

4.2.10

EE24BTECH11019 - DWARAK A

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

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

TABLE 0: Variables Used

$$x - y = 2 \quad (0.1)$$

$$\begin{pmatrix} 1 & -1 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = 2 \quad (0.2)$$

$$\mathbf{n}^\top \mathbf{x} = c \quad (0.3)$$

$$\Rightarrow \mathbf{n} = \begin{pmatrix} 1 \\ -1 \end{pmatrix} \quad (0.4)$$

$$\mathbf{m}^\top \mathbf{n} = 0 \quad (0.5)$$

$$\begin{pmatrix} 1 & m \end{pmatrix} \begin{pmatrix} 1 \\ -1 \end{pmatrix} = 0 \quad (0.6)$$

$$1 - m = 0 \quad (0.7)$$

$$m = 1 \quad (0.8)$$

$$\Rightarrow \mathbf{m} = \begin{pmatrix} 1 \\ 1 \end{pmatrix} \quad (0.9)$$

The normal vector and direction vector of line $x - y = 2$ are **m** and **n** respectively,

$$\mathbf{m} = \begin{pmatrix} 1 \\ 1 \end{pmatrix}, \mathbf{n} = \begin{pmatrix} 1 \\ -1 \end{pmatrix} \quad (0.10)$$

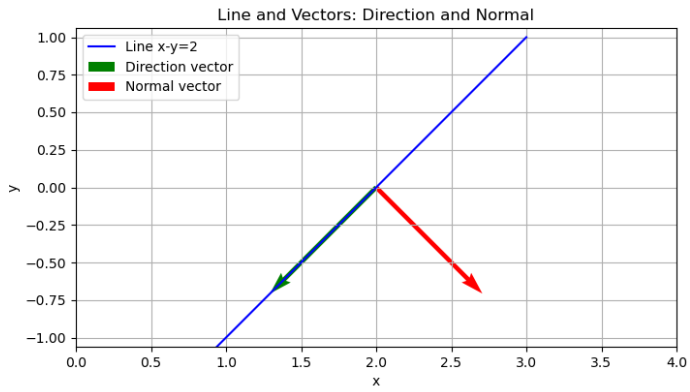


Fig. 0.1: Plot of the line, Direction Vector and Normal Vector