HOMEWORK 15
DIFFERENTIAL EQUATIONS
DUE 2013-10-29

Show your work!

(1) In class, we saw that we cannot usually just guess a sine function when applying the Method of Undetermined Coefficients to a non-homogeneous equation whose right-hand side is a sine function. Instead, we had to refine our guess by adding on an extra cosine term to cancel out an unwanted cosine on the left-hand side.

  (a) Consider the differential equation
$$y'' - 3y' - 4y = t^2.$$
  Show that this does *not* have a particular solution of the form At^2. (HINT: Plug it in and see what happens.)

  (b) Explain how to refine the guess $y_p = At^2$ in order to cancel out unwanted terms on the left-hand side.

  (c) Find the general solution of
$$y'' - 3y' - 4y = t^2.$$

(2) In class, we saw an example where the initial guess for the Method of Undetermined Coefficients was part of the complementary solution, so we had to correct our guess by multiplying by t to find the particular solution.

  (a) Make up an equation for which you have to multiply the initial guess by t^2 to find the particular solution. (HINT: We need both the initial guess, and the initial guess times t, have to be part of the complementary solution. How can that happen?)

  (b) Find the general solution of your equation from (a).

- **Five** book problems: #3.5.6, 10, 13, 18, 20.