Step-1

(b)

The objective is to find the matrix $M = E_{31}P_{23}$ if E_{31} subtracts row 1 from row 2 and then

P_{23} Exchanges rows 2 and 3 of matrix I.

Therefore $$P_{23} = \begin{pmatrix} 1 & 0 & 0 \\ 0 & 0 & 1 \\ 0 & 1 & 0 \end{pmatrix}$$

E_{31} Subtracts row 1 from row3

Therefore $$E_{31} = \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ -1 & 0 & 1 \end{pmatrix}$$

Now by definition $M = E_{31}P_{23}$

$$M = \begin{pmatrix} 1 & 0 & 0 \\ 0 & 0 & 1 \\ -1 & 1 & 0 \end{pmatrix}\begin{pmatrix} 1 & 0 & 0 \\ 0 & 0 & 1 \\ 0 & 1 & 0 \end{pmatrix}$$

$$= \begin{pmatrix} 1 & 0 & 0 \\ -1 & 0 & 1 \\ -1 & 1 & 0 \end{pmatrix}$$

Here M â€™s same but the E â€™s are different because both steps canâ€™t do at once because in E_{31} and P_{23} the second row involve.