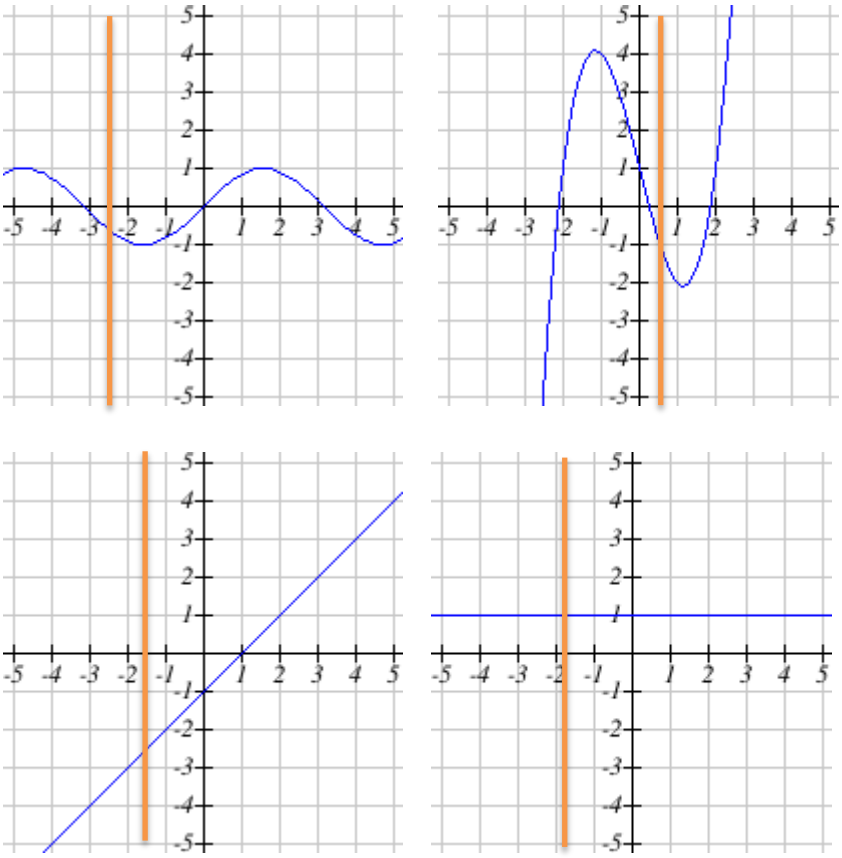
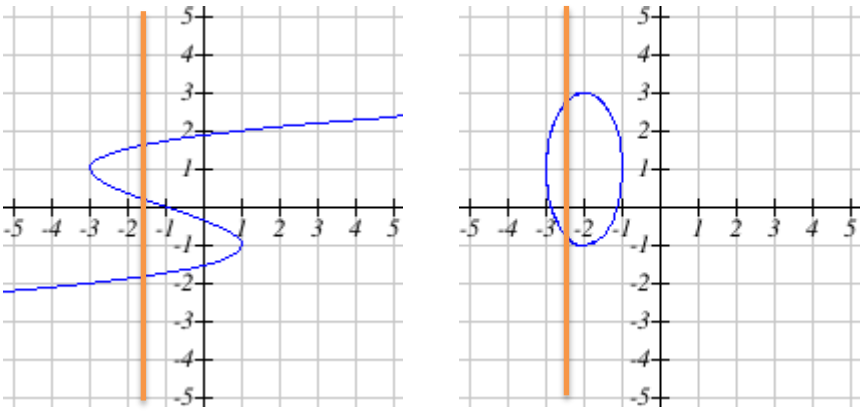
Business Math Week 1 Additional Notes/Notation

Definition: A function is a relationship (x,y) so that for every value of x there can be only one value of y. On a graph we call this the vertical line test.



These are all functions.



These two graphs are not functions (because they fail the vertical line test).

Given a table of (x,y) values, we can tell if a relationship is a function, and then also is it "one-to-one" if each "x" value appears once and each "y" value also only appears once!

x	3	10	12
y	4	7	14

< -- here we see an example of a function that is also one-to-one

x	3	10	12
y	4	7	7

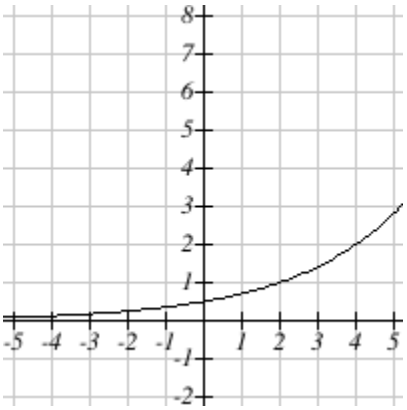
< -- here we see a function, but it is not one-to-one because 7 repeats

x	3	10	10
y	4	7	14

< -- here we see a relationship that is not a function.

