Assignment-1

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Download all python codes from

https://github.com/G.Soujanya/AssignmentT−1/tree/main/Assignment%201/CODES

and latex-tikz codes from

https://github.com/G.Soujanya/Assignment−1/tree/main/Assignment%201

1 QUESTION NO-2.13

Construct $\triangle ABC$ such that AB=2.5, BC=6, and AC=6.5.Find$\angle B$

2 SOLUTION

Let assume, AB=c, BC=a, AC=b

Let

$$\mathbf{A} = \begin{pmatrix} 6.5 \\ 2.5 \end{pmatrix}, \mathbf{B} = \begin{pmatrix} 2.5 \\ 6 \end{pmatrix}, \mathbf{C} = \begin{pmatrix} 6 \\ 6.5 \end{pmatrix} \tag{2.0.1}$$

Now,

$$\|\mathbf{A} - \mathbf{B}\|^2 = \|\mathbf{A}\|^2 = c^2 = (2.5)^2 = 6.25 \tag{2.0.2}$$

$$\|\mathbf{B} - \mathbf{C}\|^2 = \|\mathbf{C}\|^2 = a^2 = (6)^2 = 36 \tag{2.0.3}$$

$$\|\mathbf{A} - \mathbf{C}\|^2 = b^2 = (6.5)^2 = 42.25 \tag{2.0.4}$$

From $\triangle ABC$, we use the Law of cosine:

$$b^2 = a^2 + c^2 - 2accosB \tag{2.0.5}$$

$$(6.5)^2 = 6^2 + (2.5)^2 - 2 * 6 * 2.5cosB \tag{2.0.6}$$

$$(42.25) = 36 + 6.25 - 32.5 * cosB \tag{2.0.7}$$

$$42.25 - 36 - 6.25 = 32.5 * cosB \tag{2.0.8}$$

$$0 = 32.5 * cosB \tag{2.0.9}$$

$$cosB = o \tag{2.0.10}$$

$$B = 90 \tag{2.0.11}$$

As we consider$\triangle ABC$ in first quadrant we consider angle B

$$\therefore angleB = 90 \tag{2.0.12}$$

Now, Vertices of given $\triangle ABC$ can be written as,

$$\mathbf{A} = \begin{pmatrix} 6.5 \\ 2.5 \end{pmatrix}, \mathbf{B} = \begin{pmatrix} 2.5 \\ 6 \end{pmatrix}, \mathbf{C} = \begin{pmatrix} 6 \\ 6.5 \end{pmatrix} \tag{2.0.13}$$

Now, $\triangle ABC$ can be plotted using vertices AB ,BC and AC .

Plot of $\triangle ABC$:

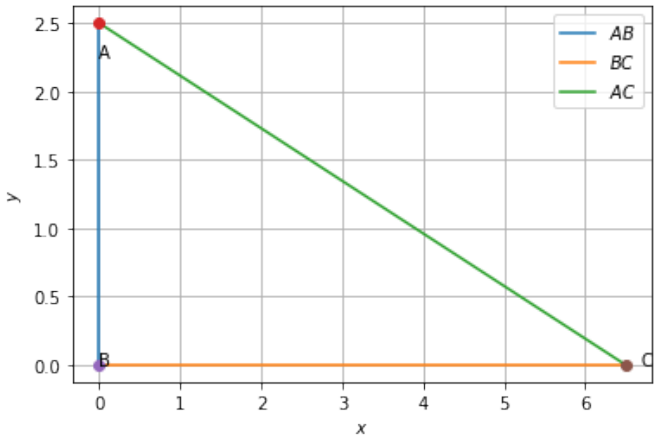

Fig. 2.1: $\triangle ABC$