

ASSIGNMENT-12.11.2.3

Question : Show that the line through the points $(4, 7, 8), (2, 3, 4)$ is parallel to the line through the points $(-1, -2, 1), (1, 2, 5)$.

Solution : Line passing through $(4, 7, 8), (2, 3, 4)$ is

$$\frac{x-4}{1} = \frac{y-7}{2} = \frac{z-8}{2} \quad (1)$$

(2)

Direction vector,

$$\mathbf{m}_1 = \begin{pmatrix} 1 \\ 2 \\ 2 \end{pmatrix} \quad (3)$$

Line passing through $(-1, -2, 1), (1, 2, 5)$ is

$$\frac{x+1}{1} = \frac{y+2}{2} = \frac{z-1}{2} \quad (4)$$

Direction vector,

$$\mathbf{m}_2 = \begin{pmatrix} 1 \\ 2 \\ 2 \end{pmatrix} \quad (5)$$

Therefore,

$$\cos \theta = \frac{(\mathbf{m}_1)^\top \mathbf{m}_2}{\|\mathbf{m}_1\| \|\mathbf{m}_2\|} \quad (6)$$

$$= \frac{(1 \ 2 \ 2) \begin{pmatrix} 1 \\ 2 \\ 2 \end{pmatrix}}{9} \quad (7)$$

$$= 1 \quad (8)$$

$$\implies \theta = 0^\circ \quad (9)$$

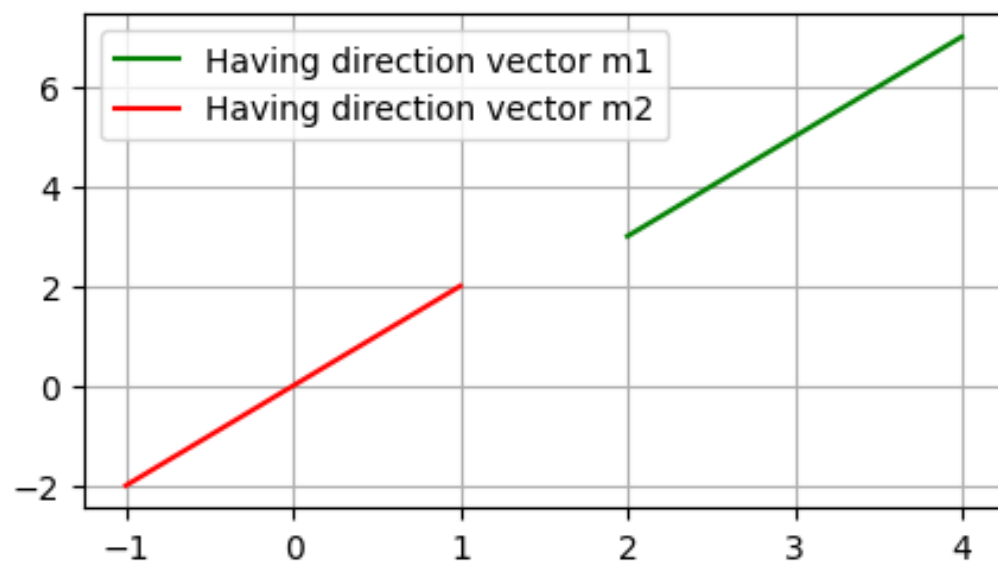


Figure 1: