

3-3.2-26

AI24BTECH11006 - Bugada Roopansha

Question:

Construct a right triangle when one side is 3.5 cm, and the sum of the other side and the hypotenuse is 5.5 cm.

Solution

Segment	Norm	Angles
$\ AB\ $	3.5	θ_1
$\ BC\ $	Distance between B and C	θ_2
$\ AC\ $	Distance between C and A	θ_3

TABLE 0
INPUT PARAMETERS

$$\|AB\| = 3.5 \text{ cm}, \quad \|BC\| + \|AC\| = 5.5 \text{ cm}$$

$$\Rightarrow \|AC\| = \sqrt{\|AB\|^2 + \|BC\|^2}$$

$$\Rightarrow 5.5 - \|BC\| = \sqrt{(3.5)^2 + \|BC\|^2}$$

$$\Rightarrow (5.5 - \|BC\|)^2 = (3.5)^2 + \|BC\|^2$$

$$\Rightarrow 30.25 - 11\|BC\| + \|BC\|^2 = 12.25 + \|BC\|^2$$

$$\Rightarrow \|BC\| = \frac{18}{11} \approx 1.64 \text{ cm}$$

$$\Rightarrow \|AC\| = 5.5 - \|BC\| \approx 3.86 \text{ cm}$$

$$\mathbf{u} = \begin{bmatrix} 3.5 \\ 0 \end{bmatrix}, \quad \mathbf{c} = \begin{bmatrix} 3.5 \\ 1.64 \end{bmatrix}$$

$$\mathbf{u} \cdot \mathbf{c} = 3.5 \cdot 3.5 = 12.25$$

$$\|\mathbf{u}\| = 3.5, \quad \|\mathbf{c}\| = \sqrt{(3.5)^2 + (1.64)^2}$$

$$\cos(\theta) = \frac{12.25}{3.5 \cdot \sqrt{3.5^2 + 1.64^2}}$$

$$\theta = \arccos(\cos(\theta)) \approx 34.89^\circ$$

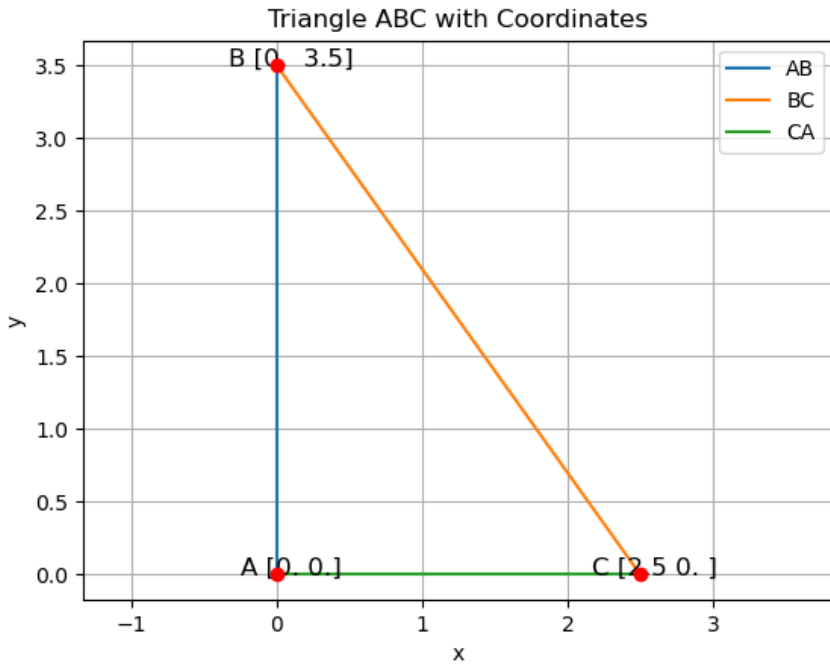


Fig. 0. Right triangle with one side of 3.5 cm and the sum of the other side and hypotenuse equal to 5.5 cm.