Gaussian Elimination Ex. 1

$3x_1 + 4x_2 + 3x_3 = 10$
$x + 5x_2 - x_3 = 7$
$6x + 3x_2 + 7x_3 = 15$

$$\begin{bmatrix} 3 & 4 & 3 \\ 1 & 5 & -1 \\ 6 & 3 & 7 \end{bmatrix} = \begin{bmatrix} 10 \\ 7 \\ 15 \end{bmatrix}$$

$$\begin{bmatrix} 3 & 4 & 3 \\ 0 & \frac{11}{3} & -2 \\ 6 & 3 & 7 \end{bmatrix} \quad \begin{bmatrix} 10 \\ \frac{11}{3} \\ 15 \end{bmatrix}$$ subtract row 2 by pivot $(\frac{1}{3})$

$$\begin{bmatrix} 3 & 4 & 3 \\ 0 & \frac{11}{3} & -2 \\ 0 & -5 & 1 \end{bmatrix} \quad \begin{bmatrix} 10 \\ \frac{11}{3} \\ -5 \end{bmatrix}$$ subtract row 3 by pivot (2)

$$\begin{bmatrix} 3 & 4 & 3 \\ 0 & \frac{11}{3} & -2 \\ 0 & 0 & \frac{-19}{11} \end{bmatrix} \quad \begin{bmatrix} 10 \\ \frac{11}{3} \\ 0 \end{bmatrix}$$ subtract row 3 by row 2 $(\frac{-15}{11})$

Back Substitution

row 3: $\frac{-19}{11}x_3 = 0 \qquad x_3 = 0$

row 2: $\frac{11}{3}x_2 + \cancel{-2(0)} = \frac{11}{3} \qquad x_2 = 1$

row 1: $3x_1 + 4(1) + 3(0) = 10$

$-4 \qquad\qquad -4$

$\frac{3x_1}{3} = \frac{6}{3}$

$x_1 = 2$

$x_1 = 2 \quad x_2 = 1 \quad x_3 = 0$