MATH 2171 **Test 2** **Fall 2001**

Name : _____

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1. (a) Find the general solution for each of the following differential equations:

   i. $y'' + 3y' + 2y = 0$;

   ii. $y'' - 4y = 0$.

   (b) According to the results gotten in Part a, determine the form of a particular solution for each of the following equations:

   i. $y'' + 3y' + 2y = xe^{2x} + 4\sin 3x$;

   ii. $y'' - 4y = xe^{2x} + 4\sin 3x$.

2. Find the solution of the initial-value problem :

$$y'' - 4y' + 4y = 0, \quad y(0) = 3, \quad y'(0) = 5.$$

3. Rewrite the equation $x'' - 4x' + 4x = 0$ as a system of first order equations

4. A mass $m = 1$ is attached to both a spring (with given spring constant $k = 125$) and a dashpot (with given damping constant $c = 10$). The mass is set in motion with initial position $x_0 = 6$ and initial velocity $v_0 = 50$. Find the position function $x(t)$ and determine the motion is overdamped, critically damped, or underdamped.

5. Find a particular solution to the following equation using the method of undetermined coefficients

$$y'' + 4y = 8e^{2x} - 6\sin x.$$

6. Find a particular solution to the following equation using the method of variation of parameters

$$y'' + y = 8 \sec x.$$

(Hint : $\int \frac{\sin u du}{\cos u} = -\ln|\cos u|$.)