MATH 230
SPRING 2007
TEST #3 NAME_____

There are a total of 7 problems. Please be sure that you have the entire test. Show all necessary work. Answers that seem to appear by magic will receive no credit.

Your work needs to be done on separate paper and must be neat and easy to read. I suggest that you work out your solutions and then copy them to the paper you plan to submit. All solutions must be submitted in hard copy and in numerical order with your final answer written ON THIS PAPER in the space provided.

You are to do your own work. You may use any books, your class notes, and Mathematica. This is due at the **BEGINNING** of class on Friday, April 27; late papers will be heavily penalized. You must turn in your test as a hard copy.

We have solved systems by a variety of methods. You may choose whichever method you prefer. But you must show all of work because different methods will give different appearing answers.

Solve each of the following systems of equations. Remember that all of your answers should be real valued.

1. (14 points)

$$x_1' = x_1 - x_2 + 4x_3$$
$$x_2' = 3x_1 + 2x_2 - x_3$$
$$x_3' = 2x_1 + x_2 - x_3$$

Answer:_____

2. (14 points)

$$\left(D^2 - 3D + 2\right)x_1 + \left(D - 1\right)x_2 = 0$$
$$\left(D - 2\right)x_1 + \left(D + 1\right)x_2 = 0$$

Answer:_____

3. (14 points)

$$2\frac{dx}{dt} + \frac{dy}{dt} - x - y = -2t$$
$$\frac{dx}{dt} + \frac{dy}{dt} + x - y = t^2$$

Answer:_____

4. (14 points)

$$x' = \begin{pmatrix} 0 & 0 & -1 \\ 2 & 0 & 0 \\ -1 & 2 & 4 \end{pmatrix} x, \quad x(0) = \begin{pmatrix} 7 \\ 5 \\ 5 \end{pmatrix}$$

Answer:_____

5. (14 points)

$$x' = \begin{pmatrix} -1 & -4 \\ 1 & -1 \end{pmatrix} x$$

Answer:_____

6. (15 points)

$$x' = \begin{pmatrix} 1 & 1 & 1 \\ 2 & 1 & -1 \\ 0 & -1 & 1 \end{pmatrix} x$$

Answer:_____

7. (15 points)

$$x' = \begin{pmatrix} 2 & -1 \\ 3 & -2 \end{pmatrix} x + \begin{pmatrix} 5\cos t - 2\sin t \\ 8\cos t - 4\sin t \end{pmatrix}$$

Answer:_____