Agenda: Thu. 11/20/2008

- Answer a few HW questions from 8.1 - 8.3
- Sec. 8.4 - Functions & Relations
  HW 1-5 all, 8, 11-29 odd, 32, 35, 37, 39, 54, 55, 56

Looking ahead:

13.6 coverage limited

	Nov. 17	Nov. 18	Nov. 19	Nov. 20
12	8.2 Lines and Slopes	8.3 Equations of Lines,	8.4 Functions: Linear, Applications, Models	13.6 Regression and Correlation
	Nov. 24	Nov. 25	Nov. 26	Nov. 27
12.5	8.5 Quadratic Functions, Apps, Models	8.5 Cont Quiz	*No Mth126 (UW-L Friday Schedule)*	*Thanksgiving – No Classes*
	Dec. 1	Dec. 2	Dec. 3	Dec. 4
13	8.6 Exponential and Log Functions, Apps, Models	Arithmetic Sequences, Quadratic Sequences	Geometric Sequences, Applications of Sequences	15.1 Basic Concepts of Graph Theory
	Dec. 8	Dec. 9	Dec. 10	Dec. 11
14	15.2 Euler Circuits	15.3 Hamilton Circuits	Review	*Study Day*

Sec. 8.1 #62:

Earthquake receiving stations at (1,4), (-6,0), and (5,-2) are 4, 5, and 10 units away from the epicenter, respectively.

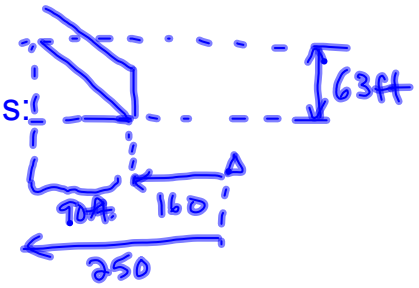
Show algebraically that the epicenter is at (-3,4).

① $d = \sqrt{(-3-1)^2 + (4-4)^2} = \sqrt{16+0} = 4$. ✓

② etc. $d = 5$ ✓

③ etc. $d = 10$ ✓

Sec. 8.2 #63: Steepness of upper deck.



Upper deck at Comiskey Park in Chicago is:
front: 160 ft from home plate
back: 250 ft from home plate
top is 63 ft above the bottom.

What is the slope of the upper deck?
(Note: I believe the maximum allowable stairway slope in new home construction is 8" in 12" (or 0.75).)

calculate $\frac{\text{rise}}{\text{run}}$:

$m = \frac{63}{90} \approx 0.7$.

8.1 #38)

a) $(x-4)^2 + (y-1)^2 = 0$

center: $(4,1)$

radius: 0

just one point!

b) $(x-4)^2 + (y-1)^2 = -1$

radius $= \sqrt{-1}$ ... that's not a real number!

no (x,y) satisfy this!

Definition: A function is a relation (i.e. set of ordered pairs) in which for each value of the first component of the ordered pair there is *exactly one* value of the second component.

Ex: Linear Function
$y = 3x - 2$

(also written $y = f(x)$, where $f(x) = 3x-2$)

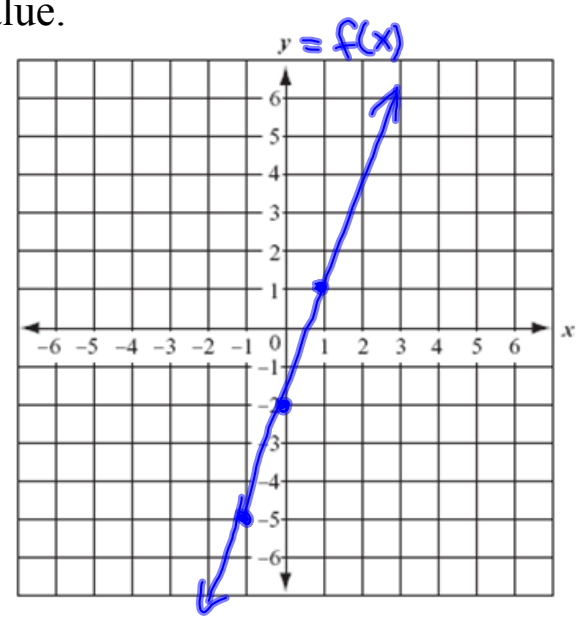
What is f(0)? $f(0) = 3(0) - 2 = -2$
f(2)? $f(2) = 4$
f(-5)? $f(-5) = -17$
f(k)? $f(k) = 3k - 2$

x	y
0	-2
2	4
-5	-17
k	3k-2

In other words: A function is a rule that assigns exactly one output value to each input value.

