Assignment4

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QUESTION

Given the vertices of a triangle PQR as P(2, 2), Q(-4, -4), and R(5, -8), find the length of the median through R.

SOLUTION

Input	Output
P	$P = \begin{pmatrix} 2 \\ 2 \end{pmatrix}$
Q	$Q = \begin{pmatrix} -4 \\ -4 \end{pmatrix}$
R	$R = \begin{pmatrix} 5 \\ -8 \end{pmatrix}$
M	Midpoint of P,Q

The midpoint M of the line segment PQ is calculated as:

$$M = \frac{P + Q}{2} \tag{0.1}$$

$$\mathbf{R} = \begin{pmatrix} 5 \\ -8 \end{pmatrix}, \quad \mathbf{M} = \begin{pmatrix} -1 \\ -1 \end{pmatrix} \tag{0.2}$$

$$\mathbf{RM} = \mathbf{R} - \mathbf{M} = \begin{pmatrix} 5 \\ -8 \end{pmatrix} - \begin{pmatrix} -1 \\ -1 \end{pmatrix} = \begin{pmatrix} 5 - (-1) \\ -8 - (-1) \end{pmatrix} = \begin{pmatrix} 6 \\ -7 \end{pmatrix}$$
 (0.3)

$$\|\mathbf{RM}\|_2 = \sqrt{\mathbf{RM}^T \mathbf{RM}} = \sqrt{\left[6 - 7\right] \left[\frac{6}{-7}\right]} = \sqrt{6^2 + (-7)^2} = \sqrt{85}$$

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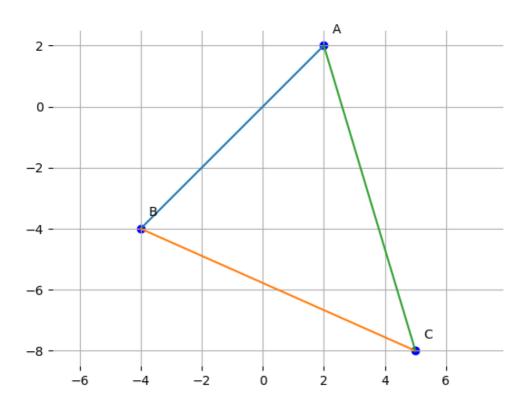


Fig. 0.1: The plot of the points