

Challenge Problem

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Abstract—This document solves the isosceles triangle problem.

Download all the codes from

https://github.com/Vaibhav11002/EE5609/tree/master/Assignment_4

1 PROBLEM

Prove that sides opposite to equal angles of a triangle are equal.

2 SOLUTION

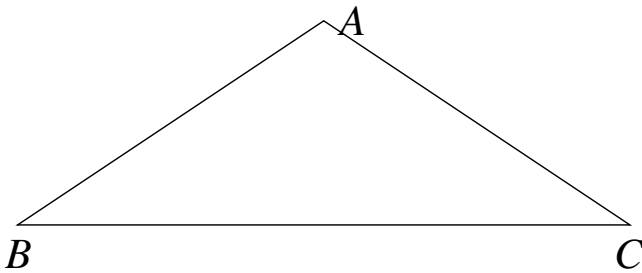


Fig. 2: Triangle

Let's assume the direction vector of side $AB=\mathbf{a}$, $BC=\mathbf{b}$ and $AC=\mathbf{c}$. In the above triangle we are assuming $\angle ACB = \angle ABC = \theta$. Now to prove that side AB and AC are equal:-

$$\mathbf{ab} = \|\mathbf{a}\| \|\mathbf{b}\| \cos \theta$$

(Dot Product of side AB with respect to base)
(2.0.1)

$$\mathbf{cb} = \|\mathbf{c}\| \|\mathbf{b}\| \cos \theta$$

(Dot Product of side AC with respect to base)
(2.0.2)

For the RHS of two side to be equal $\|\mathbf{a}\|$ should be equal to $\|\mathbf{c}\|$ and hence we can say that sides opposite to equal angle are equal.