Tuesday, January 29, 2013

Agenda:

- TISK, No MM
- Lesson 12-4: Functions
- Homework: Ch 12 HW Packet #2, §12-4 problems

TISK Problems

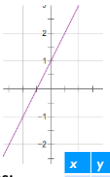
1. Write an equation in slope-intercept form for a line that passes through the points (0, 4) and (-2, 6).
2. Find the probability of rolling a multiple of 3 on a fair 12-sided die numbered 1-12.
3. Write and solve a proportion:
   Four is what percent of 24?

§12-4 Functions

- Domain
  - All the values possible for the input.
- Range
  - All the values possible for the output.
- Function
  - A rule that takes every input in the domain and maps it to exactly one output in the range.

§12-4 Functions

- Relation
  - A collection of inputs and outputs.
  - Sometimes shown as a graph:



  - Sometimes shown as a table of values:

x	y
-2	-3
-1	-1
0	1
1	3

  - Sometimes shown as an equation: $y = 2x + 1$

§12-4 Functions

- How can you tell if a relation is a function?
  1. Check to see if every input has **only one** output.

x	y
-2	-3
-1	-1
0	1
1	3

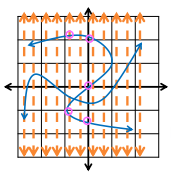
x	y
1	7
-2	8
-3	7
4	8

x	y
-1	6
2	20
-1	4
3	20

The input of -1 has two outputs, 6 and 4.

§12-4 Functions

- How can you tell if a relation is a function?
  2. Use the vertical line test (VLT).



Yes, it's a function. It passes the VLT.

No, it's not a function. It fails the VLT.

§12-4 Functions

- How can you tell if a relation is a function?
  3. Look for disallowed things in the equation:
     - Functions are not allowed to have…
       - Variables in the denominator.
       - Exponents greater than 1 on the *y* or square roots on the *x*.
       - Negative exponents.
     - Is it a function?
       - $y = 5x^2 + 1$  It has no "illegal" items.
       - $y^2 = x - 4$  It has an exponent of 2 on the *y*.
       - $y = \frac{3x}{x-1}$  It has an *x* in the denominator.
       - $y = \frac{x}{5}$  It has no "illegal" items.

§12-4 Functions

- We use ***set notation*** to indicate the values in the Domain and Range of a function.
- In set notation…
  - $\{a, b, c, \ldots\}$ means a set of numbers
    - $\{2, 4, 8, 11, 12\}$
  - (a, b) means all the numbers starting at a and ending at b, but NOT INCLUDING a or b.
    - $(5, 12)$
  - $[a, b]$ means all the numbers starting at a and ending at b and INCLUDES both a and b.
  - What do you think $(a, b]$ means?
  - What about $[a, b)$?
  - What about $[a, b) \cup \{c, d\}$?

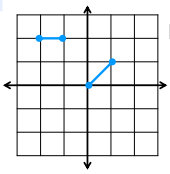
§12-4 Functions

- Give the domain and range of the following relations:

x	y
-2	-3
-1	-1
0	1
1	3

Domain (D): $\{-2, -1, 0, 1\}$

Range (R): $\{-3, -1, 1, 3\}$



Domain (D): $[-2, -1] \cup [0, 1]$

Range (R): $[0, 1] \cup \{2\}$

§12-4 Functions

- Functions have a special notation for their rules.
- When you write the rule of a function you use the notation $f(x)$ which is read "f of x" and means "this is the rule, *f*, where *x* is the variable."
  - It does **NOT MEAN** *f* times *x*.

§12-4 Functions

- Example
  - $f(x) = 3x - 2$
  - Find $f(-1), f(2)$ and $f(0)$.

You try it!
Find $f(0)$.

- This question asks you to take the rule and replace *x* with -1, then 2, then 0 and give the resulting output values.
  - $f(x) = 3x - 2$
  - $f(-1) = 3(-1) - 2$
  - $f(-1) = -3 - 2$
  - $f(-1) = -5$

So for this rule, when you input -1 you get an output of -5.

  - $f(x) = 3x - 2$
  - $f(2) = 3(2) - 2$
  - $f(2) = 6 - 2$
  - $f(2) = 4$

So for this rule, when you input 2 you get an output of 4.