Assignment 1

Atla keerthana

Download all python codes from

https://github.com/Atlakeerthana/Assignment1/blob /main/Assignment1/assignment1.py

and latex-tikz codes from

https://github.com/Atlakeerthana/Assignment1/blob /main/Assignment1/main.tex

1 Question No. 2.5

Draw a $\triangle ABC$ with side a = 7cm, $\angle B = 45^{\circ}$, $\angle A = 105^{\circ}$.

2 EXPLANATION

Given,

$$\angle A = 105^{\circ}, \angle B = 45^{\circ} and a = 7$$
 (2.0.1)

we need to find

Let us assume that the vertices of the $\triangle ABC$ as:

$$\mathbf{A} = c \begin{pmatrix} \cos B \\ \sin B \end{pmatrix}, \mathbf{B} = \begin{pmatrix} 0 \\ 0 \end{pmatrix}, \mathbf{C} = \begin{pmatrix} a \\ 0 \end{pmatrix}$$
 (2.0.2)

Finding $\angle C$ In $\triangle ABC$,

$$\angle A + \angle B + \angle C = 180^{\circ} \tag{2.0.3}$$

$$105^{\circ} + 45^{\circ} + \angle C = 180^{\circ} \tag{2.0.4}$$

$$150^{\circ} + \angle C = 180^{\circ} \tag{2.0.5}$$

$$\angle C = 180^{\circ} - 150^{\circ}$$
 (2.0.6)

$$\angle C = 30^{\circ} \tag{2.0.7}$$

By law of sines

$$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c} \tag{2.0.8}$$

$$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$$

$$\frac{\sin 105^{\circ}}{7} = \frac{\sin 45^{\circ}}{b} = \frac{\sin 30^{\circ}}{c}$$
(2.0.8)

we have:

$$\frac{\sin 105^{\circ}}{7} = \frac{\sin 30^{\circ}}{6} \tag{2.0.10}$$

$$c\sin 105^{\circ} = 7\sin 30^{\circ}$$
 (2.0.11)

$$c = \frac{7\sin 30^{\circ}}{\sin 105^{\circ}} \tag{2.0.12}$$

$$c = 3.62 \tag{2.0.13}$$

The vertex A can be expressed in a polar coordinate form as

$$\mathbf{A} = c \begin{pmatrix} \cos B \\ \sin B \end{pmatrix} \tag{2.0.14}$$

$$\mathbf{A} = 3.62 \begin{pmatrix} \cos 45^{\circ} \\ \sin 45^{\circ} \end{pmatrix} \tag{2.0.15}$$

$$\mathbf{A} = \begin{pmatrix} 2.55 \\ 2.55 \end{pmatrix} \tag{2.0.16}$$

Now, vertices of given $\triangle ABC$ can be written as,

$$\mathbf{A} = \begin{pmatrix} 2.55 \\ 2.55 \end{pmatrix}, \mathbf{B} = \begin{pmatrix} 0 \\ 0 \end{pmatrix}, \mathbf{C} = \begin{pmatrix} 7 \\ 0 \end{pmatrix} \tag{2.0.17}$$

Now, $\triangle ABC$ can be plotted using vertices a ,b and c Plot of the angle $\triangle ABC$:

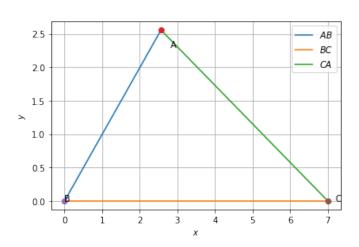


Fig. 2.1: △*ABC*