

1. Solve the following DE:

a) $y'' + 9y = 18\sec^3(3x); |x| < \frac{\pi}{6}$

b) $y'' + 6y' + 9y = \frac{2e^{-3x}}{x^2 + 1}$

c)
$$y'' + 2y' + 17y = \frac{64e^{-x}}{3 + \sin^2(4x)}$$

d)
$$y'' + 4y' + 4y = \frac{4e^{-2x}}{1 + x^2} + 2x^2 - 1$$

2. Solve the following Cauchy – Euler DE:

a) $x^2 y'' - xy' + 5y = 0$

b) $x^2 y'' + xy' + 16y = 0$

c) $x^2 y'' - 3xy' + 4y = 0; \quad y(1) = 5, \quad y'(1) = 3$

d) $x^2 y'' - xy' + 5y = 8x(\ln x)^2$

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

f) $x^2 y'' - 5xy' + 8y = 8x^6; y\left(\frac{1}{2}\right) = 0; y'\left(\frac{1}{2}\right) = 0$