Meramec College Algebra **Chapter 6** **TEST 5** **Summer 2010**

NAME: ______________________________Score____________________________/100

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SHOW ALL YOUR WORK IN A NEAT AND ORGANIZED FASHION Course Average__________

1. T F A matrix is a rectangular array of numbers.
2. T F Matrix addition is commutative.
3. T F Matrix multiplication is commutative.
4. T F The inner product of two matrices is a matrix.
5. T F If A and B are square matrices with the same dimension, then det(AB) = det(A)det(B).
6. T F The rule for the det function is a recursive rule.
7. T F If A is a square matrix and det(A) = 0, then A does not have an inverse.
8. T F If two matrices have the same order, their product is defined.
9. T F Only square matrices can be multiplied.
10. T F Every square matrix has a determinant.
11. T F Division of matrices is defined as a multiplication.
12. If a matrix has m rows and n columns, the order of the matrix is _____________.
13. If a matrix has only one row, it is called a _____________ matrix.
14. If a matrix has only one column, it is called a _____________ matrix.
15. Two matrices and are equal if they have the same _____________ and their corresponding _____________ are equal.
16. The _____________ matrix of order n is the matrix whose main diagonal entries are 1 and all other entries are 0.
17. The determinant is a function whose domain is the set of _____________ matrices and whose range is the _____________ numbers.
18. The matrix consisting of the coefficients (in the same order) of a system of equations is called the _____________________ matrix.
19. Write the 3×3 identity matrix _____________________.
20. The entry in the 34 position of the matrix AB is the inner product of row ____ in matrix A and column ____ in matrix B.
21. Write the coefficient matrix of the following system of equations: $\begin{cases} -2x+2y-4z=1 \\ 2x-5y-z=6 \\ 4x+2y-3z=5 \end{cases}$
22. Write a matrix equation which is equivalent to the system $\begin{cases} 3x+7y-4z=5 \\ 2x-3y-5z=3 \\ -2x+3y-6z=0 \end{cases}$

23. Complete the statements of the **Elementary Row Operations:**

a. Interchange two____________.

b. ______________ a row by a non-zero _____________ and ______________ that row with the ___________.

c. Add a _______________ of a row to another ____________ and replace ____________ but not both of the ___________ with that ____________.

24. Calculate $\det\left(\begin{bmatrix} 5 & 1 \\ 6 & 2 \end{bmatrix}\right) =$

25. Calculate the inner product $\begin{bmatrix} 2 & -2 & 3 \end{bmatrix}\begin{bmatrix} -4 \\ -1 \\ 2 \end{bmatrix} =$

26. Perform the addition $\begin{bmatrix} 2 & 5 & 2 \\ -1 & 0 & 6 \\ 4 & -2 & 1 \end{bmatrix} + \begin{bmatrix} -8 & 5 & -1 \\ -5 & 6 & -4 \\ 1 & 1 & 0 \end{bmatrix} =$

27. Calculate $\det\left(\begin{bmatrix} 3 & 6 & 4 \\ 1 & 0 & 2 \\ -1 & -6 & 5 \end{bmatrix}\right)$

28. The inverse of $A = \begin{bmatrix} -2 & -3 & 1 \\ -3 & -3 & 1 \\ -2 & -4 & 1 \end{bmatrix}$ **is the matrix** $\mathbf{A^{-1}} = \begin{bmatrix} 1 & -1 & 0 \\ 1 & 0 & -1 \\ 6 & -2 & -3 \end{bmatrix}$

Use this information to solve the system $\begin{cases} -2\boldsymbol{x} - 3\boldsymbol{y} + \boldsymbol{z} = 2 \\ -3\boldsymbol{x} - 3\boldsymbol{y} + \boldsymbol{z} = 0 \\ -2\boldsymbol{x} - 4\boldsymbol{y} + \boldsymbol{z} = 3 \end{cases}$

29. Supply the missing entries by performing the indicated elementary row operation.

$$\begin{bmatrix} 2 & -2 & 1 & 0 \\ 3 & -3 & 0 & 1 \end{bmatrix} \xrightarrow{\frac{1}{3}R_2 \longrightarrow R_2} \begin{bmatrix} \square & \square & \square & \square \\ \square & \square & \square & \square \end{bmatrix}$$

30. Supply the missing entries by performing the indicated elementary row operation

$$\begin{bmatrix} -2 & 3 & \frac{1}{5} & 0 \\ 6 & -3 & 0 & 1 \end{bmatrix} \xrightarrow{3R_1 + R_2 \longrightarrow R_2} \begin{bmatrix} \square & \square & \square & \square \\ \square & \square & \square & \square \end{bmatrix}$$

31. Perform the multiplication:

$$\begin{bmatrix} 2 & 3 & -4 \\ -1 & -3 & 3 \end{bmatrix} \begin{bmatrix} 3 & -2 \\ 4 & -1 \\ -2 & 1 \end{bmatrix} =$$

32. You do not need to do any computations. Simply fill in the blanks to describe the process for finding the inverse of a matrix.

To find the inverse of the matrix A = $\begin{bmatrix} 5 & 7 & 4 \\ 3 & -1 & 3 \\ 6 & 7 & 5 \end{bmatrix}$

Begin by adjoining the ____________ matrix to obtain the matrix $\begin{bmatrix} 5 & 7 & 4 & 1 & 0 & 0 \\ 3 & -1 & 3 & 0 & 1 & 0 \\ 6 & 7 & 5 & 0 & 0 & 1 \end{bmatrix}$ with order ______

The next step is to get a _______ in the ________ position.

Then use that ________ to get ________ everywhere else in the __________________________________

At this point the matrix will have been converted to $\begin{bmatrix} 1 & 7/5 & 4/5 & 1/5 & 0 & 0 \\ 0 & -26/5 & 3/5 & -3/5 & 1 & 0 \\ 0 & -7/5 & 1/5 & -6/5 & 0 & 1 \end{bmatrix}$

The next step is to get a _______ in the ________ position.

Then use that ________ to get ________ everywhere else in the __________________________________

At this point the matrix will have been converted to $\begin{bmatrix} 1 & 0 & 25/26 & 1/26 & 7/26 & 0 \\ 0 & 1 & -3/26 & 3/26 & -5/26 & 0 \\ 0 & 0 & 1/26 & -27/26 & -7/26 & 1 \end{bmatrix}$

The next step is to get a _______ in the ________ position.

Then use that ________ to get ________ everywhere else in the __________________________________

At this point the matrix will have been converted to $\begin{bmatrix} 1 & 0 & 0 & 26 & 7 & -25 \\ 0 & 1 & 0 & -3 & -1 & 3 \\ 0 & 0 & 1 & -27 & -7 & 26 \end{bmatrix}$

The inverse of A is matrix A^{-1} =

Which has order __________