Math 308, Section 101
Study Questions for First Midterm
(in class Wednesday, October 6, 2004)

For the first midterm, you will be responsible for the material from Sections 1.1–1.12 and 1.15 of the textbook.

Besides the questions listed below, remember also to review the problems from Homeworks #1–3, as well as the Recommended Exercises given out with the regular reading assignments.

I. State the three axioms concerning isometries (Axioms 6–8).

II. State the definition of angle congruence.

III. Using the definition of $\sin A$, prove that $\sin 60° = \sqrt{3}/2$. Do not assume properties of any particular triangle unless you prove them.

IV. Baragar, p. 29, #1.45

V. Baragar, p. 40, #1.76. (Note: the reference should be to Figure 1.34(b), not Figure 1.34(a).)

VI. Baragar, p. 57, #1.123. (Hint: If CF is an altitude of $\triangle ABC$, then $|AF| = b \cos A \ldots$.)

VII. Let the quadrilateral $ABCD$ be a trapezoid: the sides AB and CD are parallel, but the sides AD and BC are not parallel. Suppose that $|AD| = |BC|$. Prove that $\angle ADC = \angle BCD$.

VIII. Let A, B, C, D, P, and Q be distinct points in the plane. Suppose that f is an isometry such that $f(A) = C$, $f(B) = D$, and $f(P) = Q$. Prove that P is on the perpendicular bisector of the segment AB if and only if Q is on the perpendicular bisector of the segment CD.

IX. (a) Suppose that the incenter I of $\triangle ABC$ is the same as the centroid G of $\triangle ABC$. Prove that $\triangle ABC$ is equilateral.
(b) Suppose that the circumcenter O of $\triangle ABC$ is the same as the orthocenter H of $\triangle ABC$. Prove that $\triangle ABC$ is equilateral.