

Brief Calculus, Math 160, Kriloff, Fall 2007
Section 1.4 - Functions from Economics

How does a company calculate their cost, revenue, and profit at a certain production level?
 What types of functions can model cost and revenue? At what level does the company break even?

Definition: A *cost function* $C(q)$ gives as its output the _____
 _____.

- The cost functions we will consider are from the *company's* perspective.
- Costs may be of two types: _____ and _____.
- If $C(q)$ is linear then the vertical intercept represents the _____
 and the slope represents the _____ and is also called the _____.

Definition: A *revenue function* $R(q)$ gives as its output the _____
 _____.

- The revenue function is also from the *company's* perspective.
- If items sell at price p dollars per item, then a formula is $R(q) =$ _____.
- If the price per item, p , is constant, i.e., does not depend on the number of items q , then $R(q)$ is linear. In this case p is also called the _____.
 (We will see examples in Section 4.4 where $R(q)$ is not linear.)

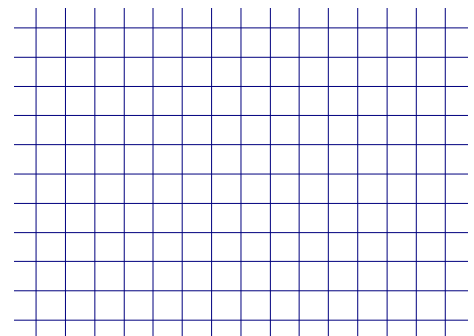
Definition: The *profit function* $\pi(q) =$ _____ (π is the Greek "p" and stands for profit.)

- The break-even point is the value of _____ where _____ or equivalently _____.
- In Section 4.4 we will apply calculus to maximize profit.

#1.4.10 A company producing jigsaw puzzles has fixed costs of \$6000 and variable costs of \$2 per puzzle. The company sells the puzzles for \$5 each.

1. Find fomulas for the cost function, the revenue function, and the profit function.

2. Sketch a graph of $R(q)$ and $C(q)$ on the same axes.
 For each axis be sure to label the meaning and units
 and to choose appropriate scales (which may well be
 different). What is the company's break-even point?



Definition: A *depreciation function* $V(t)$ gives as its output the _____
_____.

Example: A \$20,000 car has a value of \$8,000 6 years after it is purchased. If it depreciates linearly, find a formula for the value $V(t)$ after t years.

What is the vertical intercept? What does it represent for a general depreciation function?

What is the horizontal intercept? What does it represent for a general depreciation function?

If you are majoring in business or economics you will also probably want to read and work some problems from the remaining parts of Section 1.4. We will not discuss these in class however.

Section 1.5 - Exponential Functions

The exponential function with initial value P_0 , base a , and variable t has the form _____.

An exponential function is increasing and a is called the _____ if a is _____.

An exponential function is decreasing and a is called the _____ if a is _____.

If we write $a = 1+r$ then $P = P_0(1+r)^t$ and r gives the _____.

An exponential function is increasing if r is _____ and decreasing if r is _____.

Examples of applications of exponential growth Examples of applications of exponential decay

If $f(x) = mx + b$, then $f(x + 1) = \underline{\hspace{2cm}} = \underline{\hspace{2cm}} = f(x) + \underline{\hspace{2cm}}?$

A linear function changes by _____ a constant amount (which may be positive or negative) for each constant increase in the input variable, or has a constant _____ rate of change.

If $f(t) = P_0a^t$, then $f(t + 1) = \underline{\hspace{2cm}} = \underline{\hspace{2cm}} = f(t) \cdot \underline{\hspace{2cm}}?$

The output of an exponential function is _____ by a constant amount (which may be bigger or less than 1) for each constant increase in the input variable. This is the same as a constant _____ or _____ rate of change.