Exam 1, Math 544, Summer, 2003

PRINT Your Name:______________________________

Please also write your name on the back of the exam.

There are 9 problems on 6 pages. Problems 1 through 5 are worth 6 points each. Problems 6 through 9 are worth 5 points each. The exam is worth a total of 50 points. SHOW your work. *CIRCLE* your answer. **CHECK** your answer whenever possible. **No Calculators.**

If I know your e-mail address, I will e-mail your grade to you. If I don't already know your e-mail address and you want me to know it, then **send me an e-mail**.

I will leave your exam outside my office door later today, you may pick it up any time between then and the next class.

I will post the solutions on my website shortly after the class is finished.

1. Find the GENERAL solution of the following system of linear equations. Also, list three SPECIFIC solutions, if possible. CHECK that the specific solutions satisfy the equations.

$$\begin{array}{rrl} 1x_1 & +2x_2 = & 1 \\ 5x_1 & +8x_2 = & 9 \\ 3x_1 & +5x_2 = & 5 \end{array}$$

2. Find the GENERAL solution of the following system of linear equations. Also, list three SPECIFIC solutions, if possible. CHECK that the specific solutions satisfy the equations.

$$\begin{array}{rrl} 1x_1 & +2x_2 = & 1 \\ 5x_1 & +8x_2 = & 9 \\ 3x_1 & +5x_2 = & 6 \end{array}$$

3. Find the GENERAL solution of the following system of linear equations. Also, list three SPECIFIC solutions, if possible.

CHECK that the specific solutions satisfy the equations.

$$\begin{array}{cccccccc} x_1 & +3x_2 & +\ x_3 & +9x_4 & +2x_5 & = & 7 \\ x_1 & +3x_2 & +2x_3 & +13x_4 & +x_5 & = & 3 \\ x_1 & +3x_2 & +2x_3 & +13x_4 & +2x_5 & = & 6 \end{array}$$

4. How many solutions could a system of 4 linear equations in 3 unknowns have? List ALL of the possiblities. **Explain** your answer.

5. How many solutions could a system of 3 linear equations in 4 unknowns have? List ALL of the possiblities. **Explain** your answer.

6. True or False. (If true, explain why or give a proof. If false, give a counter example.) If A, B are 2×2 symmetric matrices, then AB is a symmetric matrix.

7. True or False. (If true, explain why or give a proof. If false, give a counter example.) If A, B are 2×2 matrices, then $(A-B)(A+B) = A^2 - B^2$.

8. Give an example of 2×2 matrices A and B with $A \neq \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$ and $B \neq \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$, but $AB = \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$.

9. Consider the system of linear equations.

$$\begin{array}{ccc} 3x_1 & +ax_2 = & 3 \\ ax_1 & +3x_2 = & 3. \end{array}$$

Which values for a cause the system to have no solution? Which values for a cause the system to have exactly one solution? Which values for a cause the system to have an infinite number of solutions? **Explain.**