

Question: Linear Algebra

Solution:

1. Given the matrices, $A = \begin{bmatrix} -2 & 4 & -1 \end{bmatrix}$, $B = \begin{bmatrix} 1 \\ 0 \\ -3 \end{bmatrix}$

• $A \times B = -2 \times 1 + 4 \times 0 + -1 \times -3 = \begin{bmatrix} 1 \end{bmatrix}$

• $B \times A = \begin{bmatrix} -2 & 4 & -1 \\ 0 & 0 & 0 \\ 6 & -12 & 3 \end{bmatrix}$

2. Given the matrices $C = \begin{bmatrix} 3 & 5 \\ -2 & -4 \end{bmatrix}$, $D = \begin{bmatrix} 1 & 0 \\ -1 & 6 \end{bmatrix}$

• $|C| = -4 \times 3 - 5 \times (-2) = -2$

• $C \times D = \begin{bmatrix} -2 & 30 \\ 2 & -24 \end{bmatrix}$

• $D \times C = \begin{bmatrix} 3 & 5 \\ -15 & -29 \end{bmatrix}$

• $D^T = \begin{bmatrix} 1 & -1 \\ 0 & 6 \end{bmatrix}$

• $D^{-1} = \begin{bmatrix} 1 & 0 \\ 0.1666666 & 0.1666666 \end{bmatrix}$

• $D \times D^{-1} = \begin{bmatrix} 1 & 0 \\ -1 & 6 \end{bmatrix} \times \begin{bmatrix} 1 & 0 \\ 0.1666666 & 0.1666666 \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} = I_2$