++

The plot below represents the function $f(x)$



First let's list some (x,y) points from the graph.

We can estimate if needed.

(0, ½) is on the graph. This means we say "f(0)=1/2"

(2, 1) and (4, 2) are also on the graph.

Anything more we'd have to estimate.

When we ask "what is f(2)" we are looking for the y value when x = 2. Looking at the points we listed, we have (2, 1)

$f(2) = 1$

When asked to solve $f(x) = 2$, we are looking for a point (**?** , 2). In other words, it is y = 2, what is x ? Looking at points we listed above, we have ***(4, 2)***
For f(x) = 2 , ***this is really saying*** y = 2. Therefore, the answer is: $x = 4$

++

x	0	1	2	3	4	5	6	7	8	9
$f(x)$=y	96	68	7	1	94	58	51	36	85	25

What if we have a table?

Evaluate $f(7)$

$f(7)$ = y when x is 7 = 36

Solve f(x) = 1 (same thing as y = 1)

x = 3 (look for an x that is paired with 1)

Evaluate and **Solve** (what is the difference):

When $f(x) = 9x^2 - 4x + 1$, evaluate $f(-5)$

"Evaluate" means use the formula and calculate the value

$f(-5) = 9 \cdot (-5)^2 - 4 \cdot (-5) + 1 = 9 \cdot 25 + 20 + 1 = 246$

Given $f(x) = -7x + 1$. When convenient we use "y" in place of "f(x)".

Solve $f(x) = 29$ "Solve" also means to calculate a value. We are "solving" for x.

$$y = -7x + 1 \; with \; y = 29$$

$$29 = -7x + 1$$

$$28 = -7x$$

$$28 \div (-7) = x \text{ which means } x = -4$$

++

Here is another time we are asked to evaluate something.

The total cost (in dollars) to produce q units of a good is given by the function:

$$C(q) = 6.9q + 42000$$

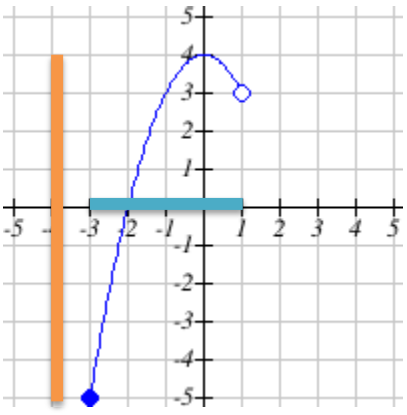
What is the total cost to produce $q = 7100$ units? Answer: $6.9 \cdot 7100 + 42000$

Cost = $ 90,990

++

Domain/Range

Find the domain and range of the function graphed below.



Domain:

left is a [and on the right is)... $[-3, 1)$

Range: lower and upper are both included, so [and]

Answer: $[-5, 4]$

With practice this gets easier...

The following will only be on the Week 1 quiz. You will not see these on the test or on future tests/quizzes. It's only so you can have some experience with it.

Given a split function, what does this mean?

$$f(x) = \begin{cases} 8x + 9 & x < 0 \\ 8x + 18 & x \geq 0 \end{cases}$$

"$x < 0$" means "x is negative" and "$x \geq 0$" means "x is 0 or positive"

More descriptive way of stating this function:

IF x is negative, choose the equation **y = 8x + 9**

Otherwise, IF x is 0 or x is positive, choose the equation **y = 8x + 18**

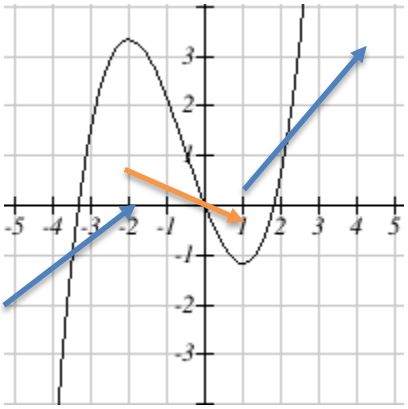
Some examples of how this works:
$f(-1) =$ __ ? **x is -1** so we choose **y = 8x + 9**. $f(-1) = 8 \cdot (-1) + 9 = -8 + 9 = 1$

Answer: $f(-1) = 1$

These two values of x are 0 and positive, so choose the equation $y = 8x + 18$

$f(0) = 8 \cdot 0 + 18 = 18$
$f(2) = 8 \cdot 2 + 18 = 34$

++



Increasing/Decreasing Always use ( )

The function graphed is:

Increasing on the interval(s)

$(-\infty, -2) \cup (1, \infty)$ When the graph goes off the page we assume infinity, either $-\infty$ or ∞

Decreasing on the interval(s)

$(-2, 1)$

Increasing is "going up" from left to right.

Decreasing is "going down" from left to right.