Assignment 1

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1 QUESTION 1

Find the value of p for which the points $\mathbf{A} = \begin{pmatrix} -5 \\ 1 \end{pmatrix}, \mathbf{B} = \begin{pmatrix} 1 \\ p \end{pmatrix}, \mathbf{C} = \begin{pmatrix} 4 \\ -2 \end{pmatrix}$ are collinear

2 SOLUTION

Given:- $\mathbf{A} = \begin{pmatrix} -5 \\ 1 \end{pmatrix}, \mathbf{B} = \begin{pmatrix} 1 \\ p \end{pmatrix}, \mathbf{C} = \begin{pmatrix} 4 \\ -2 \end{pmatrix}$

It is given that the points are collinear, then the points should satisfy the condition.

$$\mathbf{B} - \mathbf{A} = k(\mathbf{C} - \mathbf{A}) \tag{2.0.1}$$

Where k is a scalar,

$$(\mathbf{B} - \mathbf{A}) = \begin{pmatrix} 6 \\ p-1 \end{pmatrix}, \tag{2.0.2}$$

$$(\mathbf{C} - \mathbf{A}) = \begin{pmatrix} 9 \\ -3 \end{pmatrix}, \tag{2.0.3}$$

Substituting the values in equation 2.0.1 we have

$$\begin{pmatrix} 6 \\ p-1 \end{pmatrix} = k\begin{pmatrix} 9 \\ -3 \end{pmatrix} \tag{2.0.4}$$

$$\implies 6 = 9k \tag{2.0.5}$$

$$\implies k = \frac{2}{3} \tag{2.0.6}$$

And thus,we obtain the value of p

$$p - 1 = k(-3) \tag{2.0.7}$$

$$p - 1 = -3\frac{2}{3} \tag{2.0.8}$$
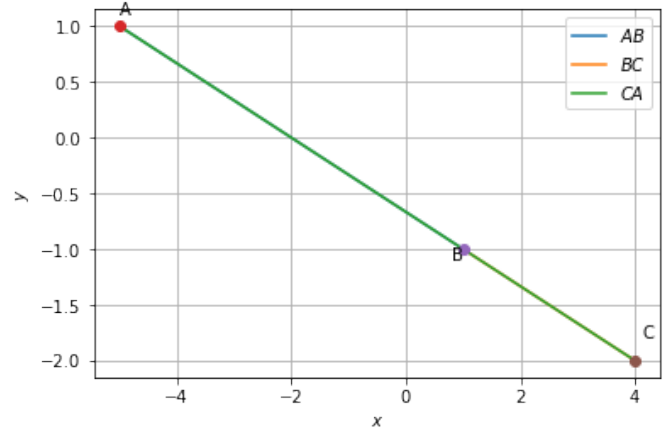
$$p - 1 = -2 \tag{2.0.9}$$

$$\implies p = -1 \tag{2.0.10}$$

Fig. 2.1: Graphical solution