

# 4.6.11

EE25BTECH11023 - Venkata Sai

**Question:**

Find the equation of the line passing through the point  $(1, -3, 2)$  and parallel to the line

$$\mathbf{r} = (2 + \lambda)\hat{i} + \lambda\hat{j} + (2\lambda - 1)\hat{k} \quad (1)$$

**Solution:** Given line is

$$\mathbf{r} = \begin{pmatrix} 2 + \lambda \\ \lambda \\ 2\lambda - 1 \end{pmatrix} \quad (2)$$

The vector equation of given line is given by

$$\mathbf{r} = \begin{pmatrix} 2 \\ 0 \\ -1 \end{pmatrix} + \lambda \begin{pmatrix} 1 \\ 1 \\ 2 \end{pmatrix} \quad (3)$$

The direction vectors of given line are

$$\mathbf{m} = \begin{pmatrix} 1 \\ 1 \\ 2 \end{pmatrix} \quad (4)$$

The lines with direction vectors  $\mathbf{m}$  and  $\mathbf{n}$  are parallel if

$$\mathbf{m} = \mathbf{n} \implies \mathbf{n} = \begin{pmatrix} 1 \\ 1 \\ 2 \end{pmatrix} \quad (5)$$

The equation of a line is given by

$$\mathbf{n}^T (\mathbf{x} - \mathbf{a}) = 0 \quad (6)$$

$$\begin{pmatrix} 1 & 1 & 2 \end{pmatrix} \left( \mathbf{x} - \begin{pmatrix} 1 \\ -3 \\ 2 \end{pmatrix} \right) = 0 \quad (7)$$

$$\begin{pmatrix} 1 & 1 & 2 \end{pmatrix} \mathbf{x} = \begin{pmatrix} 1 & 1 & 2 \end{pmatrix} \begin{pmatrix} 1 \\ -3 \\ 2 \end{pmatrix} \quad (8)$$

$$\begin{pmatrix} 1 & 1 & 2 \end{pmatrix} \mathbf{x} = 2 \quad (9)$$

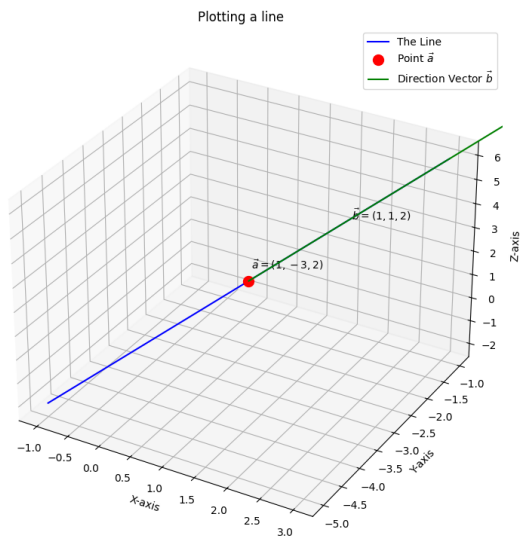


Fig. 0.1