

Assignment 4

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Abstract—This document solves a question based on triangle.

All the codes for the figure in this document can be found at

https://github.com/neharani289/EE14014/tree/master/Assignment_4

By, ASA property $\triangle BAD \cong \triangle CAD$, hence triangles are congruent.

Now by using CSCT property;

$$\mathbf{AB} = \mathbf{AC} \quad (2.0.6)$$

By converse of isosceles triangle theorem $\triangle ABC$ is isosceles.

Hence proved.

1 PROBLEM

In $\triangle ABC$, the bisector \mathbf{AD} of $\angle A$ is \perp to side \mathbf{BC} . Show that $\mathbf{AB} = \mathbf{AC}$ and $\triangle ABC$ is isosceles.

2 SOLUTION

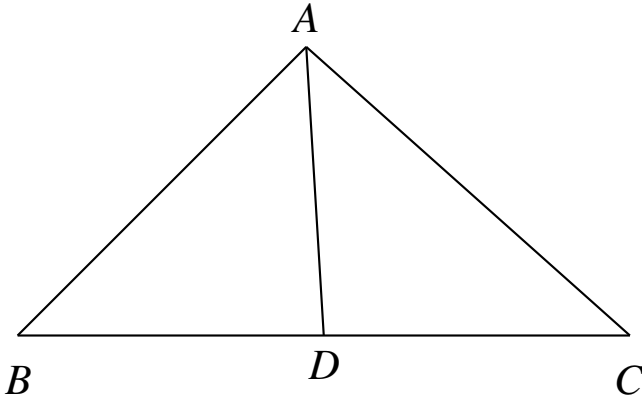


Fig. 1: Isosceles Triangle with $\mathbf{AD} \perp \mathbf{BC}$

Since line \mathbf{BC} is perpendicular to line \mathbf{AD} the inner product is zero.

$$(\mathbf{B} - \mathbf{D})^T(\mathbf{A} - \mathbf{D}) = (\mathbf{D} - \mathbf{A})^T(\mathbf{B} - \mathbf{D}) = 0 \quad (2.0.1)$$

and

$$\|\mathbf{B} - \mathbf{D}\| = \|\mathbf{D} - \mathbf{C}\| \quad (2.0.2)$$

In $\triangle BAD$ and $\triangle CAD$

$$\angle BAD = \angle CAD \quad (2.0.3)$$

$$\angle ADB = \angle ADC = 90^\circ \quad (2.0.4)$$

$$\implies AD = AD \quad (2.0.5)$$