1.1.6.27

EE24BTECH11057 - SHIVAM SHILVANT*

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

Variable	Description	Formula
A	A Point	$A = \begin{pmatrix} -4 & 6 & 10 \end{pmatrix}$
B	A Point	$B = \begin{pmatrix} 2 & 4 & 6 \end{pmatrix}$
C	A Point	$C = \begin{pmatrix} 14 & 0 & -2 \end{pmatrix}$
M	It is a matrix comprising of vectors $B - A$ and $C - A$	$M = [B - A, C - A]$

TABLE 0

If the rank of a matrix M is 1, then the points A,B,C are collinear.

$$Rank\,(M) = 1 \tag{0.1}$$

Computing matrix M

$$M = \begin{pmatrix} 6 & -2 & -4 \\ 18 & -6 & -12 \end{pmatrix} \xleftrightarrow{R_2 \to R_2 - 3R_1} \begin{pmatrix} 6 & -2 & -4 \\ 0 & 0 & 0 \end{pmatrix} \tag{0.2}$$

Thus we can conclude that the rank of matrix M is 1 and thus A, B, C are collinear.
i.e., the given points are collinear.

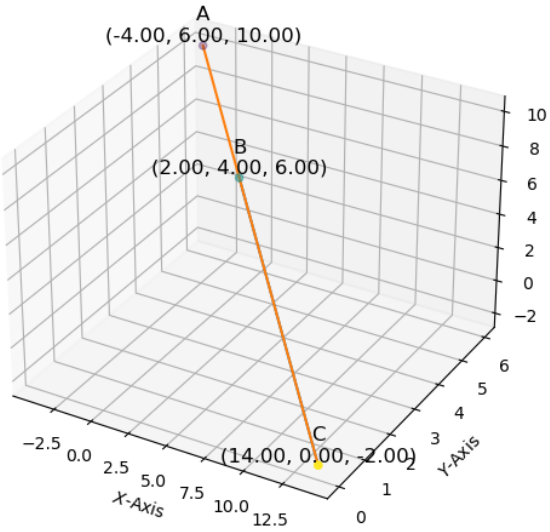

Fig. 0.1: A,B and C are collinear