Midterm #1. Math 104, Symmetry, Shape, Space.
Instructor: Ramin Naimi

Name: _____
Mon 11 Jun 2001

Closed book. Closed Notes. No Calculators. 25 points per problem. Please write very legibly.

1. If a trapezoid has two parallel sides of lengths a and b and a height of h, write a formula for its area in terms of a, b, and h. Explain why your formula is correct for all trapezoids.

2. Can a regular n-sided polygon have a vertex angle of $100°$? If yes, find n, and prove you indeed get $100°$ for the vertex angles. If not, explain why not.

3. (a) If a ball travels at a $45°$ angle out of the lower left corner of a billiard table with a (vertical) height of 320 units and a (horizontal) width of 950 units, how may times will the ball bounce until it reaches a corner pocket, including the start and the end? Why? Which corner will the ball end up at? Why?

   (b) Which corner will the ball end up at if it travels at a $45°$ angle out of the lower right corner of the same table? Why?

4. (a) Suppose AB is a line segment. Give precise and detailed instructions for constructing its perpendicular bisector.

   (b) If AB has unit length, how would you construct a right triangle whose area is $\sqrt{2}$? Explain.