

3-3.4-1

EE24BTECH11010 - Balaji

Question :

Draw a quadrilateral in the Cartesian plane, whose vertices are $\begin{pmatrix} -4 \\ 5 \end{pmatrix}$, $\begin{pmatrix} 0 \\ 7 \end{pmatrix}$, $\begin{pmatrix} 5 \\ -5 \end{pmatrix}$ and $\begin{pmatrix} -4 \\ -2 \end{pmatrix}$

Answer :

Variable	Description	Co-Ordinates
A	First Coordinate of Quadrilateral	$\begin{pmatrix} -4 \\ 5 \end{pmatrix}$
B	Second Coordinate of Quadrilateral	$\begin{pmatrix} 0 \\ 7 \end{pmatrix}$
C	third Coordinate of Quadrilateral	$\begin{pmatrix} 5 \\ -5 \end{pmatrix}$
D	Fourth Coordinate of Quadrilateral	$\begin{pmatrix} -4 \\ -2 \end{pmatrix}$

TABLE 0

Length of the side **AB**, d_1 is

$$(\mathbf{A} - \mathbf{B}) = \begin{pmatrix} -4 \\ 5 \end{pmatrix} - \begin{pmatrix} 0 \\ 7 \end{pmatrix} = \begin{pmatrix} -4 \\ -2 \end{pmatrix} \quad (1)$$

$$(\mathbf{A} - \mathbf{B})^\top (\mathbf{A} - \mathbf{B}) = 20 \quad (2)$$

$$d_1 = \|\mathbf{A} - \mathbf{B}\| = \sqrt{20} \quad (3)$$

Length of the side **BC**, d_2 is

$$(\mathbf{B} - \mathbf{C}) = \begin{pmatrix} 0 \\ 7 \end{pmatrix} - \begin{pmatrix} 5 \\ -5 \end{pmatrix} = \begin{pmatrix} -5 \\ 12 \end{pmatrix} \quad (4)$$

$$(\mathbf{B} - \mathbf{C})^\top (\mathbf{B} - \mathbf{C}) = 169 \quad (5)$$

$$d_2 = \|\mathbf{B} - \mathbf{C}\| = 13 \quad (6)$$

Length of the side **CD**, d_3 is

$$(\mathbf{C} - \mathbf{D}) = \begin{pmatrix} 5 \\ -5 \end{pmatrix} - \begin{pmatrix} -4 \\ -2 \end{pmatrix} = \begin{pmatrix} 9 \\ -3 \end{pmatrix} \quad (7)$$

$$(\mathbf{C} - \mathbf{D})^\top (\mathbf{C} - \mathbf{D}) = 90 \quad (8)$$

$$d_3 = \|\mathbf{C} - \mathbf{D}\| = \sqrt{90} \quad (9)$$

Length of the side \mathbf{DA} , d_4 is

$$(\mathbf{D} - \mathbf{A}) = \begin{pmatrix} -4 \\ -2 \end{pmatrix} - \begin{pmatrix} -4 \\ 5 \end{pmatrix} = \begin{pmatrix} 0 \\ -7 \end{pmatrix} \quad (10)$$

$$(\mathbf{D} - \mathbf{A})^\top (\mathbf{D} - \mathbf{A}) = 49 \quad (11)$$

$$d_3 = \|\mathbf{O} - \mathbf{B}\| = 7 \quad (12)$$

Perimeter of the Quadrilateral is

$$d_1 + d_2 + d_3 + d_4 = \sqrt{20} + \sqrt{90} + 20 \quad (13)$$

The Quadrilateral formed by the points:

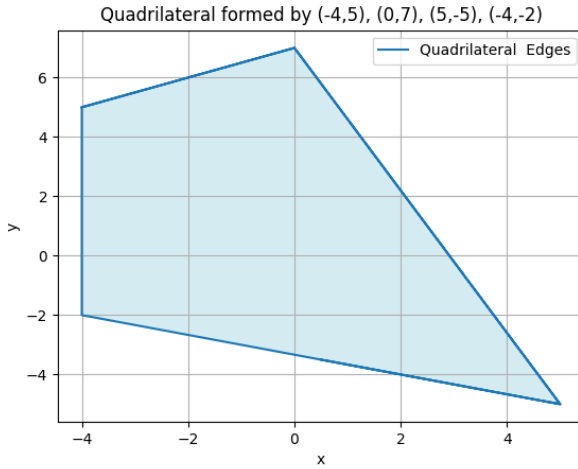


Fig. 0.1: Plot of the Quadrilateral