

# 1-1.9-6

EE24BTECH11005 - Arjun Pavanje

Question:

If  $\mathbf{Q} = \begin{pmatrix} 0 \\ 1 \end{pmatrix}$  is equidistant from  $\mathbf{P} = \begin{pmatrix} 5 \\ -3 \end{pmatrix}$  and  $\mathbf{R} = \begin{pmatrix} x \\ 6 \end{pmatrix}$ , find the value of  $x$ .

**Solution:**

Variable	Description
<b>Q</b>	$\begin{pmatrix} 0 \\ 1 \end{pmatrix}$ point
<b>P</b>	$\begin{pmatrix} 5 \\ -3 \end{pmatrix}$ point
<b>R</b>	$\begin{pmatrix} x \\ 6 \end{pmatrix}$ point
<b>x</b>	value to be found

TABLE I: Variables Used

As, **Q** is equidistant from **P**, **R**

$$\|Q - P\| = \|Q - R\| \quad (1)$$

$$\sqrt{(Q - P)^T (Q - P)} = \sqrt{(Q - R)^T (Q - R)} \quad (2)$$

$$(Q - P) = \begin{pmatrix} -5 \\ 4 \end{pmatrix}, (Q - R) = \begin{pmatrix} -x \\ -5 \end{pmatrix}$$

Putting values into equation (2) and squaring,

$$25 + 16 = x^2 + 25 \quad (3)$$

$$x^2 = 16 \quad (4)$$

$$x = \pm 4 \quad (5)$$

The required values of  $x$  are  $+4, -4$

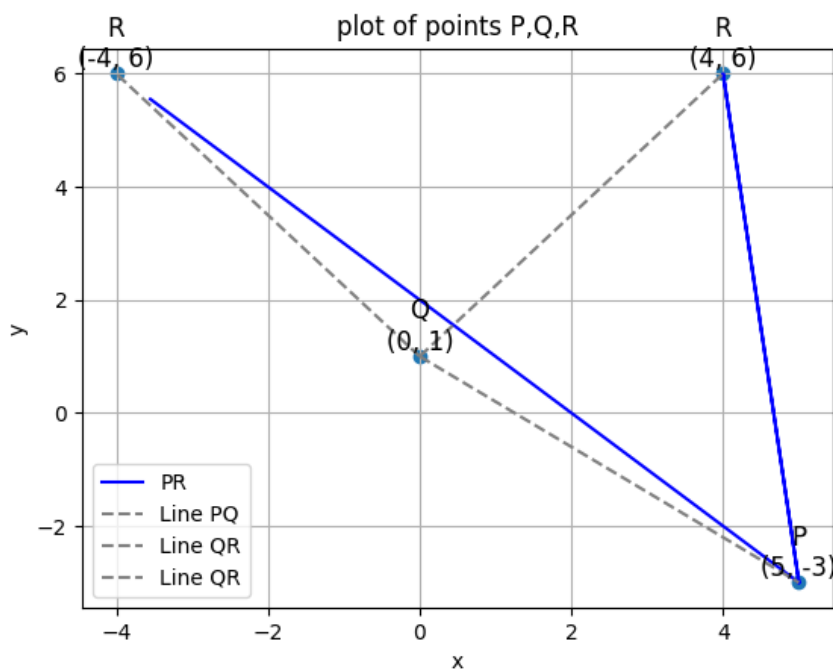


Fig. 1: Plot of P,Q,R