

# Assignment 1

Panisha Gundelli

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

Given that the points are collinear,

$$\begin{pmatrix} -5 & 1 \\ 1 & p \\ 4 & -2 \end{pmatrix} \begin{pmatrix} \mathbf{B} - \mathbf{A} & \mathbf{C} - \mathbf{A} \end{pmatrix}^T$$

$$\begin{pmatrix} 1+5 & p-1 \\ 4+5 & -2-1 \end{pmatrix} \quad (2.0.1)$$

$$\begin{pmatrix} 6 & p-1 \\ 9 & -3 \end{pmatrix} \quad (2.0.2)$$

$$\begin{pmatrix} 6 & p-1 \\ 9 & -3 \end{pmatrix} \xrightarrow{(R_2 \leftrightarrow R_1)} \begin{pmatrix} 9 & -3 \\ 6 & p-1 \end{pmatrix} \xrightarrow{(R_1/3)}$$

$$\begin{pmatrix} 3 & -1 \\ 6 & p-1 \end{pmatrix} \xrightarrow{(R_2 \rightarrow R_2 - 2R_1)} \begin{pmatrix} 3 & -1 \\ 0 & p+1 \end{pmatrix} \xrightarrow{(R_1/3)} \begin{pmatrix} 1 & -1 \\ 0 & p+1 \end{pmatrix}$$

$$\Rightarrow p+1 = 0$$

$$\Rightarrow p = -1$$

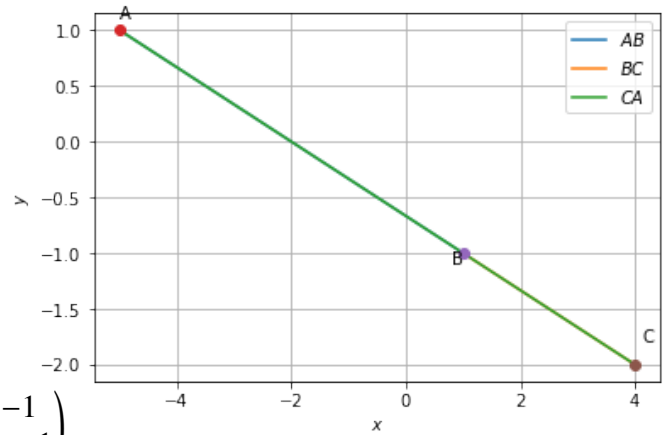


Fig. 2.1: Graphical solution