Step 1 of 8

Make M[2,1] = 0 using pivot M[1,1]

$$R2 \leftarrow R2 - \left(\frac{M[2,1]}{M[1,1]}\right) \times R1$$

$$\left[\begin{array}{c|c|c} 1 & 2 & -1 \\ \hline 2 & 3 & 1 \\ \hline 1 & 1 & 1 \end{array}\right] \rightarrow \left[\begin{array}{c|c|c} 1 & 2 & -1 \\ \hline 0 & -1 & 3 \\ \hline 1 & 1 & 1 \end{array}\right]$$

Step 2 of 8

Make M[3,1] = 0 using pivot M[1,1]

$$R3 \leftarrow R3 - \left(\frac{M[3,1]}{M[1,1]}\right) \times R1$$

$$\left[\begin{array}{c|c|c} 1 & 2 & -1 \\ \hline 0 & -1 & 3 \\ \hline 1 & 1 & 1 \end{array}\right] \rightarrow \left[\begin{array}{c|c|c} 1 & 2 & -1 \\ \hline 0 & -1 & 3 \\ \hline 0 & -1 & 2 \end{array}\right]$$

Step 3 of 8

Make M[3,2] = 0 using pivot M[2,2]

$$R3 \leftarrow R3 - \left(\frac{M[3,2]}{M[2,2]}\right) \times R2$$

$$\left[\begin{array}{c|c|c} 1 & 2 & -1 \\ \hline 0 & -1 & 3 \\ \hline 0 & -1 & 2 \end{array}\right] \rightarrow \left[\begin{array}{c|c|c} 1 & 2 & -1 \\ \hline 0 & -1 & 3 \\ \hline 0 & 0 & -1 \end{array}\right]$$

Step 4 of 8

Make pivot M[3,3] = 1

$$R3 \leftarrow \left(\frac{1}{M[3,3]}\right) \times R3$$

$$\left[\begin{array}{c|c|c} 1 & 2 & -1 \\ \hline 0 & -1 & 3 \\ \hline 0 & 0 & -1 \end{array}\right] \rightarrow \left[\begin{array}{c|c|c} 1 & 2 & -1 \\ \hline 0 & -1 & 3 \\ \hline 0 & 0 & 1 \end{array}\right]$$

Step 5 of 8

Make M[1,3] = 0 using pivot M[3,3]

R1 ← R1 - M[1,3]*R3

$$\begin{bmatrix} 1 & 2 & -1 \\ 0 & -1 & 3 \\ 0 & 0 & 1 \end{bmatrix} \rightarrow \begin{bmatrix} 1 & 2 & 0 \\ 0 & -1 & 3 \\ 0 & 0 & 1 \end{bmatrix}$$

Step 6 of 8
Make M[2,3] = 0 using pivot M[3,3]
R2 ← R2 - M[2,3]*R3

$$\begin{bmatrix} 1 & 2 & 0 \\ 0 & -1 & 3 \\ 0 & 0 & 1 \end{bmatrix} \rightarrow \begin{bmatrix} 1 & 2 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

Step 7 of 8
Make pivot M[2,2] = 1

$$R2 \leftarrow \left(\frac{1}{M[2,2]} \right) \times R2$$

$$\begin{bmatrix} 1 & 2 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{bmatrix} \rightarrow \begin{bmatrix} 1 & 2 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

Step 8 of 8
Make M[1,2] = 0 using pivot M[2,2]
R1 ← R1 - M[1,2]*R2

$$\begin{bmatrix} 1 & 2 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} \rightarrow \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$