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

$$\frac{x-4}{1}=\frac{y-7}{2}=\frac{z-8}{2} \tag{1}$$

$$\tag{2}$$

Direction vector,

$$\mathbf{m_1}=\begin{pmatrix}1\\2\\2\end{pmatrix} \tag{3}$$

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

$$\frac{x-1}{1}=\frac{y-3}{2}=\frac{z-2}{2} \tag{4}$$

Direction vector,

$$\mathbf{m_2}=\begin{pmatrix}1\\2\\2\end{pmatrix} \tag{5}$$

Therefore,

$$\cos\theta=\frac{\left(\mathbf{m_1}\right)^{\top}\mathbf{m_2}}{\|\mathbf{m_1}\|\,\|\mathbf{m_2}\|} \tag{6}$$

$$=\frac{\begin{pmatrix}1 & 2 & 2\end{pmatrix}\begin{pmatrix}1\\2\\2\end{pmatrix}}{9} \tag{7}$$

$$=1 \tag{8}$$

$$\implies \theta=0^{\circ} \tag{9}$$

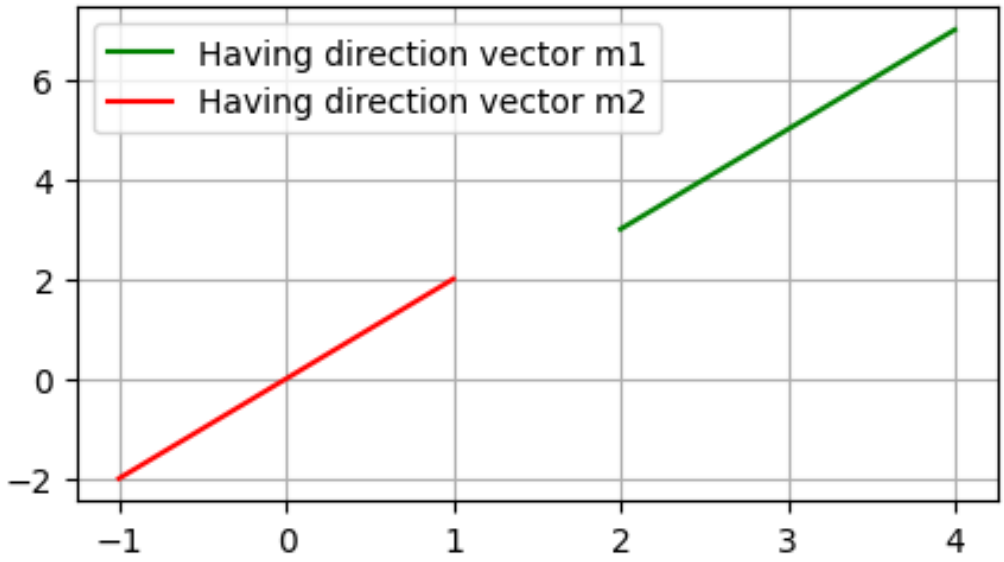
Having direction vector m1
Having direction vector m2
6
4
2
0
−2
−1
0
1
2
3
4

Figure 1: