Math 2320 Review Problems for Exam 2

1) Find the Wronskian of \( y_1 = e^{2t} \) and \( y_2 = e^{3t/2} \)

2) If the Wronskian of \( y_1 = t \) and \( y_2 = te^t \), find \( y_2 \)

3) Find the fundamental set of solutions for the ODE: \( y'' + 4y' + 3y = 0 \), \( y(0) = 1 \)

4) Verify that \( y_1 = x \) is a solution to the equation \( (x^2 - 1)y'' - 2xy' + 2y = 0 \). Then use Reduction of Order to find the general solution to the ODE.

5) Find the solution of the initial value problem.
   a) \( y'' + 4y' + 3y = 0 \), \( y(0) = 2 \), \( y'(0) = -1 \)
   b) \( y'' + 8y' - 9y = 0 \), \( y(1) = 1 \), \( y'(1) = 0 \)
   c) \( 2y'' - 3y' + y = 0 \), \( y(0) = 2 \), \( y'(0) = 1/2 \)
   d) \( y'' + y = 0 \), \( y(\pi/3) = 2 \), \( y'(\pi/3) = -4 \)
   e) \( y'' + 4y' + 4y = 0 \), \( y(-1) = 2 \), \( y'(-1) = 1 \)
   f) \( y'' - 2y' + y = \frac{e^x}{1-x^2} \)
   g) \( y'' + y = \cos t \)
   h) \( x^2y'' + 3xy' - 3y = \ln x \)

6) Find the general solution to the system of equations:
   \[
   \frac{dx}{dt} - x - y = 0 \\
   -4x + \frac{dy}{dt} - 2y = 0
   \]