

# Assignment 4

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**Abstract**—This document solves the isosceles triangle problem.

Download all latex-tikz codes from

[https://github.com/Vaibhav11002/EE5609/tree/master/Assignment\\_4](https://github.com/Vaibhav11002/EE5609/tree/master/Assignment_4)

## 1 PROBLEM

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

## 2 CONGRUENT TRIANGLES

When two triangles are congruent they will have exactly the same three sides and exactly the same three angles. The one triangle may be a mirror image of the other triangle.

## 3 SOLUTION

Let's consider  $\triangle ABC$  where  $\angle ABC = \angle ACB$ . To solve the problem, let's draw an angle bisector through the  $\angle BAC$  which meets the side  $BC$  at point  $D$ .

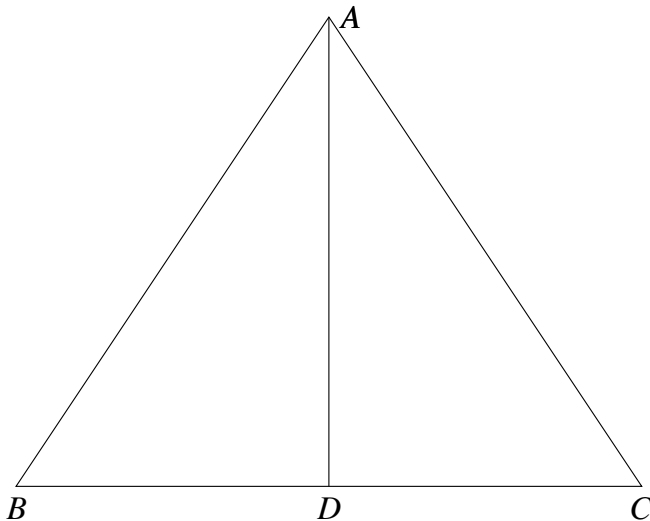


Fig. 2: Triangle by Latex-Tikz

Thus,

$$\angle BAD = \angle CAD = \frac{1}{2} \angle BAC \quad (3.0.1)$$

Now consider the two triangles,  $\triangle ABD$  and  $\triangle ACD$ . We have,

$$\angle ABD = \angle ACD \quad (3.0.2)$$

$$\angle BAD = \angle CAD \quad (3.0.3)$$

$$AD = AD \quad (3.0.4)$$

So by AAS side rule for congruency,

$$\triangle ABD \cong \triangle ACD \quad (3.0.5)$$

Thus by the property of congruent triangles,

$$AB = AC \quad (3.0.6)$$

Hence proved.