

# 4.4.2.11

EE24BTECH11032 - John Bobby

**Question:** Find the direction vector and the normal vector for the line  $y = 3x$

Variable	Description
$\mathbf{x} = \begin{pmatrix} x \\ y \end{pmatrix}$	coordinates of points on the line
$\mathbf{h}$	coordinates of a point that the line passes through
$k$	parameter
$\mathbf{m}$	direction vector
$\mathbf{n}$	normal vector

TABLE 0: Input Parameters

**Solution:** Any line can be represented

$$\mathbf{x} = \mathbf{h} + k\mathbf{m} \quad (0.1)$$

$$\mathbf{m} = \begin{pmatrix} 1 \\ m \end{pmatrix} \text{ (where } m \text{ is the slope of the line)} \quad (0.2)$$

$$\mathbf{n} = \begin{pmatrix} -m \\ 1 \end{pmatrix} \quad (0.3)$$

$$m = 3 \quad (0.4)$$

$$\therefore \mathbf{m} = \begin{pmatrix} 1 \\ 3 \end{pmatrix}, \mathbf{n} = \begin{pmatrix} -3 \\ 1 \end{pmatrix} \quad (0.5)$$

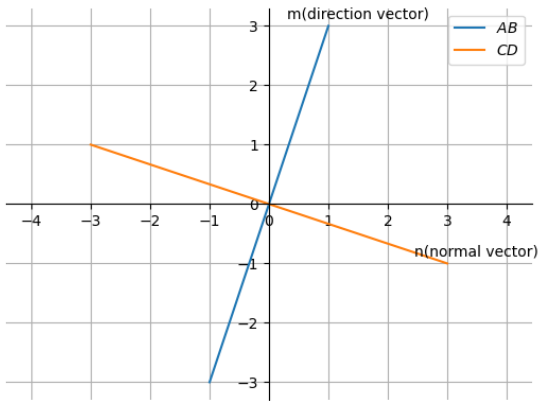


Fig. 0.1: Plot of normal vector and direction vector