

# 1.7.2

EE24BTECH11001 - Aditya Tripathy

## Question:

Show that the points  $P(5, 4)$ ,  $Q(7, k)$  and  $R(9 - 2)$  are collinear.

## Solution:

From (1.1.9.1), Points A, B, C are defined to be collinear if

$$\text{rank} \begin{pmatrix} (\mathbf{B} - \mathbf{A})^\top \\ (\mathbf{C} - \mathbf{A})^\top \end{pmatrix} = 1 \quad (0.1)$$

$$(0.2)$$

Therefore, there should be only 1 non-zero row in collinearity matrix after row-operations. So, forming the collinearity matrix and doing row operations,

$$\begin{pmatrix} 2 & k - 4 \\ 4 & -6 \end{pmatrix} \xrightarrow{R_2 = R_2 - 2R_1} \begin{pmatrix} 2 & k - 4 \\ 0 & 2 - 2k \end{pmatrix} \quad (0.3)$$

$$\implies 2 - 2k = 0 \implies k = 1 \quad (0.4)$$

Therefore  $k=1$  will satisfy condition of collinearity.

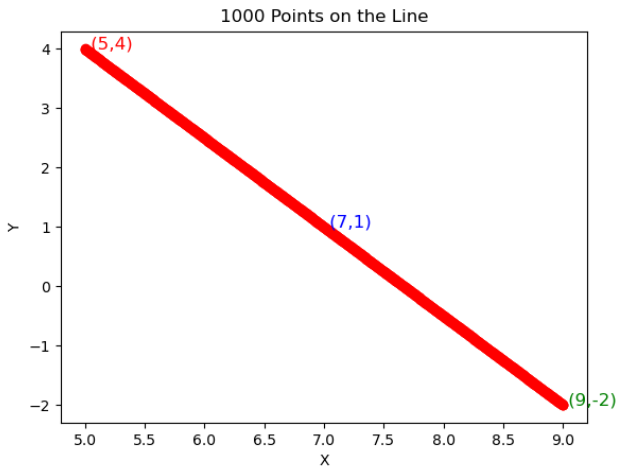


Fig. 0.1: Line joining the three given points