

Name: \_\_\_\_\_

**Math 3336**  
**Spring 2005**  
**Pretest II**

1. Find the general solution of the differential equations.

(a)  $4y'' + 4y' + y = 0$

(b)  $2y'' + 3y' = 0$

2. (a) Find the general solution of the differential equation

$$y''' + 3y'' - 54y = 0,$$

given that  $y_1(x) = e^{3x}$  is one particular solution of the differential equation.

(b) Solve the initial value problem

$$2y''' - 3y'' - 2y' = 0, \quad y(0) = 1, \quad y'(0) = -1, \quad y''(0) = 3.$$

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

$$y'' - 4y = xe^x.$$

4. Solve the initial value problem

$$y^{(4)} - 4y'' = x^2, \quad y(0) = y'(0) = 1, \quad y''(0) = y'''(0) = -1.$$

5. (a) Let  $y_1(x)$  and  $y_2(x)$  be two linearly independent solutions of the differential equation

$$y'' + p(x)y' + q(x)y = f_1(x).$$

Is  $y(x) = c_1y_1(x) + c_2y_2(x)$  a general solution of this equation?

- (b) Let  $y_1(x)$  be a particular solution of the equation

$$y'' + p(x)y' + q(x)y = f_1(x)$$

and  $y_2(x)$  be a particular solution of the equation

$$y'' + p(x)y' + q(x)y = f_2(x).$$

Prove or disprove that  $y(x) = y_1(x) + y_2(x)$  is a solution of

$$y'' + p(x)y' + q(x)y = f_1(x) + f_2(x).$$