Sample output with

$$A = \begin{pmatrix} -3 & 2 & 3 \\ 5 & -7 & 11 \\ 1 & -12 & 1 \end{pmatrix}$$

$$\begin{pmatrix} -3 & 2 & 3 & | & 1 & 0 & 0 \\ 5 & -7 & 11 & | & 0 & 1 & 0 \\ 1 & -12 & 1 & | & 0 & 0 & 1 \end{pmatrix} \begin{matrix} | \cdot \frac{5}{3} & | \cdot \frac{1}{3} \\ \longleftarrow + & \\ \longleftarrow & + \end{matrix}$$

$$\Longrightarrow \begin{pmatrix} -3 & 2 & 3 & | & 1 & 0 & 0 \\ 0 & -\frac{11}{3} & 16 & | & \frac{5}{3} & 1 & 0 \\ 0 & -\frac{34}{3} & 2 & | & \frac{1}{3} & 0 & 1 \end{pmatrix} \begin{matrix} \\ | \cdot \left(-\frac{34}{11}\right) \\ \longleftarrow + \end{matrix}$$

$$\Longrightarrow \begin{pmatrix} -3 & 2 & 3 & | & 1 & 0 & 0 \\ 0 & -\frac{11}{3} & 16 & | & \frac{5}{3} & 1 & 0 \\ 0 & 0 & -\frac{522}{11} & | & -\frac{53}{11} & -\frac{34}{11} & 1 \end{pmatrix} \begin{matrix} \longleftarrow + \\ \longleftarrow + \\ | \cdot \frac{88}{261} \quad | \cdot \frac{11}{174} \end{matrix}$$

$$\Longrightarrow \begin{pmatrix} -3 & 2 & 0 & | & \frac{121}{174} & -\frac{17}{87} & \frac{11}{174} \\ 0 & -\frac{11}{3} & 0 & | & \frac{11}{261} & -\frac{11}{261} & \frac{88}{261} \\ 0 & 0 & -\frac{522}{11} & | & -\frac{53}{11} & -\frac{34}{11} & 1 \end{pmatrix} \begin{matrix} \longleftarrow + \\ | \cdot \frac{6}{11} \\ \\ \end{matrix}$$

$$\Longrightarrow \begin{pmatrix} -3 & 0 & 0 & | & \frac{125}{174} & -\frac{19}{87} & \frac{43}{174} \\ 0 & -\frac{11}{3} & 0 & | & \frac{11}{261} & -\frac{11}{261} & \frac{88}{261} \\ 0 & 0 & -\frac{522}{11} & | & -\frac{53}{11} & -\frac{34}{11} & 1 \end{pmatrix} \begin{matrix} | \cdot \left(-\frac{1}{3}\right) \\ | \cdot \left(-\frac{3}{11}\right) \\ | \cdot \left(-\frac{11}{522}\right) \end{matrix}$$

$$\Longrightarrow \begin{pmatrix} 1 & 0 & 0 & | & -\frac{125}{522} & \frac{19}{261} & -\frac{43}{522} \\ 0 & 1 & 0 & | & -\frac{1}{87} & \frac{1}{87} & -\frac{8}{87} \\ 0 & 0 & 1 & | & \frac{53}{522} & \frac{17}{261} & -\frac{11}{522} \end{pmatrix}$$

Sample output with symbolic matrix

$$A = \begin{pmatrix} 1 & a \\ a & 1 \end{pmatrix}$$

$$\begin{pmatrix} 1 & a & | & 1 & 0 \\ a & 1 & | & 0 & 1 \end{pmatrix} \begin{matrix} | \cdot (-a) \\ \longleftarrow + \end{matrix}$$

$$\Longrightarrow \begin{pmatrix} 1 & a & | & 1 & 0 \\ 0 & 1-a^2 & | & -a & 1 \end{pmatrix} \begin{matrix} \longleftarrow + \\ | \cdot \frac{a}{a^2-1} \end{matrix}$$

$$\Longrightarrow \begin{pmatrix} 1 & 0 & | & -\frac{1}{a^2-1} & \frac{a}{a^2-1} \\ 0 & 1-a^2 & | & -a & 1 \end{pmatrix} \quad | \cdot \left(-\frac{1}{a^2-1}\right)$$

$$\Longrightarrow \begin{pmatrix} 1 & 0 & | & -\frac{1}{a^2-1} & \frac{a}{a^2-1} \\ 0 & 1 & | & \frac{a}{a^2-1} & -\frac{1}{a^2-1} \end{pmatrix}$$

Solve the equation

$$\begin{pmatrix} -1 & 4 \\ -3 & -7 \end{pmatrix} \begin{pmatrix} x_1 \\ x_2 \end{pmatrix} = \begin{pmatrix} 1 \\ 4 \end{pmatrix}$$

$$\begin{aligned}
& \begin{pmatrix} -1 & 4 & | & 1 \\ -3 & -7 & | & 4 \end{pmatrix} \begin{matrix} | \cdot (-3) \\ \longleftarrow + \end{matrix} \\
\Longrightarrow & \begin{pmatrix} -1 & 4 & | & 1 \\ 0 & -19 & | & 1 \end{pmatrix} \begin{matrix} \longleftarrow + \\ | \cdot \frac{4}{19} \end{matrix} \\
\Longrightarrow & \begin{pmatrix} -1 & 0 & | & \frac{23}{19} \\ 0 & -19 & | & 1 \end{pmatrix} \begin{matrix} | \cdot (-1) \\ | \cdot \left(-\frac{1}{19}\right) \end{matrix} \\
\Longrightarrow & \begin{pmatrix} 1 & 0 & | & -\frac{23}{19} \\ 0 & 1 & | & -\frac{1}{19} \end{pmatrix}
\end{aligned}$$