

Assignment 3

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Download the python code, latex file and the pdf doc from

<https://github.com/Rishab9991/EE5609/tree/master/Assignments/Assignment3>

Solution:

Consider Fig. 0

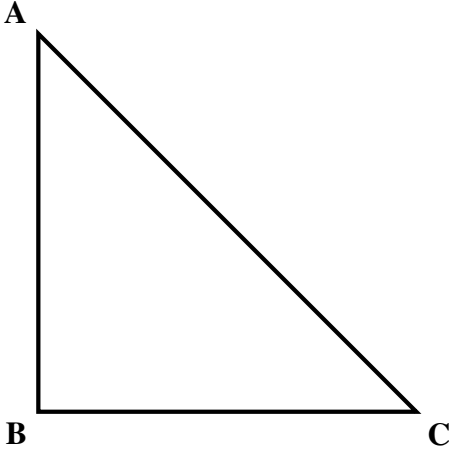


Fig. 0: Right Triangle

The sides AB, BC and AC of the triangle will be represented as direction vectors \mathbf{m}_{AB} , \mathbf{m}_{BC} and \mathbf{m}_{AC} which are obtained from Vectors \mathbf{A} , \mathbf{B} and \mathbf{C} which belong in the \mathbb{R}^2 space.

$$\mathbf{m}_{AB} = \mathbf{A} - \mathbf{B} \quad (1)$$

$$\mathbf{m}_{BC} = \mathbf{B} - \mathbf{C} \quad (2)$$

$$\mathbf{m}_{AC} = \mathbf{A} - \mathbf{C} \quad (3)$$

The sum of all angles in a triangle is 180° and since, $\angle ABC = 90^\circ$

$$\implies \angle BAC < \angle ABC \quad (4)$$

$$\implies \|\mathbf{B} - \mathbf{C}\| < \|\mathbf{A} - \mathbf{C}\| \quad (5)$$

$$\text{Also } \angle BCA < \angle ABC \implies \|\mathbf{A} - \mathbf{B}\| < \|\mathbf{A} - \mathbf{C}\| \quad (6)$$

Where $\|\mathbf{A} - \mathbf{B}\|$, $\|\mathbf{B} - \mathbf{C}\|$ and $\|\mathbf{A} - \mathbf{C}\|$ are magnitudes of sides AB, BC and AC.

Since both magnitudes of sides AB and BC are both less than magnitude of AC means that the hypotenuse (AC) is the largest side in a right triangle.

Hence Proved.