MATH 544, 1997, EXAM 1

PRINT Your Name:_____

There are 10 problems on 5 pages. Each problem is worth 10 points. SHOW your work. $\boxed{CIRCLE}$ your answer. **CHECK** your answer whenever possible.

1. Solve the system of equations which corresponds to the following matrix:

$$\left[\begin{array}{ccc|c} 1 & 2 & 0 & 4 \\ 0 & 0 & 1 & 5 \\ 0 & 0 & 0 & 0 \end{array}\right].$$

2. Solve the system of equations which corresponds to the following matrix:

$$\left[\begin{array}{ccc|c} 1 & 2 & 0 & 4 \\ 0 & 0 & 1 & 5 \\ 0 & 0 & 0 & 3 \end{array}\right].$$

3. Are the vectors $v_1 = \begin{bmatrix} 1 \\ 2 \end{bmatrix}$, and $v_2 = \begin{bmatrix} 2 \\ 4 \end{bmatrix}$ linearly independent or linearly dependent? Explain!!

4. Are the vectors $v_1 = \begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix}$, $v_2 = \begin{bmatrix} 1 \\ 1 \\ 0 \end{bmatrix}$, and $v_3 = \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}$ linearly independent or linearly dependent? Explain!!

5. Solve the following system of equations:

$$\begin{aligned} x_1 + 3x_2 + 7x_3 &= 28 \\ 2x_1 + 7x_2 + 16x_3 &= 64 \\ 3x_1 + 11x_2 + 26x_3 &= 103. \end{aligned}$$

6. Find the inverse of

$$A = \begin{bmatrix} 2 & 0 & 1 \\ 0 & 1 & 0 \\ 1 & 0 & 1 \end{bmatrix}.$$

7. True or False. If the statement is true, then PROVE the statement. If the statement is false, then give a COUNTEREXAMPLE. If A and B are 2×2 symmetric matrices, then AB is a symmetric matrix.

8. True or False. If the statement is true, then PROVE the statement. If the statement is false, then give a COUNTEREXAMPLE. If A and B are 2×2 nonsingular matrices, then AB is a nonsingular matrix.

9. True or False. If the statement is true, then PROVE the statement. If the statement is false, then give a COUNTEREXAMPLE. If A and B are 2×2 nonsingular matrices, then $A + B$ is a nonsingular matrix.

10. Define "linearly independent".