Review Problem for Midterm II, Math 363

1. Find a general solution to the given differential equations:
   a) \[ y'' = 5x^{-1}y' - 13x^{-2}y \]
   b) \[ y^{(4)} + 2y''' - 4y'' - 2y' + 3y = 0 \]
   c) \[ y''' - 2y'' - y' + 2y = e^x \]
   d) \[ y''' - 4y'' + 7y' - 6y = 0 \]
   e) \[ 2y'' - y = t \sin t \]
   f) \[ y'' + 6y' = e^t - 2t \]
   g) \[ y'' - 2y' + 10y = 6 \cos 3t - \sin 3t \]

2. a) Find a fifth order linear differential homogeneous equation with \( x^2e^x - e^{-2x} \sin x \) as a solution. b) Find a general solution to the differential equation obtained in a).

3. Determine if the following functions are linearly dependent or not.
   a) \( \{t^2, t^3, t - 1\} \)
   b) \( \{e^t, e^{2t}, e^{-t}\} \)

4. Determine a form of a particular solution for the following differential equations. Don’t solve the coefficients.
   \[ y^{(4)}(t) - 4y^{(3)}(t) + 5y''(t) - 4y'(t) + 4y(t) = t^2e^{2t} + 5 \cos 2t \]