Chapter 9.6 Check Your Understanding

Exercises 1–10 True or False. Give reasons.

1. If $A=\begin{bmatrix} -1 & 0 \\ 0 & -1 \end{bmatrix}$, then $A \cdot A = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$.

Answer:

True; evaluate A · A and see that the result is I.

2. The inverse of $\begin{bmatrix} 1 & 4 \\ 1 & 5 \end{bmatrix}$ is $\begin{bmatrix} 5 & -4 \\ -1 & 1 \end{bmatrix}$.

Answer:

True; multiply the two given matrices and see that the result is I.

3. If $A = \begin{bmatrix} 0 & 1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{bmatrix}$, then $A^{-1} = A$.

Answer:

True; evaluate A · A and see that the result is I.

4. If $A = \begin{bmatrix} 1 & -1 \\ 0 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} -1 & 1 \\ -1 & 0 \end{bmatrix}$, then $BA = AB$.

Answer:

False; $AB = \begin{bmatrix} 0 & 1 \\ -1 & 0 \end{bmatrix}$ and $BA = \begin{bmatrix} 0 & 2 \\ 0 & 1 \end{bmatrix}$.

5. If $A = \begin{bmatrix} 2 & -3 \\ -1 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 3 \\ 1 & 2 \end{bmatrix}$, then $BA = AB$.

Answer:

True; evaluate AB and BA and see that in both cases the result is I.

Exercises 6–10

Let $A = [-1, 3]$ $\quad B = \begin{bmatrix} -2 \\ -1 \end{bmatrix}, C = \begin{bmatrix} 1 & 0 \\ -1 & 2 \end{bmatrix}.$

6. The only entry in AB is positive.

Answer:

True; $AB = [-1, 3] \cdot \begin{bmatrix} -2 \\ -1 \end{bmatrix} = [5].$

7. AC is a square matrix.

Answer:

False; $AC = [-1, 3] \begin{bmatrix} 1 & 0 \\ -1 & 2 \end{bmatrix} = [-4, \ 6].$

8. All entries in BA are negative.

Answer:

False; $BA = \begin{bmatrix} -2 \\ -1 \end{bmatrix} \begin{bmatrix} -1 & 3 \end{bmatrix} = \begin{bmatrix} 2 & -6 \\ 1 & -3 \end{bmatrix}.$

9. $(BA)\ C = B(AC)$

Answer:

True; $(BA)C = \begin{bmatrix} 2 & -6 \\ 1 & -3 \end{bmatrix} \begin{bmatrix} 1 & 0 \\ -1 & 2 \end{bmatrix} = \begin{bmatrix} 8 & -12 \\ 4 & -6 \end{bmatrix}, B(AC) = \begin{bmatrix} -2 \\ -1 \end{bmatrix} [-4, \ 6] = \begin{bmatrix} 8 & -12 \\ 4 & -6 \end{bmatrix}.$

10. $A(BC)$ is undefined.

Answer:

True; $BC = \begin{bmatrix} -2 \\ -1 \end{bmatrix} \begin{bmatrix} 1 & 0 \\ -1 & 2 \end{bmatrix}$ is not defined.