

Step-1

(a) Suppose all columns of B are the same. Then all columns of EB are the same, because each column is E times a column B .

Step-2

(b) Suppose all rows of B are $\begin{bmatrix} 1 & 2 & 4 \end{bmatrix}$. We have to give an example that all rows of EB are not $\begin{bmatrix} 1 & 2 & 4 \end{bmatrix}$.

Let $B = \begin{pmatrix} 1 & 2 & 4 \\ 1 & 2 & 4 \end{pmatrix}$ and $E = \begin{pmatrix} 1 & 0 \\ 1 & 1 \end{pmatrix}$ then

$$\begin{aligned} EB &= \begin{pmatrix} 1 & 0 \\ 1 & 1 \end{pmatrix} \begin{pmatrix} 1 & 2 & 4 \\ 1 & 2 & 4 \end{pmatrix} \\ &= \begin{pmatrix} 1 & 2 & 4 \\ 2 & 4 & 8 \end{pmatrix} \\ &\neq B \end{aligned}$$

Rows of EB are combination of rows of B , so they are multiples of $\begin{bmatrix} 1 & 2 & 4 \end{bmatrix}$.