

4.3.9

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Problem Statement

The vector equation of the line

$$\frac{x-5}{3} = \frac{y+4}{7} = \frac{z-6}{2} \quad (4.3.9.1)$$

is _____.

Solution:

From (4.3.9.1) we get the following equations.

$$x = 5 + 3\kappa, \quad (4.3.9.2)$$

$$y = -4 + 7\kappa, \quad (4.3.9.3)$$

$$z = 6 + 2\kappa. \quad (4.3.9.4)$$

The general vector equation of a line in 3D is

$$\mathbf{x} = \mathbf{h} + \kappa\mathbf{m}, \quad (4.3.9.5)$$

comparing (4.3.9.2), (4.3.9.3), (4.3.9.4), and (4.3.9.5) we get,

$$\mathbf{h} = \begin{pmatrix} 5 \\ -4 \\ 6 \end{pmatrix}, \quad \mathbf{m} = \begin{pmatrix} 3 \\ 7 \\ 2 \end{pmatrix}. \quad (4.3.9.6)$$

Therefore, the vector equation of the line is:

$$\mathbf{x} = \begin{pmatrix} 5 \\ -4 \\ 6 \end{pmatrix} + \kappa \begin{pmatrix} 3 \\ 7 \\ 2 \end{pmatrix} \quad (4.3.9.7)$$

See Figure 4.3.9.1.

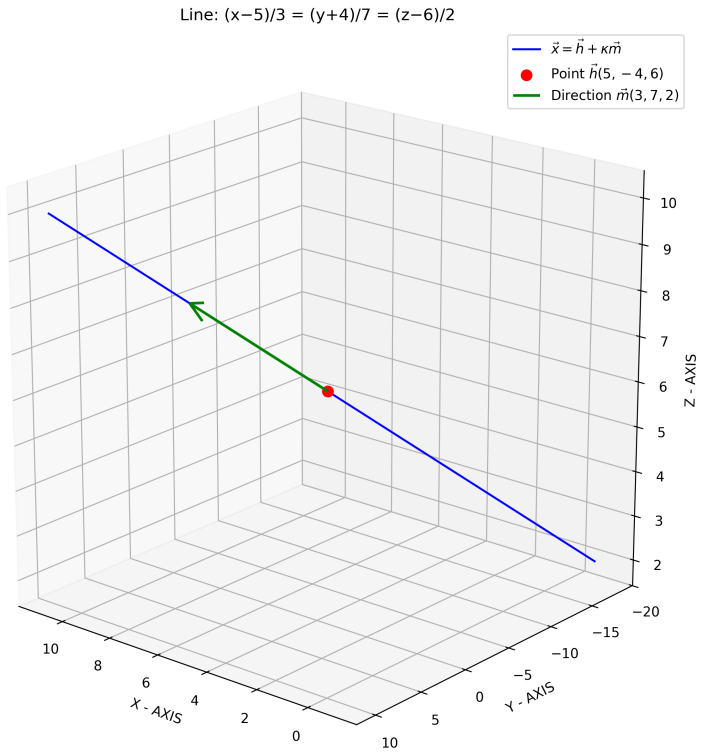


Fig. 4.3.9.1