4.5 – Optimization Problems

MATH 2554 – Calculus I

Question: Which pair of nonnegative real numbers x and y between 0 and 50 and whose sum is 50 has the maximum product?

This is a basic Optimization Problem.

Now solve the optimization problem!

All optimization problems take the following form:

What is the maximum (or minimum) value of an objective function subject to the given constraint(s)?

Guidelines for Optimization Problems

1. Read the problem carefully, identify the variables, and organize the given information with a picture (if possible).
2. Identify the objective function (the function to be optimized).
3. Identify the constraint(s).
4. Use the constraint(s) to eliminate all but one independent variable of the objective function.
5. Find the interval of interest for the remaining independent variable.
6. Find the absolute maximum or minimum of your objective function on the interval of interest.

Example:

Suppose you wish to build a rectangular pen with three parallel partitions using 500 feet of fencing. What dimensions will maximize the total area of the pen?

Exercise:

An open rectangular box with a square base is to be made from 48 square feet of material. What dimensions will result in a box with the largest possible volume?

Exercise:

Find the dimensions of the rectangle of largest area which can be inscribed in the closed region bounded by the x-axis and the graph of $y = 8 - 2x^2$.

Homework Problems: Section 4.5 (pp.284-285) #11-27 odd, 33, 37, 39, 43