

Matrix Multiplication Guided Notes

1. What is necessary condition for matrix multiplication?

Ans: Two matrices A and B are confirmable for multiplication AB if

$$\text{No of columns of A} = \text{No of Rows of B}$$

2. How the multiplication of matrices is carried out?

Ans: Let we have matrices A & B

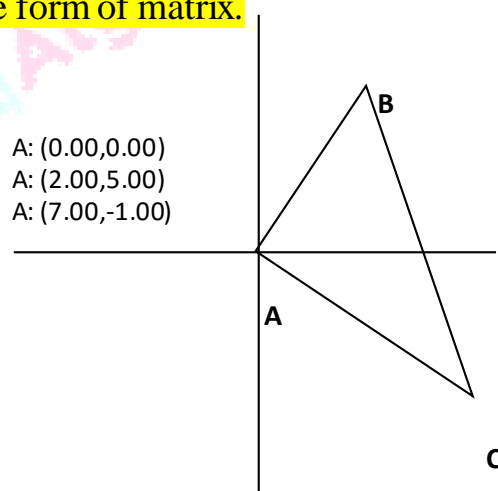
$$A = \begin{bmatrix} a & b \\ c & d \end{bmatrix} \text{ and } B = \begin{bmatrix} e & f \\ g & h \end{bmatrix}$$

$$AB = \begin{bmatrix} a & b \\ c & d \end{bmatrix} \begin{bmatrix} e & f \\ g & h \end{bmatrix}$$

$$AB = \begin{bmatrix} ae + bg & af + bh \\ ce + dg & cf + dh \end{bmatrix}$$

3. What is geometric transformation with matrices?

Ans: In geometric transformation with matrices the vertices of geometric figure are represented in the form of matrix.



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4. State the general properties of matrix multiplication.

Ans: In general,

- a. $A.B \neq B.A$ (not commutative)
- b. $A(BC) = AB(C)$ (Associative)
- c. $A.0 = 0$ (0 being zero matrix)
- d. $A.I = I.A = A$ (I being identity matrix)
- e. $(A+B)C = AC+BC$
- f. $A(B+C) = AB+AC$

5. How scalar multiplication is different from matrix multiplication.

Ans: In scalar multiplication one constant value is multiplied with each element of a matrix whereas in matrix multiplication two conformable matrices are multiplied with each other.

Matrix Multiplication Guided Notes**ROBLEM 01**

If order of a matrix A is 3×2 and order of matrix B is 2×4 then order of AB will be:

- a. 2×2
- b. 3×2
- c. 3×4
- d. 4×3

Ans: c

ROBLEM 02

Given $A = \begin{bmatrix} -1 \\ 2 \end{bmatrix}$ $B = \begin{bmatrix} 1 & 0 \\ 2 & 4 \end{bmatrix}$ and $C = [1 \quad 3]$ find the following if exists:

- a. AB
- b. BA
- c. CA
- d. BC

For (a) Order is

$$\begin{array}{cc} A & B \\ 2 \times 1 & 2 \times 2 \end{array}$$

Not equal

So AB doesn't exist

For (b) Order is

$$\begin{array}{cc} B & A \\ 2 \times 2 & 2 \times 1 \end{array}$$

Equal, BA exists and has order 2×1

$$\begin{aligned} & \begin{bmatrix} 1 & 0 \\ 2 & 4 \end{bmatrix} \begin{bmatrix} -1 \\ 2 \end{bmatrix} \\ & \begin{bmatrix} 1 \times -1 & 0 \times 2 \\ 2 \times -1 & 4 \times 2 \end{bmatrix} \\ & \begin{bmatrix} -1 & 0 \\ -2 & 8 \end{bmatrix} \end{aligned}$$

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For (c) Order is

$$\begin{array}{cc} C & A \\ 1 \times 2 & 2 \times 1 \end{array}$$

equal, CA is possible and has the order 1×2

$$C = [1 \quad 3] \quad A = \begin{bmatrix} -1 \\ 2 \end{bmatrix}$$

$$[1 \quad 3] \begin{bmatrix} -1 \\ 2 \end{bmatrix}$$

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

For (d) Order is

$$\begin{array}{cc} B & C \\ 2 \times 1 & 2 \times 2 \end{array}$$

Not equal BC doesn't exist.

PROBLEM 03

From the matrices if the geometrical figures have following vertices.

$$A(0,0) \quad B(5,2) \quad C(-4,2)$$

$$A(4,8) \quad B(-7,4)$$

$$A(0,0) \quad B(0,4) \quad C(4,4)$$

$$\begin{bmatrix} 0 & 0 \\ 5 & 2 \\ -4 & 2 \\ 4 & 8 \\ -7 & 4 \\ 0 & 0 \\ 0 & 4 \\ 4 & 4 \end{bmatrix}$$