4-4.2-13

AI24BTECH11003 - K.AKSHAY TEJA

Question:
Find the directionand normal vectors of the following line: $y = x$
Solution:

Information	Symbolic Form	Value
Given line	$\mathbf{X} = \mathbf{h} + k\mathbf{m}$	$y = x$
Direction Vector	$\mathbf{m}$	$\begin{pmatrix}1\\1\end{pmatrix}$
Normal Vector	$\mathbf{n}$	$\begin{pmatrix}-1\\1\end{pmatrix}$

TABLE 0: Final Information

The equation of the given line is:

$$y = x \tag{0.1}$$

$$\implies \begin{pmatrix}x\\y\end{pmatrix} = \begin{pmatrix}x\\x\end{pmatrix} = \begin{pmatrix}0\\0\end{pmatrix} + x\begin{pmatrix}1\\1\end{pmatrix} \tag{0.2}$$

$$\mathbf{X} = \mathbf{h} + k\mathbf{m} \tag{0.3}$$

Thereby, direction vector is:

$$\mathbf{m} = \begin{pmatrix}1\\1\end{pmatrix} \tag{0.4}$$

From (**??**) and (**??**), we get:

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

Therefore, the direction and normal vector of the line can be diven by $\mathbf{m} = \begin{pmatrix}1\\1\end{pmatrix}$ and $\mathbf{n} = \begin{pmatrix}-1\\1\end{pmatrix}$.

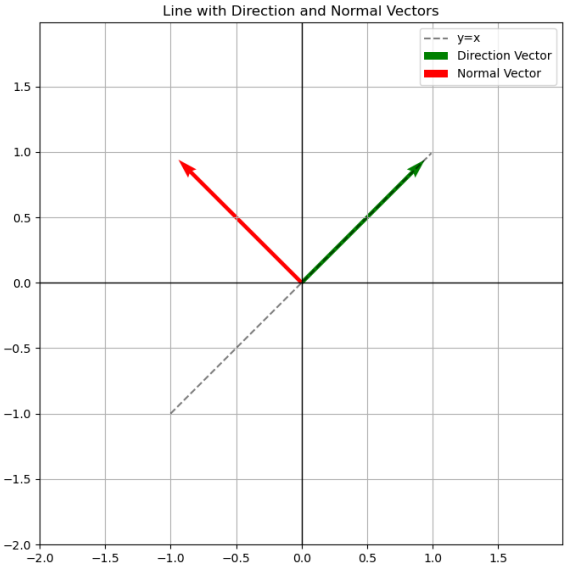

Fig. 0.1: Line and Vectors