

Assignment 1

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Download all python codes from

<https://github.com/Y.kavya/Matrix-Theory/tree/main/Assignment1/Codes>

and latex-tikz codes from

<https://github.com/Y.kavya/Matrix-Theory/tree/main/Assignment1>

We know that,

$$\sin A = \sqrt{1 - \cos^2 A} \quad (2.0.12)$$

$$\sin A = \sqrt{1 - (0.578703704)^2} \quad (2.0.13)$$

$$\sin A = 0.665102023 \quad (2.0.14)$$

C can be expressed as

$$\mathbf{C} = b \begin{pmatrix} \cos A \\ \sin A \end{pmatrix} \quad (2.0.15)$$

$$\mathbf{C} = \begin{pmatrix} 3.47222222 \\ 3.99061214 \end{pmatrix} \quad (2.0.16)$$

1 QUESTION NO. 2.10

Construct $\triangle ABC$ where $AB = 4.5$, $BC = 5$ and $CA = 6$

2 EXPLANATION

Let us assume that:

$$\mathbf{A} = \begin{pmatrix} 0 \\ 0 \end{pmatrix}, \mathbf{B} = \begin{pmatrix} c \\ 0 \end{pmatrix}, \mathbf{C} = \begin{pmatrix} p \\ q \end{pmatrix} \quad (2.0.1)$$

Then

$$AB = \|\mathbf{B} - \mathbf{A}\|^2 = \|\mathbf{B}\|^2 = c^2 \quad \because \mathbf{A} = \mathbf{0} \quad (2.0.2)$$

$$BC = \|\mathbf{B} - \mathbf{C}\|^2 = a^2 \quad (2.0.3)$$

$$AC = \|\mathbf{C} - \mathbf{A}\|^2 = \|\mathbf{C}\|^2 = b^2 \quad (2.0.4)$$

The vertex C can be expressed in polar coordinate form as

$$\mathbf{C} = b \begin{pmatrix} \cos A \\ \sin A \end{pmatrix} \quad (2.0.5)$$

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

$$a^2 = b^2 + c^2 - 2bc \cos A \quad (2.0.6)$$

$$\cos A = \frac{b^2 + c^2 - a^2}{2bc} \quad (2.0.7)$$

$$\cos A = \frac{31.25}{54} \quad (2.0.8)$$

$$\cos A = 0.578703704 \quad (2.0.9)$$

$$\angle A = \arccos(0.578703704) \quad (2.0.10)$$

$$\angle A = 54.6405804 \quad (2.0.11)$$

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

$$\mathbf{C} = \begin{pmatrix} p \\ q \end{pmatrix} = \begin{pmatrix} 3.47222222 \\ 3.99061214 \end{pmatrix}, \mathbf{A} = \begin{pmatrix} 0 \\ 0 \end{pmatrix}, \mathbf{B} = \begin{pmatrix} c \\ 0 \end{pmatrix} = \begin{pmatrix} 4.5 \\ 0 \end{pmatrix} \quad (2.0.17)$$

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

Plot of the $\triangle ABC$:

