

Assignment 4

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Abstract—This document uses the concepts of Intercept theorem, Isosceles triangle in proving a statement.

Download Python code from

https://github.com/Sairam13001/AI5006/blob/master/Assignment_4/assignment_4.py

Download latex-tikz codes from

https://github.com/Sairam13001/AI5006/blob/master/Assignment_4/assignment_4.tex

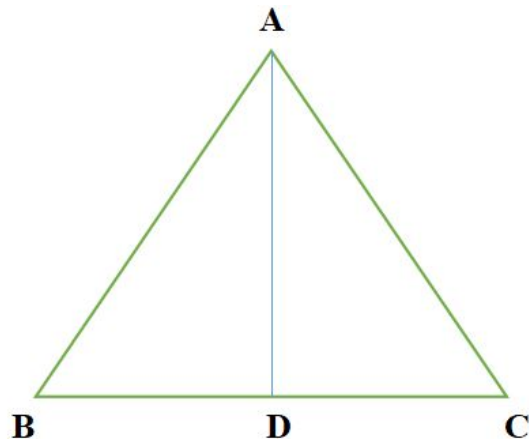


Fig. 0: Construction

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 :

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