

4-4.2-13

AI24BTECH11002 - K.AKSHAY TEJA

Question:

Find the direction and 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:

$$y = x \quad (0.1)$$

$$\Rightarrow \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} x \\ x \end{pmatrix} = \begin{pmatrix} 0 \\ 0 \end{pmatrix} + x \begin{pmatrix} 1 \\ 1 \end{pmatrix} \quad (0.2)$$

$$\mathbf{X} = \mathbf{h} + k\mathbf{m} \quad (0.3)$$

Thereby, direction vector is:

$$\mathbf{m} = \begin{pmatrix} 1 \\ 1 \end{pmatrix} \quad (0.4)$$

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

$$\mathbf{n} = \begin{pmatrix} -1 \\ 1 \end{pmatrix} \quad (0.5)$$

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

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

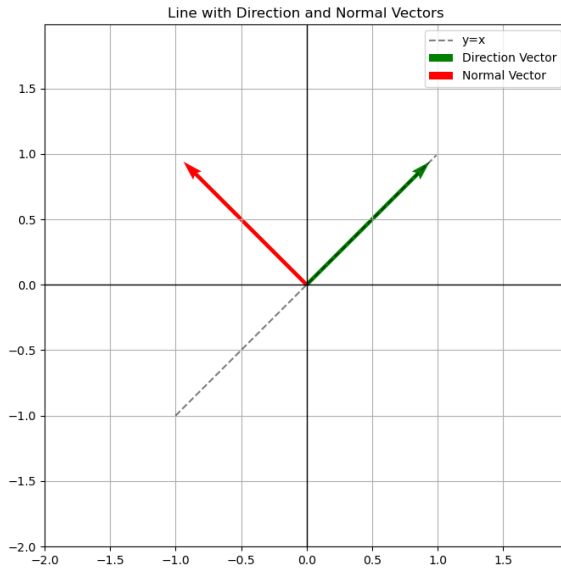


Fig. 0.1: Line and Vectors