4.5.14

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Question:
Find the equation of the line through the point $(5, 2, -4)$ and which is parallel to the vector $3\hat{i} + 2\hat{j} - 8\hat{k}$.

Solution:

Line is:	**vector**
parallel to	$\begin{pmatrix} 3 \\ 2 \\ -8 \end{pmatrix}$
Passing through	$\begin{pmatrix} 5 \\ 2 \\ -4 \end{pmatrix}$

TABLE 0: 4.5.14

If the direction vector of the line is **A** and is passing through **B** then,
Equation of the line is: $\mathbf{X} = \mathbf{B} + \lambda\,\mathbf{A}$
Given,

$$\text{The line is parallel to the vector} \begin{pmatrix} 3 \\ 2 \\ -8 \end{pmatrix} \tag{0.1}$$

$$\therefore \text{Direction vector is: } \lambda \begin{pmatrix} 3 \\ 2 \\ -8 \end{pmatrix} \tag{0.2}$$

Equation of the line :-

$$\mathbf{x} = \begin{pmatrix} 5 \\ 2 \\ -4 \end{pmatrix} + \lambda \begin{pmatrix} 3 \\ 2 \\ -8 \end{pmatrix} \tag{0.3}$$

Where,

$$\mathbf{x} = \begin{pmatrix} \mathbf{x} \\ \mathbf{y} \\ \mathbf{z} \end{pmatrix} \tag{0.4}$$

Hence, Equation of the line passing through $\begin{pmatrix} 5 \\ 2 \\ -4 \end{pmatrix}$ and Parallel to $\begin{pmatrix} 3 \\ 2 \\ -8 \end{pmatrix}$ is:

$$\mathbf{x} = \begin{pmatrix} 5 \\ 2 \\ -4 \end{pmatrix} + \lambda \begin{pmatrix} 3 \\ 2 \\ -8 \end{pmatrix}$$

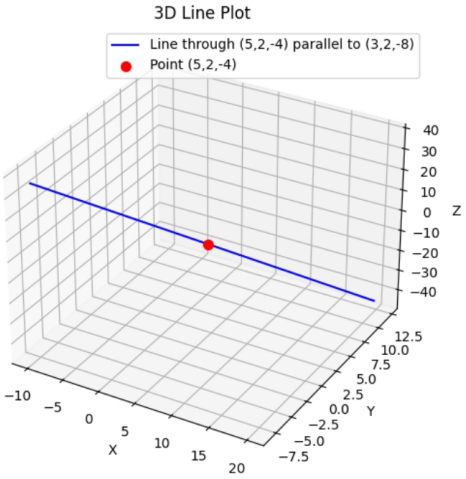

Fig. 0.1