Spring 2009 **Exam 2** **Math** 300

March 12

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Name

Directions: Only write on one side of each page.

Do any (5) of the following

1. Using any results up to and including Proposition 3.20, prove the following. (This is Exercise 30.)

   Given $\measuredangle ABC \cong \measuredangle DEF$ and $\overrightarrow{BG}$ between $\overrightarrow{BA}$ and $\overrightarrow{BC}$. Prove that there is a unique ray $\overrightarrow{EH}$ between $\overrightarrow{ED}$ and $\overrightarrow{EF}$ such that $\measuredangle ABG \cong \measuredangle DEH$. [Note: This is the result for angles dual to the corresponding Proposition 3.12 for segments.]

2. Using any previous results prove Proposition 3.21 (d). If $\measuredangle P < \measuredangle Q$ and $\measuredangle Q < \measuredangle R$, then $\measuredangle P < \measuredangle R$. [Previous results include Exercise 30 above.]

3. Using any results through Proposition 3.8 prove the following.

   If point D is interior to angle $\measuredangle CAB$ then points C and B are on opposite sides of line $\overleftrightarrow{AD}$.

4. Using any result through Proposition 3.23 prove the following.

   Any angle supplementary to an obtuse angle is an acute angle.

5. Using any results through Proposition 3.23 prove that there cannot be two midpoints of a segment. (The definition of midpoint of a segment is on the blackboard.)

   Specifically, prove that the supposition of two distinct midpoints M_1 and M_2 of segment AB leads to a contradiction. Without loss of generality, assume that M_2 lies on segment $M_1B \subset AB$ (by Proposition 3.5)

6. Exercise 35 in the textbook specifies an interpretation in which Congruence Axiom 6 (SAS) fails but all other congruence axioms, betweenness axioms and incidence axioms hold. This interpretation started with the real Euclidean plane and then modified it by interpreting lengths of segments on the x-axis (and only those on the x -axis) to be twice the Euclidean length of those segments. We discussed in class how this interpretation also failed the Circle-Circle continuity principle. Show informally (by drawing pictures and giving brief explanations) why it is possible in this interpretation for there to be two circles γ and γ' in which γ' has a point interior to γ and a point exterior to γ but the two circles meet in

   (a) 0 points
   (b) 1 distinct point
   (c) 2 distinct points
   (d) 3 distinct points or
   (e) 4 distinct points