Chapter 3 Linear & Quadratic Functions pgs 131-179

Objectives
1. Graph linear functions
2. Use Average Rate of Change to Identify Linear Functions
3. Determine whether a linear function is increasing/decreasing/constant
4. Build linear models from verbal descriptions

***RECALL: m = slope = rate of change = change in y/change x   or $\frac{\Delta y}{\Delta x}$

3.1 – Linear functions, their properties, & linear models

1.) Graph Linear Functions – get into slope intercept or standard form

y = mx + b   Ax + By = C

Example   f(x) = -3x + 7

What can say about the function above? What does each form allow us to do?
x intercept   y intercept (b)   slope

Domain:

Range:

Making a T chart for additional points

What about functions like f(x) = -2

x & y intercept:

slope:

2.) Use **Avg Rate of Change (slope)** to identify Linear functions

ONLY linear equations have slopes that are **CONSTANT**

x	y = f(x) = -3x + 7
-2	
-1	
0	
1	

Is the function below a linear function?

x	f(x)
0	0.09
1	0.12
2	0.16
3	0.22
4	0.29
5	0.39

Observation Questions:
What does changing the y-intercept do to a linear equation?
What can you conclude?

3.)Functions: increasing, decreasing, or constant
    Slopes determine whether a linear function is increasing, decreasing, or constant.

(a) $f(x) = 5x - 2$

(b) $g(x) = -2x + 8$

(c) $s(t) = \dfrac{3}{4}t - 4$

(d) $h(z) = 7$

4.)Building Linear Models
read the story carefully - remember y = mx + b
look for constant change - look for where to begin (y intercept)
write the equation in slope intercept form (f(x) = mx + b)

STRAIGHT – Line depreciation

Book value is the value of an asset that a company uses to create its balance sheet. Some companies depreciate their assets using straight-line depreciation so that the value of the asset declines by a fixed amount each year. The amount of the decline depends on the useful life that the company places on the asset. Suppose that a company just purchased a fleet of new cars for its sales force at a cost of $28,000 per car. The company chooses to depreciate each vehicle using the straight-line method over 7 years. This means that each car will depreciate by $\dfrac{\$28{,}000}{7} = \$4000$ per year.

(a) Write a linear function that expresses the book value V of each car as a function of its age, x.
(b) Graph the linear function.
(c) What is the book value of each car after 3 years?
(d) Interpret the slope.
(e) When will the book value of each car be $8000?
    [**Hint:** Solve the equation $V(x) = 8000$.]

(a)
(b)
(c)
(d)
(e)
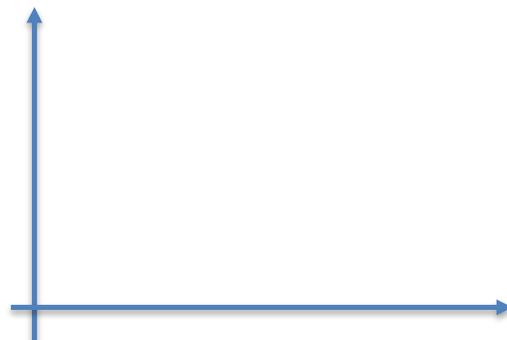
Supply and Demand

The **quantity supplied** of a good is the amount of a product that a company is willing to make available for sale at a given price. The **quantity demanded** of a good is the amount of a product that consumers are willing to purchase at a given price. Suppose that the quantity supplied, S, and quantity demanded, D, of cellular telephones each month are given by the following functions:

$$S(p) = 60p - 900$$

$$D(p) = -15p + 2850$$

where p is the price (in dollars) of the telephone.

(a) The **equilibrium price** of a product is defined as the price at which quantity supplied equals quantity demanded. That is, the equilibrium price is the price at which $S(p) = D(p)$. Find the equilibrium price of cellular telephones. What is the **equilibrium quantity,** the amount demanded (or supplied) at the equilibrium price?

(b) Determine the prices for which quantity supplied is greater than quantity demanded. That is, solve the inequality $S(p) > D(p)$.

(c) Graph $S = S(p)$, $D = D(p)$ and label the equilibrium price.

(a)

(b)

(c)