MATRIX ANALYSIS USING PYTHON

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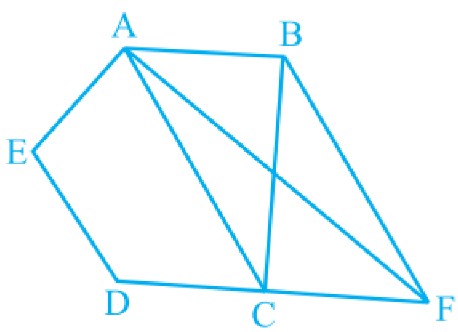
Contents

1 Problem

ABCDE is a pentagon. A line through B parallel to AC meets DC produced at F. Show that
(i) ar (ACB) = ar (ACF)
(ii) ar (AEDF) = ar (ABCDE)



2 Solution

The input parameters for this construction are

Symbol	Value	Description
$\mathbf{D}$	$\begin{pmatrix}0\\0\end{pmatrix}$	Point D
r1	4	DC
r2	8	DB
r3	6.5	DA
r4	4	DE
θ_1	$17\pi/36$	$\angle$BDC
θ_2	$53\pi/180$	$\angle$ADC
θ_3	$2\pi/3$	$\angle$EDC

Below python code realizes the above construction :

```
https://github.com/velicharlagokulkumar/FWC_module1/blob/main/matrices/lines/codes/matrix.py
```

termux commands :

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bash sh.sh.........using shell command
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To Prove: Ar($\mathbf{ACB}$)=Ar($\mathbf{ACF}$)

$$\mathbf{F} = \mathbf{C} - \mathbf{A} + \mathbf{B} \tag{1}$$

letting

$$\mathbf{v1} = \mathbf{C} - \mathbf{A} \tag{2}$$

$$\mathbf{v2} = \mathbf{C} - \mathbf{F} \tag{3}$$

Area of the $\Delta\mathbf{ACF}$ is given by

$$\frac{1}{2}\|\mathbf{v1} \times \mathbf{v2}\| \tag{4}$$

letting

$$\mathbf{v3} = \mathbf{A} - \mathbf{C} \tag{5}$$

$$\mathbf{v4} = \mathbf{A} - \mathbf{B} \tag{6}$$

Area of the $\Delta\mathbf{ACB}$ is given by

$$\frac{1}{2}\|\mathbf{v3} \times \mathbf{v4}\| \tag{7}$$

To Prove: Ar($\mathbf{AEDF}$)=Ar($\mathbf{ABCDE}$)
Area of the $\Delta\mathbf{AED}$ is given by

$$\frac{1}{2}\|\mathbf{A} \times \mathbf{E}\| \tag{8}$$

Area of the $\Delta\mathbf{ADC}$ is given by

$$\frac{1}{2}\|\mathbf{A} \times \mathbf{C}\| \tag{9}$$

From (8),(9)

$$\text{Ar}(\mathbf{AEDC})=\text{Ar}(\Delta\mathbf{AED})+\text{Ar}(\Delta\mathbf{ADC}) \tag{10}$$

From (10),(4)

$$\therefore \text{Ar}(\mathbf{AEDF})=\text{Ar}(\mathbf{AEDC})+\text{Ar}(\Delta\mathbf{ACF})$$

From (10),(7)

$$\therefore \text{Ar}(\mathbf{ABCDE})=\text{Ar}(\mathbf{AEDC})+\text{Ar}(\Delta\mathbf{ACB})$$

3 Construction

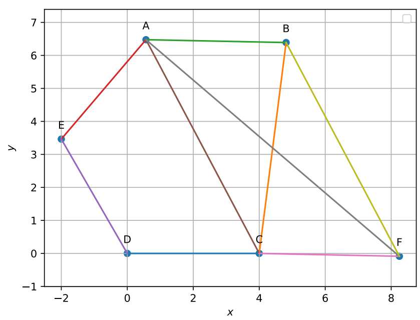

Figure of construction