Spring 2010 **Exam 2** **Honors** 213

March 25

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Name

Directions: Only write on one side of each page.

Do any (5) of the following

1. (20 points) Using any previous results, do "your problem" from Homework 07 [You need not rewrite the statement of the Proposition.]

   (a) Proposition 4.2 (Elizabeth, Jason, Lauren)

   (b) Proposition 4.3 (Abbey, Teddi, Will)

   (c) Proposition 4.4 (Evan, Jennifer, Peter)

2. (20 points) 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.]

3. (20 points) A set of points S is called **convex** if whenever two points A and B are in S, the entire segment AB is in S. Prove that the interior of an angle a convex set.

4. (20 points) Given $A * B * C$.Use any results up to and including Proposition 3.5 to prove the following.

   (a) If P is a fourth (distinct) point collinear with A, B, and C, then $\tilde{}\,(A * B * P) \Longrightarrow \tilde{}\,(A * C * P)$.

   (b) Now deduce that ray $\overrightarrow{BA}$ is a subset of ray $\overrightarrow{CA}$. That is, $\overrightarrow{BA} \subseteq \overrightarrow{CA}$.

5. (20 points) Using any results through Proposition 3.23 prove the following.

   A supplement to an acute angle is an obtuse angle.

6. (20 points) Using any results up to and including Proposition 3.8 prove the following.

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

7. (4 points each) Which of the following statements are correct? [You need not rewrite the statements themselves.]

   (a) Hilbert's Axiom of parallelism is the same as the Euclidean parallel postulate given in Chapter 1.

   (b) If points A and B are on opposite sides of a line l, then a point C not on l must be either on the same side of l as A or on the same side of l as B.

   (c) If line m is parallel to line l, then all the points on m lie on the same side of l.

   (d) The notion of "congruence" for two triangles is not defined in this chapter.

   (e) A **Hilbert Plane** is any model of the incidence, betweenness, and congruence axioms.