4.4.2.14

EE24BTECH11024 - Abhimanyu Koushik

Question:
Find the direction and normal vectors of the given line $x + y = 0$

Variable	Description
m	Direction vector
n	Normal vector
h	Intercept vector
x	Vector which represents points on the line

TABLE I: Variables Used

Solution: Let $\mathbf{x} = \begin{pmatrix} x \\ y \end{pmatrix}$
The normal can be vector found out as

$$x + y = 0 \tag{1}$$

$$\begin{pmatrix} 1 & 1 \end{pmatrix} \mathbf{x} = 0 \tag{2}$$

$$\mathbf{n} = \begin{pmatrix} 1 \\ 1 \end{pmatrix} \tag{3}$$

The direction vector can be found out as

$$x = x \tag{4}$$

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

$$\mathbf{x} = x \begin{pmatrix} 1 \\ -1 \end{pmatrix} + \begin{pmatrix} 0 \\ 0 \end{pmatrix} \tag{6}$$

$$\mathbf{x} = k \begin{pmatrix} 1 \\ -1 \end{pmatrix} \tag{7}$$

Direction vector: $\mathbf{m} = \begin{pmatrix} 1 \\ -1 \end{pmatrix}$

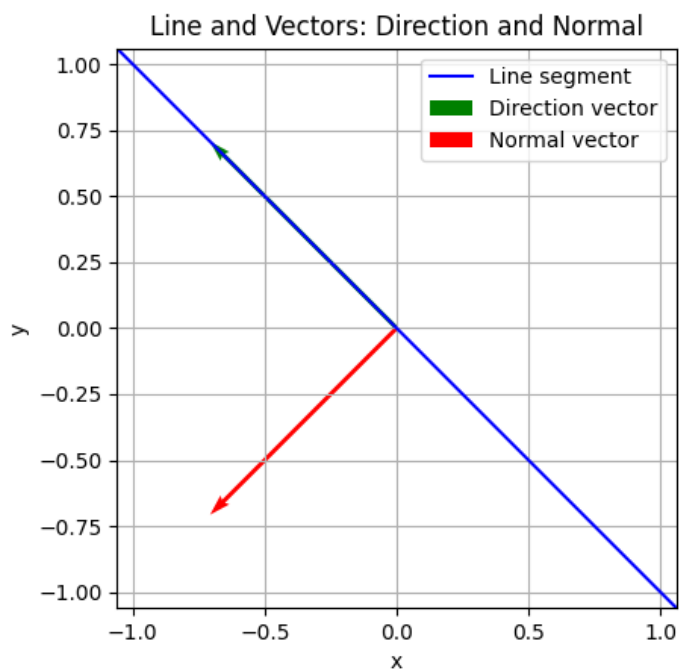Normal vector: $\mathbf{n} = \begin{pmatrix} 1 \\ 1 \end{pmatrix}$

Fig. 1: Plot of the line, Direction Vector and Normal Vector