

2.7.13

EE25BTECH11001 - Aarush Dilawri

Question:

Given vertices $\mathbf{A}(-4, -5)$, $\mathbf{B}(-1, -6)$, $\mathbf{C}(-5, 7)$ and $\mathbf{D}(4, 5)$ of a quadrilateral. Find the area of quadrilateral $ABCD$.

Solution:

Given vertices $\mathbf{A} = \begin{pmatrix} -4 \\ -5 \end{pmatrix}$, $\mathbf{B} = \begin{pmatrix} -1 \\ -6 \end{pmatrix}$, $\mathbf{C} = \begin{pmatrix} -5 \\ 7 \end{pmatrix}$, $\mathbf{D} = \begin{pmatrix} 4 \\ 5 \end{pmatrix}$. We split the quadrilateral into triangles $\triangle ABC$ and $\triangle ACD$ and add them to get the answer.

Area of $\triangle ABC$:

$$\text{Area}_{ABC} = \frac{1}{2} \left\| (\mathbf{B} - \mathbf{A}) \times (\mathbf{C} - \mathbf{A}) \right\| = 17.5 \quad (1)$$

Area of $\triangle ACD$:

$$\text{Area}_{ACD} = \frac{1}{2} \left\| (\mathbf{C} - \mathbf{A}) \times (\mathbf{D} - \mathbf{A}) \right\| = 53 \quad (2)$$

Total area of quadrilateral (sum of triangle areas):

$$\text{Area}_{ABCD} = \text{Area}_{ABC} + \text{Area}_{ACD} = 70.5 \quad (3)$$

See Fig. 0 ,

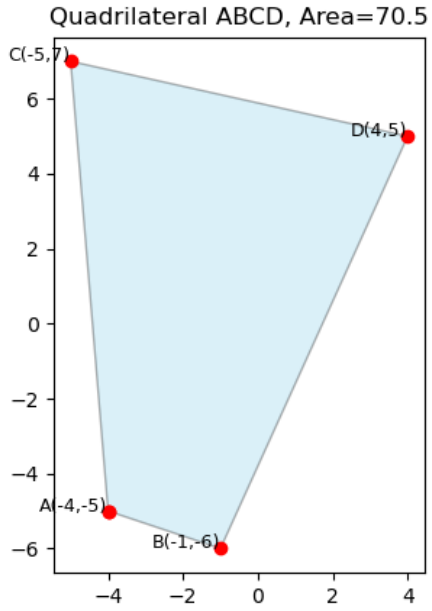


Fig. 0