

1. Suppose that A is 3 x 5 matrix and B is a 5 x 4 matrix and C is a 2 x 3 matrix. Is the product CAB possible? If so state the dimensions of the resultant matrix. If not, state why it is impossible. [2 pts]

$$A = \begin{bmatrix} -2 & 4 \\ 6 & 5 \\ -1 & 0 \end{bmatrix}$$

$$B = \begin{bmatrix} 5 & 0 & 3 \\ -2 & 1 & 4 \end{bmatrix}$$

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

For questions 2-5, reference matrices A, B, and C above. If the operation is not possible, write "not possible". [2 points each]

2.  $3C - B$

3.  $AC^T$

4.  $AB$

5.  $C^{-1}$

6. Consider the matrix  $A = \begin{bmatrix} 4 & 0 \\ -2 & 3 \end{bmatrix}$ . Find two different matrices  $B$  such that  $AB=BA$ . In total between your two answers for  $B$ , you may not have more than three entries be "0". [3]

$$B = \begin{bmatrix} & \\ & \end{bmatrix} \quad \text{or} \quad B = \begin{bmatrix} & \\ & \end{bmatrix}$$

7. Brian is trying to find the inverse of  $A = \begin{bmatrix} 2 & -4 \\ -8 & 5 \end{bmatrix}$  using Gauss Jordan elimination, but he made a mistake somewhere. Find and CIRCLE his mistake. Then correctly complete his work to find  $A^{-1}$ . [4pts]

$$\begin{bmatrix} 2 & -4 & 1 & 0 \\ -8 & 5 & 0 & 1 \end{bmatrix} \rightarrow \begin{bmatrix} 2 & -4 & 1 & 0 \\ 0 & -11 & 4 & 1 \end{bmatrix} \rightarrow \begin{bmatrix} 2 & -44 & 11 & 0 \\ 0 & 44 & -16 & -4 \end{bmatrix}$$

$$\rightarrow \begin{bmatrix} 2 & 0 & -5 & -4 \\ 0 & 44 & -16 & -4 \end{bmatrix} \rightarrow \begin{bmatrix} 1 & 0 & -5/2 & -4/2 \\ 0 & 1 & -4/11 & -1/11 \end{bmatrix}$$

8. Solve the system of equations using inverse matrices. Show all your work, correctly labeling each matrix along the way. [4 pts]

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

9. Find the inverse of the following matrix (using any method). Show all your work.  $A = \begin{bmatrix} 0 & 1 & 2 \\ 1 & 0 & 3 \\ 4 & -3 & 0 \end{bmatrix}$ . [4 pts]

10. Solve the system of equations using Gauss-Jordan Elimination. Clearly show your steps. [5 pts]

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