

1. Let

$$A = \begin{bmatrix} 1 & 2 \\ 2 & 3 \end{bmatrix}, B = \begin{bmatrix} 1 & -3 \\ 0 & 0 \end{bmatrix}, C = \begin{bmatrix} 1 & 2 & 0 \\ 3 & 4 & 2 \end{bmatrix}, D = \begin{bmatrix} 3 \\ 2 \end{bmatrix}$$

Compute (if possible):

a. $4A = \begin{bmatrix} 4 & 8 \\ 8 & 12 \end{bmatrix}$

b. $A+B = X$

c. $AC = \begin{bmatrix} -5 & 8 & 4 \\ -7 & 16 & 6 \end{bmatrix}$

d. $DB = \begin{bmatrix} 3 \\ 2 \end{bmatrix} \begin{bmatrix} 1 & -3 \end{bmatrix} = \begin{bmatrix} 3 & -9 \\ 2 & -6 \end{bmatrix}$

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e. $A^{-1} = \frac{1}{-1} \begin{bmatrix} 3 & -2 \\ -2 & 1 \end{bmatrix} = \begin{bmatrix} -3 & 2 \\ 2 & -1 \end{bmatrix}$

f. $C^t = \begin{bmatrix} 1 & -3 \\ 2 & 4 \\ 0 & 2 \end{bmatrix}$

2. Write the following system of linear equations as an augmented matrix, and find all solutions:

$$x_1 + 2x_2 + x_3 = 2$$

$$x_2 - x_3 = 5$$

$$-x_2 + x_3 = -5$$

6 $\left[\begin{array}{ccc|c} 1 & 2 & 1 & 2 \\ 0 & 1 & -1 & 5 \\ 0 & -1 & 1 & -5 \end{array} \right] \rightarrow \left[\begin{array}{ccc|c} 1 & 2 & 1 & 2 \\ 0 & 1 & -1 & 5 \\ 0 & 0 & 0 & 0 \end{array} \right]$

$$x_3 = t$$

$$x_2 - t = 5$$

$$x_2 = t + 5$$

$$x_1 + 2(t+5) + t = 2$$

$$x_1 + 3t + 10 = 2$$

$$x_1 = -3t - 8$$

$$(-8, 5, 0) + t(-3, 1, 1)$$

3. Write the following augmented matrix as a system of linear equations; then use Gaussian elimination to reduce to echelon form and solve:

6 $\left[\begin{array}{ccc|c} 1 & 2 & 0 & 0 \\ 1 & 3 & 2 & 0 \\ 0 & 2 & 4 & 1 \end{array} \right]$

$$x_1 + 2x_2 = 0$$

$$x_1 + 3x_2 + 2x_3 = 0$$

$$x_2 + 4x_3 = 1$$

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

no solutions.