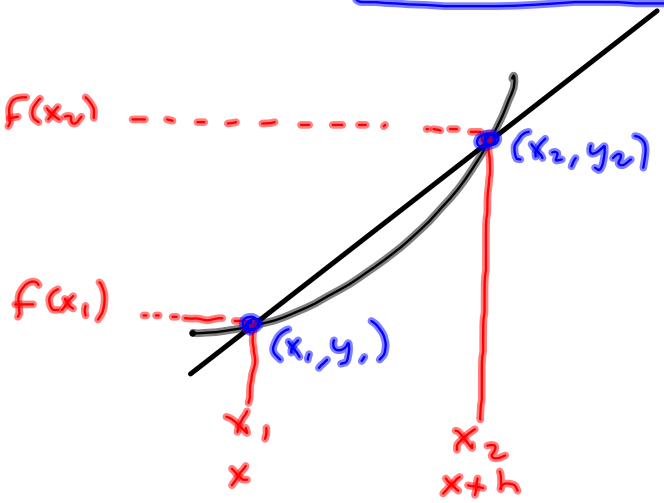
Page 8 of yesterday's notes:

Example says "find average VALUE" when it SHOULD say "Find average SLOPE."

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{f(x_2) - f(x_1)}{x_2 - x_1} = \frac{f(x+h) - f(x)}{h}$$

DIFFERENCE QUOTIENT.



Avg Rate of Change for $f(x) = x^3 - 2x$ on $[a,b] = [1,2]$

$$m_{avg} = \frac{f(2)-f(1)}{2-1} = \frac{2^3-2(2)-(1^3-2(1))}{1} = \frac{y_2-y_1}{x_2-x_1}$$

$$= 8-4-1+2 = 5$$

Simplify the difference quotient for $f(x)$.

$$\frac{f(x+h)-f(x)}{h} = \frac{(x+h)^3-2(x+h)-(x^3-2x)}{h}$$

$$= \frac{x^3+3x^2h+3xh^2+h^3-2x-2h-x^3+2x}{h}$$

$$= \frac{3x^2h+3xh^2+h^3-2h}{h} =$$

$$= \frac{h(3x^2+3xh+h^2-2)}{h} = h\left(\frac{3x^2h}{h}+\frac{3xh^2}{h}+\frac{h^3}{h}-\frac{2h}{h}\right)$$

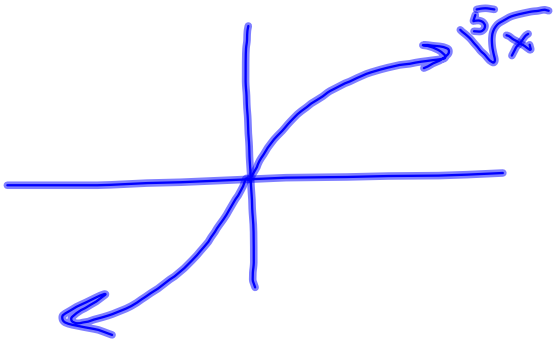
$$= \boxed{3x^2+3xh+h^2-2}$$

$h \to 0 \Rightarrow 3x^2-2$ calc.

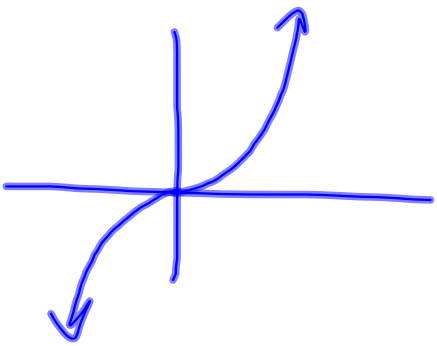
$f(x+h)$	left	h
$f(x-h)$	right	h
$f(x)+k$	up	k
$f(x)-k$	down	k

You MUST be able to reproduce the 9 functions I gave you - FAST!

(from $\sqrt[3]{x}$ & family membership)



x^{5-7} from x^3



Reflecting a function

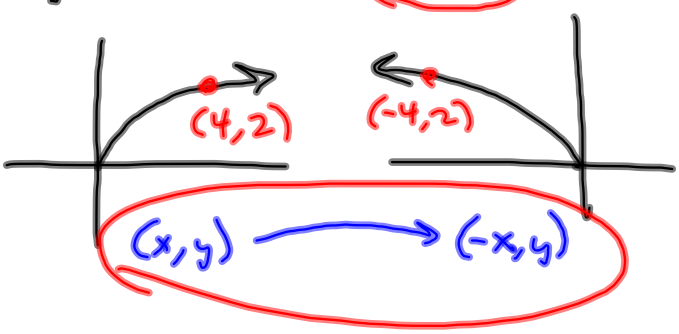
In the y-axis

Over ..

