Euclidean Planes

Recall that an incidence geometry is called *euclidean* if, given any line ℓ and any point p not on ℓ, there is exactly one line passing through p which is parallel to ℓ. So far we have avoided using any assumptions about the uniqueness of parallel lines, and have been able to prove a good number of interesting results. We will now specialize to the Euclidean case for a while.

Proposition 1 (Converse of the Alternate Interior Angles Theorem)**.** *In a Euclidean plane geometry, if two parallel lines are cut by a transversal, then alternate interior angles formed by the cut are congruent.*

Proof. (copy angle, use AIA, use uniqueness.) $\square$