3.4.5

EE24BTECH11030 - J.KEDARANANDA

Question:
Find the direction and normal vectors of each of the following lines $y = x - 2$.
Solution:

Vector	Value
Directional vector	$\begin{pmatrix} 1 \\ m \end{pmatrix}$
Normal vector	$\begin{pmatrix} -m \\ 1 \end{pmatrix}$

TABLE 0

$$y = mx + c \tag{0.1}$$
$$x = 0 \Rightarrow y = c \tag{0.2}$$
$$x = 1 \Rightarrow y = mx + c \tag{0.3}$$
$$x = h + m \tag{0.4}$$

$$m^\top n = 0 \tag{0.5}$$
$$n^\top x = n^\top h + \kappa n^\top m \tag{0.6}$$
$$\Rightarrow n(x - h) = 0 \tag{0.7}$$
$$n^\top x = c \tag{0.8}$$
$$c = n^\top h \tag{0.9}$$

$$\text{where} \quad n = \begin{pmatrix} -m \\ 1 \end{pmatrix} \tag{0.10}$$

For the line $y = x - 2$:

$$m = 1 \tag{0.11}$$

$$\text{Direction vector } m = \begin{pmatrix} 1 \\ m \end{pmatrix} = \begin{pmatrix} 1 \\ 1 \end{pmatrix} \tag{0.12}$$

The normal vector is defined by:

$$n = \begin{pmatrix} -m \\ 1 \end{pmatrix} = \begin{pmatrix} -1 \\ 1 \end{pmatrix} \tag{0.13}$$

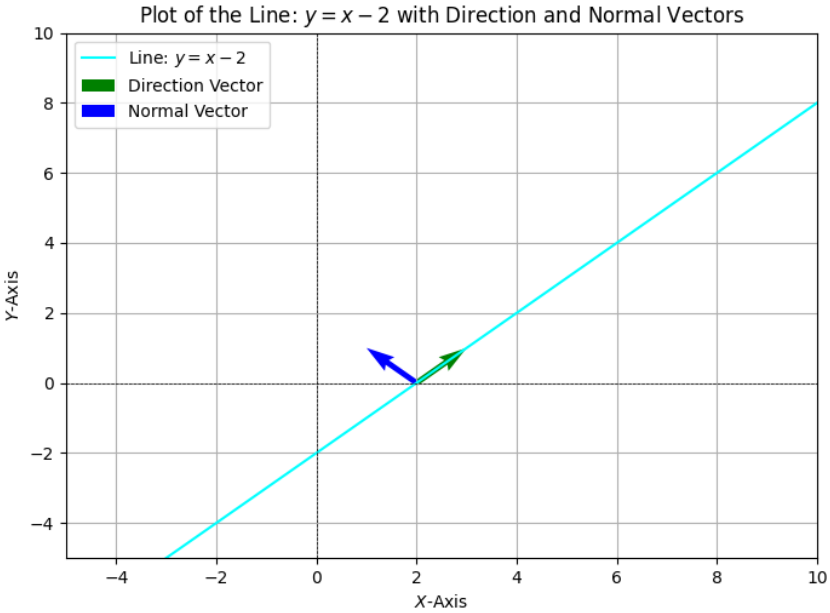

Fig. 0.1