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

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