Math 2080: Differential Equations
Worksheet 3.1: Second order linear differential equations

NAME:

1. For each of the following 2nd order ODEs, decide whether it is linear. For those that are, decide if they are also homogeneous.

   (i) $y'' + 2t^2y' + y + 5 = 0$

   (ii) $y'' + y' + t = 0$

   (iii) $y'' + e^t y = 0$

   (iv) $y'' + e^t y = 1$

   (v) $y'' + te^y = 0$

2. Solve the following 2nd order linear differential equations by inspection:

   (a) $y'' - 4y = 0$

   (b) $y'' + 4y = 0$

   (c) $y'' + 4y = 12$

3. Write the following 2nd order initial value problems as a system of two 1st order IVPs by letting $v = x'$:

$$x'' + 2x' + 2x = \sin t, \qquad x(0) = 10, \quad x'(0) = 0.$$