Assignment 1

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Download all python codes from

https://github.com/teja3657/Assignment1/tree/master/CODES

and latex-tikz codes from

https://github.com/teja3657/Assignment1/blob/master/Assignment1.tex

1 Question No.2.16

Construct an isosceles triangle in which the lengths of the equal sides is 6.5 and the angle between them is 110°.

2 SOLUTION

The vertices are:

$$\mathbf{A} = \begin{pmatrix} 0 \\ 0 \end{pmatrix}, \mathbf{C} = \begin{pmatrix} a \\ 0 \end{pmatrix}, \mathbf{B} = \begin{pmatrix} p \\ q \end{pmatrix} \tag{2.0.1}$$

In $\triangle ABC$,

$$\angle A + \angle B + \angle C = 180^{\circ} \quad (\because \angle B = \angle C) \tag{2.0.2}$$

$$\angle B = \angle C = 35^{\circ} \tag{2.0.3}$$

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

$$c^2 = a^2 + b^2 - 2ab\cos A \tag{2.0.4}$$

$$= 113.400 \tag{2.0.5}$$

$$c = 10.64 \tag{2.0.6}$$

The vertex B can be expressed in polar coordinate form as

$$\mathbf{B} = b\begin{pmatrix} \cos A \\ \sin A \end{pmatrix} \tag{2.0.7}$$

B can be expressed as

$$= 6.5\begin{pmatrix} cos110 \\ sin110 \end{pmatrix} \quad (\because b = 6.5) \tag{2.0.8}$$

$$= 6.5\begin{pmatrix} -0.34202 \\ 0.93969 \end{pmatrix} \tag{2.0.9}$$

$$= \begin{pmatrix} -2.22313 \\ 6.10798 \end{pmatrix} \tag{2.0.10}$$

So, the vertices of $\triangle ABC$ are

$$\mathbf{A} = \begin{pmatrix} 0 \\ 0 \end{pmatrix}, \mathbf{C} = \begin{pmatrix} 6.5 \\ 0 \end{pmatrix}, \mathbf{B} = \begin{pmatrix} -2.22313 \\ 6.10798 \end{pmatrix} \tag{2.0.11}$$

Plot of the Isosceles $\triangle ABC$:

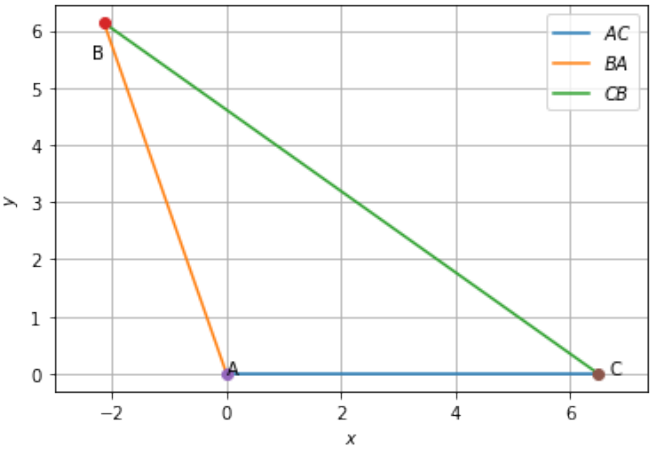

Fig. 2.1: Isosceles triangle $\triangle ABC$