

## MA 501 Homework #9

Due Tuesday, April 9, in class

1. Be ready to present the following proofs from the SMSG text: Theorems 5-6, 7-1 to 7-3, 9-13 to 9-21, 11-8. I will divide the class up into pairs and have each pair review two proofs and then individually present them.
2. Read and study Chapters 2 and 3 of Focus in High School Mathematics—Reasoning and Sense Making—Geometry. You can find this inside the Blackboard site for this course, under Course Content.
  - (a) Figure 2.5 shows a way to cut up a parallelogram to make one or two rectangles. But what if the parallelogram is very tall and leans over so much that the two altitudes do not meet the bases in the interior of the parallelogram? How can the cutting be modified to still get the area formula in this case?
  - (b) How might the students in this chapter now find a formula for the area of a regular polygon in terms of its perimeter and the distance from its center to the midpoint of one of its sides (the apothem)? Show how to derive the formula.
  - (c) Refer to the previous problem—what happens as you consider polygons with larger and larger numbers of sides, but not changing the length of the apothem—what shape does this approach, and what formula do you get for the area of this shape as a result?
  - (d) Look at Exercise 3.74 on pages 56–57 of <http://www.ms.uky.edu/~lee/ma241/ma241notesb.pdf>. (You might want to try making a physical model of this using wicki sticks.) When the circle is unrolled as shown, how do you know that it will have a triangular shape, and not some curve like a parabola? And how can this then be used to obtain a formula for the area of a circle?
  - (e) Do Exercise 3.53, parts 1–3, of <http://www.ms.uky.edu/~lee/ma241/ma241notesb.pdf>.
  - (f) There is a theorem that the measure of an angle inscribed in a circle is half the measure of the intercepted arc (SMSG Theorem 13-7). Use this theorem to explain the angle results depicted in Focus, Chapter 2, Figure 2.20, to find the angles in Figure 2.21, and to explain the angle results depicted in Figure 2.28.