

1-1.9-6

EE24BTECH11005 - Arjun Pavanje

Question:

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

Solution:

Variable	Description
\mathbf{Q}	$(0, 1)$ point
\mathbf{P}	$(5, -3)$ point
\mathbf{R}	$(x, 6)$ point
\mathbf{x}	value to be found

TABLE I: Variables Used

As, \mathbf{Q} is equidistant from \mathbf{P} , \mathbf{R}

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

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

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

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 $+4, -4$

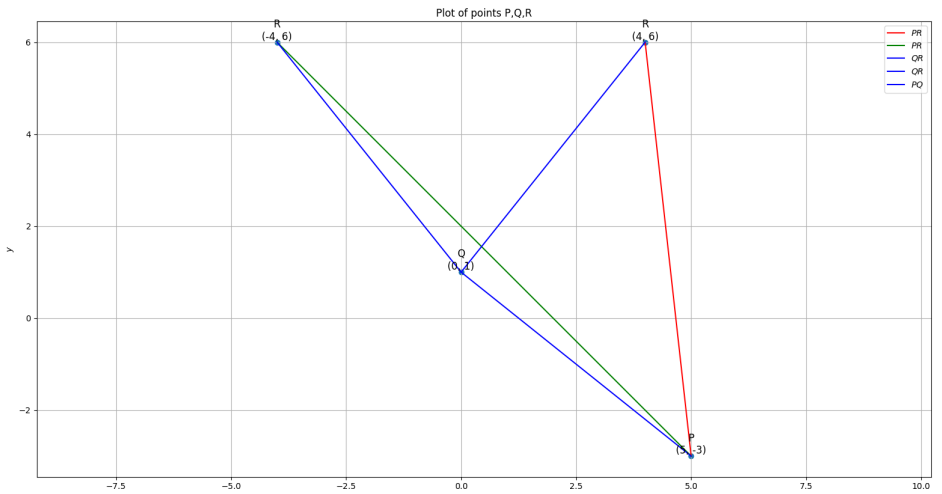


Fig. 1: Plot of P,Q,R