

12.3.

$$\text{Let } M = \begin{pmatrix} a & b \\ c & d \end{pmatrix}$$

$$EM = \begin{pmatrix} 1 & 0 \\ s & 1 \end{pmatrix} \begin{pmatrix} a & b \\ c & d \end{pmatrix}$$

$$= \begin{pmatrix} a & b \\ sa+c & sb+d \end{pmatrix}$$

So the second row is obtained from  $M$   
by multiplying the first row by  $s$ , and adding  
it to the second.

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Now

$$EM = \begin{pmatrix} 1 & s \\ 0 & 1 \end{pmatrix} \begin{pmatrix} a & b \\ c & d \end{pmatrix}$$

$$= \begin{pmatrix} a+sc & b+sd \\ c & d \end{pmatrix}$$