How much 60% antifreeze solution should be added to 4 qts of 15% antifreeze to give 50% Antifreeze?

Let x = Amt of 60% sol'n (in quarts)
= # of quarts of 60% solution

Amt of pure Antifreeze = Amt of pure Antifreeze

$$.60x + (.15)(4) = .5(x+4)$$

$\frac{\text{qts of pure AF}}{\text{1 qt of 50\% mix}} \cdot$ qts of 50% mix

$$35 \frac{\text{Miles}}{\text{hr}} \text{ to } ? \frac{\text{ft}}{\text{hr}}$$

$$35 \frac{\cancel{\text{miles}}}{\text{hr}} \cdot \frac{5280\text{ft}}{\cancel{1\text{ mile}}}$$

Conversion Factors.

5 Test Points:

Find all my mistakes on the test solutions.

Distance Formula

$$\sqrt{(x_1-x_2)^2+(y_1-y_2)^2} = r$$

$(x,y) \in$ circle

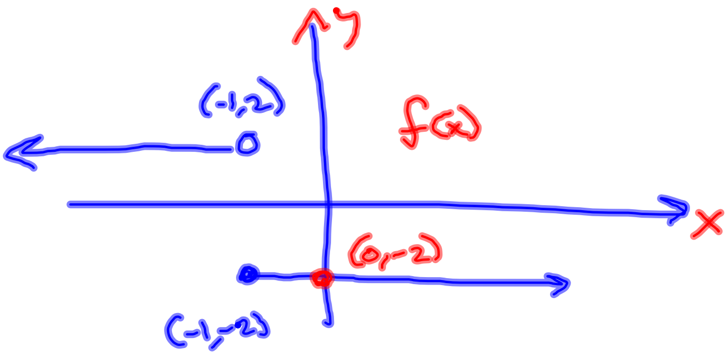
$(h,k) =$ center

$$(x_1-x_2)^2+(y_1-y_2)^2 = r^2$$

$$(x-h)^2+(y-k)^2 = r^2$$

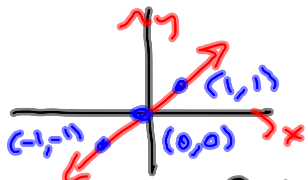
$\boxed{\text{Function Gallery}}$ in §2.3

$$f(x)=\begin{cases} 2 & \text{for } x<-1 \\ -2 & \text{for } x\geq -1 \end{cases}$$



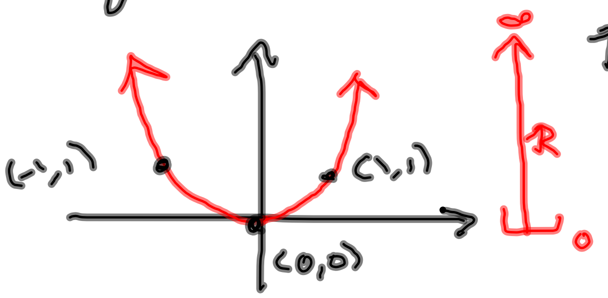
Identity $f(x) = x$

$\mathcal{D} = \mathbb{R}$
$\mathcal{R} = \mathbb{R}$
Increasing on $(-\infty, \infty)$




Square $f(x) = x^2$

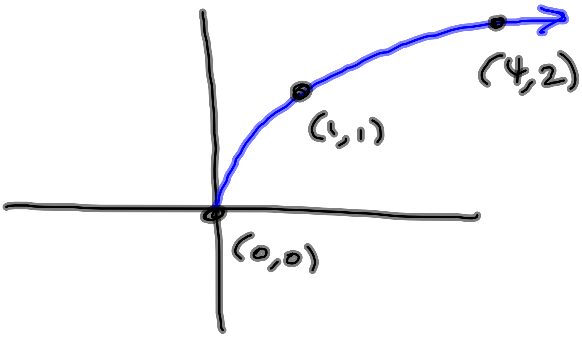
$\mathcal{D} = \mathbb{R}$
$\mathcal{R} = [0, \infty)$




