1-1.8-10

EE24BTECH11066 - YERRA AKHILESH

Question:
If $\mathbf{Q}(0,1)$ is equidistant from $\mathbf{P}(5,-3)$ and $\mathbf{R}(x,6)$, find the values of x.Also find the distances QR and PR.
Solution:

point	Description
P	$(5,-3)$
Q	$(0,1)$
R	$(x,6)$

TABLE 0: Variables Used

$$PQ = QR \tag{0.1}$$

$$\sqrt{(\mathbf{P}-\mathbf{Q})^{\top}(\mathbf{P}-\mathbf{Q})} = \sqrt{(\mathbf{Q}-\mathbf{R})^{\top}(\mathbf{Q}-\mathbf{R})} \tag{0.2}$$

$$\mathbf{P}-\mathbf{Q} = \begin{pmatrix} 5 \\ -4 \end{pmatrix} \tag{0.3}$$

$$\mathbf{Q}-\mathbf{R} = \begin{pmatrix} -x \\ -5 \end{pmatrix} \tag{0.4}$$

$$\sqrt{41} = \sqrt{x^2+25} \tag{0.5}$$

on comparing both sides,

$$x = \pm 4 \tag{0.6}$$

$$QR = \sqrt{(\mathbf{Q}-\mathbf{R})^{\top}(\mathbf{Q}-\mathbf{R})} \tag{0.7}$$

$$QR = \sqrt{41} \tag{0.8}$$

$$PR = \sqrt{(\mathbf{P}-\mathbf{R})^{\top}(\mathbf{P}-\mathbf{R})} \tag{0.9}$$

if $x = 4$,

$$PR = \sqrt{82} \tag{0.10}$$

if $x = -4$,

$$PR = \sqrt{162} \tag{0.11}$$