Matrices Day 2: Sp 2018

→ Adding (dimensions must be the same)

Ex) $\underset{3\times2}{A}\begin{bmatrix}3 & 2\\ 2 & 4\\ 6 & 5\end{bmatrix} + \underset{3\times2}{B}\begin{bmatrix}4 & -3\\ -5 & 1\\ 6 & -4\end{bmatrix} = \underset{3\times2}{C}\begin{bmatrix}7 & -1\\ -3 & 5\\ 12 & 1\end{bmatrix}$

→ Subtracting (dimensions must be the same)

Ex) $\underset{2\times2}{D}\begin{bmatrix}3 & 6\\ 4 & 6\end{bmatrix} - \underset{2\times2}{E}\begin{bmatrix}-2 & 7\\ 1 & -9\end{bmatrix} = \underset{2\times2}{F}\begin{bmatrix}5 & -1\\ 3 & 15\end{bmatrix}$

$\underset{3\times2}{A} + \underset{2\times2}{E}$ = not possible

→ Scalar Multiplication (multiply each element by scalar)

Ex) $2 \cdot D$

$$2 \cdot \begin{bmatrix}3 & 6\\ 4 & 6\end{bmatrix} = \begin{bmatrix}6 & 12\\ 8 & 12\end{bmatrix}$$

→ Multiplication (# columns in first matrix must match # rows in second; answer is # rows in first by # columns in second)

Ex) $D \cdot E$ $\quad \underset{2\times\textcircled{2}}{\begin{bmatrix}3 & 6\\ 4 & 6\end{bmatrix}} \cdot \underset{\textcircled{2}\times2}{\begin{bmatrix}-2 & 7\\ 1 & -9\end{bmatrix}} = \begin{bmatrix}R1C1 & R1C2\\ R2C1 & R2C2\end{bmatrix}$

$3\cdot-2+6\cdot1=0$
$3\cdot7+6\cdot-9=-33$
$4\cdot-2+6\cdot1=-2$
$4\cdot7+6\cdot-9=-26$

$$\begin{bmatrix}0 & -33\\ -2 & -26\end{bmatrix}$$

Ex) $A \cdot D$

$$\begin{bmatrix} 3 & 2 \\ 2 & 4 \\ 6 & 5 \end{bmatrix} \cdot \begin{bmatrix} 3 & 6 \\ 4 & 6 \end{bmatrix} = \begin{bmatrix} 17 & 30 \\ 22 & 36 \\ 38 & 66 \end{bmatrix}$$

$3 \times \textcircled{2}$ $\quad$ $\textcircled{2} \times 2$

$3 \cdot 3 + 2 \cdot 4 = 17$
$3 \cdot 6 + 2 \cdot 6 = 30$
$2 \cdot 3 + 4 \cdot 4 = 22$
$2 \cdot 6 + 4 \cdot 6 = 36$
$6 \cdot 3 + 5 \cdot 4 = 38$
$6 \cdot 6 + 5 \cdot 6 = 66$

Ex) $D \cdot A$

$2 \times \textcircled{2} \cdot \textcircled{3} \times 2$

not possible

Ex) $3 \cdot \begin{bmatrix} -2 & 1 \\ 4 & -3 \end{bmatrix} - \begin{bmatrix} 6 & 8 \\ -5 & -4 \end{bmatrix}$

$$\begin{bmatrix} -6 & 3 \\ 12 & -9 \end{bmatrix} - \begin{bmatrix} 6 & 8 \\ -5 & -4 \end{bmatrix}$$

$$\begin{bmatrix} -12 & -5 \\ 17 & -5 \end{bmatrix}$$