

1.1.6.22

EE24BTECH11059 - Yellanki Siddhanth

Question:

Show that the points $A(2, -3, 4)$, $B(-1, 2, 1)$ and $C(0, \frac{1}{3}, 2)$ are collinear

Solution:

Variable	Description	Formula
A	A 3d Point to be plotted	$A = \begin{pmatrix} 2 & -3 & 4 \end{pmatrix}$
B	A 3d Point to be plotted	$B = \begin{pmatrix} -1 & 2 & 1 \end{pmatrix}$
C	A 3d Point to be plotted	$C = \begin{pmatrix} 0 & \frac{1}{3} & 2 \end{pmatrix}$
M	It is a matrix comprising of vectors $B - A$ and $C - A$	$M = [B - A, C - A]$

TABLE 0

The rank of a matrix M is 1, then the matrix is collinear.

$$\text{Rank}(M) = 1 \quad (0.1)$$

Computing matrix M

$$M = \begin{pmatrix} -3 & 5 & -3 \\ -2 & \frac{10}{3} & -2 \end{pmatrix} \xrightarrow{R_2 \leftarrow R_2 - \frac{2}{3}R_1} \begin{pmatrix} -3 & 5 & -3 \\ 0 & 0 & 0 \end{pmatrix} \quad (0.2)$$

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

Showing that A,B,C are collinear

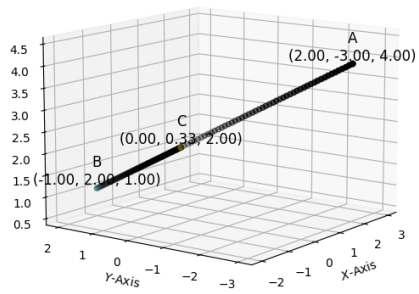


Fig. 0.1