu = 0.454 (sec), leaf count = 188

$$\left\{y(x)=\frac{\_C3\,\mathrm{e}^{-x}(x^8+28\,x^7+450\,x^6+5100\,x^5+42900\,x^4+267120\,x^3+1179360\,x^2+3326400\,x+453}{}$$

ODE No. 1517

$$x^3y^{(3)}(x)-2x^3+x^2y''(x)+2xy'(x)-y(x)+\log(x)=0$$

✓ **Mathematica** : cpu = 0.420044 (sec), leaf count = 30686

Too large to display

✓ **Maple** : cpu = 0.598 (sec), leaf count = 866

$$\left\{ y(x) = -\int -\frac{\left(x^{\frac{\left(11-3\sqrt{69}\right)\left(44+12\sqrt{69}\right)^{\frac{2}{3}}}{1200}+\frac{\sqrt[3]{44+12\sqrt{69}}}{12}+\frac{2}{3}}\right)^{2}\sqrt[3]{44+12\sqrt{69}}\left(3\sqrt{69}\sqrt[3]{44+12\sqrt{69}}-11\sqrt[3]{44+1}\right.}{13800\,x^3}\right.$$

ODE No. 1518

$$x\left(x^2+1\right)y^{(3)}(x)+3\left(2x^2+1\right)y''(x)-12y(x)=0$$

✓ **Mathematica** : cpu = 0.255438 (sec), leaf count = 106

$$\left\{\left\{y(x)\to \frac{1}{3}c_1\left(2x^2+1\right)+\frac{1}{3}c_2x\sqrt{x^2+1}+\frac{c_3\left(2x^2+1\right)\left(3x^2+3\sqrt{x^2+1}x^2\log(x)-3\sqrt{x^2+1}x^2\log\left(\sqrt{x^2}\right.\right.}{6\left(2x^3+x\right)}\right.\right.$$

✓ **Maple** : cpu = 0.448 (sec), leaf count = 60

$$\left\{y(x)=\frac{1}{x}\left(3\sqrt{x^2+1}Artanh\left(\frac{1}{\sqrt{x^2+1}}\right)\_C2\,x^2+\_C1\,x^2\sqrt{x^2+1}+2\_C3\,x^3-3\_C2\,x^2+\_C3\,x-\right.\right.$$

ODE No. 1519

$$(x+3)x^2y^{(3)}(x)-3(x+2)xy''(x)+6(x+1)y'(x)-6y(x)=0$$

✓ **Mathematica** : cpu = 0.0307151 (sec), leaf count = 65

$$\left\{\left\{y(x)\to \frac{1}{4}c_1\left(x^3-3x^2+3x+3\right)+\frac{1}{2}c_2\left(-x^3+3x^2-x-1\right)+\frac{1}{8}c_3\left(3x^3-5x^2+x+1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.158 (sec), leaf count = 19

$$\left\{y(x)=\_C2\,x^3+\_C1\,x^2+\_C3\,x+\_C3\right\}$$

ODE No. 1520

$$y''(x)\left(-6x(\mathrm{a1}+\mathrm{a2}+\mathrm{a3})+3\mathrm{a1a2}+3\mathrm{a1a3}+3\mathrm{a2a3}+9x^2\right)+2(x-\mathrm{a1})(x-\mathrm{a2})(x-\mathrm{a3})y^{(3)}(x)-2\left(b+\left(n^2+\right.\right.$$

✗ **Mathematica** : cpu = 71.7094 (sec), leaf count = 0 , DifferentialRoot result

$$\left\{\left\{y(x)\to \text{DifferentialRoot}\left(\{y,x\},\left\{-n(n+1)y(x)-2\left(xn^2+xn-3x+b\right)y'(x)+3\left(3x^2-2\mathrm{a1}x-2\mathrm{a2}\right.\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.479 (sec), leaf count = 288

$$\left\{y(x)=-\_C2\,(x-a1)\left(HeunG\left(\frac{-a3+a1}{-a2+a1},\frac{(-n^2-n+3)\,a1-b}{-4\,a2+4\,a1},\frac{n}{2}+1,-\frac{n}{2}+\frac{1}{2},\frac{3}{2},\frac{1}{2},\frac{-x+a1}{-a2+a1}\right)\right.\right.$$

ODE No. 1521

$$(x+1)x^3y^{(3)}(x)-(4x+2)x^2y''(x)+(10x+4)xy'(x)-4(3x+1)y(x)=0$$

✓ **Mathematica** : cpu = 0.0648357 (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 = 0.442 (sec), leaf count = 28

$$\left\{y(x)=x\left((\ln(x))^2\_C3\,x+\_C2\,x\ln(x)+\_C3\,x^2+\_C1\,x+\_C3\right)\right\}$$

ODE No. 1522

$$4x^4y^{(3)}(x)-4x^3y''(x)+4x^2y'(x)-1=0$$

✓ **Mathematica** : cpu = 0.0204053 (sec), leaf count = 44

$$\left\{\left\{y(x)\to \frac{c_1x^2}{2}-\frac{c_2x^2}{4}+\frac{1}{2}c_2x^2\log(x)+c_3-\frac{1}{36x}\right\}\right\}$$

✓ **Maple** : cpu = 0.049 (sec), leaf count = 34

$$\left\{y(x)=\frac{18\,x^3\_C1\,\ln(x)-1+(-9\_C1+18\_C2)\,x^3+36\_C3\,x}{36\,x}\right\}$$

ODE No. 1523

$$-\left(4x^2+2\right)x^2y''(x)+\left(10x^2+4\right)xy'(x)-4\left(3x^2+1\right)y(x)+\left(x^2+1\right)x^3y^{(3)}(x)=0$$

✓ **Mathematica** : cpu = 0.121634 (sec), leaf count = 74

$$\left\{\left\{y(x)\to c_1\left(-x^3+3x^2-x\right)+\frac{1}{2}c_2\left(x^3-2x^2+x\right)-\frac{c_3x\left(-x^3+3x^2-x\right)\left(\log(x)+1\right)}{2\left(x^2-3x+1\right)}\right\}\right\}$$

✓ **Maple** : cpu = 0.45 (sec), leaf count = 23

$$\left\{y(x)=\left(\ln\left(x\right)\_C2\,x+\_C3\,x^2+\left(\_C1+\_C2\right)x+\_C3\right)x\right\}$$

ODE No. 1524

$$x^6y^{(3)}(x)+x^2y''(x)-2y(x)=0$$

✓ **Mathematica** : cpu = 0.172122 (sec), leaf count = 96

$$\left\{\left\{y(x)\to-\frac{\left(-\frac{1}{3}\right)^{2/3}c_2x\Gamma\left(\frac{1}{3}\right)\,{}_2F_2\left(-\frac{2}{3},\frac{1}{3};\frac{2}{3},\frac{4}{3};\frac{1}{3x^3}\right)}{3\Gamma\left(\frac{4}{3}\right)}+\frac{c_3\Gamma\left(\frac{2}{3}\right)\,{}_2F_2\left(-\frac{1}{3},\frac{2}{3};\frac{4}{3},\frac{5}{3};\frac{1}{3x^3}\right)}{9\Gamma\left(\frac{5}{3}\right)}+c_1x^2\right\}\right\}$$

✓ **Maple** : cpu = 0.526 (sec), leaf count = 98

$$\left\{y(x)=x^2\left(\int 1\mathrm{e}^{\frac{1}{6\,x^3}}\left(2\,x^3K_{1/6}(-1/6\,x^{-3})+K_{\frac{5}{6}}\left(-\frac{1}{6\,x^3}\right)-K_{\frac{1}{6}}\left(-\frac{1}{6\,x^3}\right)\right)x^{-\frac{11}{2}}\,\mathrm{d}x\_C3+\int 1\mathrm{e}^{\frac{1}{6\,x^3}}\left(2\,x\right.\right.$$

ODE No. 1525

$$ay(x)+x^6y^{(3)}(x)+6x^5y''(x)=0$$

✓ **Mathematica** : cpu = 0.486336 (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 = 0.604 (sec), leaf count = 291

$$\left\{y(x)=\_C1\,\left(-8\,x^3+a\right)^4\mathrm{e}^{-\frac{1}{ax}\sqrt[3]{-a^4}}\left(2\,ax+\sqrt[3]{-a^4}\right)^{-3}\left(4\,a^2x^2-2\,x\sqrt[3]{-a^4}a+\left(-a^4\right)^{\frac{2}{3}}\right)^{-4}+\_C2\,\left(-8\,x^3\right.\right.$$

ODE No. 1526

$$\left(x^4+2x^2+2x+1\right)x^2y^{(3)}(x)-\left(2x^6+3x^4-6x^2-6x-1\right)y''(x)+\left(x^6-6x^3-15x^2-12x-2\right)y'(x)+(x$$

✗ **Mathematica** : cpu = 3603.43 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.243 (sec), leaf count = 19

$$\left\{y(x)=\_C2\,e^{x^{-1}}+e^{x}(\_C3\,x+\_C1)\right\}$$

ODE No. 1527

$$(x-a)^3(x-b)^3y^{(3)}(x)-cy(x)=0$$

✗ **Mathematica** : cpu = 135.176 (sec), leaf count = 0 , DifferentialRoot result

$$\{\{y(x)\to \text{DifferentialRoot}(\{y,x\},\{(a-x)^3(b-x)^3y^{(3)}(x)-cy(x)=0,y(0)=c_1,y'(0)=c_2,y''(0)=c_3$$

✓ **Maple** : cpu = 0.563 (sec), leaf count = 437

$$\left\{y(x)=(x-a)^{-2\,\frac{b}{a-b}}\,(x-b)^{2\,\frac{a}{a-b}}\left((b-x)^{-\frac{RootOf\left(\_Z^3+(-3\,a-3\,b)\_Z^2+\left(2\,a^2+8\,ab+2\,b^2\right)\_Z-4\,a^2b-4\,ab^2-c,index=1\right)}{a-b}}\,(a-x)^{-\frac{R}{}}\right.\right.$$

ODE No. 1528

$$y^{(3)}(x)\sin(x)+(2\cos(x)+1)y''(x)-\sin(x)y'(x)-\cos(x)=0$$

✓ **Mathematica** : cpu = 0.667355 (sec), leaf count = 72

$$\left\{\left\{y(x)\to\frac{\sin\left(\frac{x}{2}\right)\left(\sqrt{2}\left(c_2x\sin\left(\frac{x}{2}\right)+\cos\left(\frac{x}{2}\right)\left(c_2\log(2(\cos(x)+1))+2c_1\right)\right)-2\cos\left(\frac{x}{2}\right)\sin^{-1}(\cos(x))\right)}{\cos(x)-1}+\right.\right.$$

✓ **Maple** : cpu = 0.348 (sec), leaf count = 71

$$\left\{y(x)=\frac{1}{\sin(x)(\cos(x)-1)}\left((\sin(x))^2\ln\left(\frac{1-\cos(x)}{\sin(x)}\right)\_C1-\ln(\sin(x))(\sin(x))^2\_C1+(\sin(x))^2\_\right.\right.$$

ODE No. 1529

$$y^{(3)}(x)(x+\sin(x))+3(\cos(x)+1)y''(x)-3\sin(x)y'(x)-y(x)\cos(x)+\sin(x)=0$$

✗ **Mathematica** : cpu = 0.0795591 (sec), leaf count = 0 , could not solve

```
DSolve[Sin[x] - Cos[x]*y[x] - 3*Sin[x]*Derivative[1][y][x] + 3*(1 + Cos[x])*Derivative
```

✓ **Maple** : cpu = 0.079 (sec), leaf count = 25

$$\left\{y(x)=\frac{\_C3+\_C1\,x^2+\_C2\,x-\cos(x)}{\sin(x)+x}\right\}$$

ODE No. 1530

$$y'(x)\left(4\nu(\nu+1)\sin^2(x)+\cos(2x)\right)+2\nu(\nu+1)y(x)\sin(2x)+y^{(3)}(x)\sin^2(x)+3\sin(x)\cos(x)y''(x)=0$$

✗ **Mathematica** : cpu = 0.168492 (sec), leaf count = 0 , could not solve

```
DSolve[2*nu*(1 + nu)*Sin[2*x]*y[x] + (Cos[2*x] + 4*nu*(1 + nu)*Sin[x]^2)*Derivative[1]
```

✓ **Maple** : cpu = 0.251 (sec), leaf count = 113

$$\left\{y(x)=\_C1\left({}_2F_1(-\frac{\nu}{2},\frac{\nu}{2}+\frac{1}{2};\frac{1}{2};\frac{\cos(2x)}{2}+\frac{1}{2})\right)^2+\_C2\,(\cos(2x)+1)\left({}_2F_1(1+\frac{\nu}{2},\frac{1}{2}-\frac{\nu}{2};\frac{3}{2};\frac{\cos(2}{2}\right.\right.$$

ODE No. 1531

$$A(x)\left(f(x)y''(x)+g(x)y'(x)+h(x)y(x)\right)+f'(x)y''(x)+f(x)y^{(3)}(x)+g'(x)y'(x)+g(x)y''(x)+y(x)h'(x)+h($$

✗ **Mathematica** : cpu = 0.0297523 (sec), leaf count = 0 , could not solve

```
DSolve[y[x]*Derivative[1][h][x] + h[x]*Derivative[1][y][x] + Derivative[1][g][x]*Deriv
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x)=DESol\left(\left\{f(x)\frac{d^3}{dx^3}\_Y(x)+\left(\frac{d}{dx}f(x)+g(x)+A(x)\,f(x)\right)\frac{d^2}{dx^2}\_Y(x)+\left(\frac{d}{dx}g(x)+h(x)+A\right.\right.\right.$$

ODE No. 1532

$$ny(x) + y^{(3)}(x) + xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.0156199 (sec), leaf count = 103

$$\left\{\left\{y(x) \to \frac{c_2 x\,{}_1F_2\left(\frac{n}{3}+\frac{1}{3};\frac{2}{3},\frac{4}{3};-\frac{x^3}{9}\right)}{3^{2/3}} + c_1\,{}_1F_2\left(\frac{n}{3};\frac{1}{3},\frac{2}{3};-\frac{x^3}{9}\right) + \frac{c_3 x^2\,{}_1F_2\left(\frac{n}{3}+\frac{2}{3};\frac{4}{3},\frac{5}{3};-\frac{x^3}{9}\right)}{3\sqrt[3]{3}}\right\}\right\}$$

✓ **Maple** : cpu = 0.108 (sec), leaf count = 58

$$\left\{y(x) = \_C1\,{}_1\mathrm{F}_2(\frac{n}{3};\frac{1}{3},\frac{2}{3};-\frac{x^3}{9}) + \_C2\,x{}_1\mathrm{F}_2(\frac{1}{3}+\frac{n}{3};\frac{2}{3},\frac{4}{3};-\frac{x^3}{9}) + \_C3\,x^2{}_1\mathrm{F}_2(\frac{2}{3}+\frac{n}{3};\frac{4}{3},\frac{5}{3};-\frac{x^3}{9})\right\}$$

ODE No. 1533

$$-ny(x) + y^{(3)}(x) - xy'(x) = 0$$

✓ **Mathematica** : cpu = 0.0162535 (sec), leaf count = 113

$$\left\{\left\{y(x) \to \frac{\sqrt[3]{-1}c_2 x\,{}_1F_2\left(\frac{n}{3}+\frac{1}{3};\frac{2}{3},\frac{4}{3};\frac{x^3}{9}\right)}{3^{2/3}} + c_1\,{}_1F_2\left(\frac{n}{3};\frac{1}{3},\frac{2}{3};\frac{x^3}{9}\right) + \frac{(-1)^{2/3}c_3 x^2\,{}_1F_2\left(\frac{n}{3}+\frac{2}{3};\frac{4}{3},\frac{5}{3};\frac{x^3}{9}\right)}{3\sqrt[3]{3}}\right\}\right\}$$

✓ **Maple** : cpu = 0.105 (sec), leaf count = 58

$$\left\{y(x) = \_C1\,{}_1\mathrm{F}_2(\frac{n}{3};\frac{1}{3},\frac{2}{3};\frac{x^3}{9}) + \_C2\,x{}_1\mathrm{F}_2(\frac{1}{3}+\frac{n}{3};\frac{2}{3},\frac{4}{3};\frac{x^3}{9}) + \_C3\,x^2{}_1\mathrm{F}_2(\frac{2}{3}+\frac{n}{3};\frac{4}{3},\frac{5}{3};\frac{x^3}{9})\right\}$$

ODE No. 1534

$$y^{(4)}(x) = 0$$

✓ **Mathematica** : cpu = 0.0036254 (sec), leaf count = 24

$$\{\{y(x) \to c_4x^3 + c_3x^2 + c_2x + c_1\}\}$$

✓ **Maple** : cpu = 0.042 (sec), leaf count = 21

$$\left\{y(x) = \frac{\_C1\,x^3}{6} + \frac{\_C2\,x^2}{2} + \_C3\,x + \_C4\right\}$$

ODE No. 1535

$$-f(x) + y^{(4)}(x) + 4y(x) = 0$$

✓ **Mathematica** : cpu = 1.32295 (sec), leaf count = 219

$$\left\{\left\{y(x) \to e^{-x}\left(\cos(x)\int_1^x \frac{1}{8}e^{K[1]}f(K[1])(\cos(K[1]) - \sin(K[1]))\left(\sin^2(K[1]) + \cos^2(K[1])\right)\, dK[1] + e^{2x} c\right.\right.\right.$$

✓ **Maple** : cpu = 0.021 (sec), leaf count = 36

$$\left\{y(x) = \frac{f}{4} + \_C1\, e^{x}\cos(x) + \_C2\, e^{x}\sin(x) + \_C3\, e^{-x}\cos(x) + \_C4\, e^{-x}\sin(x)\right\}$$

ODE No. 1536

$$\lambda y(x) + y^{(4)}(x) = 0$$

✓ **Mathematica** : cpu = 0.00534722 (sec), leaf count = 76

$$\left\{\left\{y(x) \to c_1 e^{(-1)^{3/4}\sqrt[4]{\lambda}x} + c_2 e^{-\sqrt[4]{-1}\sqrt[4]{\lambda}x} + c_3 e^{-(-1)^{3/4}\sqrt[4]{\lambda}x} + c_4 e^{\sqrt[4]{-1}\sqrt[4]{\lambda}x}\right\}\right\}$$

✓ **Maple** : cpu = 0.02 (sec), leaf count = 50

$$\left\{y(x) = \_C1\, e^{-i\sqrt[4]{-\lambda}x} + \_C2\, e^{i\sqrt[4]{-\lambda}x} + \_C3\, e^{-\sqrt[4]{-\lambda}x} + \_C4\, e^{\sqrt[4]{-\lambda}x}\right\}$$

ODE No. 1537

$$-16e^{x^2}x^4 + y^{(4)}(x) - 12y''(x) + 12y(x) = 0$$

✓ **Mathematica** : cpu = 1.25457 (sec), leaf count = 1722

$$\left\{\left\{y(x) \to \frac{1}{12}e^{-\left(\sqrt{2\left(3-\sqrt{6}\right)}-x\right)x-\sqrt{2\left(3+\sqrt{6}\right)}x-\sqrt{2\left(3-\sqrt{6}\right)}x}\left(-2\sqrt{3+\sqrt{6}}e^{\sqrt{2\left(3+\sqrt{6}\right)}x+2\sqrt{2\left(3-\sqrt{6}\right)}x}x^3 + 2\sqrt{3+\right.\right.\right.$$

✓ **Maple** : cpu = 0.175 (sec), leaf count = 67

$$\left\{y(x) = e^{x^2} + \_C1\, e^{\sqrt{6-2\sqrt{6}}x} + \_C2\, e^{\sqrt{6+2\sqrt{6}}x} + \_C3\, e^{-\sqrt{6-2\sqrt{6}}x} + \_C4\, e^{-\sqrt{6+2\sqrt{6}}x}\right\}$$

ODE No. 1538

$$a^4y(x) + 2a^2y''(x) - \cosh(ax) + y^{(4)}(x) = 0$$

✓ **Mathematica** : cpu = 0.267774 (sec), leaf count = 66

$$\left\{\left\{y(x) \to \frac{\cos^2(ax)\cosh(ax) + \sin^2(ax)\cosh(ax)}{4a^4} + c_3\sin(ax) + c_4x\sin(ax) + c_1\cos(ax) + c_2x\cos(ax)\right\}\right.$$

✓ **Maple** : cpu = 0.51 (sec), leaf count = 51

$$\left\{y(x) = \frac{e^{-ax} + (8\_C3\,x + 8\_C1)\,a^4\cos(ax) + (8\_C4\,x + 8\_C2)\,a^4\sin(ax) + e^{ax}}{8\,a^4}\right\}$$

ODE No. 1539

$$a^4\lambda y(x) + a^2(\lambda + 1)y''(x) + y^{(4)}(x) = 0$$

✓ **Mathematica** : cpu = 0.00659291 (sec), leaf count = 44

$$\left\{\left\{y(x) \to c_2\sin\left(a\sqrt{\lambda}x\right) + c_1\cos\left(a\sqrt{\lambda}x\right) + c_4\sin(ax) + c_3\cos(ax)\right\}\right\}$$

✓ **Maple** : cpu = 0.036 (sec), leaf count = 35

$$\left\{y(x) = \_C1\ \sin(ax) + \_C2\ \cos(ax) + \_C3\ \sin\left(a\sqrt{\lambda}x\right) + \_C4\ \cos\left(a\sqrt{\lambda}x\right)\right\}$$

ODE No. 1540

$$a(bx - 1)y''(x) + aby'(x) + \lambda y(x) + y^{(4)}(x) = 0$$

✗ **Mathematica** : cpu = 0.393546 (sec), leaf count = 0 , DifferentialRoot result

$$\{\{y(x) \to \text{DifferentialRoot}(\{y, x\}, \{\lambda y(x) + aby'(x) + a(xb - 1)y''(x) + y^{(4)}(x) = 0, y(0) = c_1, y'(0) = c_2$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x) = DESol\left(\left\{\lambda\_Y(x) + ab\frac{d}{dx}\_Y(x) + a(bx - 1)\frac{d^2}{dx^2}\_Y(x) + \frac{d^4}{dx^4}\_Y(x)\right\}, \{\_Y(x)\}\right)\right\}$$

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 = 80.2369 (sec), leaf count = 0 , DifferentialRoot result

$$\{\{y(x)\to \text{DifferentialRoot}(\{y,x\},\{\left(ax^2+\beta\lambda+\gamma\right)y(x)+\left(ax^2+c+b\lambda\right)y''(x)+y^{(4)}(x)=0,y(0)=c_1$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x)=\mathit{DESol}\left(\left\{\left(ax^2+\beta\,\lambda+\gamma\right)\_Y(x)+\left(ax^2+b\lambda+c\right)\frac{d^2}{dx^2}\_Y(x)+\frac{d^4}{dx^4}\_Y(x)\right\},\{\_Y(x)\}\right)\right\}$$

ODE No. 1542

$$ay''(x)\wp(x;\mathrm{g2},\mathrm{g3})+by'(x)\wp'(x;\mathrm{g2},\mathrm{g3})+y(x)\left(c\left(6\wp(x;\mathrm{g2},\mathrm{g3})^2-\frac{\mathrm{g2}}{2}\right)+d\right)+y^{(4)}(x)=0$$

✗ **Mathematica** : cpu = 0.0286122 (sec), leaf count = 0 , could not solve

```
DSolve[(d + c*(-g2/2 + 6*WeierstrassP[x, {g2, g3}]^2))*y[x] + b*WeierstrassPPrime[x, {
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x)=\mathit{DESol}\left(\left\{\frac{d^4}{dx^4}\_Y(x)+a\,\mathit{WeierstrassP}(x,\mathit{g2},\mathit{g3})\frac{d^2}{dx^2}\_Y(x)+b\,\mathit{WeierstrassPPrime}(x,\mathit{g2},\mathit{g3})\right.\right.$$

ODE No. 1543

$$-y''(x)\left(a+12k^2\mathrm{sn}(z|x)^2\right)+y(x)\left(\alpha\mathrm{sn}(z|x)^2+\beta\right)+by'(x)+y^{(4)}(x)=0$$

✗ **Mathematica** : cpu = 0.0927446 (sec), leaf count = 0 , could not solve

```
DSolve[(beta + alpha*JacobiSN[z, x]^2)*y[x] + b*Derivative[1][y][x] - (a + 12*k^2*Jaco
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x)=\mathit{DESol}\left(\left\{\frac{d^4}{dx^4}\_Y(x)+\left(-12\,k^2(\mathit{JacobiSN}(z,x))^2-a\right)\frac{d^2}{dx^2}\_Y(x)+b\frac{d}{dx}\_Y(x)+\left(\alpha\,(\mathit{JacobiS}\right.\right.\right.$$

ODE No. 1544

$$y(x)\left(3f''(x)+3f(x)^2\right)+10f'(x)y'(x)+10f(x)y''(x)+y^{(4)}(x)=0$$

✗ **Mathematica** : cpu = 0.0138367 (sec), leaf count = 0 , could not solve

```
DSolve[10*Derivative[1][f][x]*Derivative[1][y][x] + y[x]*(3*f[x]^2 + 3*Derivative[2][f
```

✓ **Maple** : cpu = 0.02 (sec), leaf count = 41

$$\left\{y(x)=\sum_{\_a=1}^{4}\mathrm{e}^{RootOf\left(\_Z^4+10\,f\,\_Z^2+10\,df\,\_Z+3\,f^2+3\,ddf,index=\_a\right)x}\_C_{\_a}\right\}$$

ODE No. 1545

$$y^{(4)}(x)+2y^{(3)}(x)-3y''(x)-4y'(x)+4y(x)-32\sin(2x)+24\cos(2x)=0$$

✓ **Mathematica** : cpu = 0.191619 (sec), leaf count = 40

$$\left\{\left\{y(x)\to c_1e^{-2x}+c_2e^{-2x}x+c_3e^x+c_4e^xx+\sin(2x)\right\}\right\}$$

✓ **Maple** : cpu = 0.1 (sec), leaf count = 27

$$\left\{y(x)=\left(\_C4\,x+\_C2\right)\mathrm{e}^{-2\,x}+\sin\left(2\,x\right)+\left(\_C3\,x+\_C1\right)\mathrm{e}^{x}\right\}$$

ODE No. 1546

$$a^4x^4y(x)+4a^3x^3y'(x)+6a^2x^2y''(x)+4axy^{(3)}(x)+y^{(4)}(x)=0$$

✓ **Mathematica** : cpu = 0.847546 (sec), leaf count = 301

$$\left\{\left\{y(x)\to\frac{2\left(\sqrt{6}-3\right)\sqrt{-\left(\sqrt{6}-3\right)a}\,c_3\exp\left(-\frac{ax^2}{2}-\sqrt{-\left(\sqrt{6}-3\right)a}\,x-\frac{\left(-3+\sqrt{3}+\sqrt{6}\right)ax}{\sqrt{-\left(\sqrt{6}-3\right)a}}\right)}{\left(-3-\sqrt{3}+\sqrt{6}\right)\left(-3+\sqrt{3}+\sqrt{6}\right)a}+\frac{2\left(\sqrt{6}-3\right)}{}\right.\right.$$

✓ **Maple** : cpu = 0.06 (sec), leaf count = 73

$$\left\{y(x)=\mathrm{e}^{-\frac{ax^2}{2}}\left(\_C2\,\mathrm{e}^{\sqrt{-a\left(\sqrt{6}-3\right)}x}+\_C4\,\mathrm{e}^{\sqrt{\left(3+\sqrt{6}\right)a}x}+\_C1\,\mathrm{e}^{-\sqrt{-a\left(\sqrt{6}-3\right)}x}+\_C3\,\mathrm{e}^{-\sqrt{\left(3+\sqrt{6}\right)a}x}\right)\right\}$$

ODE No. 1547

$$3y(x)\left(2g(x)f'(x)+5f(x)g'(x)+6f(x)^2g(x)+g''(x)+3g(x)^2\right)+y''(x)\left(4f'(x)+11f(x)^2+10g(x)\right)+y'($$

✗ **Mathematica** : cpu = 0.0332516 (sec), leaf count = 0 , could not solve

```
DSolve[Derivative[1][y][x]*(6*f[x]^3 + 30*f[x]*g[x] + 7*f[x]*Derivative[1][f][x] + 10*
```

✓ **Maple** : cpu = 0.023 (sec), leaf count = 87

$$\left\{y(x)=\sum_{\_a=1}^{4}\mathrm{e}^{RootOf\left(\_Z^4+6\,f\,\_Z^3+\left(11\,f^2+4\,df+10\,g\right)\_Z^2+\left(6\,f^3+7\,df\,f+30\,fg+ddf+10\,dg\right)\_Z+18\,f^2g+6\,df\,g+15\,dg\,f+9\,g^2+3\,ddg,}\right.$$

ODE No. 1548

$$4y^{(4)}(x)-12y^{(3)}(x)+11y''(x)-3y'(x)-4\cos(x)=0$$

✓ **Mathematica** : cpu = 0.102465 (sec), leaf count = 50

$$\left\{\left\{y(x)\to 2c_1e^{x/2}+\frac{2}{3}c_2e^{3x/2}+c_3e^x+c_4+\frac{18\sin(x)}{65}-\frac{14\cos(x)}{65}\right\}\right\}$$

✓ **Maple** : cpu = 0.081 (sec), leaf count = 32

$$\left\{y(x)=\_C1\,\mathrm{e}^{x}+2\,\_C2\,\mathrm{e}^{x/2}+\frac{2\,\_C3}{3}\mathrm{e}^{\frac{3\,x}{2}}+\frac{18\,\sin\left(x\right)}{65}-\frac{14\,\cos\left(x\right)}{65}+\_C4\right\}$$

ODE No. 1549

$$xy^{(4)}(x)+5y^{(3)}(x)-24=0$$

✓ **Mathematica** : cpu = 0.0120985 (sec), leaf count = 34

$$\left\{\left\{y(x)\to c_4x^2-\frac{c_1}{24x^2}+c_3x+c_2+\frac{4x^3}{5}\right\}\right\}$$

✓ **Maple** : cpu = 0.03 (sec), leaf count = 26

$$\left\{y(x)=\frac{\_C2\,x^2}{2}+\frac{4\,x^3}{5}-\frac{\_C1}{24\,x^2}+\_C3\,x+\_C4\right\}$$

ODE No. 1550

$$12x^3y''(x) - \left(6x^2+1\right)y^{(3)}(x) - \left(9x^2-7\right)x^2y'(x) + 2\left(x^2-3\right)x^3y(x) + xy^{(4)}(x) = 0$$

✓ **Mathematica** : cpu = 5.40737 (sec), leaf count = 262

$$\left\{\left\{y(x)\to c_3e^{\frac{x^2}{2}}\int_1^x \frac{e^{\frac{K[1]^2}{2}}K[1]\left(\int \frac{U\left(\frac{1}{20}\left(-5-9\sqrt{5}\right),-\frac{1}{2},\frac{1}{2}\sqrt{5}K[1]^2\right)\exp\left(\frac{1}{2}\left(-\frac{1}{2}K[1]^2-2\log(K[1])\right)-\frac{1}{4}\sqrt{5}K[1]^2\right)}{\sqrt{K[1]}\sqrt[4]{K[1]^2}}\,dK[1]\right)}{\sqrt[4]{2}}\,dK\right.\right.$$

✓ **Maple** : cpu = 1.833 (sec), leaf count = 157

$$\left\{y(x) = -\int 1W_{\frac{9\sqrt{5}}{20},\frac{3}{4}}\left(\frac{\sqrt{5}x^2}{2}\right)\mathrm{e}^{-\frac{x^2}{4}}x^{-\frac{3}{2}}\,\mathrm{d}x\mathrm{e}^{x^2}\_C4 + \int 1W_{\frac{9\sqrt{5}}{20},\frac{3}{4}}\left(\frac{\sqrt{5}x^2}{2}\right)\mathrm{e}^{\frac{x^2}{4}}x^{-\frac{3}{2}}\,\mathrm{d}x\mathrm{e}^{\frac{x^2}{2}}\_C4 - \mathrm{e}^{x^2}\int 1M\right.$$

ODE No. 1551

$$-2\left(\nu^2x^2+6\right)y''(x) + \nu^2\left(\nu^2x^2+4\right)y(x) + x^2y^{(4)}(x) = 0$$

✓ **Mathematica** : cpu = 0.435644 (sec), leaf count = 110

$$\left\{\left\{y(x)\to \frac{c_3(1-x)e^{-\nu x}(\nu^2x^2+\nu^2x+\nu^2+6\nu x+6\nu+15)}{x} + \frac{c_4(1-x)e^{\nu x}(\nu^2x^2+\nu^2x+\nu^2-6\nu x-6\nu\right.\right.$$

✓ **Maple** : cpu = 0.259 (sec), leaf count = 62

$$\left\{y(x) = \frac{(\_C4\,\nu^2x^3+6\,\_C4\,\nu\,x^2+15\,\_C4\,x+\_C2)\,\mathrm{e}^{-x\nu}+\mathrm{e}^{x\nu}(\_C3\,\nu^2x^3-6\,\_C3\,\nu\,x^2+15\,\_C3\,x+}{x}\right.$$

ODE No. 1552

$$ay(x) - bx^2 + x^2y^{(4)}(x) + 2xy^{(3)}(x) = 0$$

✗ **Mathematica** : cpu = 3600. (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.079 (sec), leaf count = 89

$$\left\{ y(x) = \frac{bx^2}{a} + \_C1\ \sqrt{x}J_1\left(2\sqrt[4]{-a}\sqrt{x}\right) + \_C2\ \sqrt{x}Y_1\left(2\sqrt[4]{-a}\sqrt{x}\right) + \_C3\ \sqrt{x}J_1\left(2\sqrt{-\sqrt{-a}}\sqrt{x}\right) + \_C4\right.$$

ODE No. 1553

$$x^2y^{(4)}(x) + 4xy^{(3)}(x) + 2y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0245436 (sec), leaf count = 29

$$\{\{y(x) \to c_1(-x) + c_4x + c_1x\log(x) - c_2\log(x) + c_3\}\}$$

✓ **Maple** : cpu = 0.016 (sec), leaf count = 17

$$\{y(x) = (\_C2\ x + \_C4)\ln(x) + \_C1\ x + \_C3\}$$

ODE No. 1554

$$x^2y^{(4)}(x) + 6xy^{(3)}(x) + 6y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0241666 (sec), leaf count = 29

$$\left\{\left\{y(x) \to c_4x + \frac{1}{2}\left(\frac{c_2}{x} - 2c_1\log(x)\right) + c_3\right\}\right\}$$

✓ **Maple** : cpu = 0.016 (sec), leaf count = 18

$$\left\{y(x) = \_C1 + \_C2\ \ln(x) + \frac{\_C3}{x} + \_C4\ x\right\}$$

ODE No. 1555

$$\lambda^2(-y(x)) + x^2 y^{(4)}(x) + 6xy^{(3)}(x) + 6y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0633305 (sec), leaf count = 156

$$\left\{\left\{y(x) \to c_4 G_{0,4}^{2,0}\left(\frac{\lambda^2 x^2}{16} \middle| -\tfrac{1}{2}, \tfrac{1}{2}, 0, 0\right) + c_2 G_{0,4}^{2,0}\left(\frac{\lambda^2 x^2}{16} \middle| 0, 0, -\tfrac{1}{2}, \tfrac{1}{2}\right) + \frac{c_1\left(J_1\left(2\sqrt{\lambda}\sqrt{x}\right) + I_1\left(2\sqrt{\lambda}\sqrt{x}\right)\right.}{2\sqrt{\lambda}\sqrt{x}}\right.\right.$$

✓ **Maple** : cpu = 0.178 (sec), leaf count = 61

$$\left\{y(x) = 1\left(\_C4\ Y_1\left(2\sqrt{-\lambda}\sqrt{x}\right) + \_C3\ J_1\left(2\sqrt{-\lambda}\sqrt{x}\right) + \_C2\ Y_1\left(2\sqrt{\lambda}\sqrt{x}\right) + \_C1\ J_1\left(2\sqrt{\lambda}\sqrt{x}\right)\right)\frac{1}{\sqrt{x}}\right.$$

ODE No. 1556

$$x^2 y^{(4)}(x) + 8xy^{(3)}(x) + 12y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0235212 (sec), leaf count = 30

$$\left\{\left\{y(x) \to \frac{1}{6}\left(\frac{c_1}{x^2} + \frac{3c_2}{x}\right) + c_4 x + c_3\right\}\right\}$$

✓ **Maple** : cpu = 0.019 (sec), leaf count = 19

$$\left\{y(x) = \_C1 + \frac{\_C2}{x} + \frac{\_C3}{x^2} + \_C4\ x\right\}$$

ODE No. 1557

$$\lambda^2(-y(x)) + x^2 y^{(4)}(x) + 8xy^{(3)}(x) + 12y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0677911 (sec), leaf count = 146

$$\left\{\left\{y(x) \to c_4 G_{0,4}^{2,0}\left(\frac{\lambda^2 x^2}{16} \middle| -1, 0, -\tfrac{1}{2}, \tfrac{1}{2}\right) + c_2 G_{0,4}^{2,0}\left(\frac{\lambda^2 x^2}{16} \middle| -\tfrac{1}{2}, \tfrac{1}{2}, -1, 0\right) - \frac{3ic_1\left(I_2\left(2\sqrt{\lambda}\sqrt{x}\right) - J_2\left(2\sqrt{\lambda}\right.\right.}{4\lambda x}\right.\right.$$

✓ **Maple** : cpu = 0.136 (sec), leaf count = 61

$$\left\{y(x) = \frac{1}{x}\left(\_C4\ Y_2\left(2\sqrt{-\lambda}\sqrt{x}\right) + \_C3\ J_2\left(2\sqrt{-\lambda}\sqrt{x}\right) + \_C2\ Y_2\left(2\sqrt{\lambda}\sqrt{x}\right) + \_C1\ J_2\left(2\sqrt{\lambda}\sqrt{x}\right)\right)\right\}$$

ODE No. 1558

$$-\frac{1}{16}b^4y(x)+x(2n-2\nu+4)y^{(3)}(x)+(n-\nu+1)(n-\nu+2)y''(x)+x^2y^{(4)}(x)=0$$

✓ **Mathematica** : cpu = 0.174312 (sec), leaf count = 319

$$\left\{\left\{y(x)\to c_4 i^{-n+\nu+1}2^{3n-3\nu-3}b^{2(-n+\nu+1)+n-\nu-2}x^{\frac{1}{2}(n-\nu-2)-n+\nu+1}\Gamma(-n+\nu+2)\left(I_{\nu-n}\left(b\sqrt{x}\right)-J_{\nu-n}\left(b\sqrt{x}\right)\right)\right.\right.$$

✓ **Maple** : cpu = 0.193 (sec), leaf count = 67

$$\left\{y(x)=x^{-\frac{n}{2}+\frac{\nu}{2}}\left(K_{n-\nu}\left(b\sqrt{x}\right)\_C3+I_{n-\nu}\left(b\sqrt{x}\right)\_C1+Y_{n-\nu}\left(b\sqrt{x}\right)\_C4+J_{n-\nu}\left(b\sqrt{x}\right)\_C2\right)\right\}$$

ODE No. 1559

$$a^4\left(-x^3\right)y(x)+x^3y^{(4)}(x)+2x^2y^{(3)}(x)-xy''(x)+y'(x)=0$$

✓ **Mathematica** : cpu = 0.291685 (sec), leaf count = 100

$$\left\{\left\{y(x)\to c_4 G_{0,4}^{2,0}\left(\frac{a^4x^4}{256}\middle|\ 0,0,\tfrac{1}{2},\tfrac{1}{2}\right)+c_2 G_{0,4}^{2,0}\left(\frac{a^4x^4}{256}\middle|\ \tfrac{1}{2},\tfrac{1}{2},0,0\right)+\frac{1}{8}ic_1(I_0(ax)-J_0(ax))+\frac{1}{2}c_3(J_0(ax)\right.\right.$$

✓ **Maple** : cpu = 0.184 (sec), leaf count = 33

$$\{y(x)=\_C1\ I_0(ax)+\_C2\ J_0(ax)+\_C3\ K_0(ax)+\_C4\ Y_0(ax)\}$$

ODE No. 1560

$$x^3y^{(4)}(x)+6x^2y^{(3)}(x)+6xy''(x)=0$$

✓ **Mathematica** : cpu = 0.0210622 (sec), leaf count = 29

$$\left\{\left\{y(x)\to c_4x+\frac{1}{2}\left(\frac{c_2}{x}-2c_1\log(x)\right)+c_3\right\}\right\}$$

✓ **Maple** : cpu = 0.016 (sec), leaf count = 18

$$\left\{y(x)=\_C1+\_C2\ \ln(x)+\frac{\_C3}{x}+\_C4\ x\right\}$$

ODE No. 1561

$$y(x)\left(ax^4+(n-2)n(n+1)(n+3)\right)-2n(n+1)x^2y''(x)+4n(n+1)xy'(x)+x^4y^{(4)}(x)=0$$

✓ **Mathematica** : cpu = 4.49316 (sec), leaf count = 400

$$\left\{\left\{y(x)\to c_1\left(-2^{n-\frac{5}{2}}\right)\sqrt{x}a^{\frac{2-n}{4}+\frac{1}{4}\left(n-\frac{3}{2}\right)}\Gamma\left(\frac{3}{2}-n\right)\left(\cos\left(\frac{3}{4}\pi\left(\frac{3}{2}-n\right)\right)\mathrm{ber}_{-n-\frac{1}{2}}(\sqrt[4]{a}x)+\sin\left(\frac{3}{4}\pi\left(\frac{3}{2}-n\right.\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.279 (sec), leaf count = 69

$$\left\{y(x)=\sqrt{x}\left(Y_{n+\frac{1}{2}}(\sqrt[4]{-a}x)\_C2+J_{n+\frac{1}{2}}(\sqrt[4]{-a}x)\_C1+J_{n+\frac{1}{2}}\left(\sqrt{-\sqrt{-a}}x\right)\_C3+Y_{n+\frac{1}{2}}\left(\sqrt{-\sqrt{-a}}x\right)\_\right.\right.$$

ODE No. 1562

$$-\left(4n^2-1\right)x^2y''(x)+\left(4n^2-1\right)xy'(x)+x^4y^{(4)}(x)-4x^4y(x)+4x^3y^{(3)}(x)=0$$

✓ **Mathematica** : cpu = 1.18066 (sec), leaf count = 140

$$\left\{\left\{y(x)\to c_1\,{}_0F_3\left(;\frac{1}{2},1-\frac{n}{2},\frac{n}{2}+1;\frac{x^4}{64}\right)+\frac{1}{8}ic_2x^2\,{}_0F_3\left(;\frac{3}{2},\frac{3}{2}-\frac{n}{2},\frac{n}{2}+\frac{3}{2};\frac{x^4}{64}\right)+c_3\left(\frac{i}{2}\right)^{-n}\Gamma(1-n)^2\,(\mathrm{b}\right.\right.$$

✓ **Maple** : cpu = 0.424 (sec), leaf count = 77

$$\left\{y(x)=\left(Y_n\left(\left(\frac{1}{2}-\frac{i}{2}\right)\sqrt{2}x\right)\_C3+\_C1\,J_n\left(\left(\frac{1}{2}-\frac{i}{2}\right)\sqrt{2}x\right)\right)J_n\left(\left(\frac{1}{2}+\frac{i}{2}\right)\sqrt{2}x\right)+Y_n\left(\left(\frac{1}{2}+\frac{i}{2}\right)\right.\right.$$

ODE No. 1563

$$\left(4n^2-4x^4-1\right)y(x)-\left(4n^2-1\right)x^2y''(x)-\left(4n^2-1\right)xy'(x)+x^4y^{(4)}(x)+4x^3y^{(3)}(x)=0$$

✓ **Mathematica** : cpu = 2.13308 (sec), leaf count = 232

$$\left\{\left\{y(x)\to\frac{\sqrt[4]{-1}c_2x\,{}_0F_3\left(;\frac{3}{2},1-\frac{n}{2},\frac{n}{2}+1;\frac{x^4}{64}\right)}{2\sqrt{2}}-\frac{2(-1)^{3/4}\sqrt{2}c_1\,{}_0F_3\left(;\frac{1}{2},\frac{1}{2}-\frac{n}{2},\frac{n}{2}+\frac{1}{2};\frac{x^4}{64}\right)}{x}+c_3(-1)^{\frac{1}{4}(1-2n}\right.\right.$$

✓ **Maple** : cpu = 0.305 (sec), leaf count = 87

$$\left\{y(x)=\frac{1}{x}\left(\_C4\,{}_0\mathrm{F}_3(\,;\frac{1}{2},\frac{n}{2}+\frac{1}{2},-\frac{n}{2}+\frac{1}{2};\frac{x^4}{64})+\left(\_C3\,{}_0\mathrm{F}_3(\,;\frac{3}{2},\frac{n}{2}+1,1-\frac{n}{2};\frac{x^4}{64})+\_C2\,(\mathrm{bei}_{-n}(x))^2\right.\right.\right.$$

ODE No. 1564

$$-\left(12n^2+4x^4-3\right)y(x)-\left(4n^2+3\right)x^2y''(x)+\left(12n^2-3\right)xy'(x)+x^4y^{(4)}(x)+4x^3y^{(3)}(x)=0$$

✓ **Mathematica** : cpu = 1.43899 (sec), leaf count = 230

$$\left\{\left\{y(x)\to\frac{\sqrt[4]{-1}c_1x\,{}_0F_3\left(;\frac{1}{2},\frac{3}{2}-\frac{n}{2},\frac{n}{2}+\frac{3}{2};\frac{x^4}{64}\right)}{2\sqrt{2}}+c_3(-1)^{\frac{1}{4}(-2n-1)}2^{2n+\frac{1}{2}(2n+1)+1}x^{-2n-1}\,{}_0F_3\left(;1-n,\frac{1}{2}-\frac{n}{2},\right.\right.\right.$$

✓ **Maple** : cpu = 0.282 (sec), leaf count = 88

$$\left\{y(x)=\frac{1}{x}\left(\_C4\ x^2{}_0\mathrm{F}_3(\ ;\frac{1}{2},-\frac{n}{2}+\frac{3}{2},\frac{3}{2}+\frac{n}{2};\frac{x^4}{64})+\_C3\ x^4{}_0\mathrm{F}_3(\ ;\frac{3}{2},2-\frac{n}{2},\frac{n}{2}+2;\frac{x^4}{64})+\_C2\ (\mathrm{bei}_{-n}(x\right.\right.$$

ODE No. 1565

$$\left(x\left(-\rho^2-\sigma^2+1\right)+16x^3\right)y'(x)+y(x)\left(\rho^2\sigma^2+8x^2\right)+\left(x^2\left(-\rho^2-\sigma^2+7\right)+4x^4\right)y''(x)+x^4y^{(4)}(x)+6x^3y^{(3)}$$

✓ **Mathematica** : cpu = 0.548294 (sec), leaf count = 242

$$\left\{\left\{y(x)\to c_1x^{-\rho}\,{}_2F_3\left(\frac{1}{2}-\frac{\rho}{2},1-\frac{\rho}{2};1-\rho,-\frac{\rho}{2}-\frac{\sigma}{2}+1,-\frac{\rho}{2}+\frac{\sigma}{2}+1;-x^2\right)+c_3x^{-\sigma}\,{}_2F_3\left(\frac{1}{2}-\frac{\sigma}{2},1-\frac{\sigma}{2};\right.\right.\right.$$

✓ **Maple** : cpu = 0.435 (sec), leaf count = 71

$$\left\{y(x)=\left(Y_{\frac{\rho}{2}-\frac{\sigma}{2}}(x)\_C2+\_C1\ J_{\frac{\rho}{2}-\frac{\sigma}{2}}(x)\right)J_{\frac{\rho}{2}+\frac{\sigma}{2}}(x)+Y_{\frac{\rho}{2}+\frac{\sigma}{2}}(x)\left(Y_{\frac{\rho}{2}-\frac{\sigma}{2}}(x)\_C4+J_{\frac{\rho}{2}-\frac{\sigma}{2}}(x)\_C3\right)\right\}$$

ODE No. 1566

$$\left(x\left(-2\mu^2-2\nu^2+1\right)+16x^3\right)y'(x)+y(x)\left(\left(\mu^2-\nu^2\right)^2+8x^2\right)+\left(x^2\left(-2\mu^2-2\nu^2+7\right)+4x^4\right)y''(x)+x^4y^{(4)}$$

✓ **Mathematica** : cpu = 0.642092 (sec), leaf count = 238

$$\left\{\left\{y(x)\to c_1x^{-\mu-\nu}\,{}_2F_3\left(-\frac{\mu}{2}-\frac{\nu}{2}+\frac{1}{2},-\frac{\mu}{2}-\frac{\nu}{2}+1;1-\mu,1-\nu,-\mu-\nu+1;-x^2\right)+c_2x^{\mu-\nu}\,{}_2F_3\left(\frac{\mu}{2}-\right.\right.\right.$$

✓ **Maple** : cpu = 0.385 (sec), leaf count = 35

$$\{y(x)=(Y_\mu(x)\_C2+J_\mu(x)\_C1)\,J_\nu(x)+Y_\nu(x)(Y_\mu(x)\_C4+\_C3\ J_\mu(x))\}$$

ODE No. 1567

$$x^4y^{(4)}(x) + 8x^3y^{(3)}(x) + 12x^2y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0204715 (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 = 0.019 (sec), leaf count = 19

$$\left\{y(x) = \_C1 + \frac{\_C2}{x} + \frac{\_C3}{x^2} + \_C4\, x\right\}$$

ODE No. 1568

$$ay(x) + x^4y^{(4)}(x) + 8x^3y^{(3)}(x) + 12x^2y''(x) = 0$$

✓ **Mathematica** : cpu = 0.0113846 (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 = 0.04 (sec), leaf count = 89

$$\left\{y(x) = \_C1\, x^{-\frac{1}{2}-\frac{1}{2}\sqrt{5-4\sqrt{1-a}}} + \_C2\, x^{-\frac{1}{2}+\frac{1}{2}\sqrt{5-4\sqrt{1-a}}} + \_C3\, x^{-\frac{1}{2}-\frac{1}{2}\sqrt{5+4\sqrt{1-a}}} + \_C4\, x^{-\frac{1}{2}+\frac{1}{2}\sqrt{5+4\sqrt{1-a}}}\right\}$$

ODE No. 1569

$$xy'(x)\left((2a-1)\mathrm{C0} + 4b^2\mathrm{B0}c^2x^{2c}\right) + (6-4a)x^3y^{(3)}(x) + x^2y''(x)\left(\mathrm{A0} + 4b^2c^2x^{2c}\right) + y(x)\left(4b^2c^2\mathrm{D0}x^{2c} + \mathrm{E0}\right) +$$

✗ **Mathematica** : cpu = 3605.13 (sec), leaf count = 0 , timed out

`$Aborted`

✓ **Maple** : cpu = 0.524 (sec), leaf count = 63

$$\{y(x) = ((J_\mu(bx^c)\_C2 + Y_\mu(bx^c)\_C3)\, J_\nu(bx^c) + Y_\nu(bx^c)(\_C4\, Y_\mu(bx^c) + \_C1\, J_\mu(bx^c)))\, x^a\}$$

ODE No. 1570

$$y(x)\left(\left(a^2-c^2\nu^2\right)\left(a^2+4ac-c^2\nu^2+4c^2\right)-b^4c^4x^{4c}\right)+x^2\left(2a^2+4(a+c-1)^2+4(a-1)(c-1)-2c^2\nu^2-\right.$$

✓ **Mathematica** : cpu = 0.15202 (sec), leaf count = 470

$$\left\{\left\{y(x)\to c_1\Gamma(1-\nu)(-1)^{\frac{a-c\nu}{4c}}2^{-\frac{2(a-c\nu)}{c}-\nu-1}b^{\frac{a-c\nu}{c}+\nu}\left(x^{4c}\right)^{\frac{a-c\nu}{4c}+\frac{\nu}{4}}\left(J_{-\nu}\left(b\sqrt[4]{x^{4c}}\right)+I_{-\nu}\left(b\sqrt[4]{x^{4c}}\right)\right)+c_2\Gamma(2-\right.\right.$$

✓ **Maple** : cpu = 0.103 (sec), leaf count = 49

$$\{y(x)=x^a(Y_\nu(ibx^c)\_C4+Y_\nu(bx^c)\_C2+J_\nu(ibx^c)\_C3+J_\nu(bx^c)\_C1)\}$$

ODE No. 1571

$$-\frac{1}{16}b^4x^{2/v}y(x)+\nu^4x^4y^{(4)}(x)+\nu^3(4\nu-2)x^3y^{(3)}(x)+(\nu-1)\nu^2(2\nu-1)x^2y''(x)=0$$

✓ **Mathematica** : cpu = 0.0916109 (sec), leaf count = 390

$$\left\{\left\{y(x)\to c_1\,{}_0F_3\left(;1-\frac{v}{2},1-\frac{v}{2\nu},-\frac{v}{2\nu}-\frac{v}{2}+1;\frac{b^4v^4x^{2/v}}{256\nu^4}\right)+c_2\left(\frac{i}{16}\right)^v v^{2v}b^{2v}\nu^{-2v}\left(x^{2/v}\right)^{v/2}\,{}_0F_3\left(;\frac{v}{2}+1,\right.\right.\right.$$

✓ **Maple** : cpu = 0.252 (sec), leaf count = 143

$$\left\{y(x)=\sqrt{x}\left(Y_{(\lfloor\nu^{-1}\rfloor)^{-1}}\left(\frac{1}{\lfloor\nu^{-1}\rfloor}\sqrt{\frac{b^2}{\nu^2}}x^{\frac{\lfloor\nu^{-1}\rfloor}{2}}\right)\_C2+J_{(\lfloor\nu^{-1}\rfloor)^{-1}}\left(\frac{1}{\lfloor\nu^{-1}\rfloor}\sqrt{\frac{b^2}{\nu^2}}x^{\frac{\lfloor\nu^{-1}\rfloor}{2}}\right)\_C1+Y_{(\lfloor\nu^{-1}\rfloor)^{-1}}\left(\frac{1}{\lfloor\nu^{-1}\rfloor}\right.\right.\right.$$

ODE No. 1572

$$\left(-2\left(x^2-1\right)\left(\mu(\mu+1)+\nu(\nu+1)\right)+24x^3-8\right)y''(x)-6x(\mu(\mu+1)+\nu(\nu+1)-2)y'(x)+((\mu(\mu+1)-\nu(\nu+$$

✗ **Mathematica** : cpu = 95.5607 (sec), leaf count = 0 , DifferentialRoot result

$$\{\{y(x)\to\text{DifferentialRoot}(\{y,x\},\{(\mu-\nu-1)(\mu-\nu+1)(\mu+\nu)(\mu+\nu+2)y(x)-6x\left(\mu^2+\mu+\nu^2+\nu\right.$$

✓ **Maple** : cpu = 0.482 (sec), leaf count = 35

$$\{y(x)=(LegendreQ(\mu,x)\_C2+LegendreP(\mu,x)\_C1)\,LegendreP(\nu,x)+LegendreQ(\nu,x)\,(LegendreQ($$

ODE No. 1573

$$-\frac{1}{x^5} + (2x + e^x)\, y^{(4)}(x) + 4(e^x + 2)\, y^{(3)}(x) + 6e^x y''(x) + 4e^x y'(x) + e^x y(x) = 0$$

✗ **Mathematica** : cpu = 0.0598843 (sec), leaf count = 0 , could not solve

