1. A farmer has 2400 feet of fencing and wants to use it to fence off a rectangular field. What are the dimensions of the field that has the largest area, and what is that largest area?
   The goal is to model this situation with a function (like we did in Project 1), then use the techniques of Chapter 4 to find the absolute maximum.

Step 1: Draw a picture of several possible fields. Label the pictures by assigning variables to any quantities that change. List any other variables that might be important.

Step 2: Which quantity from the previous part is the one that we want to maximize?

Step 3: Use basic geometry to write a formula for the variable you named in the previous part. If you end up with a function that has two independent variables (input variables), that's a problem we will have to fix in the next step.

Step 4: Turn the constraint that we have only 2400 feet of fencing into an equation. Then use this equation to eliminate one of the variables in Step 3. You now have a function of one independent variable (input variable), and this is the function to maximize.

Step 5: What is the domain? (Step 6 will be easier if you actually allow the possibility of "silly" rectangles with no area).

Step 6: Use one of the procedures you know to find the absolute maximum value on the domain.

Step 7: Answer the questions asked: what are the dimensions of the field that has the largest area, and what is the largest area?

2. A farmer has 2400 feet of fencing and this time wants to fence off a rectangular field that borders a straight river. The farmer needs no fence along the river. What are the dimensions of the field that has the largest area, and what is that largest area? (This problem is similar to problem 2; use the same sequence of steps in your solution.) Explain why your answer is different from Problem 1.

3. A square-bottomed box with no top has a fixed volume of 500 $\text{cm}^3$ (1/2 Liter). What is the minimum surface area?

4. As in the previous problem, a square-bottomed box with no top has a fixed volume of 500 $\text{cm}^3$ (1/2 Liter). But this time the material for the bottom costs \$2 per $\text{cm}^2$ while the sides cost \$1 per $\text{cm}^2$. What dimensions give the minimum cost?