

1. Find the general solution to

$$y'' + 9y = \sec^2(3t)$$

2. Find the general solution to

$$y'' + 4y' + 4y = e^{-2t} \ln(9t)$$

3. Find the general solution on $(0, \infty)$ to

$$y'' + \left(\frac{6}{t}\right)y' + \left(\frac{4}{t^2}\right)y = 0$$

4. Solve the initial value problem:

$$t^2y'' - ty' + 5y = 0, \quad y(1) = -3, \quad y'(1) = 3$$