```
DSolve[-x^(-5) + E^x*y[x] + 4*E^x*Derivative[1][y][x] + 6*E^x*Derivative[2][y][x] + 4*
```

✓ **Maple** : cpu = 0.048 (sec), leaf count = 41

$$\left\{ y(x) = \frac{24\_C1\, x^4 + 24\_C2\, x^3 + 24\_C3\, x^2 + 24\_C4\, x + 1}{(24\,e^x + 48\,x)\, x} \right\}$$

ODE No. 1574

$$y(x)\left(a^4 \sin^4(x) - 3\right) + y^{(4)}(x)\sin^4(x) + 2y^{(3)}(x)\sin^3(x)\cos(x) + \left(\sin^2(x) - 3\right)\sin^2(x) y''(x) + \left(2\sin^2(x) + 3\right)$$

✗ **Mathematica** : cpu = 0.209342 (sec), leaf count = 0 , could not solve

```
DSolve[(-3 + a^4*Sin[x]^4)*y[x] + Cos[x]*Sin[x]*(3 + 2*Sin[x]^2)*Derivative[1][y][x] +
3 + Sin[x]^2)*Derivative[2][y][x] + 2*Cos[x]*Sin[x]^3*Derivative[3][y][x] + Sin[x]^4*D
```

✓ **Maple** : cpu = 0.858 (sec), leaf count = 252

$$\left\{ y(x) = \sin(x) \left({}_2F_1\left(\frac{3}{4} - \frac{1}{4}\sqrt{-4\sqrt{-(a-1)(a+1)(a^2+1)} + 5}, \frac{3}{4} + \frac{1}{4}\sqrt{-4\sqrt{-(a-1)(a+1)(a^2+\right.\right.\right.$$

ODE No. 1575

$$-f(x) + y^{(4)}(x)\sin^6(x) + 4y^{(3)}(x)\sin^5(x)\cos(x) - 6\sin^6(x) y''(x) - 4\sin^5(x)\cos(x) y'(x) + y(x)\sin^6(x) = 0$$

✗ **Mathematica** : cpu = 0.0677754 (sec), leaf count = 0 , could not solve

```
DSolve[-f[x] + Sin[x]^6*y[x] - 4*Cos[x]*Sin[x]^5*Derivative[1][y][x] - 6*Sin[x]^6*Deri
```

✓ **Maple** : cpu = 0.513 (sec), leaf count = 638

$$\left\{ y(x) = \frac{1}{48\,(e^{2ix} - 1)^4 \sin(x)} \left(12\left(e^{2ix} - 3/2\, e^{4ix} + e^{6ix} - 1/4\, e^{8ix} - 1/4\right)\left(x^2 + \frac{20}{3}\right) fx \ln\left(1 - e^{ix}\right) - \right.\right.$$

ODE No. 1576

$$2f'(x)\left(y^{(3)}(x)-a^2y'(x)\right)+f(x)\left(a^4y(x)-2a^2y''(x)+y^{(4)}(x)\right)=0$$

✗ **Mathematica** : cpu = 0.236816 (sec), leaf count = 0 , could not solve

```
DSolve[2*Derivative[1][f][x]*(-(a^2*Derivative[1][y][x]) + Derivative[3][y][x]) + f[x]
```

✓ **Maple** : cpu = 0.03 (sec), leaf count = 67

$$\left\{y(x)=\_C1\,\mathrm{e}^{-ax}+\_C2\,\mathrm{e}^{ax}+\_C3\,\mathrm{e}^{\frac{x}{f}\left(-df+\sqrt{a^2f^2+df^2}\right)}+\_C4\,\mathrm{e}^{-\frac{x}{f}\left(df+\sqrt{a^2f^2+df^2}\right)}\right\}$$

ODE No. 1577

$$f''(x)y''(x)+2y^{(3)}(x)f'(x)+f(x)y^{(4)}(x)=0$$

✓ **Mathematica** : cpu = 1.1421 (sec), leaf count = 44

$$\left\{\left\{y(x)\to\int_1^x\left(\int_1^{K[2]}\left(\frac{c_1}{f(K[1])}+\frac{c_2K[1]}{f(K[1])}\right)dK[1]\right)dK[2]+c_4x+c_3\right\}\right\}$$

✓ **Maple** : cpu = 0.012 (sec), leaf count = 21

$$\left\{y(x)=\frac{\_C1\,x^3}{6}+\frac{\_C2\,x^2}{2}+\_C3\,x+\_C4\right\}$$

ODE No. 1578

$$a^4y(x)-\lambda(ax-b)\left(y''(x)-a^2y(x)\right)-2a^2y''(x)+y^{(4)}(x)=0$$

✓ **Mathematica** : cpu = 268.095 (sec), leaf count = 139

$$\left\{\left\{y(x)\to c_3e^{-ax}\int_1^x 2ae^{2aK[1]}\int e^{-aK[1]}\mathrm{Ai}\left(\frac{a^2+\lambda K[1]a-b\lambda}{(a\lambda)^{2/3}}\right)dK[1]\,dK[1]+c_4e^{-ax}\int_1^x 2ae^{2aK[2]}\int e^{-}\right.$$

✓ **Maple** : cpu = 0.559 (sec), leaf count = 89

$$\left\{y(x)=\mathrm{e}^{ax}\left(\int\mathrm{e}^{-2\,ax}\left(\int\mathrm{e}^{ax}\left(\_C4\,\mathrm{Bi}\left(-\frac{\lambda\,(ax-b)+a^2}{a\lambda}\sqrt[3]{-a\lambda}\right)+\_C3\,\mathrm{Ai}\left(-\frac{\lambda\,(ax-b)+a^2}{a\lambda}\sqrt[3]{-a\lambda}\right)\right)\right.\right.\right.$$

ODE No. 1579

$$-ax - b\sin(x) - c\cos(x) + y^{(n)}(x) + 2y^{(3)}(x) + y'(x) = 0$$

✓ **Mathematica** : cpu = 0.683646 (sec), leaf count = 80

$$\left\{\left\{y(x) \to \frac{1}{16}\left(8ax^2 + \sin(x)\left(-6bx + c\left(13 - 2x^2\right) + 16(c_2x + c_1 + c_4)\right) + \cos(x)\left(b\left(2x^2 - 9\right) - 2(5cx + 8\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.457 (sec), leaf count = 69

$$\left\{y(x) = \frac{\left(bx^2 + (-4\,c - 8\_C4)\,x - 6\,b - 8\_C2 + 8\_C3\right)\cos(x)}{8} + \frac{\left(-cx^2 + (-4\,b + 8\_C3)\,x + 6\,c + 8\right.}{8}\right.$$

ODE No. 1580

$$y^{(6)}(x) + y(x) - \sin\left(\frac{x}{2}\right)\sin\left(\frac{3x}{2}\right) = 0$$

✓ **Mathematica** : cpu = 1.13908 (sec), leaf count = 234

$$\left\{\left\{y(x) \to c_4e^{-\frac{\sqrt{3}x}{2}}\sin\left(\frac{x}{2}\right) + c_6e^{\frac{\sqrt{3}x}{2}}\sin\left(\frac{x}{2}\right) + c_5\sin(x) + c_1e^{\frac{\sqrt{3}x}{2}}\cos\left(\frac{x}{2}\right) + c_3e^{-\frac{\sqrt{3}x}{2}}\cos\left(\frac{x}{2}\right) + c_2\cos(x)\right.\right.$$

✓ **Maple** : cpu = 0.829 (sec), leaf count = 147

$$\left\{y(x) = \frac{1}{504}\left(504\_C3\ \cos(x/2) + 504\_C4\ \sin(x/2)\right)e^{-\frac{\sqrt{3}x}{2}} + \frac{1}{504}\left(504\_C5\ \cos(x/2) + 504\_C6\ \sin(x\right.\right.$$

ODE No. 1581

$$-axy(x) - b + y^{(5)}(x) = 0$$

✗ **Mathematica** : cpu = 0.193942 (sec), leaf count = 0 , DifferentialRoot result

$$\{\{y(x) \to \text{DifferentialRoot}(\{y, x\}, \{-b - xay(x) + y^{(5)}(x) = 0, y(0) = c_1, y'(0) = c_2, y''(0) = c_3, y^{(3)}(0) =$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(diff(diff(diff(diff(y(x),x),x),x),x),x)-a*x*y(x)-b=0,y(x))
```

ODE No. 1582

$$a\nu x^{\nu-1}y(x)+ax^{\nu}y'(x)+y^{(5)}(x)=0$$

✓ **Mathematica** : cpu = 0.651254 (sec), leaf count = 787

$$\left\{\left\{y(x)\to c_5\left(\frac{4}{\nu}+1\right)^{-\frac{16}{\nu+4}}\nu^{-\frac{16}{\nu+4}}a^{\frac{4}{\nu+4}}\left(x^{\nu}\right)^{\frac{4\left(\frac{4}{\nu}+1\right)}{\nu+4}}\,{}_1F_4\left(\frac{4}{\nu\left(1+\frac{4}{\nu}\right)}+\frac{1}{1+\frac{4}{\nu}};1+\frac{1}{\left(1+\frac{4}{\nu}\right)\nu},1+\frac{2}{\left(1+\frac{4}{\nu}\right)\nu},\right.\right.\right.$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x)=DESol\left(\left\{\frac{d^5}{dx^5}\_Y(x)+ax^{\nu}\frac{d}{dx}\_Y(x)+a\nu\,x^{\nu-1}\_Y(x)\right\},\{\_Y(x)\}\right)\right\}$$

ODE No. 1583

$$ay^{(4)}(x)-f(x)+y^{(5)}(x)=0$$

✓ **Mathematica** : cpu = 459.877 (sec), leaf count = 117

$\{\{y(x)\to$ (Integrate\$\$a\$15130244 − 1)(Integrate\$\$a\$15260410 − 1)(Integrate\$\$a\$15292862 − 1)$(x-1$

✓ **Maple** : cpu = 0.04 (sec), leaf count = 40

$$\left\{y(x)=\frac{\_C3\,x^2}{2}+\frac{\_C2\,x^3}{6}+\frac{e^{-ax}\_C1}{a^4}+\frac{f\,x^4}{24\,a}+\_C4\,x+\_C5\right\}$$

ODE No. 1584

$$axy(x)-5my^{(4)}(x)+xy^{(5)}(x)=0$$

✓ **Mathematica** : cpu = 3.01315 (sec), leaf count = 216

$$\left\{\left\{y(x)\to c_5 5^{-5m-4}a^{\frac{1}{5}(5m+4)}x^{5m+4}\,{}_0F_4\left(;m+\frac{6}{5},m+\frac{7}{5},m+\frac{8}{5},m+\frac{9}{5};-\frac{ax^5}{3125}\right)+\frac{1}{125}a^{3/5}c_4x^3\,{}_0F_4\left(;\frac{6}{5},\right.\right.\right.$$

✓ **Maple** : cpu = 0.26 (sec), leaf count = 118

$$\left\{y(x)=\_C1\,{}_0F_4(\,;\frac{2}{5},\frac{3}{5},\frac{4}{5},\frac{1}{5}-m;-\frac{x^5a}{3125})+\_C2\,x\,{}_0F_4(\,;\frac{3}{5},\frac{4}{5},\frac{6}{5},\frac{2}{5}-m;-\frac{x^5a}{3125})+\_C3\,x^2{}_0F_4(\,;\frac{4}{5},\right.$$

ODE No. 1585

$$xy(x)\left(ay'(x)+by''(x)+cy^{(3)}(x)+ey^{(4)}(x)\right)=0$$

✓ **Mathematica** : cpu = 0.230167 (sec), leaf count = 214

$$\left\{\{y(x)\to 0\},\left\{y(x)\to \frac{c_1 e^{x\text{Root}\left[\#1^3+\frac{\#1^2 c}{e}+\frac{\#1 b}{e}+\frac{a}{e}\&,1\right]}}{\text{Root}\left[\#1^3+\frac{\#1^2 c}{e}+\frac{\#1 b}{e}+\frac{a}{e}\&,1\right]}+\frac{c_2 e^{x\text{Root}\left[\#1^3+\frac{\#1^2 c}{e}+\frac{\#1 b}{e}+\frac{a}{e}\&,2\right]}}{\text{Root}\left[\#1^3+\frac{\#1^2 c}{e}+\frac{\#1 b}{e}+\frac{a}{e}\&,2\right]}+\frac{c_3 e}{\text{Root}}\right.\right.$$

✓ **Maple** : cpu = 0.135 (sec), leaf count = 679

$$\left\{y(x)=0, y(x)=\_C4\, e^{\frac{x}{6e}\left(\left(12\sqrt{3}\sqrt{27a^2e^2+(-18abc+4b^3)e+4c^3a-b^2c^2}e-108ae^2+36bce-8c^3\right)^{\frac{2}{3}}-2c\sqrt[3]{12\sqrt{3}\sqrt{27a^2e^2+(-18}}\right.}\right.$$

ODE No. 1586

$$-y^{(4)}(x)(x(aA(5)-A(4))+A(5))-y^{(3)}(x)(x(aA(4)-A(3))+A(4))-(x(aA(3)-A(2))+A(3))y''(x)-(x(aA($$

✗ **Mathematica** : cpu = 84.3434 (sec), leaf count = 0 , DifferentialRoot result

$$\{\{y(x)\to \text{DifferentialRoot}(\{y,x\},\{xA(0)-xaA(1)-A(1)+(xA(1)-xaA(2)-A(2))y'(x)+(xA(2)$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x)=\int DESol\left(\left\{-\frac{(axA_2-xA_1+A_2)\_Y(x)}{x}-\frac{(axA_3-xA_2+A_3)\frac{d}{dx}\_Y(x)}{x}-\frac{(axA_4-xA_3+A}{x}\right.\right.\right.$$

ODE No. 1587

$$x^5y^{(10)}(x)-ay(x)=0$$

✓ **Mathematica** : cpu = 0.368375 (sec), leaf count = 492

$$\left\{\left\{y(x)\to \frac{(-1)^{4/5}a^{9/5}c_1x^9\,{}_0F_9\left(;\frac{6}{5},\frac{7}{5},\frac{8}{5},\frac{9}{5},2,\frac{11}{5},\frac{12}{5},\frac{13}{5},\frac{14}{5};\frac{ax^5}{9765625}\right)}{3814697265625}+\frac{(-1)^{3/5}a^{8/5}c_3x^8\,{}_0F_9\left(;\frac{4}{5},\frac{6}{5},\frac{7}{5},\frac{8}{5},\frac{9}{5},2\right.}{152587890625}\right.\right.$$

✓ **Maple** : cpu = 0.919 (sec), leaf count = 174

$$\left\{y(x) = x^{\frac{5}{2}}\left(\_C8\, Y_5\left(2\, i e^{\frac{2\, i}{5}\pi} a^{\frac{1}{10}}\sqrt{x}\right) + \_C10\, Y_5\left(2\, i e^{\frac{4\, i}{5}\pi} a^{\frac{1}{10}}\sqrt{x}\right) + \_C9\, Y_5\left(2\, i e^{\frac{3\, i}{5}\pi} a^{\frac{1}{10}}\sqrt{x}\right) + \_C7\, Y_5\left(2\, i\right.\right.\right.$$

ODE No. 1588

$$x^{10}y^{(5)}(x) - ay(x) = 0$$

✓ **Mathematica** : cpu = 15.455 (sec), leaf count = 114

$$\left\{\left\{y(x) \to c_1 x^4 e^{-\frac{\sqrt[5]{a}}{x}} + c_2 x^4 e^{\frac{\sqrt[5]{-1}\sqrt[5]{a}}{x}} + c_3 x^4 e^{-\frac{(-1)^{2/5}\sqrt[5]{a}}{x}} + c_4 x^4 e^{\frac{(-1)^{3/5}\sqrt[5]{a}}{x}} + c_5 x^4 e^{-\frac{(-1)^{4/5}\sqrt[5]{a}}{x}}\right\}\right\}$$

✓ **Maple** : cpu = 0.163 (sec), leaf count = 90

$$\left\{y(x) = \_C1\, {}_0\mathrm{F}_4(\ ;\ \frac{6}{5}, \frac{7}{5}, \frac{8}{5}, \frac{9}{5};\ -\frac{a}{3125\, x^5}) + \_C2\, x\, {}_0\mathrm{F}_4(\ ;\ \frac{4}{5}, \frac{6}{5}, \frac{7}{5}, \frac{8}{5};\ -\frac{a}{3125\, x^5}) + \_C3\, x^2\, {}_0\mathrm{F}_4(\ ;\ \frac{3}{5}, \frac{4}{5}, \frac{6}{5}\right.$$

ODE No. 1589

$$x^{11/2}y^{(11)}(x) - ay(x) = 0$$

✓ **Mathematica** : cpu = 0.047046 (sec), leaf count = 670

$$\left\{\left\{y(x) \to \frac{4}{121}(-1)^{2/11}a^{2/11}c_2 x\, {}_0F_{10}\left(;-\frac{7}{11}, -\frac{5}{11}, -\frac{3}{11}, -\frac{1}{11}, \frac{1}{11}, \frac{3}{11}, \frac{5}{11}, \frac{7}{11}, \frac{9}{11}, \frac{13}{11}; \frac{2048ax^{11/2}}{285311670611}\right) -\right.\right.$$

✓ **Maple** : cpu = 10.253 (sec), leaf count = 4353

ODE No. 1590

$$(x-a)^5(x-b)^5y^{(5)}(x)-cy(x)=0$$

✗ **Mathematica** : cpu = 367.04 (sec), leaf count = 0 , DifferentialRoot result

$$\left\{\left\{y(x)\to \text{DifferentialRoot}\left(\{y,x\},\left\{(a-x)^5(b-x)^5y^{(5)}(x)-cy(x)=0,y(0)=c_1,y'(0)=c_2,y''(0)=c_3\right.\right.\right.$$

✓ **Maple** : cpu = 2.837 (sec), leaf count = 553

$$\left\{y(x)=\mathit{ODESolStruc}\left(\mathrm{e}^{\int -4\,\frac{\_g(\_f)\left((-b-\_f/4)\mathrm{e}^{\left(\int \_g(\_f)\,\mathrm{d}\_f+\_C1\right)(a-b)}+a+\_f/4\right)}{\mathrm{e}^{\left(\int \_g(\_f)\,\mathrm{d}\_f+\_C1\right)(a-b)}-1}\,\mathrm{d}\_f+\_C2},\left[\left\{\frac{1}{(\_g(\_f))^2}\left(\left(\frac{\mathrm{d}^3}{\mathrm{d}\_f^3}\_g(\right.\right.\right.\right.\right.\right.$$

ODE No. 1591

$$y''(x)-y(x)^2=0$$

✓ **Mathematica** : cpu = 0.0531189 (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 = 0.159 (sec), leaf count = 12

$$\{y(x)=6\,\mathit{WeierstrassP}(x+\_C1,0,\_C2)\}$$

ODE No. 1592

$$y''(x)-6y(x)^2=0$$

✓ **Mathematica** : cpu = 0.0280298 (sec), leaf count = 14

$$\{\{y(x)\to \wp(x+c_1;0,c_2)\}\}$$

✓ **Maple** : cpu = 0.017 (sec), leaf count = 10

$$\{y(x)=\mathit{WeierstrassP}(x+\_C1,0,\_C2)\}$$

ODE No. 1593

$$y''(x) - 6y(x)^2 - x = 0$$

✗ **Mathematica** : cpu = 0.165278 (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))
```

ODE No. 1594

$$y''(x) - 6y(x)^2 + 4y(x) = 0$$

✓ **Mathematica** : cpu = 0.518104 (sec), leaf count = 373

$$\text{Solve}\left[\frac{4\left(\text{Root}\left[4\#1^3 - 4\#1^2 + c_1\&, 2\right] - \text{Root}\left[4\#1^3 - 4\#1^2 + c_1\&, 3\right]\right)\left(y(x) - \text{Root}\left[4\#1^3 - 4\#1^2 + c_1\right.\right.}{\left(c_1 + 4y(x)^3 - 4y(x)^2\right)\left(\text{Root}\left[4\right.\right.}\right.$$

✓ **Maple** : cpu = 0.336 (sec), leaf count = 59

$$\left\{\int^{y(x)} \frac{1}{\sqrt{4\_a^3 - 4\_a^2 + \_C1}} d\_a - x - \_C2 = 0, \int^{y(x)} -\frac{1}{\sqrt{4\_a^3 - 4\_a^2 + \_C1}} d\_a - x - \_C2 =\right.$$

ODE No. 1595

$$ay(x)^2 + bx + c + y''(x) = 0$$

✗ **Mathematica** : cpu = 0.339572 (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))
```

ODE No. 1596

$$a + y''(x) - 2y(x)^3 - xy(x) = 0$$

✗ **Mathematica** : cpu = 1.17304 (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))
```

ODE No. 1597

$$y''(x) - ay(x)^3 = 0$$

✓ **Mathematica** : cpu = 2.18162 (sec), leaf count = 242

$$\left\{\left\{y(x)\to -\frac{\sqrt[4]{2}\sqrt{c_1}\sqrt{\frac{i\sqrt{a}}{\sqrt{c_1}}}\operatorname{sn}\left(\frac{(-1)^{3/4}\sqrt{\sqrt{2}\sqrt{a}\sqrt{c_1}x^2+2\sqrt{2}\sqrt{a}\sqrt{c_1}c_2x+\sqrt{2}\sqrt{a}\sqrt{c_1}c_2^2}}{\sqrt{2}}\middle|-1\right)}{\sqrt{a}}\right\},\left\{y(x)\to \frac{\sqrt[4]{2}\sqrt{c_1}\sqrt{\frac{i\sqrt{a}}{\sqrt{c_1}}}\cdots}{}\right.\right.$$

✓ **Maple** : cpu = 0.034 (sec), leaf count = 21

$$\left\{y(x) = \_C2\ \mathit{JacobiSN}\left(\left(\frac{x}{2}\sqrt{-2\,a}+\_C1\right)\_C2, i\right)\right\}$$

ODE No. 1598

$$-2a^2y(x)^3 + 2abxy(x) - b + y''(x) = 0$$

✗ **Mathematica** : cpu = 3.72051 (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))
```

ODE No. 1599

$$ay(x)^3 + bxy(x) + cy(x) + d + y''(x) = 0$$

✗ **Mathematica** : cpu = 3.53385 (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))
```

ODE No. 1600

$$ay(x)^3 + by(x)^2 + cy(x) + d + y''(x) = 0$$

✓ **Mathematica** : cpu = 2.54892 (sec), leaf count = 1017

$$\text{Solve}\left[\frac{4F\left(\sin^{-1}\left(\sqrt{\frac{(\text{Root}[3a\#1^4+4b\#1^3+6c\#1^2+12d\#1-6c_1\&,2]-\text{Root}[3a\#1^4+4b\#1^3+6c\#1^2+12d\#1-6c_1\&,4])(y(x)-\text{Root}[3a\ldots}{(\text{Root}[3a\#1^4+4b\#1^3+6c\#1^2+12d\#1-6c_1\&,1]-\text{Root}[3a\#1^4+4b\#1^3+6c\#1^2+12d\#1-6c_1\&,4])(y(x)-\text{Root}[3a\ldots}}\right.\right.}{\ldots}\right.$$

✓ **Maple** : cpu = 0.125 (sec), leaf count = 89

$$\left\{\int^{y(x)} -6\frac{1}{\sqrt{-18\,a\_a^4 - 24\,b\_a^3 - 36\,c\_a^2 - 72\,d\_a + 36\_C1}}d\_a - x - \_C2 = 0, \int^{y(x)} 6\frac{}{\sqrt{-18\,a\_a\ldots}}\right.$$

ODE No. 1601

$$ax^r y(x)^n + y''(x) = 0$$

✗ **Mathematica** : cpu = 0.0383335 (sec), leaf count = 0 , could not solve

```
DSolve[a*x^r*y[x]^n + Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 2.948 (sec), leaf count = 151

$$\left\{y(x) = ODESolStruc\left(\_a\,\mathrm{e}^{\int \_b(\_a)\,\mathrm{d}\_a + \_C1}, [\left\{\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a) = \frac{(\_b(\_a))^2\left(a\_b(\_a)\,(n-1)^2\_a^n + (\_a\ldots\right.}{(r\ldots}\right.\right.\right.$$

ODE No. 1602

$$(n+1)a^{2n}y(x)^{2n+1}+y''(x)-y(x)=0$$

✓ **Mathematica** : cpu = 124.369 (sec), leaf count = 46

$$\text{Solve}\left[\left(\int_1^{y(x)}\frac{1}{\sqrt{c_1-K[1]^2\left(a^{2n}K[1]^{2n}-1\right)}}\,dK[1]\right)^2=(c_2+x)^2,y(x)\right]$$

✓ **Maple** : cpu = 0.31 (sec), leaf count = 73

$$\left\{\int^{y(x)}\frac{1}{\sqrt{-a^{2\,n}\_a^{2\,n+2}+\_a^2+\_C1}}d\_a-x-\_C2=0,\int^{y(x)}-\frac{1}{\sqrt{-a^{2\,n}\_a^{2\,n+2}+\_a^2+\_C1}}d\_a-x$$

ODE No. 1603

$$y''(x)-\frac{1}{\left(ay(x)^2+bxy(x)+cx^2+dy(x)+ex+k\right)^{3/2}}=0$$

✗ **Mathematica** : cpu = 60.6572 (sec), leaf count = 0 , could not solve

```
DSolve[-(k + e*x + c*x^2 + d*y[x] + b*x*y[x] + a*y[x]^2)^(-3/2) + Derivative[2][y][x]
```

✓ **Maple** : cpu = 36.77 (sec), leaf count = 8411

ODE No. 1604

$$y''(x)-e^{y(x)}=0$$

✓ **Mathematica** : cpu = 0.063622 (sec), leaf count = 34

$$\left\{\left\{y(x)\to\log\left(\frac{1}{2}c_1\left(\tanh^2\left(\frac{1}{2}\sqrt{c_1\,(c_2+x)^2}\right)-1\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.549 (sec), leaf count = 23

$$\left\{y(x)=\ln\left(\frac{1}{2\_C1^2}\left(\left(\tan\left(\frac{\_C2+x}{2\_C1}\right)\right)^2+1\right)\right)\right\}$$

ODE No. 1605

$$a e^x \sqrt{y(x)} + y''(x) = 0$$

✗ **Mathematica** : cpu = 0.508331 (sec), leaf count = 0 , could not solve

```
DSolve[a*E^x*Sqrt[y[x]] + Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 1.431 (sec), leaf count = 107

$$\left\{ y(x) = ODESolStruc\left(\frac{\_a}{e^{-2\int \_b(\_a)\, d\_a - 2\_C1}}, [\left\{ \frac{d}{d\_a}\_b(\_a) = (\_b(\_a))^2 \left(\sqrt{\_a}\_b(\_a)\, a + 4\_a\_b(\_a\right.\right.\right.$$

ODE No. 1606

$$y''(x) + e^x \sin(y(x)) = 0$$

✗ **Mathematica** : cpu = 1.19013 (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))
```

ODE No. 1607

$$a \sin(y(x)) + y''(x) = 0$$

✓ **Mathematica** : cpu = 0.111033 (sec), leaf count = 79

$$\left\{\left\{y(x) \to -2\text{am}\left(\frac{1}{2}\sqrt{(2a+c_1)(x+c_2)^2}\middle|\frac{4a}{2a+c_1}\right)\right\}, \left\{y(x) \to 2\text{am}\left(\frac{1}{2}\sqrt{(2a+c_1)(x+c_2)^2}\middle|\frac{4a}{2a+c_1}\right)\right.\right.$$

✓ **Maple** : cpu = 0.134 (sec), leaf count = 49

$$\left\{ \int^{y(x)} \frac{1}{\sqrt{2a\cos(\_a) + \_C1}} d\_a - x - \_C2 = 0, \int^{y(x)} -\frac{1}{\sqrt{2a\cos(\_a) + \_C1}} d\_a - x - \_C2 = 0 \right\}$$

ODE No. 1608

$$a^2\sin(y(x)) - b\sin(x) + y''(x) = 0$$

✗ **Mathematica** : cpu = 0.0531029 (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))
```

ODE No. 1609

$$a^2\sin(y(x)) - bf(x) + y''(x) = 0$$

✗ **Mathematica** : cpu = 0.0350598 (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))
```

ODE No. 1610

$$y''(x) - \frac{h\left(\frac{y(x)}{\sqrt{x}}\right)}{x^{3/2}} = 0$$

✓ **Mathematica** : cpu = 945.186 (sec), leaf count = 734

$$\Bigg\{\text{Solve}\Bigg[\int_1^{y(x)} \frac{2}{\sqrt{x}\sqrt{\frac{8x\int_1^{\frac{K[3]}{\sqrt{x}}} h(K[2])\,dK[2]+K[3]^2+4c_1x}{x}}}\,dK[3] - \int_1^x \Bigg(\int_1^{y(x)} \Bigg(-\frac{\frac{-\frac{4K[3]h\left(\frac{K[3]}{\sqrt{K[4]}}\right)}{\sqrt{K[4]}}+8\int_1^{\frac{K[3]}{\sqrt{K[4]}}} h(K[2])\,dK[}{K[4]}}{\sqrt{K[4]}\Bigg(\frac{4c_1K[4]+8K}{}}$$

✓ **Maple** : cpu = 0.289 (sec), leaf count = 92

$$\left\{y(x) = RootOf\left(-\ln(x) - 2\int^{\_Z}\frac{1}{\sqrt{\_C1 + 8\int h(\_g)\,\mathrm{d}\_g + \_g^2}}d\_g + 2\_C2\right)\sqrt{x}, y(x) = RootOf\right.$$

ODE No. 1611

$$y''(x) - 3y'(x) - y(x)^2 - 2y(x) = 0$$

✗ **Mathematica** : cpu = 5.0789 (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 = 0.813 (sec), leaf count = 57

$$\left\{y(x) = ODESolStruc\left(\_a, [\left\{\left(\frac{d}{d\_a}\_b(\_a)\right)\_b(\_a) - 3\_b(\_a) - \_a^2 - 2\_a = 0\right\}, \left\{\_a = y(x), \_\right.\right.\right.$$

ODE No. 1612

$$y''(x) - 7y'(x) - y(x)^{3/2} + 12y(x) = 0$$

✗ **Mathematica** : cpu = 22.1921 (sec), leaf count = 0 , could not solve

```
DSolve[12*y[x] - y[x]^(3/2) - 7*Derivative[1][y][x] + Derivative[2][y][x] == 0, y[x],
```

✓ **Maple** : cpu = 1.357 (sec), leaf count = 57

$$\left\{y(x) = ODESolStruc\left(\_a, [\left\{\left(\frac{d}{d\_a}\_b(\_a)\right)\_b(\_a) - 7\_b(\_a) - \_a^{\frac{3}{2}} + 12\_a = 0\right\}, \left\{\_a = y(x),\right.\right.\right.$$

ODE No. 1613

$$6a^2y(x) + 5ay'(x) + y''(x) - 6y(x)^2 = 0$$

✗ **Mathematica** : cpu = 2.08157 (sec), leaf count = 0 , could not solve

```
DSolve[6*a^2*y[x] - 6*y[x]^2 + 5*a*Derivative[1][y][x] + Derivative[2][y][x] == 0, y[x
```

✓ **Maple** : cpu = 0.029 (sec), leaf count = 27

$$\left\{y(x) = WeierstrassP\left(-\frac{e^{-ax}}{a} + \_C1, 0, \_C2\right)\left(e^{-ax}\right)^2\right\}$$

ODE No. 1614

$$2a^2y(x)+3ay'(x)+y''(x)-2y(x)^3=0$$

✗ **Mathematica** : cpu = 1.63008 (sec), leaf count = 0 , could not solve

```
DSolve[2*a^2*y[x] - 2*y[x]^3 + 3*a*Derivative[1][y][x] + Derivative[2][y][x] == 0, y[x
```

✓ **Maple** : cpu = 0.088 (sec), leaf count = 33

$$\left\{y(x)=\frac{\_C2}{e^{ax}}JacobiSN\left(\left(-\frac{1}{a}\sqrt{-e^{-2\,ax}}+\_C1\right)\_C2,i\right)\right\}$$

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 = 120.695 (sec), leaf count = 0 , could not solve

```
DSolve[(-2*(1 + n)*(2 + n)*y[x]*(-1 + y[x]^(n/(1 + n))))/n^2 - ((4 + 3*n)*Derivative[1
```

✓ **Maple** : cpu = 4.227 (sec), leaf count = 91

$$\left\{y(x)=ODESolStruc\left(\_a,[\left\{\frac{1}{n^2}\left(-2\,(n+2)\,(n+1)\,\_a\,\_a^{\frac{n}{n+1}}+\left(\frac{d}{d\_a}\_b(\_a)\right)\_b(\_a)\,n^2+(-3\,n^2\right.\right.\right.\right.$$

ODE No. 1616

$$\frac{1}{4}\left(a^2-1\right)y(x)+ay'(x)+by(x)^n+y''(x)=0$$

✗ **Mathematica** : cpu = 26.4215 (sec), leaf count = 0 , could not solve

```
DSolve[((-1 + a^2)*y[x])/4 + b*y[x]^n + a*Derivative[1][y][x] + Derivative[2][y][x] ==
```

✓ **Maple** : cpu = 1.213 (sec), leaf count = 63

$$\left\{y(x)=ODESolStruc\left(\_a,[\left\{\left(\frac{d}{d\_a}\_b(\_a)\right)\_b(\_a)+a\_b(\_a)+b\_a^n+\frac{\_a\,a^2}{4}-\frac{\_a}{4}=0\right\},\left\{\_a=\right.\right.\right.$$

ODE No. 1617

$$ay'(x) + bx^r y(x)^n + y''(x) = 0$$

✗ **Mathematica** : cpu = 0.0454336 (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))
```

ODE No. 1618

$$ay'(x) - 2a + be^{y(x)} + y''(x) = 0$$

✗ **Mathematica** : cpu = 30.7249 (sec), leaf count = 0 , could not solve

```
DSolve[-2*a + b*E^y[x] + a*Derivative[1][y][x] + Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 1.633 (sec), leaf count = 56

$$\left\{ y(x) = ODESolStruc\left(\_a, [\left\{ \left(\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a)\right)\_b(\_a) + a\_b(\_a) + be^{-\_a} - 2\,a = 0 \right\}, \left\{ \_a = y(x), \_b(\right.\right.\right.$$

ODE No. 1619

$$ay'(x) + f(x)\sin(y(x)) + y''(x) = 0$$

✗ **Mathematica** : cpu = 0.0606558 (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))
```

ODE No. 1620

$$y''(x) + y(x)y'(x) - y(x)^3 = 0$$

✗ **Mathematica** : cpu = 122.391 (sec), leaf count = 0 , could not solve

```
DSolve[-y[x]^3 + y[x]*Derivative[1][y][x] + Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 0.137 (sec), leaf count = 291

$$\left\{ \int^{y(x)} 2\left(\frac{\_a^4}{\sqrt[3]{\_a^6 + 2\,\_C1 + 2\sqrt{\_C1\,\_a^6 + \_C1^2}}} - \_a^2 + \sqrt[3]{\_a^6 + 2\,\_C1 + 2\sqrt{\_C1\,\_a^6 + \_C1^2}} \right)\right.$$

