

29. Matrix**Elementary Row Operation****Elementary Matrix**

$$\begin{bmatrix} 1 & 0 \\ 3 & -1 \end{bmatrix}$$

Add (-1) times row two to row one.

$$E_1 = \begin{bmatrix} 1 & -1 \\ 0 & 1 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 0 \\ 0 & -1 \end{bmatrix}$$

Add -3 times row one to row two.

$$E_2 = \begin{bmatrix} 1 & 0 \\ -3 & 1 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

Multiply row two by -1 .

$$E_3 = \begin{bmatrix} 1 & 0 \\ 0 & -1 \end{bmatrix}$$

Because $E_3E_2E_1A = I_2$, one way to factor A is as follows.

$$A = E_1^{-1}E_2^{-1}E_3^{-1} = \begin{bmatrix} 1 & 1 \\ 0 & 1 \end{bmatrix} \begin{bmatrix} 1 & 0 \\ 3 & 1 \end{bmatrix} \begin{bmatrix} 1 & 0 \\ 0 & -1 \end{bmatrix}$$

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