

# ASSIGNMENT 1

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Download all python codes from

<https://github.com/Vallidevibolla/valli/blob/main/Collinear.py>

and latex-tikz codes from

<https://github.com/Vallidevibolla/valli/blob/main/problem14.tex>

## 1 QUESTION No.14

Find the value of  $k$ , if the points  $\begin{pmatrix} k \\ 3 \end{pmatrix}$ ,  $\begin{pmatrix} 6 \\ -2 \end{pmatrix}$  and  $\begin{pmatrix} -3 \\ 4 \end{pmatrix}$  are collinear.

## 2 SOLUTION

Let

$$\mathbf{A} = \begin{pmatrix} k \\ 3 \end{pmatrix} \quad (2.0.1)$$

$$\mathbf{B} = \begin{pmatrix} 6 \\ -2 \end{pmatrix} \quad (2.0.2)$$

$$\mathbf{C} = \begin{pmatrix} -3 \\ 4 \end{pmatrix} \quad (2.0.3)$$

As, given that the points are collinear,

$$\begin{pmatrix} 6 & -2 \\ -3 & 4 \\ k & 3 \end{pmatrix} \quad (2.0.4)$$

$$\frac{1}{2} \begin{vmatrix} 1 & 1 & 1 \\ A & B & C \end{vmatrix} = 0 \quad (2.0.5)$$

$$\Rightarrow \begin{vmatrix} 1 & 1 & 1 \\ k & 6 & -3 \\ 3 & -2 & 4 \end{vmatrix} = 0 \quad (2.0.6)$$

$$\Rightarrow -6K - 9 = 0 \quad (2.0.7)$$

$$\Rightarrow k = -3/2 \quad (2.0.8)$$

## 3 ALTERNATIVE METHOD

As, given that the points are collinear,

$$\begin{pmatrix} 6 & -2 \\ -3 & 4 \\ k & 3 \end{pmatrix} \quad (3.0.1)$$

$$\begin{aligned} & \begin{pmatrix} k-6 & 3-(-2) \\ 6-(-3) & -2-4 \end{pmatrix} \\ \rightarrow & \begin{pmatrix} k-6 & 5 \\ 9 & -6 \end{pmatrix} \xrightarrow{(R_2 \rightarrow R_1)} \begin{pmatrix} 9 & -6 \\ k-6 & 5 \end{pmatrix} \\ & \xrightarrow{(R_1/3)} \begin{pmatrix} 3 & -2 \\ k-6 & 5 \end{pmatrix} \\ \rightarrow & \begin{pmatrix} 3 & -2 \\ 0 & 3 \times 5 - (-2 \times (k-6)) \end{pmatrix} \end{aligned}$$

$$\Rightarrow 15 + 2K - 12 = 0$$

$$\Rightarrow k = -3/2$$

$\therefore$  Finally the value of  $k$  is  $-\frac{3}{2}$

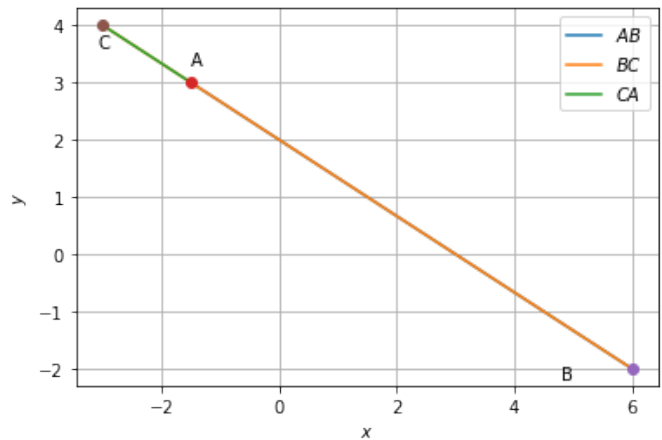


Fig. 0: collinear