Assignment 1

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1 QUESTION NO.2.7

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

2 SOLUTION

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

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

where

$$c = \sqrt{a^2 + b^2}, \theta = 45° \quad (2.0.2)$$

Therefore,

$$c^2 = a^2 + b^2 \quad (2.0.3)$$
$$c^2 = 8^2 + (c - 3.5)^2 \quad (\because c - b = 3.5) \quad (2.0.4)$$
$$c^2 = 64 + c^2 + 12.25 - 7c \quad (2.0.5)$$
$$76.25 - 7c = 0 \quad (2.0.6)$$
$$c = 10.89 \quad (2.0.7)$$

so,the vertices of $\triangle ABC$ are

$$\mathbf{A} = 10.89\begin{pmatrix} \cos 45 \\ \sin 45 \end{pmatrix} = \begin{pmatrix} 5.66 \\ 9.25 \end{pmatrix}, \mathbf{B} = \begin{pmatrix} 0 \\ 0 \end{pmatrix}, \mathbf{C} = \begin{pmatrix} 8 \\ 0 \end{pmatrix}$$
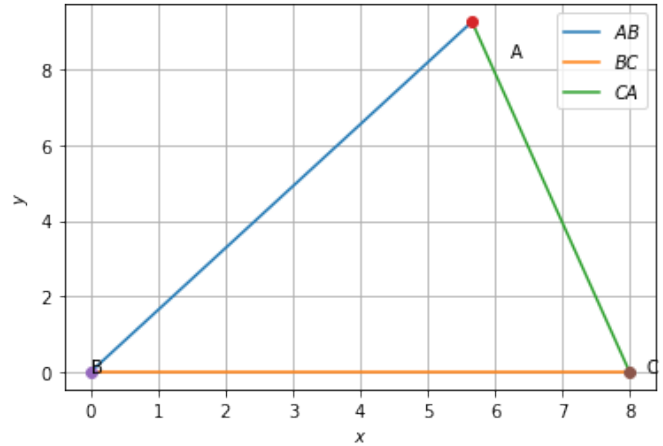$$(2.0.8)$$

Plot of the $\triangle ABC$:

Fig. 2.1: $\triangle ABC$