OPTIMIZATION

Guidelines:

1. If there is a picture to draw, DRAW IT!
2. Determine what the variables are and how they are related.
3. Decide what quantity needs to be maximized or minimized.
4. Write an expression for the quantity to be maximized or minimized in terms of only ONE variable.
5. Determine the minimum and maximum allowable values (if any) of the variables you are using.
6. Solve the problem.
7. Be sure to answer the question that is asked.

Example 1: You have 40 feet of fencing with which to enclose a rectangular space for a garden. Find the LARGEST are that can be enclosed with this much fencing and the dimensions of the corresponding garden.

Example 2: A square sheet of cardboard 18' on a side is made into an open box (there is no top) by cutting squares of equal size out of each corner and folding up the sides along the dotted lines. Find the dimensions of the box with the maximum volume.

Example 3: Find the point on the parabola $y = 9 - x^2$ closest to the point (3, 9).

You try:

1. A manufacturer wants to design an open box having a square base and a surface area of 108 square inches. What dimensions will produce a box with maximum volume?

2. A rectangular page is to contain 24 inches of print. The margins at the top and bottom of the page are to be 1.5 inches, and the margins on the left and right are to be 1 inch. What should the dimensions of the page be so that the least amount of paper is used?

3. Which points on the graph of $y = 4 - x^2$ are closest to the point (0, 2)?