

Problem Set 7: Solution of Second Order Linear ODEs with VC

Find the general solution of the homogeneous differential equations, where $x > 0$.

1. $x^2 y'' - 6y = 0$
2. $x^2 y'' + 4xy' + 2y = 0$
3. $x^2 y'' - 2xy' - 4y = 0$
4. $x^2 y'' + xy' - 4y = 0$
5. $x^2 y'' - 2xy' - 4y = 0$
6. $x^2 y'' + 5xy' + 3y = 0$
7. $x^2 y'' - 4xy' + 6y = 0$
8. $x^2 y'' + 2xy' - n(n+1)y = 0$
9. $x^2 y'' - 5xy' + 9y = 0$
10. $x^2 y'' + 5xy' + 4y = 0$
11. $x^2 y'' + xy' + y = 0$
12. $x^2 y'' + 7xy' + 13y = 0$
13. $x^2 y'' - 3xy'' + 5y = 0$
14. $x^2 y'' - 3xy' + 8y = 0$
15. $x^2 y'' - 3xy' + 20y = 0$
16. $x^2 y'' - xy' + y = x^5$
17. $2x^2 y'' + 5xy' + y = 3x + 2$
18. $x^2 y'' + xy' - y = 3x^2$
19. $x^2 y'' + 2xy' - 2y = x * \sin(\ln(x))$
20. $x^2 y'' - 3xy' + 3y = x^2$
21. $x^2 y'' + 4xy' + 2y = 10 * x^3$
22. $x^2 y'' - 2xy' - 4y = x^4$
23. 123. $xy'' - 2y/x = x + 1/(x^2)$
24. 124. $x^3 y''' + 3x^2 y'' + xy' + 8y = 65 * \cos(\ln(x))$
25. 125. $x^3 y''' + 2x^2 y'' + 2y = 10 * (x + \frac{1}{x})$

Solve the following homogenous differential equations:

26. 126. $(x-2)^2 \frac{d^2 y}{dx^2} + 5(x-2) \frac{dy}{dx} + 3y = 0$
27. 127. $2(3x+1)^2 \frac{d^2 y}{dx^2} + 21(3x+1) \frac{dy}{dx} + 18y = 0$

Solve the following differential equations:

28. 128. $(1+x)^2 \frac{d^2 y}{dx^2} + (1+x) \frac{dy}{dx} + y = 2 * \sin[\ln(1+x)]$
29. 129. $(1+x)^2 \frac{d^2 y}{dx^2} + (1+x) \frac{dy}{dx} + y = 4 * \cos[\ln(1+x)]$
30. 130. $(3x+2)^2 \frac{d^2 y}{dx^2} + 3(3x+2) \frac{dy}{dx} - 36y = 3x^2 + 4x + 1$