

4-4.2-5

EE24BTECH11029- JANAGANI SHRETHAN REDDY

Question: Find the direction and normal vectors of the line $2x = -5y$.

Solution:

$$y = mx + c \quad (1)$$

$$\Rightarrow \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} x \\ mx + c \end{pmatrix} \quad (2)$$

$$\Rightarrow \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 0 \\ c \end{pmatrix} + x \begin{pmatrix} 1 \\ m \end{pmatrix} \quad (3)$$

$$m = \begin{pmatrix} 1 \\ m \end{pmatrix} \quad (4)$$

$$m^T n = 0 \quad (5)$$

$$n = \begin{pmatrix} -m \\ 1 \end{pmatrix} \quad (6)$$

where m,n are direction and normal vectors.

$$-5y = 2x \quad (7)$$

$$y = \frac{2}{-5}x \quad (8)$$

$$\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} x \\ \frac{2}{-5}x \end{pmatrix} \quad (9)$$

$$\begin{pmatrix} x \\ y \end{pmatrix} = x \begin{pmatrix} 1 \\ \frac{2}{-5} \end{pmatrix} \quad (10)$$

$$m = \begin{pmatrix} 1 \\ m \end{pmatrix} \quad (11)$$

$$\Rightarrow m = \begin{pmatrix} 1 \\ -\frac{2}{5} \end{pmatrix} \quad (12)$$

$$m^T n = 0 \quad (13)$$

$$n = \begin{pmatrix} -m \\ 1 \end{pmatrix} \quad (14)$$

$$\Rightarrow n = \begin{pmatrix} \frac{2}{5} \\ 1 \end{pmatrix} \quad (15)$$

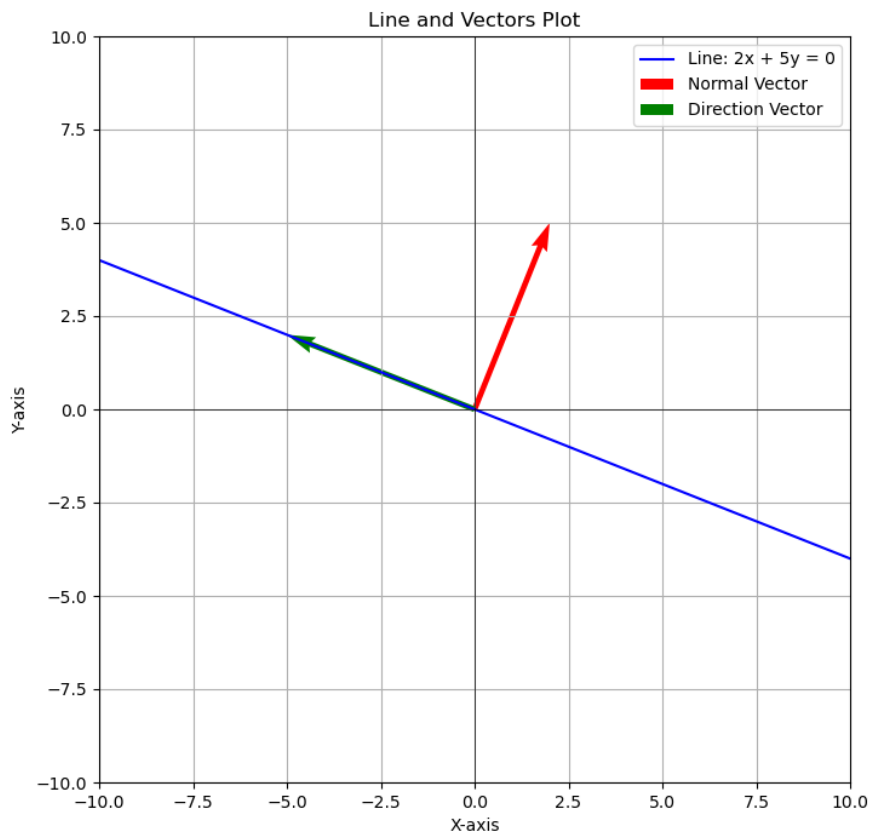


Fig. 0: plot of A,B and P