

Example 1.1

Find the dimensions of a rectangle with perimeter of 100 feet whose area is as large as possible.

Example 1.2

Suppose I want to enclose off an area for a garden. It will be up against my house, so I don't have to fence the side that's against the house. I have 24 feet of fencing. How should I construct this rectangular garden so I get the largest area?

Example 1.3

An open box is to be made from a 16-inch by 30-inch piece of cardboard by cutting out squares of equal size from the corners and bending up the sides. What size should the squares be to obtain a box with a maximum volume? What is the maximum volume?

Theorem 1.4

Maximum profit occurs at those x -values for which

$$R'(x) = C'(x)$$

and

$$R''(x) < C''(x)$$

Example 1.5

A manufacturer can sell x headphones at a price of $1400.01x$ dollars each. It costs $40x + 1500$ dollars to produce all x of them. How many headphones should the manufacturer produce in order to maximize profit? What is the maximum profit?

Example 1.6

A manufacturer of storage bins plans to produce some open-top rectangular boxes with square bases. The volume of each box is to be 100 cubic feet. Material for the base costs \$8 per square foot and material for the sides costs \$5 per square foot. Determine the dimensions of the box that will minimize the cost of material. What is the minimum cost of the material for a box?

Example 1.7

A 300-unit luxury hotel is filled to capacity when they charge \$80 per day for a room. For every increase of x dollars in the daily room rate, there are x rooms vacant. Each occupied room costs \$22 per day to service and maintain. What should the hotel charge per day in order to maximize profit? #32 p.274