

CLASS-12  
CHAPTER-11  
THREE DIMENSIONAL GEOMETRY

### Exercise 11.4

Q1. Show that the line joining the origin to the point  $(2, 1, 1)$  is perpendicular to the line determined by the points  $(3, 5, -1), (4, 3, -1)$ .

**Solution:**

Given:

$$\mathbf{P} = \begin{pmatrix} 2 \\ 1 \\ 1 \end{pmatrix}, \mathbf{A} = \begin{pmatrix} 3 \\ 5 \\ -1 \end{pmatrix}, \mathbf{B} = \begin{pmatrix} 4 \\ 3 \\ -1 \end{pmatrix} \quad (1)$$

The directional vector is given by:

$$\mathbf{m} = \mathbf{A} - \mathbf{B} = \begin{pmatrix} -1 \\ 2 \\ 0 \end{pmatrix} \quad (2)$$

check whether two vectors are perpendicular to each other or not using:

$$\mathbf{m}^T \mathbf{P} = 0 \quad (3)$$

$$(-1 \ 2 \ 0) \begin{pmatrix} 2 \\ 1 \\ 1 \end{pmatrix} = 0 \quad (4)$$

Hence, it satisfies the above condition, shows that the line passing through origin is perpendicular to the line passing through  $\mathbf{A}$  and  $\mathbf{B}$ .