1.(1 pt) Let

$$\mathbf{A} = \begin{bmatrix} -1 & -9 \\ 8 & -5 \end{bmatrix}$$

and

$$\mathbf{B} = \begin{bmatrix} -2 & -3 \\ -9 & 5 \end{bmatrix}$$

Find a 2x2 matrix **X** that solves the matrix equation

$$-3(\mathbf{A} - \mathbf{B} + \mathbf{X}) = -2(\mathbf{X} - \mathbf{A})$$

$$\mathbf{X} = \begin{bmatrix} \_\_ & \_\_ \\ \_\_ & \_\_ \end{bmatrix}$$

2.(1 pt)
If A and B are 5×4 matrices, and C is a 3×5 matrix, which of the following are defined?

- A. BA^T
- B. A^T
- C. AB
- D. CB
- E. $A - B$
- F. $C + B$

3.(1 pt) Let $A = \begin{bmatrix} 1 & 3 \\ -2 & -6 \end{bmatrix}$. Find two 2x2 matrices B and Csuch that $AB = AC$ but $B \neq C$.

$$\begin{bmatrix} \_\_ & \_\_ \\ \_\_ & \_\_ \end{bmatrix} \begin{bmatrix} \_\_ & \_\_ \\ \_\_ & \_\_ \end{bmatrix}$$

4.(1 pt) Let

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

Then A^2, A^3, A^{1370} are respectively

$$\begin{bmatrix} \_\_ & \_\_ \\ \_\_ & \_\_ \end{bmatrix}$$
$$\begin{bmatrix} \_\_ & \_\_ \\ \_\_ & \_\_ \end{bmatrix}$$
$$\begin{bmatrix} \_\_ & \_\_ \\ \_\_ & \_\_ \end{bmatrix}$$

5.(1 pt) The inverse of the matrix $\mathbf{A} = \begin{bmatrix} 7 & -3 \\ -8 & 9 \end{bmatrix}$ is

$$\begin{bmatrix} \_\_ & \_\_ \\ \_\_ & \_\_ \end{bmatrix}$$

6.(1 pt) The inverse of the matrix $\mathbf{A} = \begin{bmatrix} 13 & -9 & -6 \\ -3 & 1 & 1 \\ -4 & 3 & 2 \end{bmatrix}$ is

$$\begin{bmatrix} \_\_ & \_\_ & \_\_ \\ \_\_ & \_\_ & \_\_ \\ \_\_ & \_\_ & \_\_ \end{bmatrix}$$

7.(1 pt) The inverse of the matrix $\mathbf{A} = \begin{bmatrix} 1 & -9 & 3 \\ -2 & -1 & 1 \\ 0 & 3 & -1 \end{bmatrix}$ is

$$\begin{bmatrix} \_\_ & \_\_ & \_\_ \\ \_\_ & \_\_ & \_\_ \\ \_\_ & \_\_ & \_\_ \end{bmatrix}$$

8.(1 pt) In each of the following problems, find elementary matrices such that the respective matrix equations hold.

(i) $\begin{bmatrix} \_\_ & \_\_ & \_\_ \\ \_\_ & \_\_ & \_\_ \\ \_\_ & \_\_ & \_\_ \end{bmatrix} \begin{bmatrix} 5 & -2 & 5 \\ -2 & -4 & 1 \\ 3 & -2 & 4 \end{bmatrix} = \begin{bmatrix} 5 & -2 & 5 \\ -2 & -4 & 1 \\ -3 & 2 & -4 \end{bmatrix}$

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

(ii) $\begin{bmatrix} \_\_ & \_\_ & \_\_ \\ \_\_ & \_\_ & \_\_ \\ \_\_ & \_\_ & \_\_ \end{bmatrix} \begin{bmatrix} 4 & -4 & 2 \\ 2 & -2 & 3 \\ 4 & -3 & 2 \end{bmatrix} = \begin{bmatrix} 2 & -2 & 3 \\ 4 & -4 & 2 \\ 4 & -3 & 2 \end{bmatrix}$

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

(iii)

$\begin{bmatrix} \_\_ & \_\_ & \_\_ \\ \_\_ & \_\_ & \_\_ \\ \_\_ & \_\_ & \_\_ \end{bmatrix} \begin{bmatrix} 4 & 3 & -1 \\ -3 & 2 & 2 \\ -4 & 5 & -4 \end{bmatrix} = \begin{bmatrix} -12 & 23 & -17 \\ -3 & 2 & 2 \\ -4 & 5 & -4 \end{bmatrix}$

$\begin{bmatrix} \_\_ & \_\_ & \_\_ \\ \_\_ & \_\_ & \_\_ \\ \_\_ & \_\_ & \_\_ \end{bmatrix} \begin{bmatrix} -12 & 23 & -17 \\ -3 & 2 & 2 \\ -4 & 5 & -4 \end{bmatrix} = \begin{bmatrix} 4 & 3 & -1 \\ -3 & 2 & 2 \\ -4 & 5 & -4 \end{bmatrix}$

9.(1 pt) Let

$$\mathbf{A} = \begin{bmatrix} 0 & 9 \\ 6 & 5 \end{bmatrix}$$

(i) Write **A** as a product of 4 elementary matrices:

$\mathbf{A} = \begin{bmatrix} \_\_ & \_\_ \\ \_\_ & \_\_ \end{bmatrix} \begin{bmatrix} \_\_ & \_\_ \\ \_\_ & \_\_ \end{bmatrix} \begin{bmatrix} \_\_ & \_\_ \\ \_\_ & \_\_ \end{bmatrix} \begin{bmatrix} \_\_ & \_\_ \\ \_\_ & \_\_ \end{bmatrix}$

(ii) Write $\mathbf{A}^{-1}$ as a product of 4 elementary matrices: $\mathbf{A}^{-1} = \begin{bmatrix} \_\_ & \_\_ \\ \_\_ & \_\_ \end{bmatrix} \begin{bmatrix} \_\_ & \_\_ \\ \_\_ & \_\_ \end{bmatrix} \begin{bmatrix} \_\_ & \_\_ \\ \_\_ & \_\_ \end{bmatrix} \begin{bmatrix} \_\_ & \_\_ \\ \_\_ & \_\_ \end{bmatrix}$

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