MATRICES USING PYTHON

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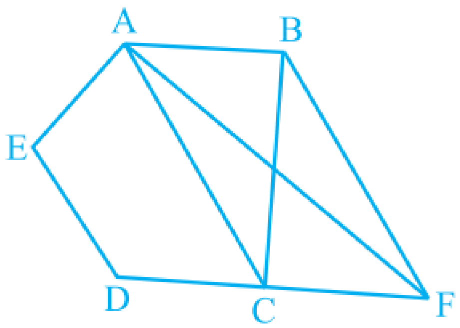
FWC22034 IITH Future Wireless Communication (FWC) ASSIGN-5

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

Theory:
In pentagon ABCDE, $AC \parallel BF$
To Prove: Ar(ACB)=Ar(ACF)
Δ ACB and Δ ACF lies on same base AC and are between same parallel AC and BF
Theorem : Two triangles on the same base (or equal bases) and between the same parallels are equal in area.

$\therefore$ Ar(Δ ACB)=Ar(Δ ACF)......(1)
Hence, Proved

To Prove: Ar(AEDF)=Ar(ABCDE)
Add Ar(AEDC) to (1) both sides
Ar(ΔACB)+Ar(AEDC)=Ar(ΔACF)+Ar(AEDC)

$\therefore$ Ar(ABCDE)=Ar(AEDF)
Hence, Proved

termux commands :

```
python3 matrix.py
```

The input parameters for this construction are

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

To Prove: Ar(ACB)=Ar(ACF)

F=C-A+B
v1=C-A
v2=C-F
Area of the ΔACF is given by
Ar(ΔACF) $=\frac{1}{2}\|\mathbf{v1} \times \mathbf{v2}\|$............(2)
v3=A-C
v4=A-B
Area of the ΔACB is given by
Ar(ΔACB) $=\frac{1}{2}\|\mathbf{v3} \times \mathbf{v4}\|$...............(3)

To Prove: Ar(AEDF)=Ar(ABCDE)

Ar(ΔAED)= $\frac{1}{2}\|\mathbf{A} \times \mathbf{E}\|$.............(5)
Ar(ΔADC)= $\frac{1}{2}\|\mathbf{A} \times \mathbf{C}\|$................(6)

Ar(AEDC)=Ar(ΔAED)+Ar(ΔADC)

$\therefore$ Ar(AEDF)=Ar(AEDC)+Ar(ΔACF)........(7)
$\therefore$ Ar(ABCDE)=Ar(AEDC)+Ar(ΔACB).......(8)

The below python code realizes the above construction:

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

3 Construction

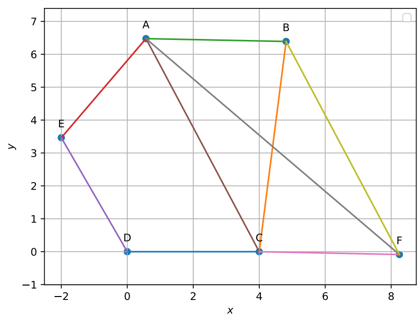


Figure of construction