$$A = \begin{bmatrix} 2 & 0 & 3 \\ 3 & 1 & 3 \\ 4 & -1 & 1 \end{bmatrix} \quad R_2' \to \frac{2}{3}R_2 - R_1, \quad R_3' \to \frac{1}{2}R_3 - R_1$$

$$\begin{bmatrix} 2 & 0 & 3 \\ 0 & 2/3 & -1 \\ 0 & -1/2 & -5/2 \end{bmatrix} \quad R_3'' \to \frac{4}{3}R_3 + R_2$$

$$\begin{bmatrix} 2 & 0 & 3 \\ 0 & 2/3 & -1 \\ 0 & 0 & -\frac{13}{3} \end{bmatrix} \quad \text{Rank } 3$$

$$E_{21} = \frac{2}{3}R_2' - R_1 = \begin{bmatrix} 1 & 0 & 0 \\ -1 & 2/3 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

$$E_{31} = \frac{1}{2}R_3 - R_1 = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ -1 & 0 & 1/2 \end{bmatrix}$$

$$E_{3'1} = \frac{4}{3}R_3 + R_2 = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 1 & 4/3 \end{bmatrix}$$

$$G_1 = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 1 & 4/3 \end{bmatrix} \times \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ -1 & 0 & 1/2 \end{bmatrix} \times \begin{bmatrix} 1 & 0 & 0 \\ -1 & 2/3 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

$$= \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ -4/3 & 1 & 2/3 \end{bmatrix} \times \begin{bmatrix} 1 & 0 & 0 \\ -1 & 2/3 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

$$G_1 = \begin{bmatrix} 1 & 0 & 0 \\ -1 & 2/3 & 0 \\ -4/3 & 2/3 & 2/3 \end{bmatrix}$$

$$G_1 A = \begin{bmatrix} -1 & 0 & 0 \\ -1 & 2/3 & 0 \\ -4/3 & 2/3 & 2/3 \end{bmatrix} \begin{bmatrix} 2 & 0 & 3 \\ 3 & 1 & 3 \\ 4 & -1 & 1 \end{bmatrix} = \begin{bmatrix} 2 & 0 & 3 \\ 0 & 2/3 & -1 \\ 0 & 0 & -13/3 \end{bmatrix}$$

(UTM)