Some notes from class

2018-02-09

Recent Theorems

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.

Theorem (ASA)

Blah, blah, blah...

Theorem (AAS)

Blah, blah, blah...

Theorem (Scalene Inequality)

Suppose A, B, and C are non-collinear. Then $BA > BC$ if and only if $m(\angle C) > m(\angle A)$.

Triangle Inequality

Theorem (Triangle Inequality)

Let A, B, and C be non-collinear points. Then $AB + BC > AC$.

Proof. Let D be the point on $\overleftrightarrow{CB}$ with $C - B - D$ and $BD = BA$. Since $\triangle ABD$ is isosceles with $BA = BD$, it is sufficient to show that $DC > AC$.

Hinge Theorem

Theorem (Hinge Theorem)

Let $\triangle ABC$ and $\triangle DEF$ be triangles, and suppose that $AB = DE$, $AC = DF$, and $m(\angle A) > m(\angle D)$. Then $BC > EF$.

Proof.

Some definitions

Definition:

If ℓ and m are lines, then a *transversal* for ℓ and m is a line that intersects both ℓ and m.

Definition:

Suppose ℓ and m are lines and t is a transversal that intersects ℓ at point P and m at point Q. If R is a point on ℓ with $R \neq P$ and S is a point on m with $S \neq Q$ such that R and S are on opposite sides of t, then we say that $\angle QPR$ and $\angle PQS$ are called *alternate interior angles*.

Alternate Interior Angle Theorem

Theorem (Alternate Interior Angle Theorem)

If two lines are intersected by a transversal forming a pair of congruent alternate interior angles, then the lines are parallel.

Proof.

Euclid's 5th Postulate

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Suppose that two lines are intersected by a transversal in such a way that the sum of the measures of two interior angles on the same side of the transversal is less than $180°$. Then the two lines intersect on that side of the transversal.

Playfair's Postulate

If ℓ is a line and P is a point not on ℓ, then there is at most one line on P that is parallel to ℓ.