frame=single, breaklines=true, columns=fullflexible
remark
*Res
frame=single, breaklines=true, columns=fullflexible

3-3.2-26

AI24BTECH11006 - Bugada Roopansha

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

Segment	Norm
$\|\|AB\|\|$	3.5
$\|\|BC\|\|$	Distance between B and C
$\|\|AC\|\|$	Distance between C and A

TABLE 0
NORMS OF SEGMENTS $\|\|AB\|\|$, $\|\|BC\|\|$, AND $\|\|AC\|\|$

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

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

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

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

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

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

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

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

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

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

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

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

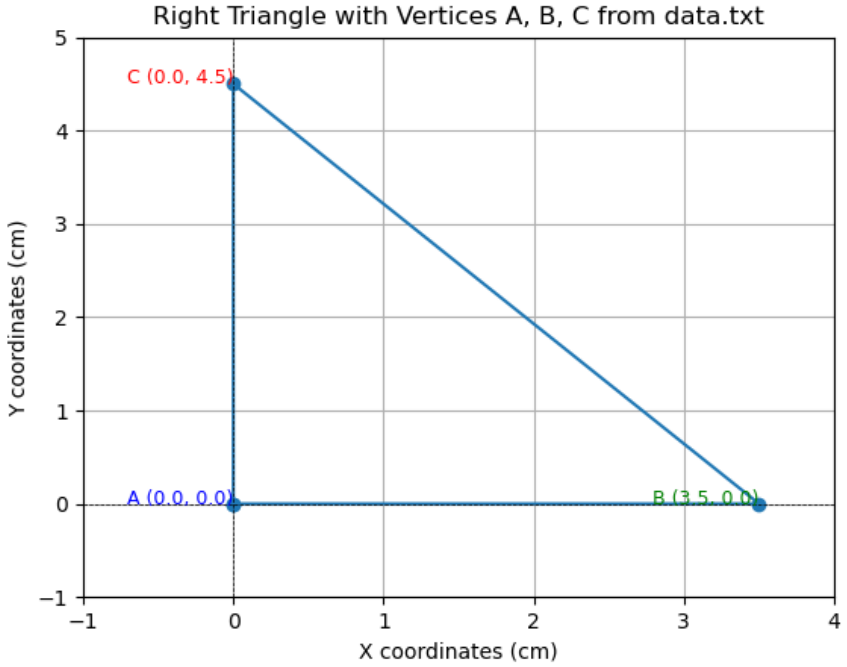

Fig. 0. Right triangle with one side of 3.5 cm and the sum of the other side and hypotenuse equal to 5.5 cm.