Key

Accelerated Precalculus
5.01-5.04 Quiz Review WS #1: Matrix Operations and Inverses

Perform the given operation. If it is not possible, write undefined and explain why.

1. $\begin{bmatrix} 1 & 7 & 0 \\ -8 & 4 & 1 \end{bmatrix} - \begin{bmatrix} 6 & 7 \\ 2 & 2 \\ 5 & 0 \end{bmatrix}$

not possible since dimensions are not alike

2. $3\begin{bmatrix} -3 & -2 & 1 \\ 2 & 6 & -1 \end{bmatrix} - \begin{bmatrix} 4 & -1 & 11 \\ -5 & 3 & 1 \end{bmatrix}$

$\begin{bmatrix} -9 & -6 & 3 \\ 6 & 18 & -3 \end{bmatrix} - \begin{bmatrix} 4 & -1 & 11 \\ -5 & 3 & 1 \end{bmatrix} = \begin{bmatrix} -13 & -5 & -8 \\ 11 & 15 & -4 \end{bmatrix}$ $\begin{bmatrix} -13 & -5 & -8 \\ 11 & 15 & -4 \end{bmatrix}$

3. $\begin{bmatrix} 5 & 1 & 4 \\ -9 & 3 & 0 \end{bmatrix}\begin{bmatrix} 1 & 5 \\ 7 & 4 \\ 8 & 11 \end{bmatrix} - \begin{bmatrix} -5 & 8 \\ 4 & -3 \end{bmatrix}$

$2\times 3 \quad 3\times 2$ ✓

$\begin{bmatrix} 1 & 5 \\ 7 & 4 \\ 8 & 11 \end{bmatrix}$

$\begin{bmatrix} 5 & 1 & 4 \\ -9 & 3 & 0 \end{bmatrix}$ $\begin{bmatrix} 5(1)+1(7)+4(8) & 5(5)+1(4)+4(11) \\ -9(1)+3(7)+0(8) & -9(5)+3(4)+0(11) \end{bmatrix}$

$\begin{bmatrix} 49 & 65 \\ 8 & -30 \end{bmatrix}$

$\begin{bmatrix} 44 & 73 \\ 12 & -33 \end{bmatrix} \rightarrow \begin{bmatrix} 44 & 73 \\ 12 & -33 \end{bmatrix} - \begin{bmatrix} -5 & 8 \\ 4 & -3 \end{bmatrix} =$

4. $\begin{bmatrix} 2 & 3 & -1 & 5 & 3 & -1 \end{bmatrix} \cdot 2\begin{bmatrix} 4 \\ -2 \\ 1 \\ 4 \\ -1 \\ -6 \end{bmatrix}$

$1\times 6 \quad 6\times 1$ ✓

$\begin{bmatrix} 8 \\ -4 \\ 2 \\ 8 \\ -2 \\ -12 \end{bmatrix}$

$\begin{bmatrix} 2 & 3 & -1 & 5 & 3 & -1 \end{bmatrix}$ $2(8)+3(-4)-1(2)+5(8)+3(-2)+1(12)$

$\begin{bmatrix} 48 \end{bmatrix}$

2×4 and 2×4

5. $2\begin{bmatrix} 1 & -1 & 4 & 2 \\ 6 & 1 & 5 & -2 \end{bmatrix}\begin{bmatrix} -3 & -1 & 0 & 5 \\ -5 & 7 & 2 & 3 \end{bmatrix}$

not possible, dimensions are not compatible for multiplication.

Determine if [A] and [B] are inverses by using matrix multiplication and explain why.

6. $A = \begin{bmatrix} 3 & 5 \\ 2 & 1 \end{bmatrix}$ $B = \begin{bmatrix} 1 & 5 \\ -2 & 3 \end{bmatrix}$

$2 \times 2 \quad 2 \times 2$ ✓

$\begin{bmatrix} 3 & 5 \\ 2 & 1 \end{bmatrix} \begin{bmatrix} 1 & 5 \\ -2 & 3 \end{bmatrix} = \begin{bmatrix} 3(1)+5(-2) & 3(5)+5(3) \\ 2(1)+2(1) & 2(5)+3(1) \end{bmatrix} = \begin{bmatrix} -7 & 30 \\ 0 & 13 \end{bmatrix} \neq \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$

Therefore matrices A and B are not inverses.

Evaluate the following. (* Just find the determinant)

7. $det \begin{bmatrix} -2 & 2 \\ 5 & 7 \end{bmatrix}$ → $-2(7)-5(2) = -24$ **-24**

8. $\begin{vmatrix} 2 & 9 \\ 0 & -1 \end{vmatrix}$ → $2(-1)-9(0) = -2$ **-2**

Find the inverse of the following matrices. If it's not possible, state not possible and why.

9. $R = \begin{bmatrix} -2 & 0 \\ -5 & 1 \end{bmatrix}$ $det(R) = -2-0 = -2$

$R^{-1} = \frac{1}{-2} \begin{bmatrix} 1 & 0 \\ 5 & -2 \end{bmatrix} = \begin{bmatrix} -1/2 & 0/2 \\ -5/2 & -2/-2 \end{bmatrix}$

$\begin{bmatrix} -1/2 & 0 \\ -5/2 & 1 \end{bmatrix}$

10. $B = \begin{bmatrix} 3 & 7 \\ -1 & -3 \end{bmatrix}$ $det(B) = 3(-3)-7(-1) = 2$

$B^{-1} = \frac{1}{2} \begin{bmatrix} -3 & -7 \\ 1 & 3 \end{bmatrix} = \begin{bmatrix} +3/2 & +7/2 \\ -1/2 & -3/2 \end{bmatrix}$

$\begin{bmatrix} +3/2 & +7/2 \\ -1/2 & -3/2 \end{bmatrix}$

11. $W = \begin{bmatrix} 5 & 7 \\ -4 & -5 \end{bmatrix}$ $det(W) = 5(-5)-7(-4) = 3$

$W^{-1} = \frac{1}{3} \begin{bmatrix} -5 & -7 \\ 4 & 5 \end{bmatrix} = \begin{bmatrix} -5/3 & -7/3 \\ 4/3 & 5/3 \end{bmatrix}$

$\begin{bmatrix} -5/3 & -7/3 \\ 4/3 & 5/3 \end{bmatrix}$

*set $ad-bc=0$

(*inverse does not exist) means that determinant = 0

Find the value for the missing element that would matrix F singular.

12. $G = \begin{bmatrix} -4 & x \\ -1 & 4 \end{bmatrix}$ *set $a(d)-b(c)=0$

$-4(4)-x(-1) = 0$

$-16 + x = 0$

$x = 16$

x = 16