3-3.3-8

EE24BTECH11062 - Homa Harshitha Vuddanti

Question:
Construct a triangle ABC with side $BC = 7cm, \angle B = 45°, \angle A = 105°$.
Solution:
Given,

Variable	Description
a	$7cm$
$\angle B$	$45°$
$\angle A$	$105°$

TABLE 0: Given variables

By angle sum property,

$$\angle A + \angle B + \angle C = 180° \tag{0.1}$$
$$\angle C = 180° - (45° + 105°) \tag{0.2}$$
$$\angle C = 30° \tag{0.3}$$

Using Sine formula, in $\triangle ABC$,

$$\frac{a}{sinA} = \frac{b}{sinB} = \frac{c}{sinC} \tag{0.4}$$

$$b = \frac{sinB}{sinA}a \tag{0.5}$$
$$b = \frac{sin\frac{\pi}{4}}{sin\frac{7\pi}{12}}7cm \tag{0.6}$$
$$b = \frac{14}{\sqrt{3}+1} \tag{0.7}$$
$$c = \frac{sinC}{sinA}a \tag{0.8}$$
$$c = \frac{sin\frac{\pi}{6}}{sin\frac{7\pi}{12}}7cm \tag{0.9}$$
$$c = \frac{14}{\sqrt{2}\left(\sqrt{3}+1\right)} \tag{0.10}$$

From equations (0.7), (0.10) and (3.1.1.3),

$$\mathbf{A} = c\begin{pmatrix} cosB \\ sinB \end{pmatrix} = \frac{14}{\sqrt{2}\left(\sqrt{3}+1\right)}\begin{pmatrix} cos\frac{\pi}{4} \\ sin\frac{\pi}{4} \end{pmatrix} \tag{0.11}$$

$$\mathbf{B} = 0 \tag{0.12}$$

$$\mathbf{C} = \begin{pmatrix} a \\ 0 \end{pmatrix} = \begin{pmatrix} 7 \\ 0 \end{pmatrix} \tag{0.13}$$

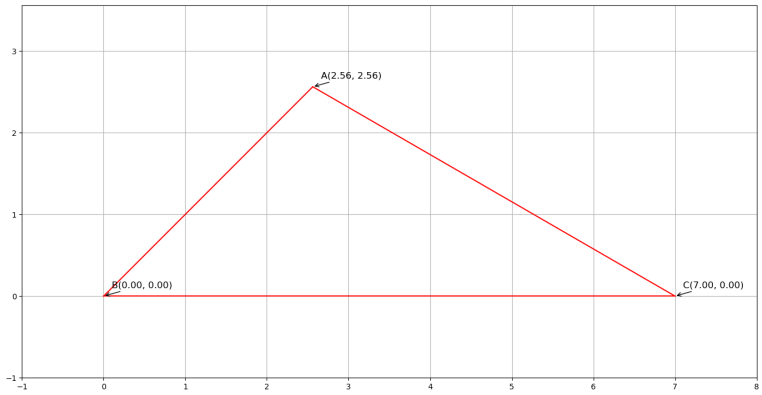

Fig. 0.1: Plot