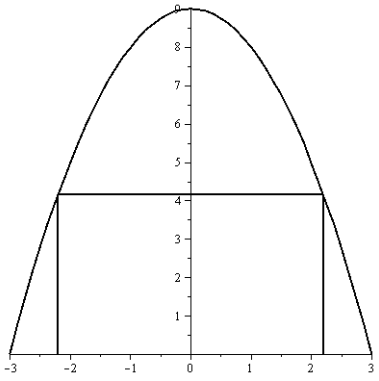
Math 11 Practice Problems for Exam II Farris
Due in class on 5/20/09 (along with text hwk.)

This is not a practice test. It is a set of problems to help you practice. The exam will also include some more routine problems, which you can practice using your textbook.

1. The figure shows one way to inscribe a rectangle in the region under the graph $y = 9 - x^2$. However, the rectangle shown is not the largest possible one. Find the dimensions of the largest possible rectangle. (You may assume that the rectangle has sides parallel to the coordinate axes.)



2. Determine the two points where the curve $x^2 + x\,y + y^2 = 9$ crosses the *x*-axis. Use implicit differentiation to show that the lines tangent to the curve at these two points are parallel to each other.

3. Use the linearization of a suitable function to approximate $\sqrt{1,001,000}$, that is, the square root of one million one thousand.

4. Let's think about the function $f(x) = (x^3 - 3x^2 + 3x + 3)/(x-1)^2$. It looks pretty complicated, but it's actually not too hard to graph, once you reorganize it correctly. (Hint: Can you connect to Pascal?) For a complete analysis, find asymptotes, intercepts, symmetry (if any), local extrema, and inflection points.

5. Determine the dimensions of the largest circular cylinder that can be inscribed in a circular cone with height 6 feet and base radius 2 feet.

6. A California Highway Patrol officer sits in a car at A, ¼ mile due south of point B on highway 280. At the instant when you are exactly 1 mile east of B, the CHP officer's radar gun shows that you are approaching the radar gun at 72 mph. Later when you are caught by the officer, you say, "But I was only going 72 mph." The officer says, "Oh no, that was the rate of change of the line-of-site distance. Based on that, I can use related rates to calculate your actual speed and give you a ticket." How fast were you going? (You may use a calculator to find out whether this is more or less than 80 mph, a threshold for certain speeding fines!)