

## 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  $\begin{bmatrix} 1 & 2 & 4 \end{bmatrix}$ .