Strategies for Optimizing (p. 223)

1. **Understand the problem.** What are you given? What are you being asked to find?
2. **Develop a mathematical model of the problem.** Draw and label a picture of what is given. Use the given information to solve in terms of a variable. Use this expression in the function you are to minimize or maximize.
3. **Graph the function** or analyze the function to determine the domain.
4. **Identify the critical points and endpoints.** Find where the derivative is zero or does not exist.
5. **Solve the mathematical model.** Use your solution of the minimum or maximum to solve for the pieces of your model.
6. **Interpret the solution**. See if your answer makes sense and write the response to the question.

Examples

1. An open top box is to be made by cutting congruent squares of side length *x* from the corners of a 20 by 25 inch sheet of tin and bending up the sides. How large should the squares be to make the box hold as much as possible? What is the resulting maximum volume?

2. You are standing at the edge of a slow-moving river which is one mile wide and wish to return to your campground on the opposite side of the river. You can swim at 2 mph and walk at 3 mph. You must first swim across the river to any point on the opposite bank. From there you walk to the campground, which is one mile from the point directly across the river from where you start your swim. What route will take the least amount of time?

3. Determine the area of the largest rectangle that can be inscribed in a circle of radius 1.