4.2.5

EE25BTECH11002 - Achat Parth Kalpesh

Question:
Find the direction and normal vector for the line;

$$2x = -5y \tag{0.1}$$

Solution:
Let $\mathbf{n}$ and $\mathbf{m}$ are the Normal and Direction vectors of the line

$$\mathbf{n_1}^\top \mathbf{x} = c \tag{0.2}$$

where ,

$$\mathbf{n_1} = \begin{pmatrix} 2 \\ 5 \end{pmatrix} \tag{0.3}$$

$$c = 0 \tag{0.4}$$

The $\mathbf{n}$ can be represented as,

$$\mathbf{n} = \begin{pmatrix} -m \\ 1 \end{pmatrix} \tag{0.5}$$

Where m is the slope of the line,

$$m = \frac{-2}{5} \tag{0.6}$$

$$\mathbf{n} = \begin{pmatrix} \frac{2}{5} \\ 1 \end{pmatrix} \tag{0.7}$$

(0.1) can be represented as,

$$\implies \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} x \\ \frac{-2}{5}x \end{pmatrix} = \begin{pmatrix} 0 \\ 0 \end{pmatrix} + x \begin{pmatrix} 1 \\ \frac{-2}{5} \end{pmatrix} \tag{0.8}$$

$$\implies \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 0 \\ 0 \end{pmatrix} + x \begin{pmatrix} 1 \\ \frac{-2}{5} \end{pmatrix} \tag{0.9}$$

Comparing it with ,

$$\mathbf{x} = \mathbf{h} + \kappa \mathbf{m} \tag{0.10}$$

We get,

$$\mathbf{m} = \begin{pmatrix} 1 \\ \frac{-2}{5} \end{pmatrix} \tag{0.11}$$

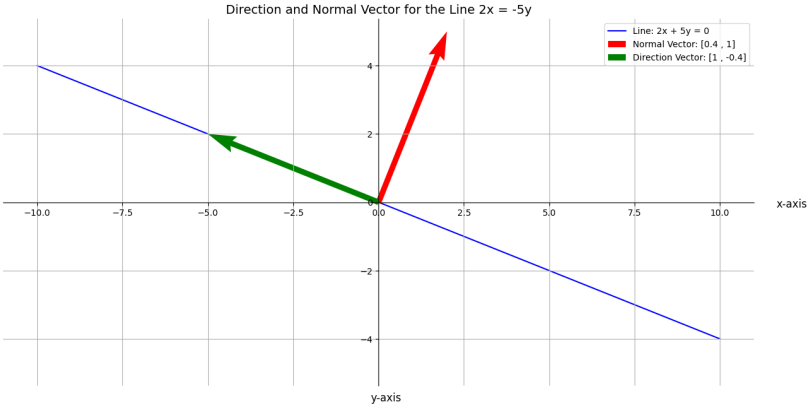
Direction and Normal Vector for the Line 2x = -5y
Line: 2x + 5y = 0
Normal Vector: [0.4 , 1]
Direction Vector: [1 , -0.4]
−10.0
−7.5
−5.0
−2.5
0.0
2.5
5.0
7.5
10.0
4
2
−2
−4
x-axis
y-axis

Fig. 0.1: Graph