

Step-1

Given that Order of A is 3 x 5, Order of B is 5 x 3, Order of C is 5 x 1, order of D is 3x1

$$(i) \quad BA = B_{5 \times 3} \cdot A_{3 \times 5} = (BA)_{5 \times 5}.$$

Number of columns of B = Number of Rows of A

Hence, the result will be exist.

$$\begin{aligned} B.A &= \begin{pmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \end{pmatrix} \begin{pmatrix} 1 & 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 & 1 \end{pmatrix} \\ &= \begin{pmatrix} 3 & 3 & 3 & 3 & 3 \\ 3 & 3 & 3 & 3 & 3 \\ 3 & 3 & 3 & 3 & 3 \\ 3 & 3 & 3 & 3 & 3 \\ 3 & 3 & 3 & 3 & 3 \end{pmatrix}_{5 \times 5} \end{aligned}$$

Step-2

$$(ii) \quad A.B = A_{3 \times 5} \cdot B_{5 \times 3}$$

$$= (AB)_{3 \times 3}$$

Number of columns of B = Number of Rows of A

Hence, the result will be exist.

$$\begin{aligned} A.B &= \begin{pmatrix} 1 & 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 & 1 \end{pmatrix} \begin{pmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \end{pmatrix} \\ &= \begin{pmatrix} 5 & 5 & 5 \\ 5 & 5 & 5 \\ 5 & 5 & 5 \end{pmatrix}_{3 \times 3} \end{aligned}$$

Step-3

$$\begin{aligned}
 \text{(iii)} \quad (A.B).D &= A_{3 \times 5} \cdot B_{5 \times 3} \cdot D_{3 \times 1} \\
 &= (AB)_{3 \times 3} \cdot D_{3 \times 1} \\
 &= (ABD)_{3 \times 1}
 \end{aligned}$$

The result will be exist

$$\begin{aligned}
 A.B &= \begin{pmatrix} 1 & 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 & 1 \end{pmatrix} \begin{pmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \end{pmatrix} \\
 &= \begin{pmatrix} 5 & 5 & 5 \\ 5 & 5 & 5 \\ 5 & 5 & 5 \end{pmatrix}_{3 \times 3}
 \end{aligned}$$

Step-4

$$\begin{aligned}
 (A.B).D &= (AB)_{3 \times 3} \cdot D_{3 \times 1} \\
 &= \begin{pmatrix} 5 & 5 & 5 \\ 5 & 5 & 5 \\ 5 & 5 & 5 \end{pmatrix}_{3 \times 3} \begin{pmatrix} 1 \\ 1 \\ 1 \end{pmatrix}_{3 \times 1} \\
 &= \begin{pmatrix} 15 \\ 15 \\ 15 \end{pmatrix}_{3 \times 1} \\
 &= 15 \begin{pmatrix} 1 \\ 1 \\ 1 \end{pmatrix}_{3 \times 1} \\
 &= 15D
 \end{aligned}$$

Step-5

$$\text{(iv)} \quad DBA = D_{3 \times 1} \cdot B_{5 \times 3} \cdot A_{3 \times 5}$$

Result will not be exist.

Step-6

$$(v) \quad A(B+C) = A_{3 \times 5} \cdot (B_{5 \times 3} + C_{5 \times 1})$$

Since order of $B \neq$ order of, sum of C and C is not possible.