

Mathematics 2260H – Geometry I: Euclidean geometry

TRENT UNIVERSITY, Fall 2018

Assignment #3

Congruence Criteria

Due on Friday, 28 September.

We have proved the side-angle-side (SAS) congruence criterion in class (Euclid's Proposition I-4), as well as the side-side-side (SSS) congruence criterion (Euclid's Proposition I-8).

1. Prove the angle-side-angle (ASA) congruence criterion: if $\angle ABC = \angle DEF$, $|BC| = |EF|$, and $\angle ACB = \angle DFE$, then $\triangle ABC \cong \triangle DEF$. (You may use our extended system of Postulates and Propositions I-1 through I-15.) [5]

It turns out that the angle-angle-side (AAS) congruence criterion also works, though we'll save that for another day. In the meantime:

2. Does the the angle-side-side (ASS) congruence criterion work? That is, is it true that if $\angle ABC = \angle DEF$, $\angle BCA = \angle EFD$, and $|CA| = |FD|$, then we must have $\triangle ABC \cong \triangle DEF$? Prove it that it works, using whatever method you like, or else give a counterexample and determine under what conditions, if any, the criterion does work. [5]