

Closing Thurs: 1.1, 1.2, 1.3

Closing **next Thurs**: 1.6

### *1.1-1.3 More Application Practice*

*Entry Task:* You are told you have to average above 75% on the three exams to pass a certain class. Assume you get 65% on your first test and 78% on your second test. What does your final exam score need to be in order to pass the class?

(Similar to HW 1.1/9)

Reminder: *Steps in Problem Solving*

Read. What do you want?

Label unknown(s).

Do an example.

Translate and solve.

*Example* (watch the units):

You sell Things.

Your total cost, in **hundreds** of dollars,  
for producing  $x$  **hundred** Things is  
given by the formula

$$C(x) = 40 + 0.5x.$$

How much do you pay in FC?

What is TC if you produce 700 Things?

How many Things are you producing if  
your total costs are \$12,000?

*Recall from Friday:*

**To find the equation of a line**

Given any two points  $(x_1, y_1)$ ,  $(x_2, y_2)$ :

1. Compute slope:  $m = \frac{y_2 - y_1}{x_2 - x_1}$ .
2. Write:  $y = m(x - x_1) + y_1$

*Example:*

Find the equation of the line that goes through  $(1, 53)$ ,  $(10, 80)$ .

- (a) What is the  $y$ -intercept?
- (b) What is the  $x$ -intercept?

## 1.3 & 1.6: More Linear Business Apps

**Recall:** If  $p$  = price and  $FC = TC(0)$ ,  
then

$$TR(q) = pq \quad , \quad TC(q) = FC + VC(q)$$

$$P(q) = TR(q) - TC(q) = \text{Profit}$$

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$$MR(q) = \frac{TR(q + \text{"one item"}) - TR(q)}{(q + \text{"one item"}) - q}$$

$$MC(q) = \frac{TC(q + \text{"one item"}) - TC(q)}{(q + \text{"one item"}) - q}$$

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$$AR(q) = \frac{TR(q)}{q} = p$$

$$AC(q) = \frac{TC(q)}{q}, \quad AVC(q) = \frac{VC(q)}{q}$$

We should know the definitions well;  
how to get them from graphs and how  
to interpret their values. Today we will  
do some algebra and discuss some  
applications.

*Example:* You sell Objects. Each object sells for \$5. Your total cost function is linear. When you produce 1 Object, total cost is \$53. When you produce 10 Objects, your total cost is \$80.

What are the functions for...

- (a) ... TC, FC and VC?
- (b) ... TR and Profit?
- (c) ... MR, MR and MP?
- (d) ... AC and AVC?

For what quantities do you make a positive profit?

Midterm 1 is next Tuesday, Oct. 25

- Covers Sup 1-9, 1.1 - 1.3, and 1.6 (problems 1-6)
- In your normal quiz section.
- Four pages of questions.
- You get 50 minutes.
- Allowed:
  - Ti – 30x IIS calc (*only this model*)
  - 8.5 x 11 inch *handwritten* notes
  - Ruler
  - Something to write with
  - (No red/green pens.
  - Pencil preferred.)
- Multiple versions of the exam. We report all suspicions of cheating.
- Show/Label your work.

## 1.6 New App

### (Linear) Supply and Demand

The “supply” and “demand” concept will not appear on exam 1. **But** the 1.6 homework is due NEXT THURSDAY (two days after exam 1).

A supply curve shows the relationship between market price,  $p$ , and the quantity,  $q$ , of that product the **manufacturers are willing to supply for that market price.**

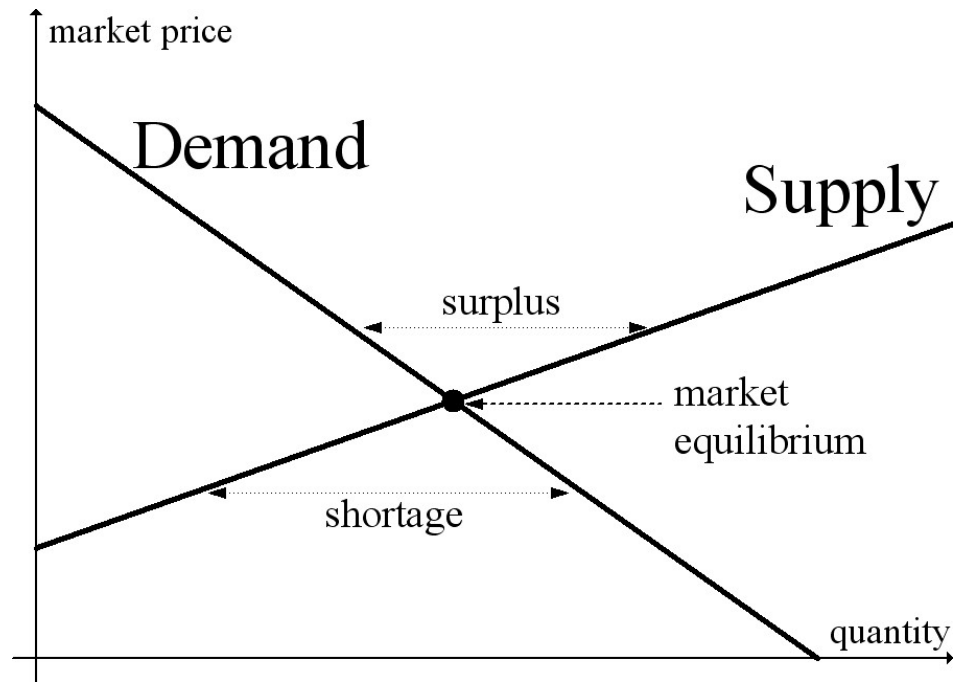
A demand curve shows the relationship between market price,  $p$ , and the quantity,  $q$ , of that product the **consumers are willing to purchase at that price.**

## The Law of Supply:

The number of quantities manufacturers are willing to supply will increase as the market price goes up. (*i.e.* the supply curve will go up from left-to-right on the graph).

## The Law of Demand:

The number of quantities consumers are willing to purchase will decrease as the market price goes up. (*i.e.* the demand curve will go down from left-to-right on the graph).





## Market Equilibrium

The quantity and price at which supply and demand intersect is called **market equilibrium**. This gives the price at which the manufacturers and consumers are willing to produce and buy the same number of units.

If the market price is greater than market equilibrium, then there will be a **surplus** (more items will be produced than sold).

If the market price is less than market equilibrium price, then there will be a **shortage** (more items will be demanded than are produced).

