1. Find the general solution to the following.
   (a) \( y'' + 3y' + 2y = e^t \)
   (b) \( y'' + 3y' + 2y = te^{-t} \)
   (c) \( y'' + 3y' + 2y = e^t + te^{-t} \)
   (d) \( 4y'' + y = 2 \sec(t/2), \quad \pi < t < \pi \)

2. Determine a suitable form for a particular solution of the following differential equations, if you were to use the method of undetermined coefficients. You do not need to determine the coefficients.
   (a) \( y'' + 3y' + 2y = e^{2t}(t + 1) \sin(5t) \)
   (b) \( y'' + 16y = t^2 \cos(4t) + t \sin(4t) + \sin(5t) \)

3. (a) Verify that \( y(t) = e^t \) is a solution of \( 2ty'' + (1 - 4t)y' + (2t - 1)y = 0, \quad 0 < t < \infty. \)
    (b) Find the general solution of \( 2ty'' + (1 - 4t)y' + (2t - 1)y = e^t, \quad 0 < t < \infty. \)