

5.3.38

EE25BTECH11004 - Aditya Appana

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Question

Find the value of x , if

$$3x + y = 1$$

$$2y - x = -5$$

Solution

Organizing the given equations into an augmented matrix:

$$\begin{pmatrix} 3 & 1 & 1 \\ -1 & 2 & -5 \end{pmatrix} \quad (1)$$

Performing row operations:

$$\begin{pmatrix} 3 & 1 & 1 \\ -1 & 2 & -5 \end{pmatrix} \xrightarrow{R_1 \rightarrow R_1 - \frac{1}{2}R_2} \begin{pmatrix} \frac{7}{2} & 0 & \frac{7}{2} \\ -1 & 2 & -5 \end{pmatrix} \quad (2)$$

$$\begin{pmatrix} \frac{7}{2} & 0 & \frac{7}{2} \\ -1 & 2 & -5 \end{pmatrix} \xrightarrow{R_2 \rightarrow R_2 + \frac{2}{7}R_1} \begin{pmatrix} \frac{7}{2} & 0 & \frac{7}{2} \\ 0 & 2 & -4 \end{pmatrix} \quad (3)$$

$$\begin{pmatrix} \frac{7}{2} & 0 & \frac{7}{2} \\ 0 & 2 & -4 \end{pmatrix} \xrightarrow{R_2 \rightarrow R_2/2} \begin{pmatrix} \frac{7}{2} & 0 & \frac{7}{2} \\ 0 & 1 & -2 \end{pmatrix} \quad (4)$$

$$\begin{pmatrix} \frac{7}{2} & 0 & \frac{7}{2} \\ 0 & 1 & -2 \end{pmatrix} \xrightarrow{R_1 \rightarrow 2/7 R_1} \begin{pmatrix} 1 & 0 & 1 \\ 0 & 1 & -2 \end{pmatrix} \quad (5)$$

$$x = 1, y = -2$$

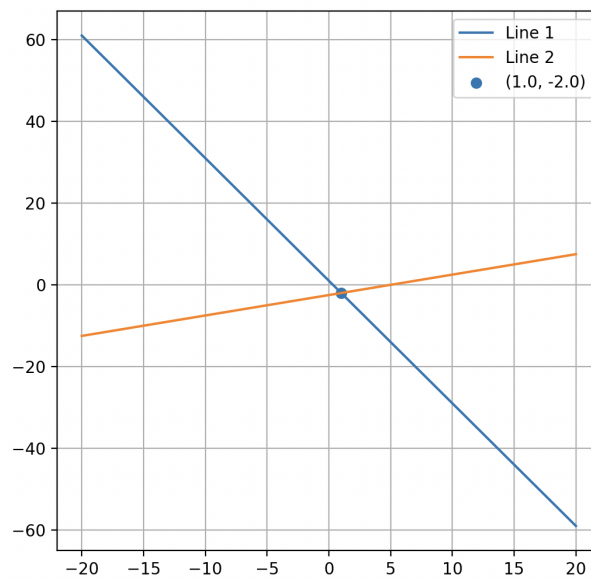


Figure 1: Plot