Key

Accelerated Precalculus 5.01-5.04 Quiz Review WS #3: Matrix Operations and Inverses

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

1. $\left(2\begin{bmatrix}0 & 1 & 2\\ -5 & 3 & 0\end{bmatrix}\begin{bmatrix}1 & -2\\ -1 & 4\\ 2 & -3\end{bmatrix}\right)-3\begin{bmatrix}-4 & 2\\ 1 & -3\end{bmatrix}$

$2\times 3 \quad 3\times 2$

$\begin{bmatrix}0 & 2 & 4\\ -10 & 6 & 0\end{bmatrix}\begin{bmatrix}1 & -2\\ -1 & 4\\ 2 & -3\end{bmatrix}$

$\begin{bmatrix}1(0)+2(-1)+4(2) & -2(0)+2(4)+4(-3)\\ -10(1)+6(-1)+0(2) & -10(-2)+6(4)+0(-3)\end{bmatrix}\rightarrow\begin{bmatrix}6 & -4\\ -16 & 44\end{bmatrix}-\begin{bmatrix}-12 & 6\\ 3 & -9\end{bmatrix}=$

$\begin{bmatrix}18 & -10\\ -19 & 53\end{bmatrix}$

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

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

$\begin{bmatrix}-6 & -7 & 4\\ 5 & 8 & -3\end{bmatrix}$

3. $3\begin{bmatrix}6 & 7\\ 2 & 2\\ 5 & 0\end{bmatrix}-2\begin{bmatrix}1 & 7 & 0\\ -8 & 4 & 1\end{bmatrix}$

not possible. Dimensions are not alike.

4. $9\begin{bmatrix}2 & -1 & 5 & 3 & -1\end{bmatrix}\cdot 2\begin{bmatrix}4\\ -2\\ 1\\ 4\\ -1\\ -6\end{bmatrix}$

1×5 and 6×1

Not possible. Inner dimensions do not match.

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

$2\times 4 \quad 4\times 2$

$\begin{bmatrix}-4 & -2 & 0 & 10\\ -10 & 2 & 4 & 8\end{bmatrix}\begin{bmatrix}1 & -2\\ 3 & 1\\ 0 & 2\\ 4 & 0\end{bmatrix}$

$\begin{bmatrix}-4(1)+3(-2)+0(0)+4(10) & -4(-2)+1(-2)+2(0)+10(0)\\ -10(1)+2(3)+4(0)+8(4) & -10(-2)+2(1)+4(2)+8(0)\end{bmatrix}=\begin{bmatrix}30 & 6\\ 28 & 30\end{bmatrix}$

$\begin{bmatrix}30 & 6\\ 28 & 30\end{bmatrix}$

WS#3

*If $[A][B]=\begin{bmatrix}1&0\\0&1\end{bmatrix}$ then matrices A and B are inverses of each other.

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

6. $A=\begin{bmatrix}7&4\\2&1\end{bmatrix}$ $B=\begin{bmatrix}-1&4\\2&-7\end{bmatrix}$

$$\begin{bmatrix}-1&4\\2&-7\end{bmatrix}$$

$$\begin{bmatrix}7&4\\2&1\end{bmatrix}\begin{matrix}7(-1)+4(2)\\2(-1)+1(2)\end{matrix}\quad\begin{matrix}7(4)+4(-7)\\2(4)+1(-7)\end{matrix}=\begin{bmatrix}1&0\\0&1\end{bmatrix}$$ ← Identity matrix

Since $[A][B]=$ Identity matrix, A and B are inverses.

Evaluate the following.

7. $det\begin{bmatrix}-2&-3\\-5&4\end{bmatrix}$ $=-2(4)-(-3)(-5)=-8-15=\boxed{-23}$

8. $\begin{bmatrix}4&-7\\2&-1\end{bmatrix}$ $4(-1)-2(-7)=\boxed{10}$

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

9. $R=\begin{bmatrix}-3&2\\-6&1\end{bmatrix}$ $det(R)=-3(1)-2(-6)=-3+12=9$

$$R^{-1}=\frac{1}{9}\begin{bmatrix}1&-2\\6&-3\end{bmatrix}=\begin{bmatrix}1/9&-2/9\\6/9&-3/9\end{bmatrix}$$

$$\begin{bmatrix}1/9&-2/9\\2/3&-1/3\end{bmatrix}$$

10. $B=\begin{bmatrix}2&5\\-1&-3\end{bmatrix}$ $det(B)=2(-3)-5(-1)=-6+5=-1$

$$B^{-1}=\frac{1}{-1}\begin{bmatrix}-3&-5\\1&2\end{bmatrix}$$

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

11. $W=\begin{bmatrix}5&2\\-6&-1\end{bmatrix}$ $det(W)=5(-1)-2(-6)=-5+12=7$

$$W^{-1}=\frac{1}{7}\begin{bmatrix}-1&-2\\6&5\end{bmatrix}=\begin{bmatrix}-1/7&-2/7\\6/7&5/7\end{bmatrix}$$

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

12. $G=\begin{bmatrix}-2&x\\-8&5\end{bmatrix}$

*set $ad-bc=0$ ← set determinant = 0 since inverse does not exist

$-2(5)-(-8)(x)=0$

$-10+8x=0$

$8x=10$

$x=\frac{10}{8}$ →

$$\boxed{x=\frac{5}{4}}$$