Ex: Linear Function
$f(x) = 3x - 2$

$\frac{\text{rise}}{\text{run}} = 3 = \frac{3}{1}$



Example: Use the sampling of points provided to find the rule for the following linear functions.

$Ax+By=C$ or $y=mx+b$ or $(y-y_0)=m(x-x_0)$ $\Rightarrow y=-2x+b \Rightarrow y=-2x+1$

$5=-2(2)+b \Rightarrow b=1$

A.

x	y
-2	5
1	-1
3	-5

Need slope

$m=\frac{-5-(-1)}{3-1}=\frac{-4}{2}=-2$

B. $y=mx+b \Rightarrow y=\frac{2}{3}x-3$

x	y
-3	-5
1	-7/3

Need m:

$\frac{(-5-(-\frac{7}{3}))\cdot 3}{(-3-1)\cdot 3}=\frac{-15+7}{-12}=\frac{-8}{-12}=\frac{2}{3}$

$-5=\frac{2}{3}(-3)+b$

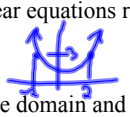
$b=-3$

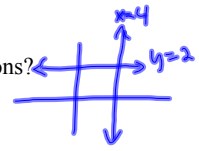
Domian: The set of all values of the independent variable (x) in a relation.

Range: The set of all values of the dependent variable (y) in a relation

Questions:

1. Do all linear equations represent functions?





$x=4$
$y=2$

2. What is the domain and range of linear function?
   Explain how you know.

$y=2$: $D=\{\text{all reals}\}$ $R=\{2\}$

$x=4$: $D=\{4\}$ $R=\{\text{all reals}\}$

3. What is the domain of the relation:
   (i) $y = 1/(x-3)$

$D=\{x \text{ such that } x\neq 3\}$

   (ii) $xy = -1$

(x,y)

Consider examples:

$(-1,1)$
$(1,-1)$
$(10,\frac{-1}{10})$
$(-2,\frac{1}{2})$

all x's will generate a unique y so $xy=-1$, except for $x=0$.

Domain: $\{x \mid x\neq 0\}$.

Range: $\{y \mid y\neq 0\}$

y is a function of x if for each independent variable there exists a unique dependent variable.

Ordered Pairs

EXAMPLES	NON-EXAMPLES
{(1,3), (2,5), (3,6), (4,3), (-2,1)}.	{(1,4), (2,7), (1,6), (-2,5), (-3,7)}

Domain? {1, 2, 3, 4, -2}

Range? {3, 5, 6, 1}

y is a function of x if for each x there exists only one y.

Equation

EXAMPLES	NON-EXAMPLES

Domain?

Range?

Vertical Line Test: If a vertical line intersects the graph of the relation in more than one point then the relation is **not** a function.

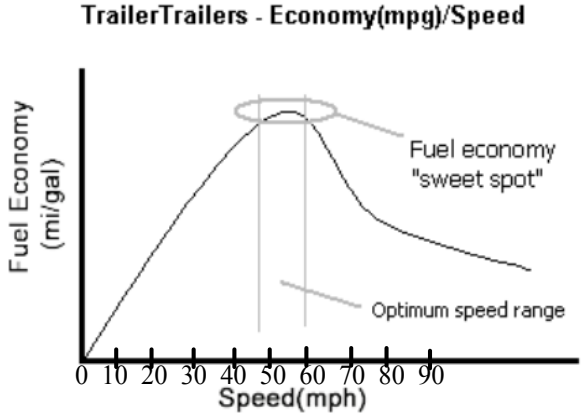
Graph

EXAMPLES	NON-EXAMPLES

Domain?

Range?

The graph below shows the (hypothetical) relationship between fuel economy and speed.



a) What is the dependent variable?
The independent variable?

b) What is the domain?

c) Is this relation a function?

d) Where is the fuel economy rising?
...falling?