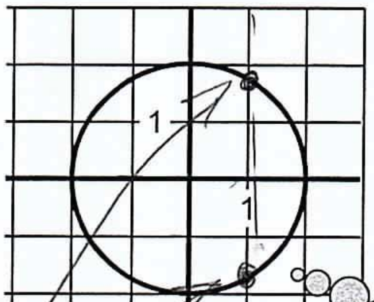
How does the graph of a function look different than any old relationship?

College Algebra
Class Notes
Graphs of Functions (section 3.2)

Recall a function is a special relationship where there is *exactly one* y *value* for each x value in the domain. So, how would this look graphically?



We saw this graph in the previous section as we worked on determining if a relationship was a function or not. Recall that we said it was *not* a function.

Draw a vertical line down through the circle to highlight the points whose x values are 1. Estimate these points in ordered pair notation.

→ (1, 1.75)
(1, −1.75)

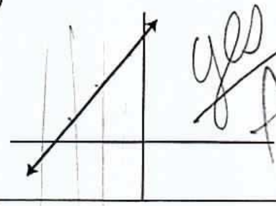
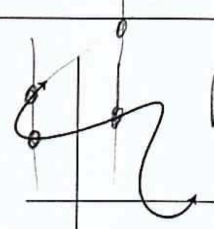
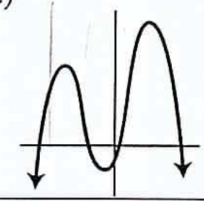
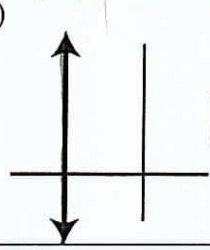
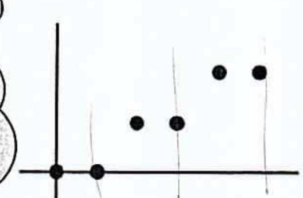
2y-values for x=1

Does the x value of 1 have *exactly* one y value associated with it?

This procedure leads us to an important tool.

Vertical Line Test: Given a graph, the vertical line test will tell you if it is a function. If any vertical line could be drawn so that it crosses the graph more than once, then it is ***not*** a function. (The vertical line represents a single x value. If this vertical line hits the graph more than once, that x value has more than one y value and so the relation is *not* a function.)

expl 1: Use the vertical line test to determine if the following are functions.

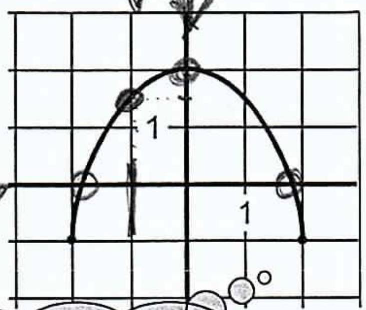
a.)  yes fnc	b.)  not a fnc	c.)  yes fnc
d.)  not a fnc	Draw multiple vertical lines to see if any x value has more than one y value.	e.)  yes fnc

Obtaining Information from the Graph of a Function:

expl 2: Use the graph of the function $f(x)$ to the right. Find the following values. Estimate if needed.

$x = -1$

$x = 0$



a.) $f(-1)$ find y when $x = -1$

$f(-1) \approx 1.5$

b.) $f(0)$ find y when $x = 0$

$f(0) = 2$

c.) Find x such that $f(x) = 0$.

Find x when $y = 0$?

$x \approx -1.8, 1.8$

or $\boxed{x \approx \pm 1.8}$

If $f(x)$ is another name for y, then these points are in the form $(x, f(x))$.

Which x values give you points on the graph? Which y values are represented?