ODE No. 1621

$$ay(x) + y''(x) + y(x)y'(x) - y(x)^3 = 0$$

✗ **Mathematica** : cpu = 100.131 (sec), leaf count = 0 , could not solve

```
DSolve[a*y[x] - y[x]^3 + y[x]*Derivative[1][y][x] + Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 2.888 (sec), leaf count = 1088

$$\left\{ \int^{y(x)} \frac{1}{-63\_a^2 + 63\,a} \left(\frac{\left(\frac{i}{2}\sqrt{3} - \frac{1}{2}\right)^3}{2} \left(126 \frac{1}{-\_a^6 + 3\,a\_a^4 - 3\_a^2a^2 + 80\_C1^3 + a^3} \sqrt[3]{-4\,(-\_a^6 + 3} \right.\right.\right.$$

ODE No. 1622

$$2a^2y(x) + (3a + y(x))y'(x) + ay(x)^2 + y''(x) - y(x)^3 = 0$$

✗ **Mathematica** : cpu = 26.3179 (sec), leaf count = 0 , could not solve

```
DSolve[2*a^2*y[x] + a*y[x]^2 - y[x]^3 + (3*a + y[x])*Derivative[1][y][x] + Derivative[
```

✓ **Maple** : cpu = 0.404 (sec), leaf count = 415

$$\left\{ y(x) = \frac{1}{e^{ax}} RootOf \left(\int^{\_Z} \frac{1}{-\_f^6 + \_C1} \left(\_f^8 - \_C1\,\_f^2 + \left((-\_f^6 + \_C1)^2 \left(\sqrt{\frac{\_C1}{-\_f^6 + \_C1}} - 1 \right) \right.\right.\right.\right.$$

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 = 0.457468 (sec), leaf count = 0 , could not solve

```
DSolve[f[x]*y[x]^2 - y[x]^3 + y[x]*(2*f[x]^2 + Derivative[1][f][x]) + (3*f[x] + y[x])*
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(diff(y(x),x),x)+(y(x)+3*f(x))*diff(y(x),x)-y(x)^3+f(x)*y(x)^2+y(x)*(diff(f
```

ODE No. 1624

$$y(x)\left(af(x)^2-\frac{f''(x)}{f(x)}+3f'(x)+\frac{3f'(x)^2}{f(x)^2}\right)+bf(x)^3-\left(\frac{f'(x)}{f(x)}+f(x)\right)\left(3y'(x)+y(x)^2\right)+y''(x)+y(x)y'(x$$

✗ **Mathematica** : cpu = 1.53224 (sec), leaf count = 0 , could not solve

```
DSolve[b*f[x]^3 - y[x]^3 + y[x]*Derivative[1][y][x] - (f[x] + Derivative[1][f][x]/f[x
```

✓ **Maple** : cpu = 1.833 (sec), leaf count = 131

$$\left\{y(x)=ODESolStruc\left(f\left(RootOf\left(\int\_b(\_a)\,\mathrm{d}\_a+\_C1-\int^{\_Z}f(\_f)\,d\_f\right)\right)\_a,[\left\{\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a)=\right.\right.\right.$$

ODE No. 1625

$$y'(x)\left(y(x)-\frac{3f'(x)}{2f(x)}\right)-\frac{y(x)^2f'(x)}{2f(x)}+y(x)\left(-\frac{f''(x)}{2f(x)}+\frac{f'(x)^2}{f(x)^2}+f(x)\right)+y''(x)-y(x)^3=0$$

✗ **Mathematica** : cpu = 0.996644 (sec), leaf count = 0 , could not solve

```
DSolve[-y[x]^3 - (y[x]^2*Derivative[1][f][x])/(2*f[x]) + (y[x] - (3*Derivative[1][f][x
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(diff(y(x),x),x)+(y(x)-3/2*diff(f(x),x)/f(x))*diff(y(x),x)-y(x)^3-
1/2*diff(f(x),x)/f(x)*y(x)^2+1/2*(f(x)+diff(f(x),x)^2/f(x)^2-diff(diff(f(x),x),x))/f(x
```

ODE No. 1626

$$y(x)f'(x)+f(x)y'(x)+y''(x)+2y(x)y'(x)=0$$

✗ **Mathematica** : cpu = 39.8629 (sec), leaf count = 0 , could not solve

```
DSolve[y[x]*Derivative[1][f][x] + f[x]*Derivative[1][y][x] + 2*y[x]*Derivative[1][y][x
```

✓ **Maple** : cpu = 0.249 (sec), leaf count = 48

$$\left\{y(x)=ODESolStruc\left(\_b(\_a),[\left\{\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a)=-f(\_a)\_b(\_a)-(\_b(\_a))^2-\_C1\right\},\{\_a=x,\_\right.\right.$$

ODE No. 1627

$$f(x)\left(y'(x)+y(x)^2\right)-g(x)+y''(x)+2y(x)y'(x)=0$$

✗ **Mathematica** : cpu = 0.302097 (sec), leaf count = 0 , could not solve

```
DSolve[-g[x] + 2*y[x]*Derivative[1][y][x] + f[x]*(y[x]^2 + Derivative[1][y][x]) + Deri
```

✓ **Maple** : cpu = 0.875 (sec), leaf count = 58

$$\left\{y(x)=ODESolStruc\left(\_b(\_a),[\left\{-\int e^{\int f(\_a)\,d\_a}g(\_a)\;d\_a+\left((\_b(\_a))^2+\frac{d}{d\_a}\_b(\_a)\right)e^{\int f(\_a)\,d\_a}\right.\right.\right.$$

ODE No. 1628

$$f(x)y(x)-g(x)+y''(x)+3y(x)y'(x)+y(x)^3=0$$

✗ **Mathematica** : cpu = 7.97066 (sec), leaf count = 0 , could not solve

```
DSolve[-g[x] + f[x]*y[x] + y[x]^3 + 3*y[x]*Derivative[1][y][x] + Derivative[2][y][x] =
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{y(x)=\frac{\frac{d}{dx}DESol\left(\left\{-g(x)\_Y(x)+f(x)\frac{d}{dx}\_Y(x)+\frac{d^3}{dx^3}\_Y(x)\right\},\{\_Y(x)\}\right)}{DESol\left(\left\{-g(x)\_Y(x)+f(x)\frac{d}{dx}\_Y(x)+\frac{d^3}{dx^3}\_Y(x)\right\},\{\_Y(x)\}\right)}\right\}$$

ODE No. 1629

$$(f(x)+3y(x))y'(x)+f(x)y(x)^2+y''(x)+y(x)^3=0$$

✗ **Mathematica** : cpu = 0.0364965 (sec), leaf count = 0 , could not solve

```
DSolve[f[x]*y[x]^2 + y[x]^3 + (f[x] + 3*y[x])*Derivative[1][y][x] + Derivative[2][y][x
```

✓ **Maple** : cpu = 0.046 (sec), leaf count = 38

$$\left\{y(x)=\frac{\int \_C1\,e^{-\int f(x)\,dx}\,dx+\_C2}{\iint \_C1\,e^{-\int f(x)\,dx}\,dx\,dx+\_C2\,x+1}\right\}$$

ODE No. 1630

$$-4a^2y(x) - 3ay(x)^2 - b + y''(x) - 3y(x)y'(x) = 0$$

✓ **Mathematica** : cpu = 11.3554 (sec), leaf count = 3227

$$\left\{\left\{y(x) \to -\frac{2\left((-1)^{\frac{a^{3/2}\sqrt{4a^3-3b}-2a^3}{4a^3}+1} 2^{-\frac{3\left(a^{3/2}\sqrt{4a^3-3b}-2a^3\right)}{4a^3}+\frac{3\sqrt{4a^6-3a^3b}}{4a^3}+1} 3^{\frac{a^{3/2}\sqrt{4a^3-3b}-2a^3}{4a^3}-\frac{\sqrt{4a^6-3a^3b}}{4a^3}} a^{-\frac{a^{3/2}\sqrt{4a^3-3b}}{2a^3}}}{}\right.\right.$$

✓ **Maple** : cpu = 0.651 (sec), leaf count = 783

$$\left\{\int^{y(x)} -6\,a^2\left(-12\_a\,a^3 - 9\_a^2a^2 + \left(RootOf\left(2\,K_{1/2\,\frac{4\,a^3-3\,b}{\sqrt{4\,a^4-3\,aba}}}\left(-1/2\,\frac{\_Z}{a^2}\right)\_C1\,a^2 + 3\,K_{1/2\,\frac{4\,a^3-3\,b}{\sqrt{4\,a^4-3\,aba}}}\right.\right.\right.\right.$$

ODE No. 1631

$$-(f(x) + 3y(x))y'(x) + f(x)y(x)^2 + y''(x) + y(x)^3 = 0$$

✗ **Mathematica** : cpu = 0.031363 (sec), leaf count = 0 , could not solve

```
DSolve[f[x]*y[x]^2 + y[x]^3 - (f[x] + 3*y[x])*Derivative[1][y][x] + Derivative[2][y][x
```

✓ **Maple** : cpu = 0.066 (sec), leaf count = 38

$$\left\{y(x) = \frac{-\int \_C1\,\mathrm{e}^{\int f(x)\,\mathrm{d}x}\,\mathrm{d}x - \_C2}{\iint \_C1\,\mathrm{e}^{\int f(x)\,\mathrm{d}x}\,\mathrm{d}x\,\mathrm{d}x + \_C2\,x + 1}\right\}$$

ODE No. 1632

$$y''(x) - 2ay(x)y'(x) = 0$$

✓ **Mathematica** : cpu = 0.0604849 (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 = 0.138 (sec), leaf count = 23

$$\left\{y(x) = \frac{1}{a}\tan\left(\sqrt{a\_C1}(\_C2 + x)\right)\sqrt{a\_C1}\right\}$$

ODE No. 1633

$$ay(x)y'(x) + by(x)^3 + y''(x) = 0$$

✗ **Mathematica** : cpu = 39.5587 (sec), leaf count = 0 , could not solve

```
DSolve[b*y[x]^3 + a*y[x]*Derivative[1][y][x] + Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 0.346 (sec), leaf count = 97

$$\left\{\int^{y(x)} \left(RootOf\left(-2\,a\_a^2 Artanh\left(\frac{a\_a^2 + 4\_Z}{\sqrt{\_a^4\,(a^2 - 8\,b)}} \right) + \_C1\,\sqrt{\_a^4\,(a^2 - 8\,b)} - \ln\left(\_a^4 b + \_Z\,\_a^2 a + \right.\right.\right.\right.$$

ODE No. 1634

$$y'(x)h(x, y(x)) + j(x, y(x)) + y''(x) = 0$$

✗ **Mathematica** : cpu = 0.160687 (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))
```

ODE No. 1635

$$ay'(x)^2 + by(x) + y''(x) = 0$$

✗ **Mathematica** : cpu = 101.769 (sec), leaf count = 0 , could not solve

```
DSolve[b*y[x] + a*Derivative[1][y][x]^2 + Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 0.22 (sec), leaf count = 79

$$\left\{\int^{y(x)} -2\,\frac{a}{\sqrt{4\,e^{-2\,a\_a}\_C1\,a^2 - 4\,b\_a\,a + 2\,b}} d\_a - x - \_C2 = 0, \int^{y(x)} 2\,\frac{a}{\sqrt{4\,e^{-2\,a\_a}\_C1\,a^2 - 4\,b\_a\,a +}}\right.$$

ODE No. 1636

$$ay'(x)\,|y'(x)| + by'(x) + cy(x) + y''(x) = 0$$

✗ **Mathematica** : cpu = 32.2042 (sec), leaf count = 0 , could not solve

```
DSolve[c*y[x] + b*Derivative[1][y][x] + a*Abs[Derivative[1][y][x]]*Derivative[1][y][x
```

✓ **Maple** : cpu = 1.027 (sec), leaf count = 59

$$\left\{y(x) = ODESolStruc\left(\_a, [\left\{\left(\frac{d}{d\_a}\_b(\_a)\right)\_b(\_a) + a\_b(\_a)\,|\_b(\_a)| + \_b(\_a)\,b + c\_a = 0\right\}, \left\{\right.\right.\right.$$

ODE No. 1637

$$ay'(x)^2 + by'(x) + cy(x) + y''(x) = 0$$

✗ **Mathematica** : cpu = 30.5196 (sec), leaf count = 0 , could not solve

```
DSolve[c*y[x] + b*Derivative[1][y][x] + a*Derivative[1][y][x]^2 + Derivative[2][y][x]
```

✓ **Maple** : cpu = 0.555 (sec), leaf count = 58

$$\left\{y(x) = ODESolStruc\left(\_a, [\left\{\left(\frac{d}{d\_a}\_b(\_a)\right)\_b(\_a) + a(\_b(\_a))^2 + \_b(\_a)\,b + c\_a = 0\right\}, \left\{\_a = \right.\right.\right.$$

ODE No. 1638

$$ay'(x)^2 + b\sin(y(x)) + y''(x) = 0$$

✗ **Mathematica** : cpu = 100.119 (sec), leaf count = 0 , could not solve

```
DSolve[b*Sin[y[x]] + a*Derivative[1][y][x]^2 + Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 0.226 (sec), leaf count = 115

$$\left\{\int^{y(x)}(-4\,a^2-1)\frac{1}{\sqrt{16\,(a^2+1/4)^2\,\_C1\,e^{-2\,a\_a} - 16\,(a^2+1/4)\,(a\sin(\_a) - 1/2\,\cos(\_a))\,b}}d\_a - x - \right.$$

ODE No. 1639

$$ay'(x)\,|y'(x)| + b\sin(y(x)) + y''(x) = 0$$

✗ **Mathematica** : cpu = 41.0669 (sec), leaf count = 0 , could not solve

```
DSolve[b*Sin[y[x]] + a*Abs[Derivative[1][y][x]]*Derivative[1][y][x] + Derivative[2][y]
```

✓ **Maple** : cpu = 3.267 (sec), leaf count = 56

$$\left\{y(x) = ODESolStruc\left(\_a, [\left\{\left(\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a)\right)\_b(\_a) + a\_b(\_a)\,|\_b(\_a)| + b\sin(\_a) = 0\right\}, \left\{\_a = \right.\right.\right.$$

ODE No. 1640

$$ay(x)y'(x)^2 + by(x) + y''(x) = 0$$

✗ **Mathematica** : cpu = 200.144 (sec), leaf count = 0 , could not solve

```
DSolve[b*y[x] + a*y[x]*Derivative[1][y][x]^2 + Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 0.217 (sec), leaf count = 70

$$\left\{\int^{y(x)} a\frac{1}{\sqrt{a\left(\mathrm{e}^{-a\_a^2}\_C1\,a - b\right)}}d\_a - x - \_C2 = 0, \int^{y(x)} -a\frac{1}{\sqrt{a\left(\mathrm{e}^{-a\_a^2}\_C1\,a - b\right)}}d\_a - x - \_C2 = \right.$$

ODE No. 1641

$$g(x)y'(x) + h(y(x))y'(x)^2 + y''(x) = 0$$

✓ **Mathematica** : cpu = 1.98266 (sec), leaf count = 57

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[\int_1^{\#1} e^{-\int_1^{K[4]} -h(K[1])\,dK[1]}\,dK[4]\&\right]\left[\int_1^{x} c_1\left(-e^{-\int_1^{K[5]} g(K[2])\,dK[2]}\right)\,dK[5] + c_2\right]\right.\right.$$

✓ **Maple** : cpu = 0.043 (sec), leaf count = 29

$$\left\{\int^{y(x)} \mathrm{e}^{\int h(\_b)\,\mathrm{d}\_b} d\_b - \_C1 \int \mathrm{e}^{-\int g(x)\,\mathrm{d}x}\,\mathrm{d}x - \_C2 = 0\right\}$$

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 = 0.969482 (sec), leaf count = 0 , could not solve

```
DSolve[f[x]*h[y[x]] + g[x]*Derivative[1][y][x] - (j[y[x]]*Derivative[1][y][x]^2)/h[y[x
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(diff(y(x),x),x)-j(y(x))/h(y(x))*diff(y(x),x)^2+g(x)*diff(y(x),x)+f(x)*h(y(
```

ODE No. 1643

$$f(x)y'(x) + g(x)j(y(x)) + h(y(x))y'(x)^2 + y''(x) = 0$$

✗ **Mathematica** : cpu = 0.3575 (sec), leaf count = 0 , could not solve

```
DSolve[g[x]*j[y[x]] + f[x]*Derivative[1][y][x] + h[y[x]]*Derivative[1][y][x]^2 + Deriv
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve((1-D(j)(y(x)))/j(y(x))*diff(y(x),x)^2+f(x)*diff(y(x),x)+diff(diff(y(x),x),x)+g(
```

ODE No. 1644

$$h(y(x))y'(x)^2 + j(y(x))y'(x) + k(y(x)) + y''(x) = 0$$

✗ **Mathematica** : cpu = 50.8634 (sec), leaf count = 0 , could not solve

```
DSolve[k[y[x]] + j[y[x]]*Derivative[1][y][x] + h[y[x]]*Derivative[1][y][x]^2 + Derivat
```

✓ **Maple** : cpu = 0.578 (sec), leaf count = 56

$$\left\{y(x) = ODESolStruc\left(\_a, [\left\{\left(\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a)\right)\_b(\_a) + h(\_a)\left(\_b(\_a)\right)^2 + \_b(\_a) + k(\_a) = 0\right\}, \left\{\right.\right.\right.$$

ODE No. 1645

$$(y'(x)^2+1)\,(y'(x)h(x,y(x))+j(x,y(x)))+y''(x)=0$$

✗ **Mathematica** : cpu = 0.147194 (sec), leaf count = 0 , could not solve

```
DSolve[(j[x, y[x]] + h[x, y[x]]*Derivative[1][y][x])*(1 + Derivative[1][y][x]^2) + Der
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(diff(y(x),x),x)+(diff(y(x),x)^2+1)*(h(x,y(x))*diff(y(x),x)+j(x,y(x)))=0,y(
```

ODE No. 1646

$$ay(x)\,(y'(x)^2+1)^2+y''(x)=0$$

✓ **Mathematica** : cpu = 10.801 (sec), leaf count = 262

$$\left\{\left\{y(x)\to\text{InverseFunction}\left[-\frac{\sqrt{\frac{\#1^2(-a)+2c_1+1}{2c_1+1}}\sqrt{2\#1^2a-4c_1}E\left(\sin^{-1}\left(\sqrt{\frac{a}{2c_1+1}}\#1\right)|1+\frac{1}{2c_1}\right)}{\sqrt{\frac{a}{2c_1+1}}\sqrt{\#1^2(-a)+2c_1+1}\sqrt{2-\frac{\#1^2a}{c_1}}}\&\right][c_2+x\right.\right.$$

✓ **Maple** : cpu = 0.178 (sec), leaf count = 94

$$\left\{\int^{y(x)}a(\_a^2+2\_C1)\frac{1}{\sqrt{-(\_a^2+2\_C1)\,a\,(-1+a\,(\_a^2+2\_C1))}}d\_a-x-\_C2=0,\int^{y(x)}-a(\_\right.$$

ODE No. 1647

$$y''(x)-a(xy'(x)-y(x))^r=0$$

✓ **Mathematica** : cpu = 51.9855 (sec), leaf count = 59

$$\left\{\left\{y(x)\to x\left(\int_1^x\left(\frac{1}{2}aK[2]^{2r}-\frac{1}{2}arK[2]^{2r}+c_1K[2]^{2r-2}\right)^{\frac{1}{1-r}}dK[2]+c_2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.71 (sec), leaf count = 60

$$\left\{y(x)=\left(\int-\frac{x^2(r-1)\,a-\_C1}{2\,x^2}2^{\frac{r}{r-1}}\left(-\left(x^2(r-1)\,a-\_C1\right)^{-1}\right)^{\frac{r}{r-1}}\mathrm{d}x+\_C2\right)x\right\}$$

ODE No. 1648

$$y''(x) - kx^a y(x)^b y'(x)^c = 0$$

✗ **Mathematica** : cpu = 0.0828005 (sec), leaf count = 0 , could not solve

```
DSolve[-(k*x^a*y[x]^b*Derivative[1][y][x]^c) + Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 1.713 (sec), leaf count = 205

$$\left\{y(x) = ODESolStruc\left(\_a\,\mathrm{e}^{\int -\_b(\_a)\,\mathrm{d}\_a + \_C1}, [\left\{\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a) = \frac{(\_b(\_a))^2}{(a-c+2)^2}\left(-k\_a^b\_b(\_a)\,(b+c-1)^2\right.\right.\right.$$

ODE No. 1649

$$h(x,y(x))\left(y'(x) - \frac{y(x)}{x}\right)^a + y''(x) = 0$$

✗ **Mathematica** : cpu = 2.6676 (sec), leaf count = 0 , could not solve

```
DSolve[h[x, y[x]]*(-(y[x]/x) + Derivative[1][y][x])^a + Derivative[2][y][x] == 0, y[x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(diff(y(x),x),x)+(diff(y(x),x)-y(x)/x)^a*h(x,y(x))=0,y(x))
```

ODE No. 1650

$$y''(x) - a\sqrt{y'(x)^2 + 1} = 0$$

✓ **Mathematica** : cpu = 0.024814 (sec), leaf count = 30

$$\left\{\left\{y(x) \to \frac{\sinh(c_1)\sinh(ax)}{a} + \frac{\cosh(c_1)\cosh(ax)}{a} + c_2\right\}\right\}$$

✓ **Maple** : cpu = 0.369 (sec), leaf count = 16

$$\left\{y(x) = \frac{\cosh(a(\_C1 + x))}{a} + \_C2\right\}$$

ODE No. 1651

$$a\left(-\sqrt{y'(x)^2+1}\right)-b+y''(x)=0$$

✓ **Mathematica** : cpu = 0.27744 (sec), leaf count = 414

$$\left\{\left\{y(x)\to\frac{a\text{InverseFunction}\left[\frac{\frac{b\tan^{-1}\left(\frac{\#1b}{\sqrt{\#1^2+1}\sqrt{a^2-b^2}}\right)}{\sqrt{a^2-b^2}}-\frac{b\tan^{-1}\left(\frac{\#1a}{\sqrt{a^2-b^2}}\right)}{\sqrt{a^2-b^2}}+\sinh^{-1}(\#1)}{a}\&\right][c_1+x]^2-b\sqrt{\text{InverseFu}\cdots}}{a^2\cdots}\right.\right.$$

✓ **Maple** : cpu = 0.207 (sec), leaf count = 31

$$\left\{y(x)=\int RootOf\left(x-\int^{\_Z}\left(a\sqrt{\_f^2+1}+b\right)^{-1}d\_f+\_C1\right)\mathrm{d}x+\_C2\right\}$$

ODE No. 1652

$$y''(x)-a\sqrt{by(x)^2+y'(x)^2}=0$$

✗ **Mathematica** : cpu = 0.815804 (sec), leaf count = 0 , could not solve

```
DSolve[-(a*Sqrt[b*y[x]^2 + Derivative[1][y][x]^2]) + Derivative[2][y][x] == 0, y[x], x
```

✓ **Maple** : cpu = 0.366 (sec), leaf count = 36

$$\left\{y(x)=\mathrm{e}^{\int RootOf\left(x-\int^{-Z}\left(a\sqrt{\_f^2+b}-\_f^2\right)^{-1}d\_f+\_C1\right)\mathrm{d}x+\_C2}\right\}$$

ODE No. 1653

$$y''(x) - a\left(y'(x)^2 + 1\right)^{3/2} = 0$$

✓ **Mathematica** : cpu = 0.0660059 (sec), leaf count = 75

$$\left\{\left\{y(x) \to c_2 - \frac{i\sqrt{a^2x^2 + 2ac_1x + c_1^2 - 1}}{a}\right\}, \left\{y(x) \to c_2 + \frac{i\sqrt{a^2x^2 + 2ac_1x + c_1^2 - 1}}{a}\right\}\right\}$$

✓ **Maple** : cpu = 0.154 (sec), leaf count = 41

$$\left\{y(x) = \frac{1}{a}\left(\left(-1 + (\_C1 + x)^2 a^2\right)\sqrt{-\left(-1 + (\_C1 + x)^2 a^2\right)^{-1}} + \_C2\, a\right)\right\}$$

ODE No. 1654

$$y''(x) - 2ax\left(y'(x)^2 + 1\right)^{3/2} = 0$$

✓ **Mathematica** : cpu = 0.2922 (sec), leaf count = 308

$$\left\{\left\{y(x) \to c_2 - \frac{\sqrt{\frac{ax^2+c_1-1}{c_1-1}}\sqrt{\frac{ax^2+c_1+1}{c_1+1}}\left(F\left(i\sinh^{-1}\left(x\sqrt{\frac{a}{c_1+1}}\right)|\frac{c_1+1}{c_1-1}\right) + (c_1 - 1)\,E\left(i\sinh^{-1}\left(x\sqrt{\frac{a}{c_1+1}}\right)|\frac{c_1}{c_1}\right.\right.}{\sqrt{\frac{a}{c_1+1}}\sqrt{a^2x^4 + 2ac_1x^2 + c_1^2 - 1}}\right.\right.$$

✓ **Maple** : cpu = 0.201 (sec), leaf count = 38

$$\left\{y(x) = \int\sqrt{-\left(-1 + (x^2 + 2\_C1)^2 a^2\right)^{-1}}a\left(x^2 + 2\_C1\right)\,dx + \_C2\right\}$$

ODE No. 1655

$$y''(x) - ay(x)\left(y'(x)^2 + 1\right)^{3/2} = 0$$

✓ **Mathematica** : cpu = 0.864338 (sec), leaf count = 350

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[-\frac{\sqrt{\frac{\#1^2a+2c_1-2}{c_1-1}}\sqrt{\frac{\#1^2a+2c_1+2}{c_1+1}}\left(F\left(i\sinh^{-1}\left(\sqrt{\frac{a}{2c_1+2}}\#1\right)|\frac{c_1+1}{c_1-1}\right) + (c_1 - 1)\,E\left(\right.\right.}{\sqrt{\frac{a}{2c_1+2}}\sqrt{\#1^4a^2 + 4\#1^2ac_1 + 4c_1^2 - 4}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.24 (sec), leaf count = 84

$$\left\{\int^{y(x)} a\left(\_a^2+2\_C1\right)\frac{1}{\sqrt{4-a^2\left(\_a^2+2\_C1\right)^2}}d\_a-x-\_C2=0,\int^{y(x)} -a\left(\_a^2+2\_C1\right)\frac{}{\sqrt{4-a}}\right.$$

ODE No. 1656

$$y''(x)-a\left(y'(x)^2+1\right)^{3/2}(bx+c+y(x))=0$$

✗ **Mathematica** : cpu = 100.312 (sec), leaf count = 0 , could not solve

```
DSolve[-(a*(c + b*x + y[x])*(1 + Derivative[1][y][x]^2)^(3/2)) + Derivative[2][y][x] =
```

✓ **Maple** : cpu = 0.805 (sec), leaf count = 771

$$\left\{y(x)=-bx+RootOf\left(-x+\int^{\_Z}\frac{1}{\left(\_f^4a^2+4\_f^3a^2c+4\_f^2a^2c^2-4\_C1\_f^2a^2-8\_C1\_f\,a^2c+4\right.}\right.\right.$$

ODE No. 1657

$$y''(x)+y(x)^3y'(x)-y(x)y'(x)\sqrt{4y'(x)+y(x)^4}=0$$

✓ **Mathematica** : cpu = 0.186093 (sec), leaf count = 43

$$\left\{\left\{y(x)\to e^{c_1}\tan\left(e^{3c_1}(c_2+x)\right)\right\},\left\{y(x)\to e^{c_1}\tanh\left(e^{3c_1}(c_2+x)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.304 (sec), leaf count = 35

$$\left\{y(x)=\frac{1}{\_C1}\tan\left((\_C2+x)\left(\_C1^2\right)^{-\frac{3}{2}}\right),y(x)=\frac{1}{\_C1}\tanh\left((\_C2+x)\left(\_C1^2\right)^{-\frac{3}{2}}\right)\right\}$$

ODE No. 1658

$$y''(x)-h(y'(x),ax+by(x))=0$$

✗ **Mathematica** : cpu = 0.122128 (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 = 0.151 (sec), leaf count = 115

$$\left\{y(x)=ODESolStruc\left(-\frac{a\left(\int\_b(\_a)\,\mathrm{d}\_a+\_C1\right)-b\_a}{b},\left[\left\{\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a)=-h\left(\frac{-a\_b(\_a)+b}{\_b(\_a)\,b},b\_a\right.\right.\right.\right.$$

ODE No. 1659

$$y''(x) - y(x)h\left(x, \frac{y'(x)}{y(x)}\right) = 0$$

✗ **Mathematica** : cpu = 10.5458 (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 = 0.108 (sec), leaf count = 60

$$\left\{y(x) = ODESolStruc\left(e^{\int \_b(\_a)\, d\_a + \_C1}, [\left\{\frac{d}{d\_a}\_b(\_a) = -(\_b(\_a))^2 + h(\_a, \_b(\_a))\right\}, \left\{\_a = x, \right.\right.\right.$$

ODE No. 1660

$$y''(x) - x^{n-2}h\left(x^{-n}y(x), x^{1-n}y'(x)\right) = 0$$

✗ **Mathematica** : cpu = 4.35061 (sec), leaf count = 0 , could not solve

```
DSolve[-(x^(-2 + n)*h[y[x]/x^n, x^(1 - n)*Derivative[1][y][x]]) + Derivative[2][y][x]
```

✓ **Maple** : cpu = 0.866 (sec), leaf count = 126

$$\left\{y(x) = ODESolStruc\left(\frac{\_a}{e^{-\left(\int \_b(\_a)\, d\_a + \_C1\right)n}}, [\left\{\frac{d}{d\_a}\_b(\_a) = (\_b(\_a))^2 \left(-\_b(\_a)\, h\left(\_a, \frac{\_b(\_a)}{\_b(}\right.\right.\right.\right.\right.$$

ODE No. 1661

$$8y''(x) + 9y'(x)^4 = 0$$

✓ **Mathematica** : cpu = 0.0311787 (sec), leaf count = 92

$$\left\{\left\{y(x) \to c_2 - \frac{1}{3}\sqrt[3]{-\frac{1}{3}}(9x - 8c_1)^{2/3}\right\}, \left\{y(x) \to \frac{(9x - 8c_1)^{2/3}}{3\sqrt[3]{3}} + c_2\right\}, \left\{y(x) \to \frac{(-1)^{2/3}(9x - 8c_1)^{2/3}}{3\sqrt[3]{3}}\right.\right.$$

✓ **Maple** : cpu = 0.101 (sec), leaf count = 51

$$\left\{y(x) = (\_C1 + x)^{\frac{2}{3}} + \_C2, y(x) = \frac{i\sqrt{3} - 1}{2}(\_C1 + x)^{\frac{2}{3}} + \_C2, y(x) = -\frac{i\sqrt{3} + 1}{2}(\_C1 + x)^{\frac{2}{3}} + \_C2\right.$$

ODE No. 1662

$$ay''(x) + cy(x) + h(y'(x)) = 0$$

✗ **Mathematica** : cpu = 1.3429 (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 = 0.398 (sec), leaf count = 56

$$\left\{y(x) = ODESolStruc\left(\_a, [\left\{\left(\frac{d}{d\_a}\_b(\_a)\right)\_b(\_a) + \frac{h(\_b(\_a)) + c\_a}{a} = 0\right\}, \left\{\_a = y(x), \_b(\_a\right.$$

ODE No. 1663

$$-xy(x)^n + xy''(x) + 2y'(x) = 0$$

✗ **Mathematica** : cpu = 0.0359081 (sec), leaf count = 0 , could not solve

```
DSolve[-(x*y[x]^n) + 2*Derivative[1][y][x] + x*Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 0.951 (sec), leaf count = 125

$$\left\{y(x) = ODESolStruc\left(\_a\,e^{\int \_b(\_a)\,d\_a + \_C1}, [\left\{\frac{d}{d\_a}\_b(\_a) = -\frac{(\_b(\_a)(n-1)^2\_a^n + 2\_a(n-3)\_\right.\right.$$

ODE No. 1664

$$ax^m y(x)^n + xy''(x) + 2y'(x) = 0$$

✗ **Mathematica** : cpu = 0.517877 (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 = 2.918 (sec), leaf count = 155

$$\left\{y(x) = ODESolStruc\left(\_a\,e^{\int \_b(\_a)\,d\_a + \_C1}, [\left\{\frac{d}{d\_a}\_b(\_a) = \frac{(\_b(\_a))^2\left(a\_b(\_a)(n-1)^2\_a^n + (m\right.}{(r}\right.\right.$$

ODE No. 1665

$$xy''(x) + 2y'(x) + xe^{y(x)} = 0$$

✗ **Mathematica** : cpu = 0.353085 (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 = 0.633 (sec), leaf count = 84

$$\left\{ y(x) = ODESolStruc\left(\_a - 2\int \_b(\_a)\,d\_a - 2\_C1, [\left\{ \frac{d}{d\_a}\_b(\_a) = (e^{-\_a} - 2)(\_b(\_a))^3 + (\_b(\right.\right.\right.$$

ODE No. 1666

$$ay'(x) + bxe^{y(x)} + xy''(x) = 0$$

✗ **Mathematica** : cpu = 0.583087 (sec), leaf count = 0 , could not solve

```
DSolve[b*E^y[x]*x + a*Derivative[1][y][x] + x*Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 0.955 (sec), leaf count = 93

$$\left\{ y(x) = ODESolStruc\left(\_a - 2\int \_b(\_a)\,d\_a - 2\_C1, [\left\{ \frac{d}{d\_a}\_b(\_a) = (be^{-\_a} - 2a + 2)(\_b(\_a))^3 \right.\right.\right.$$

ODE No. 1667

$$bx^{5-2a}e^{y(x)} + ay'(x) + xy''(x) = 0$$

✗ **Mathematica** : cpu = 0.788917 (sec), leaf count = 0 , could not solve

```
DSolve[b*E^y[x]*x^(5 - 2*a) + a*Derivative[1][y][x] + x*Derivative[2][y][x] == 0, y[x]
```

✓ **Maple** : cpu = 1.467 (sec), leaf count = 121

$$\left\{ y(x) = ODESolStruc\left((2a - 6)\int \_b(\_a)\,d\_a + 2a\_C1 + \_a - 6\_C1, [\left\{ \frac{d}{d\_a}\_b(\_a) = \left(be^{-\_a} + 2\right.\right.\right.\right.$$

ODE No. 1668

$$xy''(x) - (1 - y(x))y'(x) = 0$$

✓ **Mathematica** : cpu = 0.0706216 (sec), leaf count = 60

$$\left\{\left\{y(x) \to \sqrt{2}\sqrt{c_1+2}\tanh\left(\frac{1}{2}\left(\sqrt{2}\sqrt{c_1+2}\log(x) - 2\sqrt{2}\sqrt{c_1+2}c_2\right)\right) + 2\right\}\right\}$$

✓ **Maple** : cpu = 0.182 (sec), leaf count = 24

$$\left\{y(x) = \frac{1}{\_C1}\left(2\_C1 + \tanh\left(\frac{\ln(x) - \_C2}{2\_C1}\right)\right)\right\}$$

ODE No. 1669

$$-x^2y'(x)^2 + xy''(x) + 2y'(x) + y(x)^2 = 0$$

✓ **Mathematica** : cpu = 137.476 (sec), leaf count = 126

$$\text{Solve}\left[\int_1^{y(x)} -\frac{x}{c_1e^{xK[1]} + 2xK[1] + 1}\,dK[1] - \int_1^x \left(-\frac{y(x)}{c_1e^{y(x)K[2]} + 2y(x)K[2] + 1} - \frac{c_1e^{y(x)K[2]} + y(x)\ldots}{K[2]\left(c_1e^{y(x)K[2]} + 2y(\ldots\right.}\right.\right.$$

✓ **Maple** : cpu = 0.132 (sec), leaf count = 32

$$\left\{y(x) = \frac{1}{x}RootOf\left(-\ln(x) + \_C2 + \int^{\_Z} -\left(e^{\_f}\_C1 - 2\_f - 1\right)^{-1} d\_f\right)\right\}$$

ODE No. 1670

$$a(xy'(x) - y(x))^2 - b + xy''(x) = 0$$

✓ **Mathematica** : cpu = 84.793 (sec), leaf count = 50

$$\left\{\left\{y(x) \to x\left(\int_1^x \frac{\sqrt{-\frac{b}{a}}\tan\left(c_1 - a\sqrt{-\frac{b}{a}}K[2]\right)}{K[2]^2}dK[2] + c_2\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.415 (sec), leaf count = 35

$$\left\{y(x) = \left(\int \frac{i}{x^2}\tan\left(-i\sqrt{a}\sqrt{b}x + \_C1\right)\sqrt{b}\frac{1}{\sqrt{a}}\,dx + \_C2\right)x\right\}$$

ODE No. 1671

$$2xy''(x) + y'(x)^3 + y'(x) = 0$$

✓ **Mathematica** : cpu = 0.0351772 (sec), leaf count = 59

$$\left\{\left\{y(x) \to c_2 - 2ie^{c_1}\sqrt{e^{2c_1} - x}\right\}, \left\{y(x) \to c_2 + 2ie^{c_1}\sqrt{e^{2c_1} - x}\right\}\right\}$$

✓ **Maple** : cpu = 0.102 (sec), leaf count = 35

$$\left\{y(x) = -2\,\frac{\sqrt{\_C1\,x - 1}}{\_C1} + \_C2, y(x) = 2\,\frac{\sqrt{\_C1\,x - 1}}{\_C1} + \_C2\right\}$$

ODE No. 1672

$$x^2y''(x) - a(y(x)^n - y(x)) = 0$$

✗ **Mathematica** : cpu = 18.3299 (sec), leaf count = 0 , could not solve

```
DSolve[-(a*(-y[x] + y[x]^n)) + x^2*Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 0.961 (sec), leaf count = 65

$$\left\{y(x) = ODESolStruc\left(\_a, [\left\{\frac{d}{d\_a}\_b(\_a) = (\_b(\_a))^2\,(\_a\,\_b(\_a)\,a - \_a^n\,\_b(\_a)\,a - 1)\right\}, \left\{\_a =\right.\right.\right.$$

ODE No. 1673

$$a\left(e^{y(x)} - 1\right) + x^2y''(x) = 0$$

✗ **Mathematica** : cpu = 31.3121 (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 = 0.784 (sec), leaf count = 60

$$\left\{y(x) = ODESolStruc\left(\_a, [\left\{\frac{d}{d\_a}\_b(\_a) = (-1 + a(e^{-\_a} - 1)\,\_b(\_a))\,(\_b(\_a))^2\right\}, \left\{\_a = y(x), \_b\right.\right.\right.$$

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 = 0.0615239 (sec), leaf count = 106

$$\left\{\left\{y(x)\to c_2 2^{-\frac{a+b}{b}}c^{\frac{a+b}{b}-1}\left(x^{2b}\right)^{\frac{a+b}{2b}-\frac{1}{2}}\sin\left(c\sqrt{x^{2b}}\right)+c_1 2^{-\frac{a}{b}}c^{a/b}\left(x^{2b}\right)^{\frac{a}{2b}}\cos\left(c\sqrt{x^{2b}}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.082 (sec), leaf count = 25

$$\left\{y(x)=x^a\left(\cos\left(x^bc\right)\_C2+\sin\left(x^bc\right)\_C1\right)\right\}$$

ODE No. 1675

$$x^k\left(-h\left(x^ky(x),ky(x)+xy'(x)\right)\right)+(a+1)xy'(x)+x^2y''(x)=0$$

✗ **Mathematica** : cpu = 3.57746 (sec), leaf count = 0 , could not solve

```
DSolve[-(x^k*h[x^k*y[x], k*y[x] + x*Derivative[1][y][x]]) + (1 + a)*x*Derivative[1][y
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(x^2*diff(diff(y(x),x),x)+(a+1)*x*diff(y(x),x)-x^k*h(x^k*y(x),x*diff(y(x),x)+k*y
```

ODE No. 1676

$$a\left(xy'(x)-y(x)\right)^2-bx^2+x^2y''(x)=0$$

✓ **Mathematica** : cpu = 56.6748 (sec), leaf count = 133

$$\left\{\left\{y(x)\to x\left(c_2+\int_1^x\frac{i\sqrt{a}\sqrt{b}Y_1\left(-i\sqrt{a}\sqrt{b}K[2]\right)-i\sqrt{a}\sqrt{b}c_1J_1\left(i\sqrt{a}\sqrt{b}K[2]\right)}{aK[2]\left(c_1J_0\left(i\sqrt{a}\sqrt{b}K[2]\right)+Y_0\left(-i\sqrt{a}\sqrt{b}K[2]\right)\right)}dK[2]\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.294 (sec), leaf count = 72

$$\left\{y(x)=\left(\int-\frac{1}{ax}\sqrt{-ab}\left(\_C1\,Y_1\left(\sqrt{-ab}x\right)+J_1\left(\sqrt{-ab}x\right)\right)\left(\_C1\,Y_0\left(\sqrt{-ab}x\right)+J_0\left(\sqrt{-ab}x\right)\right)^{-1}\mathrm{d}x+\right.$$

ODE No. 1677

$$a y(x) y'(x)^2 + b x + x^2 y''(x) = 0$$

✗ **Mathematica** : cpu = 106.775 (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 = 1.708 (sec), leaf count = 101

$$\left\{ y(x) = ODESolStruc\left(\_a\, e^{\int -\_b(\_a)\, d\_a + \_C1}, [\left\{ \frac{d}{d\_a}\_b(\_a) = \left(a\_a^3 + b\right)(\_b(\_a))^3 + \left(2\, a\_a^2 + 1\right)(\_ \right.\right.\right.$$

ODE No. 1678

$$x^2 y''(x) - \sqrt{a x^2 y'(x)^2 + b y(x)^2} = 0$$

✗ **Mathematica** : cpu = 1.77562 (sec), leaf count = 0 , could not solve

```
DSolve[-Sqrt[b*y[x]^2 + a*x^2*Derivative[1][y][x]^2] + x^2*Derivative[2][y][x] == 0, y
```

✓ **Maple** : cpu = 0.319 (sec), leaf count = 60

$$\left\{ y(x) - e^{\int^{\ln(x)} RootOf\left(\int -\_Z - y(x)\left(\_a^2 y(x) - y(x)\_a - \sqrt{(y(x))^2(\_a^2 + b)}\right)^{-1} d\_a - \_b + \_C1\right) d\_b + \_C2} = 0 \right\}$$

ODE No. 1679

$$\left(x^2 + 1\right) y''(x) + y'(x)^2 + 1 = 0$$

✓ **Mathematica** : cpu = 0.101208 (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 = 0.204 (sec), leaf count = 27

$$\left\{ y(x) = \frac{x}{\_C1} + \ln(\_C1\, x - 1) + \frac{\ln(\_C1\, x - 1)}{\_C1^2} + \_C2 \right\}$$

ODE No. 1680

$$x^4\left(-y'(x)^2\right)+4x^2y''(x)+4y(x)=0$$

✗ **Mathematica** : cpu = 11.9537 (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 = 0.667 (sec), leaf count = 103

$$\left\{y(x)=ODESolStruc\left(\frac{\_a}{\left(e^{\int\_b(\_a)\,d\_a+\_C1}\right)^2},[\left\{\frac{d}{d\_a}\_b(\_a)=\left(-\_a^2+7\_a\right)\left(\_b(\_a)\right)^3+\left(\_a-5\right)\left(\_\right.\right.\right.\right.$$

ODE No. 1681

$$ay(x)^3+9x^2y''(x)+2y(x)=0$$

✗ **Mathematica** : cpu = 3.83337 (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 = 0.065 (sec), leaf count = 31

$$\left\{y(x)=\_C2\ JacobiSN\left(\left(\frac{\sqrt{2}}{2\,x^3}\sqrt{x^{\frac{20}{3}}a}+\_C1\right)\_C2,i\right)\sqrt[3]{x}\right\}$$

ODE No. 1682

$$x^3\left(y''(x)+y(x)y'(x)-y(x)^3\right)+12xy(x)+24=0$$

✗ **Mathematica** : cpu = 22.9146 (sec), leaf count = 0 , could not solve

```
DSolve[24 + 12*x*y[x] + x^3*(-y[x]^3 + y[x]*Derivative[1][y][x] + Derivative[2][y][x]
```

✓ **Maple** : cpu = 0.871 (sec), leaf count = 94

$$\left\{y(x)=ODESolStruc\left(\_a\,e^{\int-\_b(\_a)\,d\_a+\_C1},[\left\{\frac{d}{d\_a}\_b(\_a)=-\left(\left(\_a^3+\_a^2-14\_a-24\right)\_b(\_a)+\right.\right.\right.\right.$$

ODE No. 1683

$$x^3y''(x) - a(xy'(x) - y(x))^2 = 0$$

✓ **Mathematica** : cpu = 0.07893 (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 = 0.066 (sec), leaf count = 23

$$\left\{y(x) = -\frac{x}{a} \ln \left(\frac{a(\_C1\, x - \_C2)}{x}\right)\right\}$$

ODE No. 1684

$$xy(x)\left(a - 2x^2y(x)^2 + 3xy(x)\right) + b + 2x^3y''(x) + x^2(2xy(x) + 9)y'(x) = 0$$

✗ **Mathematica** : cpu = 62.4635 (sec), leaf count = 0 , could not solve

