

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

TABLE 0

A, B, C are collinear if $\text{rank}(M) = 1$

Note: rank of matrix $M = \text{rank of matrix } M^T$

$$M^T = \begin{pmatrix} -7 & -4 \\ 3 & 2m - 1 \end{pmatrix} \xrightarrow{R_2 = 3R_1 + 7R_2} \begin{pmatrix} -7 & -4 \\ 0 & -19 + 14m \end{pmatrix} \quad (1)$$

for the rank to be 1,

$$-19 + 14m = 0 \quad (2)$$

$$m = 19/14 \quad (3)$$

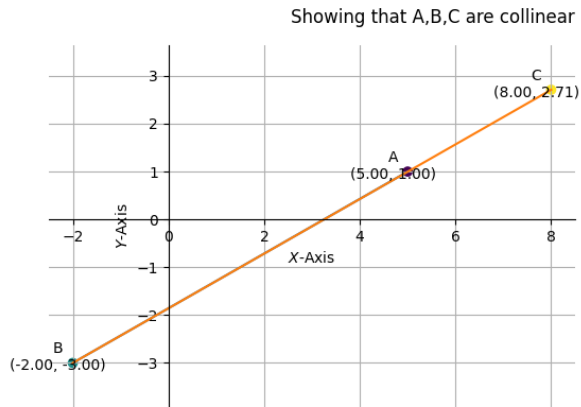


Fig. 0