Decreasing on $(-\infty, 0]$
Increasing on $[0, \infty)$

Min @ $(0,0)$
Min of $y = 0$ @ $x = 0$

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

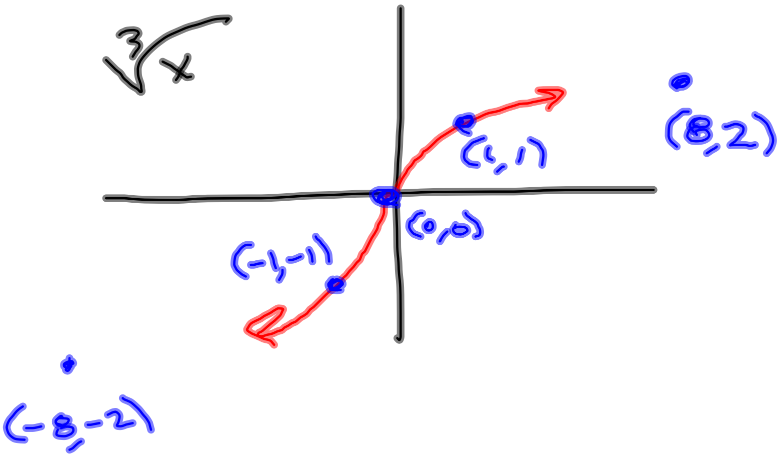



$\mathcal{D} = [0, \infty)$

$\mathcal{R} = [0, \infty)$

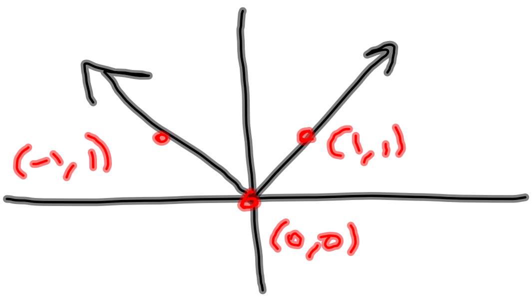
Increasing on $[0, \infty)$

$\sqrt[3]{x}$



GIF who cares?

$f(x) = |x|$



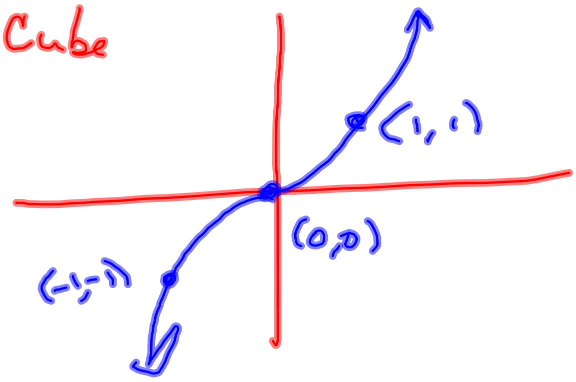

$\mathcal{D} = \mathbb{R}$

$\mathcal{R} = [0, \infty)$

Inc: $[0, \infty)$

Dec: $(-\infty, 0]$

Cube



$k > 0$

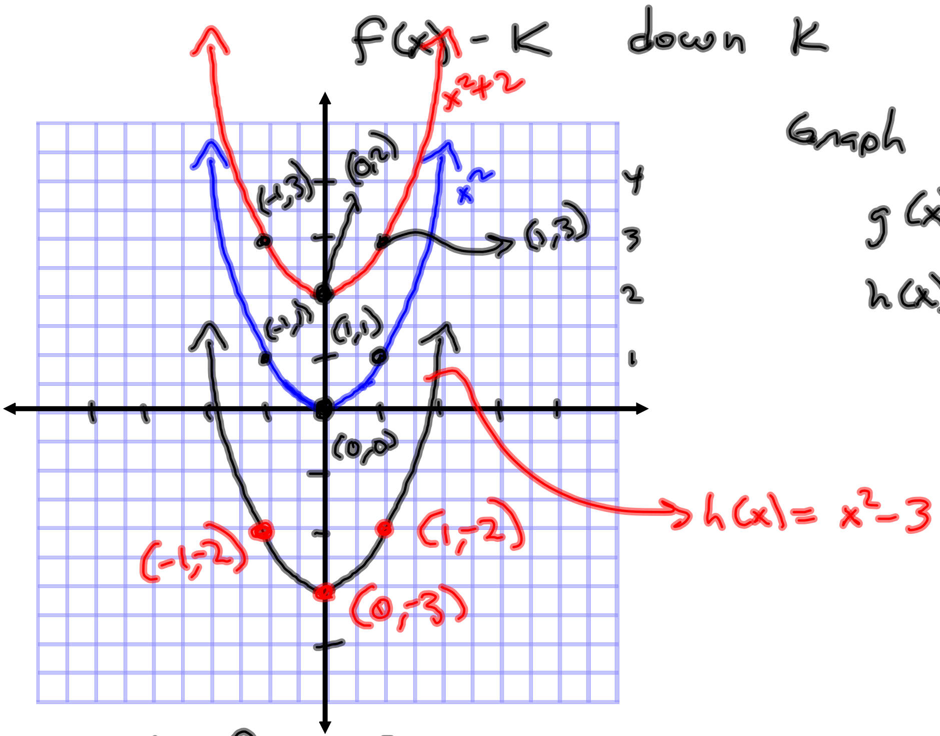
$f(x)$ $f(x) + k$ up $k$ (Add $k$ to y-values)

