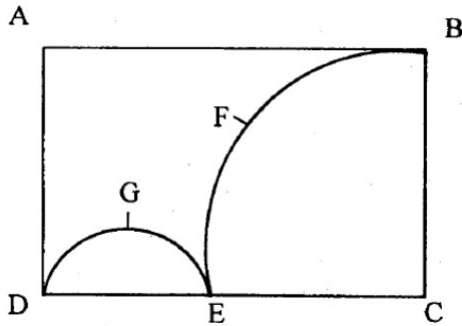


ASSIGNMENT-1

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QUESTION 3(C)



In the figure given below, ABCD is a rectangle. $AB = 14\text{cm}$ and $BC = 7\text{cm}$. From the rectangle, a quarter circle BFEC and a semicircle DGE are removed. Calculate the area of the remaining piece of the rectangle? (Take $\pi = 22/7$)

SOLUTION

Shape	Rectangle	semi circle	Quarter circle
Area	$l \times b$	$\frac{1}{2}\pi r^2$	$\frac{1}{4}\pi r^2$

Areas of various shapes

$$\begin{aligned}
 \text{area of rectangle } ABCD &= l \times b \\
 &= 14\text{cm} \times 7\text{cm} \\
 &= 98\text{cm}^2.
 \end{aligned}$$

since BC and EC are the radius of same circle

$$\begin{aligned}
 \Rightarrow \overline{BC} &= \overline{EC} \\
 &= 7\text{cm}.
 \end{aligned}$$

since AB and DC are the radius of same circle

$$\begin{aligned}
 \Rightarrow \overline{AB} &= \overline{DC} \\
 &= 14\text{cm}. \\
 \text{Also } \overline{DE} &= \overline{DC} - \overline{EC} \\
 &= 7\text{cm}
 \end{aligned}$$

The radius of semicircle \widehat{GDE}

$$\frac{\overline{DE}}{2} = \frac{7}{2}\text{cm}.$$

$$\begin{aligned}
 \text{Area of } \widehat{BFEC} \text{ region} &= \frac{1}{4} \times \pi \times (r)^2 \\
 &= \frac{1}{4} \times \pi \times 7\text{cm} \times 7\text{cm} \\
 &= \frac{77}{2}\text{cm}^2. (\text{radius is } BC)
 \end{aligned}$$

$$\begin{aligned}
 \text{Area of } \widehat{GDE} \text{ region} &= \frac{1}{2} \times \pi \times (r)^2 \\
 &= \frac{1}{2} \times \pi \times \frac{7}{2}\text{cm} \times \frac{7}{2}\text{cm}. \\
 &= \frac{77}{4}\text{cm}^2.
 \end{aligned}$$

To get the area of the remaining part take total area of rectangle and subtract the areas of

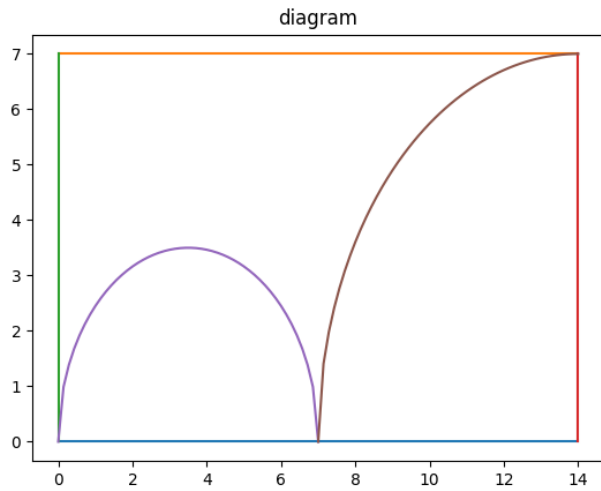


Fig. 1: python graph

semicircle and quarter circle.

Required area = $14cm \times 7cm$

$$- \frac{1}{2} \times \pi \times (7cm)^2 - \frac{1}{4} \times \pi \times \left(\frac{7}{2}\right)^2$$

$$\begin{aligned} \Rightarrow \text{arearequired} &= 98cm^2 - \frac{77}{2}cm^2 - \frac{77}{4}cm^2 \\ &= \frac{161}{4}cm^2 \\ &= 40.25cm^2 \end{aligned}$$

$$\therefore \text{Required Area} = 40.25cm^2$$

Verification in python

```
area of the requires region = area of rectangle
                             - area of semcircle-area of quatercircle
required area = 98-19.24225500323748-38.48451000647496
               = 40.27323499028755
```

Fig. 2: python code