Math 1170 | Test 5 | Name _____

Sign the following agreement and hand this page in with the rest of your exam.

I, (print your name)_____, have completed this exam without the assistance or advice of any other person. I also did not assist any other student in this class with their own exam. I take academic integrity seriously and I know that if I violate this agreement I will receive an F in this course. I agree to this agreement for all take home tests that will be given.

(sign here)_____.

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1-10 5 points per problem.

1. Write the matrix in reduced row-echelon form. Show all your work:
$$\begin{bmatrix} 1 & -1 & 5 \\ 6 & 2 & 3 \\ 5 & 3 & -3 \end{bmatrix}$$

2. Write the augmented matrix for the system of equations and solve the system. Show all your work.
$$\begin{cases} 4x + 3y - 2z = 14 \\ -x - y + 2z = -5 \\ 3x + y - 4z = 8 \end{cases}$$

3. $A = \begin{bmatrix} 6 & 5 \\ -5 & -5 \end{bmatrix}, B = \begin{bmatrix} 5 & 0 \\ -5 & -1 \end{bmatrix}$
Find A - B

4. $A = \begin{bmatrix} 6 & 5 \\ -5 & -5 \end{bmatrix}, B = \begin{bmatrix} 5 & 0 \\ -5 & -1 \end{bmatrix}$
   a. Find 3A

5. $A = \begin{bmatrix} 6 & 5 \\ -5 & -5 \end{bmatrix}, B = \begin{bmatrix} 5 & 0 \\ -5 & -1 \end{bmatrix}$

   b. Find 3A – 2B

6. $A = \begin{bmatrix} 6 & 5 \\ -5 & -5 \end{bmatrix}, B = \begin{bmatrix} 5 & 0 \\ -5 & -1 \end{bmatrix}$

   Find AB

7. Find the inverse of the matrix (if it exists). Show all your work.

$$\begin{bmatrix} -4 & 3 \\ 5 & -2 \end{bmatrix}$$

8. Use the result of problem 7 to solve the system. Show all your work.

$$\begin{cases} -4x + 3y = 6 \\ 5x - 2y = 24 \end{cases}$$

9. Find the determinant of the matrix.

$$\begin{bmatrix} 6 & -7 & 2 \\ 3 & -2 & 0 \\ 1 & 5 & 1 \end{bmatrix}$$

10. Use Cramer's Rule to solve (if possible) the system of equations. Show all your work.

$$\begin{cases} 6x - y + 2z = -4 \\ -2x + 3y - z = 10 \\ 4x - 4y + z = -18 \end{cases}$$

11-20 DO ANY 5 OF THE FOLLOWING PROBLEMS.

11. Write the un-coded 1x3 matrices for the message word: muskie. Then encode the message using the encoding matrix A: $\begin{bmatrix} 1 & -1 & 0 \\ 1 & 0 & -1 \\ 6 & -2 & -3 \end{bmatrix}$

12. One hundred liters of a 50% solution is obtained by mixing a 60% solution with a 20% solution. How many liters of each solution must be used to obtain the desired mixture?

13. A tire corporation has three factories, each of which manufactures two models of tires. The production levels are represented by $A=\begin{bmatrix}80 & 120 & 140\\ 40 & 100 & 80\end{bmatrix}$. Find the production levels when production is decreased by 5%.

14. An electronics manufacturing company produces three different models of headphones that are shipped to two warehouses. The shipment levels are represented by $A=\begin{bmatrix}8200 & 7400\\ 6500 & 9800\\ 5400 & 4800\end{bmatrix}$. The prices per unit are represented by the matrix $B = [\$79.99 \quad \$109.95 \quad \$189.99]$. Compute BA and interpret the results.

15. The pay-as-you-go cell charges (in dollars per minute) of two cellular telephone companies for calls inside the coverage area, regional roaming calls, and calls outside the coverage area are represented by $C = \begin{bmatrix} 0.07 & 0.095 \\ 0.10 & 0.08 \\ 0.28 & 0.25 \end{bmatrix}$. Column 1 is company A and column 2 is company B. Rows 1, 2, and 3 correspond to Inside, Regional Roaming, and Outside coverage area charges. The number of minutes you plan to use in the coverage areas per month are represented by the matrix $T = [120 \quad 80 \quad 20]$. Compute TC and interpret the result.

16. Find the area of a triangle with vertices at the ordered pairs:
(-5,0) (4,4) (3,2)

17. Find the area of the triangle with vertices (-2,3) (0,5) (1,-4).

18. Use a determinant to help you find the equation of the line through the points (2,5) and (6,-1).

19. The encoding matrix for a message is A = $\begin{bmatrix} -5 & 4 & -3 \\ 10 & -7 & 6 \\ 8 & -6 & 5 \end{bmatrix}$. The encoded cryptogram message is 20 -6 13 147 -102 89. Find the inverse of A and decode the message.

20. Write the uncoded 1x3 row matrices for the phrase COLLEGE ALGEBRA. Then encode the message using the encoding matrix A = $\begin{bmatrix} -5 & 4 & -3 \\ 10 & -7 & 6 \\ 8 & -6 & 5 \end{bmatrix}$