

Review 3

Matrices (Continued)

1) If

$$A = \begin{bmatrix} 2 & -2 \\ 1 & 0 \\ 7 & 5 \end{bmatrix} \text{ and } B = \begin{bmatrix} 4 & 5 \\ 2 & 3 \\ 7 & 1 \end{bmatrix}$$

find $-3A + B$.

$$-3A = \begin{bmatrix} -6 & 6 \\ -3 & 0 \\ -21 & -15 \end{bmatrix} + \begin{bmatrix} 4 & 5 \\ 2 & 3 \\ 7 & 1 \end{bmatrix} = \begin{bmatrix} -2 & 11 \\ -1 & 3 \\ -14 & -14 \end{bmatrix}$$

2) Solve the matrix equation for X.

$-3X + 10 = 5$

a) $-3X + \begin{bmatrix} 1 & 3 \\ 4 & 5 \end{bmatrix} = \begin{bmatrix} 5 & 0 \\ 0 & 2 \end{bmatrix}$

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

$$-\frac{1}{3} \cdot -3X = \begin{bmatrix} 4 & -3 \\ -4 & -3 \end{bmatrix} \cdot -\frac{1}{3}$$

$$X = \begin{bmatrix} -4/3 & 1 \\ 4/3 & +1 \end{bmatrix}$$

$10 - X = 4$

b) $\begin{bmatrix} 1 & 4 \\ -2 & 5 \\ 8 & 3 \end{bmatrix} - X = \begin{bmatrix} 1 & 2 \\ 3 & 1 \\ 6 & 7 \end{bmatrix}$

$$-\begin{bmatrix} 1 & 4 \\ -2 & 5 \\ 8 & 3 \end{bmatrix} = \begin{bmatrix} 1 & 4 \\ -2 & 5 \\ 8 & 3 \end{bmatrix}$$

$$X = \begin{bmatrix} 0 & -2 \\ 5 & -4 \\ -2 & 4 \end{bmatrix} \rightarrow X = \begin{bmatrix} 0 & 2 \\ -5 & 4 \\ 2 & -4 \end{bmatrix}$$

3) Find the product if it exists. If it exists, give the dimensions of the product matrix.

a) $\begin{bmatrix} 1 & 4 \\ 2 & 5 \end{bmatrix} \begin{bmatrix} -1 & 3 \\ 2 & 5 \end{bmatrix}$

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

$$\begin{bmatrix} 7 & 23 \\ 8 & 31 \end{bmatrix}$$

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

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

Not same. Not possible

4) Evaluate the determinant of the matrix.

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

$$-11$$

b) $\begin{bmatrix} 4 & 3 & 2 \\ 6 & 1 & 7 \\ 4 & 3 & 5 \end{bmatrix}$

5) Does the given matrix have an inverse? If it does, what is its inverse?

a) $\begin{bmatrix} 2 & 4 \\ 1 & 5 \end{bmatrix}$

$$\begin{bmatrix} 5/6 & -2/3 \\ -1/6 & 1/3 \end{bmatrix}$$

b) $\begin{bmatrix} 2 & 1 \\ 2 & 1 \end{bmatrix}$

Does not exist

6) Write the system of equations as a matrix equation.

$3x + 4y = 2$

$5x + 2y = 3z + 4$

$6x + 4z = -1$

$x \quad y \quad z = \text{constant}$
 $3x + 4y + 0z = 2$
 $5x + 2y - 3z = 4$
 $6x + 0y + 4z = -1$

$$\begin{bmatrix} 3 & 4 & 0 \\ 5 & 2 & -3 \\ 6 & 0 & 4 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 2 \\ 4 \\ -1 \end{bmatrix}$$

7) Solve the system of equations.

$-2x + 3y = 4$

$5x + 10y = 1$

$$\begin{bmatrix} -2 & 3 \\ 5 & 10 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 4 \\ 1 \end{bmatrix}$$

~~$A^{-1} \cdot A$~~ ~~X~~ ~~$= A^{-1} \cdot B$~~

$$X = A^{-1} \cdot B$$

$$X = \begin{bmatrix} -37/35 \\ 22/35 \end{bmatrix}$$