

9-4 NOTES

Sec 1 H

Multiplying Matrices Day 2

Unit 9

Ex. 1: If $A = \begin{bmatrix} 2 & 1 \\ -1 & 3 \end{bmatrix}$, $B = \begin{bmatrix} -2 & 0 \\ 4 & 2 \end{bmatrix}$, and $C = \begin{bmatrix} 1 & 1 \\ 3 & 2 \end{bmatrix}$,
 simplify each expression.

a. $(AB)C$

$$AB = \begin{bmatrix} \frac{-4+4}{2+12} & \frac{0+2}{0+6} \\ \frac{2+12}{14+18} & \frac{0+4}{14+12} \end{bmatrix} = \begin{bmatrix} 0 & 2 \\ 14 & 6 \end{bmatrix}$$

$$\begin{bmatrix} 0 & 2 \\ 14 & 6 \end{bmatrix} \begin{bmatrix} 1 & 1 \\ 3 & 2 \end{bmatrix} = \begin{bmatrix} 0+6 & 0+4 \\ 14+18 & 14+12 \end{bmatrix} = \begin{bmatrix} 6 & 4 \\ 32 & 26 \end{bmatrix}$$

b. $A(BC)$

$$BC = \begin{bmatrix} -2+0 & -2+0 \\ 4+6 & 4+4 \end{bmatrix} = \begin{bmatrix} -2 & -2 \\ 10 & 8 \end{bmatrix}$$

$$\begin{bmatrix} 2 & 1 \\ -1 & 3 \end{bmatrix} \begin{bmatrix} -2 & -2 \\ 10 & 8 \end{bmatrix} = \begin{bmatrix} -4+10 & -4+8 \\ 2+30 & 2+24 \end{bmatrix} = \begin{bmatrix} 6 & 4 \\ 32 & 26 \end{bmatrix}$$

c. Does the ASSOCIATIVE PROPERTY hold true for matrices?

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Ex. 2: If $A = \begin{bmatrix} 2 & 1 \\ -1 & 3 \end{bmatrix}$, $B = \begin{bmatrix} -2 & 0 \\ 4 & 2 \end{bmatrix}$, and $C = \begin{bmatrix} 1 & 1 \\ 3 & 2 \end{bmatrix}$,
simplify each expression.

a. $A(B+C)$ $B+C = \begin{bmatrix} -1 & 1 \\ 7 & 4 \end{bmatrix}$

$$\begin{bmatrix} 2 & 1 \\ -1 & 3 \end{bmatrix} \begin{bmatrix} -1 & 1 \\ 7 & 4 \end{bmatrix} = \begin{bmatrix} \frac{-2+7}{1+2} & \frac{2+4}{-1+12} \end{bmatrix} = \begin{bmatrix} 5 & 4 \\ 22 & 11 \end{bmatrix}$$

b. $AB + AC$

$$AB = \begin{bmatrix} \frac{-4+4}{2+12} & \frac{0+2}{0+6} \end{bmatrix} = \begin{bmatrix} 0 & 2 \\ 14 & 6 \end{bmatrix}$$

$$AC = \begin{bmatrix} \frac{2+3}{-1+9} & \frac{2+2}{-1+6} \end{bmatrix} = \begin{bmatrix} 5 & 4 \\ 8 & 5 \end{bmatrix}$$

$$= \begin{bmatrix} 5 & 6 \\ 22 & 11 \end{bmatrix}$$

c. Does the DISTRIBUTIVE PROPERTY hold true for matrices?

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Identity Matrix:

$$I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

Ex. 3: If $A = \begin{bmatrix} 2 & 1 \\ -1 & 3 \end{bmatrix}$, simplify each expression.

a. AI b. IA

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

$$\begin{bmatrix} \frac{2+0}{0+-1} & \frac{1+0}{0+3} \end{bmatrix} = \begin{bmatrix} 2 & 1 \\ -1 & 3 \end{bmatrix}$$

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Ex. 4: Simplify $\begin{bmatrix} -1 & 5 \\ 3 & 2 \end{bmatrix}^2$

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

Ex. 5: Solve the each variable.

$$\begin{bmatrix} 2 & y & 4 \\ 5 & 3 & 8 \\ -1 & -2 & 5 \end{bmatrix} \begin{bmatrix} -3 \\ 2 \\ 1 \end{bmatrix} = \begin{bmatrix} -4 \\ y \\ 4 \end{bmatrix} \begin{matrix} R1C1 \\ R2C1 \\ R3C1 \end{matrix}$$

$$-1x - 4 + 5 = 4$$

$$\begin{array}{r} -1x + 1 = 4 \\ \quad -1 \quad -1 \\ \hline \end{array}$$

$$\begin{array}{r} -1x = 3 \\ \frac{-1}{-1} \quad \frac{3}{-1} \end{array}$$

$$x = -3$$

$$-15 + 6 + 8 = y$$

$$-1 = y$$