



Algebra of Matrices Ex 5.2 Q1

$$\begin{aligned} \text{(i)} \quad & \begin{bmatrix} 3 & -2 \\ 1 & 4 \end{bmatrix} + \begin{bmatrix} -2 & 4 \\ 1 & 3 \end{bmatrix} \\ &= \begin{bmatrix} 3-2 & -2+4 \\ 1+1 & 4+3 \end{bmatrix} \\ &= \begin{bmatrix} 1 & 2 \\ 2 & 7 \end{bmatrix} \end{aligned}$$

Hence,

$$\begin{bmatrix} 3 & -2 \\ 1 & 4 \end{bmatrix} + \begin{bmatrix} -2 & 4 \\ 1 & 3 \end{bmatrix} = \begin{bmatrix} 1 & 2 \\ 2 & 7 \end{bmatrix}$$

$$\begin{aligned} \text{(ii)} \quad & \begin{bmatrix} 2 & 1 & 3 \\ 0 & 3 & 5 \\ -1 & 2 & 5 \end{bmatrix} + \begin{bmatrix} 1 & -2 & 3 \\ 2 & 6 & 1 \\ 0 & -3 & 1 \end{bmatrix} \\ &= \begin{bmatrix} 2+1 & 1-2 & 3+3 \\ 0+2 & 3+6 & 5+1 \\ -1+0 & 2-3 & 5+1 \end{bmatrix} \\ &= \begin{bmatrix} 3 & -1 & 6 \\ 2 & 9 & 6 \\ -1 & -1 & 6 \end{bmatrix} \end{aligned}$$

Hence,

$$\begin{bmatrix} 2 & 1 & 3 \\ 0 & 3 & 5 \\ -1 & 2 & 5 \end{bmatrix} + \begin{bmatrix} 1 & -2 & 3 \\ 2 & 6 & 1 \\ 0 & -3 & 1 \end{bmatrix} = \begin{bmatrix} 3 & -1 & 6 \\ 2 & 9 & 6 \\ -1 & -1 & 6 \end{bmatrix}$$

Algebra of Matrices Ex 5.2 Q2

Given, $A = \begin{bmatrix} 2 & 4 \\ 3 & 2 \end{bmatrix}, B = \begin{bmatrix} 1 & 3 \\ -2 & 5 \end{bmatrix}, C = \begin{bmatrix} -2 & 5 \\ 3 & 4 \end{bmatrix}$

$$2A - 3B$$

$$\begin{aligned} &= 2 \begin{bmatrix} 2 & 4 \\ 3 & 2 \end{bmatrix} - 3 \begin{bmatrix} 1 & 3 \\ -2 & 5 \end{bmatrix} \\ &= \begin{bmatrix} 4 & 8 \\ 6 & 4 \end{bmatrix} - \begin{bmatrix} 3 & 9 \\ -6 & 15 \end{bmatrix} \\ &= \begin{bmatrix} 4-3 & 8-9 \\ 6+6 & 4-15 \end{bmatrix} \\ &= \begin{bmatrix} 1 & -1 \\ 12 & -11 \end{bmatrix} \end{aligned}$$

Hence,

$$2A - 3B = \begin{bmatrix} 1 & -1 \\ 12 & -11 \end{bmatrix}$$

Algebra of Matrices Ex 5.2 Q2(ii)

Given, $A = \begin{bmatrix} 2 & 4 \\ 3 & 2 \end{bmatrix}, B = \begin{bmatrix} 1 & 3 \\ -2 & 5 \end{bmatrix}, C = \begin{bmatrix} -2 & 5 \\ 3 & 4 \end{bmatrix}$

$$B - 4C$$

$$\begin{aligned} &= \begin{bmatrix} 1 & 3 \\ -2 & 5 \end{bmatrix} - 4 \begin{bmatrix} -2 & 5 \\ 3 & 4 \end{bmatrix} \\ &= \begin{bmatrix} 1 & 3 \\ -2 & 5 \end{bmatrix} - \begin{bmatrix} -8 & 20 \\ 12 & 16 \end{bmatrix} \\ &= \begin{bmatrix} 1+8 & 3-20 \\ -2-12 & 5-16 \end{bmatrix} \\ &= \begin{bmatrix} 9 & -17 \\ -14 & -11 \end{bmatrix} \end{aligned}$$

Hence,

$$B - 4C = \begin{bmatrix} 9 & -17 \\ -14 & -11 \end{bmatrix}$$

Algebra of Matrices Ex 5.2 Q2(iii)

