

# ABHIJIT SINHA

## (4x4 Matrix Operations)

### ADDITION:

$$\begin{bmatrix} 2 & 1 & 5 & 7 \\ 6 & -2 & 0 & 3 \\ 3 & 2 & -4 & 1 \\ 9 & 7 & 2 & 3 \end{bmatrix} + \begin{bmatrix} 1 & 0 & 2 & 1 \\ -2 & 1 & 5 & 2 \\ 3 & -2 & 6 & 4 \\ 2 & 0 & 1 & -2 \end{bmatrix} = \begin{bmatrix} 3 & 1 & 7 & 8 \\ 4 & -1 & 5 & 5 \\ 6 & 0 & 2 & 5 \\ 11 & 7 & 3 & 1 \end{bmatrix}$$

### SUBTRACTION:

$$\begin{bmatrix} 2 & 1 & 5 & 7 \\ 6 & -2 & 0 & 3 \\ 3 & 2 & -4 & 1 \\ 9 & 7 & 2 & 3 \end{bmatrix} - \begin{bmatrix} 1 & 0 & 2 & 1 \\ -2 & 1 & 5 & 2 \\ 3 & -2 & 6 & 4 \\ 2 & 0 & 1 & -2 \end{bmatrix} = \begin{bmatrix} 1 & 1 & 3 & 6 \\ 8 & -3 & -5 & 1 \\ 0 & 4 & -10 & -3 \\ 7 & 7 & 1 & 5 \end{bmatrix}$$

### MULTIPLICATION:

$$\begin{bmatrix} 2 & 1 & 5 & 7 \\ 6 & -2 & 0 & 3 \\ 3 & 2 & -4 & 1 \\ 9 & 7 & 2 & 3 \end{bmatrix} * \begin{bmatrix} 1 & 0 & 2 & 1 \\ -2 & 1 & 5 & 2 \\ 3 & -2 & 6 & 4 \\ 2 & 0 & 1 & -2 \end{bmatrix}$$

$$= \begin{bmatrix} (2 \times 1) + (1 \times -2) + (5 \times 3) + (7 \times 2) & (2 \times 0) + (1 \times 1) + (5 \times -2) + (7 \times 0) \\ (6 \times 1) + (-2 \times -2) + (0 \times 3) + (3 \times 2) & (6 \times 0) + (-2 \times 1) + (0 \times -2) + (3 \times 0) \\ (3 \times 1) + (2 \times -2) + (-4 \times 3) + (1 \times 2) & (3 \times 0) + (2 \times 1) + (-4 \times -2) + (1 \times 0) \\ (9 \times 1) + (7 \times -2) + (2 \times 3) + (3 \times 2) & (9 \times 0) + (7 \times 1) + (2 \times -2) + (3 \times 0) \end{bmatrix}$$

$$= \begin{bmatrix} 29 & -9 & 46 & 10 \\ 16 & -2 & 5 & -4 \\ -11 & 10 & -7 & -11 \\ 7 & 3 & 68 & 25 \end{bmatrix}$$

ABHIJIT SINHA

$$\left[ \text{Matrix}_{3 \times 3} \times \text{Vector}_{1 \times 3} \right]$$

$$\begin{bmatrix} 2 & 1 & 3 \\ -1 & 7 & 2 \\ 8 & -2 & 4 \end{bmatrix} \times \begin{bmatrix} 1 \\ -2 \\ 4 \end{bmatrix}$$

$$= \begin{bmatrix} (2 \times 1) + (1 \times -2) + (3 \times 4) \\ (-1 \times 1) + (7 \times -2) + (2 \times 4) \\ (8 \times 1) + (-2 \times -2) + (4 \times 4) \end{bmatrix}$$

$$= \begin{bmatrix} 2 - 2 + 12 \\ -1 - 14 + 8 \\ 8 + 4 + 16 \end{bmatrix} = \begin{bmatrix} 12 \\ -5 \\ 28 \end{bmatrix}$$