Math 308 Homework #2

due Wednesday, September 22, 2004 at 11 AM

For this assignment, you may use anything in Sections 1.1–1.3 of the textbook, *including* the assertions stated in the exercises. (You may always use things mentioned in class, problems from previous homeworks, and earlier problems from the same homework.) You may also use the facts—lemmas, theorems, corollaries—proved in Sections 1.4–1.6, but *not* the exercises from those sections (unless they were mentioned in class, etc.).

- I. Prove that if $\triangle ABC \equiv \triangle A'B'C'$, then $\angle A = \angle A'$. (In other words, given that the definition of triangle congruence is satisfied, prove that the definition of angle congruence is satisfied.)
- II. Baragar, p. 24, #1.34
- III. Baragar, p. 25, #1.40
- IV. Show that the perpendicular bisector of a line segment is the set of all points equidistant from the two endpoints of the segment. In other words, let the line ℓ be the perpendicular bisector of the segment *AB*. For any point *C*, prove that *C* is on the line ℓ if and only if |AC| = |BC|.

Definition: A line ℓ is said to be *tangent* to a circle C if ℓ and C intersect in exactly one point.

- V. Suppose that C is a circle with center O, that P is a point on the circle C, and that ℓ is a line through P. Prove that ℓ is tangent to C if and only if ℓ is perpendicular to the radius OP of C.
- VI. Baragar, p. 23, #1.33. (Hint: don't just pick a random point C—pick an especially convenient point *C*.)