Name:_____

Math 3336
Spring 2005
Test II

1. Find the general solution of the differential equations.

   (a) $9y'' - 12y' + 4y = 0$

   (b) $35y'' - y' - 12y = 0$

2. Solve the initial value problems.

   (a) $y''' - 5y'' + 100y' - 500y = 0$, $y(0) = 0$, $y'(0) = 10$, $y''(0) = 250$ given that $y_1(x) = e^{5x}$ is one particular solution of the differential equation.

(b) $3y''' + 2y'' = 0$, $y(0) = -1$, $y'(0) = 0$, $y''(0) = 1$.

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

$$y'' + 2y' + 2y = (x - 2)e^x.$$

4. Solve the initial value problem

$$y'' + 9y = \sin 3x, \quad y(0) = 2, \quad y'(0) = 0.$$

5. (a) Suppose that $y_1(x)$ and $y_2(x)$ are solutions of the differential equation

$$y'' + p(x)y' + q(x)y = f(x).$$

Show that $z(x) = y_1(x) - y_2(x)$ is a solution of the differential equation

$$y'' + p(x)y' + q(x)y = 0.$$

(b) Find the Wronskian of the functions $e^{r_1 x}$, $e^{r_2 x}$, $e^{r_3 x}$, where the numbers r_1, r_2, and r_3 are distinct. Then determine whether or not these functions are linearly independent.