4.2.7

EE24BTECH11012 - Bhavanisankar G S

QUESTION

Find the direction and normal vectors of the line $y = 2$.

SOLUTION

Given Line	$y = 2$
To Find	Direction and normal vectors of the line

TABLE 0: Variables Used

$$y = 2 \tag{0.1}$$

$$\leftrightarrow y = mx + c \tag{0.2}$$

$$A = \begin{pmatrix} 1 \\ m \end{pmatrix} \tag{0.3}$$

$$= \begin{pmatrix} 1 \\ 0 \end{pmatrix} \tag{0.4}$$

$$B = \begin{pmatrix} -m \\ 1 \end{pmatrix} \tag{0.5}$$

$$= \begin{pmatrix} 0 \\ 1 \end{pmatrix} \tag{0.6}$$

$$\tag{0.7}$$

where A and B denote the Direction and Normal vectors of the line respectively.

Observations

1) The direction vector of the given line is $\begin{pmatrix} 1 \\ 0 \end{pmatrix}$ indicating that it is parallel to the X-Axis .
2) The Normal vector of the given line is $\begin{pmatrix} 0 \\ 1 \end{pmatrix}$ indicating that the normal vector is parallel to the Y-Axis.
3) Any line that is parallel to the Y-Axis can be considered the normal vector of the given line, and hence is of the form

$$x = k, where k \in \mathbb{R}$$

.
4) Hence we can take any line and plot in a graph as shown.

$$\boxed{A = \begin{pmatrix} 1 \\ 0 \end{pmatrix}}$$

$$\boxed{B = \begin{pmatrix} 0 \\ 1 \end{pmatrix}}$$

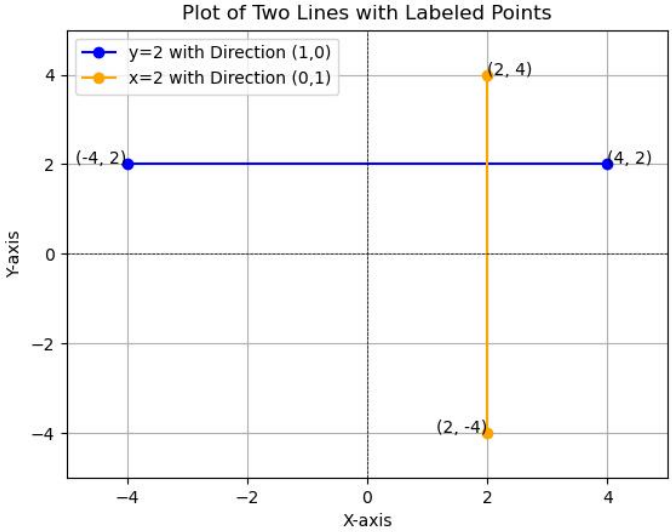

Fig. 4.1: A plot of the given question.