## AI24BTECH11016 - Jakkula Adishesh Balaji

## LINEAR FORMS (PARAMETERS)

## **Question:**

**4.2.21** Find the direction and normal vectors of the line  $F = \frac{9}{5}C + 32$ . **Solution:** 

Parameter	Description
$\vec{m}$	Direction vector
$\vec{n}$	Normal vector
$\vec{h}$	Intercept vector
$\vec{X}$	Vector which represents points on the line

TABLE .1 Parameters Used

The direction vector can be found as follows:

The equation of the line is given by:

$$F = \frac{9}{5}C + 32\tag{.1}$$

$$\implies \binom{C}{F} = \binom{C}{\frac{9}{5}C + 32} = C\binom{1}{\frac{9}{5}} + \binom{0}{32} \tag{.2}$$

This yields:

$$\vec{x} = \vec{h} + k\vec{m} \tag{.3}$$

where  $\vec{h}$  is any point on the line, and

$$\vec{m} = \begin{pmatrix} 1\\ \frac{9}{5} \end{pmatrix} \tag{.4}$$

The normal vector can be found as follows:

$$\vec{m}^T \vec{n} = 0 \tag{.5}$$

$$\vec{n}^T \vec{x} = \vec{n}^T \vec{h} + k \vec{n}^T \vec{m} \tag{.6}$$

$$\vec{n} = \begin{pmatrix} -\frac{9}{5} \\ 1 \end{pmatrix} \tag{.7}$$

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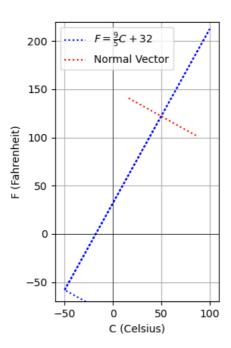


Fig. .1. Graphical representation of the vectors.