1-1.6-15

EE24BTECH11048-NITHIN.K

Question:
Find the value of m if the points $(5,1)$, $(-2,-3)$ and $(8,2m)$ are collinear.
Solution:

Variable	Description	Formula
A	A Point to be plotted	$A = \begin{pmatrix} 5 & 1 \end{pmatrix}$
B	A Point to be plotted	$B = \begin{pmatrix} -2 & -3 \end{pmatrix}$
C	A Point to be found and plotted	$C = \begin{pmatrix} 8 & 2m \end{pmatrix}$
M	It is a matrix comprising of vectors $B-A$ and $C-A$	$M = \begin{pmatrix} B-A & C-A \end{pmatrix}$

TABLE 0

A, B, C are collinear if rank(M) = 1
Note: rank of matrix M = rank of matrix M^T

$$M^T = \begin{pmatrix} -7 & -4 \\ 3 & 2m-1 \end{pmatrix} \xleftrightarrow{R_2 = 3R_1 + 7R_2} \begin{pmatrix} -7 & -4 \\ 0 & -19+14m \end{pmatrix} \tag{0.1}$$

for the rank to be 1,

$$-19 + 14m = 0 \tag{0.2}$$
$$m = 19/14 \tag{0.3}$$

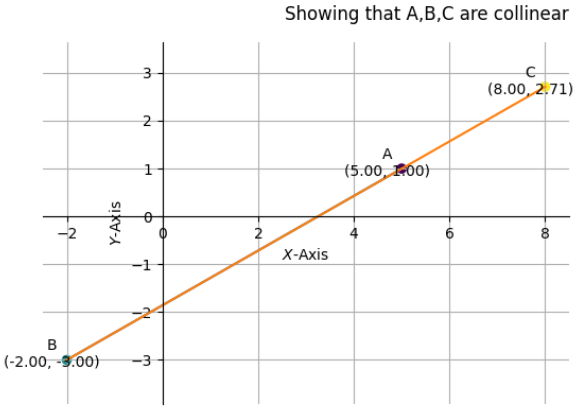
Showing that A,B,C are collinear
C
(8.00, 2.71)
A
(5.00, 1.00)
B
(-2.00, -3.00)
Y-Axis
X-Axis
3
2
1
0
−1
−2
−3
−2
0
2
4
6
8

Fig. 0.1