November 1, 2007 MA 460 Name _____

(15 pts) 1. (a) Let's quote the fifth postulate of Euclid, as in the text: *[I]f a straight line falling on two straight lines makes the interior angles on the same side less than two right angles, the two straight lines, if produced indefinitely, meet on that side on which are the angles less than the two right angles.* Illustrate this with a sketch, as if you were writing on the board for your class.

(b) Suppose that we change the wording so that the interior angles on the same side add to two right angles. Do Euclid's postulates or common notions give any insight on what must happen? Discuss.

(c) Suppose we are in the situation (b) again, so the sum of the interior angles on one side of the transversal add to 180^o. Show that the same is true for the sum on the other side

(d)(continuing) Suppose we are in the situation of (b) or (c), and suppose the two lines penetrated by the transversal **do** meet. Show that this leads to a contradiction referring to specific propositions already covered in class (so to Proposition 21).

(10 pts) 2. Have any of the propositions we have discussed yet used Euclid's fifth postulate? If so, which ones.

(10 pts) 3. Proposition 14 is the converse to proposition 13. Prove proposition 14, is it a direct proof or a proof by contradiction?

(10 pts) 4. State the following propositions from Euclid in English appropriate for your generation of students

(a) Proposition 20

(b) Proposition 16