MA 341-001 Test 2

S. Schecter

March 24, 2006

Use your own paper to work the problems. On all problems, you must **show your work** to receive credit.

When you finish, fold this paper lengthwise together with your work, so that this writing is on the outside. Write your name and row number above (the front row is row 1), and turn in.

1. Determine the form you would use for a particular solution in the method of undetermined coefficients. Do not solve for the coefficients.

   (a) $y'' + 4y = te^{-2t}$

   (b) $y'' + 4y = 6 \sin 2t$

2. Find the general solution using the method of undetermined coefficients.

$$y'' + 3y' + 2y = 8t^2 - 30$$

3. Use the variation of parameters to find a particular solution.

$$y'' - 2y' + y = t^4 e^t$$

   For this problem, the impulse response function is $h(t) = te^t$. (You don't have to check this.) Recall that the variation of parameters formula says that a particular solution of

$$my'' + by' + ky = f(t)$$

   is given by

$$y_p(t) = \int_0^t h(t - s)f(s)\, ds.$$

4. Find $Y(s)$, the Laplace transform of the solution $y(t)$ of the following initial value problem. Do not simplify $Y(s)$, and do not find $y(t)$.

$$y'' + 6y' + 9y = t^3 e^{-5t}$$
$$y(0) = 2, \quad y'(0) = -3$$

5. Find the inverse Laplace transform of the following functions.

(a) $\frac{10-2s}{s^2+2s+10}$

(b) $\frac{s^2-4}{s(s-1)^2}$

(c) $\frac{e^{-6s}}{(s+4)^3}$