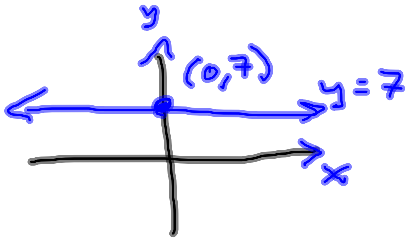
9/13 - 3.4 and 3.5 Homework Assignments

S 3.4 I #s 2, 10, 11, 12, 26, 30, 32

S 3.4 II #s 60, 62, 90, 92, 94

S 3.5 I #s 2, 6, 7, 12, 18, 21, 24, 34

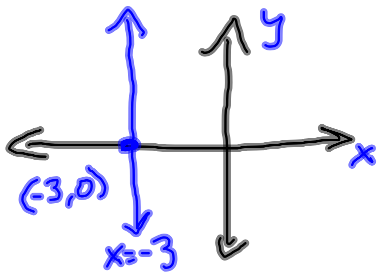
S 3.5 II #s 35, 39, 40, 42, 44, 48, 50, 54



<u>Degenerate Lines</u>

$y = 7$ horizontal $m = 0$

$x = -3$ vertical $m = \varnothing$



§3.2 I Due Tuesday

§3.2 II Due Tuesday @ end of Class

§3.3 Due Wednesday @ start.

Section 3.2 Introduction to Functions

A RELATION is a set of ordered pairs. $\{(2,1), (2,5), (-3,2), (4,6)\}$

The DOMAIN of the relation is the set of all first components of the ordered pairs. The RANGE of the relation is the set of all second components of the ordered pairs.

Domain = $\{2, -3, 4\}$ = $\{2, 2, -3, -3, -3, 4\}$

Bad Form to list more than once.

Range = $\{1, 5, 2, 6\}$

A set of ordered pairs can also be represented by a graph of points.

A FUNCTION is a relation in which each first component in the ordered pairs corresponds to *exactly* one second component.

No x-value is paired with more than one y-value.

(2,1), (2,1)

#s 1 - 18: Find the domain and range of each relation. Determine whether or not the relation is a function.

Nonexample

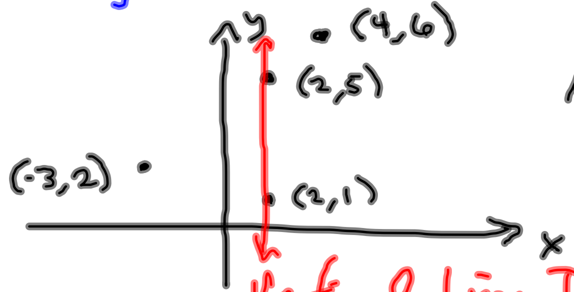
$\{(2,1), (2,5), (-3,2), (4,6)\}$

Domain = $\{2, -3, 4\}$

Range = $\{1, 5, 2, 6\}$

Not a function. (2,1) & (2,5) have same 1st component, and different 2nd components.