```
DSolve[b + x*y[x]*(a + 3*x*y[x] - 2*x^2*y[x]^2) + x^2*(9 + 2*x*y[x])*Derivative[1][y][
```

✓ **Maple** : cpu = 1.542 (sec), leaf count = 100

$$\left\{y(x) = ODESolStruc\left(\_a\, e^{\int -\_b(\_a)\, d\_a + \_C1}, [\left\{\frac{d}{d\_a}\_b(\_a) = \frac{((-2\_a^3 + \_a^2 + (a-5)\_a + b)\_b(\_}{2}\right.\right.\right.$$

ODE No. 1685

$$axy(x)+b-\left(kx^{k-1} - 12x^2\right)\left(3y'(x) + y(x)^2\right)+2\left(4x^3 - x^k\right)\left(y''(x) + y(x)y'(x) - y(x)^3\right) = 0$$

✗ **Mathematica** : cpu = 5.75448 (sec), leaf count = 0 , could not solve

```
DSolve[b + a*x*y[x] - (-12*x^2 + k*x^(-1 + k))*(y[x]^2 + 3*Derivative[1][y][x]) + 2*(4
y[x]^3 + y[x]*Derivative[1][y][x] + Derivative[2][y][x]) == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(2*(-x^k+4*x^3)*(diff(diff(y(x),x),x)+y(x)*diff(y(x),x)-y(x)^3)-(k*x^(k-
1)-12*x^2)*(3*diff(y(x),x)+y(x)^2)+a*x*y(x)+b=0,y(x))
```

ODE No. 1686

$$a^2y(x)^n + x^4y''(x) = 0$$

✗ **Mathematica** : cpu = 0.0344736 (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 = 1.101 (sec), leaf count = 128

$$\left\{y(x) = ODESolStruc\left(\_a\,e^{\int -\_b(\_a)\,d\_a + \_C1}, [\left\{\frac{d}{d\_a}\_b(\_a) = \frac{(\_b(\_a))^2\left(a^2\_b(\_a)(n-1)^2\_a^n - 2\_\right.}{4}\right.\right.$$

ODE No. 1687

$$x^4y''(x) - x\left(x^2 + 2y(x)\right)y'(x) + 4y(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.0685251 (sec), leaf count = 262

$$\left\{\left\{y(x) \to -\frac{x^3\left(i\left(-\frac{\sqrt{-c_1-1}}{\sqrt{c_1}} + \frac{i}{\sqrt{c_1}}\right)\sqrt{c_1}c_2x^{-1+i\left(-\frac{\sqrt{-c_1-1}}{\sqrt{c_1}}+\frac{i}{\sqrt{c_1}}\right)\sqrt{c_1}} + i\left(\frac{\sqrt{-c_1-1}}{\sqrt{c_1}} + \frac{i}{\sqrt{c_1}}\right)\sqrt{c_1}x^{-1+i\left(\frac{\sqrt{-c_1-1}}{\sqrt{c_1}}+\right.}\right.}{c_2x^{i\left(-\frac{\sqrt{-c_1-1}}{\sqrt{c_1}}+\frac{i}{\sqrt{c_1}}\right)\sqrt{c_1}} + x^{i\left(\frac{\sqrt{-c_1-1}}{\sqrt{c_1}}+\frac{i}{\sqrt{c_1}}\right)\sqrt{c_1}}}\right.\right.$$

✓ **Maple** : cpu = 0.138 (sec), leaf count = 21

$$\left\{y(x) = x^2(\tanh(\_C1(\_C2 - \ln(x)))\_C1 + 1)\right\}$$

ODE No. 1688

$$x^4y''(x) - x^2y'(x)\left(y'(x) + x\right) + 4y(x)^2 = 0$$

✓ **Mathematica** : cpu = 326.951 (sec), leaf count = 166

$$\text{Solve}\left[\int_1^{y(x)} \frac{1}{c_1x^2\left(-e^{\frac{K[1]}{x^2}}\right) + 4K[1] + 2x^2}\,dK[1] - \int_1^x \left(\frac{K[2]\left(c_1e^{\frac{y(x)}{K[2]^2}} + 2\left(-\frac{y(x)}{K[2]^2} - 1\right)\right)}{c_1K[2]^2\left(-e^{\frac{y(x)}{K[2]^2}}\right) + 2K[2]^2 + 4y(x)} + 2\left(\frac{}{K[2\right.\right.\right.$$

✓ **Maple** : cpu = 0.125 (sec), leaf count = 32

$$\left\{y(x) = RootOf\left(-\ln(x) + \_C2 - \int^{\_Z}\left(e^{\_f}\_C1 + 4\_f + 2\right)^{-1}d\_f\right)x^2\right\}$$

ODE No. 1689

$$x^4y''(x)+(xy'(x)-y(x))^3=0$$

✓ **Mathematica** : cpu = 0.653007 (sec), leaf count = 329

$$\left\{\left\{y(x)\to -ix\log\left(-\frac{\sqrt{-8ic_1x^2-\sinh(2c_2)-\cosh(2c_2)}}{4c_1x}-\frac{i\sinh(c_2)}{4c_1x}-\frac{i\cosh(c_2)}{4c_1x}\right)\right\},\left\{y(x)\to -ix\right.$$

✓ **Maple** : cpu = 0.171 (sec), leaf count = 37

$$\left\{y(x)=\left(-\arctan\left(\frac{1}{\sqrt{\_C1\,x^2-1}}\right)+\_C2\right)x,y(x)=\left(\arctan\left(\frac{1}{\sqrt{\_C1\,x^2-1}}\right)+\_C2\right)x\right\}$$

ODE No. 1690

$$\sqrt{x}y''(x)-y(x)^{3/2}=0$$

✗ **Mathematica** : cpu = 22.4341 (sec), leaf count = 0 , could not solve

```
DSolve[-y[x]^(3/2) + Sqrt[x]*Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 0.612 (sec), leaf count = 99

$$\left\{y(x)=ODESolStruc\left(\frac{\_a}{\left(e^{\int\_b(\_a)\,d\_a+\_C1}\right)^3},[\left\{\frac{d}{d\_a}\_b(\_a)=-(\_b(\_a))^3\_a^{\frac{3}{2}}+12(\_b(\_a))^3\_a-7\right.\right.$$

ODE No. 1691

$$y''(x)\left(ax^2+bx+c\right)^{3/2}-f\left(\frac{y(x)}{\sqrt{ax^2+bx+c}}\right)=0$$

✗ **Mathematica** : cpu = 61.8785 (sec), leaf count = 0 , could not solve

```
DSolve[-f[y[x]/Sqrt[c + b*x + a*x^2]] + (c + b*x + a*x^2)^(3/2)*Derivative[2][y][x] ==
```

✓ **Maple** : cpu = 1.144 (sec), leaf count = 254

$$\left\{y(x)=RootOf\left(-2\int^{\_Z}\frac{a}{\sqrt{4\_C1\,a^2-4c\_g^2a+b^2\_g^2+8\int F(\_g)\,d\_g}}d\_g\sqrt{4ca-b^2}-2a\arctan\right.\right.$$

ODE No. 1692

$$x^{\frac{n}{n+1}}y''(x) - y(x)^{\frac{2n+1}{n+1}} = 0$$

✗ **Mathematica** : cpu = 0.0872162 (sec), leaf count = 0 , could not solve

```
DSolve[-y[x]^((1 + 2*n)/(1 + n)) + x^(n/(1 + n))*Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 3.74 (sec), leaf count = 156

$$\left\{y(x) = ODESolStruc\left(\_a\left(e^{\frac{(\int \_b(\_a)\,d\_a + \_C1)(n+2)}{n}}\right)^{-1}, [\left\{\frac{d}{d\_a}\_b(\_a) = 2\frac{(\_b(\_a))^2}{n^2}\left(-1/2\,\_a^{\frac{2n+1}{n+1}}\_b(\_\right.\right.\right.\right.$$

ODE No. 1693

$$-h(y(x), f(x)y'(x)) + f(x)f'(x)y'(x) + f(x)^2y''(x) = 0$$

✗ **Mathematica** : cpu = 1.02729 (sec), leaf count = 0 , could not solve

```
DSolve[-h[y[x], f[x]*Derivative[1][y][x]] + f[x]*Derivative[1][f][x]*Derivative[1][y][
```

✓ **Maple** : cpu = 0.323 (sec), leaf count = 68

$$\left\{y(x) = ODESolStruc\left(\_a, [\left\{\frac{d}{d\_a}\_b(\_a) = -h\left(\_a, (\_b(\_a))^{-1}\right)(\_b(\_a))^3\right\}, \left\{\_a = y(x), \_b(\_a)\right.\right.\right.$$

ODE No. 1694

$$y(x)y''(x) - a = 0$$

✓ **Mathematica** : cpu = 0.199633 (sec), leaf count = 115

$$\left\{\left\{y(x) \to \exp\left(\frac{-c_1 - 2a\,\mathrm{erf}^{-1}\left(-i\sqrt{\frac{2}{\pi}}\sqrt{ae^{\frac{c_1}{a}}(c_2+x)^2}\right)^2}{2a}\right)\right\}, \left\{y(x) \to \exp\left(\frac{-c_1 - 2a\,\mathrm{erf}^{-1}\left(i\sqrt{\frac{2}{\pi}}\sqrt{\right.\right.}{2a}\right.\right.$$

✓ **Maple** : cpu = 0.182 (sec), leaf count = 54

$$\left\{\int^{y(x)} \frac{1}{\sqrt{2a\ln(\_a) - 2a\_C1}}d\_a - x - \_C2 = 0, \int^{y(x)} -\frac{1}{\sqrt{-2a(\_C1 - \ln(\_a))}}d\_a - x - \_C2 = \right.$$

ODE No. 1695

$$y(x)y''(x) - ax = 0$$

✗ **Mathematica** : cpu = 25.3554 (sec), leaf count = 0 , could not solve

```
DSolve[-(a*x) + y[x]*Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 0.628 (sec), leaf count = 103

$$\left\{y(x) = ODESolStruc\left(\_a\left(e^{\int \_b(\_a)\, d\_a + \_C1}\right)^{\frac{3}{2}}, [\left\{\frac{d}{d\_a}\_b(\_a) = \frac{(3\_a^2 - 4a)(\_b(\_a))^3}{4\_a} + 2(\_b(\_a\right.\right.\right.$$

ODE No. 1696

$$y(x)y''(x) - ax^2 = 0$$

✗ **Mathematica** : cpu = 24.0383 (sec), leaf count = 0 , could not solve

```
DSolve[-(a*x^2) + y[x]*Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 0.525 (sec), leaf count = 100

$$\left\{y(x) = ODESolStruc\left(\_a\left(e^{\int \_b(\_a)\, d\_a + \_C1}\right)^{2}, [\left\{\frac{d}{d\_a}\_b(\_a) = \frac{(2\_a^2 - a)(\_b(\_a))^3}{\_a} + 3(\_b(\_a))\right.\right.\right.$$

ODE No. 1697

$$-a + y(x)y''(x) + y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.0630547 (sec), leaf count = 94

$$\left\{\left\{y(x) \to -\frac{\sqrt{2a^2c_2x + a^2c_2^2 + a^2x^2 - e^{2c_1}}}{\sqrt{a}}\right\}, \left\{y(x) \to \frac{\sqrt{2a^2c_2x + a^2c_2^2 + a^2x^2 - e^{2c_1}}}{\sqrt{a}}\right\}\right\}$$

✓ **Maple** : cpu = 0.065 (sec), leaf count = 39

$$\left\{y(x) = \sqrt{ax^2 - 2\_C1\, x + 2\_C2}, y(x) = -\sqrt{ax^2 - 2\_C1\, x + 2\_C2}\right\}$$

ODE No. 1698

$$-ax - b + y(x)y''(x) + y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.043754 (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))
```

ODE No. 1699

$$y(x)y''(x) + y'(x)^2 - y'(x) = 0$$

✓ **Mathematica** : cpu = 0.0373598 (sec), leaf count = 40

$$\left\{\left\{y(x) \to c_1\left(-W\left(-\frac{e^{-\frac{x}{c_1}-\frac{c_2}{c_1}-1}}{c_1}\right)\right) - c_1\right\}\right\}$$

✓ **Maple** : cpu = 0.145 (sec), leaf count = 33

$$\left\{y(x) = -\_C1\left(lambertW\left(-\frac{e^{-1}}{\_C1}\left(e^{\frac{\_C2}{\_C1}}\right)^{-1}\left(e^{\frac{x}{\_C1}}\right)^{-1}\right)+1\right)\right\}$$

ODE No. 1700

$$y(x)y''(x) - y'(x)^2 + 1 = 0$$

✓ **Mathematica** : cpu = 0.0807811 (sec), leaf count = 44

$$\{\{y(x) \to -e^{-c_1}\sinh\left(e^{c_1}(c_2+x)\right)\}, \{y(x) \to e^{-c_1}\sinh\left(e^{c_1}(c_2+x)\right)\}\}$$

✓ **Maple** : cpu = 0.384 (sec), leaf count = 86

$$\left\{y(x) = \frac{1}{2}\left(-\_C1\left(e^{\frac{x}{\_C1}}\right)^2\left(e^{\frac{\_C2}{\_C1}}\right)^2 + \_C1\right)\left(e^{\frac{\_C2}{\_C1}}\right)^{-1}\left(e^{\frac{x}{\_C1}}\right)^{-1}, y(x) = \frac{1}{2}\left(\_C1\left(e^{\frac{x}{\_C1}}\right)^2\left(e^{\frac{\_C2}{\_C1}}\right)^2 - \_\right.\right.$$

ODE No. 1701

$$y(x)y''(x) - y'(x)^2 - 1 = 0$$

✓ **Mathematica** : cpu = 0.106654 (sec), leaf count = 80

$$\left\{\left\{y(x) \to -\frac{e^{-c_1}\tanh\left(e^{c_1}(c_2+x)\right)}{\sqrt{\tanh^2\left(e^{c_1}\left(c_2+x\right)\right)-1}}\right\},\left\{y(x) \to \frac{e^{-c_1}\tanh\left(e^{c_1}(c_2+x)\right)}{\sqrt{\tanh^2\left(e^{c_1}\left(c_2+x\right)\right)-1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.351 (sec), leaf count = 42

$$\left\{y(x) = \frac{\_C1}{2}\left(\left(e^{\frac{\_C2}{\_C1}}\right)^2\left(e^{\frac{x}{\_C1}}\right)^2+1\right)\left(e^{\frac{\_C2}{\_C1}}\right)^{-1}\left(e^{\frac{x}{\_C1}}\right)^{-1}\right\}$$

ODE No. 1702

$$e^{2x}\left(ay(x)^4+b\right)+e^xy(x)\left(cy(x)^2+d\right)+y(x)y''(x)-y'(x)^2=0$$

✗ **Mathematica** : cpu = 7.44438 (sec), leaf count = 0 , could not solve

```
DSolve[E^x*y[x]*(d + c*y[x]^2) + E^(2*x)*(b + a*y[x]^4) - Derivative[1][y][x]^2 + y[x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(diff(y(x),x),x)*y(x)-diff(y(x),x)^2+exp(x)*y(x)*(c*y(x)^2+d)+exp(2*x)*(b+a
```

ODE No. 1703

$$y(x)y''(x) - y'(x)^2 + y(x)^2(-\log(y(x))) = 0$$

✓ **Mathematica** : cpu = 0.236629 (sec), leaf count = 77

$$\left\{\left\{y(x) \to \exp\left(-\frac{1}{2}\sqrt{c_1}e^{-c_2-x}\left(e^{2c_2+2x}-1\right)\right)\right\},\left\{y(x) \to \exp\left(\frac{1}{2}\sqrt{c_1}e^{-c_2-x}\left(e^{2c_2+2x}-1\right)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.088 (sec), leaf count = 21

$$\left\{y(x) = e^{\frac{e^{-2x}\_C1\,e^x}{2}}e^{-\frac{\_C2\,e^x}{2}}\right\}$$

ODE No. 1704

$$y(x)^2\left(\frac{f''(x)}{f(x)}-\frac{f'(x)^2}{f(x)^2}\right)+f(x)y(x)^3+y(x)y''(x)-y'(x)^2-y'(x)=0$$

✗ **Mathematica** : cpu = 20.3067 (sec), leaf count = 0 , could not solve

```
DSolve[f[x]*y[x]^3 - Derivative[1][y][x] - Derivative[1][y][x]^2 + y[x]^2*(-
(Derivative[1][f][x]^2/f[x]^2) + Derivative[2][f][x]/f[x]) + y[x]*Derivative[2][y][x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(diff(y(x),x),x)*y(x)-diff(y(x),x)^2-diff(y(x),x)+f(x)*y(x)^3+y(x)^2*(diff(
diff(f(x),x)^2/f(x)^2)=0,y(x))
```

ODE No. 1705

$$-y(x)f'(x)+f(x)y'(x)+y(x)y''(x)-y'(x)^2-y(x)^3=0$$

✗ **Mathematica** : cpu = 0.232326 (sec), leaf count = 0 , could not solve

```
DSolve[-y[x]^3 - y[x]*Derivative[1][f][x] + f[x]*Derivative[1][y][x] - Derivative[1][y
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(diff(y(x),x),x)*y(x)-diff(y(x),x)^2+f(x)*diff(y(x),x)-diff(f(x),x)*y(x)-
y(x)^3=0,y(x))
```

ODE No. 1706

$$-y(x)f''(x)+f'(x)y'(x)+f(x)y(x)^3+y(x)y''(x)-y'(x)^2-y(x)^4=0$$

✗ **Mathematica** : cpu = 0.473411 (sec), leaf count = 0 , could not solve

```
DSolve[f[x]*y[x]^3 - y[x]^4 + Derivative[1][f][x]*Derivative[1][y][x] - Derivative[1][
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(diff(y(x),x),x)*y(x)-diff(y(x),x)^2+diff(f(x),x)*diff(y(x),x)-
diff(diff(f(x),x),x)*y(x)+f(x)*y(x)^3-y(x)^4=0,y(x))
```

ODE No. 1707

$$ay(x)y'(x) + by(x)^2 + y(x)y''(x) - y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.0709343 (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 = 0.109 (sec), leaf count = 39

$$\left\{y(x) = 1\mathrm{e}^{\frac{\mathrm{e}^{-ax}\_C1}{a}}\mathrm{e}^{\frac{b}{a^2}}\left(\mathrm{e}^{\frac{bx}{a}}\right)^{-1}\left(\mathrm{e}^{\frac{\_C2}{a}}\right)^{-1}\right\}$$

ODE No. 1708

$$ay(x)y'(x) - 2ay(x)^2 + by(x)^3 + y(x)y''(x) - y'(x)^2 = 0$$

✗ **Mathematica** : cpu = 46.1098 (sec), leaf count = 0 , could not solve

```
DSolve[-2*a*y[x]^2 + b*y[x]^3 + a*y[x]*Derivative[1][y][x] - Derivative[1][y][x]^2 + y
```

✓ **Maple** : cpu = 1.01 (sec), leaf count = 73

$$\left\{y(x) = ODESolStruc\left(\_a, [\left\{\left(\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a)\right)\_b(\_a) - \frac{(\_b(\_a))^2 - \_a\,\_b(\_a)\,a - b\,\_a^3 + 2\,a\,\_a^2}{\_a} =\right.\right.\right.$$

ODE No. 1709

$$2a^2y(x)^2 - (ay(x) - 1)y'(x) + ay(x) - 2b^2y(x)^3 + y(x)y''(x) - y'(x)^2 = 0$$

✗ **Mathematica** : cpu = 60.9321 (sec), leaf count = 0 , could not solve

```
DSolve[a*y[x] + 2*a^2*y[x]^2 - 2*b^2*y[x]^3 - (-1 + a*y[x])*Derivative[1][y][x] - Deri
```

✓ **Maple** : cpu = 1.824 (sec), leaf count = 84

$$\left\{y(x) = ODESolStruc\left(\_a, [\left\{\left(\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a)\right)\_b(\_a) - \frac{2\,b^2\_a^3 - 2\,\_a^2a^2 + \_a\,\_b(\_a)\,a + (\_b(\_a)}{\_a}\right.\right.\right.$$

ODE No. 1710

$$-y(x)(y(x)+1)\left(b^2y(x)^2-a^2\right)+(ay(x)-1)y'(x)+y(x)y''(x)-y'(x)^2=0$$

✗ **Mathematica** : cpu = 104.54 (sec), leaf count = 0 , could not solve

```
DSolve[-(y[x]*(1 + y[x])*(-a^2 + b^2*y[x]^2)) + (-1 + a*y[x])*Derivative[1][y][x] - De
```

✓ **Maple** : cpu = 2.523 (sec), leaf count = 91

$$\left\{y(x)=ODESolStruc\left(\_a,[\left\{\left(\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a)\right)\_b(\_a)-\frac{\_a^4b^2+b^2\_a^3-\_a^2a^2-\_a\,\_b(\_a)\,a-\_a}{\_a}\right.\right.\right.$$

ODE No. 1711

$$y(x)^2\log(y(x))\left(\cos^2(x)-n^2\cot^2(x)\right)+y(x)y''(x)-y'(x)^2+y(x)y'(x)(\tan(x)+\cot(x))=0$$

✓ **Mathematica** : cpu = 617.616 (sec), leaf count = 915

$$\left\{\left\{y(x)\to e^{e^{c_2+\int_1^x-\frac{\frac{(-1)^{1-n}2^{n+1}\left(\frac{1}{2}(-n-1)+\frac{1}{2}\right)K_n\left(\sqrt{\cos^2(K[2])-1}\right)\cos(K[2])\left(2\cos^2(K[2])-2\right)^{\frac{n+1}{2}}\sin(K[2])\left(\cos^2(K[2])-1\right)^{\frac{1}{2}(-n-1)-\frac{1}{2}}}{\sqrt{1-\cos^2(K[2])}}+\frac{(-1}{}}{}}}\right.\right.$$

✓ **Maple** : cpu = 0.592 (sec), leaf count = 81

$$\left\{y(x)=1\mathrm{e}^{\frac{Y_n(\sin(x))\_C2}{\sin(x)\left(J_n(\sin(x))Y_{n+1}(\sin(x))-J_{n+1}(\sin(x))Y_n(\sin(x))\right)}}\left(\mathrm{e}^{\frac{J_n(\sin(x))\_C1}{\sin(x)\left(J_n(\sin(x))Y_{n+1}(\sin(x))-J_{n+1}(\sin(x))Y_n(\sin(x))\right)}}\right)^{-1}\right\}$$

ODE No. 1712

$$-f(x)y(x)y'(x) - g(x)y(x)^2 + y(x)y''(x) - y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 10.0473 (sec), leaf count = 70

$$\left\{\left\{y(x) \to c_2 \exp\left(\int_1^x \left(c_1 e^{\int_1^{K[3]} f(K[1])\,dK[1]} + e^{\int_1^{K[3]} f(K[1])\,dK[1]} \int_1^{K[3]} g(K[2]) e^{-\int_1^{K[2]} f(K[1])\,dK[1]}\,dK[2]\right) dK\right.\right.\right.$$

✓ **Maple** : cpu = 0.105 (sec), leaf count = 61

$$\left\{y(x) = \frac{\_C2}{e^{\_C1 \int e^{\int f(x)\,dx}\,dx}} e^{\int e^{\int f(x)\,dx}\,dx \int \frac{g(x)}{e^{\int f(x)\,dx}}\,dx} \left(e^{\int \frac{g(x) \int e^{\int f(x)\,dx}\,dx}{e^{\int f(x)\,dx}}\,dx}\right)^{-1}\right\}$$

ODE No. 1713

$$-y(x)\left(g'(x) - y(x)^2 f'(x)\right) + y'(x)\left(f(x)y(x)^2 + g(x)\right) + y(x)y''(x) - y'(x)^2 = 0$$

✗ **Mathematica** : cpu = 20.9581 (sec), leaf count = 0 , could not solve

```
DSolve[-(y[x]*(-(y[x]^2*Derivative[1][f][x]) + Derivative[1][g][x])) + (g[x] + f[x]*y
```

✓ **Maple** : cpu = 0.341 (sec), leaf count = 54

$$\left\{y(x) = ODESolStruc\left(\_b(\_a), [\left\{\frac{f(\_a)(\_b(\_a))^2 + \_C1\,\_b(\_a) + \frac{d}{d\_a}\_b(\_a) - g(\_a)}{\_b(\_a)} = 0\right\}, \{\_c\right.\right.$$

ODE No. 1714

$$y(x)y''(x) + 3y(x)y'(x) - 3y'(x)^2 - y(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.0637011 (sec), leaf count = 25

$$\left\{\left\{y(x) \to \frac{c_2 e^x}{\sqrt{1 - 2e^{c_1 + x}}}\right\}\right\}$$

✓ **Maple** : cpu = 0.082 (sec), leaf count = 68

$$\left\{y(x) = \frac{\sqrt{2}}{2\,\_C1\,e^x - 2\,\_C2}\sqrt{(\_C1\,e^x - \_C2)\,e^{2x}}, y(x) = -\frac{\sqrt{2}}{2\,\_C1\,e^x - 2\,\_C2}\sqrt{(\_C1\,e^x - \_C2)\,e^{2x}}\right\}$$

ODE No. 1715

$$y(x)y''(x) - ay'(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.0324494 (sec), leaf count = 26

$$\left\{\left\{y(x) \to c_2(-ax - c_1 + x)^{\frac{1}{1-a}}\right\}\right\}$$

✓ **Maple** : cpu = 0.069 (sec), leaf count = 25

$$\left\{y(x) = \left(\frac{1}{(1-a)\,(\_C1\,x + \_C2)}\right)^{(a-1)^{-1}}\right\}$$

ODE No. 1716

$$a\left(y'(x)^2 + 1\right) + y(x)y''(x) = 0$$

✓ **Mathematica** : cpu = 0.660822 (sec), leaf count = 172

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[-\frac{\#1\sqrt{1 - e^{2c_1}\#1^{-2a}}\,{}_2F_1\left(\frac{1}{2}, -\frac{1}{2a}; 1 - \frac{1}{2a}; e^{2c_1}\#1^{-2a}\right)}{\sqrt{e^{2c_1}\#1^{-2a} - 1}}\&\right][c_2 + x]\right\}, \left\{y(x) -\right.\right.$$

✓ **Maple** : cpu = 0.283 (sec), leaf count = 68

$$\left\{\int^{y(x)} \frac{1}{\_a^{-a}} \frac{1}{\sqrt{-\_a^{2\,a} + \_C1}} d\_a - x - \_C2 = 0, \int^{y(x)} -\frac{1}{\_a^{-a}} \frac{1}{\sqrt{-\_a^{2\,a} + \_C1}} d\_a - x - \_C2 = 0\right\}$$

ODE No. 1717

$$ay'(x)^2 + by(x)^3 + y(x)y''(x) = 0$$

✓ **Mathematica** : cpu = 1.8505 (sec), leaf count = 49

$$\left\{\left\{y(x) \to 0^{\frac{1}{-a-1}}\right\}, \left\{y(x) \to 2^{\frac{1}{-2a-3}}\left(\frac{b}{(2a+3)c_1}\right)^{\frac{1}{-2a-3}}\right\}\right\}$$

✓ **Maple** : cpu = 0.398 (sec), leaf count = 107

$$\left\{\int^{y(x)} (2\,a+3)\,\_a^{2\,a} \frac{1}{\sqrt{-\,(2\,a+3)\,\_a^{2\,a}\,(2\,b\_a^{2\,a+3} - \_C1)}} d\_a - x - \_C2 = 0, \int^{y(x)} (-2\,a-3)\,\_a^{2\,a}\right.$$

ODE No. 1718

$$dy(x)^{1-a} + ay'(x)^2 + by(x)y'(x) + cy(x)^2 + y(x)y''(x) = 0$$

✓ **Mathematica** : cpu = 1.56356 (sec), leaf count = 744

$$\left\{\left\{y(x) \to \left(-\frac{ad\exp\left(\frac{1}{2}x\left(\sqrt{-4ac+b^2-4c}+b\right) - \frac{x\left(b\sqrt{-4ac+b^2-4c}-4(a+1)c+b^2\right)}{\sqrt{-4ac+b^2-4c}+b} - \frac{2(a+1)cx}{\sqrt{-4ac+b^2-4c}+b}\right)}{(a+1)c} - \frac{d\exp}{}\right.\right.\right.$$

✓ **Maple** : cpu = 0.33 (sec), leaf count = 133

$$\left\{y(x) = e^{-\frac{x}{2a+2}\sqrt{(-4a-4)c+b^2}} e^{-\frac{bx}{2a+2}} \left(\left((-4a-4)c^3 + b^2c^2\right)\left(de^{\frac{x}{2}\left(b+\sqrt{(-4a-4)c+b^2}\right)}\sqrt{(-4a-4)c+b^2} + \left(e\right.\right.\right.\right.$$

ODE No. 1719

$$ay'(x)^2 + f(x)y(x)y'(x) + g(x)y(x)^2 + y(x)y''(x) = 0$$

✗ **Mathematica** : cpu = 41.795 (sec), leaf count = 0 , could not solve

```
DSolve[g[x]*y[x]^2 + f[x]*y[x]*Derivative[1][y][x] + a*Derivative[1][y][x]^2 + y[x]*De
```

✓ **Maple** : cpu = 0.598 (sec), leaf count = 70

$$\left\{y(x) = ODESolStruc\left(e^{\int \_b(\_a)\,d\_a + \_C1}, \left[\left\{\frac{d}{d\_a}\_b(\_a) = (-a-1)(\_b(\_a))^2 - f(\_a)\_b(\_a) - g(\_a\right.\right.\right.\right.$$

ODE No. 1720

$$ay'(x)^2 + by(x)^2y'(x) + cy(x)^4 + y(x)y''(x) = 0$$

✗ **Mathematica** : cpu = 90.0197 (sec), leaf count = 0 , could not solve

```
DSolve[c*y[x]^4 + b*y[x]^2*Derivative[1][y][x] + a*Derivative[1][y][x]^2 + y[x]*Deriva
```

✓ **Maple** : cpu = 0.445 (sec), leaf count = 173

$$\left\{\int^{y(x)} (2a+4)\left(\tan\left(RootOf\left(2\_Z\,b\_a^2 - 2a\ln(\_a)\sqrt{4\_a^4ac - \_a^4b^2 + 8c\_a^4} - \sqrt{4\_a^4ac - \_a\right.\right.\right.\right.$$

ODE No. 1721

$$-\frac{ay(x)^3 f'(x)}{a+2}+\frac{af(x)^2y(x)^4}{(a+2)^2}-\frac{(a-1)y'(x)^2}{a}-f(x)y(x)^2y'(x)+y(x)y''(x)=0$$

✗ **Mathematica** : cpu = 1.02075 (sec), leaf count = 0 , could not solve

```
DSolve[(a*f[x]^2*y[x]^4)/(2 + a)^2 - (a*y[x]^3*Derivative[1][f][x])/(2 + a) - f[x]*y[x
1 + a)*Derivative[1][y][x]^2)/a + y[x]*Derivative[2][y][x] == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(diff(y(x),x),x)*y(x)-(a-1)/a*diff(y(x),x)^2-f(x)*y(x)^2*diff(y(x),x)+a/(a+
a/(a+2)*diff(f(x),x)*y(x)^3=0,y(x))
```

ODE No. 1722

$$-2ay(x)\left(y'(x)^2+1\right)^{3/2}+y(x)y''(x)-y'(x)^2-1=0$$

✓ **Mathematica** : cpu = 2.02454 (sec), leaf count = 797

$$\left\{\left\{y(x)\to \text{InverseFunction}\left[-\frac{\left(\left(4c_1a^2+\sqrt{8c_1a^2+1}+1\right)E\left(i\sinh^{-1}\left(\sqrt{2}\sqrt{\frac{a^2}{-4c_1a^2+\sqrt{8c_1a^2+1}-1}}\#1\right)|\frac{4c_1a^2}{4c_1a^2}\right.\right.}{}\right.\right.\right.$$

✓ **Maple** : cpu = 0.454 (sec), leaf count = 98

$$\left\{\int^{y(x)}(\_a\_a^2+\_C1)\frac{1}{\sqrt{-\_a^4a^2-2\_C1\_a^2a-\_C1^2+\_a^2}}d\_a-x-\_C2=0,\int^{y(x)}-(\_a\_a^2+\_C\right.$$

ODE No. 1723

$$(y(x)+x)y''(x)+y'(x)^2-y'(x)=0$$

✓ **Mathematica** : cpu = 0.864831 (sec), leaf count = 259

$$\left\{\left\{y(x)\to\frac{1}{2}\left(-\sqrt{2}e^{-2c_1}\sqrt{4e^{3c_1}x+e^{2c_1}-4e^{3c_1}c_2}+e^{-c_1}-4c_2+2x\right)\right\},\left\{y(x)\to\frac{1}{2}\left(\sqrt{2}e^{-2c_1}\sqrt{4e^{3c_1}x+e\right.\right.\right.$$

✓ **Maple** : cpu = 0.135 (sec), leaf count = 16

$$\left\{y(x)=\sqrt{\_C1+2x}\_C2+\_C1+x\right\}$$

ODE No. 1724

$$(x-y(x))y''(x)+2y'(x)\left(y'(x)+1\right)=0$$

✓ **Mathematica** : cpu = 0.25525 (sec), leaf count = 38

$$\left\{\left\{y(x)\to -\frac{e^{-c_1}\left(e^{c_1}c_2x+e^{c_1}c_2^2+1\right)}{c_2+x}\right\}\right\}$$

✓ **Maple** : cpu = 0.696 (sec), leaf count = 21

$$\left\{y(x)=\frac{\_C2^2-\_C2\,x+\_C1}{\_C2-x}\right\}$$

ODE No. 1725

$$(x-y(x))y''(x)-\left(y'(x)+1\right)\left(y'(x)^2+1\right)=0$$

✓ **Mathematica** : cpu = 0.377735 (sec), leaf count = 75

$$\left\{\left\{y(x)\to -\sqrt{-2c_2x+e^{2c_1}-c_2^2-x^2}-c_2\right\},\left\{y(x)\to \sqrt{-2c_2x+e^{2c_1}-c_2^2-x^2}-c_2\right\}\right\}$$

✓ **Maple** : cpu = 0.645 (sec), leaf count = 105

$$\left\{y(x)=x+RootOf\left(-x+\int^{\_Z}\left(\_C1^2\_f^2-1\right)\left(\_C1\sqrt{-\_C1^2\_f^2+2}\_f-\_C1^2\_f^2+2\right)^{-1}d\_f+\right.\right.$$

ODE No. 1726

$$(x-y(x))y''(x)-h(y'(x))=0$$

✓ **Mathematica** : cpu = 0.708509 (sec), leaf count = 75

$$\text{Solve}\left[\left\{x=\int\frac{\exp\left(-\int_1^{\text{K\$17040045}}\frac{K[3]-1}{h(K[3])}dK[3]-c_1\right)}{h(\text{K\$17040045})}d\text{K\$17040045}+c_2,y(x)=x-\exp\left(-\int_1^{\text{K\$17040045}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.132 (sec), leaf count = 39

$$\left\{y(x)=x+RootOf\left(-x+\int^{\_Z}\left(-1+RootOf\left(\int^{\_Z}\frac{\_a-1}{h(\_a)}d\_a+\ln(-\_g)+\_C1\right)\right)^{-1}d\_g+\_C2\right.\right.$$

ODE No. 1727

$$2y(x)y''(x) + y'(x)^2 + 1 = 0$$

✓ **Mathematica** : cpu = 0.183112 (sec), leaf count = 129

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[e^{2c_1} \tan^{-1}\left(\frac{\sqrt{\#1}}{\sqrt{e^{2c_1} - \#1}}\right) - \sqrt{\#1}\sqrt{e^{2c_1} - \#1}\&\right][c_2 + x]\right\}, \left\{y(x) \to \text{Invers}\right.\right.$$

✓ **Maple** : cpu = 0.434 (sec), leaf count = 823

$$\left\{y(x) = \frac{\left(-RootOf\left((\tan(\_Z))^2 \_C1^2 \_Z^2 - 4(\tan(\_Z))^2 \_C1 \_C2 \_Z - 4(\tan(\_Z))^2 \_C1\, x \_Z + 4\right.\right.}{}\right.$$

ODE No. 1728

$$a + 2y(x)y''(x) - y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.00617373 (sec), leaf count = 31

$$\left\{\left\{y(x) \to \frac{x^2(c_1^2 - a)}{4c_2} + c_1 x + c_2\right\}\right\}$$

✓ **Maple** : cpu = 0.044 (sec), leaf count = 24

$$\left\{y(x) = \frac{(\_C1^2 - a)\, x^2}{4\, \_C2} + \_C1\, x + \_C2\right\}$$

ODE No. 1729

$$a + f(x)y(x)^2 + 2y(x)y''(x) - y'(x)^2 = 0$$

✗ **Mathematica** : cpu = 0.022991 (sec), leaf count = 0 , could not solve

```
DSolve[a + f[x]*y[x]^2 - Derivative[1][y][x]^2 + 2*y[x]*Derivative[2][y][x] == 0, y[x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(2*diff(diff(y(x),x),x)*y(x)-diff(y(x),x)^2+f(x)*y(x)^2+a=0,y(x))
```

ODE No. 1730

$$2y(x)y''(x) - y'(x)^2 - 8y(x)^3 = 0$$

✓ **Mathematica** : cpu = 0.482824 (sec), leaf count = 127

$$\left\{\left\{y(x) \to -\frac{1}{2}i\sqrt{c_1}\mathrm{ns}\left(\frac{1}{2}\left(-(-1)^{3/4}\sqrt{2}\sqrt[4]{c_1}x - (-1)^{3/4}\sqrt{2}\sqrt[4]{c_1}c_2\right)\middle| -1\right)^2\right\}, \left\{y(x) \to -\frac{1}{2}i\sqrt{c_1}\mathrm{ns}\left(\frac{1}{2}\left((-\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.109 (sec), leaf count = 53

$$\left\{\int^{y(x)} \frac{1}{\sqrt{4\_a^3 + \_C1\ \_a}} d\_a - x - \_C2 = 0, \int^{y(x)} -\frac{1}{\sqrt{4\_a^3 + \_C1\ \_a}} d\_a - x - \_C2 = 0\right\}$$

ODE No. 1731

$$2y(x)y''(x) - y'(x)^2 - 8y(x)^3 - 4y(x)^2 = 0$$

✓ **Mathematica** : cpu = 1.34433 (sec), leaf count = 351

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[-\frac{i\#1\sqrt{\frac{2c_1}{\#1-\#1\sqrt{1-c_1}}+4}\sqrt{\frac{c_1}{\#1\sqrt{1-c_1}+\#1}+2}F\left(i\sinh^{-1}\left(\frac{\sqrt{\frac{c_1}{2\sqrt{1-c_1}+2}}}{\sqrt{\#1}}\right)\middle|\frac{\sqrt{1-c_1}+}{1-\sqrt{1-c}}\right.}{\sqrt{\frac{c_1}{\sqrt{1-c_1}+1}}\sqrt{4\#1^2+4\#1+c_1}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.118 (sec), leaf count = 61

$$\left\{\int^{y(x)} \frac{1}{\sqrt{4\_a^3 + \_a\_C1 + 4\_a^2}} d\_a - x - \_C2 = 0, \int^{y(x)} -\frac{1}{\sqrt{(4\_a^2 + \_C1 + 4\_a)\_a}} d\_a - x -$$

ODE No. 1732

$$2y(x)y''(x) - y'(x)^2 - 4(2y(x) + x)y(x)^2 = 0$$

✗ **Mathematica** : cpu = 2.1287 (sec), leaf count = 0 , could not solve

```
DSolve[-4*y[x]^2*(x + 2*y[x]) - Derivative[1][y][x]^2 + 2*y[x]*Derivative[2][y][x] ==
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(2*diff(diff(y(x),x),x)*y(x)-diff(y(x),x)^2-4*(x+2*y(x))*y(x)^2=0,y(x))
```

ODE No. 1733

$$y(x)^2(ay(x)+b)+2y(x)y''(x)-y'(x)^2=0$$

✓ **Mathematica** : cpu = 2.61956 (sec), leaf count = 437

$$\left\{\left\{y(x)\to \text{InverseFunction}\left[-\frac{i\sqrt{2}\#1^{3/2}\sqrt{\frac{4c_1}{\#1\left(\sqrt{2ac_1+b^2}-b\right)}+2}\sqrt{1-\frac{2c_1}{\#1\left(\sqrt{2ac_1+b^2}+b\right)}}F\left(i\sinh^{-1}\left(\frac{\sqrt{2}\sqrt{\sqrt{b^2}}}{\sqrt{}}\right.\right.}{\sqrt{\frac{c_1}{\sqrt{2ac_1+b^2}-b}}\sqrt{-\#1\left(\#1^2a+2\#1b-2c_1\right)}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.121 (sec), leaf count = 71

$$\left\{\int^{y(x)}-2\frac{1}{\sqrt{-2\,a\_a^3-4\,b\_a^2+4\_a\_C1}}d\_a-x-\_C2=0,\int^{y(x)}2\frac{1}{\sqrt{-2\,a\_a^3-4\,b\_a^2+4\_a\_C}}\right.$$

ODE No. 1734

$$ay(x)^3+2y(x)y''(x)-y'(x)^2+2xy(x)^2+1=0$$

✗ **Mathematica** : cpu = 2.28877 (sec), leaf count = 0 , could not solve

```
DSolve[1 + 2*x*y[x]^2 + a*y[x]^3 - Derivative[1][y][x]^2 + 2*y[x]*Derivative[2][y][x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(2*diff(diff(y(x),x),x)*y(x)-diff(y(x),x)^2+1+2*x*y(x)^2+a*y(x)^3=0,y(x))
```

ODE No. 1735

$$y(x)^2(ay(x)+bx)+2y(x)y''(x)-y'(x)^2=0$$

✗ **Mathematica** : cpu = 1.32848 (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
```

✗ **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))
```

ODE No. 1736

$$2y(x)y''(x) - y'(x)^2 - 3y(x)^4 = 0$$

✓ **Mathematica** : cpu = 8.4422 (sec), leaf count = 285

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[-\frac{2i\#1^{3/2}\sqrt{(-1)^{5/6}\left(\frac{\sqrt[3]{-c_1}}{\#1}-1\right)}\sqrt{\frac{(-c_1)^{2/3}}{\#1^2}+\frac{\sqrt[3]{-c_1}}{\#1}+1}F\left(\sin^{-1}\left(\frac{\sqrt{-\frac{i\sqrt[3]{-c_1}}{\#1}-}}{\sqrt[4]{3}}\right.\right.}{\sqrt[4]{3}\sqrt[3]{-c_1}\sqrt{\#1^3+c_1}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.115 (sec), leaf count = 49

$$\left\{\int^{y(x)}\frac{1}{\sqrt{\_a^4+\_C1\ \_a}}d\_a - x - \_C2 = 0, \int^{y(x)} -\frac{1}{\sqrt{\_a^4+\_C1\ \_a}}d\_a - x - \_C2 = 0\right\}$$

ODE No. 1737

$$-4\left(a+x^2\right)y(x)^2 + b + 2y(x)y''(x) - y'(x)^2 - 3y(x)^4 - 8xy(x)^3 = 0$$

✗ **Mathematica** : cpu = 1.24492 (sec), leaf count = 0 , could not solve

```
DSolve[b - 4*(a + x^2)*y[x]^2 - 8*x*y[x]^3 - 3*y[x]^4 - Derivative[1][y][x]^2 + 2*y[x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(2*diff(diff(y(x),x),x)*y(x)-diff(y(x),x)^2+b-4*(x^2+a)*y(x)^2-8*x*y(x)^3-
3*y(x)^4=0,y(x))
```

ODE No. 1738

$$2y(x)^2\left(f'(x)+f(x)^2\right) + 3f(x)y(x)y'(x) + 2y(x)y''(x) - y'(x)^2 - 8y(x)^3 = 0$$

✗ **Mathematica** : cpu = 0.538391 (sec), leaf count = 0 , could not solve

```
DSolve[-8*y[x]^3 + 2*y[x]^2*(f[x]^2 + Derivative[1][f][x]) + 3*f[x]*y[x]*Derivative[1]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(2*diff(diff(y(x),x),x)*y(x)-diff(y(x),x)^2+3*f(x)*y(x)*diff(y(x),x)+2*(f(x)^2+d
8*y(x)^3=0,y(x))
```

ODE No. 1739

$$f(x)y(x)^2 + 2y(x)y''(x) + 4y(x)^2y'(x) - y'(x)^2 + y(x)^4 + 1 = 0$$

✗ **Mathematica** : cpu = 0.0664955 (sec), leaf count = 0 , could not solve

```
DSolve[1 + f[x]*y[x]^2 + y[x]^4 + 4*y[x]^2*Derivative[1][y][x] - Derivative[1][y][x]^2
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(2*diff(diff(y(x),x),x)*y(x)-diff(y(x),x)^2+4*y(x)^2*diff(y(x),x)+1+f(x)*y(x)^2+
```