$f(x) - k$ down $k$

Graph $f(x) = x^2$

$g(x) = x^2 + 2$ up 2

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




Graph $f(x) = x^2$

$g(x) = x^2 + 2 = f(x) + 2$

$h(x) = x^2 - 3 = f(x) - 3$

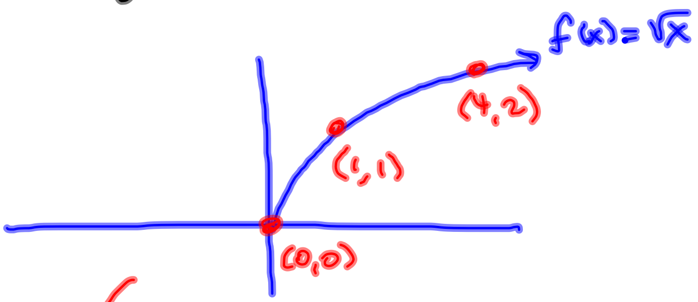
$h > 0$

$f(x-h)$ Delay by $h$ units

$f(x+h)$ Advance by $h$ units

$f(x) = \sqrt{x}$  $\mathcal{D} = [0, \infty)$
$\mathcal{R} = [0, \infty)$

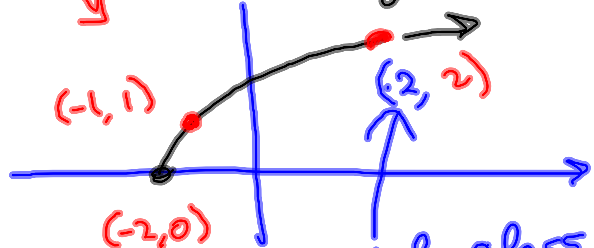
$g(x) = \sqrt{x+2} = f(x+2)$




left 2

$g(x) = \sqrt{x+2}$

subtract 2 from the x-values




whole class disgusted with me.

$x+2=0$ when $x=-2$, so, we start the graph at $x=-2$.

$$f(x) = \sqrt{x} \xrightarrow{\text{left } 2} \sqrt{x+2} = g(x) = f(x+2)$$

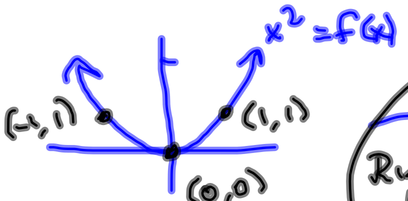
$$f(x) \xrightarrow{\text{left } 2} f(x+2)$$

$\boxed{\text{OI}}$ $\boxed{\text{DL}}$

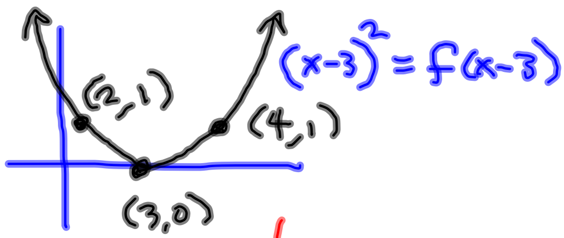
$h(x) = (x-3)^2 + 5$

$x-3=0$ when $x=3$ so it waits till $x=3$ to do its thing

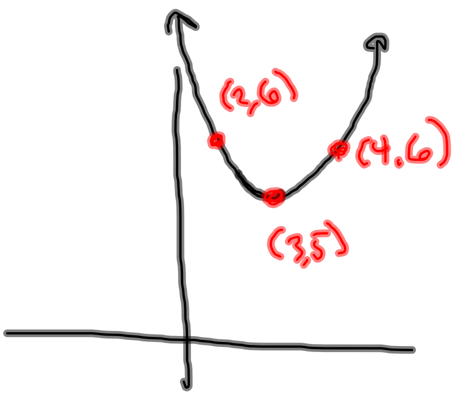
$$f(x) = x^2 \xrightarrow{\text{right } 3} \underline{(x-3)^2 = f(x-3)} \xrightarrow{\text{up } 5} (x-3)^2+5 = f(x-3)+5$$




Right 3




up5




$$(x-3)^2+5 = f(x-3)+5$$

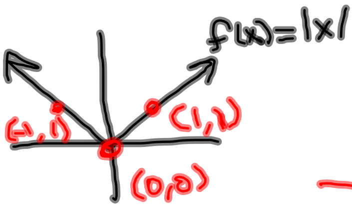
Right 3 up 5

$k\,f(x)$ $\quad$ $k$ times the y-values.

