1.1.6.13

EE24BTECH11059 - Yellanki Siddhanth

Question:
The points $(0,5)$, $(0,-9)$ and $(3,6)$ are collinear
Solution:

Variable	Description	Formula
A	A Point to be plotted	$A = \begin{pmatrix} 0 \\ 5 \end{pmatrix}$
B	A Point to be plotted	$B = \begin{pmatrix} 0 \\ -9 \end{pmatrix}$
C	A Point to be plotted	$C = \begin{pmatrix} 3 \\ 6 \end{pmatrix}$
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

$$M = \begin{pmatrix} 0 & 3 \\ -14 & 1 \end{pmatrix} \tag{0.2}$$

Clearly we can conclude that the rank of matrix M is $\neq 1$
$\therefore$ A, B, C are not collinear.
(It is a special case as it is square matrix. In the case of non-square matrices, solutions to the system can still exist, but the conditions are more complex. The rank doesnt necessarily provide as straightforward answer to the uniqueness or existence of solutions as it does with square matrices.)

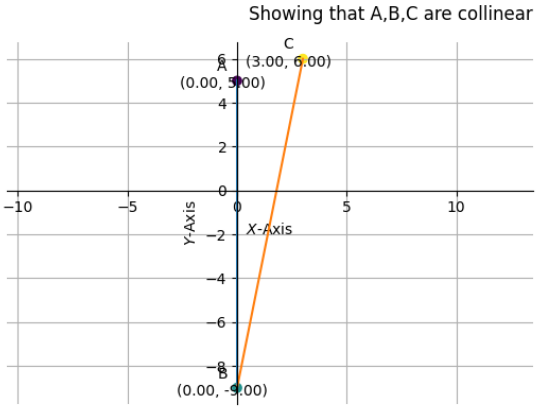
Showing that A,B,C are collinear
C
(3.00, 6.00)
A
(0.00, 5.00)
B
(0.00, -5.00)
Y-Axis
X-Axis
6
4
2
0
−2
−4
−6
−8
−10
−5
0
5
10

Fig. 0.1