Optimization Models

Requirements

No required CBL or other equipment.

In this module we look again at the way in which prices vary but this time we use a different kind of model -- an optimization model -- because the underlying reality is different. In this module we study a situation in which one producer has a monopoly and is able to set prices to maximize his or her profit.

Be sure to send email to your instructor in the usual format.

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Questions

1. This first set of problems all use the same demand function

$$\mathbf{D(p) = 1000 - 500\ p}$$

Suppose that the manufacturing cost for this product is **c**, so that the total profit is

$$\mathbf{T(p) = D(p)(p - c)}$$

   a. What price should our monopolist charge when the manufacturing cost is \$0.20?

   b. What price should our monopolist charge when the manufacturing cost is \$0.30?

   c. What price should our monopolist charge when the manufacturing cost is \$0.40?

   d. Describe what happens when the manufacturing cost rises? Be as complete as possible. Do you notice any pattern?

   e. See if the pattern that you noticed persists for other changes in the manufacturing cost.

   f. See if the pattern that you noticed persists for other linear demand functions.

2. For the next set of problems we look at the demand function

$$D(p) = \frac{1000}{1 + p^2}$$

   a. Suppose that the manufacturing cost is \$0.50. What price should our monopolist charge to maximize her profit?

b. Suppose that the manufacturing cost is $1.00. What price should our monopolist charge to maximize her profit?

c. Suppose that the manufacturing cost is $1.50. What price should our monopolist charge to maximize her profit?

d. Discuss your results. Were there any surprises? Explain.