Spring 2009 **Exam 3** **Math** 300

April 16

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Name

Directions: Only write on one side of each page.

Do any (5) of the following

1. Using any previous results, prove Proposition 4.1 (SAA) in neutral geometry. Specifically, Given $AC \cong DF$, $\measuredangle A \cong \measuredangle D$, and $\measuredangle B \cong \measuredangle E$. Then $\triangle ABC \cong \triangle DEF$.

2. Using any previous results, prove the following half of Proposition 4.10.

   (If $k \parallel l$, $m \perp k$, and $n \perp l$, then either $m = n$ or $m \parallel n$.) implies Hilbert's Euclidean parallel postulate.

3. Prove

   (a) Every acute angle has a complementary angle.

   (b) If the complements of two acute angles are congruent then the acute angles are congruent.

4. A scalene triangle is defined to be any triangle that is not isosceles. Using any results through the end of Chapter 4, prove that in any Hilbert plane there is a triangle that is scalene.

5. Here is a statement S_p: Given lines l, m, n.If $l \parallel m$ and $m \parallel n$, then $l \parallel n$.

   Using any results through Chapter 4, prove S_p holds if and only if Hilbert's Euclidean parallel postulate holds.

6. Using any result through the Chapter 4, prove the following.

   If $\square\, \mathbf{A}BCD$ is a convex quadrilateral and l is any line other than $\overleftrightarrow{AB}$ intersecting segment AB in a point between A and B, then l also intersects at least one of BC, CD, AD.