1-1.6-24

EE24BTECH11005 - Arjun Pavanje

Question:

Find the values of k if the points $\mathbf{A}\begin{pmatrix}2\\3\end{pmatrix}, \mathbf{B}\begin{pmatrix}4\\k\end{pmatrix}$, and $\mathbf{C}\begin{pmatrix}6\\-3\end{pmatrix}$ are collinear

Solution:

Variable	Description
A	Point $\begin{pmatrix}2\\3\end{pmatrix}$
B	$\begin{pmatrix}4\\k\end{pmatrix}$ point
C	$\begin{pmatrix}6\\-3\end{pmatrix}$ point
k	value to be found

TABLE I: Variables Used

First we should construct the collinearity matrix with the given points A, B, C

$$\begin{pmatrix}B-A\\C-B\end{pmatrix} \tag{1}$$

$$\begin{pmatrix}2 & k-3\\2 & -3-k\end{pmatrix} \xleftrightarrow{R_2 \to R_2 - R_1} \begin{pmatrix}2 & k-3\\0 & -2k\end{pmatrix} \tag{2}$$

rank should be 1 for collinearity, for that R_2 must be 0, so

$$-2k = 0 \tag{3}$$

$$\therefore k = 0 \tag{4}$$

The required value of k is $k = 0$

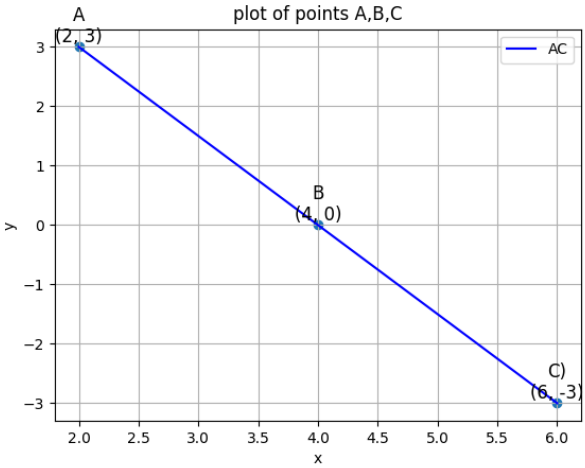

Fig. 1: Plot of the points A,B,C