

Math 142, 511, 516, 517, Spring 2010

Lecture 15.

3/11/2010

Homework #19 (Section 5-4)
Homework #20 (Section 5-5)
are due Thursday, March 11, 11:55 PM.

Homework #21 (Section 5-6)
is due Thursday, March 25, 11:55 PM.

Quiz #8 (Section 5-6) is due Tuesday, March 23.

Test 2 will be held on Thursday, March 25. It will cover sections 3.7, 4.1–4.4, 4.7, 5.1, 5.2, 5.4–5.6.

Tuesday's lecture will be the review for Test 2.

Section 5-6 **Optimization.**

Optimization problems are problems that involve finding the absolute maximum value or the absolute minimum value of a function.

Steps in solving optimization problems

Step 1. Understand the problem.

Step 2. Draw a diagram.

Step 3. Introduce variables, look for relationships among the variables, and construct a mathematical model of the form

Maximize (or minimize) $f(x)$ on the interval I

Step 4. Find the absolute maximum or minimum of $f(x)$ on the interval I and the value(s) of x where this occurs.

Step 5. Use the solution to the mathematical model to answer all questions asked in the problem.

Example 1. Find two numbers whose sum is 100 and whose product is a maximum

Example 2. A farmer with 750 ft of fencing wants to enclose a rectangular area and then divide it into four pens with fencing parallel to one side of the rectangle. What is the largest possible total area of four pens?

Example 3. A company manufactures and sells x videophones per week. The weekly price-demand and cost equations are, respectively,

$$p(x) = 500 - 0.5x \quad \text{and} \quad C(x) = 20000 + 135x.$$

(a) What price should the company charge for the cameras, and how many cameras should be produced to maximize the weekly revenue? What is the maximum revenue?

(b) What is the maximum weekly profit? How much should the company charge for the cameras, and how many cameras should be produced to realize the maximum weekly profit?

Example 4. A car rental agency rents 200 cars per day at a rate of \$30 per day. For each \$1 increase in rate, 5 fewer cars are rented. At what rate should the cars be rented to produce the maximum income? What is the maximum income?

Example 5. The concentration $C(t)$, in milligrams per cubic centimeter, of a particular drug in a patient bloodstream is given by

$$C(t) = \frac{0.16t}{t^2 + 4t + 4}$$

where t is the number of hours after the drug is taken. How many hours after the drug is taken will the concentration be maximum? What is the maximum concentration?