1.6.27

AI25BTECH11012 - GARIGE UNNATHI

Question:
Prove that the three points **A** (-4,6,10) , **B** (2,4,6) and **C** (14,0,-2) are collinear.
Solution:

Variable	Formula
A	$A = \begin{pmatrix} -4 \\ 6 \\ 10 \end{pmatrix}$
B	$B = \begin{pmatrix} 2 \\ 4 \\ 6 \end{pmatrix}$
C	$C = \begin{pmatrix} 14 \\ 0 \\ -2 \end{pmatrix}$

TABLE 0: Variables Used

If ABC are collinear , then the matrix should have rank 1.

$$(\mathbf{B}-\mathbf{A} \quad \mathbf{C}-\mathbf{A})^T$$

$$(\mathbf{B}-\mathbf{A} \quad \mathbf{C}-\mathbf{A})^T = \begin{pmatrix} 6 & -2 & -4 \\ 18 & -6 & -12 \end{pmatrix} \tag{0.1}$$

$$R_2 = R_2 - 3R_1 \tag{0.2}$$

$$\begin{pmatrix} 6 & -2 & -4 \\ 0 & 0 & 0 \end{pmatrix} \tag{0.3}$$

Since all the elements of R_2 are zero, the rank of the matrix is one.
Hence ABC are collinear points.

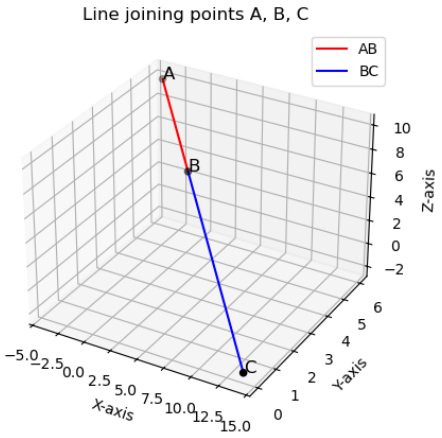
Line joining points A, B, C
AB
BC
A
B
C
X-axis
Y-axis
Z-axis
−5.0
−2.5
0.0
2.5
5.0
7.5
10.0
12.5
15.0
0
1
2
3
4
5
6
−2
0
2
4
6
8
10

Fig. 0.1