

4.2.8

EE25BTECH11005 - Aditya Mishra

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Question

Find the direction and normal vectors of the line $5 = 2x$.

Solution

The equation of the line can be written as

$$2x - 5 = 0 \quad (1)$$

The slope of the line $x = \frac{5}{2}$ is undefined, therefore it can be expressed in the parametric form as:

$$\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} \frac{5}{2} \\ 0 \end{pmatrix} + \lambda \begin{pmatrix} 0 \\ 1 \end{pmatrix} \quad (2)$$

Let $\begin{pmatrix} x \\ y \end{pmatrix}$ be the normal vector. Therefore

$$\begin{pmatrix} x \\ y \end{pmatrix}^T \begin{pmatrix} 0 \\ 1 \end{pmatrix} = 0 \quad (3)$$

$$y = 0 \quad (4)$$

$$\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 1 \\ 0 \end{pmatrix} \quad (5)$$

Therefore the line can be expressed as

$$\begin{pmatrix} 1 \\ 0 \end{pmatrix}^T x = \frac{5}{2} \quad (6)$$

Therefore, the direction vector is $\begin{pmatrix} 0 \\ 1 \end{pmatrix}$, and the normal vector is $\begin{pmatrix} 1 \\ 0 \end{pmatrix}$.

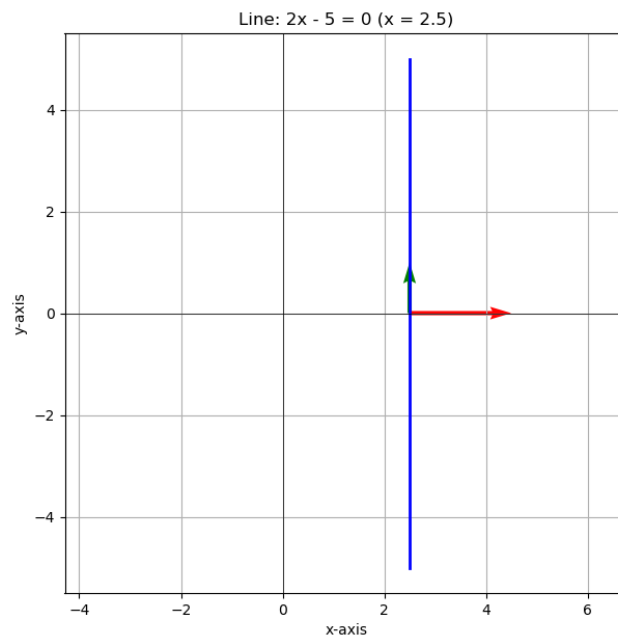


Figure 1: Plot of the line $x = 2.5$