Given, $A = \begin{bmatrix} 2 & 4 \\ 3 & 2 \end{bmatrix}, B = \begin{bmatrix} 1 & 3 \\ -2 & 5 \end{bmatrix}, C = \begin{bmatrix} -2 & 5 \\ 3 & 4 \end{bmatrix}$

$$3A - C$$

$$\begin{aligned} &= 3 \begin{bmatrix} 2 & 4 \\ 3 & 2 \end{bmatrix} - \begin{bmatrix} -2 & 5 \\ 3 & 4 \end{bmatrix} \\ &= \begin{bmatrix} 6 & 12 \\ 9 & 6 \end{bmatrix} - \begin{bmatrix} -2 & 5 \\ 3 & 4 \end{bmatrix} \\ &= \begin{bmatrix} 6+2 & 12-5 \\ 9-3 & 6-4 \end{bmatrix} \\ &= \begin{bmatrix} 8 & 7 \\ 6 & 2 \end{bmatrix} \end{aligned}$$

Hence,

$$3A - C = \begin{bmatrix} 8 & 7 \\ 6 & 2 \end{bmatrix}$$

Algebra of Matrices Ex 5.2 Q2(iv)

Given, $A = \begin{bmatrix} 2 & 4 \\ 3 & 2 \end{bmatrix}, B = \begin{bmatrix} 1 & 3 \\ -2 & 5 \end{bmatrix}, C = \begin{bmatrix} -2 & 5 \\ 3 & 4 \end{bmatrix}$

$$3A - 2B + 3C$$

$$\begin{aligned} &= 3 \begin{bmatrix} 2 & 4 \\ 3 & 2 \end{bmatrix} - 2 \begin{bmatrix} 1 & 3 \\ -2 & 5 \end{bmatrix} + 3 \begin{bmatrix} -2 & 5 \\ 3 & 4 \end{bmatrix} \\ &= \begin{bmatrix} 6 & 12 \\ 9 & 6 \end{bmatrix} - \begin{bmatrix} 2 & 6 \\ -4 & 10 \end{bmatrix} + \begin{bmatrix} -6 & 15 \\ 9 & 12 \end{bmatrix} \\ &= \begin{bmatrix} 6-2-6 & 12-6+15 \\ 9+4+9 & 6-10+12 \end{bmatrix} \\ &= \begin{bmatrix} -2 & 21 \\ 22 & 8 \end{bmatrix} \end{aligned}$$

Hence,

$$3A - 2B + 3C = \begin{bmatrix} -2 & 21 \\ 22 & 8 \end{bmatrix}$$

Algebra of Matrices Ex 5.2 Q3

Given, $A = \begin{bmatrix} 2 & 3 \\ 5 & 7 \end{bmatrix}, B = \begin{bmatrix} -1 & 0 & 2 \\ 3 & 4 & 1 \end{bmatrix}, C = \begin{bmatrix} -1 & 2 & 3 \\ 2 & 1 & 0 \end{bmatrix} \Rightarrow$

(i) $A + B$

$A + B$ is not possible as order of A is 2×2 and order of B is 2×3 .

And we know that sum of matrix is possible only when their order is same.

Hence,

$A + B$ is not possible

$B + C$

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

So,

$$B + C = \begin{bmatrix} -2 & 2 & 5 \\ 5 & 5 & 1 \end{bmatrix}$$

We need to find $2B + 3A$ and $3C - 4B$

Thus, $2B + 3A$ does not exist as the order of A and B are different.

Let us find $3C - 4B = 3 \begin{bmatrix} -1 & 2 & 3 \\ 2 & 1 & 0 \end{bmatrix} - 4 \begin{bmatrix} -1 & 0 & 2 \\ 3 & 4 & 1 \end{bmatrix}$

$$\begin{aligned} &= \begin{bmatrix} -3 & 6 & 9 \\ 6 & 3 & 0 \end{bmatrix} - \begin{bmatrix} -4 & 0 & 8 \\ 12 & 16 & 4 \end{bmatrix} \\ &= \begin{bmatrix} -3 & 6 & 9 \\ 6 & 3 & 0 \end{bmatrix} + \begin{bmatrix} 4 & 0 & -8 \\ -12 & -16 & -4 \end{bmatrix} \\ &= \begin{bmatrix} 1 & 6 & 1 \\ -6 & -13 & -4 \end{bmatrix} \end{aligned}$$

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