

Step-1

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Given that $D = \begin{bmatrix} 2 & 0 \\ 0 & 5 \end{bmatrix}$

We have to describe the rows of DA and the columns of AD .

Step-2

Let $A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$ be any 2 by 2 matrix.

Now

$$\begin{aligned} DA &= \begin{bmatrix} 2 & 0 \\ 0 & 5 \end{bmatrix} \begin{bmatrix} a & b \\ c & d \end{bmatrix} \\ &= \begin{bmatrix} 2(a) + 0(c) & 2(b) + 0(d) \\ 0(a) + 5(c) & 0(b) + 5(d) \end{bmatrix} \\ &= \begin{bmatrix} 2a & 2b \\ 5c & 5d \end{bmatrix} \end{aligned}$$

Therefore, $DA = \begin{bmatrix} 2a & 2b \\ 5c & 5d \end{bmatrix}$

From DA , we observe that the first row of DA is 2 times the first row of A and the second row of DA is 5 times the second row of A .

Step-3

Now

$$\begin{aligned} AD &= \begin{bmatrix} a & b \\ c & d \end{bmatrix} \begin{bmatrix} 2 & 0 \\ 0 & 5 \end{bmatrix} \\ &= \begin{bmatrix} a(2) + b(0) & a(0) + b(5) \\ c(2) + d(0) & c(0) + d(5) \end{bmatrix} \\ &= \begin{bmatrix} 2a & 5b \\ 2c & 5d \end{bmatrix} \end{aligned}$$

Therefore, $AD = \begin{bmatrix} 2a & 5b \\ 2c & 5d \end{bmatrix}$

From AD , we observe that the first column of AD is 2 times the first column of A and the second column of AD is 5 times the second column of A .