

Assignment 1

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Find Python Codes from below link

<https://github.com/praneeth2720/IIT-H/blob/main/Assignment1/st-lines.py>

and latex codes from

<https://github.com/praneeth2720/IIT-H/tree/main/Assignment1>

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1.1 Question 14

Find the value of k if the points (k, 3), (6, -2) and (-3, 4) are collinear.

1.2 Solution

Let P, Q and R are the given points

$$P = \begin{pmatrix} K \\ 3 \end{pmatrix} \quad Q = \begin{pmatrix} 6 \\ -2 \end{pmatrix} \quad R = \begin{pmatrix} -3 \\ 4 \end{pmatrix}$$

And if the three points are collinear then the area of triangle formed by these points will be zero

By using area of triangle formula

$$\frac{1}{2} \begin{vmatrix} k & 3 & 1 \\ 6 & -2 & 1 \\ -3 & 4 & 1 \end{vmatrix} = 0 \quad (1.2.1)$$

$$R_2 \Leftrightarrow R_2 - R_3 \quad (1.2.2)$$

$$\begin{vmatrix} k & 3 & 1 \\ 9 & -6 & 0 \\ -3 & 4 & 1 \end{vmatrix} = 0 \quad (1.2.3)$$

$$R_1 \Leftrightarrow R_1 - R_3 \quad (1.2.4)$$

$$\begin{vmatrix} k+3 & -1 & 0 \\ 9 & -6 & 0 \\ -3 & 4 & 1 \end{vmatrix} = 0 \quad (1.2.5)$$

$$(1.2.6)$$

$$\Rightarrow -6k - 18 + 9 = 0$$

$$-6k = 9$$

$$k = \frac{-3}{2}$$

\therefore the point P is $\begin{pmatrix} -\frac{3}{2} \\ 3 \end{pmatrix}$

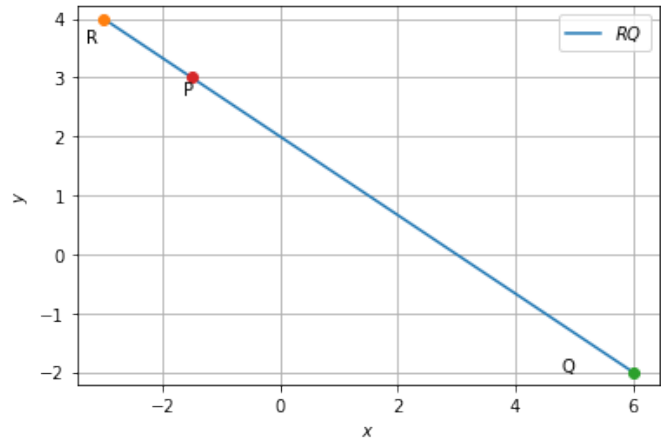


Figure.1: three collinear points