

Assignment 1

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Download all python codes from

<https://github.com/Sowmyabandi99/Assignment1/blob/main/assignment1.py>

and latex-tikz codes from

<https://github.com/Sowmyabandi99/Assignment1/blob/main/main.tex>

1 QUESTION No.2.7

In $\triangle ABC$, $a = 8$, $\angle B = 45^\circ$ and $c - b = 3.5$. Sketch $\triangle ABC$.

2 SOLUTION

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

$$\mathbf{A} = c \begin{pmatrix} \cos \theta \\ \sin \theta \end{pmatrix}, \mathbf{B} = \begin{pmatrix} 0 \\ 0 \end{pmatrix}, \mathbf{C} = \begin{pmatrix} a \\ 0 \end{pmatrix}, \quad (2.0.1)$$

From $\triangle ABC$, we use the law of cosines:

$$b^2 = a^2 + c^2 - 2ac \cos B \quad (2.0.2)$$

$$(c - 3.5)^2 = 8^2 + c^2 - 2(8)c \cos 45^\circ \quad (\because c - b = 3.5) \quad (2.0.3)$$

$$c^2 + 12.25 - 7c = 64 + c^2 - 11.31c \quad (2.0.4)$$

$$11.31c - 7c = 64 - 12.25 \quad (2.0.5)$$

$$4.31c = 51.75 \quad (2.0.6)$$

$$\Rightarrow c = 12 \quad (2.0.7)$$

So, the vertices of $\triangle ABC$ are

$$\mathbf{A} = 12 \begin{pmatrix} \cos 45^\circ \\ \sin 45^\circ \end{pmatrix} = \begin{pmatrix} 8.4 \\ 8.4 \end{pmatrix}, \mathbf{B} = \begin{pmatrix} 0 \\ 0 \end{pmatrix}, \mathbf{C} = \begin{pmatrix} 8 \\ 0 \end{pmatrix} \quad (2.0.8)$$

Plot of the $\triangle ABC$:

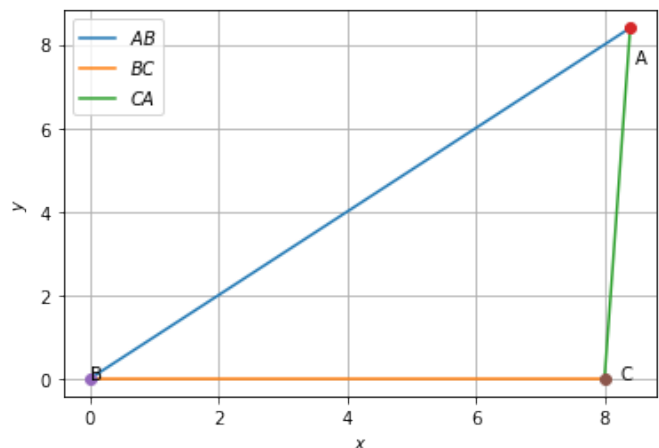


Fig. 2.1: $\triangle ABC$