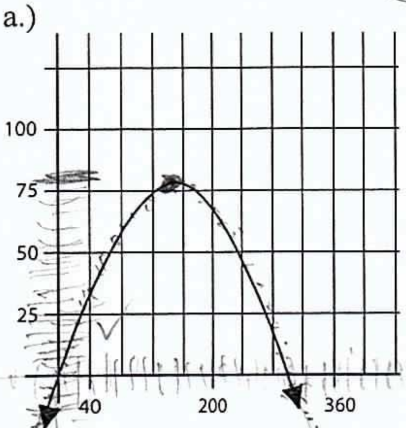
Finding domain and range:

Ex Ey

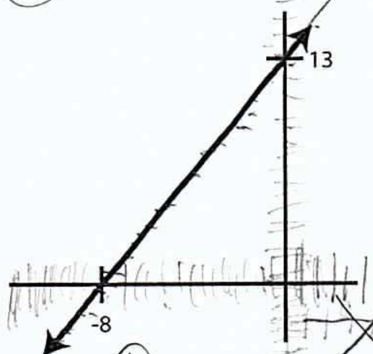
expl 3: Find the domains and ranges for the various functions. Use interval notation.

top point $y \approx 80$

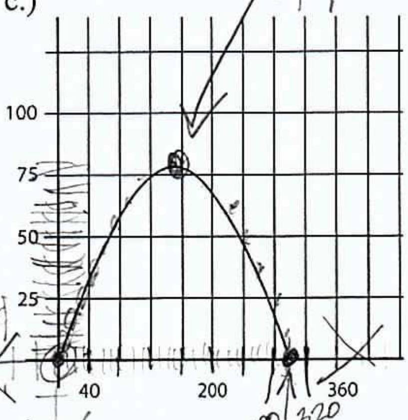
a.)



b.)



c.)



(b)

Dom: $(-\infty, \infty)$

Range: $(-\infty, \infty)$

(c)

Dom: $[0, 295]$

Range: $[0, 80]$

(a)

Dom: all real numbers

OR $(-\infty, \infty)$

Range: $(-\infty, 80]$

where does $g(x)=0$? when $x=-2$

expl 4: Use the graphs to the right.

a.) Find the domain of g.

$[-3, 8]$

b.) Find the domain of f.

$[-2, 8]$

c.) Find the domain of $f+g$.

$[-2, 8]$

d.) Find the domain of f/g.

$[-2,8]$ but exclude $x=-2$

$\rightarrow (-2, 8]$

e.) Find $(f+g)(4) = f(4)+g(4)$

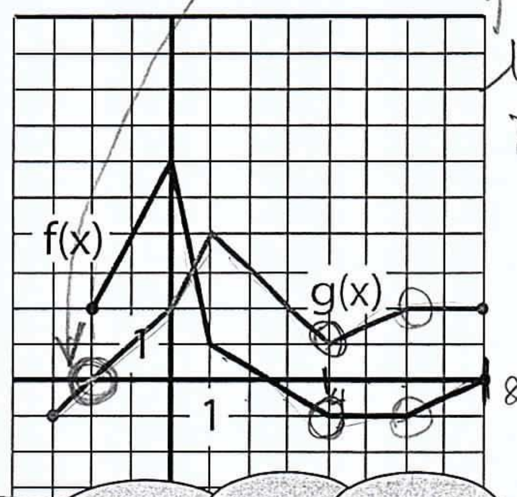
$= -1+1 = 0$

f.) Find $(g-f)(6)$.

$= g(6) - f(6)$

$= 2 - {}^{-}1$

$= 3$



For which x values could you find $f(x) + g(x)$? For instance, can you find $f(-3) + g(-3)$? Can you find $f(4) + g(4)$?

How does the domain of f/g differ from that of $f+g$?

expl 5: Consider the function $f(x) = 2x^2 + 6x + 7$. If $f(x) = 3$, then what is x? What point(s) are on the graph of $f(x)$? Use ordered pair notation.

$\cancel{f(3)}$

$f(x) = 2x^2 + 6x + 7$

$3 = 2x^2 + 6x + 7$

$-3 \qquad\qquad -3$

$0 = 2x^2 + 6x + 4$

$0 = 2(x^2 + 3x + 2)$

$0 = 2(x+1)(x+2)$

$0 = x+1$ or $0 = x+$

$-1 = x$ $\qquad -2 = x$

If $f(x)=3$, then $x=-1$ or $x=-2$.

ordered pairs:

$(-1, 3)$ and $(-2, 3)$