1.1.6.22

EE24BTECH11059 - Yellanki Siddhanth

Question:
Show that the points $A\,(2,-3,4)$,$B\,(-1,2,1)$ and $C\left(0,\frac{1}{3},2\right)$ 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.

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

Computing matrix M

$$M=\begin{pmatrix}-3 & 5 & -3\\ -2 & \frac{10}{3} & -2\end{pmatrix}\xleftrightarrow{R_2\leftarrow R_2-\frac{2}{3}R_1}\begin{pmatrix}-3 & 5 & -3\\ 0 & 0 & 0\end{pmatrix} \tag{0.2}$$

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

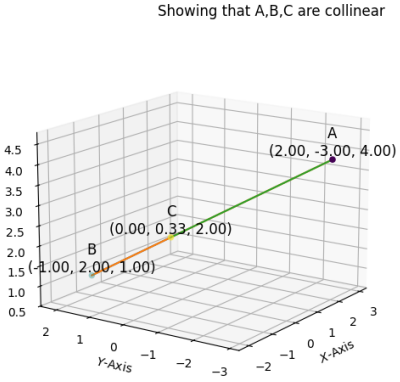
Showing that A,B,C are collinear
A
(2.00, -3.00, 4.00)
C
(0.00, 0.33, 2.00)
B
(-1.00, 2.00, 1.00)
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
2
1
0
−1
−2
−3
Y-Axis
−2
−1
0
1
2
3
X-Axis

Fig. 0.1