3.a

$$E_3 E_2 E_1 PA = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & -2/11 & 1 \end{bmatrix} \begin{bmatrix} -5 & 2 & -1 \\ 0 & 11/5 & 27/5 \\ 0 & 2/5 & 14/5 \end{bmatrix} = \begin{bmatrix} -5 & 2 & -1 \\ 0 & 11/5 & 27/5 \\ 0 & 0 & 20/11 \end{bmatrix} = U$$

$$U = E_3 P_3 E_2 P_2 E_1 P_1 A, \quad P_3 \& P_2 = I$$

$$\tilde{E}_3 \tilde{E}_2 \tilde{E}_1 P_3 P_2 P_1 A = U$$

$$P_3 P_2 P_1 A = (\tilde{E}_3 \tilde{E}_2 \tilde{E}_1)^{-1} U$$

$$\begin{bmatrix} -5 & 2 & -1 \\ 3 & 1 & 6 \\ 1 & 0 & 3 \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 \\ -3/5 & 1 & 0 \\ -1/5 & 2/11 & 1 \end{bmatrix} \begin{bmatrix} -5 & 2 & -1 \\ 0 & 11/5 & 27/5 \\ 0 & 0 & 20/11 \end{bmatrix}$$

$$PA = LU$$