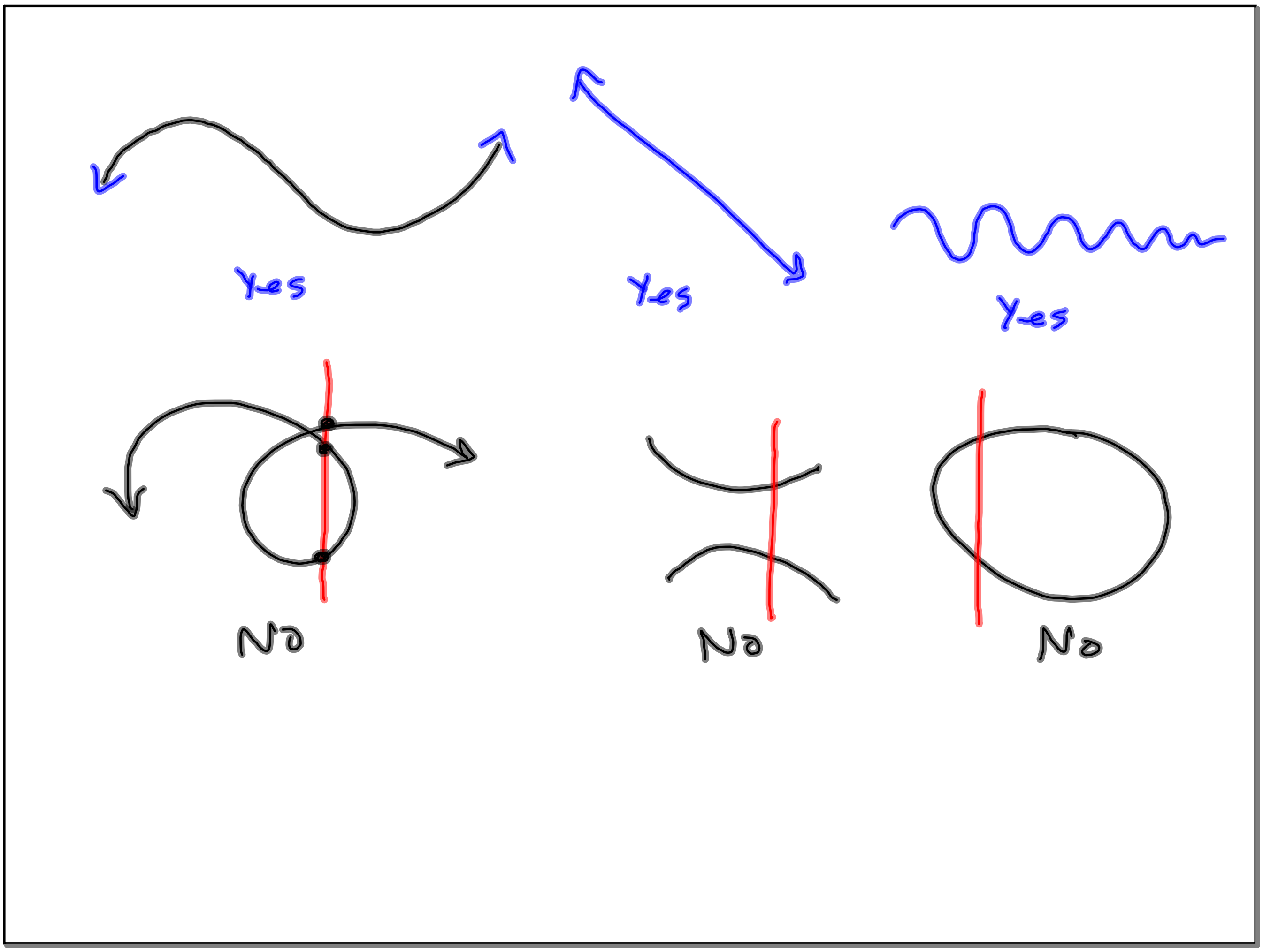
A graph of this relation.



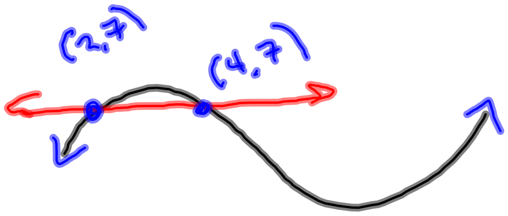
Vertical Line Test FAIL.
It hits the graph more than once.

A vertical line will only intersect a function at most once.

Sep 10-6:49 AM



Sep 13-11:35 AM



Yes

So x=2 & x=4 are both assigned to y=7. That's ok. It passes the VERTICAL LINE TEST & qualifies as a function

Notice that two different x-values are paired with one y-value. This FUNCTION fails the horizontal line test, which we discuss in November.

ONE-TO-ONE Functions

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Sep 13-11:37 AM

In a graph, a FUNCTION will never have two or more points are stacked above one another, hence the VERTICAL LINE TEST:

If no vertical line can be drawn so that it intersects a graph more than once, the graph is the graph of a function.

