1.7.10

EE24BTECH11012 - Bhavanisankar G S

QUESTION

Find the relation between x and y if the points $\mathbf{A}(x, y)$, $\mathbf{B}(-5, 7)$ and $\mathbf{C}(-4, 5)$ are collinear. (10, 2015).

SOLUTION

Variable name	Description	Formula
$\mathrm{A}=\begin{pmatrix} x \\ y \end{pmatrix}$	The point with unknown coordinates	$rank\begin{pmatrix}\mathbf{C}-\mathbf{B} & \mathbf{A}\end{pmatrix}$
$\mathrm{B} = \begin{pmatrix} -5, 7 \end{pmatrix}$	The point in 2-D plane with coordinates $\begin{pmatrix} -5 \\ 7 \end{pmatrix}$	For points to be collinear,
$\mathrm{M} = \begin{pmatrix} -4, 5 \end{pmatrix}$	The point with coordinates $\begin{pmatrix} -4, 5 \end{pmatrix}$	

Three points A, B and C are said to be collinear if

$$rank\begin{pmatrix}\mathbf{C}-\mathbf{B} & \mathbf{B}-\mathbf{A}\end{pmatrix} = 1$$

$$\begin{pmatrix} 1 & -5-x \\ -2 & 7-y \end{pmatrix} \leftrightarrow \mathrm{R}_2 \to R_2 + 2R_1$$

$$\begin{pmatrix} 1 & -5-x \\ 0 & -3-y-2x \end{pmatrix} \tag{0.1}$$

For the rank of the matrix to be one, $2x + y + 3 = 0$.

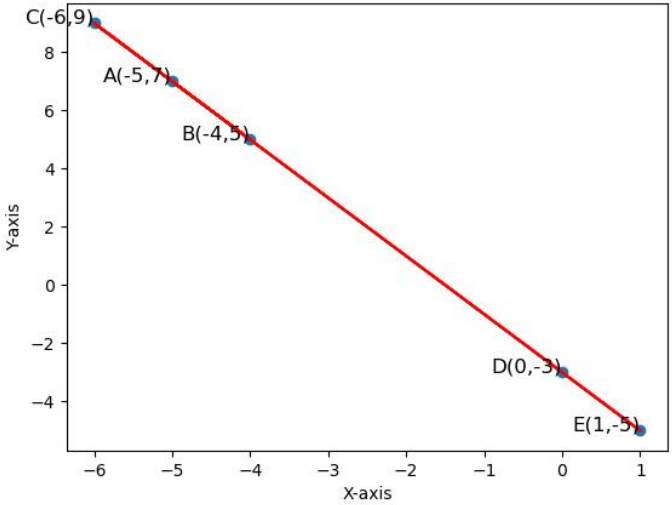

Fig. 0.1: A plot of the given question.