MAT515 Homework 4

Due Wednesday, September 30

1. Prove the SAS congruence theorem: Assume $\triangle ABC$ and $\triangle A'B'C'$ satisfy

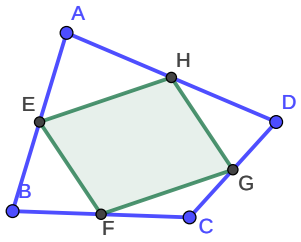
$$\measuredangle A = \measuredangle A', \qquad |AB| = |A'B'|, \quad \text{and} \quad |AC| = |A'C'|.$$

Then $\triangle ABC \cong \triangle A'B'C'$. The method is similar to the proof of ASA, and is illustrated in this youtube video.

2. Prove that any two circles with the same radius are congruent. While this is "obvious", it needs a careful proof.

3. Let $ABCD$ be any quadrilateral (it needn't be convex). Prove that the quadrilateral $EFGH$ obtained by joining the midpoints of adjacent sides of $\square ABCD$ is always a parallelogram.

You might find the Geogebra construction at right helpful.



4. Prove that Theorem G11(FTS*) of the text implies the Fundamental Theorem of Similarity. That is, assuming Axioms (L1)-(L8) and Theorems G1–G9 as well as Theorem G11, show that FTS holds.

Note that we did the converse (FTS $\implies$ G11) in class.