## 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':

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