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Mathematical Economics Semester - VIth
Matrix.

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

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

Find AB . Is BA defined?

Given that

$$A = \begin{bmatrix} 1 & 2 & -3 & 4 & 3 \\ 0 & 4 & 5 & 2 & 4 \\ 5 & 1 & 0 & -2 & 3 \end{bmatrix} \quad 3 \times 5$$

Order of matrix $A = 3 \times 5$.

$$B = \begin{bmatrix} 1 & 2 \\ 3 & 4 \\ 5 & 6 \\ 7 & 8 \\ 9 & 10 \end{bmatrix} \quad 5 \times 2$$

∴ Order of matrix $AB = 3 \times 2$.

Now

$$AB = A \times B.$$

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

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

$$AB = \begin{bmatrix} 1 + 6 - 15 + 28 + 27 & 2 + 8 - 18 + 32 + 30 \\ 0 + 12 + 25 + 14 + 36 & 0 + 16 + 30 + 16 + 40 \\ 5 + 3 + 0 - 14 + 27 & 10 + 4 + 0 - 16 + 30 \end{bmatrix}$$

$$AB = \begin{bmatrix} 47 & 54 \\ 87 & 102 \\ 21 & 28 \end{bmatrix} \quad 3 \times 2$$

Order of matrix AB = 3×2 .

Again, we have

$$A = \begin{bmatrix} 1 & 2 & -3 & 4 & 3 \\ 0 & 4 & 5 & 2 & 4 \\ 5 & 1 & 0 & -2 & 3 \end{bmatrix}_{3 \times 5}$$

Order of matrix $A = 3 \times 5$.

$$B = \begin{bmatrix} 1 & 2 \\ 3 & 4 \\ 5 & 6 \\ 7 & 8 \\ 9 & 10 \end{bmatrix}_{5 \times 2}$$

Order of matrix $B = 5 \times 2$.

For the multiplication of matrices it must be fulfilled.

Columns in 1st matrix = Rows in 2nd matrix

For BA .

Columns in $B = 2$

Rows in $A = 3$

$2 \neq 3$.

BA is not defined.