Math 1313
Chapter 1 – Section 1.3
Linear Depreciation; Linear Cost, Revenue and Profit Functions

Simple Depreciation: The value of certain things depreciates as time progresses.

Example 1: In 2002, the Boyer Company installed a new machine in one of its factories at a cost of $300,000. The machine is depreciated linearly over 10 years with a scrap value of $ 10,000.

a. Find the rate of depreciation for this machine.

b. Find an expression for the machine's book value in the *t*-th year of use ($0 \leq t \leq 10$).

c. Find the machine's book value in 2006.

Example 2: A certain department of a local university bought a copier that had an original value of $36,000 and will be depreciated linearly over 5 years with scrap value of $4,000.

a. Find an expression for the copier's book value in the *t*-th year of use ($0 \leq t \leq 5$).

b. Find the copier's book value at the end of the second year.

If x is the number of units of a product manufactured or sold at a firm then,

- the **cost function,** $C(x)$, is the total cost of manufacturing x units of the product.
- the **revenue function,** $R(x)$, is the total revenue realized from the sale of x units of the product.
- the **profit function,** $P(x)$, is the total profit realized from manufacturing and selling x units of the product.

Fixed costs are costs that remain more or less constant regardless of the firm's activity level.

Variable costs are costs that vary with production or sales.

Formulas

Suppose a firm has fixed cost of F dollars, a production cost of c dollars per unit and a selling price of s dollars per unit then

- $C(x) = cx + F$
- $R(x) = sx$
- $P(x) = R(x) – C(x) = (s – c)x – F$

where x is the number of units of the commodity produced and sold.

Example 3: A manufacturer has a monthly fixed cost of $150,000 and a production cost of $12 for each unit produced. The product sells for $23 per unit.

a. What is the cost function?

b. What is the revenue function?

c. What is the profit function?

d. Compute the profit (loss) corresponding to production levels of 8,000 units and 25,000 units.

e. How many units must the manufacturer produce and sell to make a profit of $70,000?