

Linear differential equations with constant coefficients

Q1. Solve the following $\frac{d^3y}{dx^3} + 2\frac{d^2y}{dx^2} - 5\frac{dy}{dx} - 6y = 0$.

Q2. Solve $\frac{d^4y}{dx^4} + 2\frac{d^2y}{dx^2} + y = 0$.

Q3. Solve $(D^4 - 2D^2 + 1)y = 0$.

Q4. Solve $(D^2 + D - 6)y = e^{4x}$.

Q5. Solve $(D^2 + D)y = e^{4x}$.

Q6. Solve $(D^2 - 7D - 6)y = (1 + x^2)e^{2x}$.

Q7. Solve $(D^2 + D - 6)y = e^{4x}$.

Q8. Solve $\frac{d^4y}{dx^4} - a^4y = \sin ax$.

Q9. Solve $(D^2 + 4)y = \cos 2x$.

Q10. Solve $(D^2 - 4)y = \cos^2 x$.

Q11. Solve $(D^3 - D^2 - 6D)y = 1 + x^2$.

Q12. Solve $(D^2 + 2D + 5)y = x^2 + 1$.

Q13. Solve $(D^2 - 3D + 2)y = 2e^x \sin\left(\frac{x}{2}\right)$.

Q14. Solve $(D^2 + 1)y = e^x \cos x + x^2 e^{3x}$.

Q15. Solve $(D^3 - 7D - 6)y = \cos x \cosh x$.

Q16. Solve by the method of variation of parameters

$$\frac{d^2 y}{dx^2} - 6\frac{dy}{dx} + 9y = \frac{e^{3x}}{x^2}.$$

Q17. Solve $\frac{d^2 y}{dx^2} - 2\frac{dy}{dx} + y = xe^x \sin x$.

Q18. Solve $(D^2 + a^2)y = \sec ax$.

Q19. Solve $(D^2 - 1)y = e^{-x} \sin(e^{-x}) + \cos(e^{-x})$.

Q20. Solve $(D^2 - D - 2)y = 2 \log x + \frac{1}{x} + \frac{1}{x^2}$.

Q21. Solve $(D^2 - 2D + 2)y = e^x \tan x$ using method of variation of parameter.

Q22. Solve $\frac{d^2 y}{dx^2} + 3\frac{dy}{dx} + 2y = e^{e^x}$ by method of variation of parameters.

Q23. Solve $(D^2 - 1)y = \frac{2}{1 + e^x}$ by method of variation of parameters.

