3-3-9

AI24BTECH11008- Sarvajith

Question:
Draw an isosceles triangle ABC in which BC = 5.5cm and altitude AL = 5.3cm.
Solution:
The vertices of the above triangle are given by:

lengths	values
BC	5.5cm
AL	5.3cm

TABLE 1 0: values of lengths of triangle

$$\mathbf{A} = c\begin{pmatrix}\cos B\\ \sin B\end{pmatrix} \tag{0.1}$$

$$\mathbf{B} = \begin{pmatrix}0\\0\end{pmatrix} \tag{0.2}$$

$$\mathbf{C} = \begin{pmatrix}a\\0\end{pmatrix} \tag{0.3}$$

Where a,b,c are BC,AB,AC respectively and B is the angle formed by the side AB and BC.
AL bisects BC, then 2 right angled triangle ALB and ALC are formed.
As triangle ABL is a right angled triangle, and K is sum of b and c, B is given by

$$\tan B = \frac{5.3}{2.75}$$
$$\cos B = \frac{1}{\sqrt{1+\tan B^2}}$$
$$\cos B = 0.46$$
$$\sin B = 0.87$$
$$c = \frac{K^2 - a^2}{2\left(K - a\cos B\right)}$$

($K = 2c$) substituting all the values in c and solving them gives

$$c = 5.97 \tag{0.4}$$

substituting the above values in 0.1,0.3 gives the coordinates as

$$\mathbf{A} = \begin{pmatrix} 2.75 \\ 5.3 \end{pmatrix}$$

$$\mathbf{B} = \begin{pmatrix} 0 \\ 0 \end{pmatrix}$$

$$\mathbf{C} = \begin{pmatrix} 5.5 \\ 0 \end{pmatrix}$$

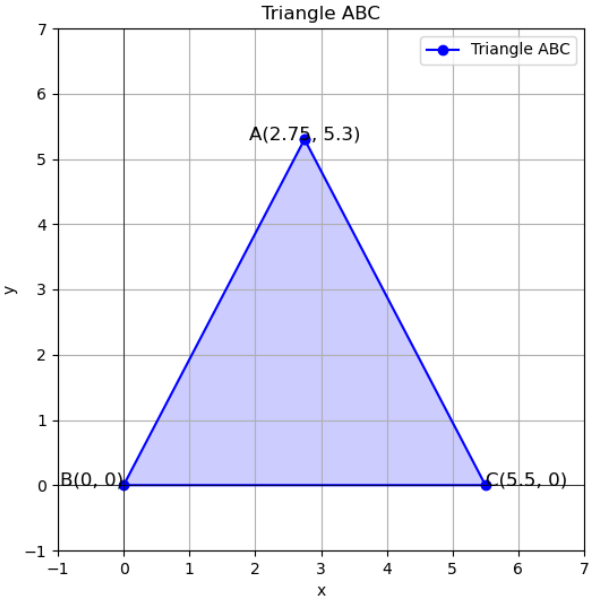

Fig. 0.1: plot for isosceles triangle