ODE No. 1740

$$2y(x)y''(x) - 3y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.026634 (sec), leaf count = 16

$$\left\{\left\{y(x) \to \frac{c_2}{(2c_1 + x)^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.046 (sec), leaf count = 13

$$\left\{y(x) = 4\left(\_C1\, x + \_C2\right)^{-2}\right\}$$

ODE No. 1741

$$2y(x)y''(x) - 3y'(x)^2 - 4y(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.0971011 (sec), leaf count = 17

$$\left\{\left\{y(x) \to c_2 \sec^2(2c_1 + x)\right\}\right\}$$

✓ **Maple** : cpu = 0.096 (sec), leaf count = 34

$$\left\{y(x) = 4\left(\left(\_C1^2 - \_C2^2\right)(\sin(x))^2 - 2\,\_C1\,\_C2\,\sin(x)\cos(x) + \_C2^2\right)^{-1}\right\}$$

ODE No. 1742

$$f(x)y(x)^2 + 2y(x)y''(x) - 3y'(x)^2 = 0$$

✗ **Mathematica** : cpu = 10.6699 (sec), leaf count = 0 , could not solve

```
DSolve[f[x]*y[x]^2 - 3*Derivative[1][y][x]^2 + 2*y[x]*Derivative[2][y][x] == 0, y[x],
```

✓ **Maple** : cpu = 0.218 (sec), leaf count = 60

$$\left\{y(x) = \mathit{ODESolStruc}\left(\mathrm{e}^{\int -\_b(\_a)\,\mathrm{d}\_a + \_C1}, [\left\{\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a) = \frac{(\_b(\_a))^2}{2} - \frac{f(\_a)}{2}\right\}, \left\{\_a = x, \_b(\_a) =\right.\right.\right.$$

ODE No. 1743

$$y(x)^2\left(ay(x)^3 + 1\right) + 2y(x)y''(x) - 6y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 22.5208 (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 = 0.121 (sec), leaf count = 71

$$\left\{\int^{y(x)} -2\frac{1}{\sqrt{4\_C1\,\_a^4 + 4\,a\_a^3 + 1}\_a}d\_a - x - \_C2 = 0, \int^{y(x)} 2\frac{1}{\sqrt{4\_C1\,\_a^4 + 4\,a\_a^3 + 1}\_a}d\_a\right.$$

ODE No. 1744

$$2y(x)y''(x) - y'(x)^2\left(y'(x)^2 + 1\right) = 0$$

✓ **Mathematica** : cpu = 1.03941 (sec), leaf count = 173

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[-ie^{-c_1}\left(\sqrt{\#1}\sqrt{\#1e^{2c_1}-1} - e^{-c_1}\log\left(\sqrt{\#1}e^{2c_1} + e^{c_1}\sqrt{\#1e^{2c_1}-1}\right)\right)\&\right][c_2\right.\right.$$

✓ **Maple** : cpu = 0.393 (sec), leaf count = 823

$$\left\{y(x) = \frac{(-\mathit{RootOf}((\tan(\_Z))^2\_C1^2\_Z^2 - 4(\tan(\_Z))^2\_C1\,\_C2\,\_Z - 4(\tan(\_Z))^2\_C1\,x\_Z + 4}{}\right.$$

ODE No. 1745

$$2(y(x)-a)y''(x)+y'(x)^2+1=0$$

✓ **Mathematica** : cpu = 0.344122 (sec), leaf count = 204

$$\left\{\left\{y(x)\to \text{InverseFunction}\left[-\sqrt{2}\left(\frac{1}{2}\sqrt{a-\#1}\sqrt{e^{2c_1}-2(a-\#1)}-\frac{e^{2c_1}\tan^{-1}\left(\frac{\sqrt{2}\sqrt{a-\#1}}{\sqrt{e^{2c_1}-2(a-\#1)}}\right)}{2\sqrt{2}}\right)\&\right][c$$

✓ **Maple** : cpu = 0.581 (sec), leaf count = 117

$$\left\{-\frac{\_C1}{2}\arctan\left(1\left(y(x)-a-\frac{\_C1}{2}\right)\frac{1}{\sqrt{-(-y(x)+a)(a+\_C1-y(x))}}\right)-x-\_C2+\sqrt{-(-y(x$$

ODE No. 1746

$$-ax^2-bx-c+3y(x)y''(x)-2y'(x)^2=0$$

✗ **Mathematica** : cpu = 0.0397927 (sec), leaf count = 0 , could not solve

```
DSolve[-c - b*x - a*x^2 - 2*Derivative[1][y][x]^2 + 3*y[x]*Derivative[2][y][x] == 0, y
```

✓ **Maple** : cpu = 0.609 (sec), leaf count = 207

$$\left\{y(x)=RootOf\left(-2\,b\arctan\left(\frac{2\,ax+b}{\sqrt{4\,ca-b^2}}\right)-2\int^{\_Z}\frac{b}{\sqrt{4\_f^{4/3}\_C1\,b^2-36\,c\_f^2a+9\,b^2\_f^2-2}}d\_f\sqrt{}$$

ODE No. 1747

$$3y(x)y''(x)-5y'(x)^2=0$$

✓ **Mathematica** : cpu = 0.0266804 (sec), leaf count = 20

$$\left\{\left\{y(x)\to\frac{c_2}{(3c_1+2x)^{3/2}}\right\}\right\}$$

✓ **Maple** : cpu = 0.023 (sec), leaf count = 17

$$\left\{-\frac{3}{2}(y(x))^{-\frac{2}{3}}-\_C1\,x-\_C2=0\right\}$$

ODE No. 1748

$$4y(x)y''(x) - 3y'(x)^2 + 4y(x) = 0$$

✓ **Mathematica** : cpu = 0.0949451 (sec), leaf count = 43

$$\left\{\left\{y(x) \to \frac{\left(c_1^2x^2 + 2c_2c_1^2x + c_2^2c_1^2 - 64\right)^2}{256c_1^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.166 (sec), leaf count = 67

$$\left\{-4\,\frac{\sqrt{\_C1\,\left(y\left(x\right)\right)^{3/2}+4\,y\left(x\right)}}{\sqrt{y\left(x\right)}\_C1}-x-\_C2=0, 4\,\frac{\sqrt{\_C1\,\left(y\left(x\right)\right)^{3/2}+4\,y\left(x\right)}}{\sqrt{y\left(x\right)}\_C1}-x-\_C2=0, y(x)=0\right.$$

ODE No. 1749

$$4y(x)y''(x) - 3y'(x)^2 - 12y(x)^3 = 0$$

✓ **Mathematica** : cpu = 0.530566 (sec), leaf count = 181

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[-\frac{4\sqrt{\frac{4\#1^{3/2}}{c_1}+1}\sqrt{\#1^{3/2}c_1+4\#1^3}\,{}_2F_1\left(\frac{1}{6},\frac{1}{2};\frac{7}{6};-\frac{4\#1^{3/2}}{c_1}\right)}{4\#1^2+\sqrt{\#1}c_1}\&\right][c_2+x]\right\},\left\{y(\right.\right.$$

✓ **Maple** : cpu = 0.55 (sec), leaf count = 57

$$\left\{\int^{y(x)}\frac{1}{\sqrt{\_C1\,\_a^{\frac{3}{2}}+4\,\_a^3}}d\_a-x-\_C2=0, \int^{y(x)}-\frac{1}{\sqrt{\_C1\,\_a^{\frac{3}{2}}+4\,\_a^3}}d\_a-x-\_C2=0\right\}$$

ODE No. 1750

$$ay(x)^3 + by(x)^2 + cy(x) + 4y(x)y''(x) - 3y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 4.66113 (sec), leaf count = 2281

$$\left\{\text{Solve}\left[-\frac{4F\left(\sin^{-1}\left(\sqrt{\frac{\left(\text{Root}\left[a\#1^4+3b\#1^2-3c_1\#1-3c\&,2\right]-\text{Root}\left[a\#1^4+3b\#1^2-3c_1\#1-3c\&,4\right]\right)\left(\sqrt{y(x)}-\text{Root}\left[a\#1^4+3b\#1^2-\right.\right.}{\left(\text{Root}\left[a\#1^4+3b\#1^2-3c_1\#1-3c\&,1\right]-\text{Root}\left[a\#1^4+3b\#1^2-3c_1\#1-3c\&,4\right]\right)\left(\sqrt{y(x)}-\text{Root}\left[a\#1^4+3b\#1^2-\right.\right.}}\right.\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.441 (sec), leaf count = 87

$$\left\{\int^{y(x)} -3\,\frac{1}{\sqrt{9\_C1\,\_a^{3/2}-3\,a\_a^3-9\,b\_a^2+9\,c\_a}}d\_a - x - \_C2 = 0, \int^{y(x)} 3\,\frac{1}{\sqrt{9\_C1\,\_a^{3/2}-3\,a\_}}\right.$$

ODE No. 1751

$$y'(x)\left(6y(x)^2-\frac{2y(x)f'(x)}{f(x)}\right)+f(x)y(x)+g(x)y(x)^2+4y(x)y''(x)-2y(x)^2y'(x)-3y'(x)^2+y(x)^4=0$$

✗ **Mathematica** : cpu = 0.693894 (sec), leaf count = 0 , could not solve

```
DSolve[f[x]*y[x] + g[x]*y[x]^2 + y[x]^4 - 2*y[x]^2*Derivative[1][y][x] + (6*y[x]^2 - (
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(4*diff(diff(y(x),x),x)*y(x)-3*diff(y(x),x)^2+(6*y(x)^2-2*diff(f(x),x)*y(x)/f(x)
2*y(x)^2*diff(y(x),x)+g(x)*y(x)^2+f(x)*y(x)=0,y(x))
```

ODE No. 1752

$$ay(x)^2+4y(x)y''(x)-5y'(x)^2=0$$

✓ **Mathematica** : cpu = 0.136311 (sec), leaf count = 26

$$\left\{\left\{y(x)\to c_2\operatorname{sech}^4\left(\frac{1}{4}\sqrt{a}(x-4c_1)\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.121 (sec), leaf count = 33

$$\left\{y(x)=16\,\frac{\left(e^{1/4\,\sqrt{a}x}\right)^4a^2}{\left(e^{1/2\,\sqrt{a}x}\_C1-\_C2\right)^4}\right\}$$

ODE No. 1753

$$12y(x)y''(x)-15y'(x)^2+8y(x)^3=0$$

✓ **Mathematica** : cpu = 0.322584 (sec), leaf count = 43

$$\left\{\left\{y(x)\to\frac{2304c_1^2}{\left(3c_1^2x^2+6c_2c_1^2x+3c_2^2c_1^2+128\right)^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.171 (sec), leaf count = 147

$$\left\{-12\frac{y(x)\left(8\sqrt{y(x)}-\_C1\right)\sqrt{8\,y(x)-\sqrt{y(x)}\_C1}}{\sqrt{-24\,(y(x))^3+3\_C1\,(y(x))^{5/2}\_C1}\sqrt{\sqrt{y(x)}\left(8\sqrt{y(x)}-\_C1\right)}}-x-\_C2=0,12\frac{}{\sqrt{-24\,(}}\right.$$

ODE No. 1754

$$ny(x)y''(x)-(n-1)y'(x)^2=0$$

✓ **Mathematica** : cpu = 0.0319652 (sec), leaf count = 17

$$\{\{y(x)\to c_2(x-c_1n)^n\}\}$$

✓ **Maple** : cpu = 0.052 (sec), leaf count = 15

$$\left\{y(x)=\left(\frac{\_C1\,x+\_C2}{n}\right)^n\right\}$$

ODE No. 1755

$$ay(x)y''(x)+by'(x)^2+\mathrm{c0}+\mathrm{c1}y(x)+\mathrm{c2}y(x)^2+\mathrm{c3}y(x)^3+\mathrm{c4}y(x)^4=0$$

✗ **Mathematica** : cpu = 104.071 (sec), leaf count = 0 , could not solve

```
DSolve[c0 + c1*y[x] + c2*y[x]^2 + c3*y[x]^3 + c4*y[x]^4 + b*Derivative[1][y][x]^2 + a*
```

✓ **Maple** : cpu = 0.369 (sec), leaf count = 418

$$\left\{\int^{y(x)}(2\,a+b)\,(3\,a+2\,b)\,(a+b)\,(a+2\,b)\,b\_a^{2\,\frac{b}{a}}\frac{}{\sqrt{-36\,(a+2\,b)\,(a+2/3\,b)\,(a+b)\left(2/3\,(a+2\,b)\,(a+b\right.}}\right.$$

ODE No. 1756

$$a y(x) y''(x)+b y'(x)^2-\frac{y(x) y'(x)}{\sqrt{c^2+x^2}}=0$$

✗ **Mathematica** : cpu = 3599.93 (sec), leaf count = 0 , timed out

```
$Aborted
```

✓ **Maple** : cpu = 0.188 (sec), leaf count = 75

$$\left\{y(x)=\left(\left(\left(\frac{a}{a+b}\left(\frac{\_C1\ \sqrt[a]{2}ax^{a^{-1}+1}}{a+1}{}_2F_1(-\frac{1}{2\,a},-\frac{1}{2\,a}-\frac{1}{2};1-a^{-1};-\frac{c^2}{x^2})+\_C2\right)\right)^{-1}\right)^{\frac{a}{a+b}}\right)^{-1}\right\}$$

ODE No. 1757

$$(a+2) f(x) y(x)^2 y'(x)+a y(x) y''(x)+a y(x)^3 y'(x)-(a-1) y'(x)^2+f(x)^2 y(x)^4=0$$

✗ **Mathematica** : cpu = 0.921886 (sec), leaf count = 0 , could not solve

```
DSolve[f[x]^2*y[x]^4 + (2 + a)*f[x]*y[x]^2*Derivative[1][y][x] + a*y[x]^3*Derivative[1
1 + a)*Derivative[1][y][x]^2 + a*y[x]*Derivative[2][y][x] == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(a*y(x)*diff(diff(y(x),x),x)-(a-1)*diff(y(x),x)^2+(a+2)*f(x)*y(x)^2*diff(y(x),x)
```

ODE No. 1758

$$y''(x)(a y(x)+b)+c y'(x)^2=0$$

✓ **Mathematica** : cpu = 0.0591868 (sec), leaf count = 36

$$\left\{\left\{y(x)\to \frac{(c_1(-(a+c))\,(-c_2-x))^{\frac{a}{a+c}}-b}{a}\right\}\right\}$$

✓ **Maple** : cpu = 0.083 (sec), leaf count = 42

$$\left\{y(x)=\frac{1}{a}\left((\_C1\ x+\_C2)\,(a+c)\left(\frac{1}{(a+c)\,(\_C1\ x+\_C2)}\right)^{\frac{c}{a+c}}-b\right)\right\}$$

ODE No. 1759

$$xy(x)y''(x) + xy'(x)^2 - y(x)y'(x) = 0$$

✓ **Mathematica** : cpu = 0.035775 (sec), leaf count = 18

$$\left\{\left\{y(x) \to c_2\sqrt{c_1 + x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.039 (sec), leaf count = 31

$$\left\{y(x) = \sqrt{\_C1\, x^2 + 2\_C2}, y(x) = -\sqrt{\_C1\, x^2 + 2\_C2}\right\}$$

ODE No. 1760

$$ay(x)y'(x) + f(x) + xy(x)y''(x) + xy'(x)^2 = 0$$

✓ **Mathematica** : cpu = 321.185 (sec), leaf count = 118

$$\left\{\left\{y(x) \to -\sqrt{2}\sqrt{\int_1^x \left(c_1 K[3]^{-a} + K[3]^{-a}\left(\int_1^{K[3]} K[2]^{a-1}(-f(K[2]))\, dK[2]\right)\right) dK[3] + c_2}\right\}, \left\{y(x) \right.\right.$$

✓ **Maple** : cpu = 0.096 (sec), leaf count = 114

$$\left\{y(x) = \frac{\sqrt{2}}{a-1}\sqrt{(a-1)\left(x^{1-a}\int \frac{x^a f(x)}{x}\, dx + x^{1-a}\_C1 - \int f(x)\, dx - \_C2\right)}, y(x) = -\frac{\sqrt{2}}{a-1}\sqrt{(a-1\right.$$

ODE No. 1761

$$x\left(ay(x)^4 + d\right) + y(x)\left(by(x)^2 + c\right) + xy(x)y''(x) - xy'(x)^2 + y(x)y'(x) = 0$$

✗ **Mathematica** : cpu = 1.5258 (sec), leaf count = 0 , could not solve

```
DSolve[y[x]*(c + b*y[x]^2) + x*(d + a*y[x]^4) + y[x]*Derivative[1][y][x] - x*Derivati
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(x*y(x)*diff(diff(y(x),x),x)-x*diff(y(x),x)^2+y(x)*diff(y(x),x)+x*(d+a*y(x)^4)+y
```

ODE No. 1762

$$ay(x)y'(x) + bxy(x)^3 + xy(x)y''(x) - xy'(x)^2 = 0$$

✗ **Mathematica** : cpu = 52.9532 (sec), leaf count = 0 , could not solve

```
DSolve[b*x*y[x]^3 + a*y[x]*Derivative[1][y][x] - x*Derivative[1][y][x]^2 + x*y[x]*Deri
```

✓ **Maple** : cpu = 0.911 (sec), leaf count = 108

$$\left\{y(x) = ODESolStruc\left(\frac{\_a}{\left(e^{\int \_b(\_a)\,d\_a + \_C1}\right)^2}, [\left\{\frac{d}{d\_a}\_b(\_a) = -2\,\frac{\_b(\_a)\,(1/2 + \_a^2(-1/2\,b\_a + a -}{}\right.\right.\right.$$

ODE No. 1763

$$ay(x)y'(x) + xy(x)y''(x) + 2xy'(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.1456 (sec), leaf count = 35

$$\left\{\left\{y(x) \to c_2 \exp\left(\frac{1}{3}(\log(3x - (a-1)c_1x^a) - a\log(x))\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.069 (sec), leaf count = 148

$$\left\{y(x) = \frac{\sqrt[3]{3}}{(a-1)\,x^a}\sqrt[3]{(a-1)^2\,(x^a)^2\,(\_C2\,(a-1)\,x^a - \_C1\,x)}, y(x) = \frac{\sqrt[3]{3}(i\sqrt{3}-1)}{(2\,a-2)\,x^a}\sqrt[3]{(a-1)^2\,(x^a)^2\,(\_}\right.$$

ODE No. 1764

$$xy(x)y''(x) - 2xy'(x)^2 + (y(x)+1)y'(x) = 0$$

✓ **Mathematica** : cpu = 0.0639699 (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 = 0.213 (sec), leaf count = 18

$$\left\{y(x) = \_C1\,\tanh\left(\frac{\ln(x) - \_C2}{2\,\_C1}\right)\right\}$$

ODE No. 1765

$$ay(x)y'(x) + xy(x)y''(x) - 2xy'(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.129405 (sec), leaf count = 24

$$\left\{\left\{y(x)\to \frac{c_2x^a}{(a-1)c_1x^a+x}\right\}\right\}$$

✓ **Maple** : cpu = 0.039 (sec), leaf count = 27

$$\left\{y(x) = -\frac{(a-1)\,x^a}{\_C2\ (a-1)\,x^a - \_C1\ x}\right\}$$

ODE No. 1766

$$xy(x)y''(x) - 4xy'(x)^2 + 4y(x)y'(x) = 0$$

✓ **Mathematica** : cpu = 0.0464067 (sec), leaf count = 21

$$\left\{\left\{y(x)\to \frac{c_2x}{\sqrt[3]{c_1x^3+1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.049 (sec), leaf count = 64

$$\left\{y(x) = x\frac{1}{\sqrt[3]{-3\,\_C2\ x^3+\_C1}}, y(x) = \frac{\left(i\sqrt{3}-1\right)x}{2}\frac{1}{\sqrt[3]{-3\,\_C2\ x^3+\_C1}}, y(x) = -\frac{\left(i\sqrt{3}+1\right)x}{2}\frac{}{\sqrt[3]{-3\,\_}}\right.$$

ODE No. 1767

$$\left(\frac{ax}{\sqrt{b^2-x^2}} - x\right)y'(x)^2 + xy(x)y''(x) - y(x)y'(x) = 0$$

✓ **Mathematica** : cpu = 0.0794915 (sec), leaf count = 55

$$\left\{\left\{y(x)\to c_2\exp\left(\frac{c_1\log\left(a\sqrt{b^2-x^2}-c_1\right)}{a^2}+\frac{\sqrt{b^2-x^2}}{a}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.405 (sec), leaf count = 50

$$\left\{y(x) = \_C2\ e^{\int -x\sqrt{b^2-x^2}\left(\_C1\ \sqrt{b^2-x^2}+a\left(b^2-x^2\right)\right)^{-1}dx}\right\}$$

ODE No. 1768

$$x(y(x)+x)y''(x)+xy'(x)^2+(x-y(x))y'(x)-y(x)=0$$

✓ **Mathematica** : cpu = 0.117433 (sec), leaf count = 87

$$\left\{\left\{y(x)\to -x-\sqrt{-e^{2c_2}x^2-2ic_1x^2+e^{2c_2}+x^2}\right\},\left\{y(x)\to -x+\sqrt{-e^{2c_2}x^2-2ic_1x^2+e^{2c_2}+x^2}\right\}\right\}$$

✓ **Maple** : cpu = 0.067 (sec), leaf count = 43

$$\left\{y(x)=-x-\sqrt{(-\_C2+1)\,x^2+\_C1},y(x)=-x+\sqrt{(-\_C2+1)\,x^2+\_C1}\right\}$$

ODE No. 1769

$$2xy(x)y''(x)-xy'(x)^2+y(x)y'(x)=0$$

✓ **Mathematica** : cpu = 0.0469519 (sec), leaf count = 18

$$\left\{\left\{y(x)\to c_2\left(c_1+\sqrt{x}\right)^2\right\}\right\}$$

✓ **Maple** : cpu = 0.05 (sec), leaf count = 21

$$\left\{y(x)=\_C1\,\sqrt{x}\_C2+\_C1^2x+\frac{\_C2^2}{4}\right\}$$

ODE No. 1770

$$x^2(y(x)-1)y''(x)-2x^2y'(x)^2-2x(y(x)-1)y'(x)-2(y(x)-1)^2y(x)=0$$

✓ **Mathematica** : cpu = 0.782749 (sec), leaf count = 28

$$\left\{\left\{y(x)\to \frac{1}{x^2\left(-\frac{c_1}{x}+c_2-\frac{1}{x^2}\right)}+1\right\}\right\}$$

✓ **Maple** : cpu = 0.078 (sec), leaf count = 26

$$\left\{y(x)=\frac{x(\_C1\,x-\_C2)}{\_C1\,x^2-\_C2\,x-1}\right\}$$

ODE No. 1771

$$x^2(y(x)+x)y''(x)-(xy'(x)-y(x))^2=0$$

✓ **Mathematica** : cpu = 0.0848161 (sec), leaf count = 21

$$\left\{\left\{y(x)\to c_2xe^{\frac{c_1}{x}}-x\right\}\right\}$$

✓ **Maple** : cpu = 0.22 (sec), leaf count = 22

$$\left\{y(x)=-\frac{x}{\_C1}\left(-e^{-\frac{\_C2}{x}}e^{-1}+\_C1\right)\right\}$$

ODE No. 1772

$$a(xy'(x)-y(x))^2+x^2(x-y(x))y''(x)=0$$

✓ **Mathematica** : cpu = 1.02427 (sec), leaf count = 37

$$\left\{\left\{y(x)\to x\left(\left((a-1)\left(\frac{(-1)^{a+1}c_1}{x}-c_2\right)\right)^{\frac{1}{1-a}}+1\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.164 (sec), leaf count = 37

$$\left\{\left(x^ay(x)-x^{a+1}\right)(x-y(x))^{-a}-x(a-1)\_C1+\_C2=0\right\}$$

ODE No. 1773

$$2x^2y(x)y''(x)+x^2\left(-\left(y'(x)^2+1\right)\right)+y(x)^2=0$$

✓ **Mathematica** : cpu = 0.191239 (sec), leaf count = 44

$$\left\{\left\{y(x)\to\frac{x\left(c_1^2\log^2(x)-2c_2c_1^2\log(x)+c_2^2c_1^2+4\right)}{4c_1}\right\}\right\}$$

✓ **Maple** : cpu = 0.046 (sec), leaf count = 30

$$\left\{y(x)=\frac{x\left(4\_C2^2(\ln(x))^2+4\_C1\ln(x)\_C2+\_C1^2+1\right)}{4\_C2}\right\}$$

ODE No. 1774

$$ax^2y(x)y''(x)+bx^2y'(x)^2+cxy(x)y'(x)+dy(x)^2=0$$

✓ **Mathematica** : cpu = 1.43533 (sec), leaf count = 93

$$\left\{\left\{y(x)\to c_2\exp\left(-\frac{\log(x)\left(a\sqrt{\frac{a^2-2ac-4ad-4bd+c^2}{a^2}}-a+c\right)-2a\log\left(x^{\sqrt{\frac{a^2-2ac-4ad-4bd+c^2}{a^2}}}+c_1\right)}{2(a+b)}\right)\right\}\right\}$$

✓ **Maple** : cpu = 0.328 (sec), leaf count = 136

$$\left\{y(x)=x^{-\frac{1}{2b+2a}\sqrt{(-4a-4b)d+(a-c)^2}}x^{\frac{a}{2b+2a}}x^{-\frac{c}{2b+2a}}\left(\frac{a^2+(-2c-4d)a-4db+c^2}{(a+b)^2}\left(x^{\frac{1}{a}\sqrt{(-4a-4b)d+(a-c)^2}}\_C\right.\right.\right.$$

ODE No. 1775

$$-a(x+2)y(x)^2+x(x+1)^2y(x)y''(x)-x(x+1)^2y'(x)^2+2(x+1)^2y(x)y'(x)=0$$

✓ **Mathematica** : cpu = 0.12985 (sec), leaf count = 29

$$\left\{\left\{y(x)\to c_2e^{\frac{-a-c_1}{x}+a\log(x+1)}\right\}\right\}$$

✓ **Maple** : cpu = 0.117 (sec), leaf count = 31

$$\left\{y(x)=\frac{(1+x)^a}{\_C1\,e^a}e^{-\frac{\_C2}{x}}\left(e^{\frac{a}{x}}\right)^{-1}\right\}$$

ODE No. 1776

$$8\left(1-x^3\right)y(x)y''(x)-4\left(1-x^3\right)y'(x)^2-12x^2y(x)y'(x)+3xy(x)^2=0$$

✓ **Mathematica** : cpu = 2832.24 (sec), leaf count = 134

$$\left\{\left\{y(x)\to c_2\exp\left(\int_1^x-\frac{2\left(-\frac{3}{32}c_1K[1]^2\,{}_2F_1\left(\frac{11}{12},\frac{5}{4};\frac{5}{3};K[1]^3\right)+\frac{21}{64}\sqrt[3]{-1}K[1]^3\,{}_2F_1\left(\frac{5}{4},\frac{19}{12};\frac{7}{3};K[1]^3\right)+\sqrt[3]{-1}\,{}_2F\right.}{-c_1\,{}_2F_1\left(-\frac{1}{12},\frac{1}{4};\frac{2}{3};K[1]^3\right)-\sqrt[3]{-1}K[1]\,{}_2F_1\left(\frac{1}{4},\frac{7}{12};\frac{4}{3};K[1]^3\right)}\right.\right.\right.$$

✓ **Maple** : cpu = 0.362 (sec), leaf count = 49

$$\left\{y(x) = \frac{x}{\_C1}\left(\_C1\ LegendreQ\left(-\frac{1}{6}, \frac{1}{3}, \sqrt{-(x-1)(x^2+x+1)}\right) + \frac{\_C2}{2} LegendreP\left(-\frac{1}{6}, \frac{1}{3}, \sqrt{-(x-\right.\right.\right.$$

ODE No. 1777

$$f0(x)y(x)y''(x) + f1(x)y'(x)^2 + f2(x)y(x)y'(x) + f3(x)y(x)^2 = 0$$

✗ **Mathematica** : cpu = 49.3778 (sec), leaf count = 0 , could not solve

```
DSolve[f3[x]*y[x]^2 + f2[x]*y[x]*Derivative[1][y][x] + f1[x]*Derivative[1][y][x]^2 + f
```

✓ **Maple** : cpu = 0.707 (sec), leaf count = 79

$$\left\{y(x) = ODESolStruc\left(e^{\int \_b(\_a)\, d\_a + \_C1}, [\left\{\frac{d}{d\_a}\_b(\_a) = \frac{(-f0(\_a) - f1(\_a))(\_b(\_a))^2 - f2(\_a)\_}{f0(\_a)}\right.\right.\right.$$

ODE No. 1778

$$y(x)^2 y''(x) - a = 0$$

✓ **Mathematica** : cpu = 0.967702 (sec), leaf count = 75

$$\text{Solve}\left[\left(\frac{y(x)\sqrt{c_1 - \frac{2a}{y(x)}}}{c_1} + \frac{a\log\left(\sqrt{c_1}y(x)\sqrt{c_1 - \frac{2a}{y(x)}} - a + c_1 y(x)\right)}{c_1^{3/2}}\right)^2 = (c_2 + x)^2, y(x)\right]$$

✓ **Maple** : cpu = 0.645 (sec), leaf count = 245

$$\left\{y(x) = \frac{\_C1\left(a\_C1 + e^{RootOf\left(csgn(\_C1^{-1})\_C1^4 a^2 - 2\_Z\_C1^3 a e^{\_Z} - (e^{\_Z})^2 csgn(\_C1^{-1})\_C1^2 - 2e^{\_Z} csgn(\_C1^{-1})\_C2 -\right.}\right.}{2e^{RootOf\left(csgn(\_C1^{-1})\_C1^4 a^2 - 2\_Z\_C1^3 a e^{\_Z} - (e^{\_Z})^2 csgn(\_C1^{-1})\_C1^2 - 2e^{\_Z} csgn(\_C1^{-1})\_C2 - 2e^{\_Z} cs\right.}}\right.$$

ODE No. 1779

$$ax + y(x)^2 y''(x) + y(x) y'(x)^2 = 0$$

✗ **Mathematica** : cpu = 3.07249 (sec), leaf count = 0 , could not solve

```
DSolve[a*x + y[x]*Derivative[1][y][x]^2 + y[x]^2*Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 0.637 (sec), leaf count = 112

$$\left\{ \ln(x) - \int^{\frac{y(x)}{x}} \frac{\_g^2}{2\_g^3 + 2a} \left(\sqrt[3]{\frac{a}{\_g^3}} \sqrt{3} \tan\left(RootOf\left(-2\_Z\sqrt{3} + \ln\left(\frac{(\tan(\_Z))^2 + 1}{(\tan(\_Z))^2 + 2\sqrt{3}\tan(\_Z) + 3} \right.\right.\right.\right.\right.$$

ODE No. 1780

$$-ax - b + y(x)^2 y''(x) + y(x) y'(x)^2 = 0$$

✗ **Mathematica** : cpu = 0.492036 (sec), leaf count = 0 , could not solve

```
DSolve[-b - a*x + y[x]*Derivative[1][y][x]^2 + y[x]^2*Derivative[2][y][x] == 0, y[x],
```

✓ **Maple** : cpu = 0.654 (sec), leaf count = 160

$$\left\{ \frac{b\ln(ax+b)}{a} - \int^{\frac{y(x)}{ax+b}} -\frac{\_g^2 b\sqrt{3}}{6\_g^3a^2 - 6} \left(-3\tan\left(RootOf\left(6b^2 \int \frac{\_g^2}{\_g^3a^2 - 1} \left(-\frac{a}{b^3\_g^3} \right)^{2/3} d\_g - 2\_Z\sqrt{\right.\right.\right.\right.$$

ODE No. 1781

$$\left(y(x)^2 + 1\right) y''(x) + (1 - 2y(x)) y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.0815087 (sec), leaf count = 19

$$\{\{y(x) \to \tan(\log(-c_1(-c_2 - x)))\}\}$$

✓ **Maple** : cpu = 0.075 (sec), leaf count = 11

$$\{y(x) = \tan(\ln(\_C1\, x + \_C2))\}$$

ODE No. 1782

$$\left(y(x)^2+1\right)y''(x)-3y(x)y'(x)^2=0$$

✓ **Mathematica** : cpu = 0.0865305 (sec), leaf count = 93

$$\left\{\left\{y(x)\to -\frac{ic_1(c_2+x)}{\sqrt{c_1^2x^2+2c_2c_1^2x+c_2^2c_1^2-1}}\right\},\left\{y(x)\to \frac{ic_1(c_2+x)}{\sqrt{c_1^2x^2+2c_2c_1^2x+c_2^2c_1^2-1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.069 (sec), leaf count = 33

$$\left\{y(x)=\sqrt{-\left(\_C1^2x^2+2\,\_C1\,\_C2\,x+\_C2^2-1\right)^{-1}}(\_C1\,x+\_C2)\right\}$$

ODE No. 1783

$$\left(y(x)^2+x\right)y''(x)-2\left(x-y(x)^2\right)y'(x)^3+\left(4y(x)y'(x)+1\right)y'(x)=0$$

✓ **Mathematica** : cpu = 1.40654 (sec), leaf count = 26

$$\text{Solve}\left[x=c_2e^{e^{-c_1y(x)}}-y(x)^2,y(x)\right]$$

✓ **Maple** : cpu = 0.192 (sec), leaf count = 23

$$\left\{\frac{-y(x)\,\_C1+\ln\left(x+(y(x))^2\right)+\_C2+2}{y\left(x\right)}=0\right\}$$

ODE No. 1784

$$\left(x^2+y(x)^2\right)y''(x)-\left(xy'(x)-y(x)\right)\left(y'(x)^2+1\right)=0$$

✓ **Mathematica** : cpu = 0.321343 (sec), leaf count = 74

$$\text{Solve}\left[\frac{1}{2}\left(i\cot\left(c_1\right)\left(\log\left(1-\frac{iy(x)}{x}\right)-\log\left(1+\frac{iy(x)}{x}\right)\right)+\log\left(1-\frac{iy(x)}{x}\right)+\log\left(1+\frac{iy(x)}{x}\right)\right)=c_2$$

✓ **Maple** : cpu = 0.733 (sec), leaf count = 82

$$\left\{y(x)=\tan\left(RootOf\left(-\left(e^{\frac{i\_C1\_Z}{-1+\_C1}}\right)^2\left(e^{\frac{\_C2\_C1}{-1+\_C1}}\right)^2\left(x^{\frac{\_C1}{-1+\_C1}}\right)^2\left(e^{\frac{i\_Z}{-1+\_C1}}\right)^2+\left(e^{\frac{\_C2}{-1+\_C1}}\right)^2\left(x^{(-1+\_C1)^{-1}}\right)^2(\right.\right.\right.$$

ODE No. 1785

$$\left(x^2+y(x)^2\right)y''(x)-2(xy'(x)-y(x))\left(y'(x)^2+1\right)=0$$

✓ **Mathematica** : cpu = 0.38786 (sec), leaf count = 95

$$\left\{\left\{y(x)\to\frac{1}{2}\left(-\sqrt{4x\left(e^{c_2}-x\right)+e^{2c_2}\cot^2\left(c_1\right)}-e^{c_2}\cot\left(c_1\right)\right)\right\},\left\{y(x)\to\frac{1}{2}\left(\sqrt{4x\left(e^{c_2}-x\right)+e^{2c_2}\cot^2\left(c\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.438 (sec), leaf count = 83

$$\left\{y(x)=\frac{1}{2\_C2}\left(\_C1+1-\sqrt{\_C1^2+(4\,i\_C2\,x+2)\_C1-4\_C2^2x^2-4\,i\_C2\,x+1}\right),y(x)=\frac{1}{2\_C}\right.$$

ODE No. 1786

$$f(x)(1-y(x))y(x)y'(x)+2(1-y(x))y(x)y''(x)-(1-2y(x))y'(x)^2=0$$

✓ **Mathematica** : cpu = 0.990839 (sec), leaf count = 95

$$\left\{\left\{y(x)\to\frac{1}{4}\exp\left(-i\int_1^x c_1\left(-e^{-\int_1^{K[3]}\frac{1}{2}f(K[1])\,dK[1]}\right)dK[3]-ic_2\right)\left(1+\exp\left(i\int_1^x c_1\left(-e^{-\int_1^{K[3]}\frac{1}{2}f(K[1])\,dK[\right.\right.\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.24 (sec), leaf count = 42

$$\left\{y(x)=\frac{1}{8\_C2}\left(2\,\mathrm{e}^{\_C1\int\mathrm{e}^{-1/2\int f(x)\,\mathrm{d}x}\,\mathrm{d}x}\_C2+1\right)^2\left(\mathrm{e}^{\_C1\int\mathrm{e}^{-\frac{\int f(x)\,\mathrm{d}x}{2}}\,\mathrm{d}x}\right)^{-1}\right\}$$

ODE No. 1787

$$h(y(x))+2(1-y(x))y(x)y''(x)-(1-3y(x))y'(x)^2=0$$

✗ **Mathematica** : cpu = 100.242 (sec), leaf count = 0 , could not solve

```
DSolve[h[y[x]] - (1 - 3*y[x])*Derivative[1][y][x]^2 + 2*(1 - y[x])*y[x]*Derivative[2][
```

✓ **Maple** : cpu = 0.347 (sec), leaf count = 80

$$\left\{\int^{y(x)}\frac{1}{\_b-1}\frac{1}{\sqrt{\_b\left(\_C1+\int\frac{h(\_b)}{\_b^2(\_b-1)^3}\,\mathrm{d}\_b\right)}}d\_b-x-\_C2=0,\int^{y(x)}-\frac{1}{\_b-1}\frac{1}{\sqrt{\_b\left(\_C1+\int\frac{}{\_b^2}\right.}}\right.$$

ODE No. 1788

$-4(1-y(x))y(x)^2\left(-f'(x)-f(x)^2-g'(x)+g(x)^2\right)+4y(x)y'(x)(f(x)y(x)+g(x))-2(1-y(x))y(x)y''(x)+($

✗ **Mathematica** : cpu = 1.59087 (sec), leaf count = 0 , could not solve

```
DSolve[-4*(1 - y[x])*y[x]^2*(-f[x]^2 + g[x]^2 - Derivative[1][f][x] - Derivative[1][g]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{\sqrt{y(x)}-2\frac{\frac{\partial}{\partial x}DESol\left(\left\{-1/4\,e^{-2\int f(x)\,dx+2\int g(x)\,dx}\_C1^2\_Y(x)-2\,g(x)\frac{d}{dx}\_Y(x)+\frac{d^2}{dx^2}\_Y(x\right.\right.}{DESol\left(\left\{-1/4\,e^{-2\int f(x)\,dx+2\int g(x)\,dx}\_C1^2\_Y(x)-2\,g(x)\frac{d}{dx}\_Y(x)+\frac{d^2}{dx^2}\_Y(x)\right\},\{\_Y(x\right.}\right.$$

ODE No. 1789

$4y(x)^2(1-y(x))\left(-f'(x)+f(x)^2-g'(x)-g(x)^2\right)-4y(x)y'(x)(f(x)y(x)+g(x))+(1-y(x))^3\left(\mathrm{f0}(x)^2y(x)^2\right.$

✗ **Mathematica** : cpu = 10.3535 (sec), leaf count = 0 , could not solve

```
DSolve[(1 - y[x])^3*(-f1[x]^2 + f0[x]^2*y[x]^2) + 4*(1 - y[x])*y[x]^2*(f[x]^2 - g[x]^2
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(-2*y(x)*(1-y(x))*diff(diff(y(x),x),x)+(1-3*y(x))*diff(y(x),x)^2-4*y(x)*diff(y(x
y(x))^3*(f0(x)^2*y(x)^2-f1(x)^2)+4*y(x)^2*(1-y(x))*(f(x)^2-g(x)^2-diff(g(x),x)-
diff(f(x),x))=0,y(x))
```

ODE No. 1790

$$-h(y(x))+3(1-y(x))y(x)y''(x)-2(1-2y(x))y'(x)^2=0$$

✓ **Mathematica** : cpu = 22.76 (sec), leaf count = 182

$$\left\{\left\{y(x)\to \text{InverseFunction}\left[\int_1^{\#1}-\frac{1}{(1-K[2])^{2/3}K[2]^{2/3}\sqrt{2\int_1^{K[2]}-\frac{h(K[1])\exp\left(-2\left(\frac{2}{3}\log(1-K[1])+\frac{2}{3}\log(K[1])\right)\right)}{3(K[1]-1)K[1]}d\right.}\right.\right.\right.$$

✓ **Maple** : cpu = 0.329 (sec), leaf count = 119

$$\left\{\int^{y(x)}-\frac{\sqrt{9}}{3}\frac{1}{\sqrt{(\_b-1)\sqrt[3]{\_b\,(\_b-1)}\_b\left(\_C1-\frac{2}{3}\int\frac{h(\_b)}{\_b\,(\_b-1)}\left(\_b^2-\_b\right)^{-\frac{4}{3}}d\_b\right)}}d\_b-x-\_C2=\right.$$

ODE No. 1791

$$-h(y(x)) + (1 - y(x))y''(x) - 3(1 - 2y(x))y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 22.6098 (sec), leaf count = 164

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[\int_1^{\#1} -\frac{e^{\frac{1}{2}(12-12K[2])}}{(K[2]-1)^3\sqrt{2\int_1^{K[2]} -\frac{h(K[1])\exp(-2(6(K[1]-1)+3\log(K[1]-1)))}{K[1]-1}\,dK[1] + c_1}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.359 (sec), leaf count = 90

$$\left\{\int^{y(x)} \frac{1}{(\_b-1)^3 \left(\mathrm{e}^{\_b}\right)^6} \frac{1}{\sqrt{-2\int \frac{h(\_b)}{\left(\mathrm{e}^{\_b}\right)^{12}(\_b-1)^7}\,\mathrm{d}\_b + \_C1}} d\_b - x - \_C2 = 0, \int^{y(x)} -\frac{1}{(\_b-1)^3\left(\mathrm{e}^{\_b}\right)^6}\right.$$

ODE No. 1792

$$a(y(x) - 1)y(x)y''(x) + y'(x)^2(by(x) + c) + h(y(x)) = 0$$

✓ **Mathematica** : cpu = 26.7925 (sec), leaf count = 222

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[\int_1^{\#1} -\frac{K[2]^{-\frac{c}{a}}(1-K[2])^{\frac{1}{2}\left(\frac{2b}{a}+\frac{2c}{a}\right)}}{\sqrt{2\int_1^{K[2]} -\frac{h(K[1])\exp\left(-\frac{2(c\log(K[1])-(b+c)\log(1-K[1]))}{a}\right)}{a(K[1]-1)K[1]}\,dK[1] + c_1}}\,dK[2]\&\right]\right.\right.$$

✓ **Maple** : cpu = 0.526 (sec), leaf count = 194

$$\left\{\int^{y(x)} a \frac{1}{\sqrt{a\left(a\_C1 - 2\int \frac{h(\_b)}{\_b\,(\_b-1)}\left((\_b-1)^{\frac{b}{a}}\right)^2 \left((\_b-1)^{\frac{c}{a}}\right)^2 \left(\_b^{\frac{c}{a}}\right)^{-2} \mathrm{d}\_b\right)}} \left(\_b^{\frac{c}{a}}\right)^{-1} \left((\_b-1)^{\frac{-b-c}{a}}\right.\right.$$

ODE No. 1793

$$a(y(x)-1)y(x)y''(x)-(a-1)(2y(x)-1)y'(x)^2+f(x)(y(x)-1)y(x)y'(x)=0$$

✓ **Mathematica** : cpu = 1.32788 (sec), leaf count = 113

$$\left\{\left\{y(x)\to \text{InverseFunction}\left[-\frac{a(1-\#1)^{-1/a}(-(\#1-1)\#1)^{\frac{1}{a}}\left((a+1)\,{}_2F_1\left(-\frac{1}{a},\frac{1}{a};1+\frac{1}{a};\#1\right)+\#1\,{}_2F_1\left(\right.\right.}{a+1}\right.\right.\right.$$

✓ **Maple** : cpu = 0.076 (sec), leaf count = 40

$$\left\{\_C1\,\mathrm{e}^{-\frac{fx}{a}}-\_C2+\int^{y(x)}\frac{\sqrt[a]{\_a\,(\_a-1)}}{\_a\,(\_a-1)}d\_a=0\right\}$$

ODE No. 1794

$$ab(y(x)-1)y(x)y''(x)+y'(x)^2(-((2ab-a-b)y(x)+(1-a)b))+f(x)(y(x)-1)y(x)y'(x)=0$$

✓ **Mathematica** : cpu = 1.25637 (sec), leaf count = 98

$$\left\{\left\{y(x)\to \text{InverseFunction}\left[-\frac{a\#1^{\frac{1}{a}}\left((a+1)\,{}_2F_1\left(\frac{1}{a},-\frac{1}{b};1+\frac{1}{a};\#1\right)+\#1\,{}_2F_1\left(1+\frac{1}{a},\frac{b-1}{b};2+\frac{1}{a};\#1\right)\right)}{a+1}\&\right]\right.\right.$$

✓ **Maple** : cpu = 0.102 (sec), leaf count = 46

$$\left\{\_C1\,\mathrm{e}^{-\frac{fx}{ab}}-\_C2+\int^{y(x)}\frac{\sqrt[b]{\_a-1}\sqrt[a]{\_a}}{\_a\,(\_a-1)}d\_a=0\right\}$$

ODE No. 1795

$$xy(x)^2y''(x)-a=0$$

✓ **Mathematica** : cpu = 0.330618 (sec), leaf count = 116

$$\text{Solve}\left[-\frac{\sqrt{-\frac{2ay(x)}{x}-\frac{2c_1y(x)^2}{x^2}}}{2c_1}-\frac{a\tan^{-1}\left(\frac{\sqrt{2}\sqrt{c_1}\left(\frac{a}{2c_1}+\frac{y(x)}{x}\right)}{\sqrt{-\frac{2ay(x)}{x}-\frac{2c_1y(x)^2}{x^2}}}\right)}{2\sqrt{2}c_1^{3/2}}-c_2-\frac{1}{x}=0,y(x)\right]$$

✓ **Maple** : cpu = 1.332 (sec), leaf count = 529

$$\left\{y(x) = \frac{\left(9\,a\_C1 + \mathrm{e}^{RootOf\left(243\, csgn(\_C1^{-1})\_C1^4 a^2 x - 54\_Z\,\mathrm{e}^{\_Z} a x\_C1^3 - 3\, csgn(\_C1^{-1})\left(\mathrm{e}^{\_Z}\right)^2 \_C1^2 x - 6\, csgn(\_C1^{-1})\mathrm{e}^{\_Z}\right.}}{2\,\mathrm{e}^{RootOf\left(243\, csgn(\_C1^{-1})\_C1^4 a^2 x - 54\_Z\,\mathrm{e}^{\_Z} a x\_C1^3 - 3\, csgn(\_C1^{-1})\left(\mathrm{e}^{\_Z}\right)^2 \_C1^2 x - 6\, csgn(\_C1^{-1})\mathrm{e}^{\_Z}\right.}}\right.$$

ODE No. 1796

$$(a^2 - x^2)\,(a^2 - y(x)^2)\,y''(x) + (a^2 - x^2)\,y(x)y'(x)^2 - x(a^2 - y(x)^2)\,y'(x) = 0$$

✓ **Mathematica** : cpu = 0.340765 (sec), leaf count = 363

$$\left\{\left\{y(x) \to -\frac{1}{2}e^{-c_2}\left(1 - \frac{x}{\sqrt{x^2 - a^2}}\right)^{-\frac{c_1}{2}}\left(\frac{x}{\sqrt{x^2 - a^2}} + 1\right)^{-\frac{c_1}{2}}\sqrt{2a^2e^{2c_2}\left(1 - \frac{x}{\sqrt{x^2 - a^2}}\right)^{c_1}\left(\frac{x}{\sqrt{x^2 - a^2}} + \right.}\right.\right.$$

✓ **Maple** : cpu = 0.258 (sec), leaf count = 51

$$\left\{y(x) = \frac{1}{2\_C2}\left(\left(\left(x + \sqrt{-a^2 + x^2}\right)^{\_C1}\right)^2 \_C2^2 + a^2\right)\left(\left(x + \sqrt{-a^2 + x^2}\right)^{\_C1}\right)^{-1}\right\}$$

ODE No. 1797

$$(y(x)-1)^3\,(ay(x)^2 + b) + cxy(x)^2(y(x)-1) + dx^2y(x)^2(y(x)+1) + 2x^2y(x)(y(x)-1)y''(x) - x^2(3y(x)-1)y'(x)$$

✗ **Mathematica** : cpu = 14.4496 (sec), leaf count = 0 , could not solve

```
DSolve[c*x*(-1 + y[x])*y[x]^2 + d*x^2*y[x]^2*(1 + y[x]) + (-1 + y[x])^3*(b + a*y[x]^2)
1 + y[x])*y[x]*Derivative[1][y][x] - x^2*(-1 + 3*y[x])*Derivative[1][y][x]^2 + 2*x^2*(
1 + y[x])*y[x]*Derivative[2][y][x] == 0, y[x], x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(2*x^2*y(x)*(-1+y(x))*diff(diff(y(x),x),x)-x^2*(3*y(x)-1)*diff(y(x),x)^2+2*x*y(x
1+y(x))*diff(y(x),x)+(a*y(x)^2+b)*(-1+y(x))^3+c*x*y(x)^2*(-1+y(x))+d*x^2*y(x)^2*(1+y(x
```

ODE No. 1798

$$x^3y(x)^2y''(x) + (y(x) + x)\,(xy'(x) - y(x))^3 = 0$$

✗ **Mathematica** : cpu = 38.0025 (sec), leaf count = 0 , could not solve

```
DSolve[(x + y[x])*(-y[x] + x*Derivative[1][y][x])^3 + x^3*y[x]^2*Derivative[2][y][x] =
```

✓ **Maple** : cpu = 0.255 (sec), leaf count = 166

$$\left\{y(x) = RootOf\left(-2\ln(x) - \int^{\_Z} 1\left(iY_{i\sqrt{3}}\left(2\sqrt{\_f}\right)\sqrt{3}\_C1\sqrt{\_f} + i\sqrt{3}J_{i\sqrt{3}}\left(2\sqrt{\_f}\right)\sqrt{\_f} + Y_{i\sqrt{3}}\left(2\sqrt{\right.\right.\right.$$

ODE No. 1799

$$y(x)^3y''(x) - a = 0$$

✓ **Mathematica** : cpu = 1.81796 (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 = 0.165 (sec), leaf count = 46

$$\left\{y(x) = \frac{1}{\_C1}\sqrt{\left((\_C2 + x)^2\_C1^2 + a\right)\_C1}, y(x) = -\frac{1}{\_C1}\sqrt{\left((\_C2 + x)^2\_C1^2 + a\right)\_C1}\right\}$$

ODE No. 1800

$$y(x)\left(y(x)^2 + 1\right)y''(x) + \left(1 - 3y(x)^2\right)y'(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.48693 (sec), leaf count = 84

$$\left\{\left\{y(x)\to -\frac{\sqrt{-2c_1x - 2c_2c_1 - 1}}{\sqrt{2}\sqrt{c_1x + c_2c_1}}\right\},\left\{y(x)\to \frac{\sqrt{-2c_1x - 2c_2c_1 - 1}}{\sqrt{2}\sqrt{c_1x + c_2c_1}}\right\}\right\}$$

✓ **Maple** : cpu = 0.06 (sec), leaf count = 60

$$\left\{y(x) = \frac{1}{2\_C1\,x + 2\_C2}\sqrt{-4\,(\_C1\,x + \_C2)\,(\_C1\,x + \_C2 + 1/2)}, y(x) = -\frac{1}{2\_C1\,x + 2\_C2}\sqrt{-\right.$$

ODE No. 1801

$$-a^2xy(x)^2+2y(x)^3y''(x)+y(x)^4-1=0$$

✗ **Mathematica** : cpu = 44.1747 (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))
```

ODE No. 1802

$$-ax^2-bx-c+2y(x)^3y''(x)+y(x)^2y'(x)^2=0$$

✗ **Mathematica** : cpu = 0.341686 (sec), leaf count = 0 , could not solve

```
DSolve[-c - b*x - a*x^2 + y[x]^2*Derivative[1][y][x]^2 + 2*y[x]^3*Derivative[2][y][x]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(2*y(x)^3*diff(diff(y(x),x),x)+y(x)^2*diff(y(x),x)^2-a*x^2-b*x-c=0,y(x))
```

ODE No. 1803

$$-\mathrm{a0}(a-y(x))^2(b-y(x))^2(c-y(x))^2-\mathrm{a2}(a-y(x))^2(c-y(x))^2-\mathrm{a3}(a-y(x))^2(b-y(x))^2+2(a-y(x))(b-y(x))($$

✓ **Mathematica** : cpu = 20.8386 (sec), leaf count = 10387

$$\left\{\text{Solve}\left[-\frac{2F\left(\sin^{-1}\left(\sqrt{\frac{(\text{Root}\left[\mathrm{a0}\#1^4+(-a\mathrm{a0}-b\mathrm{a0}-c\mathrm{a0}-c_1)\#1^3+(-\mathrm{a1}-\mathrm{a2}-\mathrm{a3}+a\mathrm{a0}b+a\mathrm{a0}c+\mathrm{a0}bc+ac_1+bc_1+cc_1)\#1^2+(a\mathrm{a2}+c\mathrm{a2}+\right.}{(\text{Root}\left[\mathrm{a0}\#1^4+(-a\mathrm{a0}-b\mathrm{a0}-c\mathrm{a0}-c_1)\#1^3+(-\mathrm{a1}-\mathrm{a2}-\mathrm{a3}+a\mathrm{a0}b+a\mathrm{a0}c+\mathrm{a0}bc+ac_1+bc_1+cc_1)\#1^2+(a\mathrm{a2}+c\mathrm{a2}+\right.}}\right.\right.}{}\right.\right.$$

✓ **Maple** : cpu = 2.478 (sec), leaf count = 115620

Too large to display

ODE No. 1804

$$y''(x)\left(-ay(x)-b+4y(x)^3\right)-\left(6y(x)^2-\frac{a}{2}\right)y'(x)^2=0$$

✓ **Mathematica** : cpu = 3.05696 (sec), leaf count = 415

$$\text{Solve}\left[\frac{2\sqrt{\frac{y(x)-\text{Root}[4\#1^3-\#1a-b\&,1]}{\text{Root}[4\#1^3-\#1a-b\&,3]-\text{Root}[4\#1^3-\#1a-b\&,1]}}\sqrt{\frac{y(x)-\text{Root}[4\#1^3-\#1a-b\&,2]}{\text{Root}[4\#1^3-\#1a-b\&,3]-\text{Root}[4\#1^3-\#1a-b\&,2]}}\left(y(x)-\text{Root}[4\right.}{c_1\sqrt{2ay(x)+2b-8y(x)}}\right.$$

✓ **Maple** : cpu = 0.04 (sec), leaf count = 31

$$\left\{\int^{y(x)}\frac{1}{\sqrt{4\_a^3-a\_a-b}}d\_a-\_C1\,x-\_C2=0\right\}$$

ODE No. 1805

$$\left(-ay(x)-b+4y(x)^3\right)\left(f(x)y'(x)+y''(x)\right)-\left(6y(x)^2-\frac{a}{2}\right)y'(x)^2=0$$

✓ **Mathematica** : cpu = 2.52099 (sec), leaf count = 436

$$\text{Solve}\left[\frac{2\sqrt{\frac{y(x)-\text{Root}[4\#1^3-\#1a-b\&,1]}{\text{Root}[4\#1^3-\#1a-b\&,3]-\text{Root}[4\#1^3-\#1a-b\&,1]}}\sqrt{\frac{y(x)-\text{Root}[4\#1^3-\#1a-b\&,2]}{\text{Root}[4\#1^3-\#1a-b\&,3]-\text{Root}[4\#1^3-\#1a-b\&,2]}}\left(y(x)-\text{Root}[4\right.}{\sqrt{ay(x)+b-4y(x)^3}}\right.$$

✓ **Maple** : cpu = 0.061 (sec), leaf count = 34

$$\left\{\_C1\,\mathrm{e}^{-fx}-\_C2+\int^{y(x)}\frac{1}{\sqrt{4\_a^3-a\_a-b}}d\_a=0\right\}$$

ODE No. 1806

$-f(x)((y(x)-1)y(x)(y(x)-x))^{3/2}+2(1-y(x))\left(x^2-2xy(x)+y(x)\right)y(x)y'(x)-2(1-x)x(1-y(x))(x-y(x$

✗ **Mathematica** : cpu = 20.032 (sec), leaf count = 0 , could not solve

```
DSolve[-((1 - y[x])^2*y[x]^2) - f[x]*((-1 + y[x])*y[x]*(-x + y[x]))^(3/2) + 2*(1 - y[x
```

✓ **Maple** : cpu = 3.659 (sec), leaf count = 733

$$\left\{-\frac{\_C1}{2}eval\left(\int\frac{1}{x-1}e^{\int\frac{1}{x(x-1)}EllipticE(\sqrt{x})(EllipticK(\sqrt{x}))^{-1}\,dx}\int 1\int\frac{1}{(x-y)^2y(-1+y)}\sqrt{-y(-1+y)(x-$$

ODE No. 1807

$a(1-y(x))^2(x-y(x))^2y(x)^2+bx(1-y(x))^2(x-y(x))^2-c(1-x)(x-y(x))^2y(x)^2-d(1-x)x(1-y(x))^2y(x)^2+2$

✗ **Mathematica** : cpu = 27.7883 (sec), leaf count = 0 , could not solve

```
DSolve[b*x*(1 - y[x])^2*(x - y[x])^2 - d*(1 - x)*x*(1 - y[x])^2*y[x]^2 - c*(1 - x)*(x
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(2*x^2*y(x)*(1-x)^2*(1-y(x))*(x-y(x))*diff(diff(y(x),x),x)-x^2*(1-
x)^2*(x-2*x*y(x)-2*y(x)+3*y(x)^2)*diff(y(x),x)^2-2*x*y(x)*(1-x)*(1-y(x))*(x^2+y(x)-
2*x*y(x))*diff(y(x),x)+b*x*(1-y(x))^2*(x-y(x))^2-c*(1-x)*y(x)^2*(x-y(x))^2-
d*x*y(x)^2*(1-x)*(1-y(x))^2+a*y(x)^2*(x-y(x))^2*(1-y(x))^2=0,y(x))
```

ODE No. 1808

$b\sqrt{(1-y(x)^2)(1-a^2y(x)^2)}y'(x)^2+\left(y(x)^2-1\right)\left(a^2y(x)^2-1\right)y''(x)+y(x)\left(-2a^2y(x)^2+a^2+1\right)y'(x)^2=$

✓ **Mathematica** : cpu = 104.637 (sec), leaf count = 172

$$\text{Solve}\left[\log(x)-b\left(\frac{\log\left(bc_1\sqrt{1-y(x)^2}\sqrt{1-a^2y(x)^2}+\sqrt{y(x)^2-1}\sqrt{a^2y(x)^2-1}\exp\left(\frac{b\sqrt{1-y(x)^2}\sqrt{1-a^2y(x)}}{\sqrt{y(x)^2-1}\sqrt{a}}\right.\right.}{b}\right.\right.$$

✓ **Maple** : cpu = 0.163 (sec), leaf count = 72

$$\left\{\int^{y(x)}e^{\int\frac{1}{(\_b^2-1)(\_b^2a^2-1)}\left(-2\_b^3a^2+\_b\,a^2+b\sqrt{(\_b^2-1)(\_b^2a^2-1)}+\_b\right)d\_b}d\_b-\_C1\,x-\_C2=0\right\}$$

ODE No. 1809

$$y''(x)\left(ax^2+2bx+c+y(x)^2\right)^2+dy(x)=0$$

✗ **Mathematica** : cpu = 46.8029 (sec), leaf count = 0 , could not solve

```
DSolve[d*y[x] + (c + 2*b*x + a*x^2 + y[x]^2)^2*Derivative[2][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 0.694 (sec), leaf count = 336

$$\left\{y(x)=RootOf\left(-\int^{\_Z}\frac{a}{-\_f^4ac+\_f^4b^2+\_C1\,\_f^2a^2-c\_f^2a+b^2\_f^2+\_C1\,a^2+d}\sqrt{(\_f^2+1)\,(-$$

ODE No. 1810

$$\sqrt{y(x)}y''(x)-a=0$$

✓ **Mathematica** : cpu = 0.102954 (sec), leaf count = 1677

$$\left\{\left\{y(x)\to\frac{3c_1^2}{16a^2}+\frac{\sqrt[3]{-\frac{221184c_1^6}{a^6}+\frac{159252480x^2c_1^3}{a^2}+\frac{159252480c_2^2c_1^3}{a^2}+\frac{318504960xc_2c_1^3}{a^2}+2293235712a^2x^4+229323}}{}\right.\right.$$

✓ **Maple** : cpu = 0.15 (sec), leaf count = 91

$$\left\{\frac{1}{12\,a^2}\left(-3\_C1\,\sqrt{4\,a\sqrt{y\,(x)}-\_C1}-\left(4\,a\sqrt{y\,(x)}-\_C1\right)^{\frac{3}{2}}\right)-x-\_C2=0,\frac{1}{12\,a^2}\left(3\_C1\,\sqrt{4\,a\sqrt{y}}\right.\right.$$

ODE No. 1811

$$\sqrt{x^2+y(x)^2}y''(x)-a\left(y'(x)^2+1\right)^{3/2}=0$$

✗ **Mathematica** : cpu = 3600.08 (sec), leaf count = 0 , timed out

```
$Aborted
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , exception

```
time expired
```

ODE No. 1812

$$y(x)y''(x)(1-\log(y(x)))+y'(x)^2(\log(y(x))+1)=0$$

✓ **Mathematica** : cpu = 0.0264596 (sec), leaf count = 29

$$\left\{\left\{y(x)\to e^{\frac{c_1x+c_2c_1-1}{c_1(c_2+x)}}\right\}\right\}$$

✓ **Maple** : cpu = 0.05 (sec), leaf count = 19

$$\left\{y(x)=\mathrm{e}^{\frac{\_C1\,x+\_C2-1}{\_C1\,x+\_C2}}\right\}$$

ODE No. 1813

$$Ay(x)\left(a\sin^2(y(x))+c\right)+y''(x)\left(a\sin^2(y(x))+b\right)+ay'(x)^2\sin(y(x))\cos(y(x))=0$$

✗ **Mathematica** : cpu = 103.045 (sec), leaf count = 0 , could not solve

```
DSolve[A*(c + a*Sin[y[x]]^2)*y[x] + a*Cos[y[x]]*Sin[y[x]]*Derivative[1][y][x]^2 + (b +
```

✓ **Maple** : cpu = 0.421 (sec), leaf count = 138

$$\left\{\int^{y(x)}\sqrt{2}(b+a(\sin(\_a))^2)\frac{1}{\sqrt{-\left(a(\sin(\_a))^2A-2a\_a\cos(\_a)\sin(\_a)A+\_a^2(a+2c)A-2\_C\right.}}$$

ODE No. 1814

$$ah(y(x))y'(x)^2+h(y(x))y''(x)+j(y(x))=0$$

✓ **Mathematica** : cpu = 13.0886 (sec), leaf count = 116

$$\left\{\left\{y(x)\to \text{InverseFunction}\left[\int_1^{\#1}-\frac{e^{aK[2]}}{\sqrt{2\int_1^{K[2]}-\frac{e^{2aK[1]}j(K[1])}{h(K[1])}dK[1]+c_1}}dK[2]\&\right][c_2+x]\right\},\left\{y(x)\to \text{Inv}\right.$$

✓ **Maple** : cpu = 0.198 (sec), leaf count = 87

$$\left\{\int^{y(x)}\frac{1}{(h(\_b))^{-a}}\frac{1}{\sqrt{-2\int\frac{((h(\_b))^a)^2}{h(\_b)}\mathrm{d}\_b+\_C1}}d\_b-x-\_C2=0,\int^{y(x)}-\frac{1}{(h(\_b))^{-a}}\frac{1}{\sqrt{-2\int 2\frac{((h(\_b))}{h(\_b)}}}\right.$$

ODE No. 1815

$$h(y(x))^2\left(-j\left(x,\frac{y'(x)}{h(y(x))}\right)\right)+h(y(x))y''(x)-h(y(x))y'(x)^2=0$$

✗ **Mathematica** : cpu = 1.19051 (sec), leaf count = 0 , could not solve

```
DSolve[-(h[y[x]]^2*j[x, Derivative[1][y][x]/h[y[x]]]) - h[y[x]]*Derivative[1][y][x]^2
```

✓ **Maple** : cpu = 0.896 (sec), leaf count = 71

$$\left\{y(x)=ODESolStruc\left(RootOf\left(\int\_b(\_a)\,\mathrm{d}\_a+\_C1-\int^{\_Z}(h(\_f))^{-1}\,d\_f\right),[\left\{\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a)=1\right\}\right.$$

ODE No. 1816

$$x^2(-y(x))y'(x)+y'(x)y''(x)-xy(x)^2=0$$

✗ **Mathematica** : cpu = 63.9918 (sec), leaf count = 0 , could not solve

```
DSolve[-(x*y[x]^2) - x^2*y[x]*Derivative[1][y][x] + Derivative[1][y][x]*Derivative[2]
```

✓ **Maple** : cpu = 1.706 (sec), leaf count = 46

$$\left\{y(x)=ODESolStruc\left(\_b(\_a),[\left\{-(\_b(\_a))^2\_a^2+\left(\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a)\right)^2+\_C1=0\right\},\{\_a=x,\_b(\_\right.\right.$$

ODE No. 1817

$$4y'(x)^2+(xy'(x)-y(x))\,y''(x)=0$$

✗ **Mathematica** : cpu = 29.486 (sec), leaf count = 0 , could not solve

```
DSolve[4*Derivative[1][y][x]^2 + (-y[x] + x*Derivative[1][y][x])*Derivative[2][y][x] =
```

✓ **Maple** : cpu = 0.299 (sec), leaf count = 40

$$\left\{y(x)=\mathrm{e}^{\int^{\ln(x)}\mathrm{e}^{RootOf\left(\ln\left(\mathrm{e}^{\_Z}-1\right)\mathrm{e}^{\_Z}+\_C1\,\mathrm{e}^{\_Z}-\_Z\,\mathrm{e}^{\_Z}-\_b\,\mathrm{e}^{\_Z}+2\right)}-1d\_b+\_C2}\right\}$$

ODE No. 1818

$$(xy'(x) - y(x))\,y''(x) - \left(y'(x)^2 + 1\right)^2 = 0$$

✗ **Mathematica** : cpu = 1.43316 (sec), leaf count = 0 , could not solve

```
DSolve[-(1 + Derivative[1][y][x]^2)^2 + (-y[x] + x*Derivative[1][y][x])*Derivative[2][
```

✓ **Maple** : cpu = 0.425 (sec), leaf count = 66

$$\left\{y(x) = RootOf\left(-\ln(x) + \int^{-Z} \frac{-\_f + RootOf\left(-\tan\left(\_Z^{-1}\right)\_C1\,\_Z + \_f\,\_C1\,\tan\left(\_Z^{-1}\right) + \tan\left(\right.\right.}{\_f^2 + }\right.\right.$$

ODE No. 1819

$$ax^3y'(x)y''(x) + by(x)^2 = 0$$

✗ **Mathematica** : cpu = 90.7482 (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 = 0.082 (sec), leaf count = 42

$$\left\{y(x) = e^{\int^{\ln(x)} RootOf\left(-\int^{-Z} \frac{a\_a}{a\_a^3 - a\_a^2 + b} d\_a - \_b + \_C1\right) d\_b + \_C2}\right\}$$

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 = 6172.68 (sec), leaf count = 0 , timed out

```
$Aborted
```

✓ **Maple** : cpu = 1.109 (sec), leaf count = 88

$$\left\{y(x) = ODESolStruc\left(e^{\int \_b(\_a)\,d\_a + \_C1}, \left[\left\{\frac{d}{d\_a}\_b(\_a) = \frac{-(\_b(\_a))^3 f1 + (-f2 - f3)(\_b(\_a))^2 - f}{\_b(\_a) f1 + f2}\right.\right.\right.$$

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 = 51.6781 (sec), leaf count = 0 , could not solve

```
DSolve[y[x] + 3*x*Derivative[1][y][x] + 2*y[x]*Derivative[1][y][x]^3 + (x^2 + 2*y[x]^2
```

✓ **Maple** : cpu = 3.026 (sec), leaf count = 54

$$\left\{y(x)=ODESolStruc\left(\_b(\_a),\left[\left\{(\_b(\_a))^2\left(\frac{d}{d\_a}\_b(\_a)\right)^2+\_a^2\frac{d}{d\_a}\_b(\_a)+\_a\_b(\_a)+\_C\right.\right.\right.$$

ODE No. 1822

$$\left(y'(x)^2+y(x)^2\right)y''(x)+y(x)^3=0$$

✓ **Mathematica** : cpu = 1.76332 (sec), leaf count = 371

$$\left\{\left\{y(x)\to c_2\exp\left(\frac{1}{12}\left(-2\sqrt{3}\tan^{-1}\left(\frac{1+2\text{InverseFunction}\left[\frac{\left(\sqrt{3}-i\right)\tan^{-1}\left(\frac{\#1}{\sqrt{\frac{1}{2}\left(1-i\sqrt{3}\right)}}\right)}{\sqrt{6\left(1-i\sqrt{3}\right)}}+\frac{\left(\sqrt{3}+i\right)\tan^{-1}\left(\frac{}{\sqrt{\frac{1}{2}}}\right.}{\sqrt{6\left(1+i\sqrt{3}\right.}}\right.}{\sqrt{3}}\right.\right.\right.\right.\right.$$

✓ **Maple** : cpu = 1.504 (sec), leaf count = 291

$$\left\{y(x)=\left(\_C1+\tan\left(\sqrt{3}x\right)\right)^{\left(2\_C1^2+2\right)^{-1}}\_C2\left(1+\left(\tan\left(\sqrt{3}x\right)\right)^2\right)^{-\frac{\_C1^2}{4\_C1^2+4}}\left(\_C1+\tan\left(\sqrt{3}x\right)\right)^{\frac{\_C}{2\_C}}\right.$$

ODE No. 1823

$$y''(x)\left(a(xy'(x)-y(x))+y'(x)^2\right)-b=0$$

✗ **Mathematica** : cpu = 0.31314 (sec), leaf count = 0 , could not solve

```
DSolve[-b + (Derivative[1][y][x]^2 + a*(-y[x] + x*Derivative[1][y][x]))*Derivative[2][
```

✓ **Maple** : cpu = 0.447 (sec), leaf count = 289

$$\left\{y(x)=-\frac{ax^2}{4}+\mathit{RootOf}\left(-x-\int^{\_Z}\frac{1}{\_f^2a^2-4\_f\,b+2\_C1}\sqrt{\left(\_f^2a^2-4\_f\,b+2\_C1\right)\left(\_f\,a+\sqrt{4\right.\right.}\right.$$

ODE No. 1824

$$y''(x)\left(a\sqrt{y'(x)^2+1}-xy'(x)\right)-y'(x)^2-1=0$$

✓ **Mathematica** : cpu = 0.388266 (sec), leaf count = 347

$$\left\{\left\{y(x)\to\frac{-2\sqrt{x^2\left(a^2+c_1^2-x^2\right)}+c_1x\log\left(-c_1\left(\sqrt{x^2\left(a^2+c_1^2-x^2\right)}+c_1x\right)+a^2(-x)+ax^2\right)+c_1x\log}{}\right.\right.$$

✓ **Maple** : cpu = 0.902 (sec), leaf count = 96

$$\left\{y(x)=\int\frac{1}{a^3-ax^2}\left(-\_C1\,a^2-x\sqrt{a^2\left(\_C1^2+a^2-x^2\right)}\right)\mathrm{d}x+\_C2,y(x)=\int\frac{1}{a^3-ax^2}\left(-\_C1\,a^2+\right.\right.$$

ODE No. 1825

$$f(x)+y''(x)h(y'(x))+j(y(x))y'(x)=0$$

✗ **Mathematica** : cpu = 0.0680164 (sec), leaf count = 0 , could not solve

```
DSolve[f[x] + j[y[x]]*Derivative[1][y][x] + h[Derivative[1][y][x]]*Derivative[2][y][x]
```

✓ **Maple** : cpu = 0.985 (sec), leaf count = 49

$$\left\{y(x)=\mathit{ODESolStruc}\left(\_f(\_b),[\left\{\int^{\_f(\_b)}1d\_a+\int^{\frac{\mathrm{d}}{\mathrm{d}\_b}\_f(\_b)}h(\_a)\,d\_a+\_b\,f+\_C1=0\right\},\{\_b=\right.\right.$$

ODE No. 1826

$$-ay(x) - b + y''(x)^2 = 0$$

✓ **Mathematica** : cpu = 1.43355 (sec), leaf count = 119

$$\left\{ \text{Solve}\left[\frac{(ay(x)+b)^2\, {}_2F_1\left(\frac{1}{2}, \frac{2}{3}; \frac{5}{3}; -\frac{4(b+ay(x))^{3/2}}{3ac_1}\right)^2}{a^2 c_1} = (c_2+x)^2, y(x) \right], \text{Solve}\left[\frac{(ay(x)+b)^2\, {}_2F_1\left(\frac{1}{2}, \frac{2}{3}; \frac{5}{3}; \frac{4(b}{}\right.}{a^2 c_1} \right.\right.$$

✓ **Maple** : cpu = 0.8 (sec), leaf count = 173

$$\left\{ \int^{y(x)} a\sqrt{3} \frac{1}{\sqrt{a\left(4\_a\sqrt{a\_a+b}a + 4\,b\sqrt{a\_a+b} - \_C1\right)}} d\_a - x - \_C2 = 0, \int^{y(x)} -3 \frac{}{\sqrt{-12\left(\left(a\_a -\right.\right.}} \right.$$

ODE No. 1827

$$a^2 y''(x)^2 - 2axy''(x) + y'(x) = 0$$

✗ **Mathematica** : cpu = 1.23638 (sec), leaf count = 0 , could not solve

```
DSolve[Derivative[1][y][x] - 2*a*x*Derivative[2][y][x] + a^2*Derivative[2][y][x]^2 ==
```

✓ **Maple** : cpu = 3.711 (sec), leaf count = 81

$$\left\{ y(x) = \int RootOf\left(-\int_{\_g}^{\_Z} \left(x\sqrt{x^2 - \_f} - x^2 + 2\_f\, a \right)^{-1} \mathrm{d}\_f + \_C1 \right) \mathrm{d}x + \_C2, y(x) = \int RootOf\left(\right.\right.$$

ODE No. 1828

$$2\left(x^2+1\right) y''(x)^2 + 2y'(x)\left(y'(x)+x\right) - x\left(4y'(x)+x\right) y''(x) - 2y(x) = 0$$

✓ **Mathematica** : cpu = 0.0118208 (sec), leaf count = 32

$$\left\{ \left\{ y(x) \to -\frac{1}{2}\sqrt{c_2 - c_1^2 x^2} + c_1 x + c_2 \right\} \right\}$$

✓ **Maple** : cpu = 0.773 (sec), leaf count = 59

$$\left\{ y(x) = \frac{\_C1\, x^2}{2} + \_C2\, x + \_C1^2 + \_C2^2, y(x) = \frac{x}{2}\left(\_C1 + \frac{Arcsinh(x)}{4} \right)\sqrt{x^2+1} - \frac{3\,x^2}{16} + \_C1^2 + \right.$$

ODE No. 1829

$$3x^2y''(x)^2+4y'(x)^2-2(3xy'(x)+y(x))\,y''(x)=0$$

✓ **Mathematica** : cpu = 0.0074367 (sec), leaf count = 24

$$\left\{\left\{y(x)\to \frac{c_1^2x^2}{c_2}+c_1x+c_2\right\}\right\}$$

✓ **Maple** : cpu = 0.539 (sec), leaf count = 36

$$\left\{y(x)=0, y(x)=x^{\frac{2\sqrt{3}}{3}}\_C1\,x, y(x)=\frac{\_C1^2x^2}{\_C2}+\_C1\,x+\_C2\right\}$$

ODE No. 1830

$$(2-9x)x^2y''(x)^2+6y(x)y''(x)-36xy'(x)^2-6(1-6x)xy'(x)y''(x)=0$$

✓ **Mathematica** : cpu = 0.193041 (sec), leaf count = 24

$$\left\{\left\{y(x)\to \frac{c_1^2x^3}{c_2}+c_1x+c_2\right\}\right\}$$

✓ **Maple** : cpu = 0.695 (sec), leaf count = 308

$$\left\{y(x)=0, y(x)=\frac{27\_C1\,\sqrt{5}\sqrt{4}x}{4}\left((9\,x-1)\sqrt{9}+9\sqrt{9\,x^2-2\,x}\right)^{-\frac{2\sqrt{9}}{9}}\left((9\,x-1)\sqrt{9}+9\sqrt{9\,x^2-2\,x}\right)^{-\cdots}\right.$$

ODE No. 1831

$$y(x)(xF(0,2)+xF(2,0))y''(x)+xF(2,2)y''(x)^2+xF(1,1)y''(x)+y'(x)\left((xF(1,2)+xF(2,1))y''(x)+y(x)(\cdots\right.$$

✗ **Mathematica** : cpu = 506.625 (sec), leaf count = 0 , could not solve

```
DSolve[x*F[0, 0]*y[x]^2 + x*F[1, 1]*Derivative[2][y][x] + (x*F[0, 2] + x*F[2, 0])*y[x]
```

✓ **Maple** : cpu = 1.238 (sec), leaf count = 163

$$\left\{y(x)=ODESolStruc\left(e^{\int \_b(\_a)\,d\_a+\_C1}, [\left\{\frac{d}{d\_a}\_b(\_a)=\frac{1}{2\,(F_{2,2})(\_a)}\left(\sqrt{(((F_{2,1})(\_a))^2+2\,(F_{1,2})(\cdots}\right.\right.\right.\right.$$

ODE No. 1832

$$y(x)y''(x)^2 - ae^{2x} = 0$$

✗ **Mathematica** : cpu = 1.13339 (sec), leaf count = 0 , could not solve

```
DSolve[-(a*E^(2*x)) + y[x]*Derivative[2][y][x]^2 == 0, y[x], x]
```

✓ **Maple** : cpu = 1.129 (sec), leaf count = 117

$$\left\{y(x) = ODESolStruc\left(\_a\left(e^{-\frac{2\int \_b(\_a)\,\mathrm{d}\_a}{3} - \frac{2\_C1}{3}}\right)^{-1}, [\left\{\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a) = -\frac{(\_b(\_a))^3}{9\_a}\left(-4\_a^2 + 9\sqrt{a\_a}\right)\right.\right.\right.$$

ODE No. 1833

$$y''(x)^2\left(a^2y(x)^2 - b^2\right) + y'(x)^2\left(a^2y'(x)^2 - 1\right) - 2a^2y(x)y'(x)^2y''(x) = 0$$

✗ **Mathematica** : cpu = 3600.91 (sec), leaf count = 0 , timed out

```
$Aborted
```

✓ **Maple** : cpu = 3.947 (sec), leaf count = 162

$$\left\{y(x) = \_C1, y(x) = \frac{b}{a}, y(x) = b\left(e^{\frac{\_C2+x}{b}\sqrt{\_C1^2a^2-1}} - \_C1\right)\frac{1}{\sqrt{\_C1^2a^2-1}}, y(x) = \frac{b}{a}\tan\left(\frac{\_C1 - x}{ab}\sqrt{\right.\right.$$

ODE No. 1834

$$\left(x^2y(x)y''(x) + x^2\left(-y'(x)^2\right) + y(x)^2\right)^2 - 4xy(x)\left(xy'(x) - y(x)\right)^3 = 0$$

✗ **Mathematica** : cpu = 17.1531 (sec), leaf count = 0 , could not solve

```
DSolve[-4*x*y[x]*(-y[x] + x*Derivative[1][y][x])^3 + (y[x]^2 - x^2*Derivative[1][y][x]
```

✓ **Maple** : cpu = 0.645 (sec), leaf count = 92

$$\left\{y(x) = 0, y(x) = \_C1\,x, y(x) = ODESolStruc\left(e^{\int \_b(\_a)\,\mathrm{d}\_a + \_C1}, [\left\{\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a) = \frac{1}{\_a^2}\left(-2\sqrt{\_a\,(-1\right.\right.\right.\right.$$

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 = 0.120559 (sec), leaf count = 143

$$\left\{\left\{y(x)\to\frac{1}{4}\left(-\frac{8c_1^3}{\sqrt[3]{3}\sqrt[3]{\sqrt{3}\sqrt{27c_1^{10}c_2^{10}-64c_1^9c_2^9}-9c_1^5c_2^5}}+\frac{c_1^2}{c_2}-\frac{2\sqrt[3]{\sqrt{3}\sqrt{27c_1^{10}c_2^{10}-64c_1^9c_2^9}-9c_1^5c_2^5}}{3^{2/3}c_2^3}\right)x^2+\right.\right.$$

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve((2*diff(diff(y(x),x),x)*y(x)-diff(y(x),x)^2)^3+32*diff(diff(y(x),x),x)*(x*diff(
diff(y(x),x))^3=0,y(x))
```

ODE No. 1836

$$\sqrt{ay''(x)^2+by'(x)^2}+cy(x)y''(x)+dy'(x)^2=0$$

✗ **Mathematica** : cpu = 14.4938 (sec), leaf count = 0 , could not solve

```
DSolve[d*Derivative[1][y][x]^2 + c*y[x]*Derivative[2][y][x] + Sqrt[b*Derivative[1][y][
```

✓ **Maple** : cpu = 6.725 (sec), leaf count = 116

$$\left\{y(x)=0, y(x)=\_C1, y(x)=\_C1\,x+\_C2, y(x)=ODESolStruc\left(\_a,[\left\{\frac{\_b(\_a)}{-c^2\_a^2+a}\left(\left(\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a\right.\right.\right.\right.$$

ODE No. 1837

$$y^{(3)}(x)-a^2\left(y'(x)^5+2y'(x)^3+y'(x)\right)=0$$

✗ **Mathematica** : cpu = 11.2399 (sec), leaf count = 0 , could not solve

```
DSolve[-(a^2*(Derivative[1][y][x] + 2*Derivative[1][y][x]^3 + Derivative[1][y][x]^5))
```

✓ **Maple** : cpu = 1.372 (sec), leaf count = 95

$$\left\{y(x)=\int RootOf\left(-3\int^{\_Z}\frac{1}{\sqrt{3\,a^2\_f^6+9\,a^2\_f^4+9\,a^2\_f^2+9\_C1}}d\_f+x+\_C2\right)\mathrm{d}x+\_C3, y(x\right.$$

ODE No. 1838

$$y^{(3)}(x) + y(x)y''(x) - y'(x)^2 + 1 = 0$$

✗ **Mathematica** : cpu = 0.0520489 (sec), leaf count = 0 , could not solve

```
DSolve[1 - Derivative[1][y][x]^2 + y[x]*Derivative[2][y][x] + Derivative[3][y][x] == 0
```

✓ **Maple** : cpu = 1.61 (sec), leaf count = 73

$$\left\{y(x) = ODESolStruc\left(\_a, [\left\{\left(\frac{\mathrm{d}^2}{\mathrm{d}\_a^2}\_b(\_a)\right)(\_b(\_a))^2 + \left(\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a)\right)^2 \_b(\_a) + \left(\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a)\right.\right.\right.\right.$$

ODE No. 1839

$$y^{(3)}(x) - y(x)y''(x) + y'(x)^2 = 0$$

✗ **Mathematica** : cpu = 0.0365327 (sec), leaf count = 0 , could not solve

```
DSolve[Derivative[1][y][x]^2 - y[x]*Derivative[2][y][x] + Derivative[3][y][x] == 0, y[
```

✓ **Maple** : cpu = 1.592 (sec), leaf count = 116

$$\left\{y(x) = ODESolStruc\left(e^{\int \_g(\_f)\,\mathrm{d}\_f + \_C2}, [\left\{\frac{\mathrm{d}}{\mathrm{d}\_f}\_g(\_f) = 6\,\frac{(\_g(\_f)\,\_f + 1)\,\_g(\_f)\,(1/6 + (\_f - 1/6)}{\_f}\right.\right.\right.$$

ODE No. 1840

$$ay(x)y''(x) + y^{(3)}(x) = 0$$

✗ **Mathematica** : cpu = 0.0278288 (sec), leaf count = 0 , could not solve

```
DSolve[a*y[x]*Derivative[2][y][x] + Derivative[3][y][x] == 0, y[x], x]
```

✓ **Maple** : cpu = 0.953 (sec), leaf count = 129

$$\left\{y(x) = ODESolStruc\left(e^{\int \_g(\_f)\,\mathrm{d}\_f + \_C2}, [\left\{\frac{\mathrm{d}}{\mathrm{d}\_f}\_g(\_f) = \frac{\_g(\_f)\left(6\,(\_g(\_f))^2\,\_f^2 + 2\,(\_g(\_f))^2\,\_f\,a\right.}{\_f}\right.\right.\right.$$

ODE No. 1841

$$-f(x)+x^2y^{(3)}(x)+xy''(x)+(2xy(x)-1)y'(x)+y(x)^2=0$$

✗ **Mathematica** : cpu = 0.123719 (sec), leaf count = 0 , could not solve

```
DSolve[-f[x] + y[x]^2 + (-1 + 2*x*y[x])*Derivative[1][y][x] + x*Derivative[2][y][x] +
```

✓ **Maple** : cpu = 0.63 (sec), leaf count = 60

$$\left\{y(x)=ODESolStruc\left(\_b(\_a),[\left\{\_a^2\frac{\mathrm{d}^2}{\mathrm{d}\_a^2}\_b(\_a)+\_a(\_b(\_a))^2-\left(\frac{\mathrm{d}}{\mathrm{d}\_a}\_b(\_a)\right)\_a-\int f(\_a)\right.\right.\right.$$

ODE No. 1842

$$x^2y^{(3)}(x)+x(y(x)-1)y''(x)+xy'(x)^2+(1-y(x))y'(x)=0$$

✓ **Mathematica** : cpu = 0.252592 (sec), leaf count = 286

$$\left\{\left\{y(x)\to\frac{2x\left(c_3\left(J_{\frac{\sqrt{c_2+2}}{\sqrt{2}}}\left(-\frac{1}{2}ix\sqrt{c_1}\right)-\frac{1}{4}i\sqrt{c_1}x\left(J_{\frac{\sqrt{c_2+2}}{\sqrt{2}}-1}\left(-\frac{1}{2}ix\sqrt{c_1}\right)-J_{\frac{\sqrt{c_2+2}}{\sqrt{2}}+1}\left(-\frac{1}{2}ix\sqrt{c_1}\right)\right)\right)+Y_{\frac{\sqrt{c_2+}}{\sqrt{2}}}\right.}{c_3xJ_{\frac{\sqrt{c_2+2}}{\sqrt{2}}}\left(-\frac{1}{2}ix\sqrt{c_1}\right)+xY_{\frac{\sqrt{c_2+2}}{\sqrt{2}}}}\right.\right.$$

✓ **Maple** : cpu = 1.471 (sec), leaf count = 190

$$\left\{\ln(x)+2\int^{y(x)}\left(2\left(RootOf\left(-2\sqrt{4+\_C1}Y_{1/2\sqrt{4+\_C1}}\left(1/2\sqrt{2}\_Z\right)\_C2+2Y_{1/2\sqrt{4+\_C1}}\left(1/2\sqrt{2}\_Z\right)\right.\right.\right.\right.$$

ODE No. 1843

$$y^{(3)}(x)y(x)+y(x)^3y'(x)-y'(x)y''(x)=0$$

✓ **Mathematica** : cpu = 3.01882 (sec), leaf count = 409

$$\left\{\left\{y(x)\to\text{InverseFunction}\left[-\frac{2i\sqrt{\frac{\#1^2}{2\left(\sqrt{c_2^2-c_1}-c_2\right)}+1}\sqrt{1-\frac{\#1^2}{2\left(c_2+\sqrt{c_2^2-c_1}\right)}}F\left(i\sinh^{-1}\left(\frac{\sqrt{\frac{1}{\sqrt{c_2^2-c_1}-c_2}}\#1}{\sqrt{2}}\right)|\frac{c_2}{c_2}\right.}{\sqrt{\frac{1}{\sqrt{c_2^2-c_1}-c_2}}\sqrt{-\frac{\#1^4}{2}+2\#1^2c_2-2c_1}}\right.\right.\right.$$

✓ **Maple** : cpu = 0.494 (sec), leaf count = 77

$$\left\{\int^{y(x)} -2\frac{1}{\sqrt{-\_a^4+4\_C2\,\_a^2-4\_C2^2+4\_C1}}d\_a-x-\_C3=0,\int^{y(x)} 2\frac{1}{\sqrt{-\_a^4+4\_C2\,\_a^2}}\right.$$

ODE No. 1844

$$4y(x)^2y^{(3)}(x)+15y'(x)^3-18y(x)y'(x)y''(x)=0$$

✗ **Mathematica** : cpu = 0.07912 (sec), leaf count = 0 , could not solve

```
DSolve[15*Derivative[1][y][x]^3 - 18*y[x]*Derivative[1][y][x]*Derivative[2][y][x] + 4*
```

✓ **Maple** : cpu = 0.643 (sec), leaf count = 17

$$\left\{y(x)=\frac{\_C3}{\left(-4+(x+\_C2)^2\_C1\right)^2}\right\}$$

ODE No. 1845

$$9y(x)^2y^{(3)}(x)+40y'(x)^3-45y(x)y'(x)y''(x)=0$$

✗ **Mathematica** : cpu = 0.0834529 (sec), leaf count = 0 , could not solve

```
DSolve[40*Derivative[1][y][x]^3 - 45*y[x]*Derivative[1][y][x]*Derivative[2][y][x] + 9*
```

✓ **Maple** : cpu = 0.218 (sec), leaf count = 22

$$\left\{y(x)=\_C3\left(\_C2^2+2\_C2\,x+x^2-9\_C1\right)^{-\frac{3}{2}}\right\}$$

ODE No. 1846

$$2y^{(3)}(x)y'(x)-3y'(x)^2=0$$

✓ **Mathematica** : cpu = 0.051393 (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 = 0.031 (sec), leaf count = 28

$$\left\{y(x)=\_C1,y(x)=\_C1+\_C2\,\mathrm{e}^{\frac{\sqrt{6}x}{2}}+\_C3\,\mathrm{e}^{-\frac{\sqrt{6}x}{2}}\right\}$$

ODE No. 1847

$$y^{(3)}(x)\left(y'(x)^2+1\right)-3y'(x)y''(x)^2=0$$

✓ **Mathematica** : cpu = 0.132276 (sec), leaf count = 95

$$\left\{\left\{y(x)\to c_3-\frac{i\sqrt{c_1^2x^2+2c_2c_1^2x+c_2^2c_1^2-1}}{c_1}\right\},\left\{y(x)\to c_3+\frac{i\sqrt{c_1^2x^2+2c_2c_1^2x+c_2^2c_1^2-1}}{c_1}\right\}\right\}$$

✓ **Maple** : cpu = 0.638 (sec), leaf count = 49

$$\left\{y(x)=-\sqrt{-\_C2^2-2\_C2\,x-x^2+\_C1}+\_C3,y(x)=\sqrt{-\_C2^2-2\_C2\,x-x^2+\_C1}+\_C3\right\}$$

ODE No. 1848

$$y^{(3)}(x)\left(y'(x)^2+1\right)-y''(x)^2\left(a+3y'(x)\right)=0$$

✗ **Mathematica** : cpu = 1476.12 (sec), leaf count = 0 , could not solve

```
DSolve[-((a + 3*Derivative[1][y][x])*Derivative[2][y][x]^2) + (1 + Derivative[1][y][x]
```

✓ **Maple** : cpu = 1.566 (sec), leaf count = 789

$$\left\{y(x)=\int\frac{\sin\left(RootOf\left(e^{2a\_Z}\_C1^2\_C2^2a^4+2e^{2a\_Z}\_C1^2\_C2\,a^4x+e^{2a\_Z}\_C1^2a^4x^2+2e^{2a\_Z}\_C1^2\right.\right.}{\cos\left(RootOf\left(e^{2a\_Z}\_C1^2\_C2^2a^4+2e^{2a\_Z}\_C1^2\_C2\,a^4x+e^{2a\_Z}\_C1^2a^4x^2+2e^{2a\_Z}\_C1^2\right.\right.}\right.$$

ODE No. 1849

$$y^{(3)}(x)y''(x)-a\sqrt{b^2y''(x)^2+1}=0$$

✓ **Mathematica** : cpu = 0.72991 (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 = 0.259 (sec), leaf count = 197

$$\left\{y(x)=\_C2\,x+\int\frac{1}{2\,b}\left(-1\ln\left(\sqrt{(1+b^2(x+\_C1)\,a)(-1+b^2(x+\_C1)\,a)}+(x+\_C1)\,b^4a^2\frac{1}{\sqrt{a^2b^4}}\right.\right.\right.$$

ODE No. 1850

$$y^{(4)}(x)y'(x) - y^{(3)}(x)y''(x) + y^{(3)}(x)y'(x)^3 = 0$$

✗ **Mathematica** : cpu = 0.0934178 (sec), leaf count = 0 , could not solve

```
DSolve[Derivative[1][y][x]^3*Derivative[3][y][x] - Derivative[2][y][x]*Derivative[3][y
```

✓ **Maple** : cpu = 1.568 (sec), leaf count = 164

$$\left\{y(x) = ODESolStruc\left(\int \frac{\_j(\_h)}{e^{\int \_j(\_h)\,d\_h + \_C2}\,\_h}\,d\_h + \_C3, [\left\{\frac{d}{d\_h}\_j(\_h) = \frac{\_j(\_h)\left(12\left(\_j(\_h)\right)^2 \_h^2\right.}{}\right.\right.\right.$$

ODE No. 1851

$$y'(x)^3\left(f'(x)y'(x) + f(x)y''(x)\right) - y''(x)\left(f''(x)y'(x) + 2f'(x)y''(x) + f(x)y^{(3)}(x)\right) + y'(x)\left(f^{(3)}(x)y'(x) + 3f\right.$$

✗ **Mathematica** : cpu = 0.877152 (sec), leaf count = 0 , could not solve

```
DSolve[2*q[x]*Sin[y[x]]*Derivative[1][y][x]^2 + Derivative[1][y][x]^3*(Derivative[1][f
(Derivative[1][q][x]*Derivative[1][y][x]) + q[x]*Derivative[2][y][x]) - Derivative[2][
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve(diff(y(x),x)*(diff(diff(diff(f(x),x),x),x)*diff(y(x),x)+3*diff(diff(f(x),x),x)*
diff(diff(y(x),x),x)*f*diff(diff(diff(y(x),x),x),x)+diff(y(x),x)^3*(diff(f(x),x)*diff(
diff(q(x),x)*diff(y(x),x))*cos(y(x))=0,y(x))
```

ODE No. 1852

$$3y^{(4)}(x)y''(x) - 5y^{(3)}(x)^2 = 0$$

✓ **Mathematica** : cpu = 0.0349571 (sec), leaf count = 28

$$\left\{\left\{y(x) \to c_2\left(-\sqrt{3c_1 + 2x}\right) + c_4 x + c_3\right\}\right\}$$

✓ **Maple** : cpu = 0.245 (sec), leaf count = 28

$$\left\{y(x) = 3\left(\_C2 + x\right)\sqrt{6}\_C1\sqrt{-\frac{\_C1}{\_C2 + x}} + \_C3\,x + \_C4\right\}$$

ODE No. 1853

$$40y^{(3)}(x)^3+9y^{(5)}(x)y''(x)^2-45y^{(4)}(x)y^{(3)}(x)y''(x)=0$$

✗ **Mathematica** : cpu = 0.0738189 (sec), leaf count = 0 , could not solve

```
DSolve[40*Derivative[3][y][x]^3 - 45*Derivative[2][y][x]*Derivative[3][y][x]*Derivati
```

✓ **Maple** : cpu = 1.628 (sec), leaf count = 110

$$\left\{y(x)=\iint RootOf\left(-\int^{\_Z}\left(RootOf\left(-20\ln(\_f)+\int^{\_Z}\_k\left(\mathrm{e}^{RootOf(81\_k^2\mathrm{e}^{\_Z}-40\,\mathrm{e}^{\_Z}\ln(2)-20\,\mathrm{e}^{\_Z}\ln(5)+20\,\mathrm{e}\right.\right.\right.\right.\right.$$

ODE No. 1854

$$y^{(n)}(x)-f\left(\frac{\partial^{n-1}y(x)}{\partial x^{n-1}}\right)=0$$

✗ **Mathematica** : cpu = 0.142945 (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
```

ODE No. 1855

$$y^{(n)}(x)-f\left(\frac{\partial^{n-2}y(x)}{\partial x^{n-2}}\right)=0$$

✗ **Mathematica** : cpu = 0.00453799 (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
```

ODE No. 1856

$$\{x'(t) = ax(t), y'(t) = b\}$$

✓ **Mathematica** : cpu = 0.015018 (sec), leaf count = 22

$$\left\{\left\{x(t) \to c_1 e^{at}, y(t) \to bt + c_2\right\}\right\}$$

✓ **Maple** : cpu = 0.074 (sec), leaf count = 19

$$\left\{\left\{x(t) = \_C1\, e^{at}, y(t) = bt + \_C2\right\}\right\}$$

ODE No. 1857

$$\{x'(t) = ay(t), y'(t) = -ax(t)\}$$

✓ **Mathematica** : cpu = 1.43801 (sec), leaf count = 39

$$\{\{x(t) \to c_2 \sin(at) + c_1 \cos(at), y(t) \to c_2 \cos(at) - c_1 \sin(at)\}\}$$

✓ **Maple** : cpu = 0.108 (sec), leaf count = 35

$$\{\{x(t) = \_C1\ \sin(at) + \_C2\ \cos(at), y(t) = \cos(at)\_C1 - \sin(at)\_C2\}\}$$

ODE No. 1858

$$\{x'(t) = ay(t), y'(t) = bx(t)\}$$

✓ **Mathematica** : cpu = 0.0257973 (sec), leaf count = 182

$$\left\{\left\{x(t) \to \frac{1}{2}c_1 e^{-\sqrt{a}\sqrt{b}t}\left(e^{2\sqrt{a}\sqrt{b}t} + 1\right) + \frac{\sqrt{a}c_2 e^{-\sqrt{a}\sqrt{b}t}\left(e^{2\sqrt{a}\sqrt{b}t} - 1\right)}{2\sqrt{b}}, y(t) \to \frac{\sqrt{b}c_1 e^{-\sqrt{a}\sqrt{b}t}\left(e^{2\sqrt{a}\sqrt{b}t} - 1\right)}{2\sqrt{a}} +\right.\right.$$

✓ **Maple** : cpu = 0.051 (sec), leaf count = 64

$$\left\{\left\{x(t) = \_C1\, e^{\sqrt{a}\sqrt{b}t} + \_C2\, e^{-\sqrt{a}\sqrt{b}t}, y(t) = 1\sqrt{b}\left(\_C1\, e^{\sqrt{a}\sqrt{b}t} - \_C2\, e^{-\sqrt{a}\sqrt{b}t}\right)\frac{1}{\sqrt{a}}\right\}\right\}$$

ODE No. 1859

$$\{x'(t) = ax(t) - y(t), y'(t) = ay(t) + x(t)\}$$

✓ **Mathematica** : cpu = 0.00539074 (sec), leaf count = 51

$$\left\{\left\{x(t)\to c_1e^{at}\cos(t)-c_2e^{at}\sin(t), y(t)\to c_1e^{at}\sin(t)+c_2e^{at}\cos(t)\right\}\right\}$$

✓ **Maple** : cpu = 0.085 (sec), leaf count = 37

$$\left\{\left\{x(t)=\mathrm{e}^{at}(\_C1\ \sin(t)+\_C2\ \cos(t)), y(t)=\mathrm{e}^{at}(\sin(t)\,\_C2-\cos(t)\,\_C1)\right\}\right\}$$

ODE No. 1860

$$\{x'(t) = ax(t) + by(t), y'(t) = by(t) + cx(t)\}$$

✓ **Mathematica** : cpu = 0.0488593 (sec), leaf count = 696

$$\left\{\left\{x(t)\to \frac{c_1\left(a\left(-e^{\frac{1}{2}t\left(-\sqrt{a^2-2ab+b^2+4bc}+a+b\right)}\right)+ae^{\frac{1}{2}t\left(\sqrt{a^2-2ab+b^2+4bc}+a+b\right)}+be^{\frac{1}{2}t\left(-\sqrt{a^2-2ab+b^2+4bc}+a+b\right)}+\surd\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.071 (sec), leaf count = 177

$$\left\{\left\{x(t)=\_C1\,\mathrm{e}^{\frac{t}{2}\left(a+b+\sqrt{b^2+(-2a+4c)b+a^2}\right)}+\_C2\,\mathrm{e}^{\frac{t}{2}\left(a+b-\sqrt{b^2+(-2a+4c)b+a^2}\right)}, y(t)=\frac{1}{2b}\left(-\_C2\left(a-b+\surd\right.\right.\right.\right.$$

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 = 0.0132866 (sec), leaf count = 183

$$\left\{\left\{x(t)\to c_2e^{\frac{t(a\alpha+b\beta)}{a^2+b^2}}\sin\left(\frac{t(a\beta-\alpha b)}{a^2+b^2}\right)+c_1e^{\frac{t(a\alpha+b\beta)}{a^2+b^2}}\cos\left(\frac{t(a\beta-\alpha b)}{a^2+b^2}\right), y(t)\to c_2e^{\frac{t(a\alpha+b\beta)}{a^2+b^2}}\cos\left(\frac{t(a\beta-\alpha b}{a^2+b^2}\right.\right.\right.$$

✓ **Maple** : cpu = 0.151 (sec), leaf count = 152

$$\left\{\left\{x(t)=\_C1\,\mathrm{e}^{\frac{t((i\beta+\alpha)a-b(i\alpha-\beta))}{a^2+b^2}}+\_C2\,\mathrm{e}^{-\frac{t((i\beta-\alpha)a-b(i\alpha+\beta))}{a^2+b^2}}, y(t)=i\left(\_C1\,\mathrm{e}^{\frac{t((i\beta+\alpha)a-b(i\alpha-\beta))}{a^2+b^2}}-\_C2\,\mathrm{e}^{-\frac{t((i\beta-\alpha)a-}{a^2+}}\right.\right.\right.$$

ODE No. 1862

$$\{x'(t) = -y(t), y'(t) = 2x(t) + 2y(t)\}$$

✓ **Mathematica** : cpu = 0.220213 (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 = 0.033 (sec), leaf count = 39

$$\{\{x(t) = e^t(\sin(t)\_C1 + \cos(t)\_C2), y(t) = -((\_C1 + \_C2)\cos(t) + \sin(t)(\_C1 - \_C2))e^t\}\}$$

ODE No. 1863

$$\{x'(t) + 3x(t) + 4y(t) = 0, 2x(t) + y'(t) + 5y(t) = 0\}$$

✓ **Mathematica** : cpu = 0.00755382 (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 = 0.031 (sec), leaf count = 35

$$\left\{\left\{x(t) = \_C1\, e^{-7t} + \_C2\, e^{-t}, y(t) = \_C1\, e^{-7t} - \frac{\_C2\, e^{-t}}{2}\right\}\right\}$$

ODE No. 1864

$$\{x'(t) = -5x(t) - 2y(t), y'(t) = x(t) - 7y(t)\}$$

✓ **Mathematica** : cpu = 0.0127484 (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 = 0.034 (sec), leaf count = 44

$$\left\{\left\{x(t) = e^{-6t}(\sin(t)\_C1 + \cos(t)\_C2), y(t) = -\frac{e^{-6t}((\_C1 - \_C2)\cos(t) - \sin(t)(\_C1 + \_C2))}{2}\right\}\right\}$$

ODE No. 1865

$$\{x'(t) = \mathrm{a1}x(t) + \mathrm{b1}y(t) + \mathrm{c1}, y'(t) = \mathrm{a2}x(t) + \mathrm{b2}y(t) + \mathrm{c2}\}$$

✓ **Mathematica** : cpu = 1.29732 (sec), leaf count = 2062

$$\left\{\left\{x(t) \to -\frac{\mathrm{b1}e^{-\frac{1}{2}\left(\mathrm{a1}+\mathrm{b2}+\sqrt{\mathrm{a1}^2-2\mathrm{b2}\mathrm{a1}+\mathrm{b2}^2+4\mathrm{a2}\mathrm{b1}}\right)t}\left(\frac{2\left(\left(\mathrm{a1}-\mathrm{b2}+\sqrt{\mathrm{a1}^2-2\mathrm{b2}\mathrm{a1}+\mathrm{b2}^2+4\mathrm{a2}\mathrm{b1}}\right)\mathrm{c2}-2\mathrm{a2}\mathrm{c1}\right)e^{\sqrt{\mathrm{a1}^2-2\mathrm{b2}\mathrm{a1}+\mathrm{b2}^2+4\mathrm{a2}\mathrm{b1}}}}{-\mathrm{a1}-\mathrm{b2}+\sqrt{\mathrm{a1}^2-2\mathrm{b2}\mathrm{a1}+\mathrm{b2}^2+4\mathrm{a2}\mathrm{b1}}}\right.}{2\,(\mathrm{a1}}\right.\right.$$

✓ **Maple** : cpu = 0.404 (sec), leaf count = 224

$$\left\{\left\{x(t) = e^{\frac{t}{2}\left(a1+b2+\sqrt{a1^2-2\,a1\,b2+4\,a2\,b1+b2^2}\right)}\_C2 + e^{\frac{t}{2}\left(a1+b2-\sqrt{a1^2-2\,a1\,b2+4\,a2\,b1+b2^2}\right)}\_C1 + \frac{c2\,b1 - c1\,b2}{a1\,b2 - a2\,b1}\right.\right.$$

ODE No. 1866

$$\{x'(t) + 2y(t) = 3t, y'(t) - 2x(t) = 4\}$$

✓ **Mathematica** : cpu = 0.0325329 (sec), leaf count = 132

$$\left\{\left\{x(t) \to -c_2\sin(2t) + c_1\cos(2t) + \cos(2t)\left(\frac{3}{2}t\sin(2t) - \frac{5}{4}\cos(2t)\right) - \sin(2t)\left(\frac{5}{4}\sin(2t) + \frac{3}{2}t\cos(2t)\right)\right.\right.$$

✓ **Maple** : cpu = 0.031 (sec), leaf count = 39

$$\left\{\left\{x(t) = \sin(2\,t)\_C2 + \cos(2\,t)\_C1 - \frac{5}{4}, y(t) = -\cos(2\,t)\_C2 + \sin(2\,t)\_C1 + \frac{3\,t}{2}\right\}\right\}$$

ODE No. 1867

$$\left\{-t^2 + x'(t) + y(t) + 6t + 1 = 0, y'(t) - x(t) = -3t^2 + 3t + 1\right\}$$

✓ **Mathematica** : cpu = 0.0841844 (sec), leaf count = 124

$$\{\{x(t) \to -c_2\sin(t) + c_1\cos(t) + \cos(t)\left(\left(3t^2 - t - 13\right)\cos(t) + (t-12)t\sin(t)\right) - \sin(t)\left(\left(-3t^2 + t + 13\right.\right.$$

✓ **Maple** : cpu = 0.032 (sec), leaf count = 42

$$\{\{x(t) = \sin(t)\_C2 + \cos(t)\_C1 + 3\,t^2 - t - 13, y(t) = t^2 - \cos(t)\_C2 + \sin(t)\_C1 - 12\,t\}\}$$

ODE No. 1868

$$\left\{x'(t)+3x(t)-y(t)=e^{2t},x(t)+y'(t)+5y(t)=e^{t}\right\}$$

✓ **Mathematica** : cpu = 0.0457578 (sec), leaf count = 162

$$\left\{\left\{x(t)\to c_1e^{-4t}(t+1)+c_2e^{-4t}t-e^t(t+1)\left(\frac{t}{5}+\frac{1}{36}e^t(6t-7)-\frac{1}{25}\right)+e^tt\left(\frac{t}{5}+\frac{1}{36}e^t(6t-1)+\frac{4}{25}\right),\right.\right.$$

✓ **Maple** : cpu = 0.118 (sec), leaf count = 64

$$\left\{\left\{x(t)=\mathrm{e}^{-4t}\_C2+\mathrm{e}^{-4t}t\_C1+\frac{\mathrm{e}^{t}}{25}+\frac{7\,\mathrm{e}^{2t}}{36},y(t)=-\frac{\mathrm{e}^{2t}}{36}-\mathrm{e}^{-4t}\_C2-\mathrm{e}^{-4t}t\_C1+\frac{4\,\mathrm{e}^{t}}{25}+\mathrm{e}^{-4t}\_C1\right\}\right.$$

ODE No. 1869

$$\left\{x'(t)+2x(t)+y'(t)+y(t)=t+e^{2t},x'(t)-x(t)+y'(t)+3y(t)=e^{t}-1\right\}$$

✓ **Mathematica** : cpu = 0.454379 (sec), leaf count = 118

$$\left\{\left\{x(t)\to\frac{5}{72}\left(c_1e^{-7t/5}+\frac{12(5712t+833e^t+2352e^{2t}-5508)}{20825}\right)+\frac{1}{5}\left(t-e^t+e^{2t}+1\right),y(t)\to\frac{5}{48}\left(c_1e^{-7\right.\right.\right.$$

✓ **Maple** : cpu = 0.109 (sec), leaf count = 51

$$\left\{\left\{x(t)=\frac{3\,t}{7}-\frac{1}{49}-\frac{\mathrm{e}^{t}}{6}+\frac{5\,\mathrm{e}^{2t}}{17}+\mathrm{e}^{-\frac{7t}{5}}\_C1,y(t)=-\frac{\mathrm{e}^{2t}}{17}+\frac{\mathrm{e}^{t}}{4}+\frac{t}{7}-\frac{26}{49}+\frac{3\_C1}{2}\mathrm{e}^{-\frac{7t}{5}}\right\}\right\}$$

ODE No. 1870

$$\left\{x'(t)+y'(t)-y(t)=e^{t},2x'(t)+y'(t)+2y(t)=\cos(t)\right\}$$

✓ **Mathematica** : cpu = 0.173346 (sec), leaf count = 122

$$\left\{\left\{x(t)\to-\frac{3}{4}c_2\left(e^{4t}-1\right)+c_1+\frac{1}{68}e^{-4t}\left(e^{4t}-1\right)\left(34e^t+3\sin(t)-12\cos(t)\right)+\frac{1}{4}\left(2e^{-3t}+2e^t+\frac{3}{17}e^{-4t}\mathrm{s}\right.\right.\right.$$

✓ **Maple** : cpu = 0.21 (sec), leaf count = 47

$$\left\{\left\{x(t)=\frac{\_C1\,\mathrm{e}^{4t}}{4}+\frac{5\sin(t)}{17}-\frac{3\cos(t)}{17}+\mathrm{e}^{t}+\_C2,y(t)=-\frac{\_C1\,\mathrm{e}^{4t}}{3}+\frac{4\cos(t)}{17}-\frac{\sin(t)}{17}-\frac{2\,\mathrm{e}^{t}}{3}\right\}\right\}$$

ODE No. 1871

$$\left\{4x'(t)+2x(t)+9y'(t)+31y(t)=e^t,3x'(t)+x(t)+7y'(t)+24y(t)=3\right\}$$

✓ **Mathematica** : cpu = 0.205212 (sec), leaf count = 180

$$\left\{\left\{x(t)\to -c_2e^{-4t}\sin(t)+c_1e^{-4t}(\cos(t)-\sin(t))+\frac{1}{442}\left(3\left(153e^t-754\right)\sin(t)+31\left(17e^t-78\right)\cos(t)\right)(c\right.\right.$$

✓ **Maple** : cpu = 0.066 (sec), leaf count = 62

$$\left\{\left\{x(t)=\mathrm{e}^{-4t}\sin(t)\_C2+\mathrm{e}^{-4t}\cos(t)\_C1-\frac{93}{17}+\frac{31\,\mathrm{e}^t}{26},y(t)=\frac{((-221\_C1-221\_C2)\cos(t)+221}{221}\right.\right.$$

ODE No. 1872

$$\left\{4x'(t)+11x(t)+9y'(t)+31y(t)=e^t,3x'(t)+8x(t)+7y'(t)+24y(t)=e^{2t}\right\}$$

✓ **Mathematica** : cpu = 0.0604337 (sec), leaf count = 162

$$\left\{\left\{x(t)\to -c_1e^{-4t}(t-1)-c_2e^{-4t}t-e^tt\left(-\frac{4t}{5}+\frac{1}{36}e^t(30t+19)-\frac{11}{25}\right)-e^t(t-1)\left(\frac{4t}{5}-\frac{1}{36}e^t(30t+49\right.\right.\right.$$

✓ **Maple** : cpu = 0.054 (sec), leaf count = 65

$$\left\{\left\{x(t)=\mathrm{e}^{-4t}\_C2+\mathrm{e}^{-4t}t\_C1+\frac{31\,\mathrm{e}^t}{25}-\frac{49\,\mathrm{e}^{2t}}{36},y(t)=\frac{19\,\mathrm{e}^{2t}}{36}-\frac{11\,\mathrm{e}^t}{25}-\mathrm{e}^{-4t}\_C2-\mathrm{e}^{-4t}t\_C1-\mathrm{e}^{-4t}\_\right.\right.$$

ODE No. 1873

$$\left\{4x'(t)+44x(t)+9y'(t)+49y(t)=t,3x'(t)+34x(t)+7y'(t)+38y(t)=e^t\right\}$$

✓ **Mathematica** : cpu = 0.0472799 (sec), leaf count = 322

$$\left\{\left\{x(t)\to \frac{1}{5}c_1e^{-6t}\left(4e^{5t}+1\right)-\frac{1}{5}c_2e^{-6t}\left(e^{5t}-1\right)-\frac{1}{5}e^{-6t}\left(e^{5t}-1\right)\left(\frac{16}{5}e^{6t}\left(\frac{t}{6}-\frac{1}{36}\right)+4e^{2t}-\frac{4e^{7t}}{7}-\frac{31}{5}e\right.\right.\right.$$

✓ **Maple** : cpu = 0.053 (sec), leaf count = 52

$$\left\{\left\{x(t)=\mathrm{e}^{-6t}\_C2+\mathrm{e}^{-t}\_C1-\frac{56}{9}-\frac{29\,\mathrm{e}^t}{7}+\frac{19\,t}{3},y(t)=4\,\mathrm{e}^{-6t}\_C2-\mathrm{e}^{-t}\_C1+\frac{24\,\mathrm{e}^t}{7}+\frac{55}{9}-\frac{17\,t}{3}\right\}\right\}$$

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 = 0.169892 (sec), leaf count = 131

$$\{\{x(t)\to c_2e^{\text{Integrate}[f(K[2]),\{K[2],1,t\},\text{Assumptions}\to\text{True}]}\sin(\text{Integrate}[g(K[1]),\{K[1],1,t\},\text{Assumptions}\to\text{Tru}$$

✓ **Maple** : cpu = 1.424 (sec), leaf count = 57

$$\left\{\left\{x(t)=e^{\int\tan(\_C1-\int g(t)\,dt)g(t)+f(t)\,dt}\_C2, y(t)=e^{\int\tan(\_C1-\int g(t)\,dt)g(t)+f(t)\,dt}\tan\left(\_C1-\int g(t)\,dt\right)\_C2\right.\right.$$

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 = 0.00660219 (sec), leaf count = 0 , could not solve

```
DSolve[{f[t]*(a*x[t] + b*y[t]) + Derivative[1][x][t] == g[t], f[t]*(c*x[t] + d*y[t]) +
```

✓ **Maple** : cpu = 1.426 (sec), leaf count = 1447

$$\left\{\left\{x(t)=1\left(-\int\frac{g(t)\frac{d}{dt}f(t)-f(t)\left(\frac{d}{dt}g(t)-f(t)\left(h(t)b-g(t)d\right)\right)}{(f(t))^2}e^{\frac{\int f(t)\,dt}{2}\left(-\sqrt{\frac{-a^2+2ad-4bc-d^2}{ad-bc}}\sqrt{-ad+bc}+a+d\right)}\right.\right.\right.$$

ODE No. 1876

$$\left\{x'(t)=x(t)\cos(t),y'(t)=x(t)e^{-\sin(t)}\right\}$$

✓ **Mathematica** : cpu = 0.113969 (sec), leaf count = 41

$$\left\{\left\{x(t)\to c_1e^{\sin(t)},y(t)\to c_1\text{Integrate}\left[e^{\sin(K[1])-\sin(K[1])},\{K[1],1,t\},\text{Assumptions}\to\text{True}\right]+c_2\right\}\right\}$$

✓ **Maple** : cpu = 0.151 (sec), leaf count = 18

$$\{\{x(t)=\_C2\,e^{\sin(t)},y(t)=\_C2\,t+\_C1\}\}$$

ODE No. 1877

$$\{tx'(t) + y(t) = 0, x(t) + ty'(t) = 0\}$$

✓ **Mathematica** : cpu = 0.00503492 (sec), leaf count = 31

$$\left\{\left\{x(t) \to c_1 t + \frac{c_2}{t}, y(t) \to \frac{c_2}{t} - c_1 t\right\}\right\}$$

✓ **Maple** : cpu = 0.076 (sec), leaf count = 31

$$\left\{\left\{x(t) = \frac{\_C1\, t^2 + \_C2}{t}, y(t) = \frac{-\_C1\, t^2 + \_C2}{t}\right\}\right\}$$

ODE No. 1878

$$\{tx'(t) + 2x(t) = t, -(t+2)x(t) + ty'(t) - ty(t) = -t\}$$

✓ **Mathematica** : cpu = 0.0113974 (sec), leaf count = 39

$$\left\{\left\{x(t) \to \frac{c_1}{t^2} + \frac{t}{3}, y(t) \to -\frac{c_1}{t^2} + c_2 e^t - \frac{t}{3}\right\}\right\}$$

✓ **Maple** : cpu = 0.048 (sec), leaf count = 39

$$\left\{\left\{x(t) = \frac{t}{3} + \frac{\_C2}{t^2}, y(t) = \frac{3\_C1\, e^t t^2 - t^3 - 3\_C2}{3\, t^2}\right\}\right\}$$

ODE No. 1879

$$\left\{tx'(t) + 2(x(t) - y(t)) = t, x(t) + ty'(t) + 5y(t) = t^2\right\}$$

✓ **Mathematica** : cpu = 0.121518 (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 = 0.129 (sec), leaf count = 54

$$\left\{\left\{x(t) = \frac{2\, t^6 + 9\, t^5 + 30\_C2\, t + 30\_C1}{30\, t^4}, y(t) = \frac{8\, t^6 - 3\, t^5 - 30\_C2\, t - 60\_C1}{60\, t^4}\right\}\right\}$$

ODE No. 1880

$$\{t^2(1-\sin(t))x'(t) = t^2y(t) + tx(t)(1-2\sin(t)), t^2(1-\sin(t))y'(t) = x(t)(t\cos(t)-\sin(t)) + ty(t)(1-t$$

✗ **Mathematica** : cpu = 0.0208916 (sec), leaf count = 0 , could not solve

```
DSolve[{t^2*(1 - Sin[t])*Derivative[1][x][t] == t*(1 - 2*Sin[t])*x[t] + t^2*y[t], t^2*
```

✓ **Maple** : cpu = 0.064 (sec), leaf count = 23

$$\{\{x(t) = t(\_C1\, t + \_C2), y(t) = \sin(t)\_C2 + \_C1\, t\}\}$$

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 = 0.0488401 (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 = 0.023 (sec), leaf count = 48

$$\left\{\left\{x(t) = -\frac{d}{dt}f(t) + g(t) - f(t) - \frac{d^2}{dt^2}f(t) + \frac{d}{dt}g(t), y(t) = f(t) + \frac{d^2}{dt^2}f(t) - \frac{d}{dt}g(t)\right\}\right\}$$

ODE No. 1882

$$\{2x'(t) - 3x(t) + y'(t) = 0, x''(t) + y'(t) - 2y(t) = e^{2t}\}$$

✓ **Mathematica** : cpu = 0.595193 (sec), leaf count = 928

$$\left\{\left\{x(t) \to \frac{1}{46}e^{t/2}c_1\left(23\cos\left(\frac{\sqrt{23}t}{2}\right) + 23e^{t/2} - 3\sqrt{23}\sin\left(\frac{\sqrt{23}t}{2}\right)\right) + \frac{e^{3t/2}\left(23e^{t/2}\cos\left(\frac{\sqrt{23}t}{2}\right) - 7\sqrt{23}e\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.277 (sec), leaf count = 99

$$\left\{\left\{x(t) = \frac{e^{2t}}{4} + \_C1\, e^t + \_C2\, e^{\frac{t}{2}}\cos\left(\frac{\sqrt{23}t}{2}\right) + \_C3\, e^{\frac{t}{2}}\sin\left(\frac{\sqrt{23}t}{2}\right), y(t) = -\frac{7}{4}e^{\frac{t}{2}}\left(\frac{\_C3\sqrt{23}}{7} + \_C\right.\right.\right.$$

ODE No. 1883

$$\{x'(t)+x(t)-y'(t)=2t, x''(t)-9x(t)+y'(t)+3y(t)=\sin(2t)\}$$

✓ **Mathematica** : cpu = 0.675694 (sec), leaf count = 602

$$\left\{\left\{x(t)\to \frac{1}{16}c_1e^{-3t}\left(20e^{4t}t+7e^{4t}+9\right)+\frac{1}{16}c_2e^{-3t}\left(4e^{4t}t+3e^{4t}-3\right)-\frac{3}{16}c_3e^{-3t}\left(4e^{4t}t-e^{4t}+1\right)+\frac{e^{-4t}(2\right.\right.$$

✓ **Maple** : cpu = 0.098 (sec), leaf count = 80

$$\left\{\left\{x(t)=-\frac{2\cos(2t)}{325}+4-\frac{36\sin(2t)}{325}+2t+\_C1\,e^{t}+\_C2\,e^{-3t}+\_C3\,e^{t}t, y(t)=\frac{16\cos(2t)}{325}-\frac{37}{}\right.\right.$$

ODE No. 1884

$$\{x'(t)-x(t)+2y(t)=0, x''(t)-2y'(t)=2t-\cos(2t)\}$$

✓ **Mathematica** : cpu = 0.309295 (sec), leaf count = 224

$$\left\{\left\{x(t)\to 7\left(c_2+t^2-\frac{1}{2}\sin(2t)\right)+8\left(c_1e^{t/2}+c_2\left(e^{t/2}-1\right)+\frac{1}{136}e^{-t/2}\left(2e^{t/2}\cos(2t)-4\left(34e^{t/2}t^2+17e^{t/}\right.\right.\right.\right.\right.$$

✓ **Maple** : cpu = 0.095 (sec), leaf count = 69

$$\left\{\left\{x(t)=2\,e^{t/2}\_C1-t^2+\frac{\sin(2t)}{34}+\frac{2\cos(2t)}{17}-4t+\_C2, y(t)=\frac{\_C1}{2}e^{\frac{t}{2}}-t+\frac{\cos(2t)}{34}+\frac{9\sin(2t}{68}\right.\right.$$

ODE No. 1885

$$\{tx'(t)-ty'(t)-2y(t)=0, tx''(t)+2x'(t)+tx(t)=0\}$$

✗ **Mathematica** : cpu = 0.0220362 (sec), leaf count = 0 , could not solve

```
DSolve[{-2*y[t] + t*Derivative[1][x][t] - t*Derivative[1][y][t] == 0, t*x[t] + 2*Deriv
```

✓ **Maple** : cpu = 0.845 (sec), leaf count = 47

$$\left\{\left\{x(t)=\frac{\sin(t)\_C2+\_C3\cos(t)}{t}, y(t)=\frac{(\_C3\,t+2\_C2)\cos(t)+(\_C2\,t-2\_C3)\sin(t)+\_C1}{t^2}\right.\right.$$

ODE No. 1886

$$\{ay(t) + x''(t) = 0, y''(t) - a^2y(t) = 0\}$$

✓ **Mathematica** : cpu = 0.0212455 (sec), leaf count = 115

$$\left\{\left\{x(t) \to -\frac{c_4e^{-at}(-2ate^{at} + e^{2at} - 1)}{2a^2} - \frac{c_3e^{-at}(e^{at} - 1)^2}{2a} + c_2t + c_1, y(t) \to \frac{1}{2}c_3e^{-at}(e^{2at} + 1) + \frac{c_4e^{-at}(\right.\right.$$

✓ **Maple** : cpu = 0.054 (sec), leaf count = 49

$$\left\{\left\{x(t) = \frac{-\_C3\ e^{-at} - \_C4\ e^{at} + a(\_C1\ t + \_C2)}{a}, y(t) = \_C3\ e^{-at} + \_C4\ e^{at}\right\}\right\}$$

ODE No. 1887

$$\{x''(t) = ax(t) + by(t), y''(t) = cx(t) + dy(t)\}$$

✓ **Mathematica** : cpu = 0.547245 (sec), leaf count = 5748

$$\left\{\left\{x(t) \to \frac{e^{-\frac{\sqrt{a+d-\sqrt{a^2-2da+d^2+4bc}t}}{\sqrt{2}}-\frac{\sqrt{a+d+\sqrt{a^2-2da+d^2+4bc}t}}{\sqrt{2}}}\left(e^{\frac{\sqrt{a+d-\sqrt{a^2-2da+d^2+4bc}t}}{\sqrt{2}}}a - e^{\frac{\sqrt{a+d+\sqrt{a^2-2da+d^2+4bc}t}}{\sqrt{2}}}a - e^{\sqrt{}}\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.166 (sec), leaf count = 360

$$\left\{\left\{x(t) = \_C1\ e^{-\frac{t}{2}\sqrt{-2\sqrt{a^2-2\,ad+4\,bc+d^2}+2\,a+2\,d}} + \_C2\ e^{\frac{t}{2}\sqrt{-2\sqrt{a^2-2\,ad+4\,bc+d^2}+2\,a+2\,d}} + \_C3\ e^{-\frac{t}{2}\sqrt{2\sqrt{a^2-2\,ad+4}}}\right.\right.$$

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 = 26.7855 (sec), leaf count = 56704

Too large to display

✓ **Maple** : cpu = 0.219 (sec), leaf count = 457

$$\left\{\left\{x(t) = \_C4\ e^{\frac{t}{2}\sqrt{2\sqrt{a1^2-2\,a1\,b2+4\,a2\,b1+b2^2}+2\,a1+2\,b2}} + \_C3\ e^{-\frac{t}{2}\sqrt{2\sqrt{a1^2-2\,a1\,b2+4\,a2\,b1+b2^2}+2\,a1+2\,b2}} + \_C2\right.\right.$$

ODE No. 1889

$$\{x''(t) + x(t) + y(t) = -5, -4x(t) + y''(t) - 3y(t) = -3\}$$

✓ **Mathematica** : cpu = 0.109257 (sec), leaf count = 554

$$\left\{\left\{x(t) \to -\frac{1}{4}c_4e^{-t}\left(e^{2t}t + t - e^{2t} + 1\right) - \frac{1}{2}c_1e^{-t}\left(e^{2t}t - t - e^{2t} - 1\right) - \frac{1}{2}c_2e^{-t}\left(e^{2t}t + t - 2e^{2t} + 2\right) - \frac{1}{4}c_3e\right.\right.$$

✓ **Maple** : cpu = 0.047 (sec), leaf count = 60

$$\{\{x(t) = (\_C4\, t + \_C2)\,e^{-t} + 18 + (\_C3\, t + \_C1)\,e^{t}, y(t) = ((-2\,t + 2)\,\_C4 - 2\,\_C2)\,e^{-t} - 23 + ((-$$

ODE No. 1890

$$\left\{x''(t) = c^2x(t)\left(3\cos^2(at + b) - 1\right) + \frac{3}{2}c^2y(t)\sin(2abt), y''(t) = \frac{3}{2}c^2x(t)\sin(2abt) + c^2y(t)\left(3\sin^2(at + b)\right)\right.$$

