

Assignment 1

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Download all python and latex codes from

<https://github.com/abhiroopchintalapudi03/EE3900.git>

As

$$\|\mathbf{A} - \mathbf{B}\|^2 = \|\mathbf{B} - \mathbf{C}\|^2 = 37 \quad (2.0.12)$$

(From (2.0.7) and (2.0.9))

\Rightarrow In $\triangle ABC$ sides AB, BC are equal.

$\Rightarrow \triangle ABC$ is an isosceles triangle.

1 PROBLEM 2.5

Check whether

$$\mathbf{A} = \begin{pmatrix} 5 \\ -2 \end{pmatrix}, \mathbf{B} = \begin{pmatrix} 6 \\ 4 \end{pmatrix}, \mathbf{C} = \begin{pmatrix} 7 \\ -2 \end{pmatrix} \quad (1.0.1)$$

are the vertices of an isosceles triangle.

2 SOLUTION

Let,

$$\mathbf{A} = \begin{pmatrix} 5 \\ -2 \end{pmatrix}, \mathbf{B} = \begin{pmatrix} 6 \\ 4 \end{pmatrix}, \mathbf{C} = \begin{pmatrix} 7 \\ -2 \end{pmatrix} \quad (2.0.1)$$

For the triangle to be isosceles triangle, one of

$$\|\mathbf{A} - \mathbf{B}\| = \|\mathbf{B} - \mathbf{C}\| \quad (2.0.2)$$

$$\text{or } \|\mathbf{A} - \mathbf{B}\| = \|\mathbf{B} - \mathbf{C}\| \quad (2.0.3)$$

$$\text{or } \|\mathbf{B} - \mathbf{C}\| = \|\mathbf{C} - \mathbf{A}\| \quad (2.0.4)$$

$$\text{or } \|\mathbf{C} - \mathbf{A}\| = \|\mathbf{A} - \mathbf{B}\| \quad (2.0.5)$$

Now,

$$\mathbf{A} - \mathbf{B} = \begin{pmatrix} 5 - 6 \\ (-2) - 4 \end{pmatrix} = \begin{pmatrix} -1 \\ -6 \end{pmatrix} \quad (2.0.6)$$

$$\Rightarrow \|\mathbf{A} - \mathbf{B}\|^2 = (-1)^2 + (-6)^2 = 37 \quad (2.0.7)$$

$$\mathbf{B} - \mathbf{C} = \begin{pmatrix} 6 - 7 \\ 4 - (-2) \end{pmatrix} = \begin{pmatrix} -1 \\ 6 \end{pmatrix} \quad (2.0.8)$$

$$\Rightarrow \|\mathbf{B} - \mathbf{C}\|^2 = (-1)^2 + 6^2 = 37 \quad (2.0.9)$$

$$\mathbf{C} - \mathbf{A} = \begin{pmatrix} 7 - 5 \\ (-2) - (-2) \end{pmatrix} = \begin{pmatrix} 2 \\ 0 \end{pmatrix} \quad (2.0.10)$$

$$\Rightarrow \|\mathbf{C} - \mathbf{A}\|^2 = 2^2 = 4 \quad (2.0.11)$$

You can also see from the below diagram that the triangle is an isosceles triangle with sides AB, BC equal.

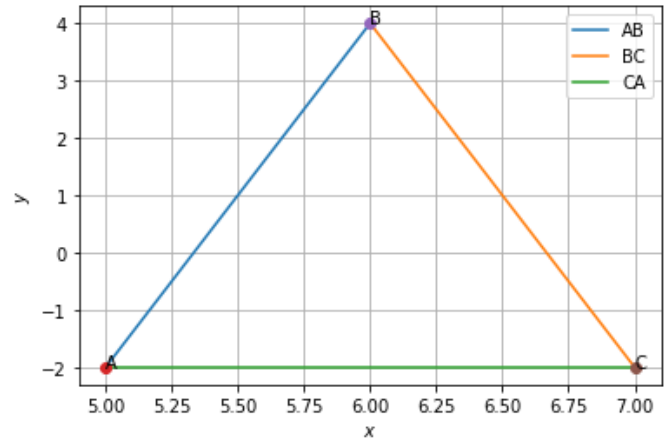


Fig. 0: $\triangle ABC$