1.7.4

AI24BTECH11023 - Tarun Reddy Pakala

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

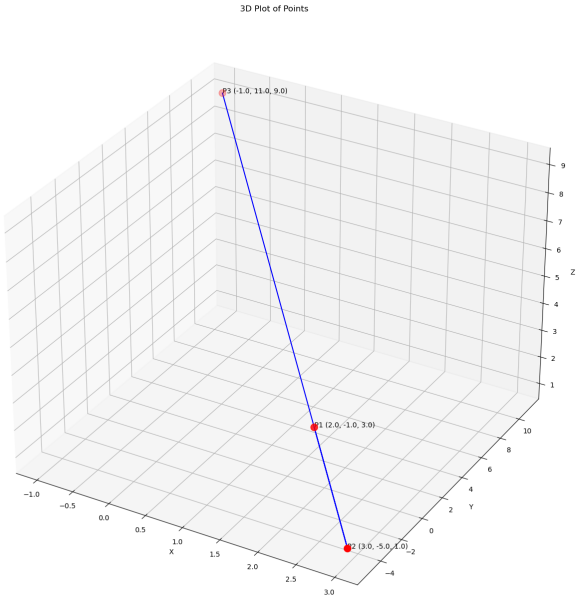
Next, we construct the matrix using these vectors:

$$\text{Matrix} = \begin{pmatrix} \overrightarrow{B-A} & \overrightarrow{C-A} \end{pmatrix} = \begin{pmatrix} 1 & -3 \\ -4 & 12 \\ -2 & 6 \end{pmatrix}$$

Now, we perform row reduction:

$$\begin{pmatrix} 1 & -3 \\ -4 & 12 \\ -2 & 6 \end{pmatrix} \rightarrow \begin{pmatrix} 1 & -3 \\ 0 & 0 \\ 0 & 0 \end{pmatrix}$$

Since the matrix has rank 1 (only one non-zero row), the points are collinear.


3D Plot of Points
P3 (-1.0, 11.0, 9.0)
P1 (2.0, -1.0, 3.0)
P2 (3.0, -5.0, 1.0)
X
Y
Z