$f(-x)$

HORIZONTAL REFLECTION

$f(x) = \sqrt{x}$ $f(-x) = \sqrt{-x}$



In the x-axis

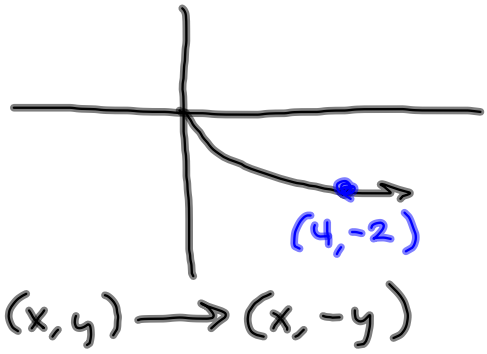
Over ..

$y = f(x)$

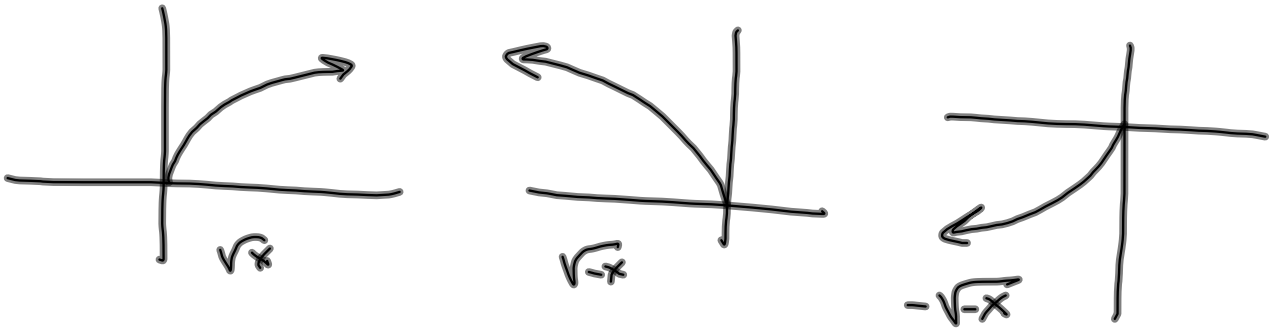
$-f(x)$ $-y = -f(x)$

VERTICAL REFLECTION

$-f(x) = -\sqrt{x}$



$-f(-x) = -\sqrt{-x}$



§2.1 #s 99-102 are good muscle-builders.

§2.2 #s 3-48 If you've NEVER graphed by the (frustrating) random points method, then try a couple/few.

I want you to understand the basic functions & graph from THAT plat form.

#14 $y = 2 - \sqrt{x} = -\sqrt{x} + 2$

Always Do vertical shift LAST.

x^2-3x+5

$= x^2-3x+\left(\frac{3}{2}\right)^2 - \frac{9}{4}+\frac{20}{4}$

$= (x-\frac{3}{2})^2+\frac{11}{4}$

$3\sin\left(\frac{\pi}{2}x-\frac{\pi}{2}\right)+11$

$af(x)$
Vertical stretch

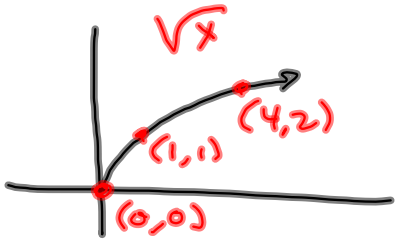
$(x,y) \longrightarrow (x,2y)$

$3f(x)$

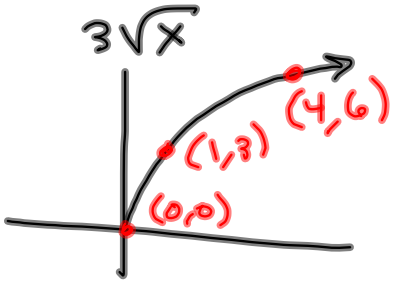
$(x,y) \longmapsto (x,3y)$

$3\sqrt{x}$

$\sqrt{x}$



$3\sqrt{x}$



$f(ax)$
Horizontal stretch

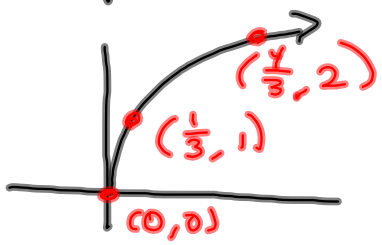
$(x,y) \longrightarrow \left(\frac{1}{a}x,y\right)$

$f(3x)$

$(x,y) \longrightarrow \left(\frac{1}{3}x,y\right)$

BONUS

$\sqrt{3x}$



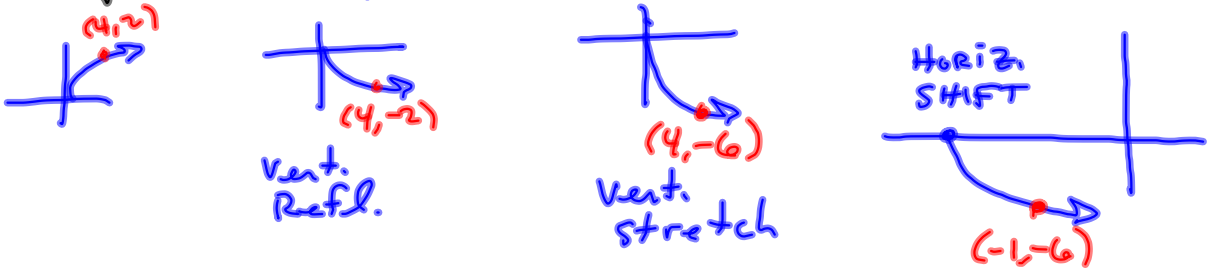
Sep 19-10:39 AM

COMBINE:

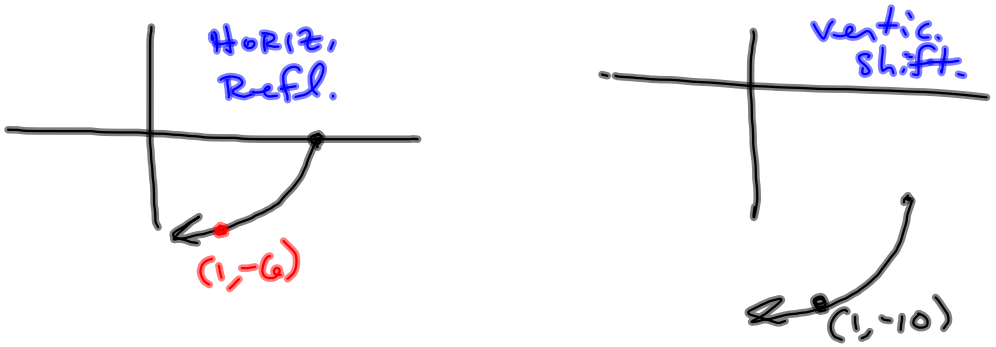
$g(x) = -3\sqrt{5-x} - 4 = -3\sqrt{-x+5} - 4$

Deconstruct

$\sqrt{x} \rightarrow -\sqrt{x} \rightarrow -3\sqrt{x} \rightarrow -3\sqrt{x+5}$



$\rightarrow -3\sqrt{-x+5} \rightarrow -3\sqrt{-x+5} - 4$

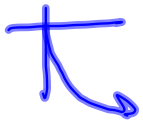


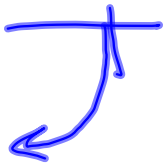
$\sqrt{x} \longrightarrow -\sqrt{x} \longrightarrow -3\sqrt{x} \longrightarrow -3\sqrt{x+5}$

$\longrightarrow -3\sqrt{-x+5} \longrightarrow -3\sqrt{-x+5} - 4$

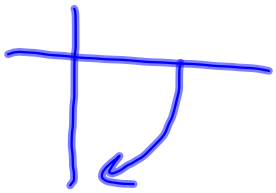
$-x+5 = -(x-5)$

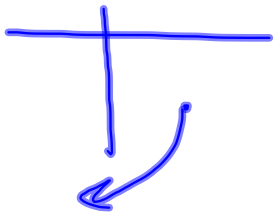
$\sqrt{x} \longrightarrow -3\sqrt{x} \longrightarrow -3\sqrt{-x}$ $\sqrt{-x}$





$-3\sqrt{-(x-5)} \longrightarrow -3\sqrt{-(x-5)} - 4$





Friday Quiz on ALL basic Functions, the way I presented them.

Sep 19-10:59 AM