Section 3.7

Guidelines for Solving Applied Minimum and Maximum Problems

1. Identify all *given* quantities and all quantities *to be determined*. If possible, make a sketch.
2. Write a **primary equation** for the quantity that is to be maximized or minimized.
3. Reduce the primary equation to one having a *single independent variable*. This may involve the use of a **secondary equation** relating the independent variables of the primary equation.
4. Determine a feasible domain of the primary equation. That is, determine the values for which the stated problem makes sense.
5. Determine the desired maximum or minimum value by the calculus techniques discussed in Sections 3.1 and 3.4.

1) A box company wants to manufacture a closed box with a base that has a length that is twice as long as its width, and has a surface area of 432 square inches. What dimensions will produce a box with maximum volume?

2) Which point on the graph of $y = \sqrt{x}$ is closest to the point $(4, 0)$?

3) A rectangular page needs to have 75 square inches of print. The margins at the top and bottom of the page should be 1 inch and the margins on the left and right should be $\frac{3}{4}$ inches. What should the dimensions of the page be so that the least amount of paper is used?

4) Two poles, one 6 meters tall and one 15 meters tall, are 20 meters apart. A length of wire is attached to the top of each pole and it is also staked to the ground somewhere between the two poles. Where should the wire be staked so that the minimum amount of wire is used?

5) A 2 feet piece of wire is cut into two pieces and once piece is bent into a square and the other is bent into an equilateral triangle. Where should the wire cut so that the total area enclosed by both is minimum and maximum?

Homework for 3.7: #7, 17, 19, 22, 25