1.2.26

AI25BTECH11018-Hemanth Reddy

Question:

Using vectors, prove that the points(2,-1,3), (3,-5,1),and(-1,11,9) are collinear.

Solution:

Let $\mathbf{A}\begin{pmatrix}2\\-1\\3\end{pmatrix}$ $\mathbf{B}\begin{pmatrix}3\\-5\\1\end{pmatrix}$ $\mathbf{C}\begin{pmatrix}-1\\11\\9\end{pmatrix}$ be vectors

Points **A**,**B**, **C** are defined to be collinear if

$$\text{rank}\,(\mathbf{B}-\mathbf{A} \quad \mathbf{C}-\mathbf{A}) = 1$$
$$\text{rank}\mathbf{A} = \text{rank}\mathbf{A}^T$$

$$\mathbf{A}^T = \begin{pmatrix}1 & -4 & -2\\-3 & 12 & 6\end{pmatrix}$$

$$R_2 = R_2 + 3R_2$$

$$\mathbf{A}^T = \begin{pmatrix}1 & -4 & -2\\0 & 0 & 0\end{pmatrix}$$

which has rank 1.So we can conclude that the given points are collinear.

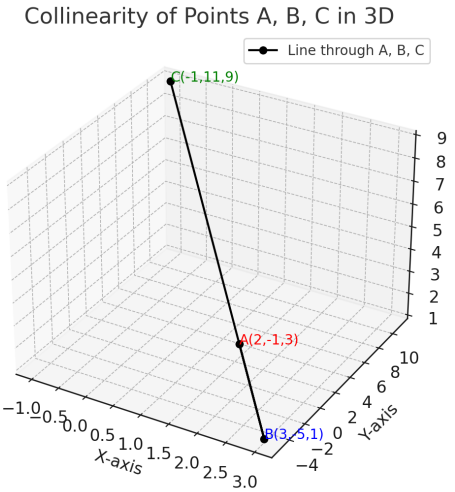

Fig. 0.1