✗ **Mathematica** : cpu = 0.00899022 (sec), leaf count = 0 , could not solve

```
DSolve[{Derivative[2][x][t] == c^2*(-1 + 3*Cos[b + a*t]^2)*x[t] + (3*c^2*Sin[2*a*b*t]*
1 + 3*Sin[b + a*t]^2)*y[t]}, {x[t], y[t]}, t]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{\left\{x(t) = DESol\left(\left\{\frac{d^4}{dt^4}\_Y(t) + \left(2\,\frac{\sin(atb)\,ab}{\cos(atb)} - 2\,\frac{ab\cos(atb)}{\sin(atb)}\right)\frac{d^3}{dt^3}\_Y(t) + \left(2\,c^2 - 3\,(\sin(at))^2\,c^2(\mathrm{co}\right.\right.\right.\right.\right.$$

ODE No. 1891

$$\{x''(t) + 6x(t) + 7y(t) = 0, 3x(t) + y''(t) + 2y(t) = 2t\}$$

✓ **Mathematica** : cpu = 0.563389 (sec), leaf count = 742

$$\left\{\left\{x(t) \to -\frac{7}{60}c_4e^{-t}\left(3e^{2t} - 2e^t\sin(3t) - 3\right) + \frac{1}{60}c_2e^{-t}\left(9e^{2t} + 14e^t\sin(3t) - 9\right) - \frac{7}{20}c_3e^{-t}\left(e^{2t} - 2e^t\cos(3\right.\right.\right.$$

✓ **Maple** : cpu = 0.047 (sec), leaf count = 64

$$\left\{\left\{x(t) = \frac{14\,t}{9} + \_C1\,e^{t} + \_C2\,\cos(3\,t) + \_C3\,e^{-t} + \_C4\,\sin(3\,t)\,, y(t) = -\_C1\,e^{t} + \frac{3\,\_C2\,\cos(3\,t)}{7}\right.\right.$$

ODE No. 1892

$$\{-ay'(t) + bx(t) + x''(t) = 0, ax'(t) + by(t) + y''(t) = 0\}$$

✓ **Mathematica** : cpu = 0.412413 (sec), leaf count = 4815

$$\left\{\left\{x(t) \to \frac{e^{-\frac{\sqrt{-a^2-2b-\sqrt{a^2(a^2+4b)}}\,t}{\sqrt{2}}-\frac{\sqrt{-a^2-2b+\sqrt{a^2(a^2+4b)}}\,t}{\sqrt{2}}}\left(e^{\frac{\sqrt{-a^2-2b-\sqrt{a^2(a^2+4b)}}\,t}{\sqrt{2}}}a^2 - e^{\frac{\sqrt{-a^2-2b+\sqrt{a^2(a^2+4b)}}\,t}{\sqrt{2}}}a^2 - e^{\sqrt{2}\sqrt{}}\right.}{}\right.\right.$$

✓ **Maple** : cpu = 0.139 (sec), leaf count = 463

$$\left\{\left\{x(t) = \_C1\,\mathrm{e}^{-\frac{t}{2}\sqrt{-2\,a^2-2\,\sqrt{a^2(a^2+4\,b)}-4\,b}} + \_C2\,\mathrm{e}^{\frac{t}{2}\sqrt{-2\,a^2-2\,\sqrt{a^2(a^2+4\,b)}-4\,b}} + \_C3\,\mathrm{e}^{-\frac{t}{2}\sqrt{-2\,a^2+2\,\sqrt{a^2(a^2+4\,b)}-4\,b}}\right.\right.$$

ODE No. 1893

$$\left\{-\mathrm{A0}y'(t) + \mathrm{a1}x''(t) + \mathrm{b1}x'(t) + \mathrm{c1}x(t) = \mathrm{B0}e^{i\omega t}, \mathrm{A0}x'(t) + \mathrm{a2}y''(t) + \mathrm{b2}y'(t) + \mathrm{c2}y(t) = 0\right\}$$

✓ **Mathematica** : cpu = 1168.74 (sec), leaf count = 5562

✓ **Maple** : cpu = 1.232 (sec), leaf count = 1579

$$\left\{\left\{x(t) = \frac{\_C1\left(a2\ a1\ \left(RootOf\left(a1\ a2\ \_Z^4 + (a1\ b2 + a2\ b1)\_Z^3 + (A^2 + a1\ c2 + a2\ c1 + b1\ b2)\_Z\right.\right.\right.}{}\right.\right.$$

ODE No. 1894

$$\left\{a(x'(t)-y'(t))+\mathrm{b1}x(t)+x''(t)=\mathrm{c1}e^{i\omega t},a(y'(t)-x'(t))+\mathrm{b2}y(t)+y''(t)=\mathrm{c2}e^{i\omega t}\right\}$$

✓ **Mathematica** : cpu = 2706.04 (sec), leaf count = 3402

$$\left\{\left\{x(t)\to -a\mathrm{b2}c_3\mathrm{RootSum}\left[\#1^4+2a\#1^3+\mathrm{b1}\#1^2+\mathrm{b2}\#1^2+a\mathrm{b1}\#1+a\mathrm{b2}\#1+\mathrm{b1b2}\&,\frac{}{4\#1^3+6a\#}\right.\right.\right.$$

✓ **Maple** : cpu = 0.746 (sec), leaf count = 1056

$$\left\{\left\{x(t)=\frac{(-c1\,\omega^2+ia(c1+c2)\,\omega+c1\,b2)\,\mathrm{e}^{i\omega\,t}}{\omega^4-2\,ia\omega^3+(-b1-b2)\,\omega^2+i\,(b1+b2)\,a\omega+b1\,b2}+\_C1\,\mathrm{e}^{RootOf(\_Z^4+2\,a\_Z^3+(b1+b2)\_Z^2+(b\right.\right.$$

ODE No. 1895

$$\{\mathrm{a11}x''(t)+\mathrm{a12}y''(t)+\mathrm{b11}x'(t)+\mathrm{b12}y'(t)+\mathrm{c11}x(t)+\mathrm{c12}y(t)=0,\mathrm{a21}x''(t)+\mathrm{a22}y''(t)+\mathrm{b21}x'(t)+\mathrm{b2}$$

✓ **Mathematica** : cpu = 0.461001 (sec), leaf count = 7517

✓ **Maple** : cpu = 0.328 (sec), leaf count = 1008

$$\left\{\left\{x(t)=\sum_{\_a=1}^{4}\mathrm{e}^{RootOf((a22\,a11-a21\,a12)\_Z^4+(b22\,a11-a12\,b21-a21\,b12+a22\,b11)\_Z^3+(a11\,c22-a12\,c21-a21\,c12+a22\,c11+\right.\right.$$

ODE No. 1896

$$\left\{x''(t)-2x'(t)-y'(t)+y(t)=0,2x'(t)-x(t)+y^{(3)}(t)-y''(t)=t\right\}$$

✓ **Mathematica** : cpu = 0.2066 (sec), leaf count = 1132

$$\left\{\left\{x(t)\to \frac{1}{64}e^{-t}\left(2e^{2t}t^2-6e^{2t}t+7e^{2t}+1\right)\left(e^t(1-t)+e^{-t}\left(-2t^3-8t^2-17t-17\right)\right)+\frac{1}{64}e^{-t}\left(2e^{2t}t^2+6e\right.\right.\right.$$

✓ **Maple** : cpu = 0.049 (sec), leaf count = 67

$$\left\{\left\{x(t)=-\frac{2\_C2\,\mathrm{e}^{-t}}{3}+\frac{(-9\_C5\,t^2-6\_C4\,t-3\_C3-18\_C5)\,\mathrm{e}^t}{3}-t-2,y(t)=\_C2\,\mathrm{e}^{-t}-2+(\_\right.\right.$$

ODE No. 1897

$$\{x''(t) + y''(t) + y'(t) = \sinh(2t), 2x''(t) + y''(t) = 2t\}$$

✓ **Mathematica** : cpu = 0.131356 (sec), leaf count = 280

$$\left\{\left\{x(t) \to \frac{1}{4}c_4e^{-2t}\left(2e^{2t}t - e^{2t} + 1\right) + c_2t + c_1 + t\left(\frac{t^2}{2} + \frac{t}{2} - \frac{e^{4t}}{8} + e^{2t}\left(\frac{t}{2} - \frac{1}{4}\right)\right) + \frac{1}{48}\left(-4\left(4t^2 - 3t + 3\right)\right.\right.\right.$$

✓ **Maple** : cpu = 0.342 (sec), leaf count = 86

$$\left\{\left\{x(t) = \frac{(-12\,t + 12\_C2 - 15)\,e^{-2\,t}}{48} + \frac{t^3}{6} + \frac{t^2}{4} + \_C3\,t + \_C4 - \frac{\cosh(2\,t)}{16} - \frac{\sinh(2\,t)}{16}, y(t) = \frac{(4\,t -}{}\right.\right.$$

ODE No. 1898

$$\{x''(t) - x'(t) + y'(t) = 0, x''(t) - x(t) + y''(t) = 0\}$$

✓ **Mathematica** : cpu = 0.0446561 (sec), leaf count = 420

$$\left\{\left\{x(t) \to -\frac{1}{5}c_1e^{\frac{t}{2}-\frac{\sqrt{5}t}{2}}\left(\sqrt{5}e^{\sqrt{5}t} - 5e^{\frac{\sqrt{5}t}{2}+\frac{t}{2}} - \sqrt{5}\right) + \frac{c_2e^{\frac{t}{2}-\frac{\sqrt{5}t}{2}}\left(e^{\sqrt{5}t} - 1\right)}{\sqrt{5}} - \frac{1}{10}c_4e^{\frac{t}{2}-\frac{\sqrt{5}t}{2}}\left(5e^{\sqrt{5}t} + \sqrt{5}e^{\sqrt{5}t}\right.\right.\right.$$

✓ **Maple** : cpu = 0.062 (sec), leaf count = 71

$$\left\{\left\{x(t) = \frac{\_C4\,\left(\sqrt{5} - 1\right)}{2}e^{-\frac{\left(\sqrt{5}-1\right)t}{2}} - \frac{\_C3\,\left(\sqrt{5} + 1\right)}{2}e^{\frac{\left(\sqrt{5}+1\right)t}{2}} + \_C1\,e^{t}, y(t) = \_C2 + \_C3\,e^{\frac{\left(\sqrt{5}+1\right)t}{2}} + \_\right.\right.$$

ODE No. 1899

$$\{x'(t) = 2x(t), y'(t) = 3x(t) - 2y(t), z'(t) = 2y(t) + 3z(t)\}$$

✓ **Mathematica** : cpu = 0.0138776 (sec), leaf count = 112

$$\left\{\left\{x(t) \to c_1e^{2t}, y(t) \to \frac{3}{4}c_1e^{-2t}\left(e^{4t} - 1\right) + c_2e^{-2t}, z(t) \to \frac{3}{10}c_1e^{-2t}\left(2e^{t} + 3e^{2t} + 4e^{3t} + 1\right)\left(e^{t} - 1\right)^2 + \frac{2}{5}c\right.\right.$$

✓ **Maple** : cpu = 0.091 (sec), leaf count = 52

$$\left\{\left\{x(t) = \_C3\,e^{2\,t}, y(t) = \frac{3\_C3\,e^{2\,t}}{4} + e^{-2\,t}\_C2, z(t) = \_C1\,e^{3\,t} - \frac{3\_C3\,e^{2\,t}}{2} - \frac{2\,e^{-2\,t}\_C2}{5}\right\}\right\}$$

ODE No. 1900

$$\{x'(t) = 4x(t), y'(t) = x(t) - 2y(t), z'(t) = x(t) - 4y(t) + z(t)\}$$

✓ **Mathematica** : cpu = 0.0103805 (sec), leaf count = 94

$$\left\{\left\{x(t) \to c_1e^{4t}, y(t) \to \frac{1}{6}c_1e^{-2t}\left(e^{6t} - 1\right) + c_2e^{-2t}, z(t) \to \frac{1}{9}c_1e^{-2t}\left(e^{3t} + e^{6t} - 2\right) - \frac{4}{3}c_2e^{-2t}\left(e^{3t} - 1\right) + c_3e\right.\right.$$

✓ **Maple** : cpu = 0.065 (sec), leaf count = 50

$$\left\{\left\{x(t) = \_C3\, e^{4\,t}, y(t) = \frac{\_C3\, e^{4\,t}}{6} + e^{-2\,t}\_C2, z(t) = \frac{\_C3\, e^{4\,t}}{9} + \_C1\, e^{t} + \frac{4\, e^{-2\,t}\_C2}{3}\right\}\right\}$$

ODE No. 1901

$$\{x'(t) = y(t) - z(t), y'(t) = x(t) + y(t), z'(t) = x(t) + z(t)\}$$

✓ **Mathematica** : cpu = 0.0105626 (sec), leaf count = 105

$$\{\{x(t) \to c_2\left(e^t - 1\right) + c_3\left(1 - e^t\right) + c_1, y(t) \to c_1\left(e^t - 1\right) + c_2\left(e^tt + 1\right) + c_3\left(-e^tt + e^t - 1\right), z(t) \to c_1\left(e^t\right.$$

✓ **Maple** : cpu = 0.055 (sec), leaf count = 43

$$\{\{x(t) = \_C2 + \_C3\, e^{t}, y(t) = (\_C3\, t + \_C1)\, e^{t} - \_C2, z(t) = ((t-1)\,\_C3 + \_C1)\, e^{t} - \_C2\}\}$$

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 = 0.0162327 (sec), leaf count = 226

$$\{\{x(t) \to c_2\left(e^t - 1\right) + c_3\left(1 - e^t\right) + c_1 + e^{-t}\left(1 - e^t\right)(-t-1) + e^{-t}\left(e^t - 1\right)(-t-1), y(t) \to c_3\left(-e^tt + e^t\right.$$

✓ **Maple** : cpu = 0.048 (sec), leaf count = 51

$$\{\{x(t) = \_C2 + \_C3\, e^{t}, y(t) = (\_C3\, t + \_C1)\, e^{t} - t - \_C2 - 1, z(t) = ((t-1)\,\_C3 + \_C1)\, e^{t} - t -$$

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 = 0.106058 (sec), leaf count = 1304

$$\left\{\left\{x(t) \to \frac{e^{-i\sqrt{a^2+b^2+c^2}t}\left(2e^{i\sqrt{a^2+b^2+c^2}t}a^2 + b^2e^{2i\sqrt{a^2+b^2+c^2}t} + c^2e^{2i\sqrt{a^2+b^2+c^2}t} + b^2 + c^2\right)c_1}{2\left(a^2+b^2+c^2\right)} - \frac{be^{-i\sqrt{a^2+b^2+c^2}t}}{}\right.\right.$$

✓ **Maple** : cpu = 0.133 (sec), leaf count = 299

$$\left\{\left\{x(t) = \_C1 + \_C2\sin\left(\sqrt{a^2+b^2+c^2}t\right) + \_C3\cos\left(\sqrt{a^2+b^2+c^2}t\right), y(t) = \frac{1}{b\left(b^2+c^2\right)}\left(\_C1\,b^3 + \right.\right.\right.$$

ODE No. 1904

$$\{x'(t) = cy(t) - bz(t), y'(t) = az(t) - cx(t), z'(t) = bx(t) - ay(t)\}$$

✓ **Mathematica** : cpu = 0.0768165 (sec), leaf count = 1445

$$\left\{\left\{x(t) \to \frac{e^{-\sqrt{-a^2-b^2-c^2}t}\left(2e^{\sqrt{-a^2-b^2-c^2}t}a^2 + b^2e^{2\sqrt{-a^2-b^2-c^2}t} + c^2e^{2\sqrt{-a^2-b^2-c^2}t} + b^2 + c^2\right)c_1}{2\left(a^2+b^2+c^2\right)} - \frac{e^{-\sqrt{-a^2-b^2-}}}{}\right.\right.$$

✓ **Maple** : cpu = 0.077 (sec), leaf count = 257

$$\left\{\left\{x(t) = \_C1 + \_C2\sin\left(\sqrt{a^2+b^2+c^2}t\right) + \_C3\cos\left(\sqrt{a^2+b^2+c^2}t\right), y(t) = \frac{1}{a\left(b^2+c^2\right)}\left(\left(-a^2b\_C\right.\right.\right.\right.$$

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 = 0.00700153 (sec), leaf count = 0 , could not solve

```
DSolve[{Derivative[1][x][t] == h[t]*y[t] - g[t]*z[t], Derivative[1][y][t] == -
(h[t]*x[t]) + f[t]*z[t], Derivative[1][z][t] == g[t]*x[t] - f[t]*y[t]}, {x[t], y[t], z
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , result contains DESol

$$\left\{\left\{x(t) = DESol\left(\left\{\frac{d^3}{dt^3}\_Y(t) + \left(-\frac{(h(t))^2\frac{d}{dt}f(t)}{(h(t))^2f(t) + (g(t))^2f(t) + \left(\frac{d}{dt}h(t)\right)g(t) - h(t)\frac{d}{dt}g(t)} - \frac{}{(h(t)}\right.\right.\right.\right.\right.$$

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 = 0.0743488 (sec), leaf count = 278

$$\left\{\left\{x(t) \to \frac{1}{3}c_1e^t\left(2\cos\left(\sqrt{3}t\right)+1\right) - \frac{1}{3}c_2e^t\left(-\sqrt{3}\sin\left(\sqrt{3}t\right)+\cos\left(\sqrt{3}t\right)-1\right) - \frac{1}{3}c_3e^t\left(\sqrt{3}\sin\left(\sqrt{3}t\right)+\right.\right.\right.$$

✓ **Maple** : cpu = 0.067 (sec), leaf count = 120

$$\left\{\left\{x(t) = \mathrm{e}^t\left(\cos\left(\sqrt{3}t\right)\_C3 + \sin\left(\sqrt{3}t\right)\_C2 + \_C1\right), y(t) = \frac{\mathrm{e}^t\left(\_C2\sqrt{3} - \_C3\right)\cos\left(\sqrt{3}t\right)}{2} + \frac{\mathrm{e}^t(-\right.\right.$$

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 = 0.0140664 (sec), leaf count = 179

$$\{\{x(t) \to c_1\left(-e^t\right)\left(2e^{2t}-3\right) + 6c_2e^t\left(2e^t+3e^{2t}-5\right) - 2c_3e^t\left(4e^t+5e^{2t}-9\right), y(t) \to -2c_1e^t\left(e^{2t}-1\right) + c$$

✓ **Maple** : cpu = 0.052 (sec), leaf count = 66

$$\left\{\left\{x(t) = \_C1\,\mathrm{e}^{2t} + \_C2\,\mathrm{e}^t + \_C3\,\mathrm{e}^{3t}, y(t) = \frac{\_C1\,\mathrm{e}^{2t}}{4} + \frac{2\,\_C2\,\mathrm{e}^t}{3} + \_C3\,\mathrm{e}^{3t}, z(t) = \frac{\_C1\,\mathrm{e}^{2t}}{4} + \_C2\right.\right.$$

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 = 0.0235574 (sec), leaf count = 551

$$\left\{\left\{x(t) \to -36c_2\mathrm{RootSum}\left[\#1^3 - 40\#1^2 + 1714\#1 + 1404\&, \frac{2\#1e^{\#1t} + e^{\#1t}}{3\#1^2 - 80\#1 + 1714}\&\right] + 4c_3\mathrm{RootSum}\left[\right.\right.\right.$$

✓ **Maple** : cpu = 0.745 (sec), leaf count = 1213

$$\left\{\left\{x(t) = \_C2\,\mathrm{e}^{\frac{\left(\left(263474+18\sqrt{351406311}\right)^{\frac{2}{3}}+80\sqrt[3]{263474+18\sqrt{351406311}}-3542\right)t}{6\sqrt[3]{263474+18\sqrt{351406311}}}}\sin\left(\frac{\sqrt{3}t\left(\sqrt[3]{4}\sqrt[3]{\left(131737+9\sqrt{351406311}\right.}\right.}{6\sqrt[3]{263474+18\sqrt{35140631}}}\right.\right.\right.$$

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 = 0.059932 (sec), leaf count = 1630

$$\left\{\left\{x(t) \to -c_2 \text{RootSum}\left[\#1^3 - a\#1^2 - b\#1^2 - c\#1^2 - \alpha^2\#1 - \beta^2\#1 - g^2\#1 + ab\#1 + ac\#1 + bc\#1\right.\right.\right.$$

✓ **Maple** : cpu = 23.997 (sec), leaf count = 33085

Too large to display

ODE No. 1910

$$\{tx'(t) = 2x(t) - t, t^3y'(t) = t^2y(t) - x(t) + t, t^4z'(t) = t^3z(t) - t^2y(t) - x(t) + t\}$$

✓ **Mathematica** : cpu = 0.00964778 (sec), leaf count = 39

$$\left\{\left\{x(t) \to c_3t^2 + t, y(t) \to c_2t + c_3, z(t) \to c_1t + \frac{c_3}{t} + c_2\right\}\right\}$$

✓ **Maple** : cpu = 0.073 (sec), leaf count = 37

$$\left\{\left\{x(t) = \_C3\,t^2 + t, y(t) = \_C2\,t + \_C3, z(t) = \frac{\_C1\,t^2 + \_C2\,t + \_C3}{t}\right\}\right\}$$

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 = 0.0314955 (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 = 0.123 (sec), leaf count = 308

$$\left\{\left\{x(t) = \_C1 + \_C2\,\sin\left(\sqrt{a^2+b^2+c^2}\ln(t)\right) + \_C3\,\cos\left(\sqrt{a^2+b^2+c^2}\ln(t)\right), y(t) = \frac{1}{b(b^2+c^2)}\right.\right.$$

ODE No. 1912

$$\{\mathrm{x1}'(t) = a\mathrm{x2}(t) + b\mathrm{x3}(t)\cos(ct) + b\mathrm{x4}(t)\sin(ct), \mathrm{x2}'(t) = -a\mathrm{x1}(t) + b\mathrm{x3}(t)\sin(ct) - b\mathrm{x4}(t)\cos(ct), \mathrm{x3}'(t)$$

✗ **Mathematica** : cpu = 0.337909 (sec), leaf count = 0 , could not solve

```
DSolve[{Derivative[1][x1][t] == a*x2[t] + b*Cos[c*t]*x3[t] + b*Sin[c*t]*x4[t], Derivat
(a*x1[t]) + b*Sin[c*t]*x3[t] - b*Cos[c*t]*x4[t], Derivative[1][x3][t] == -
(b*Cos[c*t]*x1[t]) - b*Sin[c*t]*x2[t] + a*x4[t], Derivative[1][x4][t] == -
(b*Sin[c*t]*x1[t]) + b*Cos[c*t]*x2[t] - a*x3[t]}, {x[t], y[t], z[t]}, t]
```

✓ **Maple** : cpu = 2.355 (sec), leaf count = 2956

$$\left\{\left\{x1(t) = \_C2 + \_C3\ \sin(ct) + \_C4\ \cos(ct), x2(t) = -\cos(ct)\_C3 + \sin(ct)\_C4 + \_C1, x3(t) =\right.\right.$$

ODE No. 1913

$$\{x'(t) = -x(t)(x(t) + y(t)), y'(t) = y(t)(x(t) + y(t))\}$$

✓ **Mathematica** : cpu = 0.511222 (sec), leaf count = 64

$$\{\{y(t) \to -\sqrt{c_1}\cot\left(\sqrt{c_1}t - \sqrt{c_1}c_2\right), x(t) \to -\sqrt{c_1}\tan\left(\sqrt{c_1}t - \sqrt{c_1}c_2\right)\}\}$$

✓ **Maple** : cpu = 0.144 (sec), leaf count = 57

$$\left\{[\{x(t) = 0\}, \{y(t) = (-t + \_C1)^{-1}\}], \left[\left\{x(t) = \frac{1}{\_C1}\tanh\left(\frac{\_C2 + t}{\_C1}\right)\right\}, \left\{y(t) = \frac{-(x(t))^2 - \frac{d}{dt}x(t)}{x(t)}\right.\right.\right.$$

ODE No. 1914

$$\{x'(t) = x(t)(ay(t) + b), y'(t) = y(t)(cx(t) + d)\}$$

✓ **Mathematica** : cpu = 0.821705 (sec), leaf count = 201

$$\left\{\left\{y(t) \to \frac{bW\left(\frac{a\text{InverseFunction}\left[\int_1^{\#1} \frac{1}{K[1]\left(W\left(\frac{ae^{\frac{cK[1]}{b}+\frac{c_1}{b}}K[1]^{\frac{d}{b}}}{b}\right)+1\right)}dK[1]\&\right][bt+c_2]^{\frac{d}{b}}\exp\left(\frac{c\text{InverseFunction}\left[\int_1^{\#1}\frac{}{K[1]\left(W\left(\frac{ae^{\frac{cK[1}{b}}}{}\right.\right.}\right.}{b}\right.}{b}\right.}{a}\right.\right.$$

✓ **Maple** : cpu = 0.795 (sec), leaf count = 92

$$\left\{[\{x(t)=0\},\{y(t)=\_C1\,e^{dt}\}],\left[\left\{x(t)=RootOf\left(-\int^{\_Z}\frac{1}{b\_a}\left(lambertW\left(\frac{e^{-1}}{b}e^{-\frac{ac}{b}}\_a^{\frac{d}{b}}e^{-\frac{\_C1}{b}}\right)+1\right)^{-}\right.\right.\right.\right.$$

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 = 965.002 (sec), leaf count = 0 , could not solve

```
DSolve[{Derivative[1][x][t] == x[t]*(alpha + a*(p*x[t] + q*y[t])), Derivative[1][y][t]
```

✓ **Maple** : cpu = 9.725 (sec), leaf count = 147

$$\left\{[\{x(t) = 0\}, \left\{y(t) = \frac{\beta}{e^{-\beta t}\_C1\,\beta - bq}\right\}], [\left\{x(t) = ODESolStruc\left(\_b(\_a), [\left\{\left(\left(\frac{d}{d\_a}\_b(\_a)\right)(\_b(\_\right.\right.\right.\right.$$

ODE No. 1916

$$\{x'(t) = h(a - x(t))(c - x(t) - y(t)), y'(t) = k(b - y(t))(c - x(t) - y(t))\}$$

✗ **Mathematica** : cpu = 250.038 (sec), leaf count = 0 , could not solve

```
DSolve[{Derivative[1][x][t] == h*(a - x[t])*(c - x[t] - y[t]), Derivative[1][y][t] ==
```

✓ **Maple** : cpu = 0.673 (sec), leaf count = 180

$$\left\{[\{x(t) = a\}, \left\{y(t) = \frac{(c-a)\,e^{k(t+\_C1)(-c+a+b)} - b}{-1 + e^{k(t+\_C1)(-c+a+b)}}\right\}], [\left\{x(t) = RootOf\left(-\int^{\_Z} \frac{1}{\_a - a}\left((\_a - a)^{-\frac{k}{h}} h\_\right.\right.\right.$$

ODE No. 1917

$$\{x'(t) = y(t)^2 - \cos(x(t)), y'(t) = y(t)(-\sin(x(t)))\}$$

✗ **Mathematica** : cpu = 250.054 (sec), leaf count = 0 , could not solve

```
DSolve[{Derivative[1][x][t] == -Cos[x[t]] + y[t]^2, Derivative[1][y][t] == -
(Sin[x[t]]*y[t])}, {x[t], y[t]}, t]
```

✓ **Maple** : cpu = 1.519 (sec), leaf count = 109

$$\left\{[\left\{x(t) = RootOf\left(2\int^{\_Z}\left(\tan\left(RootOf\left(-3\sqrt{-(\cos(\_f))^2}\ln\left(9/4\frac{(\cos(\_f))^2}{(\cos(\_Z))^2}\right) + 3\_C1\sqrt{-(\cos\right.\right.\right.\right.\right.\right.$$

ODE No. 1918

$$\left\{x'(t)=-x(t)y(t)^2+x(t)+y(t),y'(t)=x(t)^2y(t)-x(t)-y(t)\right\}$$

✗ **Mathematica** : cpu = 0.0910979 (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 = 2.696 (sec), leaf count = 184

$$\left\{[\{x(t)=0\},\{y(t)=0\}],[\left\{x(t)=ODESolStruc\left(\_a,[\left\{\frac{1}{2\_a^2}\left(\sqrt{(4\_a^2-4\_a\_b(\_a)+1)(\_a^3+\_\right.\right.\right.\right.\right.\right.$$

ODE No. 1919

$$\left\{x'(t)=x(t)\left(-\left(x(t)^2+y(t)^2\right)\right)+x(t)+y(t),y'(t)=-y(t)\left(x(t)^2+y(t)^2\right)-x(t)+y(t)\right\}$$

✗ **Mathematica** : cpu = 0.109351 (sec), leaf count = 0 , could not solve

```
DSolve[{Derivative[1][x][t] == x[t] + y[t] - x[t]*(x[t]^2 + y[t]^2), Derivative[1][y][
x[t] + y[t] - y[t]*(x[t]^2 + y[t]^2)}, {x[t], y[t]}, t]
```

✓ **Maple** : cpu = 3.856 (sec), leaf count = 203

$$\left\{[\{x(t)=0\},\{y(t)=0\}],[\left\{x(t)=ODESolStruc\left(\_a,[\left\{\frac{1}{2\_a^3}\left(\sqrt{-(4\_a^4+4\_a\_b(\_a)-4\_a^2-\right.\right.\right.\right.\right.\right.$$

ODE No. 1920

$$\left\{x'(t)=x(t)\left(x(t)^2+y(t)^2-1\right)-y(t),y'(t)=y(t)\left(x(t)^2+y(t)^2-1\right)+x(t)\right\}$$

✗ **Mathematica** : cpu = 0.0856214 (sec), leaf count = 0 , could not solve

```
DSolve[{Derivative[1][x][t] == -y[t] + x[t]*(-1 + x[t]^2 + y[t]^2), Derivative[1][y][t
1 + x[t]^2 + y[t]^2)}, {x[t], y[t]}, t]
```

✓ **Maple** : cpu = 3.432 (sec), leaf count = 205

$$\left\{[\{x(t)=0\},\{y(t)=0\}],[\left\{x(t)=ODESolStruc\left(\_a,[\left\{\frac{1}{2\_a^3}\left(\sqrt{-(4\_a^4-4\_a^2-4\_a\_b(\_a)-\right.\right.\right.\right.\right.\right.$$

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 = 2.51577 (sec), leaf count = 0 , could not solve

```
DSolve[{Derivative[1][x][t] == -(y[t]*(x[t]^2 + y[t]^2)), Derivative[1][y][t] == Piece
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve({diff(x(t),t) = -y(t)*(x(t)^2+y(t)^2), diff(y(t),t) = piecewise(2*x(t) <= x(t)^
1/2*y(t)^2/x(t))*(x(t)^2+y(t)^2))})
```

ODE No. 1922

$$\left[\left\{x'(t)=\left(\begin{cases} \sin\left(\frac{1}{x(t)^2+y(t)^2}\right)x(t)\left(x(t)^2+y(t)^2-1\right) & x(t)^2+y(t)^2\neq 1 \\ 0 & \text{True}\end{cases}\right)-y(t),y'(t)=\left(\begin{cases} \text{si}\end{cases}\right.\right.\right.$$

✗ **Mathematica** : cpu = 12.425 (sec), leaf count = 0 , could not solve

```
DSolve[{Derivative[1][x][t] == Piecewise[{{Sin[(x[t]^2 + y[t]^2)^(-1)]*x[t]*(-
1 + x[t]^2 + y[t]^2), x[t]^2 + y[t]^2 != 1}}, 0] - y[t], Derivative[1][y][t] == Piecew
1)]*y[t]*(-1 + x[t]^2 + y[t]^2), x[t]^2 + y[t]^2 != 1}}, 0] + x[t]}, {x[t], y[t]}, t]
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve({diff(x(t),t) = -y(t)+piecewise(x(t)^2+y(t)^2 <> 1,x(t)*(x(t)^2+y(t)^2-
1)*sin(1/(x(t)^2+y(t)^2))), diff(y(t),t) = x(t)+piecewise(x(t)^2+y(t)^2 <> 1,y(t)*(x(t
1)*sin(1/(x(t)^2+y(t)^2)))})
```

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 = 0.0298527 (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 = 0.172 (sec), leaf count = 35

$$\left\{\left\{x(t)=\frac{\_C1\,t+\_C2}{t^2+1},y(t)=\frac{-\_C2\,t+\_C1}{t^2+1}\right\}\right\}$$

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 = 0.0709979 (sec), leaf count = 191

$$\left\{\left\{y(t)\to\frac{c_1\left(e^{c_2}-\sqrt{-4c_1^2t^2+e^{2c_2}-4t^2}\right)}{2\left(c_1^2+1\right)},x(t)\to\frac{e^{c_2}-\sqrt{-4c_1^2t^2+e^{2c_2}-4t^2}}{2\left(c_1^2+1\right)}\right\},\left\{y(t)\to\frac{c_1\left(\sqrt{-4c_1^2\right.}}{}\right.\right.$$

✓ **Maple** : cpu = 0.418 (sec), leaf count = 180

$$\left\{[\{x(t)=0\},\left\{y(t)=\frac{1}{2\_C1}\left(1+\sqrt{-4\_C1^2t^2+1}\right),y(t)=\frac{1}{2\_C1}\left(1-\sqrt{-4\_C1^2t^2+1}\right)\right\}],[\left\{x(t)\right.\right.$$

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 = 8.62881 (sec), leaf count = 0 , could not solve

```
DSolve[{-x[t] + t*Derivative[1][x][t] + a*Derivative[1][y][t] + Derivative[1][y][t]^2
y[t] + t*Derivative[1][y][t] + Derivative[1][x][t]*Derivative[1][y][t] == 0}, {x[t], y
```

✓ **Maple** : cpu = 0.272 (sec), leaf count = 194

$$\left\{[\left\{x(t)=-\frac{t^2}{3}\right\},\left\{y(t)=-\frac{t^3}{27\,a}\right\}],[\{x(t)=\_C1\,t+\_C2\},\left\{y(t)=-\frac{\left(\frac{\mathrm{d}}{\mathrm{d}t}x(t)+t\right)\left(\left(\frac{\mathrm{d}}{\mathrm{d}t}x(t)\right)^2+t\frac{\mathrm{d}}{\mathrm{d}t}x(\right.\right.}{a}\right.\right.$$

ODE No. 1926

$$\left\{x(t)=f(x'(t),y'(t))+tx'(t),y(t)=g(x'(t),y'(t))+ty'(t)\right\}$$

✗ **Mathematica** : cpu = 0.00613758 (sec), leaf count = 0 , could not solve

```
DSolve[{x[t] == f[Derivative[1][x][t], Derivative[1][y][t]] + t*Derivative[1][x][t], y
```

✓ **Maple** : cpu = 0.159 (sec), leaf count = 96

$$\left\{[\left\{\int RootOf\left(t\frac{\mathrm{d}}{\mathrm{d}t}y(t)+g\left(\_Z,\frac{\mathrm{d}}{\mathrm{d}t}y(t)\right)-y(t)\right)\,\mathrm{d}t+\_C1=tRootOf\left(t\frac{\mathrm{d}}{\mathrm{d}t}y(t)+g\left(\_Z,\frac{\mathrm{d}}{\mathrm{d}t}y(t)\right)-y(\right.\right.\right.$$

ODE No. 1927

$$\{x''(t) = ae^{2x(t)} + e^{-2x(t)}\cos^2(y(t)) - e^{-x(t)}, y''(t) = e^{-2x(t)}\sin(y(t))\cos(y(t)) - \tan(y(t))\sec^2(y(t))\}$$

✗ **Mathematica** : cpu = 0.00960682 (sec), leaf count = 0 , could not solve

```
DSolve[{Derivative[2][x][t] == -E^(-x[t]) + a*E^(2*x[t]) + Cos[y[t]]^2/E^(2*x[t]), Der
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve({diff(diff(x(t),t),t) = a*exp(2*x(t))-exp(-x(t))+exp(-2*x(t))*cos(y(t))^2, dif
2*x(t))*sin(y(t))*cos(y(t))-sin(y(t))/cos(y(t))^3})
```

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 = 0.00696601 (sec), leaf count = 0 , could not solve

```
DSolve[{Derivative[2][x][t] == (k*x[t])/(x[t]^2 + y[t]^2)^(3/2), Derivative[2][y][t] =
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve({diff(diff(x(t),t),t) = k*x(t)/(x(t)^2+y(t)^2)^(3/2), diff(diff(y(t),t),t) = k*
```

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 = 0.00869615 (sec), leaf count = 0 , could not solve

```
DSolve[{Derivative[2][x][t] == -((c*f[Sqrt[Derivative[1][x][t]^2 + Derivative[1][y][t]
g - (c*f[Sqrt[Derivative[1][x][t]^2 + Derivative[1][y][t]^2]]*y[t]*Derivative[1][y][t]
```

✓ **Maple** : cpu = 3.862 (sec), leaf count = 116

$$\left\{\left[\left\{y(t) = ODESolStruc\left(\_a, \left[\left\{\left(\frac{d}{d\_a}\_b(\_a)\right)\_b(\_a) + 1\left(C(\_a)\, f\left(\sqrt{(\_b(\_a))^2}\right)\_b(\_a) + g\sqrt{(\right.\right.\right.\right.\right.\right.$$

ODE No. 1930

$$\{x'(t) = y(t) - z(t), y'(t) = x(t)^2 + y(t), z'(t) = x(t)^2 + z(t)\}$$

✓ **Mathematica** : cpu = 0.0550785 (sec), leaf count = 308

$$\left\{\left\{x(t) \to e^{-c_3}\left(e^{c_3}c_1 + e^t\right), y(t) \to c_2\left(e^{-c_3}\left(e^{c_3}c_1 + e^t\right) - c_1\right) + \left(e^{-c_3}\left(e^{c_3}c_1 + e^t\right) - c_1\right)\left(-\frac{c_1^2}{e^{-c_3}\left(e^{c_3}c_1 + e^t\right.}\right.\right.\right.$$

✓ **Maple** : cpu = 0.046 (sec), leaf count = 45

$$\left\{\left[\left\{x(t) = \_C2 + \_C3\,\mathrm{e}^t\right\}, \left\{y(t) = \left(\int (x(t))^2\,\mathrm{e}^{-t}\,\mathrm{d}t + \_C1\right)\mathrm{e}^t\right\}, \left\{z(t) = -\frac{\mathrm{d}}{\mathrm{d}t}x(t) + y(t)\right\}\right]\right\}$$

ODE No. 1931

$$\{ax'(t) = (b-c)y(t)z(t), by'(t) = (c-a)x(t)z(t), cz'(t) = (a-b)x(t)y(t)\}$$

✓ **Mathematica** : cpu = 5.57203 (sec), leaf count = 10101

$$\left\{\left\{x(t) \to \frac{\frac{\sqrt{2}b^2\sqrt{a(a-c)}c_1\,\mathrm{sn}\left(\frac{\frac{\sqrt{2}\sqrt{a}\sqrt{a-c}c\sqrt{c_2}t}{\sqrt{b}\sqrt{b-c}} - \frac{\sqrt{2}\sqrt{a}\sqrt{b}\sqrt{a-c}\sqrt{c_2}t}{\sqrt{b-c}} - \frac{\sqrt{2}\sqrt{a}\sqrt{a-c}c\sqrt{c_2}c_3}{\sqrt{b}\sqrt{b-c}} + \frac{\sqrt{2}\sqrt{a}\sqrt{b}\sqrt{a-c}\sqrt{c_2}c_3}{\sqrt{b-c}}}{a} \middle| -\frac{(a-b)bc_1}{(a-c)cc_2}\right)}{(a-c)\sqrt{b(b-c)c_1}} - \frac{\sqrt{2}b\sqrt{a(a-}{}}{a}\right.\right.$$

✓ **Maple** : cpu = 0.632 (sec), leaf count = 695

$$\left\{[\{x(t) = 0\}, \{y(t) = 0\}, \{z(t) = \_C1\}], [\{x(t) = 0\}, \{y(t) = \_C1\}, \{z(t) = 0\}], [\{x(t) = \_C1\}, \{y(t\right.$$

ODE No. 1932

$$\{x'(t) = x(t)(y(t) - z(t)), y'(t) = y(t)(z(t) - x(t)), z'(t) = z(t)(x(t) - y(t))\}$$

✗ **Mathematica** : cpu = 2.29976 (sec), leaf count = 0 , could not solve

```
DSolve[{Derivative[1][x][t] == x[t]*(y[t] - z[t]), Derivative[1][y][t] == y[t]*(-
x[t] + z[t]), Derivative[1][z][t] == (x[t] - y[t])*z[t]}, {x[t], y[t], z[t]}, t]
```

✓ **Maple** : cpu = 0.932 (sec), leaf count = 383

$$\left\{ [\{x(t) = 0\}, \{y(t) = 0\}, \{z(t) = \_C1\}], [\{x(t) = 0\}, \left\{ y(t) = \frac{\_C1\, e^{\_C2\,\_C1} e^{\_C1\, t}}{-1 + e^{\_C2\,\_C1} e^{\_C1\, t}} \right\}, \left\{ z(t) = \frac{\frac{d}{dt} y(t)}{y(t)} \right\}\right.$$

ODE No. 1933

$$\{x'(t) + y'(t) = x(t)y(t), y'(t) + z'(t) = y(t)z(t), x'(t) + z'(t) = x(t)z(t)\}$$

✗ **Mathematica** : cpu = 127.007 (sec), leaf count = 0 , could not solve

```
DSolve[{Derivative[1][x][t] + Derivative[1][y][t] == x[t]*y[t], Derivative[1][y][t] +
```

✓ **Maple** : cpu = 2.287 (sec), leaf count = 17738

Too large to display

ODE No. 1934

$$\left\{ x'(t) = \frac{x(t)^2}{2} - \frac{y(t)}{24}, y'(t) = 2x(t)y(t) - 3z(t), z'(t) = 3x(t)z(t) - \frac{y(t)^2}{6} \right\}$$

✗ **Mathematica** : cpu = 78.982 (sec), leaf count = 0 , could not solve

```
DSolve[{Derivative[1][x][t] == x[t]^2/2 - y[t]/24, Derivative[1][y][t] == 2*x[t]*y[t]
y[t]^2/6 + 3*x[t]*z[t]}, {x[t], y[t], z[t]}, t]
```

✓ **Maple** : cpu = 1.29 (sec), leaf count = 377

$$\left\{ [\{y(t) = 0\}, \{x(t) = -2(-2\_C1 + t)^{-1}\}, \{z(t) = 0\}], [\{y(t) = 256(\_C1\, t + \_C2)^{-4}\}, \left\{ x(t) = \frac{1}{6\, y(\right.\right.$$

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 = 0.0532991 (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 = 1.73 (sec), leaf count = 741

$$\Bigg\{[\{x(t) = 0\}, \{y(t) = 0\}, \{z(t) = \_C1\}], [\{x(t) = 0\}, \Big\{y(t) = \frac{1}{\left(e^{\_C2\,\_C1}\right)^2 \left(e^{\_C1\,t}\right)^2 - 1}\sqrt{\left(\left(e^{\_C2\,\_C1}\right)^2 \right.}$$

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 = 0.0516265 (sec), leaf count = 0 , could not solve

```
DSolve[{Derivative[1][x][t] == x[t]*(y[t]^2 - z[t]^2), Derivative[1][y][t] == -
(y[t]*(x[t]^2 + z[t]^2)), Derivative[1][z][t] == (x[t]^2 + y[t]^2)*z[t]}, {x[t], y[t],
```

✓ **Maple** : cpu = 0.611 (sec), leaf count = 710

$$\Bigg\{[\{x(t) = 0\}, \{y(t) = 0\}, \{z(t) = \_C1\}], [\{x(t) = 0\}, \Big\{y(t) = \frac{1}{\left(e^{\_C2\,\_C1}\right)^2 \left(e^{\_C1\,t}\right)^2 - 1}\sqrt{-\left(e^{\_C1\,t}\right)^4 \_}$$

ODE No. 1937

$$\left\{x'(t) = -x(t)y(t)^2 + x(t) + y(t), y'(t) = x(t)^2 y(t) - x(t) - y(t), z'(t) = y(t)^2 - x(t)^2\right\}$$

✗ **Mathematica** : cpu = 0.265198 (sec), leaf count = 0 , could not solve

```
DSolve[{Derivative[1][x][t] == x[t] + y[t] - x[t]*y[t]^2, Derivative[1][y][t] == -
x[t] - y[t] + x[t]^2*y[t], Derivative[1][z][t] == -x[t]^2 + y[t]^2}, {x[t], y[t], z[t]
```

✓ **Maple** : cpu = 2.343 (sec), leaf count = 242

$$\Bigg\{[\{x(t) = 0\}, \{y(t) = 0\}, \{z(t) = \_C1\}], [\Big\{x(t) = ODESolStruc\Big(\_a, [\Big\{\frac{1}{2\,\_a^2}\Big(\sqrt{(4\,\_a^2 - 4\,\_b(\_a)\_}$$

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 = 0.00911949 (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 = 0.112 (sec), leaf count = 101

$$\left\{\left\{x(t)=\_C5\,\mathrm{e}^{t\sqrt{\frac{\mathrm{d}}{\mathrm{d}r}F(r)}\frac{1}{\sqrt{r}}}+\_C6\,\mathrm{e}^{-t\sqrt{\frac{\mathrm{d}}{\mathrm{d}r}F(r)}\frac{1}{\sqrt{r}}},y(t)=\_C3\,\mathrm{e}^{t\sqrt{\frac{\mathrm{d}}{\mathrm{d}r}F(r)}\frac{1}{\sqrt{r}}}+\_C4\,\mathrm{e}^{-t\sqrt{\frac{\mathrm{d}}{\mathrm{d}r}F(r)}\frac{1}{\sqrt{r}}},z(t)=\_C\right.\right.$$

ODE No. 1939

$$\{(x(t)-y(t))(x(t)-z(t))x'(t)=f(t),(y(t)-x(t))(y(t)-z(t))y'(t)=f(t),(z(t)-x(t))(z(t)-y(t))z'($$

✗ **Mathematica** : cpu = 0.030205 (sec), leaf count = 0 , could not solve

```
DSolve[{(x[t] - y[t])*(x[t] - z[t])*Derivative[1][x][t] == f[t], (-x[t] + y[t])*(y[t]
x[t] + z[t])*(-y[t] + z[t])*Derivative[1][z][t] == f[t]}, {x[t], y[t], z[t]}, t]
```

✓ **Maple** : cpu = 1.402 (sec), leaf count = 899

$$\left\{\left[\left\{x(t)=\int 3\,\frac{f(t)}{\_C1^3+11664\,\_C2^2-23328\,\_C2\,\int f(t)\,\mathrm{d}t+11664\,\left(\int f(t)\,\mathrm{d}t\right)^2}\left(\left(-1-i\sqrt{3}\right)\left(\left(1+\right.\right.\right.\right.\right.\right.$$

ODE No. 1940

$$\{\mathrm{x1}'(t)\sin(\mathrm{x2}(t))=\mathrm{x4}(t)\sin(\mathrm{x3}(t))+\mathrm{x5}(t)\cos(\mathrm{x3}(t)),\mathrm{x2}'(t)=\mathrm{x4}(t)\cos(\mathrm{x3}(t))-\mathrm{x5}(t)\sin(\mathrm{x3}(t)),\mathrm{x1}'(t)\,c$$

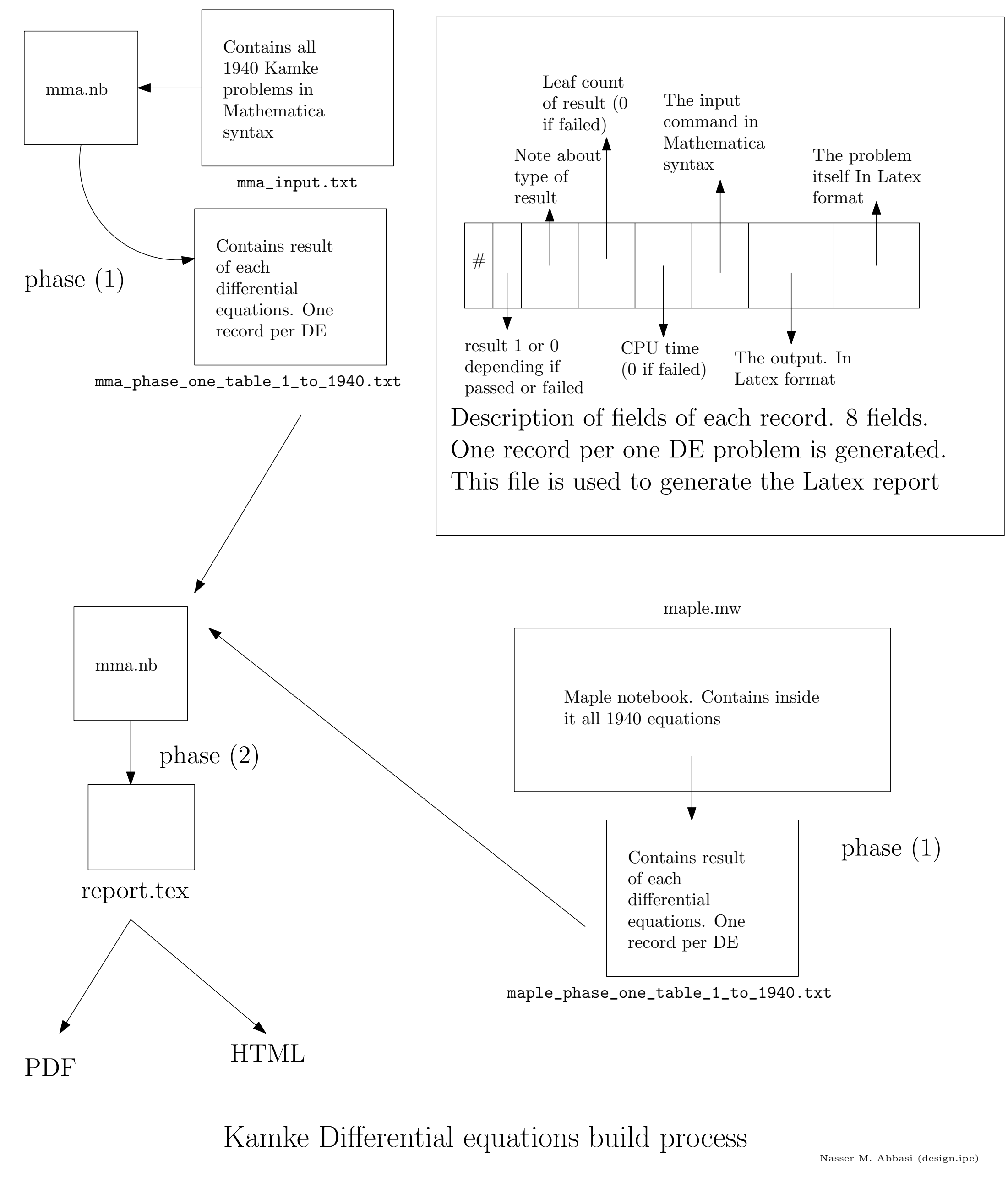
✗ **Mathematica** : cpu = 0.0089691 (sec), leaf count = 0 , could not solve

```
DSolve[{Sin[x2[t]]*Derivative[1][x1][t] == Sin[x3[t]]*x4[t] + Cos[x3[t]]*x5[t], Deriva
(a*(1 - lambda)*x5[t]) + Derivative[1][x4][t] == -(m*Cos[x3[t]]*Sin[x2[t]]), a*(1 - la
```

✗ **Maple** : cpu = 0. (sec), leaf count = 0 , could not solve

```
dsolve({diff(x1(t),t)*sin(x2(t)) = x4(t)*sin(x3(t))+x5(t)*cos(x3(t)), diff(x3(t),t)+di
(1-lambda)*a*x5(t) = -m*sin(x2(t))*cos(x3(t)), diff(x5(t),t)+(1-lambda)*a*x4(t) = m*si
x5(t)*sin(x3(t))})
```

3 Appendix


mma.nb
Contains all 1940 Kamke problems in Mathematica syntax
mma_input.txt
Contains result of each differential equations. One record per DE
phase (1)
mma_phase_one_table_1_to_1940.txt
Leaf count of result (0 if failed)
The input command in Mathematica syntax
Note about type of result
The problem itself In Latex format
#
result 1 or 0 depending if passed or failed
CPU time (0 if failed)
The output. In Latex format
Description of fields of each record. 8 fields.
One record per one DE problem is generated.
This file is used to generate the Latex report
mma.nb
maple.mw
Maple notebook. Contains inside it all 1940 equations
phase (2)
report.tex
Contains result of each differential equations. One record per DE
phase (1)
maple_phase_one_table_1_to_1940.txt
PDF
HTML
Kamke Differential equations build process
Nasser M. Abbasi (design.ipe)