- Scalar Multiplication

Let $A = [a_{ij}]_{mxn}$ and $B = [b_{ij}]_{pxq}$ be two matrices , then, we can define the multiplication of A and B as $AB = [c_{ik}]_{mxq}$

Where $[c_{ik}]$ can be obtained as first taking the element wise product of element of ith row of A and kth column of B and then adding such product

For defining AB . A is called Pre-multiplier and B is Post multiplier
It is possible when Col (pre) = Rows(post) i.e, n = p
And , the order of resultant matrix i.e., AB is always Rows(pre) x Col(post) or we can say m x q.

Properties

1. $AB \neq BA$
2. $A(BC) = (AB)C$
3. $AI = IA = A$
4. $AO = OA = O$
5. $A^n = A.A.A....A('n' times)$
6. If AB is defined, then BA is need not to be define
7. If A and B are square matrices of same order , then, AB and BA are define both

- Transpose of Matrix

Transpose of matrix A i.e., A' can be obtained by interchanging their Row and Columns
If $A = [a_{ij}]_{mxn} \Rightarrow A' = [a_{ji}]_{nxm}$ or simply $R \leftrightarrow C$