Some notes from class

2018-02-02

Theorems we know

Theorem

Suppose a line ℓ intersects $\triangle PQR$ at a point S such that $P - S - Q$. Then ℓ intersects $\overline{PR}$ or $\overline{RQ}$.

Theorem (Crossbar Theorem)

If X is a point in the interior of $\triangle ABC$, then $\overrightarrow{AX}$ intersects $\overline{BC}$ in a point Y such that $B - Y - C$.

Theorem (Isosceles Triangle Theorem)

If two sides of a triangle are congruent, then the angles opposite those sides are congruent.

Alternative Proof. Let $\triangle ABC$ be isosceles, with $AB = AC$. Draw the angle bisector of $\angle A$, and let D be the point where it meets side $\overline{BC}$. Then by SAS $\triangle BAD \cong \triangle CAD$.

Perpendicular bisectors

Theorem (Perpendicular Bisector Theorem)

A point is on the perpendicular bisector of a line segment if and only if it is equidistant from the endpoints of the line segment.

Proof. Let A and B be distinct points.

We first prove that if a point P is on the perpendicular bisector of $\overline{AB}$, then $PA = PB$.

We next show that if a point P satisfies $PA = PB$, then P is on the perpendicular bisector of $\overline{AB}$.

Exterior angles

Def. An exterior angle of a triangle is an angle that is both adjacent and supplementary to an angle in the triangle.

Theorem (Exterior Angle Theorem)

The measure of an exterior angle of a triangle is greater than or equal to the measure of each non-adjacent interior angle of the triangle.

Proof.

ASA (beginning of Section 3.3)

Theorem (ASA)

If the angles of two triangles are in one-to-one correspondence in such a way that two angles and the included side of one triangle are congruent to two angles and the included side of the other triangle, then the two triangles are congruent.

Proof.

AAS

Theorem (AAA)

If the angles of two triangles are in one-to-one correspondence in such a way that two angles and a non-included side of one triangle are congruent to the respective parts of the other triangle, then the two triangles are congruent.

Proof.