Series Solutions near an Ordinary Point
MATH 256

Problems from Boyce and DiPrima, 7th Edition (Section 5.2)

Solve the DE with a power series about x_0. Find the recurrence relation, the first four terms in two linearly independent solutions, and, if possible, the general term.

2. $y'' - xy' - y = 0, x_0 = 0.$
3. $y'' - xy' - y = 0, x_0 = 1.$
4. $y'' + k^2x^2y = 0, x_0 = 0, k$ constant.
5. $(1 - x)y'' + y = 0, x_0 = 0.$
6. $(2 + x^2)y'' - xy' + 4y = 0, x_0 = 0.$
7. $y'' + xy' + 2y = 0, x_0 = 0.$
9. $(1 + x^2)y'' - 4xy' + 6y = 0, x_0 = 0.$
10. $(4 - x^2)y'' + 2y = 0, x_0 = 0.$
11. $(3 - x^2)y'' - 3xy' - y = 0, x_0 = 0.$
12. $(1 - x)y'' + xy' - y = 0, x_0 = 0.$
13. $2y'' + xy' + 3y = 0, x_0 = 0.$
14. $2y'' + (x + 1)y' + 3y = 0, x_0 = 2.$