5.2.34

EE25BTECH11031 - Sai Sreevallabh

Question:

Solve the given system of linear equations

$$x + y = 5$$
$$2x - 3y = 4$$

Solution:

Given lines can be represented as

$$\begin{pmatrix} 1 & 1 \end{pmatrix} \mathbf{x} = 5 \tag{0.1}$$

$$\begin{pmatrix} 2 & -3 \end{pmatrix} \mathbf{x} = 4 \tag{0.2}$$

Expressing the above as an augmented matrix

$$\left(\begin{array}{cc|c} 1 & 1 & 5 \\ 2 & -3 & 4 \end{array}\right) \tag{0.3}$$

Converting into Reduced Row Echelon Form using row operations

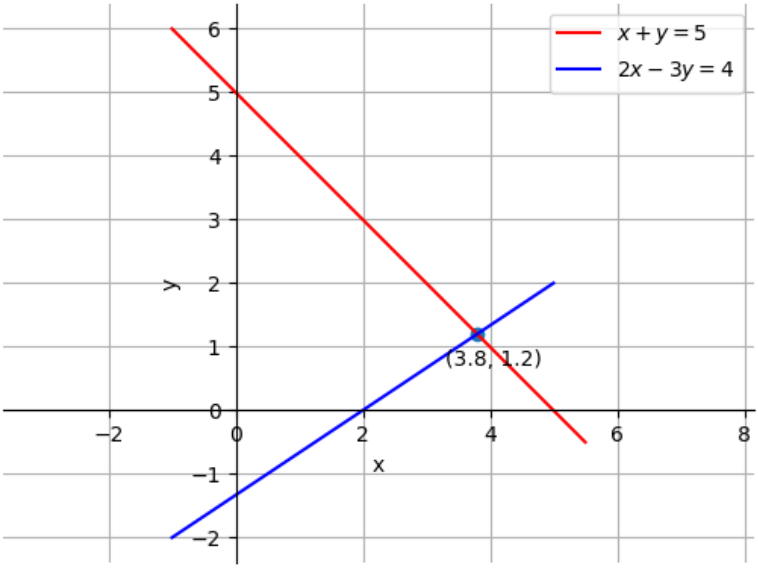
$$\left(\begin{array}{cc|c} 1 & 1 & 5 \\ 2 & -3 & 4 \end{array}\right) \xleftrightarrow{R_2 \to R_2 - 2R_1} \left(\begin{array}{cc|c} 1 & 1 & 5 \\ 0 & -5 & -6 \end{array}\right) \tag{0.4}$$

$$\left(\begin{array}{cc|c} 1 & 1 & 5 \\ 0 & -5 & -6 \end{array}\right) \xleftrightarrow{R_2 \to \frac{-1}{5} R_2} \left(\begin{array}{cc|c} 1 & 1 & 5 \\ 0 & 1 & \frac{6}{5} \end{array}\right) \tag{0.5}$$

$$\left(\begin{array}{cc|c} 1 & 1 & 5 \\ 0 & 1 & \frac{6}{5} \end{array}\right) \xleftrightarrow{R_1 \to R_1 - R_2} \left(\begin{array}{cc|c} 1 & 0 & \frac{19}{5} \\ 0 & 1 & \frac{6}{5} \end{array}\right) \tag{0.6}$$

$$\mathbf{x} = \begin{pmatrix} \frac{19}{5} \\ \frac{6}{5} \end{pmatrix} \tag{0.7}$$

The solution of the given system of linear equations is $\begin{pmatrix} \frac{19}{5} \\ \frac{6}{5} \end{pmatrix}$


$x + y = 5$
$2x - 3y = 4$
(3.8, 1.2)
x
y
6
5
4
3
2
1
0
−1
−2
−2
0
2
4
6
8