1.7.7

EE24BTECH11026 - G.Srihaas

QUESTION

For what value of P the points $(2,1)$, $(P,-1)$ and $(-1,3)$ are collinear. $(10, 2019)$.

Solution:

Variable name	Description	Formula
A	The point in 2-D plane with coordinates	$\begin{pmatrix}2\\1\end{pmatrix}$
B	The point with unknown coordinate	$\begin{pmatrix}P\\-1\end{pmatrix}$
C	The point in 2-D plane with coordinates	$\begin{pmatrix}-1\\3\end{pmatrix}$

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

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

$$\begin{pmatrix}-1-P & P-2\\ 4 & -2\end{pmatrix} \xleftrightarrow{R_1 \to R_1/(-P-1)} \tag{0.1}$$

$$\begin{pmatrix}1 & \frac{2-P}{P+1}\\ 4 & -2\end{pmatrix} \xleftrightarrow{R_2 \to R_2-4R_1} \tag{0.2}$$

$$\begin{pmatrix}1 & \frac{2-P}{P+1}\\ 0 & \frac{2P-10}{P+1}\end{pmatrix} \tag{0.3}$$

For the rank of the matrix to be one, $2P - 10 = 0$.

$P - 5 = 0$.

$P = 5$.

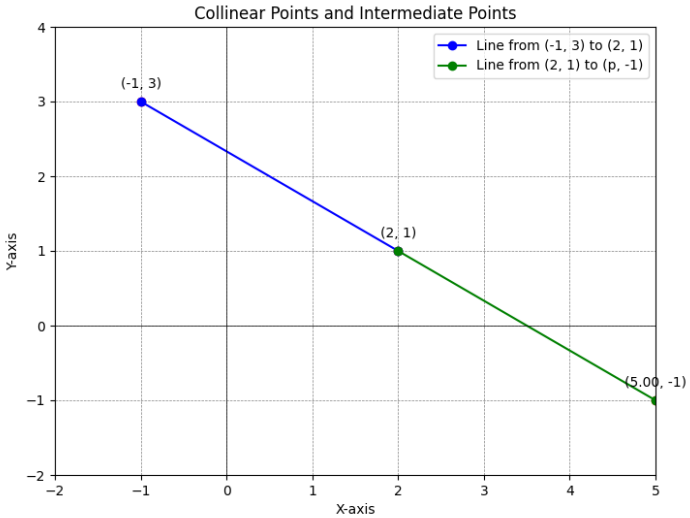

Fig. 0.1: A plot of the given question.