Your Name: ______________________________

Mathematics 461 (Wilson) Fall semester 2008

Midterm exam October 29, 2008

Write your answers to the five problems in the spaces provided. If you must continue an answer somewhere other than immediately after the problem statement, be sure (a) to tell where to look for the answer, and (b) to label the answer wherever it winds up.

You may refer to notes you have brought in on a sheet of paper, as announced in class and by email.

I have provided two separate sheets that give you (a) the axioms we have adopted (the green sheet) and (b) the propositions, and a few theorems, that have been stated in the text (the goldenrod sheet). Some of the problems refer to a proposition by number.

Be sure to explain your reasoning. Don't just say "A implies B" if there is any question as to why that is so. Be careful to assume only what is appropriate to a problem, not, for example, all of the things we find true in Euclidean geometry!

Problem	Points	Score
1	18	
2	18	
3	18	
4	28	
5	18	
TOTAL	100	

Problem 1 (18 points)
Prove that a line cannot be contained in the interior of a triangle.

Problem 2 (18 points)

We call a set of points S *convex* if, whenever A and B are in S, the entire segment AB is contained in S.

Prove that a half plane (all of the points on the same side of some given line) is a convex set.

Problem 3 (18 points)
Prove Proposition 2.3.

Problem 4 (28 points)
Justify each step in the following proof of Proposition 3.11:

(1) Assume on the contrary that BC is not congruent to EF.

(2) Then there is a point G on $\overrightarrow{EF}$ such that $BC \cong EG$.

(3) $G \neq F$.

(4) Since $AB \cong DE$, adding gives $AC \cong DG$.

(5) However, $AC \cong DF$.

(6) Hence $DF \cong DG$.

(7) Therefore, $F = G$.

(8) Our assumption has led to a contradiction; hence, $BC \cong EF$.

Problem 5 (18 points)
Prove Proposition 3.6.