Function Notation
To denote that y is a function of x, we can write

$$y = f(x)$$

Reads like "f of x"

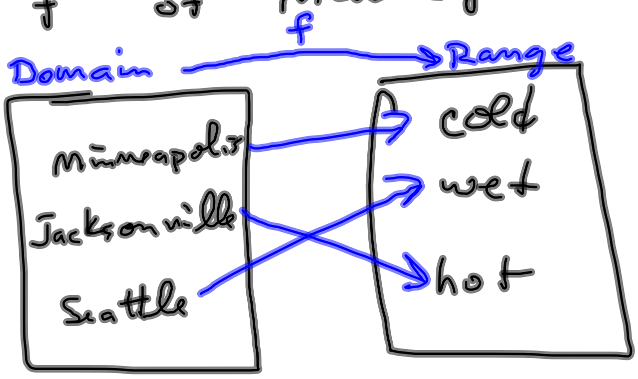
We say that y depends on x, because every x-value in the domain determines a y-value.

f = { (Minneapolis, cold), (Jacksonville, hot), (Seattle, wet) }

f (Minneapolis) = cold

Climate as a function of city.

"f of Minneapolis is cold"



Domain = { Minneapolis, Jacksonville, Seattle }

Range = { cold, wet, hot }

{ (2,3), (5,-2), (2,3) }

Sep 10-6:52 AM

Note that the *x*-values don't necessarily depend on the *y*-value, since we can have different *x*-values being associated with the same *y*-value, and still have a function.

x = Independent variable

y = Dependent variable.

y depends on x

$y = f(x)$

$f(x) = 7$

$y = 7$

what's $f(\square)$?

$f(\square) = 7$

$f(x) = 3x - 2$

$f(\square) =$

$3\square - 2$

f(☺) = 3☺ - 2

f(★) = 3★ - 2

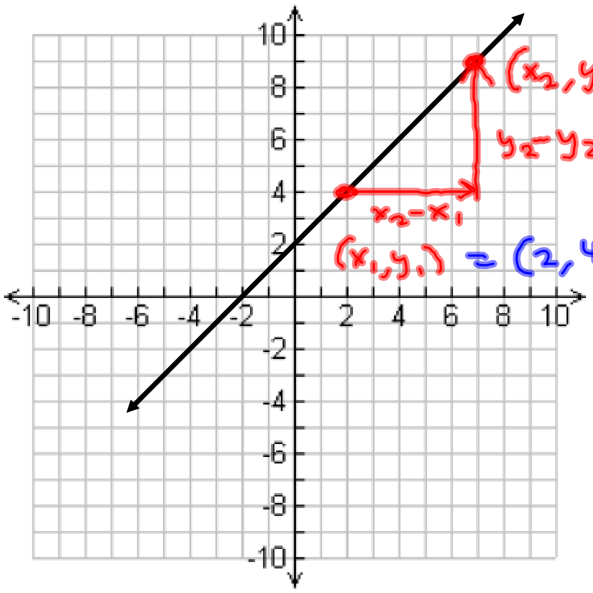
$f(x^2 - 1)$

$f(\boxed{x^2-1}) = 3\boxed{x^2-1} - 2$

$= 3(x^2-1) - 2$

$$\text{Slope} = \frac{\text{RISE}}{\text{RUN}} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{9-4}{7-2} = \frac{5}{5} = 1$$

$$= \frac{1}{1} = \frac{\text{up } 1}{\text{right } 1}$$



Degenerate Cases

$(2, 3)$, $(-6, 3)$

(x_1, y_1) (x_2, y_2)

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{3-3}{-6-2} = \frac{0}{-8} = 0$$

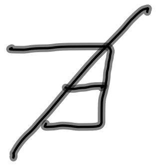
Horizontal line.

$y = 3$

$(2, 3)$, $(2, -7)$

(x_1, y_1) (x_2, y_2)

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-7-3}{2-2} = \frac{-10}{0}$$



m is undefined

Equation of the line is $x = 2$

Vertical line.

what about

(2, 3) & (2, −7) ?

$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-7-3}{2-2} = \frac{-10}{0}$ ∄

Vertical Line $\boxed{x = 2}$

(2, 5) & (−3, 5) ?

$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{5-5}{-3-2} = \frac{0}{-5} = 0$

$\boxed{y = 5}$

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