$f(kx)$ $\quad$ $\frac{1}{k}$ times the x-values.

$g(x) = 3|x|$

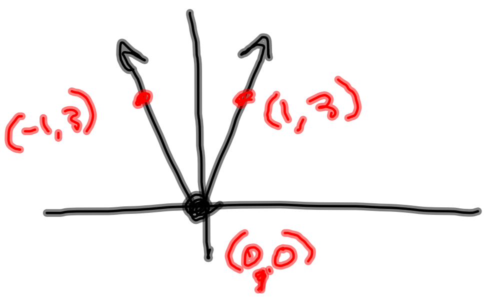
$f(x) = |x| \Longrightarrow g(x) = 3|x| = 3f(x)$




Long-term goal.

$-3\sqrt{2x-6} - 11$

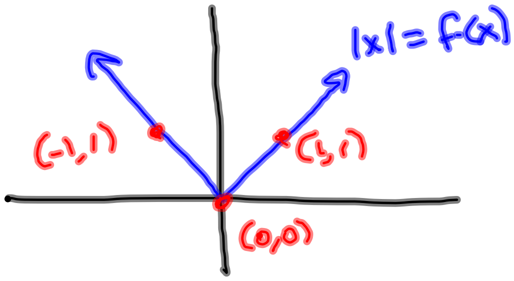
$g(x) = 3|x| = 3f(x)$

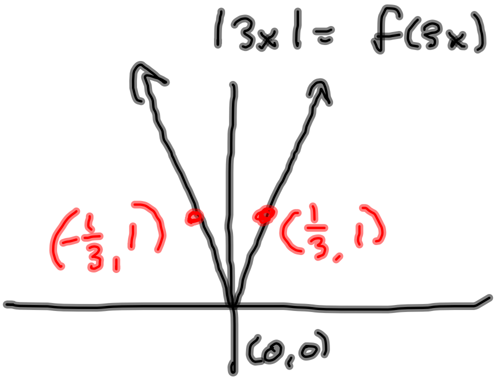


$h(x) = |3x|$

$f(x) = |x| \Longrightarrow h(x) = |3x| = f(3x)$

multiply x-values by $\frac{1}{3}$




Compare & Contrast

$3|x|$ & $|3x|$

$3f(x)$ $\qquad$ $f(\sqrt{3}x)$

$3x^2$ -vs- $(\sqrt{3}\,x)^2 = (\sqrt{3})^2 x^2 = 3x^2$

vertical stretch $\qquad$ Horizontal Shrink

3 times y-values $\qquad$ $\frac{1}{\sqrt{3}}$ times x-values.

So, $f(kx) \neq k f(x)$, generally.

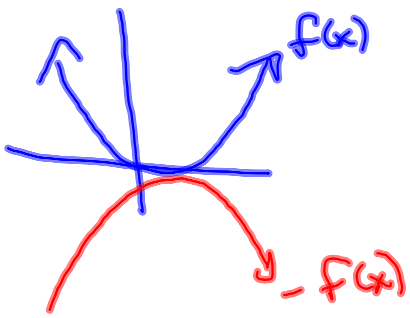
only sometimes.

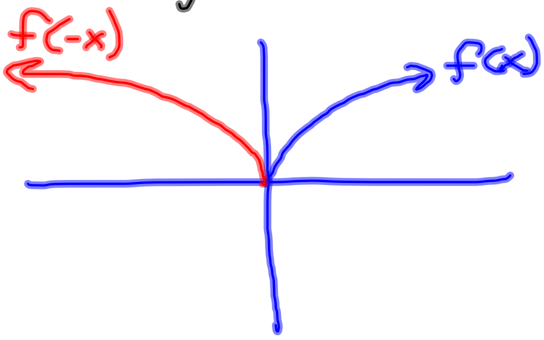
$f(x) = x$, $f(x) = |x|$

I cheated you of

$-f(x)$
Reflect in
x-axis

$f(-x)$
Reflect in
y-axis




§2.3 #s 12, 15, 24, 46, 50, 58

Bonus - Separate Hand-in:

$g(x) = \sqrt{2-x}$

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