4.10.2

Aditya Appana - EE25BTECH11004

September 16,2025

The distance of the point of intersection of the lines $2x - 3y + 5 = 0$ and $3x + 4y = 0$ from the line $5x - 2y = 0$ is _____.

Solution

We need to find the point of intersection of the lines $2x - 3y + 5 = 0$ and $3x + 4y = 0$, which we can do by forming the augmented matrix.

$$\begin{pmatrix} 2 & -3 & -5 \\ 3 & 4 & 0 \end{pmatrix} \tag{1}$$

Using row transformations:

$$\begin{pmatrix} 2 & -3 & 5 \\ 3 & 4 & 0 \end{pmatrix} \xrightarrow{R_2 \to R_2 - \frac{3}{2}R_1} \begin{pmatrix} 2 & -3 & 5 \\ 0 & \frac{17}{2} & \frac{-15}{2} \end{pmatrix} \tag{2}$$

Solving, we get the point of intersection as

$$\begin{pmatrix} \frac{-20}{17} \\ \frac{15}{17} \end{pmatrix} \tag{3}$$

Solution

Two find the distance of this point from the line $5x - 2y = 0$, we use the formula:

$$\left| \frac{\mathbf{n}^T \mathbf{x} - c}{||n||} \right| = d \tag{4}$$

$$\left| \frac{\begin{pmatrix} 5 \\ -2 \end{pmatrix}^T \begin{pmatrix} \frac{-20}{17} \\ \frac{15}{17} \end{pmatrix}}{\sqrt{5^2 + 2^2}} \right| = \left| \frac{-130}{17\sqrt{29}} \right| = \frac{130}{17\sqrt{29}} = d \tag{5}$$

The distance of the point of intersection of the lines $2x - 3y + 5 = 0$ and $3x + 4y = 0$ from the line $5x - 2y = 0$ is $\frac{130}{17\sqrt{29}}$.
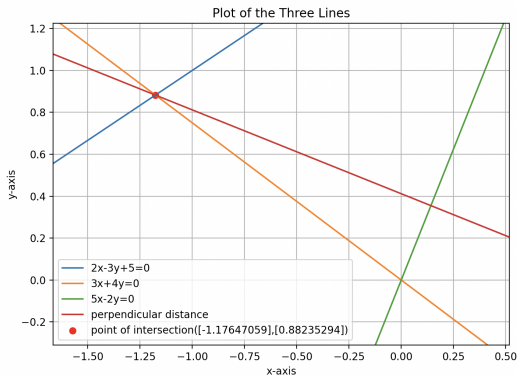
codes permalink

Figure: Plot