

# Assignment 4

Sairam V C Rebbapragada

**Abstract**—This document uses the concepts of Similar triangles in proving a statement.

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[https://github.com/Sairam13001/AI5006/blob/master/Assignment\\_4/assignment\\_4.py](https://github.com/Sairam13001/AI5006/blob/master/Assignment_4/assignment_4.py)

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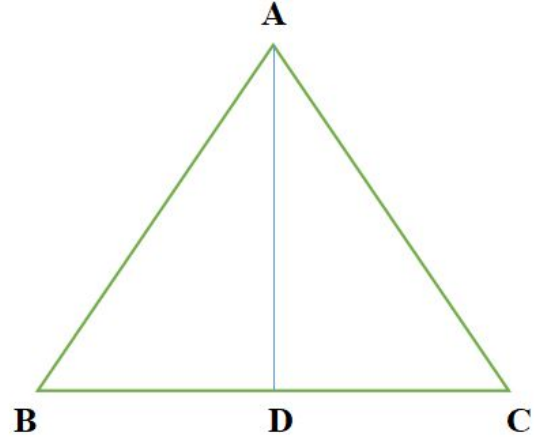


Fig. 0: Construction

## 1 PROBLEM

$D$  is a point on side  $BC$  of a  $\triangle ABC$  such that  $\frac{BD}{CD} = \frac{AB}{AC}$ . Prove that  $AD$  is the bisector of  $\angle BAC$

## 2 EXPLANATION

**SSS PROPERTY** : Two triangles are similar if their corresponding sides are in proportion. For example two triangles  $\triangle ABC$  and  $\triangle XYZ$  can be said to be similar if :

$$\frac{\|A - B\|}{\|X - Y\|} = \frac{\|B - C\|}{\|Y - Z\|} = \frac{\|A - C\|}{\|X - Z\|} \quad (2.0.1)$$

If two triangles are similar, then corresponding angles are equal.

Hence it is proved that  $AD$  is the bisector of  $\angle BAC$

## 3 SOLUTION

Given that :

$$\frac{\|B - D\|}{\|C - D\|} = \frac{\|A - B\|}{\|A - C\|} \quad (3.0.1)$$

In triangles  $\triangle ABD$  and  $\triangle ACD$ ,

$$\frac{\|A - B\|}{\|A - C\|} = \frac{\|B - D\|}{\|C - D\|} = \frac{\|A - D\|}{\|A - D\|} \quad (3.0.2)$$

From SSS property we can see that these two triangles are similar. So, the corresponding angles are equal. Thus, we can say that :

$$\angle DAB = \angle DAC \quad (3.0.3)$$