Assignment 1

Atla keerthana

Download all python codes from

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1 QUESTION No. 2.5

Draw a $\triangle ABC$ with side $a = 7$cm, $\angle B = 45°$, $\angle A = 105°$.

2 EXPLANATION

Given,

$$\angle A = 105°, \angle B = 45° \text{ and } a = 7 \tag{2.0.1}$$

we need to find
Let us assume that the vertices of the $\triangle ABC$ as:

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

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

$$\angle A + \angle B + \angle C = 180° \tag{2.0.3}$$
$$105° + 45° + \angle C = 180° \tag{2.0.4}$$
$$150° + \angle C = 180° \tag{2.0.5}$$
$$\angle C = 180° - 150° \tag{2.0.6}$$
$$\angle C = 30° \tag{2.0.7}$$

By law of sines

$$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c} \tag{2.0.8}$$
$$\frac{\sin 105°}{7} = \frac{\sin 45°}{b} = \frac{\sin 30°}{c} \tag{2.0.9}$$

we have:

$$\frac{\sin 105°}{7} = \frac{\sin 30°}{c} \tag{2.0.10}$$
$$c\sin 105° = 7\sin 30° \tag{2.0.11}$$
$$c = \frac{7\sin 30°}{\sin 105°} \tag{2.0.12}$$
$$c = 3.62 \tag{2.0.13}$$

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

$$\mathbf{A} = c\begin{pmatrix}\cos B \\ \sin B\end{pmatrix} \tag{2.0.14}$$
$$\mathbf{A} = 3.62\begin{pmatrix}\cos 45° \\ \sin 45°\end{pmatrix} \tag{2.0.15}$$
$$\mathbf{A} = \begin{pmatrix}2.55 \\ 2.55\end{pmatrix} \tag{2.0.16}$$

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

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

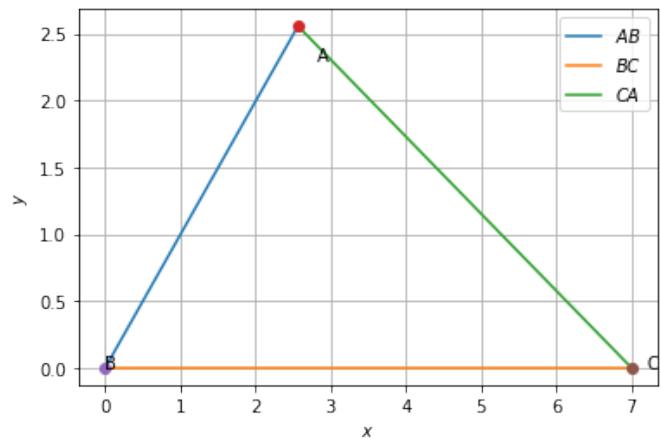Now,$\triangle ABC$ can be plotted using vertices a ,b and c
Plot of the angle $\triangle ABC$:

Fig. 2.1: $\triangle ABC$