3-3.3-5

AI24BTECH11003 - Vijaya Sreyas

Question:
Construct a $\triangle ABC$ in which $CA = 6cm$, $AB = 5cm$ and $BAC = 45°$.

Solution:

Information	Simplified Symbol	Value
CA	b	$6cm$
AB	c	$5cm$
BAC	A	$45°$

TABLE 0: Given Information

Using cosine formula in $\triangle ABC$,

$$a^2 = b^2 + c^2 - 2bc\cos A \tag{0.1}$$

$$\implies a^2 = 61 - 30\sqrt{2} \tag{0.2}$$

$$\tag{0.3}$$

The value of a is slightly difficult to work with. To overcome this complication, we can express the coordinates of $\triangle ABC$ as

$$\mathbf{A} = \mathbf{O}, \mathbf{B} = c\begin{pmatrix}\cos A\\ \sin A\end{pmatrix}, \mathbf{C} = \begin{pmatrix}b\\0\end{pmatrix} \tag{0.4}$$

$$\implies \mathbf{A} = \mathbf{O}, \mathbf{B} = \frac{5}{\sqrt{2}}\begin{pmatrix}1\\1\end{pmatrix}, \mathbf{C} = \begin{pmatrix}6\\0\end{pmatrix} \tag{0.5}$$

Using these values, we can now plot an example triangle with these sides on a graph.

Codes for plotting the triangle:

codes/triangle.c
codes/plot_triangle.py

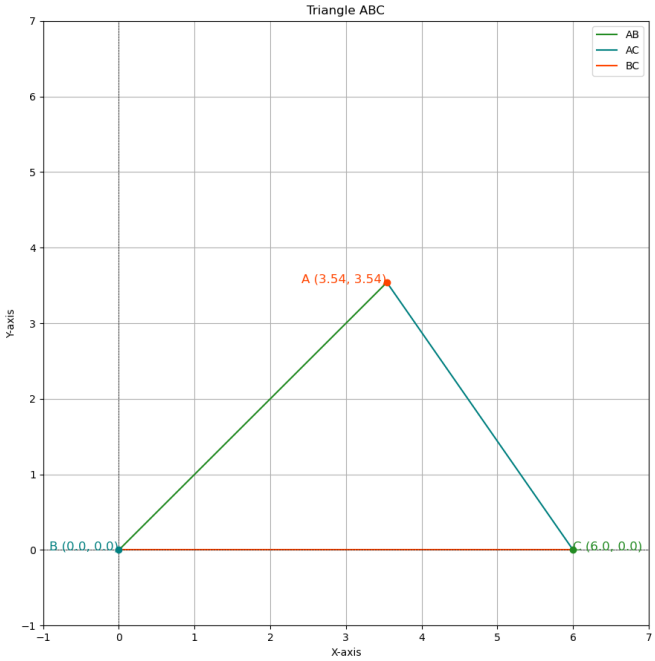

Fig. 0.1: Plot of the triangle